Aspen Power Station

Detailed Project Description

Submitted to:

The Impact Assessment Agency

Submitted by:

Saskatchewan Power Corporation (SaskPower)

September 2023

Stantec

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Abbreviations

AADT	average annual daily traffic
AAFC	Agriculture and Agri-foods Canada
ACC	Air Cooled Condenser
AGC	Automatic Generation Control
AHPP	aquatic habitat protection permit
AQMS	Air Quality Management System
AUC	Alberta Utilities Commission
ATRIS	Aboriginal and Treaty Rights Information System
BD6	Boundary Dam unit 6
BES	Battery Energy Storage
BMP	Beneficial Management Practice
BOP	balance of project
Burns and McDonnell	Burns & McDonnell Canada Ltd.
CAAQ	Canadian Ambient Air Quality Standard
CadnaA	Computer Aided Noise Abatement
CAES	Compressed Air Energy Storage
CCGT	Combined Cycle Gas Turbine
CCME	Canadian Council of Ministers of the Environment
CCUS	Carbon Capture Utilization Storage
CDG	Cultural Diversity Group
CEGEP	Collège d'enseignement général et professionnel
°C	Celsius
CEMS	continuous emissions monitoring system
CEPA	*Canadian Environmental Protection Act*
CER	Clean Electricity Regulations
CH_4	methane
CLI	Canada Land Inventory
CN	Canadian National

CO	carbon monoxide
CO_2	carbon dioxide
COSEWIC	Committee of the Status of Endangered Wildlife in Canada
CO_{2e}	carbon dioxide equivalent
CP	Canadian Pacific
CTG	combustion turbine generator
D&I	diversity and inclusion
dB	decibel
dBA	A-weighted decibel
DEI	Diversity, Equity and Inclusion
DFO	Department of Fisheries and Oceans Canada
DPD	Detailed Project Description
D&RP	Decommissioning and Reclamation Plan
DSM	Demand Side Management
EA	Environmental Assessment
EASB	Environmental Assessment and Stewardship Branch
ECCC	Environment and Climate Change Canada
EFC	Equivalent Firm Capacity
EMP	Environmental Management Plan
ENV-LB	Ministry of Environment-Lands Branch
EPA	Environmental Protection Agency
EPC	engineering, procurement, and construction
EPP	Environmental Protection Plan
ERG	Employee Resource Group
ERP	Emergency Response Plan
FHQ	File Hills Qu'Appelle
GBA+	Gender Based Analysis Plus
GDP	gross domestic product
GGFN	George Gordon First Nation
GHG	Greenhouse Gas
GOC	Government of Canada

GOS	Government of Saskatchewan
gpm	gallons per minute
GSU	Generator Step-Up
GTG	gas turbine generator
GW	gigawatt
Gwh	gigawatt hours
GWP	Global Warming Potentials
ha	hectare
HABISask	Hunting Angling and Biodiversity Information of Saskatchewan
HADD	harmful alteration, disruption or destruction
HCB	Heritage Conservation Branch
HDPE	high-density polyethylene
HHV	higher heating value
HP	High pressure
HRIA	Heritage Resource Impact Assessment
HRSG	heat recovery steam generator
IA	impact assessment
IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
IBA	Important Bird Area
IEN	Indigenous Employees Network
IPD	Initial Project Description
IPP	Independent Power Producer
IRR	Indigenous Recruitment and Retention
ISO	International Organization of Standardization
kg CO_{2e}/MWh	kilograms per megawatt hour
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
kV	kilovolt
kW	kilowatt

L	litre
LAA	Local Assessment Area
LDAR	Leak Detection and Repair
LIM-AT	Low-income measure, after tax
LGBTQ	Lesbian, Gay Bi-sexual, Transgender, Queer
LGBTQ2S+	Lesbian, Gay Bi-sexual, Transgender, Queer, Two-Spirited
LM	loam Ecosite
LOA	Live out allowance
L/s	litres per second
LTSA	long-term service agreement
m	metre
m^2	square metre
m^3/day	cubic metres per day
m^3/hour	cubic metres per hour
mg/m^3	milligram per cubic metre
MBCA	*Migratory Birds Convention Act*
MECL	minimum emissions compliance load
MN-S	Métis Nation Saskatchewan
MOH	Ministry of Highways
MOU	memorandum of understanding
MW	megawatt
MWh	megawatt hours
N_2O	nitrous oxide
NED	Network for Employees with Disabilities
NIA	Noise Impact Assessment
NIR	National Inventory Report
NMHC	non-methane hydrocarbon
No.	number
NO_x	nitrogen oxide
NO_2	nitrogen dioxide
NPRI	National Pollutant Release Inventory

OEM	original equipment manufacturer
PDA	Project Development Area
PEZ	prairie ecozone
ppm	parts per million
$PM_{2.5}$	particulate matter of 2.5 micron in diameter or smaller
PM_{10}	particulate matter of 10 micron in diameter or smaller
PRM	Planning Reserve Margin
PSL	permissible sound level
RAA	Regional Assessment Area
RCMP	Royal Canadian Mounted Police
RFP	Request for Proposal
RM	rural municipality
RO	reverse osmosis
ROW	right-of-way
SAAQ	Saskatchewan Ambient Air Quality Standard
SARA	*Species at Risk Act*
SaskEnergy	SaskEnergy Incorporated
SaskPower	Saskatchewan Power Corporation
SCGT	simple cycle gas turbine
SDSP	Species detection survey protocol
SFCA	Southern Fur Conservation Area
SHRC	Saskatchewan Human Rights Commission
SK	Saskatchewan
SK ENV	Saskatchewan Ministry of Environment
SK PCAP	Saskatchewan Prairie Conservation Action Plan
SKCDC	Saskatchewan Conservation Data Centre
SKSID	Saskatchewan Soil Information Database
SKSIS	Saskatchewan Soil Information System
SMR	small modular reactor
SO_2	sulphur dioxide
SOCC	species of conservation concern

SPP	Southwest Power Pool
SSP	SaskPower Supply Plan
Stantec	Stantec Consulting Ltd.
STC	sound transmission class
STEM	science, technology, engineering, and mathematics
STG	steam turbine generator
SWPPP	Storm Water Pollution Prevention Plan
the Project	Aspen Power Station
t	tonne
TK&P	Traditional Knowledge and Protocol
TLRU	traditional land and resource use
TPM	total particulate matter
TransGas	TransGas Limited
$\mu g/m^3$	microgram per cubic metre
ULN	Ultra Low NO_x
US	United States
UTM	Universal Transverse Mercator
VC	valued component
VOC	volatile organic compound
WDM	wet meadow
WLCS	Wicehtowak Limnos Consulting Services LP
WLSS	Wolverine Switching Station
WMZ	Wildlife Management Zone
WRG	Women’s Resource Group
WSA	Water Security Agency

PART A: GENERAL INFORMATION

1 Project Information

Saskatchewan Power Corporation (SaskPower) is pleased to submit this Detailed Project Description (DPD) of the Aspen Power Station (the Project). The scope of this document is to describe the potential effects of the Project on environmental, sociocultural, and socio-economic components, as well as to outline mitigation measures associated with the construction, operation and maintenance, and decommissioning phases of the Project and activities incidental to the Project.

This document is intended to fulfill the requirements of a DPD under the *Impact Assessment Act (IAA)* and reflects the requirements of The Information and Time Limits Regulations, and the Impact Assessment Agency of Canada's (IAAC) Guide to Preparing an Initial Project Description and a Detailed Project Description (Government of Canada (GOC) 2019a, GOC 2019c, GOC 2022a).

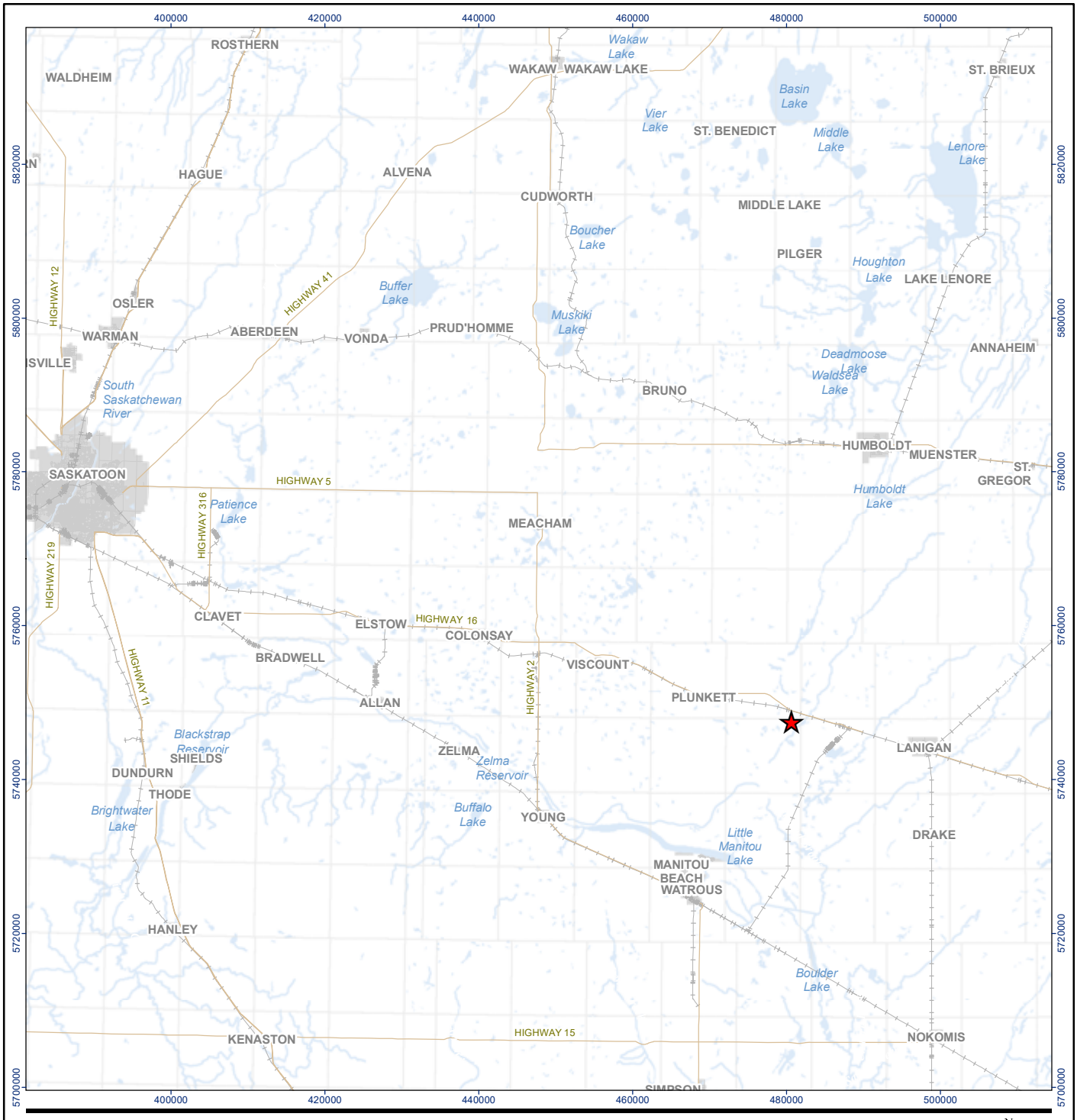
1.1 Type or Sector

The proposed Project is a 370 megawatt (MW) combined cycle gas turbine (CCGT) natural gas facility, with a targeted commercial operation date in 2027 with expected operation until 2047. Additional information on the Project's production capacity and process are provided in Section 10.0.

Natural gas generation is a critical component in achieving both an increase in renewable capacity and a reduction in greenhouse gas (GHG) emissions, in accordance with SaskPower's GHG emissions reduction strategy. The Project is required to provide firm capacity as load grows and conventional coal plants retire. The Project is also an ideal candidate for providing a back-up to intermittent renewable generation options such as solar and wind, as natural gas can quickly ramp up or down as the renewable generation output fluctuates. Therefore, once in service, the Project will play a key role in SaskPower's GHG emissions reduction strategy. Additional information on the Project's purpose is provided in Section 7.0.

1.2 Proposed Location

The Project is located approximately 104 kilometres (km) southeast of Saskatoon, Saskatchewan; and approximately 17 km west of Lanigan, Saskatchewan. The Project is located within one quarter section of land, NW 36-33-24 W2M, within the rural municipality (RM) of Usborne No. 310. The quarter section of land is owned by SaskPower. The general location of the Project is shown in Figure 1-1. The Project location is described in further detail in Section 13.0.



Legend

- Project Site
- Major Road
- Railway
- Township
- Town/City

0 10 20 Kilometers

(At original document size of 8.5x11)
1:750,000

N

Stantec SaskPower

Project Location	Prepared by KL on 2023-01-25
NW-36-33-24 W2M	TR by RM on 2023-01-25
Near Guernsey, SK	IR by JH on 2023-01-25
Client/Project	111477076-001 REVD

SaskPower Aspen Power Station

Figure No.
1-1

Title
Project Overview

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Base features produced under license with the Government of Canada, Government of Saskatchewan

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

2 Proponent Information

SaskPower is a Crown Corporation of the Province of Saskatchewan with its corporate head office in Regina. SaskPower is the principal supplier of electricity in the province with an obligation to deliver power to the province in a safe, reliable, cost-effective, and environmentally responsible manner. SaskPower operates under the legislated mandate and authority of the provincial Government of Saskatchewan (GOS) and its Board of Directors is accountable to the Minister responsible for SaskPower.

2.1 The Proponent's Name and Contact Information

Name of the Proponent: Saskatchewan Power Corporation (SaskPower)

Address of the Proponent: 2025 Victoria Avenue, Regina, Saskatchewan S4P 0S1

2.2 Primary Representative

Primary Representative:
Riley Chesterton
Project Manager, Power Production Project Delivery
306-566-6619
rchesterton@saskpower.com

2.3 Project Team

SaskPower plans to partner with an engineering, procurement, and construction (EPC) firm to build the Project. The EPC firm will have experience in executing projects with advanced F-class combined cycle facilities in Canada. The EPC firm will be required to support stakeholder engagement, comply with the commitments made within this Project Description, and investigate and commit to procurement opportunities for local and Indigenous vendors.

Burns & McDonnell Canada Ltd. (Burns and McDonnell) participated in the development of this Project Description to ensure the accuracy of the information provided, as this participation was the basis for emission and noise details. Burns and McDonnell has executed other combined cycle facilities throughout North America including projects in Saskatchewan and Ontario.

SaskPower contracted Stantec Consulting Ltd. (Stantec) to evaluate the environmental effects of the Project and prepare the regulatory submission. Stantec has extensive experience in evaluating the effects of power projects both locally and across Canada.

3 Public Engagement Summary

3.1 Siting Decision Engagement

3.1.1 PRELIMINARY ENGAGEMENT

In March 2020 SaskPower began broadly sharing information about the need for a future natural gas generation facility, the four geographical areas of interest under consideration, and the siting analysis process. The four potential regions were the Aberdeen area, Estevan area, Saskatoon area and the Lanigan area (i.e., Project site). By seeking community input at this early stage of the Project's development, SaskPower engaged the public to ensure interests, concerns and future community land use plans would be considered alongside technical factors to help determine the location of the Project.

SaskPower's engagement objectives at this stage of the Project development were to:

- Share meaningful Project information.
- Learn and integrate local interests, concerns, and future land use plans into the siting assessment process to the greatest extent possible.
- Share the findings of the site assessment and the ultimate preferred Project site location.

Table 3-1 summarizes the stakeholder outreach activity from March 2020 to July 2021.

Table 3-1 Stakeholder Outreach Activity from March 2020 to July 2021

Activity	Description	Date
Emails	Over 40 invitations were sent to local municipalities, special interest groups, and Indigenous communities initially identified in all three areas under consideration. The package contained information on the Project and the opportunities to exchange information with SaskPower via an in-person workshop. See Appendix A for a copy of the information.	March 11, 2020
Emails	Workshop invitation recipients were notified that due to COVID-19 the face-to-face workshops were cancelled while other meeting options were evaluated.	March 18, 2020
Emails	Local municipalities, special interest groups, and Indigenous communities were advised the Regina area was no longer under consideration and SaskPower is focusing on land owned in the Saskatoon, Lanigan and Estevan areas.	June to August 2020
Online and Paper Survey	Local municipalities, special interest groups, and Indigenous communities were sent a 5-minute electronic survey to understand preferences to provide input and receive project information.	June 25, 2020 to July 31, 2020

Activity	Description	Date
Phone calls	Follow up phone calls were made to ensure local municipalities and special interest groups were aware of the new siting information and SaskPower's desire to learn how groups wanted to exchange information in light of COVID-19. Paper copies were offered if electronic wasn't preferred.	June to August 2020
Electronic Newsletter	An electronic mailing list was set up so anyone could subscribe to receive project information and updates.	Launched June 2020
Webpage	A dedicated web page containing Project information and the opportunities to exchange information was updated here: Aspen Power Station (saskpower.com)	Launched March 2020
Toll free phone number and Email	Both a dedicated toll-free phone line and email address were made available for members of the public and included in all information SaskPower shared regarding the Project.	March 2020 to Present
Virtual Meeting	Meeting with Saskatchewan Environmental Society representatives to hear their perspectives on when and how SaskPower achieves net-zero.	Dec 1, 2020
Letters/Email/ Newsletter	Provided project updates to over 140 Indigenous communities, landowners, business and special interest groups that the Saskatoon area sites (near Aberdeen and adjacent to the Queen Elizabeth Power Station) were less optimal due to higher costs. Study work to continue at the Lanigan and Estevan area sites. See Appendix A for a copy of the letter.	July 16, 2021

3.1.2 KEY COMMENTS AND CONCERNS

Key interests and concerns heard between March 2020 and July 2021 are summarized as follows:

- Managing COVID-19 mandates is a top priority.
- Why natural gas as the power source? There's interest on conventional coal, coal with carbon capture utilization and storage (CCUS) and solar power.
- Interest in understanding potential servicing needs and when siting decisions will be made.
- Concern about impacts to the local communities with the retirement of conventional coal.
- Keep those interested in the process informed via letters, phone calls and emails.

Local municipalities in each study area were generally interested in learning more about the Project and discussing potential opportunities to work together. SaskPower considered all feedback and evaluated all factors such as potential environmental effects, constructability and accessibility, performance, availability and cost of natural gas supply infrastructure, cost of transmission interconnection, water supply and wastewater management, and the overall cost of the Project.

3.2 Site Specific Engagement

3.2.1 PUBLIC ENGAGEMENT

In July 2022 SaskPower publicly announced the siting decision for the Project. SaskPower notified local municipalities, landowners, special interest groups and community members of the decision and invited groups to participate in the process as the Project was further evaluated.

SaskPower's engagement objectives at this stage of the Project development were to:

- Understand how the Project might affect stakeholders.
- How SaskPower could lessen effects.
- Anything else stakeholders wanted SaskPower to know as site studies were conducted.
- Understand who else SaskPower should be talking with.
- Maintain open communication throughout the Project.

Table 3-2 summarizes the stakeholder outreach activity from July 2022 to present.

Table 3-2 Stakeholder Outreach Activity from July 2022 to Present

Activity	Description	Date
Letters	Provided project update to Indigenous communities, landowners, business and special interest groups that SaskPower had selected the Lanigan area as the preferred site for the Project. Invited to meetings and a Project office to learn more about the Project. (~90 communications). See Appendix A for a copy of the letter.	July 12, 2022
Meetings	SaskPower ensured nearby landowners had an opportunity to meet with the Project team to learn about the Project, exchange information and continue to learn about interests and concerns, especially regarding the proximity to the Project site. In person meetings and phone calls were held with 8 landowners. See Appendix A for a copy of the presentation and information sheet shared.	July 26, 2022
Project Office	A Project office was hosted in Lanigan at the Town Hall (~30 attendees). SaskPower offered a "come and go" style format for members of the public to learn about the Project, exchange information and continue to learn about interests and concerns. The Project office was advertised on the radio and promoted on the town's Facebook page. It ran from noon to 7:00 PM. See Appendix A for infographics shared at the Project office.	July 27, 2022
Feedback Survey	Paper and online survey was available to stakeholders to provide comments after the Project office regarding the Project. SaskPower received five submissions from the survey.	August 24, 2022
Letters/Email/ Newsletter	Provided a Project update to landowners, business and special interest groups with a summary of the information collected after the meetings and Project office. See Appendix A for a copy of the summary, letter and newsletter.	September 26, 2022

Activity	Description	Date
Project Office	A second Project office was hosted in Lanigan at the Merry Mixers Seniors Hall (12 attendees). SaskPower offered a "come and go" style format for members of the public to learn how the Project has progressed, exchange information and continue to learn about interests and concerns. The Project office was advertised by direct contact and on social media. It ran on October 25 from 1:00 PM to 6:00 PM and October 26 from 9:00 AM to noon. See Appendix A for a copy of the information sheet shared.	October 25 and 26, 2022
Newsletter	Interested parties were invited to sign up for Project updates. See Appendix A for updates provided through this subscription.	July 2022 to Ongoing
Webpage	A dedicated web page containing Project information and the opportunities to exchange information were updated here: Aspen Power Station (saskpower.com)	July 2022 to Present
Toll free phone number and Email	Both a dedicated toll-free phone line and email address were made available for members of the public and included in all information SaskPower shared regarding the Project.	March 2020 to Present

3.2.2 KEY COMMENTS AND CONCERNS BY STAKEHOLDERS

SaskPower began collecting feedback from local municipalities, landowners, special interest groups, and community members regarding the Project after the Project site announcement in July 2022. Key interests and concerns to date are summarized in Table 3-3.

Table 3-3 Key Interests and Concerns Raised by Stakeholders

Stakeholder Interest/Concern	SaskPower Response
How was the Project site chosen?	Site was purchased in 2013 and part of evaluation for natural gas power station sites. Further study in 2021 resulted in choosing the Project site based on opportunities for: • Road access • Potential groundwater availability • Proximity to natural gas and transmission infrastructure • Cost
What happens to unused portions of the Project site?	If there are unused potions of land after the build, the current renter may use the land. If the renter cancels the lease SaskPower will re-evaluate what is available at that time.
What is the plan regarding aesthetics, security and garbage?	Closest house is 0.5 km from the Project site. SaskPower has committed to work with the landowners to improve the line of sight and create visual buffers. The Project will be enclosed with a fence, monitored by closed-circuit television and access only by key passes. During construction, daily walks are conducted to address safety and housekeeping. Contractors are required to dispose of waste properly.
Why natural gas and what does the supply plan in the future look like?	As SaskPower phases out conventional coal it needs to replace it with another reliable source of firm capacity. In the near-term natural gas is the only baseload supply option available at the scale required to meet that need. Imported power and a small portion of the renewables added will also play a role in replacing firm capacity. Natural gas is also required to enable the addition of variable renewables to reduce GHG emissions.

Stakeholder Interest/Concern	SaskPower Response
	Natural gas generation emits less than half the GHG emissions of conventional coal. The amount it operates will be reduced by the addition of 1000 MW of new wind and solar between 2024 and 2027. SaskPower is already maximizing all other available supply options at the scale and in the timeframe that new supply is required. SaskPower is greatly expanding renewables, adding its first battery energy storage facility, and is increasing tie-line capacity to the Southwest Power Pool by an additional 500 MW and to Manitoba Hydro by an additional 100 MW by 2027. SaskPower is on track to meet its target to reduce GHG emissions by 50% below 2005 levels by 2030 and to increase renewable capacity up to 50% by 2030. Additional renewables are planned following 2030 to continue to reduce GHG emissions. SaskPower continues to evaluate emerging supply options as it works towards net-zero GHG emissions by 2050 or earlier.
What is the lifespan of a natural gas facility?	Typical life expectancy is 25 years. The actual life span depends on any new regulations and how SaskPower decides to balance the power supply.
Who does the Project serve?	Power from the Project would go to the provincial power grid serving all customers.
Where will the natural gas come from?	TransGas (TransGas Limited) will be routing a natural gas line to the Project site from Prud'Homme, Saskatchewan. The natural gas commodity will be purchased from a diverse mix of counterparties and transported by TransGas to the plant site.
How does the Project connect to SaskPower's grid?	SaskPower needs to build a transmission power line. It will connect the Project to the Wolverine Switching Station (WLSS), two quarter sections to the west.
How loud will the Project be in operation? In construction?	During operation and maintenance, noise must stay below 50 decibels (dB) during the day and 40 dB during night. Noise studies are available to interested stakeholders. Some construction stages have unavoidable noisy activities – pile driving and steam blows. The noise will be intermittent. SaskPower will do its best to let nearby landowners know about pile driving and steam blows in advance.
Will there be impacts to water?	There are three wells on the Project site that were tested to determine how much water they supply and the effects to neighbouring wells. Water usage at the Project should not impact neighbouring landowner's water supply. SaskWater will construct and tie-in a water pipeline to supply water to the Project site. Water will be sourced from the Zelma Reservoir through existing SaskWater infrastructure providing standard non-potable water. A water treatment facility will be built on site to ensure the water used in the process is very clean. This process allows the Project to operate efficiently. Water requirements during construction and operation will not impact the availability of water.
How many people will be employed?	It is estimated that during construction there will be 375 people on site with a peak of around 450 people. SaskPower is looking into potential construction camps to accommodate these large numbers. In operation and maintenance, the power station will employ approximately 25 people.

Stakeholder Interest/Concern	SaskPower Response
Can local suppliers be part of the Project?	A partner will work with SaskPower to build the power station. Potential build partners will be assessed on how they plan to work with local and Indigenous suppliers and SaskPower will ensure they meet their commitments. When the build partner is selected, then SaskPower will hold supplier sessions in Regina, Saskatoon and in the community. These sessions give local and Indigenous suppliers the chance to meet the build partner.
Will this property pay taxes?	Power generation facilities are tax exempt through the Grants-in-Lieu of Property Tax Policy. The Project would be part of this policy.
Can the local health services handle the influx of workers?	This circumstance will be reviewed jointly between SaskPower and the Saskatoon Health Region as SaskPower continues to consider the large number of workers expected on site during the Project. SaskPower wants to be responsible in the community and will collaborate with the health authority regarding plans for safety.
What is SaskPower's commitment to the environment?	SaskPower is committed to environmental stewardship and sustainability. A third-party environmental assessment (EA) program began this year. During construction, unavoidable noise may deter wildlife from the area. But once in operation and maintenance, the Project shouldn't continue to deter local wildlife.

Comments from local municipalities and stakeholders were mainly positive regarding the Project. The community sees the Project as an opportunity for growth and are familiar with industrial projects as there are large potash mines in development and expansion in the area. For the full response of how SaskPower has addressed comments from stakeholders, see the Summary of What We Heard, attached in Appendix A. SaskPower will continue to work with stakeholders to keep them informed about the Project and address questions and concerns.

3.3 Jurisdictional Engagement

The Project team began engaging with federal, provincial, and municipal agencies in March 2020 to discuss natural gas generation, introduce the Project, discuss technical requirements, any potential concerns, and the regulatory approval and permitting processes.

3.3.1 FEDERAL ENGAGEMENT

Table 3-4 Federal Engagement Activities from April 2020 to July 2023

Activity	Description	Date
Email	Information package was sent to IAAC.	April 20, 2020
Conference Call	Provided background information on the Project to IAAC.	April 21, 2020
Email	Sent meeting notes from April 21, 2020 meeting to IAAC's for review.	April 29, 2020
Email	IAAC confirmed that the meeting notes from April 21, 2020 were satisfactory	May 7, 2020
Email	Sent an update on the Project status.	September 10, 2021
Email	Requested an introductory meeting with IAAC.	August 30, 2022
Virtual Meeting	Provided a Project introduction to IAAC.	September 20, 2022

Activity	Description	Date
Virtual Meeting	Discussed Indigenous engagement.	October 4, 2022
Email	Requested update from IAAC on the list of Indigenous communities to be engaged on the Project.	October 28, 2022
Email	Requested clarification on terminology in the guidelines.	November 9, 2022
Virtual Meeting	Provided an overview of project and anticipated timelines to IAAC; discuss clarifications.	November 10, 2022
Email	Sent IAAC the PowerPoint presentation from September 20, 2022.	November 10, 2022
Email	Revised list of Indigenous communities to be engaged on the Project provided by IAAC.	November 28, 2022
Email	Submitted the draft Initial Project Description (IPD) to IAAC for review.	December 22, 2022
Email	IPD review checklist provided by IAAC.	January 17, 2023
Virtual Meeting	Discussed IPD review checklist with IAAC.	January 19, 2023
Virtual Meeting	Discussed updated list of Indigenous communities to be engaged on the Project with IAAC.	February 3, 2023
Virtual Meeting	Discussed the alternative means of carrying out a project and the use of best available technologies with IAAC.	March 1, 2023
Webpage	Submitted the IPD and IPD English and French Summaries to the IAAC Project Registry.	April 11, 2023
Email	IAAC confirmed receipt of the IPD and English and French Summaries.	April 11, 2023
Email	IAAC determined that the Project meets the definition of a designated project under the IAAC and the IPD meets the requirements of the *Information and Management of Time Limits Regulations*.	April 21, 2023
Email	IAAC confirmed that the IPD, IPD English and French Summaries and Public Notice were posted to the IAAC Project Registry home page. IAAC indicated that the public comment period would be from April 25 to May 25, 2023.	April 25, 2023
Virtual Meeting	IAAC hosted the Aspen Power Plant – Public Information Session #1.	May 16, 2023
Virtual Meeting	IAAC hosted the Aspen Power Plant – Public Information Session #2.	May 17, 2023
Email	IAAC provided the IPD Summary of Issues.	June 2, 2023
Virtual Meeting	Discussed the IPD Summary of Issues with IAAC.	June 5, 2023
Email	Requested a time limit suspension for the Project.	June 27, 2023
Email	IAAC confirmed that the time limit was suspended for the Project.	June 30, 2023

3.3.2 PROVINCIAL ENGAGEMENT

SaskPower is in ongoing discussions with the provincial government regarding regulatory requirements. All regulatory requirements will be adhered to including submission of a Technical Proposal for examination through the provincial *The Environmental Assessment Act*.

Table 3-5 Provincial Engagement Activities from March 2020 to July 2023

Activity	Description	Date
Email	Workshop invitation sent to Ministry of Environment-Environmental Assessment and Stewardship Branch (EASB) and Ministry of Environment-Lands Branch (ENV-LB) regarding siting options.	March 12, 2020
Newsletter	Sent to EASB, ENV-LB, Ministry of Parks, Culture and Sport, Heritage Conservation Branch (HCB), and Water Security Agency (WSA).	June 25, 2020
Email	Asked whether EASB and ENV-LB would like to meet with SaskPower.	August 20, 2020
Email	Asked whether Ministry of Parks, Culture and Sport would like to meet with SaskPower.	August 20, 2020
Virtual Meeting	Meeting with EASB and ENV-LB to discuss the role of natural gas generation and the Project site options under consideration.	September 14, 2020
Virtual Meeting	Meeting with Ministry of Parks, Culture and Sport to discuss the role of natural gas generation and the Project regions under consideration.	September 16, 2020
Mail	Letter sent to WSA regarding the selection of the Project site and invitation to public open house on July 27, 2022.	July 12, 2022
Email	WSA advised that the operation and maintenance group that manages the Dellwood Brook Dam have no concerns with the Project and the water rights, approvals and compliance group will take the existing licensed surface and groundwater projects in the vicinity into account during the evaluation process.	August 8, 2022
Phone call	Provided EASB with a Project overview, anticipated timelines and an invite to a virtual meeting.	October 26, 2022
Virtual Meeting	Provided a Project introduction to EASB and ENV-LB.	February 14, 2023
Email	Asked the Saskatchewan Ministry of Highways if a Traffic Impact Assessment was required for the Project.	May 17, 2023
Phone Call and Email	Scheduled a tour of the Great Plains Power Station with EASB.	June 29, 2023

3.3.3 MUNICIPAL ENGAGEMENT

Multiple engagement activities were undertaken with the cities, towns and RMs in sync with the geographical areas under consideration during the siting of the Project. Once a decision was made, updates were provided on the siting decision and information on the Project and invitations to attend the Project office were sent to the local RMs and the town of Lanigan. SaskPower continually sought advice on how best to reach their constituents.

Table 3-6 Municipal Engagement Activities from March 2020 to August 2023

Activity	Description	Date
Conference Call	Shared results of gas quality studies with the city of Estevan.	Sept. 2, 2020
Conference Call	Shared the site evaluation process, supply plan and forecasts, and gathered feedback from the city of Saskatoon.	Sept. 17, 2020
Conference Call	Shared information about the site evaluation and Saskatchewan's power future, discussed interested and concerns, and addressed concerns of the Saskatoon North Partnership for Growth.	Nov. 12, 2020
Virtual Meeting	Presentation to RM of Corman Park.	Nov. 12, 2020
Virtual Meeting	Presentation to RM of Aberdeen.	Nov. 12, 2020
Email	Information about the further study of the Shand and Lanigan areas was sent to the RM Usborne, RM Aberdeen, RM Estevan, city of Saskatoon, and city of Estevan.	July 16, 2021
Email	Information about the Project site selection was sent to the RM Usborne, RM Aberdeen, RM Estevan, and city of Estevan.	July 12, 2022
Email	Invitation to Project office sent to RM Usborne	July 19, 2022
Email	Invitation to Project office and information sheet sent to RM Usborne office	July 25, 2022
Email	Summary of What We Heard at the Project office sent to RM Usborne, RM Wolverine, and town of Lanigan. SaskPower offered to meet with the respective administration or council.	September 26, 2022
Email	Invitation to Project office sent to town of Lanigan, RM Usborne, and RM Wolverine. SaskPower offered to meet with the respective administration or council.	October 20, 2022
Phone Calls	Notified the RM of Wolverine, RM of Usborne and town of Lanigan that the IPD was submitted to IAAC.	April 21, 2023
In-person meeting	SaskPower met with the RM of Wolverine Council to provide an update on the Project, discuss permitting requirements and the preparation of a road maintenance agreement.	May 26, 2023
In-person meeting	SaskPower met with the RM of Usborne Council to provide an update on the Project, discuss permitting requirements and the preparation of a road maintenance agreement.	August 16, 2023

3.4 Response to the Summary of Issues

The IPD was posted on IAAC's Project Registry on April 25, 2023. IAAC invited public comments on the IPD and solicited comments from federal authorities. IAAC hosted two virtual information sessions on the Project. Comments were received from eight federal authorities, ENV, two stakeholders, and one Indigenous community. A Summary of Issues on comments received on the IPD was posted on the IAAC's Project Registry on June 2, 2023. Responses to the issues raised are incorporated into this DPD and are summarized in the Summary of Issues Concordance Table in Appendix B.

3.5 Plan for Future Engagement

SaskPower is committed to ongoing discussions with stakeholders throughout Project development and the life of the Project. Moving forward SaskPower's engagement goals are to:

- Share meaningful Project information.
- Continue to learn about local interests and concerns.
- Integrate Project mitigation measures that help address local interests and concerns to the greatest extent possible.
- Share how stakeholder interests and concerns influenced Project plans.

All engagement activities, stakeholder interactions and commitments made as a result of engagement activities are and will be tracked in SaskPower's stakeholder engagement software, Borealis. SaskPower will monitor the area for changes to the baseline as discussed in Section 15 and address as required.

Table 3-7 summarizes the planned stakeholder outreach activities to meet the above engagement goals.

Table 3-7 Planned Stakeholder Outreach Activity

Activity	Description	Proposed Date
Presentations	Provide Project information and updates to interested stakeholders.	As requested
Supplier Sessions	Sessions will be made available to interested contractors regarding opportunities and commitments in the procurement and construction of the Project.	To be determined
Commitment Registry	Project commitments will be logged and monitored to confirm stakeholders' expectations are met.	Ongoing
Newsletter	Project updates through newsletter will be continued to interested parties.	Ongoing
Webpage	A dedicated web page containing Project information and the opportunities to exchange information updated here: Aspen Power Station (saskpower.com)	Ongoing
Toll free phone number and Email	Both a dedicated toll-free phone line and email address made available for members of the public and included in all information SaskPower shared regarding the Project.	Ongoing
Site Tour	Facilitate tour(s) of other natural gas facilities such as Chinook Power Station at Swift Current. This offer has been made available during previous meetings, Project offices and updates.	As requested
Community contact	Provide a community contact dedicated to identifying, taking and resolving issues during the construction period.	To be determined

The remaining activities are to be determined with stakeholders as they engage with SaskPower in how they want to participate. SaskPower continues to collect input and host discussions with interested members of the public who want more information or to address specific concerns.

3.5.1 EPC PARTNER – STAKEHOLDER ENGAGEMENT PLAN

During the planning process, the EPC Partner will facilitate outreach to local businesses, neighbours, local leaders (Mayor and City Council), Provincial leaders, Civic and Government leaders, Chamber of Commerce, Rotary Club, trade organizations, labour groups, environmental groups, and local and Indigenous advancement organizations.

Key objectives of the stakeholder engagement plan are to:

- Align with SaskPower's stakeholder engagement commitments.
- Identify stakeholders throughout all phases of the Project.
- Identify the individual(s) responsible for the stakeholder engagement.
- Identify/analyze stakeholder need, objectives, risks, means to communicate or inform.
- Keep stakeholders informed throughout each stage of the Project by most efficient means.
- Ensure stakeholders can express input and voice concerns. Prepare an effective communication platform for that stakeholder interaction.
- Respond in a timely manner to stakeholder input and concerns.
- Document stakeholder communication.

Key activities that will be undertaken as part of the EPC's stakeholder engagement plan may include:

- Create an Aspen Power Station website to serve as the focal point for public communication.
- Ensure alignment between the EPC website and SaskPower's website.
- Develop and advance a social media plan to facilitate communication with stakeholders.
- Leverage existing organizations such as the Saskatchewan Industrial & Mining Suppliers Association, SaskBuilds, Priority Saskatchewan, and Chamber of Commerce to link to the social media plan and Project website to fully distribute messaging about the Project.
- Host quarterly updates for the community at large at the City Hall, local town hall, or at a business venue for stakeholders to learn about the Project progress. Advertise this meeting on the website and through local newspapers and media outlets.

4 Indigenous Engagement Summary

Early engagement has occurred with Indigenous communities who may be affected by the Project. The Project site is located within Treaty Six territory, however there are several Treaty Four First Nations within 100 km of the Project site. Métis Nation – Saskatchewan (MN-S) is recognized as the official governing organization for Métis in Saskatchewan. Indigenous Peoples engaged to date included First Nations within Treaty Four and Treaty Six, as well as the MN-S.

SaskPower's engagement objectives for the Project include:

- Sharing meaningful Project information and learn about Traditional Knowledge, as well as stakeholder interests and concerns.
- Integrating Traditional Knowledge as well as stakeholder interests and concerns into the Project plans to the greatest extent possible.
- Communicating how Traditional Knowledge as well as stakeholder interests and concerns influence Project plans.
- Continuing to exchange information on topics and issues.
- Exploring opportunities for Indigenous communities to engage with and contribute to the Project implementation.

SaskPower is committed to ongoing discussions with Indigenous communities and stakeholders throughout the development and life of the Project.

4.1 List of Potentially Affected and Interested Indigenous Communities

4.1.1 PRELIMINARY LIST OF INDIGENOUS COMMUNITIES DURING SITING

In March 2020, SaskPower identified an initial list of 16 Indigenous communities who may potentially be affected by the siting of a new natural gas power station (Table 4-1). SaskPower used a proximity methodology in determining the initial list for engagement and contacted Indigenous communities within 100 km of the four geographical areas under consideration during siting (i.e., Aberdeen, Saskatoon, Estevan, Lanigan (which was ultimately selected as the preferred Project site)). Additionally, neighbouring Indigenous communities outside the 100 km proximity were also contacted to ensure Project discussions with Indigenous Peoples were inclusive of all associated groups and communities. This analysis included both home communities and other reserve lands in proximity. Other reserve lands are often land parcels acquired during the Treaty Land Entitlement implementation process and those home communities might be much further away than 100 km. An invitation to participate in a workshop in either Saskatoon or Regina to learn more about natural gas power generation and to provide input was sent via email to these Indigenous communities. However, due to the onset of the COVID-19 pandemic, these workshops were cancelled.

Table 4-1 Preliminary List of Indigenous Communities Identified by SaskPower during Siting

Indigenous Communities
Beardy's and Okemasis Cree Nation
Carry the Kettle Nakoda Nation
Day Star First Nation
File Hills Qu'Appelle (FHQ) Development
George Gordon First Nation
Kawacatoose First Nation
Métis Nation – Saskatchewan (Western Region 2A)
Mistawasis Nêhiyawak
Muskeg Lake First Nation
Muskowekwan First Nation
Okanese First Nation
Peepeekisis First Nation
Piapot First Nation
Saskatoon Tribal Council
Star Blanket First Nation
Whitecap Dakota First Nation
Zagime First Nation

4.1.2 LIST OF INDIGENOUS COMMUNITIES FOR THE PROJECT

SaskPower contacted IAAC in April of 2020 to discuss and determine an initial list of the Indigenous communities that SaskPower was to engage with regarding the Project. IAAC provided a preliminary list to SaskPower on April 22, 2020, identifying the Indigenous communities within approximately 100 km of the Project. A list of 16 potentially affected and interested Indigenous communities was provided based on the Aboriginal and Treaty Rights Information System (ATRIS) search results (Table 4-2).

Table 4-2 Preliminary List of Potentially Affected and Interested Indigenous Communities for the Project Identified by IAAC, April 2020

Indigenous Community	Reserve Lands within Approximately 100 km of Project Location	Approximate Distance from Project (km)
Beardy's and Okemasis Cree Nation	Beardy's & Okemasis Reserve No. 96 & 97-A	68
Day Star First Nation	Day Star No. 87	80
English River First Nation	Grasswoods Indian Reserve No. 192J	93
George Gordon First Nation	George Gordon First Nation Indian Reserve No. 86	99
Kawacatoose First Nation	Kawacatoose First Nation Indian Reserve No. 88	82
	Poorman Indian Reserve No. 88	76
Kinistin Saulteaux Nation	Kinistin No. 91A	99

Indigenous Community	Reserve Lands within Approximately 100 km of Project Location	Approximate Distance from Project (km)
Muskeg Lake Cree Nation	Asimakaniseekan Askiy Indian Reserve No. 102A	94
	Asimakaniseekan Askiy Indian Reserve No. 102B	102
Muskowekwan First Nation	Muskowekwan Indian Reserve No. 85-13	94
	Muskowekwan Indian Reserve No. 85-14	96
	Muskowekwan Indian Reserve No. 85-18	98
	Muskowekwan Indian Reserve No. 85-66	100
	Muskowekwan No. 85	103
	Muskowekwan No. 85A	87
One Arrow First Nation	One Arrow Indian Reserve No. 95	109
	One Arrow Indian Reserve No. 95-1C	89
	One Arrow Indian Reserve No. 95-1E	86
	One Arrow Indian Reserve No. 95-1H	89
	Sounding Sky Reserve	101
Red Pheasant Cree Nation	Red Pheasant No. 108	251
Thunderchild First Nation	Thunderchild First Nation Indian Reserve No. 115X	398
Whitecap Dakota First Nation	Whitecap Indian Reserve No. 94	99
Yellow Quill First Nation	Nakaway Ahkeeng Reserve	99
	Yellow Quill Indian Reserve 90-10	99

Sources: https://sidait-atris.aadnc-aandc.gc.ca/atris_online/Content/Search.aspx
https://sidait-atris.aadnc-aandc.gc.ca/atris_online/Content/AboriginalCommunityView.aspx

In October 2022, SaskPower contacted IAAC to request an update on the list of Indigenous communities. On February 1, 2023, IAAC provided a list of eleven Indigenous communities (Table 4-3).

Table 4-3 Revised List of Potentially Affected and Interested Indigenous Communities for the Project Identified by IAAC, February 2023

Indigenous Community	Reserve Lands within Approximately 100 km of Project Location	Approximate Distance from Project (km)
Beardy's and Okemasis Cree Nation	Beardy's & Okemasis Reserve No. 96-97-A	68
Day Star First Nation	Day Star No. 87	80
Fishing Lake First Nation	Fishing Lake Indian Reserve No. 89	110
George Gordon First Nation	George Gordon First Nation Indian Reserve No. 86	99
Kawacatoose First Nation	Kawacatoose First Nation Indian Reserve No. 88	82
	Poorman Indian Reserve No. 88	76
Kinistin Saulteaux Nation	Kinistin No. 91A	99
Métis Nation – Saskatchewan	-	-

Indigenous Community	Reserve Lands within Approximately 100 km of Project Location	Approximate Distance from Project (km)
Muskowekwan First Nation	Muskowekwan Indian Reserve No. 85-13	94
	Muskowekwan Indian Reserve No. 85-14	96
	Muskowekwan Indian Reserve No. 85-18	98
	Muskowekwan Indian Reserve No. 85-66	100
	Muskowekwan No. 85	103
	Muskowekwan No. 85A	87
One Arrow First Nation	One Arrow Indian Reserve No. 95	109
	One Arrow Indian Reserve No. 95-1C	89
	One Arrow Indian Reserve No. 95-1E	86
	One Arrow Indian Reserve No. 95-1H	89
	Sounding Sky Indian Reserve	101
Whitecap Dakota First Nation	Whitecap Indian Reserve No. 94	99
Yellow Quill First Nation	Nakaway Ahkeeng Reserve	99
	Yellow Quill Indian Reserve 90-10	99

4.2 Summary of Engagement with Indigenous Peoples

SaskPower's engagement approach with Indigenous communities is an iterative model that evolves as the development of the Project progresses. It begins with sharing meaningful Project information to enhance and shape Project outcomes by actively engaging and attentively listening to Indigenous communities' interests and concerns and incorporating Indigenous knowledge. In March of 2020 through the Project siting process, SaskPower contacted Indigenous communities with an invitation to participate in a workshop to provide input.

When the Project site was selected, SaskPower prepared Project introductory letters for all identified Indigenous communities (Table 4-2). The letters contained a brief description of the Project, its location, and a request to meet face-to-face to discuss the Project. These letters were sent by email, followed by hardcopy in the mail on July 12, 2022. A follow-up letter reiterating the Project information and reminder of who to contact if there were any questions or concerns was sent out to the same Indigenous communities on October 31, 2022. See Appendix C for an example of the documentation.

Phone calls were made to each Indigenous community listed by IAAC in the updated February 2023 list on February 2 and 3, 2023 to:

- Confirm receipt of the notification letter.
- Confirm the Indigenous communities' understanding of the engagement process.
- Determine the need for another conversation or a face-to-face meeting as well as future notification preference.

SaskPower has continued Indigenous engagement since February of 2023. In-person meetings were conducted by members of the Project team, including members from SaskPower's Indigenous Relations department, with the goal to:

- Share information on the Project schedule and Project activities (e.g., planning, construction, operation, and decommissioning).
- Listen to Indigenous communities to gain an understanding of their interests and concerns and their knowledge as it relates to the Project.
- Address any Project related questions and concerns.
- Extend an invite to tour SaskPower's similar power generation facilities to learn more about this type of Project.
- Discuss future engagement activities to continue the dialogue.

A summary of Indigenous engagement efforts and activities undertaken to date is provided in Table 4-4.

Table 4-4 Summary of Indigenous Engagement Activities

Indigenous Community	Date	Means of Engagement
Beardy's and Okemasis Cree Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call to governance centre to extend an invite for a meeting. No answer no voice mail.
	June 16, 2023	Phone call to governance centre to arrange a meeting.
	July 18, 2023	A meeting was held between SaskPower and the Chief as well the Willow Cree Development Corporation president and coordinator.
	Aug 9, 2023	Phone call and emails to CEO of the economic development company to offer the opportunity for the Nation to complete a Traditional Land Use Vegetation Survey that would take place between August 14-25, 2023.
Carry the Kettle Nakoda Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Day Star First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.

Indigenous Community	Date	Means of Engagement
	February 2, 2023	Phone call to governance centre and left voicemail referencing previous contact attempts (email and letters) and invited the First Nation for a discussion about the Project.
	June 22, 2023	Phone call to the Chief to arrange a meeting.
	June 26, 2023	A meeting was scheduled with Chief and Council at SaskPower Head Office. Due to extenuating circumstances the Nation was unable to attend. Rescheduling was discussed with the Chief but not set at that time.
	July 28, 2023	Follow-up phone call to reschedule the meeting. Message was left on voicemail.
English River First Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
File Hills Qu'Appelle Development	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Fishing Lake First Nation	February 2, 2023	Phone call attempt to governance centre to invite for Project discussion. No voicemail.
	June 13, 2023	Meeting was arranged through discussions with the Chair of Board of Directors of the First Nations University.
	June 19, 2023	Project information discussion held with Chief and representative from Fishing Lake Nation Ventures held at the First Nations University in Regina.
George Gordon First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 2, 2023	Phone call to governance centre and left voicemail referencing previous contact attempts (email and letters) and invited the First Nation for a discussion about the Project.
	June 14, 2023	Phone call to Touchwood Agency Tribal Council and scheduled a meeting for June 23, 2023 at George Gordon Urban office in Regina.
	June 23, 2023	Project information discussion held with Chief and Touchwood Agency Tribal Council at George Gordon's Development office in Regina.
Kawacatoose First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.

Indigenous Community	Date	Means of Engagement
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call to governance centre and left voicemail referencing previous contact attempts (email and letters) and invited the First Nation for a discussion about the Project.
	June 13-26, 2023	Email and phone call attempts unsuccessful.
	July 3-28, 2023	Email and phone call attempts unsuccessful until end of July. The Nation agreed to meet during August 2023.
Kinistin Saulteaux Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call to governance centre and left voicemail referencing previous contact attempts (letters) and invited the First Nation for a discussion about the Project.
	June 14, 2023	Phone call to governance centre to arrange a meeting.
	June 27, 2023	Project information discussion with Chief and Council and select community members at the Kinistin Saulteaux Nation Band office.
Métis Nation - Saskatchewan (Western Region 2A)	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	March 31, 2023	Phone call to arrange a meeting with the MN-S Western Region 2A Regional Director on April 6, 2023 at the MN-S office in Saskatoon.
	April 6, 2023	Project information presentation provided to the MN-S Western Region 2A Regional Director at the MN-S office in Saskatoon. No inquiries or concerns were raised by the MN-S Western Region 2A Regional Director during the presentation. MN-S wanted to coordinate another information session to include the MN-S council members where inquiries and concerns could be voiced.
	April 17, 2023	Meeting rescheduled by MN-S to April 29, 2023.
	April 20, 2023	Meeting rescheduled by MN-S to May 10, 2023
	May 10, 2023	MN-S Western Region 2A Regional Director postponed meeting that was scheduled for June 22, 2023 in Saskatoon. No follow-up date was determined at the time.
	June 12, 2023	MN-S Western Region 2A Regional Director scheduled meeting for June 22, 2023.
	June 22, 2023	Meeting scheduled for June 22, 2023 was rescheduled by MN-S and proposed for June 28, 2023, however SaskPower was unable to attend.

Indigenous Community	Date	Means of Engagement
	July, 5-August 10, 2023	Email and phone communication continued with the Regional Director of MNS Western Region 2A to try and set a time for a meeting. SaskPower confirmed a meeting date of Aug 26, 2023 with the Director and Council in Saskatoon.
Mistawasis Nêhiyawak	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 24, 2023	President/CEO/Director of Economic Development of Misty Ventures for the Nation contacted SaskPower for an engagement session. A meeting was scheduled for July 27, 2023 at the SaskPower Saskatoon Office.
	July 27, 2023	Project information discussion with Misty Ventures and Chemco relating to economic involvement, and consultation.
Muskeg Lake Cree Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
Muskowekwan First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call attempt to governance centre to invite for Project discussion. Voicemail was full and therefore could not leave message.
	June 29, 2023	Email attempt to coordinate a project information meeting.
	July 5-28, 2023	Several email and phone call attempts were unsuccessful. On July 28, 2023 the Nation agreed to a meeting in Regina Head Office in late August 2023.
One Arrow First Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call attempt to governance centre to invite for Project discussion. No voicemail.
	June 14, 2023	Phone call to Chief to arrange a meeting.
	July 5, 2023	Project Information discussion with Chief and Council scheduled to take place on July 19 in Saskatoon as per communication on June 2023 with the Chief. Meeting was rescheduled to August 9, 2023 as requested by the Nation.

Indigenous Community	Date	Means of Engagement
	August 9, 2023	A meeting with Chief and Council occurred at the One Arrow Community Centre. Renewable power generation and economic inclusion was discussed.
Okanese First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Peepeekisis First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Piapot First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Red Pheasant Cree Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
Saskatoon Tribal Council	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Star Blanket First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
Thunderchild First Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
Whitecap Dakota First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.
	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call to governance centre and left voicemail referencing previous contact attempts (email/letters) and invited the First Nation for a discussion about the Project.
	June 13, 2023	Attempt made to coordinate a meeting with Chief and Council for the first week of July.
	July 5-28, 2023	Email and phone calls were unsuccessful as the Nation has been busy with the Self-Governing Agreement with the Federal government.

Indigenous Community	Date	Means of Engagement
Yellow Quill First Nation	July 11, 2022	Letter sent explaining project and seeking input.
	October 31, 2022	Follow-up letter reiterating the Project information and reminder of who to contact if there were any questions concerns.
	February 3, 2023	Phone call attempt to governance centre to invite for Project discussion. Voicemail was full and therefore could not leave message.
	June 12-16, 2023	Several phone call attempts to Administration Centre. No option to leave a message.
	July 19 – August 14, 2023	Attempts made to coordinate an information meeting.
Zagime First Nation	March 11, 2020	Email extending an invitation to participate in a workshop to provide input on the need for a future natural gas generation facility, the two geographical study areas under consideration, site selection process, and SaskPower contact information.

4.2.1 TRADITIONAL KNOWLEDGE AND PROTOCOL STUDY

SaskPower engaged the services of Wicehtowak Limnos Consulting Services LP (WLCS), a consulting firm wholly owned by George Gordon First Nation (GGFN), to undertake a Traditional Knowledge and Protocol (TK&P) study of the Project site that considered Traditional Knowledge and impacts relevant to the IAA regulatory process. WLCS has been appointed by GGFN leadership to conduct all stewardship work on behalf of the Nation for Projects that may impact Rights. In response to this request, WLCS undertook a TK&P study for the Project to:

- Provide regulatory context from the perspective of George Gordon First Nation.
- Undertake a desktop review of data generated by Stantec during baseline EAs to verify findings and identify gaps.
- Conduct a field assessment of the Project Development Area (PDA) to examine if there are areas of cultural and/or traditional significance for Indigenous Peoples throughout the Project area.

SaskPower is currently undergoing planning sessions to address the vegetation component of the TK&P, as the original study took place out of season for vegetation in the Project area. Refer to Section 21.0 and Appendix C for more information on the TK&P study.

4.3 Results of Indigenous Engagement to Date

To date, SaskPower has sent information via mail, email, and follow-up phone calls to Indigenous communities of potential interest/concern. SaskPower has also had initial in-person meetings with several Indigenous communities on the list. The Indigenous engagement that has taken place to date has provided Project details to the Indigenous communities and has served as a conduit for economic reconciliation and the building of relationships between the Indigenous communities and SaskPower as a Crown Corporation. As a Crown Corporation, SaskPower understands the Honour of the Crown and has been acting honourably in all dealings and engagements with Indigenous Peoples. With Indigenous engagement throughout the various stages of the Project, SaskPower aims to inform the Duty to Consult process both at the provincial and federal level, if needed.

SaskPower acknowledges that the natural gas pipeline may trigger the provincial Duty to Consult process and has communicated this possibility with Indigenous communities during the engagement process. SaskPower will relay information to TransGas regarding issues and concerns raised by Indigenous communities during SaskPower's engagement to ensure opportunities and communication lines are not lost.

4.3.1 KEY ISSUES RAISED

Key Issues raised to date are largely centred around participation and procurement of contracts to employ Indigenous companies and people on the Project. Table 4-5 provides the summary of Indigenous inquiries and concerns during the in-person meetings and SaskPower's responses.

Table 4-5 Summary of Indigenous Inquiries and Concerns During Engagement Meetings

Key Comments/Concerns	SaskPower Response
Request for economic inclusion with Indigenous communities' partner companies with the construction and operation of the Project.	SaskPower encouraged the Indigenous communities to apply for all open procurement opportunities as SaskPower progresses to the construction phase of the project. Refer to Section 22.2 for commitments.
Request for involvement with the technical committee and the importance of having an individual on it that can speak to Indigenous knowledge.	SaskPower has consulted WLCS to conduct a traditional knowledge and land use study for the project. Refer to 4.2.1 for details.
Request to have Indigenous Monitor on site for the natural gas line that is being constructed by TransGas.	The construction of the TransGas pipeline is outside the care and control of SaskPower and is regulated under the provincial government. SaskPower provided contact information to both TransGas and the Indigenous community to explore Indigenous Monitoring opportunities.
Request to be involved in the natural gas line that is being constructed by TransGas.	The construction of the TransGas pipeline is outside the care and control of SaskPower and is regulated under the provincial government. SaskPower provided contact information to both TransGas and the Nation to explore Indigenous opportunities.

Key Comments/Concerns	SaskPower Response
Pleased with how the BHP Jansen Mine completed Indigenous Engagement and inclusion of Indigenous Partnerships. The Nation looks forward to doing something similar with SaskPower.	SaskPower will continue indigenous engagement and provide opportunities for Indigenous involvement throughout construction of the Project.
Feelings of exclusion from previous SaskPower power generation station builds and wants to move forward to fulfill commitments that were made in the past.	SaskPower is working towards building relationships with Indigenous communities in Saskatchewan but also building partnerships that benefit all of Saskatchewan.
Proposed an Elders Council for the Project like other successful industry partnerships that have been established.	SaskPower is committed to reconciliation and will examine this request.
Frustrated with how contractor Request for Proposals (RFPs) were set up in the past. Indicated that RFPs should provide better opportunity to pre-qualified Indigenous contractors first.	There is a commitment to the EPC Build Partner for local Indigenous spend. Refer to Section 15.3 and 22.2 for commitments.
How can the Band use solar to offset the cost of power at their units?	As other First Nations within Saskatchewan have utilized renewable energy to provide localized green energy it also creates an avenue to be a partner with SaskPower as they can provide power to the provincial power grid as well.
Concern for low representation in the SaskPower Indigenous workforce.	SaskPower is committed to building relationships with Indigenous communities. SaskPower is developing a recruitment and retention strategy to address barriers that face Indigenous people within the corporate sector.
This Project falls within Mistawasis Nêhiyawak traditional territory. Does SaskPower understand and honour traditional territory?	SaskPower does honour traditional territory and is beginning to understand the complexities of traditional territory and the living nature of it as it does not remain stagnant.
Inquired as to the process in which the Nation can develop a solar farm and partner with SaskPower to aid in renewable energy generation.	As other First Nations within Saskatchewan have utilized renewable energy to provide localized green energy it also creates an avenue to be a partner with SaskPower as they can provide power to the provincial power grid as well.
Request to see the TK&P study that was completed by WLCS	The TK&P study can be viewed on the IAAC Project Registry that was submitted with the IPD on April 11, 2023.

4.4 Plan for Future Indigenous Engagement

Engagement with the Project specific list of Indigenous communities and associated communities is ongoing, and SaskPower will continue to make contact and be available for discussion as the Project continues. If there is no response or feedback from the Indigenous Peoples, SaskPower Indigenous Relations will reach out to the Chief of each First Nation and the leaders within the MN-S to arrange discussions if requested or desired by the Indigenous communities.

Additionally, SaskPower has ongoing engagement with other Indigenous communities and organizations (not specific to the Project) throughout Saskatchewan regarding the future of the power system in Saskatchewan. These engagement activities include conversations on SaskPower's future power supply options which includes the Project.

SaskPower is committed to ongoing discussions with Indigenous communities throughout the development and life of the Project. SaskPower will continue to notify Indigenous communities as required as the Project progresses or as requested by the Indigenous community. SaskPower recognizes that Indigenous communities have diverse and unique circumstances that may impact their ability to engage at specific times. SaskPower understands these complex circumstances and will continue to engage with the Indigenous communities involved as the Project progresses.

Future meetings will take place with procurement during the next phase of the Project. SaskPower has the ability to develop contracts with each of the Indigenous Economic Development arms that have expressed interest to date. SaskPower has started and will continue to compile information on the services each Indigenous community can provide related to the Project.

All listed Indigenous communities will be invited to participate and provide feedback in stakeholder Project-related engagement activities such as:

- procurement information sessions
- site tours
- presentations and meetings

It is anticipated that Indigenous cultural ceremonies will likely occur for the Project. SaskPower will determine (through discussions with Indigenous communities) as to what cultural ceremonies or activities may be appropriate for the Project and which Indigenous communities will conduct and/or participate in each cultural activity.

In the spirit of reconciliation and good governance, SaskPower will continue to engage in good faith with Indigenous communities to determine whether there are any adverse impacts to the rights of Indigenous Peoples in accordance with Section 35 of the *Constitution Act*. SaskPower will continue our efforts to communicate with the Project specific list of Indigenous communities by means of email, phone calls, letters, and open invitations to meet in their communities. If SaskPower is invited to participate in any community or ceremonial events, we will actively participate including considering requests for community-based sponsorships. As proponents of the Project, SaskPower will participate in any consultation process that the GOC and GOS requires as the Project moves forward.

5 Regional Studies or Plans

The Project location has not been part of any regional assessments under Sections 92 or 93 of the IAA (GOC 2019a, GOC 2022b). Additionally, there are no known regional assessments of the area in which the Project is located at this time (GOC 2022b). Regional plans, development plans, and management frameworks that may be applicable to the Project are outlined in Section 18.4.

The Project is located within Treaty Six and the Métis Nation of Saskatchewan territory and is in close proximity to Treaty Four territory as shown in Figure 13-1. The desktop review of publicly available information did not identify any traditional land and resource use (TLRU) studies in the area. In addition, SaskPower contacted the Indigenous Consultation Unit of the Saskatchewan Ministry of Government Relations on January 20, 2023, for any information on TLRU or Traditional Knowledge studies that have been undertaken in the Project area. The response received was that there was no knowledge of any TLRU studies in the Project area.

6 Strategic Assessments

The Strategic Assessment of Climate Change conducted under Section 95(2) of the IAA is applicable to the Project (GOC 2019a, GOC 2020a). The Project has the potential to have a negative effect on carbon sink capacity from the potential loss of wetland area during vegetation clearing and ground disturbance during the construction phase of the Project. The PDA covers 64.9 hectares (ha) and is comprised of 9.4 ha of wetland area. Additional information on the existing conditions and potential effects to wetlands are provided in Sections 14.2.4 and 19.1.4, respectively.

PART B: PROJECT INFORMATION

7 Purpose, Need and Benefits of Project

SaskPower must replace over 1,400 MW of conventional coal generation from 2021 to 2030 and is working to implement all of the currently available supply options. SaskPower has a plan to reduce GHG emissions to net-zero by 2050 (refer to Section 23.3.2 for more information). Natural gas generation will play a significant role in the initial transition to replace conventional coal generation and reduce GHG emissions. The Project is needed to provide firm capacity to replace retiring conventional coal generation, back up renewables, and act as contingency (by providing additional energy) for the situation where load grows faster than expected, aging units become even less reliable or fail, or other projects are delayed.

Conventional coal units currently meet the grid's need for both firm capacity (i.e., to ensure energy is available during peak demand) and baseload energy (i.e., a constant supply of electricity). As SaskPower works to replace conventional coal units and reduce GHG emissions, natural gas generation will provide most of the firm capacity but not all of the energy that was once provided by conventional coal. Whenever there is an increasing amount of wind and solar power available, SaskPower relies on these sources for energy and the natural gas units are turned down resulting in saving fuel costs, reducing GHG emissions, and reducing wear and tear on the natural gas units. This means that the Project's full 370 MW output is required during the coldest winter evenings to meet peak demand (when wind and solar power may not be available). Energy use will be reduced during the rest of the year, potentially to less than 15% of its capacity factor. As a contingency option, the Project cannot provide additional firm capacity (over the full 370 MW already counted as firm capacity) but there is opportunity to rely on additional energy from the Project if needed (increasing the capacity factor).

Section 12.2 addresses other supply options that are not specifically alternatives to this Project as all of the projects will be needed, but together with the Project, will form the electrical generation system that will replace conventional coal, meet increasing demand, and lower GHG emissions.

SaskPower continues to evaluate emerging supply options as it works towards net-zero GHG emissions by 2050 or earlier. SaskPower is also significantly increasing renewable generation capacity. However, the power system will need to be managed carefully when adding significant variable generation to ensure that the grid remains operable and stable. This means that additions cannot come faster than the grid modernization and back-up generation that is required to support the fluctuating supply.

The proposed Clean Electricity Regulations (CER) indicate a requirement for all electric utilities in Canada to reach net-zero GHG emissions by 2035. Reaching net-zero GHG emissions is a huge challenge for SaskPower. To reduce emissions even to four million tonnes (t), approximately 75% below 2005 levels, would require SaskPower to expand, refurbish, and replace the equivalent of 150% of the current generating capacity. Significant investment is also required in new transmission infrastructure, grid modernization, and the sustainment of the electricity system. To get to net-zero, SaskPower has interim targets that include reducing GHG emissions as noted above and increasing non-emitting and renewable generation to up to 50% of the current capacity by 2030. SaskPower is on track to meet these targets.

SaskPower is currently evaluating what would be required to achieve net-zero by 2035 in anticipation of the forthcoming CER and commits that the Project will be compliant.

7.1 Project Purpose

The proposed Project is a nominal 370 MW combined cycle natural gas power station, with the capability to generate up to a maximum of 380 MW under optimum ambient conditions. The Project is required to serve increasing load, enable the retirement of conventional coal generation as well as the addition of new intermittent renewable generation projects (i.e., wind and solar). As such, once in service, the Project will play a crucial role in SaskPower's GHG emissions reduction strategy and reaching net-zero.

7.2 Project Need

SaskPower prepares a ten-year supply plan annually which outlines its generation plan to meet the province's future power needs. The amount of generation required over the respective timeframe is determined through reliability modeling. Once the generation requirement is assessed, various strategies, and supply alternatives that could be available by the required date are taken into consideration to meet the resource adequacy requirements, and to ensure system stability and security considering diversity of the supply mix.

Based on the Resource Adequacy analysis, as load grows, and conventional coal and other units retire, SaskPower needs to build the Project, along with other projects, to maintain the Planning Reserve Margin (PRM). The PRM states how much extra firm capacity is available above the expected peak demand. SaskPower's PRM level is set to meet the potential peak demand and ensure reliable supply of electricity during instances such as when a power plant goes offline for maintenance, unexpectedly, or for high energy demand periods during abnormal weather conditions (e.g., extreme heat or cold).

In addition to the PRM, and our GHG emissions and renewable additions targets, SaskPower's planning criteria includes considerations to ensure the system remains reliable and operable. For example, as SaskPower looks to increase non-emitting and renewable generation up to 50% of the current capacity by 2030, intermittent generation is projected to be a greater factor in the day-to-day operations of the grid. Flexible generation such as quick-starting natural gas generators are required to respond quickly to changes on the electrical grid while continuing to meet customer demand.

In the near-term, natural gas generation is the only baseload supply option available at the scale required to replace the firm capacity from conventional coal. Imported power, and a small portion of the renewables added, will also play a role in replacing firm capacity but that role is limited. Natural gas generation is also required to enable the addition of variable renewables to further reduce GHG emissions. Operation of natural gas facilities will be reduced over time by the addition of renewables. SaskPower has 1,000 MW of new wind and solar already in-construction or in-planning for 2027. So, while natural gas generation will provide the bulk of firm capacity in the near-term, a significant portion of the energy formerly provided by conventional coal will be provided by renewable energy.

Capacity is the maximum output from an electric generator measured in MW. Firm capacity means one can count on it to be available at the time of system peak. We count 100% of natural gas generation as firm capacity. A wind farm, for example, may have 100 MW of capacity; however, as wind is intermittent by nature, only 10% of the capacity is accounted for as firm in the winter and 5% in the summer. SaskPower needs to ensure there is enough firm capacity on our system to meet peak demand – the period of the year when residents use the most electricity.

Energy is the amount of electricity generated over a period of time measured in megawatt hours (MWh). A natural gas generator may be needed to replace the firm capacity that used to be provided by a conventional coal facility to ensure that on the coldest winter night when the sun isn't shining, and the wind isn't blowing, SaskPower is able to serve the energy required. But whenever the sun is shining, and the wind is blowing SaskPower can turn that natural gas unit off and replace the energy that the coal facility used to provide with non-GHG emitting renewable energy.

Due to federal regulations on coal plant emissions, SaskPower must retire nearly 1,400 MW of conventional coal unit capacity between 2021 and 2030. Though conversion to CCUS of coal plants is possible, its cost is projected to be over 40% more than the cost of the Project as well as being unable to meet anticipated emissions thresholds proposed for the Clean Electricity Regulations. As well as replacing or converting nearly 1,400 MW of coal capacity, SaskPower also must retire 136 MW of legacy gas generation units before 2030. On top of replacement of retiring generation units, SaskPower expects load growth requiring over 300 MW of additional peak demand capacity from 2023 – 2030. The new capacity for replacement and growth required is over 1,800 MW. SaskPower has the Great Plains Power Station currently under construction to provide 370 MW of capacity in 2024. This situation leaves a remaining requirement of over 1400 MW of new power capacity.

SaskPower has two major baseload supply options to replace conventional coal (as coal with CCUS will not meet the proposed CER guidelines) and meet increasing demand in the next 10 years. These options are imports and natural gas generation. The supply of imports is limited and cannot meet all the needs for new capacity. This limitation is due to constraints on growth in new transmission capacity and the limits on surplus generation capacity available for export in some jurisdictions. SaskPower has submitted a transmission service request, and fully executed all agreements to increase the ability to import from the Southwest Power Pool (SPP) for up to 650 MW by 2027 and has the potential for an additional 100 MW of transmission tie-line capacity from Manitoba by 2027. SaskPower has signed the appropriate agreements with SPP to carry out the planning and permitting requirements to build the transmission expansion. A Request for Proposals to procure 500 MW of firm capacity from SPP (utilizing the 650 MW tie-line) is expected to be issued in 2023 and awarded in 2024. It is anticipated that the import of power from SPP would begin somewhere in the 2027-2029 timeframe and is expected that the term of the contract would be between six and 20 years. Capacity from coal generation (including coal with CCUS) will not be accepted and preference will be given to low or non-emitting sources provided they meet the requirements for firm capacity. The most likely backstop for firm SPP import contracts will be natural gas generation.

SaskPower currently has two contracts with Manitoba Hydro for firm capacity and energy. A contract for 100 MW of capacity is currently in place and expires in 2040. A second contract for 190 MW of capacity is currently in place and expires in 2052; however, Manitoba Hydro can opt out as early as 2040 if they need the energy to serve their own load. This second contract includes an option for an additional 25 MW of

capacity for SaskPower's northern electrical system. This option is not being exercised at this time because additional capacity in the far north is not currently required. Additional capacity arrangements with Manitoba Hydro are not being considered at this time as Manitoba Hydro has indicated that they do not have additional firm capacity to sell to SaskPower.

The next large new hydro project in Manitoba cannot be in-service before 2035 and more likely in 2040. Currently a new transmission line has approvals for development in North Dakota that will support the proposed 650 MW of additional trade with SPP. To further expand trade beyond this tie-line requires a large new transmission line within the SPP region. This alternative is unlikely to be in-service before 2035.

The Project is critically needed to provide capacity, it will also be utilized to back-up renewables, and act as a contingency (by providing additional energy) if other options do not materialize, load grows, or aging units fail. This SaskPower-owned and operated Project is largely within SaskPower's control whereas other projects, including imported power or Independent Power Producer (IPP) projects are not within SaskPower's control to the same extent. If firm import capacity from the SPP is delayed, transmission tie-lines are delayed, or our neighbours determine they need to retain power in an emergency, the Project will remain a reliable source of power for the people of Saskatchewan.

7.3 Potential Benefits of Project

SaskPower has traditionally designed large natural gas facilities to operate only in combined cycle mode, meaning the gas turbine operates in conjunction with the steam turbine, heat recovery steam generator (HRSG) and feedwater system. This design provides the most efficient and lowest cost for baseload natural gas generation but does limit the flexibility of the unit. This Project will be designed with the ability to operate in either flexible simple cycle or efficient combined cycle mode to maximize flexibility to support the addition of renewable generation. As more renewable generation is added to reduce GHG emissions, SaskPower requires the added system operational flexibility embedded in this Project design.

SaskPower is committed to a large expansion in wind and solar generation; however, these sources of power provide limited capacity to the system. To integrate these renewable supply options that are intermittent by nature, a back-up generation source is required to ensure there is enough electricity generation to meet demand at all times. Natural gas generation is an ideal candidate as it can quickly ramp up or down as the renewable generation output fluctuates. Coal plants converted to CCUS cannot ramp up and down quickly in response to fluctuations in demand or output of solar and wind power.

For Saskatchewan, natural gas generation supplied by the Project is currently the best option in terms of cost and performance for integration of renewables to reach SaskPower's 50% emissions reduction target by 2030. While simple cycle gas turbines may be better suited to provide rapid response to support renewables, they have higher emissions intensities and lower efficiency as compared to the Project. Other possible backup power options such as batteries for long-term energy storage are not available at a reasonable cost. To meet requirements for 48 to 72 hours of backup power for Saskatchewan, battery storage will cost many times more than the Project and in the next ten years, even with significant expected cost reductions, will remain many times more costly than the Project. Further information related to alternatives to the Project can be found in Section 12.2.

Natural gas generation is a key component to achieving both an increase in renewable capacity and GHG emissions reduction. Natural gas combined cycle power stations emit up to 60% less carbon dioxide (CO_2) as compared to conventional coal-fired generation in Saskatchewan. The transition of conventional coal-fired generating units to renewables and natural gas represents a significant reduction in GHG and other air emissions. As more renewables are added to the Saskatchewan system, the Project will operate at lower outputs and potentially less of the time but will still provide the capacity needed during times when renewable electricity is unavailable. As annual output of the Project is reduced with increasing renewable electricity production, its annual GHG emissions will decline. The Project is integral to SaskPower's plans to achieve at least a 50% reduction in GHG emissions by 2030 while keeping the supply of electricity reliable and affordable.

7.4 Consequences of Project Delays

SaskPower is faced with challenges including aging infrastructure and additional power demand. The goal is to ensure SaskPower can meet these challenges with *reliable, sustainable, and cost-effective power* and the Project is well positioned to address these challenges. By 2027, an increase in demand for power of approximately 200 MW is expected compared to 2023 levels. After 2027, demand is expected to continue to grow at a rate of approximately 1.0% annually for the next 10 years.

Based on the most likely load and supply assumptions, SaskPower is able to maintain its PRM above 15% (Reference Margin Level) but accounting for sensitivities such as higher than most likely load forecast due to increased electrification, early shutdown of coal units (due to forced outages) and reduced firm capacity from Wind resources, there is risk that our PRM will drop to 14% in July 2027 and as low as 9% during 2028-29 (Winter) if the Project isn't available. Whenever available capacity falls below the PRM, the risk of unserved energy increases. This means residents and customers of SaskPower will not have the power they need when they need it; the risk is highest on the coldest winter days and the hottest summer days.

The Boundary Dam unit 6 (BD6) coal-fired power station is slated for retirement at the end of 2027 after the Project comes online. If the Project is delayed, continued operation of BD6 will be needed to cover the shortage and retirement will be delayed. In addition, the expansion of renewable generation capacity will also be compromised and GHG emissions will rise.

8 Physical Activities Regulations

The IAA, administered by IAAC, has two regulations that are most applicable to the Project, the *Physical Activities Regulations* and the *Information and Management of Time Limits Regulations* (GOC 2019a, GOC 2022a). The *Physical Activities Regulations* lists the activities and types of projects (designated projects) that require an impact assessment (IA) (GOC 2019b). Section 30 of the *Physical Activities Regulations* states:

> *30. The construction, operation, decommissioning and reclamation of a new fossil fuel-fired power generating facility with a production capacity of 200 MW or more.*

The Project will be 370 MW in size, and therefore, an IPD of the Project that includes the information outlined in the *Information and Management of Time Limits Regulations* was provided to IAAC under Section 10 of the IAA (GOC 2019a).

The *Information and Management of Time Limits Regulations* outlines the information that had to be included in the IPD under Section 3 and Schedule 1 (GOC 2019c). Section 3 of the *Information and Management of Time Limits Regulations* states:

> *3. For the purposes of subsection 10(1) of the Act, the information that is to be provided in the initial description of a designated project is set out in Schedule 1 and must*
>
> > *(a) be representative of the project at the time the information is provided; and*
> >
> > *(b) include the information related to any option that the proponent is considering in respect of any item in the description of the project.*

In accordance with Section 15(1) of the IAA, a DPD of the Project that includes the information outlined in the *Information and Management of Time Limits Regulations* must be provided to IAAC (GOC 2019a). The *Information and Management of Time Limits Regulations* also outlines the information that must be included in the DPD under Section 4 and Schedule 2 (GOC 2019c). Section 4 of the *Information and Management of Time Limits* Regulations states:

> *4 For the purposes of subsection 15(1) of the Act, the information that is to be provided in the detailed description of a designated project is set out in Schedule 2 and must*
>
> > *(a) be representative of the project at the time the information is provided;*
> >
> > *(b) include the information related to any option that the proponent is considering in respect of any item in the description of the project; and*
> >
> > *(c) include the proponent's responses to the issues raised during any consultation undertaken under section 12 of the Act.*

The Project is not a component of a larger project that is listed in the *Physical Activities Regulations* (GOC 2019b). This is a new project, and neither the Project nor any of its components are an expansion of an existing project (GOC 2019b).

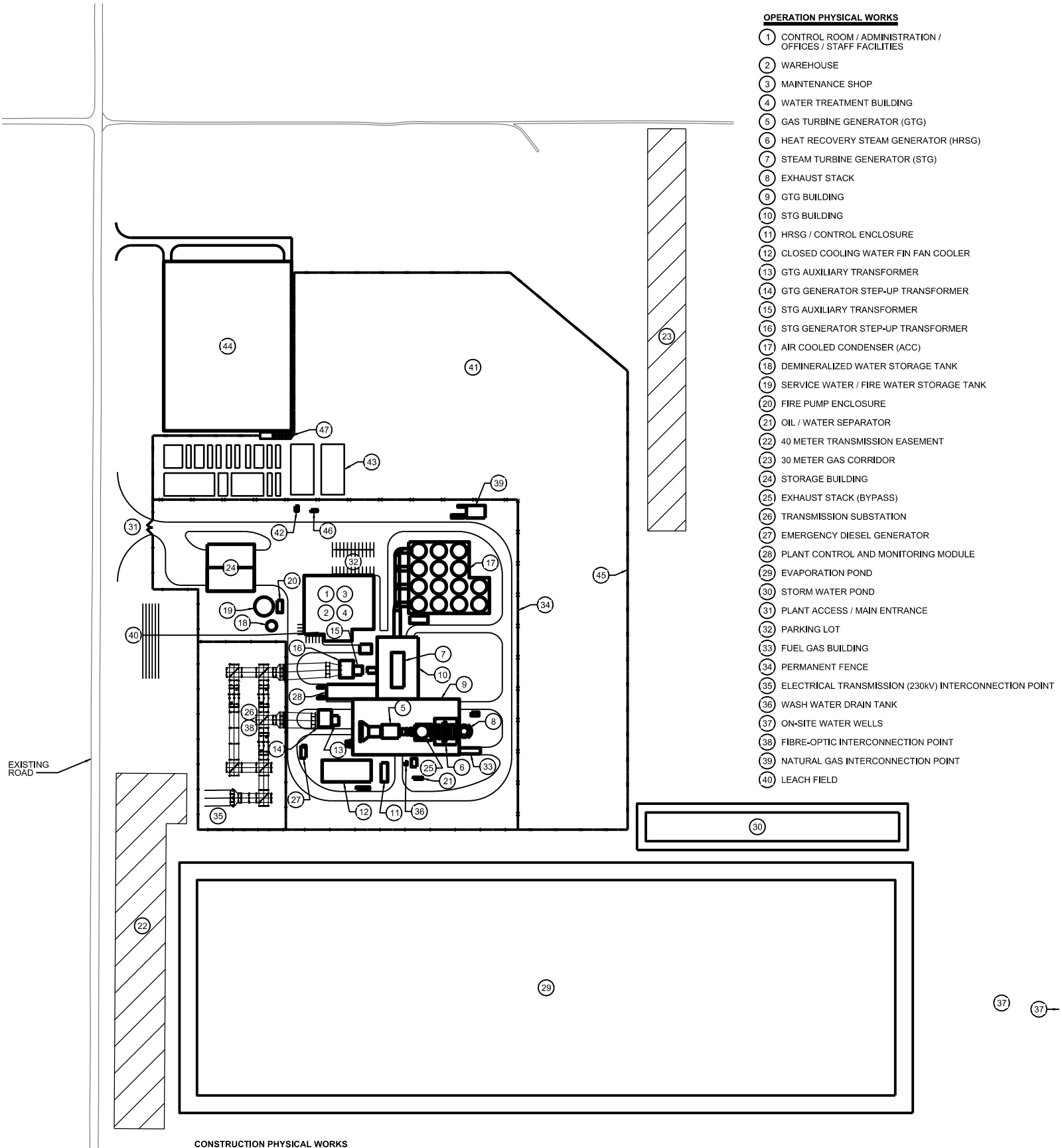
9 Description of Project Activities

The Project will be a power generation facility that uses natural gas to generate a nominal 370 MW of electricity. Components will include the Project, as well as the following incidental activities necessary for Project construction and operation and maintenance (refer to Section 9.4 for further descriptions of incidental activities):

- distribution (25 kilovolt (kV)) power line
- overhead 230 kV transmission power line
- underground Fibre-optic line(s) for telecommunications
- road improvements
- underground water supply pipeline
- underground natural gas supply lines
- relocation of existing natural gas lines

Except for the incidental activities, all structures and equipment will be located within the PDA, currently owned by SaskPower (Section 14.1.1). This Project includes the powerhouse, with steam turbine and gas turbine building areas, multipurpose building with main control/administration areas, warehouse, workshop, and water treatment building, Air Cooled Condenser (ACC), switchyard, and miscellaneous auxiliary buildings and structures.

The land is currently undeveloped with the only existing infrastructure on the Project site being two underground high-pressure natural gas lines running diagonally across the middle of the quarter section that will need to be relocated and three water wells that SaskPower installed in the southeast part of the quarter section. The Project site layout illustrates the proposed locations of the physical structures to be erected on the Project site (Figure 9-1, Table 9-1).



OPERATION PHYSICAL WORKS

1. CONTROL ROOM / ADMINISTRATION / OFFICES / STAFF FACILITIES
2. WAREHOUSE
3. MAINTENANCE SHOP
4. WATER TREATMENT BUILDING
5. GAS TURBINE GENERATOR (GTG)
6. HEAT RECOVERY STEAM GENERATOR (HRSG)
7. STEAM TURBINE GENERATOR (STG)
8. EXHAUST STACK
9. GTG BUILDING
10. STG BUILDING
11. HRSG / CONTROL ENCLOSURE
12. CLOSED COOLING WATER FIN FAN COOLER
13. GTG AUXILIARY TRANSFORMER
14. GTG GENERATOR STEP-UP TRANSFORMER
15. STG AUXILIARY TRANSFORMER
16. STG GENERATOR STEP-UP TRANSFORMER
17. AIR COOLED CONDENSER (ACC)
18. DEMINERALIZED WATER STORAGE TANK
19. SERVICE WATER / FIRE WATER STORAGE TANK
20. FIRE PUMP ENCLOSURE
21. OIL / WATER SEPARATOR
22. 40 METER TRANSMISSION EASEMENT
23. 30 METER GAS CORRIDOR
24. STORAGE BUILDING
25. EXHAUST STACK (BYPASS)
26. TRANSMISSION SUBSTATION
27. EMERGENCY DIESEL GENERATOR
28. PLANT CONTROL AND MONITORING MODULE
29. EVAPORATION POND
30. STORM WATER POND
31. PLANT ACCESS / MAIN ENTRANCE
32. PARKING LOT
33. FUEL GAS BUILDING
34. PERMANENT FENCE
35. ELECTRICAL TRANSMISSION (230kV) INTERCONNECTION POINT
36. WASH WATER DRAIN TANK
37. ON-SITE WATER WELLS
38. FIBRE-OPTIC INTERCONNECTION POINT
39. NATURAL GAS INTERCONNECTION POINT
40. LEACH FIELD

CONSTRUCTION PHYSICAL WORKS

41. CONSTRUCTION LAYDOWN
42. CONSTRUCTION POWER TRANSFORMER
43. CONSTRUCTION TRAILERS
44. CONSTRUCTION PARKING
45. CONSTRUCTION FENCE
46. ELECTRICAL DISTRIBUTION (25kV) INTERCONNECTION POINT
47. CONSTRUCTION ENTRANCE / SECURITY

PRELIMINARY - NOT FOR CONSTRUCTION

SaskPower

FIGURE 9-1

Table 9-1 Physical Works Associated with the Project

Number	Project Components	Key Dimensions	Area (ha)
1	CONTROL ROOM/ ADMINISTRATION/OFFICES/STAFF FACILITIES	42 m x 15 m	0.065
2	WAREHOUSE	16 m x 18 m	0.028
3	MAINTENANCE SHOP	13.5 m x 18 m	0.024
4	WATER TREATMENT BUILDING	38 m x 28 m	0.105
5	GAS TURBINE GENERATOR (GTG)	See item 9	See item 9
6	HRSG	See item 9	See item 9
7	STEAM TURBINE GENERATOR (STG)	See item 10	See item 10
8	EXHAUST STACK	52 m height	N/A
9	GTG BUILDING	85 m x 45 m	0.380
10	STG BUILDING	45 m x 35 m	0.158
11	HRSG CONTROL ENCLOSURE	3.5 m x 7.5 m	0.002
12	CLOSED COOLING WATER FIN FAN COOLER	10 m x 42 m	0.0416
13	GTG AUXILIARY TRANSFORMER	2.5 m x 4.5 m	0.001
14	GTG GENERATOR STEP-UP (GSU) TRANSFORMER	5 m x 10 m	0.004
15	STG AUXILIARY TRANSFORMER	2.5 m x 4.5 m	0.001
16	STG GSU TRANSFORMER	5 m x 10 m	0.004
17	AIR COOLED CONDENSER (ACC)	65 m x 56 m, 26 m tall	0.364
18	DEMINERALIZED WATER STORAGE TANK	567,811 litres (L)	N/A
19	SERVICE/FIRE WATER STORAGE TANK	1,892,706 L	N/A
20	FIRE PUMP ENCLOSURE	4 m x 10 m	0.004
21	OIL/WATER SEPARATOR	3785 L	N/A
22	40 METER TRANSMISSION EASEMENT	TBD	TBD
23	30 METER FUEL GAS EASEMENT	TBD	TBD
24	STORAGE BUILDING	37 m x 37 m	0.138
25	EXHAUST STACK (BYPASS)	52 m height	N/A
26	TRANSMISSION SUBSTATION	72 m x 72 m	0.518
27	EMERGENCY DIESEL GENERATOR	4 m x 7 m	0.003
28	PROJECT CONTROL AND MONITORING MODULE	12 m x 31 m	0.036
29	EVAPORATION POND (EXCLUDING SOIL BERM) EVAPORATION POND (INCLUDING SOIL BERM)	557m x 172 m 585 m x 200 m	9.580 11.700
30	STORM WATER POND	37 m x 216 m	0.799
31	PROJECT ACCESS / MAIN ENTRANCE	N/A	N/A
32	PARKING LOT	35 m x 100 m (Approximately 30 stalls)	0.348
33	FUEL GAS BUILDING	5 m x 14 m	0.008

Number	Project Components	Key Dimensions	Area (ha)
34	PERMANENT FENCE	N/A	N/A
35	ELECTRICAL TRANSMISSION (230 kV) INTERCONNECTION POINT	N/A	N/A
36	WASH WATER DRAIN TANK	3 m x 5 m	0.002
37	ON-SITE WATER WELLS (NOT SHOWN)	N/A	N/A
38	FIBRE-OPTIC INTERCONNECTION POINT	N/A	N/A
39	NATURAL GAS INTERCONNECTION POINT	N/A	N/A
40	LEACH FIELD	N/A	N/A
41	CONSTRUCTION LAYDOWN	75,000 metres squared (m^2)	7.284
42	CONSTRUCTION POWER TRANSFORMER	5 m x 10 m	0.002
43	CONSTRUCTION TRAILERS	150 m x 48 m	0.728
44	CONSTRUCTION PARKING	105 m x 135 m	1.416
45	CONSTRUCTION FENCE	N/A	N/A
46	ELECTRICAL DISTRIBUTION (25 kV) INTERCONNECTION POINT	N/A	N/A
47	CONSTRUCTION ENTRANCE / SECURITY	N/A	N/A

For a more detailed description of the physical works associated with the Project please refer to Section 9.2 and Section 9.3.

9.1 Anticipated Size

Conceptual renderings for the Project are provided in Figure 9-2 and Figure 9-3. The Project will be located within the western half of NW 36-33-24-W2M. The total anticipated disturbance footprint for the Project, including temporarily disturbed areas during construction, will be approximately 700 m x 450 m (31.5 ha). The total disturbed areas include approximately 9.7 ha for construction facilities and laydown, 14.6 ha for the storm and wastewater ponds, 8.1 ha for the main Project area, and the remainder for temporary excavation spoils and right-of-way (ROW) access for incidental activities such as transmission and gas piping.

The Project is a nominal 370 MW CCGT power plant with the capability to generate up to a maximum of 380 MW under optimum ambient conditions. Nominal output is used for convenience by manufacturers to compare generation associated with various technologies. Actual output from the Project will vary with seasonal ambient conditions. Further description on the electrical generating process can be found in Section 10.0, with estimated waste and emissions from the Project defined in Section 14.0.

Figure 9-2 Project Concept Rendering (Looking East)

Figure 9-3 Project Concept Rendering (Looking North)

9.2 Physical Works Associated with Construction

Construction physical works include temporary structures and facilities needed to manage the Project such as construction management trailers, laydown space, parking space, construction utilities, and temporary security measures.

9.2.1 ACTIVITIES

9.2.1.1 Pre-construction

Project pre-construction activities will include land and geotechnical surveys required for design and construction. Land surveys will identify site boundaries and topographic details required for site preparation and grading. Geotechnical surveys will be conducted to gather information on soil consistency and structure needed for piling and foundation design. During this time, SaskPower will also seek the appropriate regulatory approvals and permits, raise Project awareness through community outreach, and select the construction contractor(s) and technology provider(s) to deliver the Project.

Detailed project planning will occur during this phase. Prior to contractor mobilization a site procedures manual will be developed and will include a site Emergency Response Plan (ERP), an environmental management plan (EMP) that will include a Spill Contingency Plan, and site safety procedures.

9.2.1.2 Site Preparation and Grading

Site preparation activities will be performed prior to any other construction work. The developed portion of the Project site will be stripped of topsoil and organic matter. The topsoil will be stockpiled for later use in landscaping. The Project site will be excavated or filled, where required, to bring the Project site to the required elevations. Excavation spoils will likewise be temporarily stockpiled on site. Excavated materials, where possible, will be re-used as fill. The intent will be to balance excavation and fill quantities, to avoid importing or exporting material as much as possible.

The Project site will be graded to drain into main collection ditches. The Project site surface will be graded to a slope of one vertical to 100 horizontal, where site conditions and elevations allow, permitting rapid removal of surface water. Some locations within the power block will be drained by a catch basin and piping system. The main collection ditches will have a trapezoidal cross-section shape, with a minimum bottom width of 1.2 metres (m). The side slopes will be designed to the soil conditions present on site. Ditches shall be designed to be adequately protected from erosion after excavation to maintain slope stability using vegetation or other engineered means.

The general sequence of the Project site preparation construction will be to begin work in the main Project area and in the construction management trailer area/parking lot area. Following the initial work, the balance of the Project site preparation construction scope will be performed, which includes installing the Project site fence, preparing the switchyard area, excavating the wastewater and storm water ponds, installing the storm water collection system, and developing the main construction roads on the Project site.

9.2.1.3 Foundation Excavation and Construction

Foundation construction will begin as soon as site preparation work permits. There may be some overlap of site preparation and foundation work (for example, foundations may be installed in the main powerhouse area while pond excavation is ongoing to optimize Project schedule). Piling work will begin first, followed by installation of major equipment foundations and substructures. The Project will utilize either driven steel piles or auger-cast piles, depending on findings during the pre-construction phase. Dewatering activities are not expected during the foundation excavation. If the foundation excavation becomes saturated and dewatering activities need to take place, SaskPower will submit a dewatering plan to the WSA to ensure the proper permitting is in place.

Duct bank, grounding grid, and underground piping installation work will be completed in parallel to the foundation work in the same areas.

9.2.1.4 Building and Equipment Installation

Above grade construction activities will commence at completion of foundation work. It is during the building and equipment installation phase that craft labour force will peak at the Project site. To effectively manage the workforce, SaskPower expects that this phase will be broken up into the following scopes of work:

- above-ground mechanical erection (including the HRSG, above ground piping, and balance of project (BOP) equipment)
- powerhouse Building erection
- multipurpose Building and Storage Building erection
- field erected tanks (storage for demineralized water, and service / fire water)
- above-ground electrical construction
- erection of the ACC
- installation of fire protection and detection equipment
- switchyard construction, including above grade poles, line, and miscellaneous components for a complete generating station / transmission line interface

9.2.1.5 Commissioning and Testing

Start-up and commissioning of the Project involves a documented, safe, timely, and orderly transition from construction to operation and maintenance. It includes testing, start-up, and transfer of all packages, systems, and facilities. Planning for this transition will begin in the engineering stage, with the definition of Start-up Packages. EPC planning will strive for early commissioning of as many packages as practical. Early checkout and testing will help distribute the start-up workload more efficiently, reducing risk and uncertainty associated with Project start-up and commissioning.

The principal activities during this stage are as follows:

- start-up planning and preparation
- start-up and commissioning management
- start-up and commissioning of the Project, including the following major activities:
  - Cold commissioning (pressure testing of piping, continuity testing on wire and cable, etc.)
  - Hot commissioning:
    - Backfeed (energization of major equipment for the first time, using power from the grid)
    - Cleaning, inspections, and "button-up" of the HRSG and ACC
    - Flushing of the gas turbine generator (GTG) and steam turbine generator (STG) oil systems
    - GTG "first-fire" and rough tuning
    - HRSG "steam-blows" (generating steam through the HRSG and temporarily venting to atmosphere, to ensure proper steam cleanliness before introducing steam to the STG)
  - Facility testing, including operational testing in both simple and combined cycle
- operator training

Chemical cleaning will be utilized to remove grease and other contaminants in the HRSG, with all debris and cleaning agent contained and properly disposed. Once all systems have been properly cleaned and flushed, the GTG will be ready for first-fire. With the GTG running, steam generated in the HRSG from the GTG exhaust will be used to conduct steam blows. After steam blows are complete, the STG will be started to electrically synchronize to the grid. The Project team will then tune the unit to optimize performance. The final activities in the commissioning process will be facility testing. Facility testing for the Project will include performance tests, function and demonstration tests, noise and emission tests, and reliability tests.

9.2.2 PERMANENT STRUCTURES

Permanent structures will include only the Project infrastructure described below in Section 9.3.2. Construction fuel gas piping and the construction power feed will remain in place to support any future potential maintenance work throughout the operating life of the Project.

9.2.3 TEMPORARY STRUCTURES

At the conclusion of the construction phase of the Project, construction management facilities and temporary fencing will be removed from the Project site. Most of the developed construction management area, including laydown and temporary parking, will have rock surfacing removed and replaced with topsoil and grass seed. A rock surfaced area will remain for maintenance trailers and approximately 50-60 electrified parking stalls for future maintenance activities during operation and maintenance.

9.2.3.1 Security

Site security will be increased throughout the Project lifecycle. In the early construction phases, a permanent site security fence will be erected. A temporary fence surrounding the construction laydown area will also be constructed. Workers will be required to sign in and out of site. When trade staff levels require increased safety and monitoring on site, temporary site security services will be implemented. This requirement will include a turnstile and a digital access control system to assist with tracking labour force onsite. After commissioning is complete, a permanent closed-circuit television system will be used to monitor and control site access.

9.2.3.2 Construction Parking

The construction parking lot will be located on the north side of the Project site as shown on the Project site layout drawing. The parking area will be constructed by the Project site preparation subcontractor and will be approximately 105 m by 135 m. In developing this area, existing topsoil will be stripped, and a layer of geotextile fabric plus crushed rock will be placed. It is expected that construction management personnel at the superintendent level and above will be allowed to park on-site near the construction office trailers. Upon Project completion, approximately 50-60 electrified stalls in the construction parking lot, will remain, to support future maintenance needs of the Project. The remainder will be stripped of crushed rock and geotextile, then replaced with topsoil and grass seed.

9.2.3.3 Construction Laydown

The construction laydown area will total approximately 6.5 ha along the north and east sides of the Project site. Like the parking lot, existing topsoil will be stripped, and a layer of geotextile fabric plus crushed rock will be placed. Most of the construction laydown space will be utilized for temporary storage and staging of deliveries. A smaller portion of this space will be reserved for on-site fabrication. Here, piping and some supplemental steel will be prefabricated and/or assembled at grade elevation prior to being lifted to the final locations. Upon Project completion all construction laydown areas will be stripped of crushed rock and geotextile, then replaced with topsoil and grass seed.

9.2.3.4 Construction Management Facilities

Construction management office trailers will be constructed early in the Project to house the EPC Contractor and SaskPower construction management personnel. Additional trailers will be provided to accommodate subcontractors as well as site representatives from major equipment suppliers. Prior to the installation of the permanent utilities, temporary facilities may be required such as a portable generator, portable toilets, and sanitary storage facilities.

The construction trailer area will be established near the construction parking lot. The construction trailer area will be approximately 40 m x 147 m (0.59 ha) and used by all the construction management personnel. The construction trailer area will include office space and restrooms for management staff, plus larger congregating areas for site-wide safety meetings, training, and break areas.

Contractor storage trailers and tool bins may also be located here with approval from the construction management team. Storage trailers and tool bin locations will change as construction progresses.

9.3 Physical Works Associated with Operation and Maintenance

Operation and maintenance physical works will include all structures and equipment to be located at NW 36-33-24-W2M. These include the powerhouse, multipurpose building, storage building, and BOP infrastructure described above. Additionally, operation and maintenance physical works will include the incidental activities required for operation and maintenance infrastructure mentioned above.

Figure 9-1 and Table 9-1 provide additional detail of physical works associated with the operation and maintenance of the Project.

9.3.1 ACTIVITIES

The Project will be owned and operated by SaskPower. Day-to-day operation and maintenance will be provided by a staff of operators, engineers, and support staff totaling approximately 25 people. Additional support staff will be available from the other natural gas generating facilities in the SaskPower fleet.

A detailed description of the generation process can be found in Section 10.0. The Project will have the capability to operate in simple cycle mode, using the GTG only (no HRSG or STG) for rapid load response to support intermittency associated with renewable generation. In addition, the Project will be able to operate in combined cycle mode, achieving higher overall thermal efficiency and output through utilization of the HRSG and STG. The Project will initially start in simple cycle mode and will transition over to combined cycle operation when increased load is required and will typically operate between 50% and 100% of GTG load. The Project site will be monitored and controlled in the local control room as well as SaskPower's grid control centre and will be operated using Automatic Generation Control (AGC) for the purpose of load following variable renewable generation. The Project is anticipated to require up to 100 starts per year and operate up to 2200 hours per year.

9.3.2 PERMANENT STRUCTURES

9.3.2.1 Powerhouse

The Powerhouse is a T-shaped building which encloses the GTG, STG, HRSG, and other BOP electrical and mechanical equipment. The footprint of the building will be approximately 5,400 m^2 (0.54 ha). The GTG/HRSG portion of the building will be approximately 85 m x 45 m, whereas the STG portion of the building will be approximately 45 m x 35 m. The height of the powerhouse building will range from approximately 15 m to 40 m. There will be two exhaust stacks, each anticipated to be 52 m tall and constructed from steel:

- A bypass stack will be connected directly to the GTG exhaust and penetrate through the roof of the powerhouse building. When operating in simple cycle mode, a damper will divert GTG exhaust gas through this stack, “bypassing” the HRSG and steam cycle.
- When operating in combined cycle mode, the damper will divert GTG gas through the HRSG, where exhaust heat will be recovered to produce steam for the STG. The cooled exhaust gas will then exit the second stack connected to the back of the HRSG.

In addition to the GTG, STG, and associated auxiliary equipment, other BOP equipment will be in the powerhouse building. This equipment includes the boiler feedwater pumps, HRSG blowdown tank, air compressors, dryers and receivers, sample panel, etc. The continuous emissions monitoring system (CEMS) will also be located indoors in its own enclosure, with monitoring probes connected to each of the two stacks.

9.3.2.2 Multipurpose Building

A multipurpose building will be constructed to house the operating and maintenance staff. The building is expected to be a pre-engineered steel frame structure with walls consisting of outboard cold-formed girts for the attachment of exterior metal panel and insulation system and roof consisting of cold-formed purlins to support the metal roof panel and insulation system. The preliminary dimensions of the areas within the multipurpose building are as follows:

- control room/administration rooms: 42 m x 15 m
- warehouse: 16 m x 18 m
- maintenance shop: 13.5 m x 18 m, and
- water treatment area: 38 m x 28 m

The administration/control room building will contain offices, a lunchroom, a distributed control system room, an operating control room, and washroom facilities. The building will be occupied 24 hours a day by operating and support staff. The warehouse will be used for storage of all critical spare parts and day to day consumables that are required for Project operation and maintenance. The maintenance shop will be used by trade staff to perform routine repair and maintenance for Project equipment.

The water treatment equipment will be located at the south end of the multipurpose building. The water treatment equipment will be used to treat either on-site well water or non-potable water sourced from SaskWater and to recycle process water for reuse. The equipment will include mixed bed ion exchangers, a reverse osmosis (RO) system, ultrafilters, chemical storage totes, and chemical feed pumps for cycle chemical control. The mixed bed ion exchangers will be rental units with regeneration taking place offsite by the supplier.

Secondary containment will be installed around all equipment, unloading pads, or storage tanks that contain oil or chemical in volume greater than or equal to 189 L. The secondary containment will be designed to meet the local, provincial, and federal requirements pertaining to hazardous substances, dangerous goods, and oil storage. If possible, the secondary containment areas will be sloped. Oil containments will include a manual drain valve piped to the oil water separator.

An enclosed breezeway will be constructed to connect the multipurpose building and the powerhouse. The multipurpose building will incorporate Universal Design to meet accessibility standards, where applicable. These standards include wheelchair-accessibility, gender-neutral washrooms, push door operators, accessible entrances and ramps, accessible stairways and elevators where applicable, washroom accessibility features, slip-resistant floors, and appropriate lighting.

9.3.2.3 Storage Building

A standalone storage building (37 m x 37 m) will be constructed to support outage maintenance and storage of equipment and materials during construction and future operation of the Project. One half of the building is for heated storage, typically used for storing materials or equipment that are emergent and need to be kept warm for reliability. The other half of the building is for cold storage, typically for storing materials or equipment that need to be secured for prevention of theft or weather damage.

The building is a pre-engineered framed structure with walls consisting of outboard cold-formed girts for the attachment of exterior metal panel and insulation system and roof consisting of cold-formed purlins to support the metal roof panel and insulation system.

9.3.2.4 Balance of Project Infrastructure

The ACC is a heat exchanger which condenses steam from the steam turbine to condensate. Fans, driven by electric motors, provide cooling air to the heat exchangers. The condensate collects in the condensate manifolds and gravity is used to drain the condensate to the main condensate tank. Condensate is then pumped from the condensate tank to the feedwater system to go through the steam cycle again. The ACC will be located near the northeast corner of the power station (roughly in the centre of NW 36-33-24-W2M) with an overall dimension of approximately 65 m x 56 m with a height of approximately 26 m.

A 5 m x 14 m pre-engineered fuel gas enclosure will be in the southeast corner of the Project. Inside this building will be a performance gas heater where feedwater is used to heat up fuel gas, a fuel gas filter/separator, and a knockout tank. This equipment will be used to prepare the natural gas for combustion in the gas turbine.

A water/glycol loop will be used in a closed-cycle cooling water system to cool various STG, GTG, and BOP equipment. The water/glycol loop is cooled by a fin-fan heat exchanger. Motor operated fans provide cooling air to the heat exchanger. The closed cooling water fin-fan heat exchanger measures approximately 10 m x 42 m and will be located outdoor adjacent to the powerhouse.

The electrical generator systems convert the mechanical rotating energy of the combustion and steam turbines into electrical energy to supply the power system load through the three-phase Generator Step-Up (GSU) Transformers to the high-voltage transmission system.

The high-voltage switchyard and transmission system provides the interconnection between the Project electrical system and the utility electrical grid for the transfer of power generated out of the Project, and supply of start-up and auxiliary power into the Project.

Two field erected water tanks, fire/service water and demineralized water, will also be located on site. The fire/service water tank will have a capacity of approximately 1,892,706 L whereas the demineralized tank is estimated to have a capacity of 567,811 L. The water storage tanks serve to improve operational reliability of the unit in the event of interruption of water supply from on-site wells, or equipment malfunction in producing demineralized water.

A 1,250-kilowatt (kW) emergency diesel generator will be installed to ensure the Project is in a ready-to run condition following a unit trip or loss of external power. The emergency diesel generator will be connected to an essential services electrical bus to supply power to critical Project components.

An oil/water separator located near the multipurpose building is used to separate oil from the water that will be collected from the Project drains. The oil/water separator will be designed to remove 20 micron and larger oil droplets to concentrations of less than 10 parts per million (ppm). It will be designed to store 3,785 L of oil. The oil/water separator will be constructed as a double walled buried tank and will have a leak monitor to detect a breach in the inner tank wall. Clean effluent will be recycled back to the fire/service water tank while the collected oil will be disposed offsite at an appropriate disposal facility periodically.

A septic tank and leach field will be installed on site to collect and dispose of sanitary waste streams. No wastewater infrastructure will be required to support the Project.

A storm water pond will also be constructed for the Project. The storm water pond will be designed to retain all site drainage water. The pond is estimated to be 35 m x 200 m (0.70 ha) in size.

Aside from storm water runoff, the Project will not discharge any liquid waste off site. To achieve this, a new evaporation pond will be constructed on the Project property to receive process wastewater streams. The evaporation pond will be sized based on the necessary evaporation rate and site ambient conditions. It is expected that the pond will be approximately 557 m x 172 m (9.58 ha) in size (excluding the surrounding berm). With the soil berm, the pond is expected to be approximately 585 m x 200 m (11.70 ha) in size. A high-density polyethylene (HDPE) or clay liner will be installed to ensure wastewater collected does not infiltrate native soil. SaskPower will be responsible for maintaining this liner and monitoring the pond for leakage as part of their operating procedures.

A permanent parking lot will be located on the north side of the multipurpose building and will have approximately 30 parking stalls to accommodate operation and maintenance staff and visitors. Additional parking spaces will be located along the west and south sides of the multipurpose building, next to the water treatment area. Parking surfaces will be paved.

A security fence will be constructed around the perimeter of the Project site to stop humans and animals from entering the Project site. The fence will be installed early in the construction period for added security and safety.

The Project will include several other permanent small buildings or enclosures including the fire water pump enclosure, emergency diesel generator, and three electrical equipment modules - the control and monitoring module, a gas turbine electrical building, and the CEMS and HRSG control enclosure. Enclosures will be designed for equipment protection as well as applicable noise mitigation.

An underground wash water drain tank will be located to the north of the GTG building. The 3 m x 5 m tank will collect water from the compressor wash and will be hauled off site periodically for disposal at an approved facility.

9.3.3 TEMPORARY STRUCTURES

No temporary structures associated with operation and maintenance are anticipated.

9.4 Incidental Activities

This section provides a description of the activities incidental to the designated project required during construction and operation and maintenance. In addition to the requirements stated in Schedule 2, Section 4 of the *Information and Management of Time Limit Regulations*, a separate application for the Project, including all incidental activities will be submitted to the EASB in mid-2023 for approval. The activities incidental to the Project during construction and operation and maintenance include:

- 25 kV Distribution power line
- 230 kV Overhead transmission power line
- underground Fibre-optic line(s) for telecommunications
- road improvements
- underground water supply pipeline
- underground natural gas supply lines
- relocation of existing natural gas lines

9.4.1 25 KV DISTRIBUTION POWER LINE

The Project will require connection to SaskPower's existing power distribution system to support construction activities. SaskPower will be responsible for routing, constructing, and operating the construction power feed to the Project site. A step-down transformer will provide construction power at an estimated service capacity of 3,000 amps at 480 volts. It is expected that this supply will be tapped off a newly built overhead 25 kV line located directly south of the property. It is anticipated that the total length of these tap-off underground cables will be approximately 800 m within a 10 m-wide ROW.

The newly built 25 kV line will include:

- Building approximately 8 km of new overhead distribution line within the developed road allowance from the Project to tie-in to an existing powerline located within the TransCanada Yellowhead Highway 16 road allowance.
- Rebuilding approximately 10 km of existing, aging 14.4 kV line within the developed TransCanada Yellowhead Highway 16 road allowance.
- Building an additional 4 km of new overhead distribution line from the TransCanada Yellowhead Highway 16 road allowance to a tie-in point on an existing distribution line south of Lanigan, Saskatchewan.

The new line will not be dedicated for the Project and may be used for future supply to rural customers in the area. Distribution line routing, stakeholder engagement, regulatory approvals/permits, construction, and operation and maintenance are the responsibility of SaskPower.

9.4.2 230 KV TRANSMISSION POWER LINE

The Project will require a dedicated 230 kV overhead transmission line to connect the Project to the electric grid. SaskPower is planning to route, construct, and operate an approximately 2.5 km-long new 230 kV transmission line within a 40 m-wide ROW to interconnect the Project with SaskPower's existing WLSS located directly west of the Project in NE 34-33-24 W2M.

A preliminary desktop study and ground reconnaissance of the area between the Project and the WLSS was performed in June 2022. Based on these assessments, a study area located within the RM of Usborne consisting of three-quarter sections was identified. The boundaries of the study area are presented in Figure 14-2.

The new 230 kV transmission line will use the last open position in the southwest corner of the WLSS and the point of interconnection is located on the west side of the Project site. The new line will require the crossing of six existing transmission lines. Due to these technical constraints, SaskPower will work directly with the three impacted landowners to address any concerns with structure placement during the line design process.

9.4.3 TELECOMMUNICATIONS

Telecommunications through a fibre-optic line will be required for operation and maintenance of the Project. Installation of this infrastructure is considered complementary and for the sole benefit of the Project. Existing fibre-optic cables are in place at the WLSS in support of SaskPower's existing switching station control systems. A new fiber optic line will be installed underground between the existing WLSS and the Project site, following the same 2.5 km route as the 230 kV transmission line (see Section 9.4.2 above). This fibre line may be installed earlier, schedule permitting, to provide service throughout the construction phase as well. SaskPower will be responsible for routing, constructing, and operating the fibre-optic line.

9.4.4 ROAD IMPROVEMENTS

New roads are not required for the Project; however, the primary site entrance will be located 1.65 km south of the TransCanada Yellowhead Highway 16off of Range Road 2241. Tentatively, primary access to the Project is expected to be via Range Road 2241 which is currently a 6.25 m wide, gravel-surfaced rural road. This portion of road between TransCanada Yellowhead Highway 16 and the Project entrance may require improvement to support construction traffic and loads. Likewise, turning lanes may need to be added to TransCanada Yellowhead Highway 16 at this intersection to accommodate the expected increase in traffic. The final travel route to access the Project site will be finalized in consultation with the RM of Usborne and RM of Wolverine No. 340, as required. Any road modifications, improvements, maintenance, and dust control requirements would be under the care and control of the RM of Usborne and RM of Wolverine.

SaskPower will coordinate with the RM of Wolverine and the Saskatchewan Ministry of Highways (MOH) to meet compliance with applicable road restrictions and transportation requirements during the construction period.

Any road improvements made to support construction of the Project will remain for use during operation and maintenance, as well as for use by the local community.

9.4.5 WATER SUPPLY INFRASTRUCTURE

The overall estimate for construction water consumption is approximately 55 million L (55,000 m^3) as shown in Table 9-2. Construction water will be used for dust suppression and soil compaction during site preparation and foundation installation. The water consumption estimates provided below are estimates based on previous SaskPower projects of similar scope and size. It is estimated that one truck per day for four days per week will be required for dust suppression. Water consumption for soil compaction is based on expected earthwork quantities.

As construction progresses, additional water will be used to support hydrostatic pressure testing of piping systems, flushing, and first fills. For approximately 1-2 weeks during commissioning, a temporary increase in water demand beyond well capacity will be required to support steam blows (see Section 24.1 for additional detail). SaskPower will work with local RMs, if necessary, to source this temporary water need and deliver to site by truck.

Table 9-2 Estimated Volume of Water Required During the Construction Phase

Construction Activity	Volume (m^3)
Site Preparation / Foundations / Dust Suppression	17,034
Hydrostatic Testing	7,003
Commissioning[(a)]	46,182
Total	70,220
Note: (a) Peak water demand will be expected during steam blows	

SaskPower constructed two water supply wells (13-01, & 13-02) and a monitoring piezometer (13-03) on the Project quarter section in the winter of 2013. A well testing program was completed between September 6 and September 8, 2022 to test the water supply wells and determine the hydraulic characteristics of the Empress Group Aquifer and make recommendations for long-term sustainable flow rates and pump settings. Based on the testing program, Well 13-01 has a recommended maximum flow rate of 4 L/s (63 US gallons per minute (gpm)) and Well 13-02 has a recommended maximum flow rate of 6.5 L/s (102 US gpm). These wells will be used to support the water consumed during the construction phase of the Project and are regulated under the Saskatchewan Water Security Agency.

During operation and maintenance, the Project will require a continuous flow rate of approximately 1.3 L/s (20 US gpm) for normal operations, with peak continuous rates of roughly 6.5 L/s (102 US gpm) anticipated during summer months.

SaskWater will construct and tie-in a water pipeline to supply water to the Project site. SaskWater is responsible for routing, constructing, operating and maintaining the waterline. Preliminary routing shows the pipeline will be routed within a 30-m wide ROW along the west side of SW 36-33-24-W2M approximately 800 m in length between the corner of the Project site and the proposed tie-in point to an existing waterline in the corner of NW 25-33-24-W2M. SaskWater has indicated it will either be located within private land or in the developed RM road allowance.

All water used for Project operations and maintenance will be sourced from the Zelma Reservoir through existing SaskWater infrastructure. The Zelma Reservoir is connected to Lake Diefenbaker via a canal system that includes seven reservoirs collectively named the Saskatoon Southeast Non-potable Water Supply System. These connected water bodies include Broderick Reservoir, Brightwater Reservoir, Blackstrap Reservoir, Bradwell Reservoir, Zelma Reservoir, and Dellwood Reservoir which are supplied with water via Lake Diefenbaker and via surface water runoff. All of these water bodies, including Zelma Reservoir, are used by rural communities as well as commercial entities for their supply of non-potable water (drinking water supplies, agriculture-based irrigation, municipal irrigation, treatment systems, industrial uses, etc.). The Project's maximum usage from Zelma Reservoir of 48.5 l/s is a fraction of the 2800 l/s capacity for the canal that feeds Zelma. The entire Saskatoon Southeast Non-Potable Water Supply System moves approximately 68 billion litres annually (68,006 cubic decametres).

9.4.6 NATURAL GAS INFRASTRUCTURE

TransGas is a wholly owned subsidiary of SaskEnergy Incorporated (SaskEnergy) and responsible for the transmission and storage of natural gas within the province of Saskatchewan. TransGas is in the process of determining the infrastructure requirements to provide natural gas to the Project and will be the proponent for the construction of a proposed compressor station, meter station and natural gas supply pipeline (up to the SaskPower property boundary). The natural gas infrastructure is outside the care and control of SaskPower with no ability to direct or influence the activities.

According to TransGas, the Project location is in an area with substantial industrial activity, with several nearby potash mines currently served by TransGas pipelines that are operating at or near capacity. The proposed pipeline and associated facilities, while being constructed primarily to serve the Project, will be designed and constructed to provide ancillary benefits and capacity to support other natural gas customers in the area. Some of the TransGas system benefits associated with this proposed pipeline could include:

- Incremental volume in the area to support future growth.
- Secondary source of supply to accommodate planned or unplanned outages on existing pipelines.
- Renewal of certain affected facilities.

The natural gas infrastructure will be subject to the regulatory approval process under the Saskatchewan Ministry of Environment (SK ENV), Saskatchewan Ministry of Energy and Resources, and the Ministry of Parks, Culture and Sport. TransGas will make applications to these regulators to obtain approval to proceed with the natural gas infrastructure prior to beginning construction. Refer to Appendix D for more information.

Additionally, SaskPower and TransGas understand the challenges faced to decarbonize industry by 2050, and the need for clean natural gas supplies. All market participants transporting gas on the TransGas pipeline system must adhere to their standard natural gas quality specifications denoted in the TransGas tariff (Gas Quality | TransGas). SaskPower and TransGas meet regularly to discuss industry developments, adoption of technologies, progress of active and potential pilot projects in order to apply the knowledge in assessments for opportunities in Saskatchewan. Through TransGas' Customer Dialogue process, the industry committee discusses the potential impacts to changes in the TransGas gas quality specifications.

SaskPower and TransGas will continue to jointly collaborate with other counterparties shipping natural gas on the TransGas pipeline system (producers, marketers, end users, etc.) to evaluate future potential outcomes of adopting cleaner fuels to align with Canada's climate targets and regulations. SaskPower will strive to procure the best option as it becomes available.

9.5 Physical Works Associated with Decommissioning

In general, the overall duration of the decommissioning process, as well as the size of the crews involved, are expected to be substantially less than that required for construction of the Project. Physical works during the decommissioning phase will include temporary structures and facilities needed to manage the decommissioning scope such as construction management trailers, waste storage areas/containers, parking space and construction utilities. At the completion of the decommissioning phase these temporary provisions will be removed from the Project site. No new permanent structures will be constructed.

The Project is expected to operate until 2047. Precise timing for the decommissioning of the Project cannot be predicted at this time as it depends solely on the mode of operation. However, all relevant environmental regulations in existence at the time of decommissioning will be adhered to.

9.5.1 ACTIVITIES

In order for SaskPower to operate the Project, an Authorization to Operate must be obtained from SK ENV. As part of this Authorization, SaskPower is required to provide a comprehensive decommissioning and reclamation plan (D&RP). This plan is reviewed periodically for completeness and adherence to environmental laws/regulations as they may change periodically. This D&RP will guide SaskPower's activities and will outline the decommissioning and reclamation objectives, methodologies, and estimated costs to be submitted as a required part of the provincial Authorization to Operate application process.

The decommissioning will begin when SaskPower's Asset Management Group determines the station is at the end of life such that the decommissioning activities can ensue. SaskPower will review the Project D&RP, formally allocate funds, assign a project manager, and confirm the schedule of the decommissioning activities. When a project manager is assigned, he or she will be responsible for consulting with the environmental regulatory agency and will likely begin stakeholder consultation and complete an environmental decommissioning impact review.

Prior to demolition, the following measures will be taken:

- Floor drains, trenches, and sumps will be cleaned, and any materials removed will be tested and disposed of at approved facilities, as required.
- Oil and chemicals will be drained from the equipment and disposed of at approved facilities.
- Recycling of materials, rather than disposal in the landfill will be conducted, wherever practical.
- Charged Energy from electrical and mechanical systems will be removed.

During the first year of demolition activities, major equipment, piping, and electrical and mechanical infrastructure will be removed from site. As the year progresses it is expected that the Project and associated buildings (powerhouse, warehouse, administration/water treatment plant, etc.) will be removed from site.

The second year will see more underground work progress. Foundations and pilings will be removed to 1 m-below grade and the excavation backfilled and rubble will be crushed for use as base material. The gravel surface will be stockpiled on site for possible sale and metal will be sold for salvage. It is anticipated that small diameter underground piping may be left in the ground but any above or below ground storage tanks will be removed. After the decommissioning has been completed, only the foundations, pilings and HDPE pipe 1 m-below grade will remain on site. These will be identified in a caveat registered on the property title.

At the closure of the Project, the site will be reclaimed in accordance with industry standards and applicable environmental guidelines and regulations. It is expected that the site will be graded, contoured, and revegetated with an appropriate seed mix. Post-operation monitoring and an adaptive management approach will be taken to ensure reclamation success.

Below is the forecasted D&RP for incidental activities:

Electrical Power Infrastructure

The transmission and distribution incidental activities (Sections 9.4.1.1 and 9.4.1.2) specific to the Project will be removed when the CCGT facility is retired. Any reusable equipment, poles, conductors, or hardware will be salvaged. Unusable materials will be disposed in an approved manner and/or sold for scrap.

Fibre optic Line

The fibre optic communication line (Section 9.4.3) to the Project will run between the WLSS and the Project site. The line will terminate in a pedestal on the edge of the property. It is expected the fibre optic cable will be abandoned or repurposed by SaskTel or SaskPower following the retirement of the Project.

Road Upgrades

Road infrastructure (Section 9.4.4) to and from the Project, which are under the care and control of the RM of Usborne, will be maintained following the decommissioning of the Project.

Water Line

The water supply line to the Project is provided by and under the care and control of SaskWater (Section 9.4.5). At decommissioning, SaskWater will determine whether the pipeline will be removed or abandoned.

Natural Gas Infrastructure

The natural gas supply infrastructure for the Project is provided by and under the care and control of TransGas (Section 9.4.6). At decommissioning, TransGas will isolate, make safe and evaluate removal of their supporting infrastructure and pipeline based on other customer natural gas needs at that time.

10 Project Production Capacity and Process

10.1 Maximum Production Capacity

The Project will be a CCGT electric power generation facility which will use natural gas to produce a nominal 370 MW of electricity, with the capability to generate up to a maximum of 380 MW under optimum ambient conditions. These are the expected gross amounts of electricity generated by the Project. During operation and maintenance, the Project will draw power from itself to run equipment and other house services. The expected net export of electricity to the grid will vary with ambient conditions, operating mode, and grid load requirements, with a projected maximum of 374 MW. The remainder of this document will reference the generating capacity for this Project as a nominal 370 MW of electricity.

10.2 Production Process Description

The 370 MW capacity of the Project is derived from two primary electric generators. A GTG with a nominal capacity of 250 MW, plus a STG with a nominal capacity of 120 MW. In addition to the two generators, the Project will consist of one HRSG and one ACC. In the rare event of a generator trip or other power loss, a 1.25 MW diesel generator will provide emergency power to essential loads, such as turbine lube oil pumps to enable safe shut down of equipment and systems and prevent equipment damage.

The general process for the Project is to combust natural gas in a gas turbine, which is coupled to an electric generator to produce power. Gas turbine exhaust temperature can range from 590ºC to 630ºC at the outlet of the gas turbine. This heat from the exhaust gas is then “recovered” in the HRSG, which is a waste heat boiler that produces steam at three pressure levels (high, intermediate, and low). This steam is utilized in the steam turbine, which is also coupled to an electric generator for additional power output.

Exhaust steam exits the low-pressure section of the STG and is ducted into the ACC. The ACC is a heat exchanger where ambient air is drawn from the surroundings by the fans to condense the exhaust steam into condensate, which is collected in a tank. Condensate is then pumped into the deaerator, and then from the deaerator via the boiler feedwater pumps to the HRSG, and the steam cycle repeats.

This type of power plant is known as a CCGT electrical power generation facility. Due to the waste heat recovered, CCGT plants are one of the most efficient and reliable generation technologies available. Refer to Figure 10-1 for an overall process flow diagram.

The Project will be similar in size to SaskPower’s Chinook Power Station located near Swift Current, as well as the Great Plains Power Station currently under construction near Moose Jaw. There will be one key difference from these projects, which is the inclusion of a HRSG bypass stack. CCGT facilities are often utilized for baseload generation due to their high efficiencies. However, inefficiency can arise if full capacity is not utilized (for example, if the Project is run at partial load). As GTG exhaust gases flow into the HRSG, a constant flow of water must be supplied for steam production, which in-turn requires auxiliary power from pumps and other Project equipment. In start-up or part-load situations, steam may be produced but not sent to the STG, in which case auxiliary power is being consumed unnecessarily.

To support SaskPower's supply plan of increased production from renewable sources, SaskPower anticipates a higher need for part load and rapid response generation. By including a bypass stack with the Project, SaskPower will have the ability to start-up and operate the GTG independently (simple cycle gas turbine (SCGT)) mode if needed, independent of the steam cycle. Conversely, if demand is high, SaskPower can operate in CCGT mode to maximize output and efficiency. The ability to start and operate in simple cycle enables faster start and response times to support grid response to renewable generation and system disturbances.

GTG exhaust will be emitted to atmosphere either through the bypass stack or HRSG stack, depending on the mode of operation. For the Project, the emissions are controlled through utilization of Ultra Low nitrogen oxide ($NO_{x)}$) (ULN) burners within the GTG itself, which optimizes the ratio of combustion air to fuel as well as combustion temperature to control NO_x emissions during the combustion process. This design means that bypassing the HRSG and operating in SCGT mode does not change emissions produced by the combustion turbine generator (CTG). Emissions associated with the Project are discussed in detail in Section 24.0.

Electric power will be generated by the GTG and STG at an intermediate voltage (between 13.8 – 18 kV). Auxiliary transformers will siphon off some of the produced electricity and voltage to 4.16 kV to support facility loads. The remaining (net) electricity generated will pass through GSU transformers where voltage will be increased to 230 kV for transmission to the grid.

Natural gas will be utilized as the fuel source for the Project. Natural gas will be delivered to the Project site via a buried gas line, approximately 16" in diameter. Prior to entering the GTG, natural gas will be filtered to remove excess moisture and particulate. The incoming gas will also be heated via a water-bath type dewpoint heater, to prevent any moisture condensation as pressure is regulated.

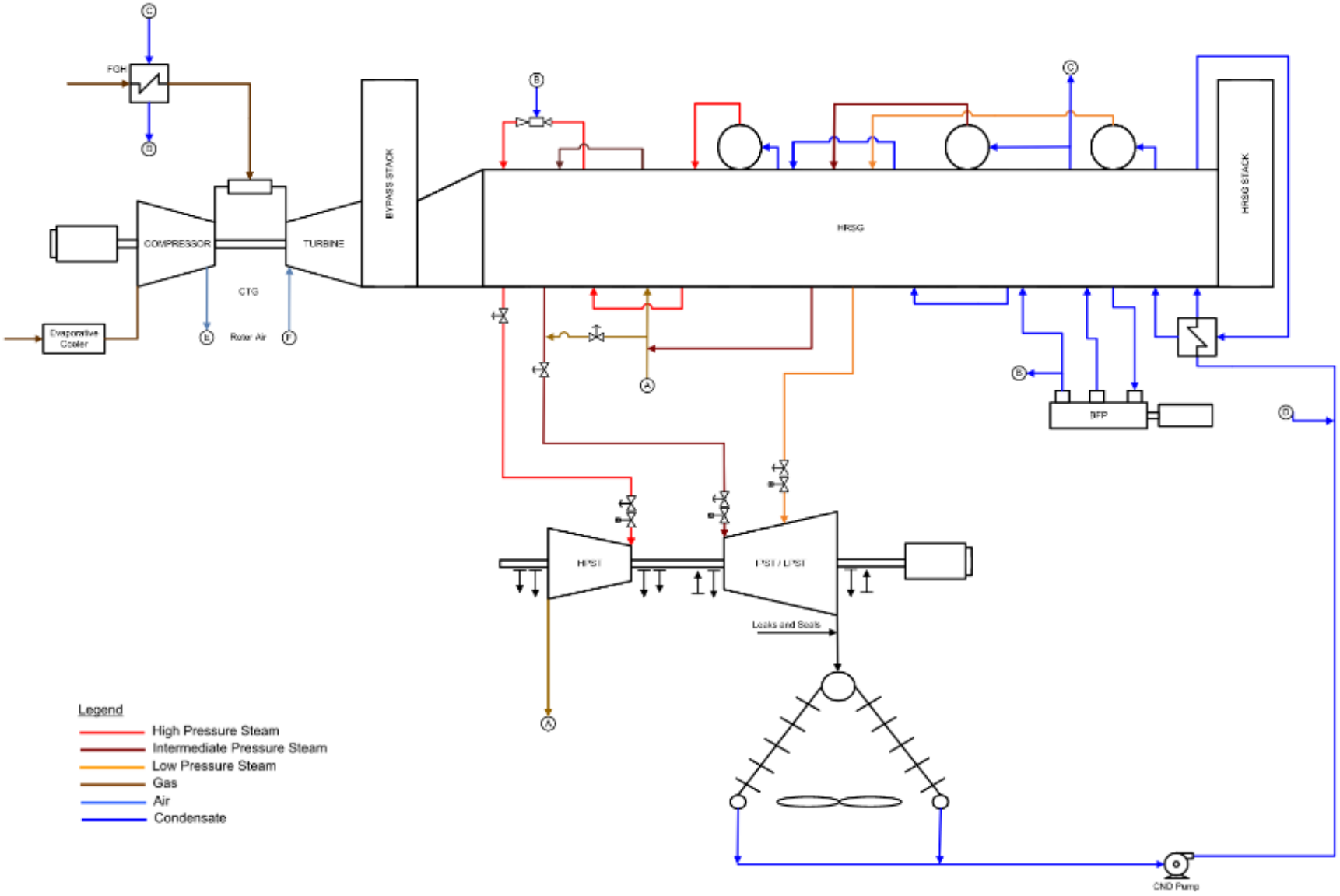
The Project will require raw water for makeup to the steam cycle, as well as the GTG evaporative cooler in warmer months. Water treatment equipment such as filters, RO units, and mixed bed ion-exchange vessels will be used to treat incoming raw water. Water chemistry in the steam cycle will be controlled through injection of chemicals including amine, phosphate, and ammonia to minimize corrosion and prevent scale formation.

Wastewater will be generated from the water treatment processes, steam cycle blowdown, and evaporative cooler blowdown. The estimated process wastewater that will be discharged during normal operation and maintenance, will range between 46 L/minute and 150 L/minute (67-216 cubic metres per day (m^3/day)) across various ambient conditions. Water that cannot be recycled to Project processes will be sent to the on-site evaporation pond.

Site water from rain, snowmelt, and runoff will be managed through a series of ditches and culverts. In the power block area, there will be on-grade duct banks that will make routing water to ditches difficult. As a result, the storm water in the power block area will be drained to inlets and routed via underground pipes to tie into the new site ditches. Rerouting of surface drainage will be confined to the Project site only. A Storm Water Pollution Prevention Plan (SWPPP) will be developed during site preparation design to implement and control storm water discharge.

A CEMS will be installed at the Project to measure and report emission data per the requirements of the annexed New Source Emission Guidelines for Thermal Electricity Generation (GOC 1999), published in the Canada Gazette, Part 1, and for controlling the unit. The CEMS information will be in accordance with Protocol and Performance Specifications EPS 1/PG/7 referenced in the guidelines.

Figure 10-1 Process Flow Diagram of a Combined Cycle Natural Gas Facility (with Bypass Stack)



11 Project Schedule

The Project schedule is outlined in Table 11-1. The schedule may be affected by SaskPower internal governance approvals and by regulating agency assessments and approvals. The schedule assumes that no federal IA or provincial EA will be required and there are no SaskPower internal governance approval delays.

Table 11-1 Project Schedule Assuming no IA Required

Activity	Project Schedule
Pre-Construction	
Land and Geotechnical Surveys	October 2022
Regulatory Applications and Approval	February 2023 – March 2024
Major Equipment Purchased	October 2023 – December 2025
Construction	
Site Clearing and Grubbing	April 2024 – May 2024
Site Preparation / Leveling	May 2024 – September 2024
Piling Installation	May 2024 – September 2024
Foundation and Underground Utility Installation	June 2024 – February 2025
Building Erection	September 2024 – June 2025
Equipment Installation	March 2025 – July 2026
Electrical Construction	June 2025 – Aug 2026
Commissioning and Start-up	March 2026 – February 2027
Operation and Maintenance	2027 – 2047 (estimated 20-year design life)
Decommissioning (after Project Life)	2047 - 2049

If an IA or EA is required, the Project milestones will need to be shifted accordingly based on the time required to conduct the assessments. Table 11-2 outlines the Project schedule taking into consideration approximately 2.5 years would be required to complete the IA. As mentioned previously in Section 7.4, if the Project is not in operation in 2027, continued operation of the existing coal facility would be needed to cover the supply shortage and the expansion of renewable generation capacity would be compromised resulting in an increase in GHG emissions.

Table 11-2 Project Schedule Taking into Consideration the Anticipated Time Required for an IA

Activity	Anticipated Schedule
Pre-Construction	
Land and Geotechnical Surveys	October 2022
Regulatory Applications and Approval	February 2023 – October 2025
Major Equipment Purchased	October 2023 – December 2025
Construction	
Site Clearing & Grubbing	April 2026 – May 2026
Site Preparation / Leveling	May 2026 – September 2026
Piling Installation	May 2026 – September 2026
Foundation and Underground Utility Installation	June 2026 – February 2027
Building Erection	September 2026 – June 2027
Equipment Installation	March 2027 – July 2028
Electrical Construction	October 2027 – December 2028
Commissioning & Start-up	March 2028 – July 2029
Operation and Maintenance	2029 – 2047 (estimated 18-year design life)
Decommissioning (after Project Life)	2047 - 2049

11.1 Anticipated Construction Schedule

Pre-construction activities are anticipated to start in the fall of 2022 and continue throughout 2023, including planning, permitting, and site investigative work. Due to global market conditions and ongoing supply chain issues resulting from the COVID-19 pandemic, lead times for major equipment have increased significantly. To maintain the Project schedule outlined above, it is anticipated that major equipment will need to be purchased in fall 2023.

Construction is anticipated to begin in April 2024, after the spring thaw. Site preparation activities will be performed prior to any other construction work and are expected to take approximately 4-5 months to complete.

Piling work will begin in May 2024, followed shortly by installation of foundations and subsurface utilities. It is preferable that all subsurface work be completed during one construction season, and that all major equipment foundations be completed before freezing conditions occur the following winter.

Building construction will begin in late 2024 following completion of foundation construction. Erection of the Powerhouse Building will be scheduled based on major equipment deliveries, and the need to install the turbines before the building can be fully enclosed. Currently, major equipment is expected to arrive beginning spring 2025 and continue throughout that year. Mechanical construction will be scheduled to mobilize to site beginning with HRSG component deliveries that same year.

Above ground electrical construction including the transmission interconnection will begin in June 2025. Electrical equipment installation work will be completed first followed by raceways installation and then cable installation.

Switchyard construction will begin in 2025 and will be completed in time to support electrical backfeed targeted for May 2026.

The entire start-up and commissioning process is anticipated to take approximately 11 months to complete. First start-up of the GTG is expected to occur in fall of 2026. After steam blows are complete, there will be a period of approximately two to three months for tuning of the Project, as well as performance testing. The Project is currently estimated to be operational by February 2027.

11.2 Anticipated Operation and Maintenance Schedule

The Project is expected to operate for 20 years, between 2027 and 2047. Operation and maintenance of the Project will be the responsibility of SaskPower. Operation and maintenance personnel will either directly perform, or subcontract and oversee maintenance of all Project equipment.

Maintenance and refurbishment work on the STG and GTG will be provided by the original equipment manufacturer (OEM) to maintain reliability and efficiency. A comprehensive long-term service agreement will cover the gas and steam turbine and associated generators. Included in the Long-Term Service Agreement is remote monitoring of equipment health and performance to ensure long term equipment reliability and performance is achieved. Major maintenance intervals for the equipment are a function of run-time, with outages expected to occur every 33,200 hours (assuming base load operation). Depending on how the Project is operated (e.g., multiple starts, peaking, deep cycling or load following) the manufacturer may recommend more frequent maintenance intervals. A typical maintenance schedule is provided in Table 11-3.

Table 11-3 Turbine Manufacturer's Typical Maintenance Schedule

Equivalent Base Hours* (EBH)	Combustion Turbine Outage	Outage Durations (Days)	Steam Turbine Outage
33,200	Hot Gas Inspection	14	Limited Inspection
66,400	Major Inspection	21	Major Overhaul
99,600	Hot Gas Inspection	14	Limited Inspection
132,800	Major Inspection	28	Major Overhaul
150,000	End of Term		N/A
Note: *Hours are approximate at time of outage			

Operation and maintenance responsibility for incidental activities supporting the Project will be as follows:

- The overhead transmission line between the Project site and WLSS will be the responsibility of SaskPower.
- The water supply pipeline to the Project will be the responsibility of SaskWater.
- The fuel gas supply pipeline and associated infrastructure for the Project will be the responsibility of TransGas.

11.3 Anticipated Expansion Schedule of the Project

There are currently no anticipated plans to expand the generating capacity of the Project. Space is being left on the east side of the Project site to facilitate the future potential addition of CCUS technology. SaskPower currently owns and operates the world's only commercial scale CCUS facility on a power generating unit in the world. As such, SaskPower has extensive experience with CO_2 capture, its performance, potential challenges, as well as knowledge of how to effectively utilize this technology in new applications. Studies are underway to assess potential steam cycle modifications, carbon capture footprint and integration, parasitic loads, water requirements and ability to sequester or sell CO_2. Additional details about the potential for a future CCUS facility can be found in Section 23.3.1.

11.4 Anticipated Decommissioning Schedule

The Project is expected to operate until at least 2047. Precise activities and timing for the decommissioning of the Project cannot be predicted at this time, however, all relevant environmental regulations in existence at the time of decommissioning will be adhered to. Decommissioning and reclamation will take approximately two years. An extra year may be required for post decommissioning and reclamation environmental monitoring activities.

12 Alternative Assessment

12.1 Alternative Means of the Project

12.1.1 SITE LOCATIONS

SaskPower conducted an extensive review and analysis of potential sites for development of a new natural gas power station between 2020 and 2022. The Project site selection process began with identifying potential geographical regions that were technically feasible for a new natural gas generation facility combined with an internal assessment of SaskPower's existing facilities and lands owned by SaskPower. Four geographical areas and sites of interest were identified including: Aberdeen (an area centred around an existing switching station in the area); Estevan (existing land at the Shand Power Station); Saskatoon (land owned by SaskPower near the existing Queen Elizabeth Power Station); and the Project site (existing land owned by SaskPower within close proximity to SaskPower's WLSS).

In early 2020, SaskPower began broadly sharing information about the need for a future natural gas generation facility, the four geographical areas of interest under consideration, and the siting analysis and process. Local municipalities in all four study areas were generally interested in learning more about the Project and discussing potential opportunities to work together.

SaskPower considered all feedback and evaluated the sites with consideration to all potential environmental effects, constructability and accessibility, land use, Project performance, availability and cost of natural gas supply infrastructure, cost of transmission interconnection, water supply and wastewater management, and the overall cost of the Project. SaskPower's existing lands near Estevan and the Project areas aligned best with the key interests and concerns raised during SaskPower's technical analysis and engagement**.** In July 2021 SaskPower narrowed its focus to these two areas.

The Project site was purchased in November 2013 as a result of a site selection study that was initially undertaken between 2011 and 2015. SaskPower's Chinook Power Station location near Swift Current was ultimately chosen over the Project area for development due to increased costs for gas infrastructure in the Project area at the time of the study. Reassessment of the Project site found that significant gas infrastructure investment has been implemented to reinforce the gas transmission capacity supplied into the Saskatoon and surrounding areas, making these areas attractive due to the increased redundancy, and low execution risk to support the Project. Additional benefits for the Project site are road access, proximity to existing transmission infrastructure and continued support from neighbouring municipalities.

The Project site was chosen over the Shand Power Station site as the Shand site has greater potential for future development. The Shand Power Station is an existing coal-fired facility under consideration for conversion to natural gas, which would utilize the existing local natural gas supply. Other potential generation and supply options in the Estevan area including the recently announced 100 MW solar facility and planned power purchase agreements with suppliers in the United States will fully utilize existing delivery capability in the area.

There are significant unknowns regarding the potential economic life of the Project and what additions, such as CCUS, may be required. Despite the uncertainty, proceeding with natural gas fired generation is still economically preferred as even with potential CCUS addition or a condensed life, the expected cost is below other future baseload options such as small modular reactors (SMRs), CCUS on Coal or biomass. Natural gas CCGT (with ability to operate as SCGT) is technology that can be installed now and provides greater flexibility to accommodate renewable energy.

It is not yet known if a CCUS retrofit on the Project will be feasible or economic. Space is being left on site to facilitate future potential addition of CCUS. Studies are underway to assess water requirements and ability to sequester or sell CO_2.

12.1.2 GAS TURBINE TECHNOLOGY

In order to increase system flexibility, a large SCGT facility composed of two 230 MW SCGTs was initially considered. SCGTs can start, stop, and ramp up and down more quickly than a CCGT. An SCGT facility requires minimal staff and minimal water. Two 230 MW SCGTs would have provided 460 MW of additional capacity to the system to meet peak demand without adding significant operating costs if the capacity factor remains as low as estimated with the planned addition of renewables. However, in consultation with TransGas, SaskPower determined that this region is not well suited to support the large fluctuation in natural gas volumes that would occur with 460 MW of fast acting generation ramping from 0 to full load in a variable manner. SCGTs require larger volumes of fuel per unit of electricity produced as the waste heat is not utilized. It was determined that a 370 MW CCGT was the largest unit this region could support.

The F-Class GTG will have the most up-to-date technology including several features intended to keep emissions low. NO_x will be controlled through use of ULN burners. Emissions of particulates will be low due to the combustion of clean-burning natural gas. In addition, carbon monoxide (CO) and volatile organic compounds (VOC) emissions will be minimized through effectively tuned combustion turbine controls. Further, the natural gas quality expected for the Project site has a very low sulfur content (less than 23 milligram per cubic metre (mg/m^3)) which will result in significantly lower sulphur dioxide (SO_2) emissions compared to other fuels. The Project is being designed to achieve ground level effects that will meet the Saskatchewan and Canadian Ambient Air Quality Standards (SAAQs and CAAQs).

An F-Class GTG was selected based on SaskPower's grid design, forecasted need, and for commonality with other units in the SaskPower fleet. For SaskPower's grid, the optimal combined cycle facility size is approximately 370 MW, with the operational flexibility to support SaskPower's renewable energy plan. G-Class, H-Class, and J-Class turbines all have outputs larger than 370 MW when installed in a 1x1 CCGT configuration. An H-class 1x1 CCGT is estimated to have output of more than 400 MW under International Organization of Standardization (ISO) conditions, with an efficiency that is 1-2% better than a 1x1 F-class in an unfired facility. Using G, H, or J-class technology for the Project would require the unit to be derated to produce not more than 370 MW, require significant grid reinforcement, and renegotiation of interconnection agreements.

Although the G, H, J-Class gas turbines generally have better efficiency and produce less CO_2 than the F-class on a pounds-per-Megawatt hours (MWh) basis, derating the unit would adversely impact the efficiency advantage of larger gas turbines. Moreover, F-class gas turbines also have a lower NO_x emission on a ppm basis compared to the H-class. The H-class turbine typically has 25 ppm NO_x emission limit. SaskPower is committed to meeting a NO_x emission of 15 ppm emission limit at the stack exit. H-class gas turbines would not meet the NO_x emission requirement in this case.

12.1.3 INCIDENTAL ACTIVITIES

12.1.3.1 25 kV Distribution Power Line

Final routing of the distribution line will occur once detailed engineering design begins in summer/fall 2023. The final route will be designed within the developed road allowances and will take into consideration technical constraints such as existing overhead and underground utilities, and RM road widening plans as well as environmental constraints such as treed areas and large waterbodies. Generally, the line is designed with poles placed every 90 m, except where wetland areas require the installation of longer spans.

12.1.3.2 230 kV Transmission Power Line

Final routing of the transmission line will occur once engineering begins in summer/fall 2023. The new line will require the crossing of six existing transmission lines so there are limited routing options. Due to these technical constraints, SaskPower will work directly with the three impacted landowners to address any concerns with structure placement during the line design process.

12.1.3.3 Water Supply Infrastructure

As mentioned in Section 9.4.5, three wells were drilled on the Project site as part of a groundwater investigation in 2013, including: two 15-centimetre (cm) diameter wells, and a 5 cm observation well to evaluate groundwater resources. Recent yield tests conducted by SaskPower indicate that these existing wells are capable of sustaining a combined output of approximately 8.3 L per second (L/s) (29.9 cubic metres per hour (m^3/hour)), which is adequate to support most construction water demands, as well as operation and maintenance.

SaskPower is currently analyzing the quality of water from the wells to evaluate corrosion potential. Currently, it is expected that the use of water from the wells will greatly accelerate the wear on Project components, including the treatment plant. Therefore, the SaskWater underground water supply pipeline (Section 9.4.5) is considered the preferred water supply option for the operation and maintenance phase of the Project. until further economical analysis can be completed. Groundwater will be used in support of Project construction activities.

The results of the groundwater investigation that was conducted are presented in Appendix E. As mentioned in Section 9.4.5, the investigation concluded that effects to groundwater quantity as a result of Project operation are nominal.

12.1.3.4 Natural Gas Infrastructure

TransGas is in the process of determining the infrastructure requirements to provide natural gas to the Project. To address these requirements, TransGas had identified two options with several routing possibilities for a high-pressure natural gas line, a meter station located near the Project and the potential for a compressor station. The north route, initially identified as Option B, was selected. Option B originates at an existing TransGas facility at SW-12-38-28-W2M near Prud'homme, Saskatchewan and ends at the Project. Based on continued routing assessments, four potential north routes have been identified between the start and end location. Route finalization is still underway; however, efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructures as possible.

It is not known at this time what portion of the proposed pipeline will be dedicated solely to the Project given it is outside the care and control of SaskPower. Refer to Appendix D for more information.

12.2 Alternatives to the Project

The Project is currently needed to provide firm capacity, back up renewables, and act as contingency (by providing additional energy) for the situation where load grows faster than expected, aging units become less reliable or fail, or other projects are delayed. SaskPower must replace over 1,400 MW of conventional coal generation (2021-2030) and is working to implement all the currently available supply options. SaskPower has a plan to reduce GHG emissions to net-zero by 2050 (refer to Section 23.3.2). Natural gas generation will play a significant role in the initial transition to replace conventional coal generation and reducing GHG emissions 50% below 2005 levels by 2030. Section 23.3.2 speaks to the next stage of the transition to net-zero GHG emissions and the need for new, low or non-emitting technologies to replace or augment conventional natural gas generation.

12.2.1 NATURAL GAS GENERATION

SaskPower needs firm capacity to ensure power needs can be met during peak demand even if the wind isn't blowing or the sun isn't shining. While renewables and renewables backed by energy storage can provide some firm capacity, a significant amount of conventional, dispatchable generation will still be required to maintain system reliability (refer to Section 7). SaskPower has a limited number of generation supply options available to meet the growing demand for power, and transition from conventional coal, over the next 10 years. Natural gas is the only baseload supply option available that can be built at the scale required to serve our need to replace conventional coal, meet load growth, and enable renewables. There are no alternative options available before 2030 that are more technically or economically feasible to meet the need being filled by the Project. While other options are being explored to provide baseload generation such as biomass, they are not available at the scale and timing required to assist in the required transition from coal.

Two large 230 MW F-class simple cycle units were considered in place of the Project to provide even greater firm capacity and increased ability to support renewables, but this option would lead to higher GHG emissions by eliminating the ability to operate more efficiently in combined cycle mode where additional power is produced with the same fuel input by utilizing a steam turbine generator to capture additional energy from the waste heat. The *Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired*

Generation of Electricity 2018, limit units over 150 MW and 33% capacity factor to emit 450 t/GWh of GHG emissions or less, which is not possible for large F-class units. Even though the expected capacity factor is low, having a regulated limit would reduce the ability to count on the Project for additional energy if other projects are delayed or units fail. Additionally, natural gas system limitations in the region limited the fuel capacity that could be quickly ramped over the full range of the generators. The smaller project size and combined cycle ability enables full capacity when needed with reduced fuel requirements. In fact, since this is the most cost-effective way to operate the facility, it will operate primarily in combined cycle mode while retaining the ability to start up in simple cycle and provide additional flexibility to the system if needed.

Additionally, SaskPower is investigating the possibility of completing coal to gas conversions on its existing coal fired generation facilities. While converting these existing units to natural gas would provide significant emissions reductions versus combusting coal, there is limited natural gas infrastructure currently in place at these facilities. Not only would these converted units have a higher emissions intensity as compared to a CCGT, but they would also be less dispatchable and provide less flexibility to facilitate additional renewable generation. These converted units would be more expensive to operate and would be required to retire by 2035, in line with current regulations and the pending CER. The addition of CCUS to an aging converted coal unit is not expected to be economically feasible. SaskPower is still investigating the ability to utilize coal to gas conversions to aid in the transition to lower emitting generation; however, this would not replace the need for the Project.

12.2.2 ELECTRICITY IMPORTS

Imported generation is the only other baseload option available in the near term. Imported energy can be a useful bridge between phasing out conventional coal and developing new low or non-emitting technologies but the amount of import potential is limited. SaskPower has worked with our neighbours and now plans to build new transmission tie-line capacity to North Dakota to increase the ability to import from the SPP up to 650 MW. Meanwhile, SaskPower will have up to 100 MW of increased capability from Manitoba by 2027. It is yet to be seen how much firm import capacity will be realized as contracts have yet to be pursued that can offset the need to build more natural gas generation. A competitive procurement for 500 MW of firm import capacity from SPP is expected to be issued in 2023, with imports starting between 2027 and 2029. Additional import capacity from SPP was not explored due to cost, infrastructure limitations, as well as concerns around the overall reliability and diversity of the grid. Should SPP post an Energy Alert, exports from SPP would be paused, which would have large implications to the Saskatchewan grid, equivalent to the size of firm capacity contracted. The new tie-line also provides up to 150 MW (when 500 MW is dedicated to providing firm capacity) and 650 MW of transmission capability to provide flexible energy when available at market prices. This flexibility will also help facilitate the integration of renewable generation in Saskatchewan and should provide access to energy from the 33 gigawatts (GW) of renewable generation in the SPP.

The ability to increase imports from Alberta and Manitoba are limited in the near term. Currently, firm import capacity from Alberta is limited to 75 MW. SaskPower has recently strengthened its interprovincial tie to Manitoba and secured 290 MW of import capacity. This purchase from Manitoba fully subscribes the current firm import capability from Manitoba and Manitoba Hydro has stated that they no longer have additional firm capacity and energy to sell to Saskatchewan. Another import limiting factor is that neighbouring jurisdictions are generally facing the same electric utility transitional issues as Saskatchewan.

12.2.3 RENEWABLE GENERATION

SaskPower has recently more than doubled wind capacity from 244 MW in 2020 to 618 MW in 2022. Another 320 MW of wind and solar is in planning to be in-service by 2026 and the next 700 MW of wind and solar to be in-service by 2028 were announced in south-central Saskatchewan to support coal reliant communities. As mentioned previously, SaskPower will continue to add renewable generating sources to provide up to 50% of our capacity by 2030. Variable renewable generating sources alone cannot provide the baseload power required on our system. As such, additional technologies such as gas peaking units or energy storage systems are required to supplement renewable generation.

SaskPower is exploring additional hydro potential. Concepts and current costs are being analyzed for capacity additions through facility redevelopments (50–100 MW) and potential greenfield hydro development (200-300 MW). These projects will continue to be considered and may be developed post 2034; however, Saskatchewan has a much smaller potential for hydro generation than Manitoba or British Columbia and additional future projects are likely to be limited.

SaskPower assesses all Independent Power Producer biomass options that are brought forward. SaskPower has recently added an 8 MW biomass facility owned by the Meadow Lake Tribal Council. This facility is right sized for the available feedstock – waste material from the adjacent sawmill. Biomass has been found to be high cost and has the best opportunity for economic operation when sized according to and adjacent to the feedstock to avoid high transportation costs.

Geothermal power is an emerging opportunity that is not yet commercially available in Canada. SaskPower signed a 5 MW power purchase agreement with DEEP Earth Energy Production for what may become Canada's first geothermal power station.

12.2.4 ENERGY STORAGE

Energy storage systems are widely seen as the best option to mitigate the supply challenges around renewable generation and assist in transitioning renewables from intermittent to base load generation. SaskPower has evaluated different technologies such as Battery Energy Storage (BES), Compressed Air Energy Storage (CAES), pumped hydro storage, and other forms of emerging technologies which are not commercially available such as Liquid Air Energy Storage or Thermal Energy Storage.

SaskPower uses industry standard tools and planning practices to ensure reliable, sustainable, and cost-effective power for customers. Analysis that follows these best practices has been performed to evaluate different sizes and uses of batteries and other types of energy storage and the potential role they could play in the SaskPower system. This analysis has shown that batteries can provide the best value when providing ancillary services such as short term (< one hour) balancing of the grid and stabilizing of the local transmission system. This evaluation is consistent with what is shown in other jurisdictions. SaskPower is currently completing its first battery storage project (20 MW / 20 MWh, to be in-service in Regina in 2023) that will be used for this purpose. While energy storage is being used to provide some firm capacity (i.e., replacement of conventional generation) in other locations, this solution is a less common use of BES so far as it is extremely expensive to do so.

SaskPower also generates and utilizes very detailed models of the generation fleet at a high temporal resolution as well as through various analytical techniques, like Equivalent Firm Capacity (EFC) for example. These models and techniques are used to evaluate the amount of firm generation capacity (like a natural gas plant) that could be replaced with intermittent or energy limited resources like wind, solar, and batteries, while maintaining the same level of reliability for our customers. Reliability analysis has shown that a BES with 370 MW of capacity and a minimum of 24 hours of duration would be required to provide the same level of system reliability as the Project in 2027. As BES produce no energy themselves, these results are completely dependant on the makeup of the rest of the grid. As conventional coal retires and more intermittent resources are added, it is expected that the duration required to maintain reliability past 2030 would be even longer. This size of BES isn't feasible or cost effective, resulting in costs more than three times more expensive than the Project. These results were produced using typical weather data and don't consider extreme events that can occasionally occur on the power system. For example, in 2018, transmission line icing caused approximately 200,000 SaskPower customers to be left without electricity after several lines and all coal facilities tripped offline. Having resources that can run 24/7 are critical to minimize societal impact during these types of events.

Currently, typical BES installations are limited to only a few hours of duration. Using a 4-hour duration as an example, assuming one full charge and discharge cycle per day, and a discharge efficiency of 90%, the maximum annual capacity factor of a 4-Hour BES would be 15%. For a 370 MW BES this means it can provide a maximum of 495 GWh of energy in a year. In reality, actual operating conditions will mean that there will not be an opportunity to charge and discharge the BES every single day. Modelling analysis shows a 4-hour BES operating in the range of 9%-12% capacity factor, depending on the year and the availability of the other resources on the system to charge the BES.

In comparison to the Project, taking into account temperature related derates as well as expected maintenance requirements and forced outage rates, the Project will be capable of operating at approximately an 88% annual capacity factor, which means it can provide 2906 GWh of energy in a year. Most importantly, the Project is not limited to operating for a limited number of consecutive hours as with a BES. While SaskPower doesn't expect to operate the Project at a high-capacity factor, the option to operate it for unlimited duration at maximum output, independent of the availability of the other resources on the grid, is the key characteristic that allows it to provide the required system reliability.

Potential CAES and pumped hydro options have also been identified and projects may be developed in the future. There is limited potential for pumped storage in Saskatchewan, but options are being assessed, and feasibility and costs will continue to be evaluated. If found to be feasible, projects may be developed in the future. CAES technology either relies on waste heat supplied via an unabated simple cycle gas turbine (diabatic), or stored waste heat from compression in thermal energy stores (adiabatic). As the CER has not been finalized, there is significant uncertainty as to how a diabatic CAES system will be regulated. Alternatively, the adiabatic system relies on thermal energy storage which is an emerging technology. The uncertainty around the technological readiness and future regulations makes immediate development of CAES unattractive at this time.

12.2.5 ENERGY MANAGEMENT, DISTRIBUTED GENERATION, AND GRID MODERNIZATION

SaskPower is pursuing Demand Side Management (DSM) solutions to support decarbonization. In 2022, SaskPower commissioned the modelling of different energy efficiency and demand response scenarios that could lead to nearly 300 MW of peak demand reduction in Saskatchewan over 10 years. In early 2023, SaskPower approved the implementation of a 3-year DSM plan that would deliver nearly 21 MW of peak demand savings. The first customer offerings from that plan are expected to launch in Fall 2023. Once the plan is fully launched and based on the results, SaskPower will develop additional DSM plans for consideration in following years.

Customer distributed generation and other smart-connected technologies like battery storage and electric vehicles are considered part of the long-term solution to decarbonization and managing a net-zero grid. However, currently SaskPower is only part of the way through its grid modernization efforts. A modernized grid is necessary to accommodate and utilize customer-side technologies to the benefit of the grid. Unfortunately, SaskPower's grid does not have those capabilities today. As such, customer connected devices may provide some value but without the required grid visibility and control in place to effectively manage these devices they can do more harm than good. SaskPower is working to implement many of the system requirements to leverage customer-sided technologies; however, it will take time to implement at scale.

While SaskPower is currently exploring the development and implementation of grid enhancing technologies, they do not provide additional capacity to the system. When we looked to import 500 MW of firm capacity from the SPP, SaskPower investigated the best way to provide the additional transmission capability required. Grid enhancing technologies are always considered and may be part of the solution but, in this case, a new transmission line to increase transmission capability to 650 MW was required. Similarly, minimizing line losses is always considered as part of planning system additions. The scale of replacing even 370 MW of the over 1400 MW (2021-2030) of conventional coal replacements plus load growth requirement is much greater than could be achieved by finding additional line loss efficiencies.

12.2.6 SASKPOWER PROCEEDING WITH MULTIPLE PROJECTS

The reality is that as we look to replace over 1,400 MW of conventional coal and reduce GHG emissions to 50% of 2005 levels by 2030 and net-zero by 2050 SaskPower needs to rely on all available options at once. Analysis continues on all supply options to ensure that SaskPower has the correct mix of conventional generation (like natural gas), solar, wind, and energy storage to ensure a reliable, sustainable, cost-effective supply of power. SaskPower is taking advantage of all currently feasible low and non-GHG emitting supply options and mitigation measures within the province and is investing to enable the development of new options for the future. Table 12-1 provides a summary of the supply options that SaskPower is currently investing in.

Table 12-1 SaskPower Low and non-GHG Emitting Supply Options Available Before and After 2030

Supply Options and Mitigation Measures (Available Before 2030)	Supply Options (Potentially Available After 2030)
Natural Gas Generation	Additional Saskatchewan Hydro
Imported Power	Nuclear SMRs
Renewable Generation including wind, solar, and biomass	CCUS on Natural Gas Generation
Distributed Generation	Hydrogen
Battery Energy Storage	
Demand Side Management	

PART C: LOCATION INFORMATION

13 Description of the Project Location

13.1 Geographic Location

13.1.1 GEOGRAPHIC COORDINATES OF THE PROJECT

The coordinates of the centre of the quarter section that the Project is located in are latitude 51°52'41.33"N (51.87815), longitude 105°16'50.64"W (-105.28073).

13.1.2 GEOGRAPHIC COORDINATES OF INCIDENTAL ACTIVITIES

The incidental activities associated with the Project (Figure 14-2), and the coordinates of their beginning and end points are presented below. The incidental activities study corridors have been defined to encompass the area in which they could be routed and sited. The corridors are described with respect to biophysical and human environment resources to aid in siting of routes and to provide context for the environmental setting, potential environmental effects, and likely mitigation measures (Section 14.0).

Table 13-1 Coordinates of Incidental Activities

Incidental Activity	Beginning Point	End Point
Overhead 230 kV transmission line	Latitude: 51.87674 Longitude: -105.31809	Latitude: 51.87747 Longitude: -105.28649
Underground fibre-optic line	Latitude: 51.87674 Longitude: -105.31809	Latitude: 51.87747 Longitude: -105.28649
Overhead 25 kV power distribution line	Latitude: 51.880485 Longitude: -105.286831	Latitude: 51.823377 Longitude: -105.032826
Underground non-potable water supply pipeline	Latitude: 51.86698 Longitude: -105.28634	Latitude: 51.87443 Longitude: -105.28634
Underground natural gas infrastructure	Latitude: 52.254668 Longitude: -105.876024	Latitude: 51.87806 Longitude: -105.28649
Road upgrades	Latitude: 51.89297 Longitude: -105.28668	Latitude: 51. 87455 Longitude: -105.28661

Incidental activities may use existing ROWs that have been previously used for a different type of linear project. For example, the power distribution line, underground non-potable water supply pipeline, and road upgrades are expected to occur in existing road allowances.

13.2 Site Maps

The Project's general location is shown in Figure 1-1. The spatial relationship of the Project's components is discussed in Section 9.0, including the Project layout in Figure 9-1, which illustrates the proposed arrangement and locations of the physical components to be constructed for the Project.

13.3 Legal Land Description

The Project is located in the northwest quarter of Section 36, Township 33, Range 24, West of the second meridian (W2M) (Figure 1-1). SaskPower is the registered owner of this quarter section. Refer to Appendix F for a copy of the land title. The incidental activities (distribution, transmission, fibre optic) under the care and control of SaskPower are located on either privately owned land or within developed road allowances owned by the Province of Saskatchewan and administered by the RM (Appendix F).

The waterline under the care and control of SaskWater will be located in either privately owned land or within the developed road allowance owned by the Province of Saskatchewan.

TransGas has indicated that although final routing and siting has not been completed, the Project will primarily be located on private, freehold lands with some portions intersecting lands owned by the Province of Saskatchewan.

13.4 Residences and Communities

13.4.1 PROXIMITY TO ANY PERMANENT, SEASONAL OR TEMPORARY RESIDENCES

The Project is located in a region where land is primarily utilized for agricultural purposes. The nearest permanent, seasonal, or temporary rural residence is located approximately 0.5 km northwest of the Project. There are seven rural residences within 1.5 km of the Project, and fifteen rural residences within 5.0 km of the Project. The locations of residences within 1.5 km of the Project are illustrated in Section 14.0, in Figure 14-3.

The rural residences in proximity of the Project are not defined as sensitive receptors in accordance with Health Canada guidance (Health Canada 2017b).

13.4.2 PROXIMITY TO NEAREST AFFECTED COMMUNITIES

The Project is located approximately 17 km west of the town of Lanigan, Saskatchewan, and 104 km southeast of the city of Saskatoon, Saskatchewan as shown in Figure 1-1. There are several other communities (e.g., hamlets, villages, towns, cities) in proximity to the Project, and the closest community is the organized hamlet of Guernsey at approximately 6 km (Figure 1-1).

13.5 Proximity to Traditional Land Use

The Project is located within Treaty Six and the Métis Nation of Saskatchewan territory and is in close proximity to Treaty Four territory as shown in Figure 13-1. The Project is located on a quarter section that is owned by SaskPower. The incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan to the extent feasible. Privately owned lands and leased provincial Crown land are typically not available for TLRU, and as such, the Project is not expected to affect the ability of Indigenous Peoples to exercise Aboriginal and Treaty Rights, or use, access, or develop lands and resources currently used for traditional purposes.

To date, no concerns regarding potential effects on health and socio-economic conditions, physical and cultural heritage, any structure, site, or thing that is of historical, archaeological, palaeontological, or architectural significance have been raised during engagement with Indigenous communities (Section 4.3). Further information regarding engagement with Indigenous communities can be found in Section 4.0. Through ongoing engagement, SaskPower will seek affirmation from Indigenous communities whether lands proposed for the Project are currently used by Indigenous Peoples for traditional purposes.

This assessment uses a conservative approach that recognizes that a lack of publicly available TLRU information does not necessarily represent a lack of current use by Indigenous Peoples. This assessment assumes that TLRU sites, areas, and activities have the potential to occur on unoccupied Crown land, even if Indigenous peoples did not identify specific activities, or sites in those same areas.

The Project and Incidental Activity Study Area boundaries are located within proximity to occupied provincial Crown land administered by the Saskatchewan Ministry of Agriculture. The nearest occupied provincial Crown land is located adjacent to the Incidental Activity Study Area where the proposed distribution line is located within the TransCanada Yellowhead Highway 16 road allowance (NE 02-34-24 W2M, SE 06-34-23 W2M, SW/SE 29-33-22 W2M) (Appendix F). The nearest unoccupied Crown land is outside of the largest Local Assessment Area (LAA) and Regional Assessment Area (RAA) boundaries (air quality), approximately 20 km southeast of the Incidental Activity Study Area boundaries at SE 05-32-20 W2M.

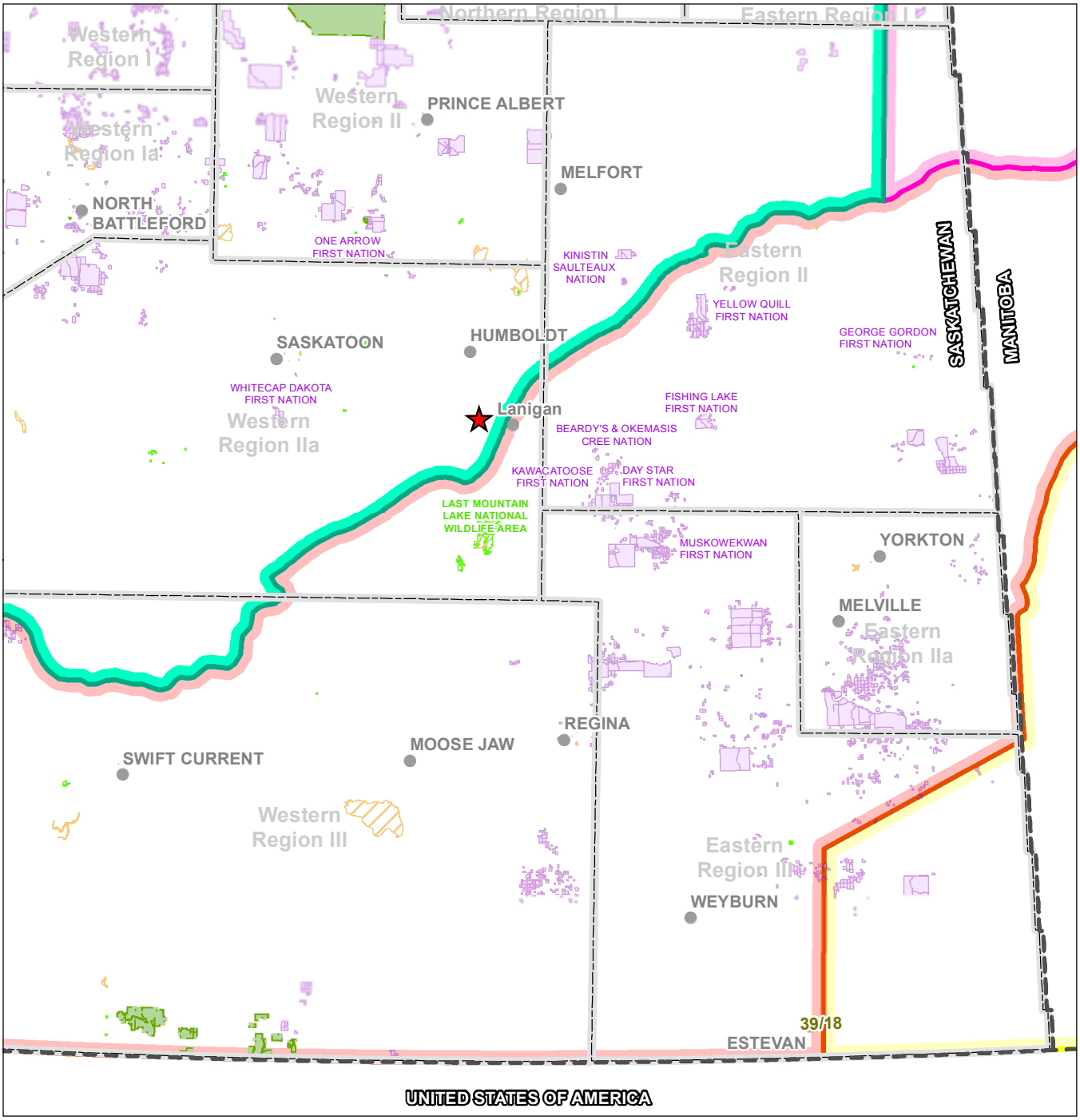
The Project and incidental activities under the care and control of SaskPower will not traverse land:

- In a reserve as defined in subsection 2(1) of the *Indian Act.*
- Designated as First Nation land as defined in subsection 2(1) of the *First Nations Land Management Act.*
- That is subject to a comprehensive land claim agreement or a self-government agreement.
- Set aside for the use and benefit of Indigenous Peoples.

Table 4-3 presents the approximate distances of Indigenous communities as identified by IAAC. The closest reserve lands belong to Beardy's and Okemasis Cree Nation, approximately 68 km east of the Project. Figure 13-1 shows the Project in relation to Indigenous communities, including the Indigenous communities identified by IAAC on February 1, 2023. There are no known First Nation lands as defined in subsection 2(1) of the *First Nations Land Management Act* in proximity of the Project at this time. Additionally, there are no known comprehensive land claim agreement or self-government agreements in proximity of the Project at this time.

13.6 Proximity to Federal Lands

The nearest federal lands to the Project are Last Mountain Lake National Wildlife Area (approximately 47 km) and Beardy's and Okemasis Cree Nation (approximately 68 km) (Figure 13-1). There are several other federal lands in proximity to the Project (i.e., within 100 km), including Indigenous communities, National Wildlife Areas, and Migratory Bird Sanctuaries.



Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Base features produced under license with the Government of Canada, Government of Saskatchewan, and Bing Imagery.
3. Background: Orthoimagery ©

Legend

- City/Town
- Project Site
- Migratory Bird Sanctuary
- National Wildlife Area
- National Park
- First Nations Reserve
- Political Boundary
- Métis Region Boundary

First Nations Treaties

- Treaty 2, 1871
- Treaty 4, 1874
- Treaty 5, 1875
- Treaty 6, 1876

0 25 50 Kilometers

(At original document size of 8.5x11)
1:3,000,000

N

Stantec SaskPower

Project Location	Prepared by KL on 2023-02-14
NW-36-33-24 W2M	TR by RM on 2023-02-14
Near Guernsey, SK	IR by JH on 2023-02-14
Client/Project	111477076-001 REVE

SaskPower Aspen Power Station

Figure No.
13-1

Title
Administrative Boundaries and Federal Lands

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14 Physical Environment

14.1 Overview

This physical environment overview has been developed using *Ecoregions of Saskatchewan* (Acton et al. 1998). The Project is located in the Quill Lake Plain landscape area within the Aspen Parkland ecoregion of the Prairie ecozone. The Prairie ecozone is characterized as a level to gently rolling plain with numerous subdued uplands dispersed throughout most of its extent. Most landforms in the Prairie ecozone are of glacial origin, where ground moraine, glaciolacustrine and glaciofluvial plains are contributors to the predominantly “flat prairie” landscape.

In the Aspen Parkland ecoregion, the prevalent soils are Black Chernozemic, in response to the additions of organic matter in the fescue grasslands, and the slower rates of decomposition due to the cooler climate. The vegetation in the Aspen Parkland, is a mosaic of patches of trembling aspen (*Populus tremuloides*), agricultural lands, woodlands, areas of native grassland, and wetlands. Patches of trembling aspen (*Populus tremuloides*) often include an understory of shrubs, herbs, and grasses. Shrublands also often appear on the margins of aspen stands, or in depressions of the hummocky landscape. The Aspen Parkland supports numerous species due to its native grasslands, wooded groves, and numerous wetlands. Predominant species found within the Aspen Parkland include deer (*Odocoileus hemionus*), snowshoe hare (*Lepus americanus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and savannah sparrow (*Passerculus sandwichensis*).

Figure 14-3 presents biophysical considerations for the Project. The environmental setting for the Project is described in further detail in Section 14.2.

14.1.1 SPATIAL BOUNDARIES

The valued components (VCs) included in this document were reviewed to determine the spatial boundary (i.e., study area) over which an effect could be reasonably evaluated or to identify constraints in the routing and siting process. Spatial boundaries have been developed for the Project and are defined below.

14.1.1.1 Project Site

Project Development Area (PDA) – The Project will be located within the western half of NW 36-33-24-W2M. Although the total disturbance footprint for the Project, including temporarily disturbed areas during construction, is expected to be approximately 700 metres (m) x 450 m (31.5 hectares), the PDA has conservatively been defined as the entire NW 36-33-24-W2M to encompass any potential layout modifications.

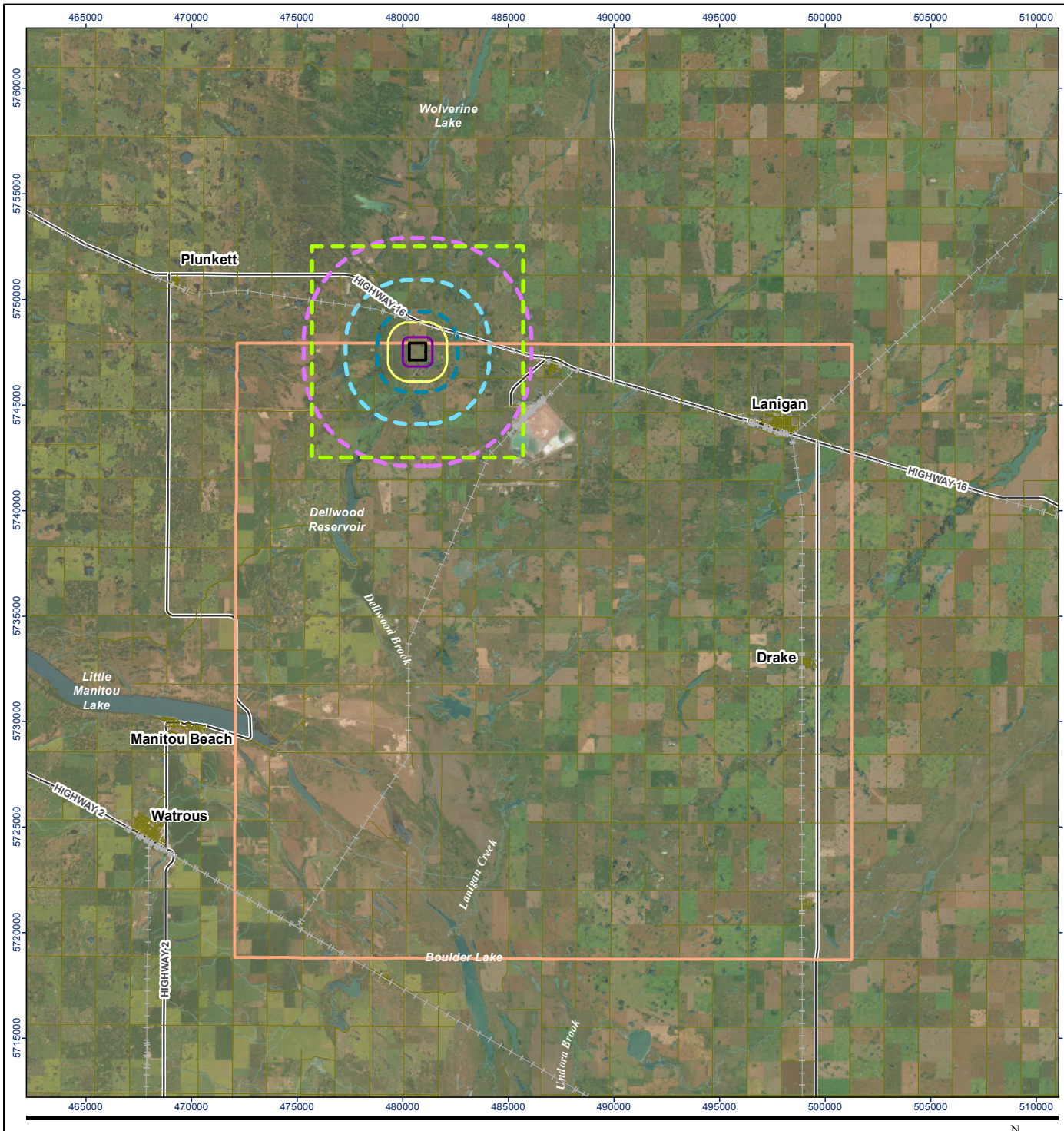
Local Assessment Area (LAA) – The LAA is a buffer of the PDA that represents the spatial extent within which the Project could have effects on VCs of the environment. Specific LAAs that have been developed for VCs are listed below. The spatial boundaries of the study areas are presented in Figure 14-1.

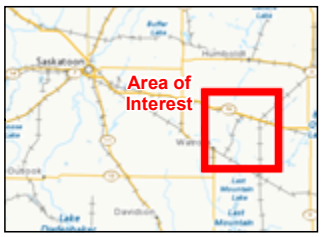
- Air Quality: The air quality LAA includes a 10 km x 10 km buffer of the PDA.

- Noise: The noise LAA includes a 1.5 km buffer of the PDA.
- Terrain and Soil: The LAA for terrain and soil capability are the same as the PDA because the potential effects of the Project site will be confined to the PDA.
- Vegetation and Wetlands: The vegetation and wetlands LAA includes a 300 m buffer of the PDA.
- Wildlife and Wildlife Habitat: The wildlife and wildlife habitat LAA includes a 1 km buffer of the PDA. The wildlife and wildlife habitat LAA was established based on maximum recommended avoidance setback for provincially and federal listed wildlife species of conservation concern (SOCC) that have the potential to occur near the Project (Section 14.2.5).
- Human Environment: The human environment LAA includes the RM of Usborne, the town of Lanigan, and the village of Drake.

Regional Assessment Area (RAA) – The RAA represents the regional context over which cumulative effects may occur and can be examined for biophysical, human, cultural, and economic VCs (Figure 14-1). A buffer of 5 km from the PDA was used as an area to describe potential regional issues for all VCs except for air quality, noise, and human environment, which are listed below.

- Air Quality: The air quality RAA is the same as the LAA for air quality and includes a 10 km x 10 km buffer of the PDA.
- Noise: The noise RAA includes a 3 km buffer of the PDA.
- Human Environment: The human environment RAA includes the Province of Saskatchewan.





Legend

- Railway
- Project Development Area (PDA)
- Local Assessment Area - Air Quality (10 x 10 km)
- Local Assessment Area - Noise (1.5 km)
- Local Assessment Area - Vegetation and Wetlands (300 m)
- Local Assessment Area - Wildlife (1 km)
- Local Assessment Area - Human Environment (RM of Usborne, Town of Lanigan, and Village of Drake)
- Regional Assessment Area - Noise (3 km)
- Regional Assessment Area - Vegetation and Wetlands, Wildlife (5 km)

0 2 4 Kilometers

(At original document size of 8.5x11)
1:275,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Base features produced under license with the Government of Canada, Government of Saskatchewan, and Bing Imagery.
3. Background: Orthoimagery © Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Stantec SaskPower

Project Location	Prepared by KL on 2022-12-20
NW-36-33-24 W2M	TR by RM on 2022-12-20
Near Guernsey, SK	IR by JH on 2022-12-20
Client/Project	111477076-004 REVC

SaskPower Aspen Power Station

Figure No.
14-1

Title
Spatial Boundaries

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

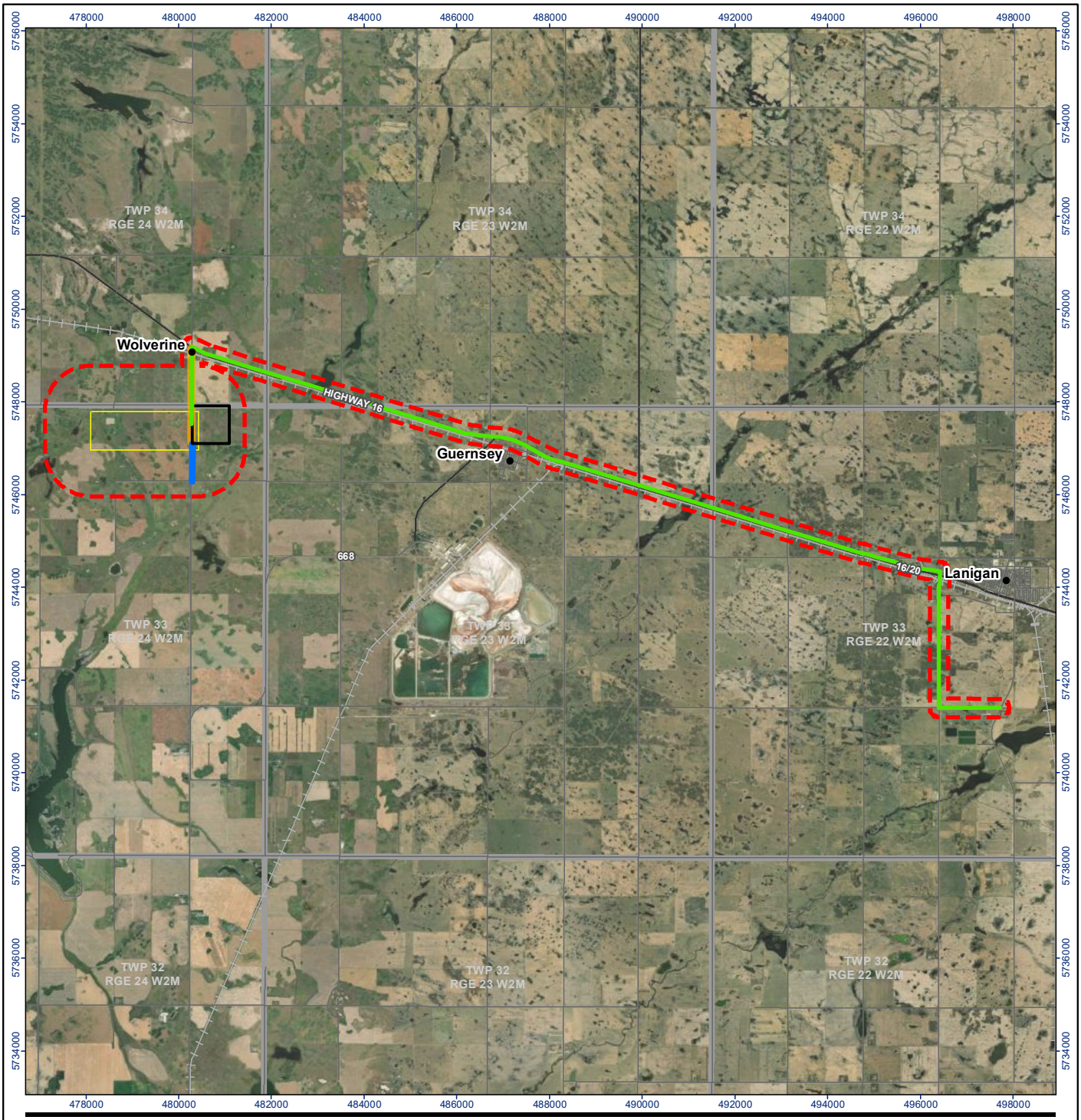
14.1.1.2 Incidental Activity Study Area

Incidental Activity Study Area – Routing and siting for incidental activities has not been finalized. As such, a study area (Figure 14-2) has been defined which encompasses the area in which incidental activities could be routed and sited.

The Incidental Activity Study Area is described with respect to biophysical and human environment resources to aid in siting of routes and to provide context for the environmental setting, potential environmental effects, and likely mitigation measures (Figure 14-2). The incidental activities to be routed and sited within this study area and their approximate footprint associated with construction and operation and maintenance are as follows:

- 25 kV distribution power line: 23 km-long x 10 m-wide ROW (23 ha)
- 230 kV transmission power line: 2.5 km-long x 40 m-wide ROW (100 ha)
- fibre optic line: 2.5 km-long x 10 m-wide ROW (2.5 ha)
- road upgrades: 2 km-long x 20 m-wide ROW (4 ha)
- water supply line: 800 m-long x 30-m wide ROW (2.4 ha)

Natural gas infrastructure has not been included. Its development and components (e.g., pipeline, compressor station, meter station) are, and will be, outside of the care and control of SaskPower. Natural gas infrastructure will be developed by a third-party proponent (TransGas) that will be subject to its own provincial and/or federal regulatory approval and permitting processes. The routing is still underway; however, TransGas has indicated that efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructures. TransGas noted that issues, concerns, and knowledge identified during the engagement process will be considered in the planning, routing and development of the natural gas infrastructure. The line routing and facility siting, engagement and consultation, construction, and operation and maintenance are the responsibility of TransGas. Refer to Appendix D for more information from TransGas.



Legend

- Incidental Activity Study Area
- Project Development Area (PDA)
- 25 kV Distribution Power Line
- 230 kV Transmission Power Line Study Area
- Water Supply Pipeline
- Road Improvement Extents
- Major Road
- Minor Road
- Railway
- Township

0 1 2 Kilometers

(At original document size of 8.5x11)
1:125,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Base features produced under license with the Government of Canada, Government of Saskatchewan, and Bing Imagery.
3. Background: Orthoimagery © Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec SaskPower

Project Location
NW-36-33-24 W2M
Near Guernsey, SK

Prepared by JH on 2023-07-27
TR by RM on 2023-07-27
IR by XX on 2023-07-27

Client/Project
111477076-003 REVG

SaskPower Aspen Power Station

Figure No.
14-2

Title
Incidental Activity Study Area

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14.2 Project Environmental Setting

This section describes the physical and biological VCs that have the potential to interact with the Project. Specifically, detailed methods (including for desktop review and field surveys), existing conditions, effect pathways, mitigation strategies, and summary of residual effects are presented as they relate to potential Project-related environmental effects. Effect pathways for fish and fish habitat and aquatic species are not present and potential Project-related effects to these matters of federal jurisdiction are not expected. Additional information on fish and fish habitat and aquatic species are presented in Sections 19.6 and 19.7, respectively.

14.2.1 AIR QUALITY

This section addresses air quality in the context of the Project and outlines the methods and results of the desktop review in addition to identifying potential effect pathways, and mitigation strategies.

14.2.1.1 Methods

The focus of the air quality assessment is on Project operation and maintenance because the operation and maintenance phase has the most potential to produce adverse air quality effects. Air emissions associated with Project construction are expected to be minor, occur only for short intervals, and their effects are expected to be limited to the immediate vicinity of the Project.

The effects of air emissions from Project operation and maintenance are evaluated using plume dispersion modelling, which accounts for physical characteristics of emission sources, topographic effects, and hourly variations in meteorological conditions. The dispersion modelling assessment is provided in Appendix G and predicts ground-level concentrations for each substance modelled. An air quality analysis was performed for CO, NO_X, SO_2, total particulate matter (TPM), particulate matter of 10 micron in diameter or smaller (PM_{10}), and particulate matter of 2.5 micron in diameter or smaller ($PM_{2.5}$).

A detailed description of the dispersion modelling methods is provided in Appendix G. The Saskatchewan Air Quality Modelling Guideline (SK ENV 2012) was used to conduct the air dispersion modelling analysis for the Project. Model results were compared to the SAAQS (SK ENV 2015a) shown in Table 14-1 and the CAAQS (CCME 2012)) shown in Table 14-2. It should be noted that the CAAQS were developed and are intended to be used for regional air quality management relative to air zone monitoring station measurements and not as regulatory standard for permitting or determining the acceptability of specific facilities. A comparison to the SAAQS is made at the maximum point of impingement in the air quality LAA, whereas a comparison to the CAAQS is made at nearby residential receptors.

Table 14-1 Saskatchewan Ambient Air Quality Standards (SAAQS)

Pollutant	Averaging Period	micrograms per cubic meter (µg/m3)
CO	1-hour	15,000
	8-hour	6,000
NO_2	1-hour	300
	24-hour	200
	Annual	45 [a]
SO_2	1-hour	450
	24-hour	125
	Annual	20 [a]
$PM_{2.5}$	24-hour	28 [b]
	Annual	10
PM_{10}	24-hour	50
TPM	24-hour	100
	Annual	60 [c]

Notes:
[a] Arithmetic mean
[b] The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
[c] Geometric mean

Table 14-2 Canadian Ambient Air Quality Standards

Pollutant	Averaging Period	CAAQS		Statistical Form
		Effective 2020	Effective 2025	
		µg/m^3		
NO_2	1-hour	113	79	3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
	Annual	32	23	Average over a single calendar year of all 1-hour average concentrations
SO_2	1-hour	183	170	3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations
	Annual	13	10	Average over a single calendar year of all 1-hour average SO_2 concentrations
$PM_{2.5}$	24-hour	27	--	3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	Annual	8.8	--	3-year average of the annual average of all 1-hour concentrations

14.2.1.2 Existing Conditions

The dispersion modelling assessment provided in Appendix G summarizes the existing air quality conditions for the Central Region of Saskatchewan, as established by the SK ENV (SK ENV 2012) through their regional background concentrations. These accepted background concentrations are based on data collected by the Central Region air quality monitoring stations located in Saskatoon, Saskatchewan and is considered to be representative of the Project location. Table 14-3 shows the background concentrations of the Saskatoon monitoring station for the substances of interest. A location map of air monitoring stations in Saskatchewan is referenced in Appendix B of SK ENV 2012. The background concentrations for all substances and averaging periods are below the SAAQS.

Table 14-3 Central Region Ambient Background Concentrations

Pollutant	Averaging Period	Percentile	Background Concentration		SAAQS
			ppm	µg/m^3	µg/m^3
CO	1-hour	90	0.5	577.0	15,000
	8-hour	90	0.4	480.0	6,000
NO_2	1-hour	90	0.021	40.0	300
	24-hour	90	0.017	32.0	200
	Annual	50	0.008	15.0	45
SO_2	1-hour	90	0.001	2.6	450
	24-hour	90	0.001	2.6	125
	Annual	50	0.000	0.0	20
$PM_{2.5}$	24-hour	90	--	7.5	28
	Annual	50	--	3.3	10
PM_{10}	24-hour	90	--	36.3	50
TPM	24-hour	90	--	7.5	100
	Annual	50	--	3.3	60

Under the National Air Quality Management System (AQMS), the ambient monitoring data for air zones are assessed annually against the CAAQS. As part of AQMS, Saskatchewan is divided into six air zones. The Project site falls within the Northeast Air Zone. Compliance with the CAAQS for the Northeast Air Zone is determined based on three years of measurement data collected by the monitoring stations within the air zone. Based on the Saskatchewan air zones report for 2017-2019 published by GOS (GOS 2021a), the Northeast air zone $PM_{2.5}$ CAAQS metric values for 24-hour and annual $PM_{2.5}$ are 17.0 and 7.3 µg/m^3, respectively. These measured $PM_{2.5}$ concentrations are less than the $PM_{2.5}$ CAAQS of 27 and 8.8 µg/m^3, respectively. The Northeast air zone falls under the orange category management level of AQMS for $PM_{2.5}$ and is under the management level with objective to improve air quality using early and ongoing actions for continuous improvement.

14.2.2 NOISE

Noise emission equipment from a power generation facility can potentially affect the acoustic environment at identified residential noise sensitive receptors within the LAA. The assessment of this noise effect is guided by provincial noise guidelines. The Province of Saskatchewan does not have a numerical noise limit applicable to the Project. For consistency with other power-generation applications, the Project's sound level design goal is to meet the permissible sound level (PSL) and low frequency noise thresholds as determined by Alberta Utilities Commission (AUC) Rule 012 (AUC Rule 012; Rule 012).

14.2.2.1 Methods

The noise assessment approach is based on methods prescribed in Rule 012. Rule 012 prescribes the PSL noise threshold for residential dwellings during normal operation and maintenance of a project; however, there are no quantitative noise thresholds for Project-related construction activities therefore the Project construction noise effect was assessed qualitatively.

The approach used to assess the potential noise effects during normal operation and maintenance is summarized as follows:

- determine the assessment area and receptor location(s) within the LAA/RAA
- establish the PSL noise thresholds for noise sensitive receptors
- quantify the ambient sound levels at the noise sensitive receptors in accordance with AUC Rule 012
- predict the Project's noise effects for the two operation scenarios (i.e., combined-cycle and simple-cycle)
- assess compliance by comparing the cumulative noise level at the receptors to the PSL

Seven noise sensitive receptors (i.e., Rec 01 to Rec 07) have been identified within 1.5 km of the Project property line. The daytime and nighttime PSLs for the dwellings near the Project are 50 decibels A-weighted (dBA) and 40 dBA, respectively. The more restrictive nighttime PSL was used as the noise design goal for the Project, as the Project is designed to operate continuously during both daytime and nighttime hours.

To quantify the noise emitted by the Project, a noise model was developed based on historical and vendor-supplied sound level data. The noise model predicted noise level at the seven receptors, as well as area in the surrounding community. Sound modelling was performed using industry-accepted sound modelling software Computer Aided Noise Abatement (CadnaA), version 2022. The software is a scaled, three-dimensional program, which accounts for air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise emitting equipment and predicts sound pressure levels. The model calculates sound propagation based on ISO 9613-2:1996, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center frequency range from 31.5 to 8,000 Hz.

As prescribed in AUC Rule 012, noise effects from the ambient sound level, an existing regulated facility, and the Project are combined to determine the cumulative sound level. The cumulative sound level is compared to the nighttime PSL noise threshold of 40 dBA at all seven receptors. There is an existing substation (WLSS) within 2 km west of the Project. Noise effect from this substation is considered in the cumulative sound level. In addition to the PSL, the low-frequency noise analysis was conducted for all the receptors.

A detailed Noise Impact Assessment (NIA) report for the Project is presented in Appendix H. The NIA report summarizes the methods, noise emission sources, prediction results, and assumptions associated with the noise assessment for the Project.

14.2.2.2 Existing Conditions

The acoustic environment near the Project is characterized by a low population rural environment with a mix of agricultural and industrial activities. The existing daytime ambient sound level of 45 dBA and nighttime sound level of 35 dBA were assumed in the NIA, as recommended by AUC for rural environments in Alberta. The acoustic environment in a rural area in Saskatchewan is similar to Alberta; therefore, the ambient sound level recommended by Rule 012 are considered representative for the Project.

14.2.3 TERRAIN AND SOIL

This section addresses terrain and soil in the context of the Project, as the Project has the potential to affect the terrain integrity, and the soil quality and quantity. This section outlines the methods and results of the desktop review and field surveys.

14.2.3.1 Methods

14.2.3.1.1 Desktop

Existing data was used to conduct a desktop analysis of baseline terrain and soil conditions within the PDA and the Incidental Activity Study Area. Baseline terrain and soil conditions were obtained from the Saskatchewan Soil Information System (SKSIS) (SKSIS Working Group 2018) and the Hunting Angling and Biodiversity Information of Saskatchewan (HABISask) (SK ENV 2022) to determine soil classification, surface texture, surface expression and slope class. The databases provide a regional overview of terrain and soil resources for most of Saskatchewan. The desktop review focused on a general classification and identification of terrain and soil characteristics. These characteristics included slope, topsoil texture, erosion potential, and soil agricultural capability ratings. Existing slope classes associated with published soils spatial data were based on the slope classes defined in the Saskatchewan Soil Information Database (SKSID) 4.0 user manual (Agriculture and Agri-foods Canada (AAFC) 2013). Soil agricultural capability ratings were based on published values in HABISask and as defined in SKSID 4.0 (AAFC 2013). The SKSID 4.0 soil agricultural capability class ratings follow the Canada Land Inventory (CLI) rating system (CLI 1972) of soil capability classification for agriculture. The CLI system rates climate, terrain, and soil factors independently, as each factor can control the suitability of a tract of land for crop production.

14.2.3.1.2 Field Surveys

Stantec documented site-specific observations related to topography, slopes, and general drainage within the PDA in August 2022. The field survey was completed at a survey intensity level 1, which means that there is at least one inspection in every soil delineation (ACRB 1981). A total of four inspection points were selected using satellite imagery on Google Earth based off two different soil polygons that represent different soil textures, topography, and soil drainage (SKSIS Working Group 2018). At each inspection site, topographic data such as slope, and surface expression were collected. Areas of bare soil, erosion, and drastic changes in topography were documented.

14.2.3.2 Existing Conditions

14.2.3.2.1 Desktop

The soils consist of a mix of Orthic and Calcareous Black Chernozems with poorly drained Gleysols found in depressions (SKSIS Working Group 2018). Most of the soils in the PDA were formed on sandy fluvial parent material overlaying till. The dominant surface texture is sandy loam, which can be susceptible to wind erosion. These surface textures are not as susceptible to water erosion as finer textured soils with higher clay content. Agricultural capability ranges from class 3 to class 4 indicating that there is moderate to severe crop limitations that restrict the range of crops or that require special conservation practices (SKSIS Working Group 2018).

14.2.3.2.2 Field Surveys

The topography is mostly undulating; however, areas in the northwest portion of the PDA are nearly level. Slopes within the PDA range from 0.5% to 5% and generally converge into depressions on the east side. The topography becomes more pronounced outside the eastern boundary of the PDA where it becomes gently rolling. The overall slope of the PDA is southward towards Dellbrook Creek and Dellbrook Reservoir. Two small areas (i.e., less than 10 m x 10 m) of bare soil were observed in the field where wind erosion is suspected to have occurred.

14.2.3.2.3 Incidental Activity Study Area

The terrain in the Incidental Activity Study Area includes surface expressions that range from nearly level to undulating topography. The landscape within the Incidental Activity Study Area is predominantly gently sloping (2% to 5% slope gradient) and to a lesser extent, nearly level to level sloping (0% to 0.5% slope gradient). The presence of nearly level slopes is generally associated with wetland depressions. Parent material of which the soils has formed on include fluvial, till, and fluviolacustrine deposits (AAFC 2013).

The soils in the Incidental Activity Study Area consist of Black Chernozems with Gleysolic soils in poorly drained depressional areas. The dominant surface soil textures include coarse textured sand and medium textures such as very fine sandy loam and loam. Coarser textured surface soils such as sand can be more susceptible to wind erosion than finer textures. High water erosion potential is associated with finer textured soils with high clay content. In addition to soil texture, water erosion potential considers the typical rainfall for the area, soil type, infiltration rate, slope length, land use, and farming practices. The soils in the

Incidental Activity Study Area have a low potential for water erosion. Soil agricultural capability ratings in the Incidental Activity Study Area ranges from Class 2 to Class 7. Classes 2, 3, and 4 soils are considered capable of sustaining field crop cultivation. Class 2 soils have moderate limitations and can be cropped with little difficulty. Class 3 and Class 4 soils have moderately severe to severe limitations, respectively, that restrict the range of crops that can be grown. Classes 5 and 6 soils have the limited capability to support sustained perennial forage crop cultivation. Class 7 soils have no capacity for arable land or permanent pasture (CLI 1972).

14.2.4 VEGETATION AND WETLANDS

The Project is expected to result in environmental effects on vegetation and wetlands, which may include changes to plant species of conservation concern (SOCC). Therefore, vegetation and wetlands is carried forward as a VC in this assessment. SOCC are defined as federally and provincially legislated species at risk and species identified in federal and provincial tracking lists and activity restriction guidelines, including species:

- Listed under Schedule 1, Schedule 2, or Schedule 3 of the federal *Species at Risk Act* (SARA) (GOC 2002) as endangered, threatened, or special concern (GOC 2022c).
- Listed under *The Wildlife Act* (GOS 1998) and *Wild Species at Risk Regulations* (GOS 1999) of Saskatchewan as endangered, threatened, or vulnerable.
- Listed by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened, or special concern (GOC 2022c).
- Assigned a rank of S1, S2, or S3 (or a combination of these ranks) by the Saskatchewan Conservation Data Centre (SKCDC) (SKCDC 2022).
- Included in the Saskatchewan Activity Restriction Guidelines for Sensitive Species (GOS 2017a).

14.2.4.1 Methods

14.2.4.1.1 Desktop

Provincial databases, aerial photography, and literature sources were reviewed for existing data on vegetation and wetlands. The desktop review determined land cover and wetlands, as well as historical records of plant SOCC within the vegetation and wetlands LAA and the Incidental Activity Study Area. Prior to field surveys, a desktop HABISask search was used to determine the ecoregion and ecosite within the vegetation and wetlands LAA and Incidental Activity Study Area.

Prior to field surveys, land cover and wetlands in the PDA, vegetation and wetlands LAA, and wildlife and wildlife habitat LAA were delineated and classified in ArcGIS with aerial imagery from various years using SaskPower's standard land cover classification definitions (Table 14-4). Wetland boundaries were mapped, and wetlands classified according to the *Classification of Natural Ponds and Lakes in the Glaciated Prairie Region* (Stewart and Kantrud 1971) (Table 14-5). The land cover and wetlands were mapped at a scale of 1:3,000.

Table 14-4 SaskPower's Standard Land Cover Classification

Land Cover Class	Land Cover Subclass	Definition
Cleared	Populated area	Land that includes buildings in urban and rural areas and farmsteads.
	Industrial	Land that is predominantly developed including commercial and industrial plants, gravel pits and mine structures.
	Cultivated	Land that has been converted to cultivated annual crops, which is annually tilled, seeded or cut.
	Hay/Forage	Land that has been converted to cultivated crops used for livestock, which is cut annually.
	Road	Human-constructed routes for vehicles including surface/paved highways and non-surfaced trails.
Low Vegetation	High Shrub (>2 m)	Land dominated by woody, multi-stemmed plants or trees larger than 2 m in height.
	Low Shrub (<2 m)	Land dominated by woody, multi-stemmed plants or trees less than 2 m in height including wolf willow (*Elaeagnus commutata*) and snowberry (*Symphoricarpos occidentalis*).
	Tame Pasture	Pastureland sown to perennial grasses and/or legumes and used for livestock grazing (not cut annually for hay). Over time native species may be incorporated in the Project community.
	Native Grassland	Land where the sod layer has never been converted to agricultural production and is dominated by native plant species or an area of unbroken grasslands or parkland dominated (≥ 51 per cent) by perennial native vegetation and wildlife species and/ or an area of previously broken grassland that has reverted to native vegetation (i.e., has remained unbroken for at least 30 years).
Waterway	River	A large watercourse of natural flowing water.
	Lake	Non-flowing water, wetland larger than 20.2 ha in size.
	Stream	A small watercourse of natural flowing water.
Forested	Forested	Land dominated by tree species including deciduous, mixed wood, and coniferous dominated forest.
(SaskPower 2021)		

Table 14-5 Wetland Classification

Land Cover Class	Land Cover Subclass	Wetland Class	Definition
Wetland	Temporary	Class II	Characterized by standing or slow moving water for a few weeks after snowmelt or several days after a heavy storm. Typically dominated by foxtail barley (*Hordeum jubatum*), dock spp (*Rumex* spp), wild mint (Mentha arvensis) and other wet meadow (WDM) vegetation.
	Seasonal	Class III	Characterized by a shallow marsh zone that dominates the deepest part of the wetland area. Example species include awned sedge (*Carex atherodes*), water smartweed (*Persicaria amphibia* var. *emersa*) and slough grass (*Beckmannia syzigachne*).
	Semi-Permanent	Class IV	Characterized by marsh vegetation which dominates the central zone of the wetland as well as submerged aquatic plants including cattail (*Typha latifolia*), hard-stemmed bullrush (*Schoenoplectus acutus* var. *acutus*) and Siberian water-milfoil (*Myriophyllum sibiricum*).
	Open Water	Class V	Characterized by a permanent-open-water zone that dominates the deepest part of the wetland area. Generally, have very little to no vegetation in the central zone. Plants commonly present is cattail (*Typha latifolia*) and spiral ditch grass (*Ruppia cirrhosa*).
	Alkali Ponds	Class VI	Dominated by an intermittent-alkali zone in the deepest part of the wetland area. They have a pH above 7 and a high concentration of salts. Dominant plants include red samphire (*Salicornia rubra*) and beaked ditch-grass (*Ruppia maritima*).
(Stewart & Kantrud 1971)			

14.2.4.1.2 Field Surveys

Habitat Assessment

A habitat assessment was completed in the PDA and Incidental Activity Study Area to validate the land cover classification in conjunction with the vegetation assessment. For the vegetation and wetlands LAA and wildlife and wildlife habitat LAA, the habitat assessment was completed roadside. The results of the habitat assessment were used to update the land cover and wetland mapping.

Listed Plant Species Survey

Early listed plant surveys were completed on June 14, 2022 and June 27 to 29, 2023 and a late listed plant survey was completed on August 19, 2022 and another is planned for August 2023. The listed plant surveys were conducted in accordance with *The Wildlife Act* (GOS 1998) and standard research permit conditions as a research permit had not been received by the time the surveys were completed. These surveys were completed following the SK ENV Species Detection Survey Protocol 20.0 Rare Vascular Plant June 2021 Update (SK ENV 2021). The objective of this survey was to confirm the presence of plant SOCC. Surveys targeted areas of suitable habitat within the PDA.

The listed plant species survey consisted of two visits to capture early blooming and late-blooming species. The survey effort was determined based on estimates of land cover classification within the PDA using the results of desktop land cover mapping. Transects were selected in ArcGIS prior to field surveys based on the suitable habitat for plant SOCC including native grasslands, tame pasture, forest, shrubland, and wetlands. The transects ranged between 100 to 1,000 m in length and 5 m wide. All transects were placed a minimum of 10 m apart. Transect search speed was no faster than four kilometres/hour. Data was collected using FieldMaps for ArcGIS (© 2018-2021 Esri Inc. version 22.3.1) and Survey123 for ArcGIS (© 2022 Esri Inc version 3.15.156) applications on an Apple device. Data collected include Universal Transverse Mercator (UTM) coordinates at the start and end of the transect, the legal subdivision, environmental conditions, and a complete vascular plant species inventory including weeds listed under *The Weed Control Act* (GOS 2010a). If a plant SOCC was encountered, data was collected.

Detailed Vegetation Survey

A detailed vegetation survey was completed at the start of each transect. The detailed vegetation survey included vegetation community classification according to Saskatchewan Prairie Conservation Action Plan's Saskatchewan Rangeland Ecosystems: Ecosite Guide Publications (Thorpe 2014a).

To acquire additional data and detail on the abundance of dominant vascular plant species within the PDA and Incidental Activity Study Area, one metre-square quadrats were assessed at the start of each transect during the listed plant species surveys. The percent cover of each vascular plant species, bryophytes, lichens, litter, water, and bare ground was recorded for each quadrat. Any incidental plant SOCC observations were recorded. Data was collected using FieldMaps and Survey123 applications on an Apple device.

Weed Survey

Weed surveys were conducted to determine the presence of weed species listed as prohibited, noxious or nuisance under *The Weed Control Act* and documented opportunistically while conducting the listed plant species surveys, detailed vegetation surveys, and the wetland/waterbody assessment (Table 14-6). The density distribution was determined for all prohibited and noxious weeds following a density distribution guide for rating invasive species infestation (Saskatchewan Prairie Conservation Action Plan [SK PCAP] 2008). Data were collected using FieldMaps and Survey123 applications on an Apple device.

Table 14-6 Weed Designation Definitions as Defined Under *The Weed Control Act*

Provincial Designation	Definition
Prohibited	Prohibited weeds pose a significant economic and/or environmental threat and are absent or very rare. The regulatory objective for these weeds is early detection and eradication upon discovery in consultation with the weed inspector and the Saskatchewan Ministry of Agriculture.
Noxious	Noxious weeds are locally established within a limited area. The regulatory objective is to prevent invasion to uninfected areas.
Nuisance	Nuisance weeds are widely established, but may spread easily from one area to the next. The regulatory objective for these species is to address the underlying reason for their occurrences and to take measures to reduce their long-term effect.
(Brenzil 2010)	

Wetland/Waterbody Assessment

A wetland/waterbody assessment was completed in conjunction with the listed plant species and detailed vegetation surveys. The wetland/waterbody assessment was conducted to confirm the wetland boundaries and classes according to Stewart and Kantrud (1971) (Table 14-5). Data was collected using FieldMaps application on an Apple device. Results of the wetland/waterbody assessment were used to update the wetland mapping within the PDA.). Data was collected using FieldMaps application on an Apple device. Results of the wetland/waterbody assessment were used to update the wetland mapping within the PDA.

14.2.4.2 Existing Conditions

14.2.4.2.1 Desktop

The PDA and LAA is located in the Quill Lake Plain in the Aspen Parkland ecoregion. The Quill Lake Plain mostly consists of agricultural cropland with remnant native grassland and tame pasture located in areas of sandy soils including the former federal pasture north of TransCanada Yellowhead Highway 16 near Plunkett (Acton et al. 1998).

A search of the HABISask database revealed no historical occurrences of plant SOCC (Appendix I) within the vegetation and wetlands LAA. There is no critical habitat for federally listed species at risk (i.e., species listed under SARA) within the vegetation and wetlands LAA. There are 31 potential plant SOCC within the Quill Lake Plain landscape area (Appendix I).

The PDA is located approximately 350 m northwest of Dellwood Brook and approximately 30 m northwest of the Wolverine Lake diversion canal. The canal is connected to Wolverine Lake approximately 11 km upstream from the PDA. The canal diverts excess runoff (i.e., flood control mitigation) from Wolverine Lake around the Dellwood Reservoir where water is released downstream into the Dellwood Brook approximately 10 km south of the PDA. The water diversion canal is unlikely to provide fish habitat because it is largely ephemeral (i.e., only containing water seasonally or after precipitation events). Dellwood Brook is the closest potential fish bearing water feature to the Project and flows southwest through the Incidental Activity Study Area before entering the Dellwood Reservoir approximately 5.3 km downstream, eventually reaching

its confluence with Lanigan Creek approximately 21.5 km south of the Incidental Activity Study Area. Given the distance to Dellwood Brook from the PDA, no interactions with fish or fish habitat are expected to occur.

The PDA covers 64.9 ha and consists of predominantly low vegetation (55.4%) with the remainder comprised of cleared (29.4%), wetland (14.5%), and forested (0.8%). It should be noted that during the field surveys, native grassland in the PDA was observed to be invaded by non-native species with an understory of native species. The vegetation and wetlands LAA covers 189.8 ha and consists of predominately low vegetation (41.9%) with the remainder comprised of cleared (37.4%), wetland (13.7%), forested (6.5%), and waterway (0.5%). The wildlife and wildlife habitat LAA covers 701.0 ha and consists predominately of cleared (41.1%) with the remainder comprised of low vegetation (40.4%), wetland (13.4%), forested (4.0%), and waterway (1.0%). A summary of land cover is presented in Table 14-7.

Table 14-7 Land Cover Summary

Land Cover Class	Land Cover Subclass	PDA		Vegetation and Wetlands LAA		Wildlife and Wildlife Habitat LAA	
		Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
Cleared	Populated Area	-	-	-	-	2.5	0.4
	Industrial	-	-	-	-	4.2	0.6
	Cultivated	18.9	29.1	68.4	36.0	263.5	37.6
	Hay/forage	-	-	-	-	5.3	0.8
	Road	-	-	2.2	1.2	11.8	1.7
	Dugout	0.2	0.3	0.3	0.2	1.2	0.2
Subtotal*		**19.1**	**29.4**	**70.9**	**37.4**	**288.4**	**41.1**
Forested	Forested	0.5	0.8	12.4	6.5	28.4	4.0
Subtotal*		**0.5**	**0.8**	**12.4**	**6.5**	**28.4**	**4.0**
Low Vegetation	Low Shrub (<2 m)	-	-	-	-	0.7	0.1
	Tame Pasture	14.9	23.0	46.1	24.3	229.7	32.8
	Native Grassland	21.0	32.3	33.4	17.6	53.0	7.6
Subtotal*		**35.9**	**55.4**	**79.5**	**41.9**	**283.4**	**40.4**
Waterway	Stream	-	-	1.0	0.5	6.8	1.0
Subtotal*		-	-	1.0	0.5	6.8	1.0
Wetland	Seasonal	4.8	7.3	11.7	6.2	60.7	8.7
	Semi-permanent	-	-	0.4	0.2	0.4	0.1
	Temporary	4.6	7.1	13.9	7.3	33.1	4.7
Subtotal*		**9.4**	**14.5**	**26.0**	**13.7**	**94.1**	**13.4**
Grand Total*		**64.8**	**100.0**	**189.8**	**100.0**	**701.1**	**100.0**

Note:
Potential for variances in sums due to rounding.

Incidental Activity Study Area

The Incidental Activity Study Area encompasses the Quill Lake Plain in the Aspen Parkland ecoregion. A search of the HABISask database revealed records of three plant SOCC within the Incidental Activity Study Area including seven occurrences of large yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens*) S2, two occurrences of pale bulrush (*Scirpus pallidus*) S3, and one occurrences of marsh felwort (*Lomatogonium rotatum* var. *fontanum*) S3 (Appendix I). There is no critical habitat for federally listed species at risk (i.e., species listed under SARA) within the Incidental Activity Study Area. Large yellow lady's slipper is a perennial forb that is commonly found in wet meadows, forested wetlands, bogs, and swamps (NatureServe 2023). Pale bulrush is a perennial graminoid found in ditches, canals, and streams (NatureServe 2023). Marsh felwort is an annual/biennial obligate wetland forb that is found in areas of thin, sandy or gravelly soils in herbaceous freshwater to brackish wetlands (USDA 2023, NatureServe 2023). In addition to the historical records, the SKCDC lists 30 plant SOCC with the potential to occur within the Elstow Plain (Appendix I).

Dellwood Brook flows southwest through the Incidental Activity Study Area before entering the Dellwood Reservoir, approximately 5.3 km downstream, eventually reaching its confluence with Lanigan Creek approximately 21.5 km south of the Incidental Activity Study Area. Wetlands are scattered throughout the Incidental Activity Study Area.

Appendix D provides information on the TransGas study area for the proposed natural gas infrastructure.

14.2.4.2.2 Field Surveys

Habitat Assessment

The land cover classification provided in Table 14-7 was validated based on the results of the habitat assessment (Figure 14-3). The native grassland observed in the field was dominated by slender wheatgrass (*Elymus trachycaulus ssp. Trachycaulus*) and invaded by non-native species including smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*).

Listed Plant Species Vegetation Survey

A total of three transects were surveyed in the PDA during the listed plant surveys. A total of 68 vascular plant species were observed (Appendix I) and no plant SOCC were found.

Detailed Vegetation Survey

The Project is located within the Aspen Parkland ecoregion of the Prairie ecozone on a sandy loam ecosite. The reference plant community (i.e., typical for ungrazed or slightly grazed communities with no invasion of non-native species) for this ecosite is Aspen Parkland (AP) – sand and sandy loam (SD) – community type A (AP-SD-A). Community type A means that there is no alteration from the original reference community (Thorpe 2014a). The expected dominant plant species found in this community is western porcupine-grass (*Hesperostipa curtiseta*), sedge (*Carex spp*) and needle-and-thread (*Hespersostipa comata*) (Thorpe 2014b).

A total of three quadrats were surveyed during the early and late vegetation assessment. One of the quadrats was a meadow and marsh ecosite and the other two were loam ecosites. Meadow and marsh ecosites are characterized as being moist to wet ecosites with gleysolic soils (Thorpe 2014a). Loam ecosites are described as well-drained soils with medium to moderately fine textured soils (Thorpe 2014a).

The plant community for quadrat one is the prairie ecozone (PEZ), WDM ecosite, community type C (PEZ-WDM-C). Community type C has alterations from the reference plant community (Thorpe 2014b). The dominant species observed in quadrat one were silverweed (*Potentilla anserina ssp. Anserina*) and smooth brome. Alterations to the expected plant community (AP-SD-A) are due to increased grazing decreasing the dominance of sedges and increasing Kentucky blue grass, Canada thistle and other non-native species.

The plant community for quadrats two and three are both Aspen Parkland, loam (LM), community type E (AP-LM-E). Community type E has moderate alteration from the reference community (Thorpe 2014a). This plant community is dominated by mid grasses, with significant amounts of short grasses and forbs and lesser amounts of half shrubs (Thorpe 2014b). The dominant plant species observed in these two quadrats was slender wheat grass and Kentucky bluegrass.

Appendix I presents the cover of vascular plant species, bryophytes, lichens, litter, water, and bare ground recorded for each quadrat.

Weed Survey

Four noxious weed species were observed in the PDA including Canada thistle (*Cirsium arvense*), common tansy (*Tanacetum vulgare*), perennial sow thistle (*Sonchus arvensis*), and annual hawksbeard (*Crepis tectorum*) (Figure 14-3; Table 14-8).

Table 14-8 Noxious Weed Occurrences in the PDA

Common Name	Scientific Name	Density Distribution[1]	UTM Coordinates
Canada thistle	*Cirsium arvense*	10	13U 580384 5747173
Canada thistle	*Cirsium arvense*	10	13U 480678 5747202
Canada thistle	*Cirsium arvense*	10	13U 480972 5747832
common tansy	*Tanacetum vulgare*	2	13U 480810 5747212
common tansy	*Tanacetum vulgare*	2	13U 480957 5747204
common tansy	*Tanacetum vulgare*	8	13U 480901 5747288
common tansy	*Tanacetum vulgare*	6	13U 480576 5747941
perennial sow thistle	*Sonchus arvensis*	10	13U 580384 5747173
perennial sow thistle	*Sonchus arvensis*	12	13U 480555 5747143
perennial sow thistle	*Sonchus arvensis*	10	13U 480678 5747202
perennial sow thistle	*Sonchus arvensis*	10	13U 480972 5747832
perennial sow thistle	*Sonchus arvensis*	12	13U 480645 5747728

Common Name	Scientific Name	Density Distribution[1]	UTM Coordinates
annual hawksbeard	*Crepis tectorum*	1	13U 480676 5747461

Note:

[1] Density Distribution Class Definitions:

1= Rare, 2= few sporadically occurring individual plants, 6= A single patch plus a few sporadically occurring plants, 8 = A few patches plus several sporadically occurring plants, 10= Continuous uniform occurrences of well spaced plants, 12= Continuous dense occurrences of plants (SK PCAP 2008)

Wetland/Waterbody Assessment

Based on the field verified wetland mapping, there are four wetlands within the PDA. Three wetlands classified as Class III (seasonal pond) and one wetland is Class II (temporary) (Figure 14-3; Table 14-9).

Table 14-9 Wetlands in the PDA

Wetland	UTM Coordinates	Wetland Class	Potential for Interactions with Fish or Fish Habitat
1	13U 480939 5747197	Class II	No interactions are expected to occur
2	13U 480892 5747814	Class III	No interactions are expected to occur
3	13U 480611 5747490	Class III	No interactions are expected to occur
4	13U 480540 5747547	Class III	No interactions are expected to occur

14.2.5 WILDLIFE AND WILDLIFE HABITAT

This section addresses terrestrial wildlife and wildlife habitat resources in the context of the Project. While all wildlife species and their habitats are considered as part of the assessment, there is an added focus placed on wildlife SOCC and migratory birds that are known, or have the potential, to occur in the wildlife and wildlife habitat LAA and RAA. SOCC are defined in Section 14.2.4.1.1. This section outlines the methods and results of the desktop review and field surveys.

14.2.5.1 Methods

14.2.5.1.1 Desktop

Existing information from provincial and federal databases, satellite imagery, literature sources, and field surveys were used to characterize wildlife and wildlife habitat relative to the PDA and the Incidental Activity Study Area. A focus was placed on determining known occurrences of wildlife SOCC, migratory birds, and availability of their habitat within the Project. Habitat suitability was evaluated to determine the wildlife SOCC and migratory birds that have potential to occur in the Project. Migratory birds are those protected under the *Migratory Birds Convention Act* (GOC 1994).

The following sources of information were reviewed:

- the HABISask Application database search for historical records of SOCC and protected and designated lands (SK ENV 2022)

- SKCDC taxa lists (SKCDC 2022)
- SARA public registry database for SARA- and COSEWIC-listed species (GOC 2022c)
- Birds of the World Online database (Cornell Lab of Ornithology and the American Ornithologists' Union 2022)
- Saskatchewan Breeding Bird Atlas (Birds Canada 2022a, 2022b)
- satellite imagery such as ESRI World Imagery (Digital Globe 2016) and FlySask (SGIC 2008-2013)

These data sources provided information about potential and historical wildlife SOCC occurrences, sensitive wildlife habitat features (e.g., migratory bird concentration sites), and habitat types present within the Project (i.e., land cover classes). In addition to the historical occurrences of wildlife SOCC, the availability of wildlife habitat within the Project, in combination with a species' range, was used to determine wildlife SOCC and migratory birds with the potential to occur in the Project. Wildlife habitat availability was evaluated based on land cover data, as well as a review of satellite imagery. Because land cover classes represent broad habitat types (i.e., are at a coarse scale), a habitat association approach was used to estimate habitat availability. Specifically, each land cover class was evaluated to determine whether it provided suitable habitat using knowledge of seasonal habitat requirements for wildlife, including wildlife SOCC and migratory birds. Land cover mapping methods are presented in Section 14.2.4.1.

Notes
1. Coordinate System:
Name: NAD 1983 CSRS UTM Zone 13N
2. Data Sources: Base features produced under license with the Government of Saskatchewan and the Government of Canada.

Legend

- Rural Residence
- Railway
- Surface Flow
- Watercourse
- Major Road
- Minor Road
- Project Development Area (PDA)
- Vegetation Local Assessment Area (LAA) (300 m)
- Wildlife LAA (1 km)
- Agricultural Crown Land
- Quarter Section

Field Observations of Species of Conservation Concern

- Spague's Pipit and Baird's Sparrow
- Sprague's Pipit
- Western Tiger Salamander

Wildlife Incidental Feature

- Coyote Den
- Active Songbird Nest
- Stick Nest

Noxious Weed Observation

- Common Tansy
- Perennial Sow Thistle
- Perennial Sow Thistle, Canada Thistle

Land Cover Classification

Land Cover, Land Cover Sublcass

- Cleared, Cultivated
- Cleared,Hay/Forage
- Cleared, Industrial
- Cleared, Populated Area
- Cleared, Road
- Forested, Forested
- Low Vegetation, Low Shrub (<2m)
- Low Vegetation, Native Grassland
- Low Vegetation, Tame Pasture
- Waterway, Stream
- Dugout,Dugout
- Wetland, Seasonal
- Wetland, Temporary

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Stantec

Project Location
NW-36-33-24 W2M
Near Guernsey, SK

Prepared by KL on 2/24/2023
TR by NK on 2/24/2023
IR by JH on 2/24/2023

Client/Project
111477076-005-REVD

SaskPower Aspen Power Station

Figure No.
14-3

Title
Biophysical Considerations

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14.2.5.1.2 Field Surveys

As part of the wildlife and wildlife habitat assessment, wildlife surveys were conducted to identify the presence or sign of wildlife species within the wildlife and wildlife habitat LAA with an emphasis on SOCC as well as their associated habitat types and landscape features (e.g., targeting all wetland classes for the presence of yellow rails). The survey types and the associated methods are presented in the following sections.

General Wildlife Survey

All wildlife and wildlife signs (e.g., migratory bird nest, mammal den, scat, tracks) that would not otherwise be recorded in the wildlife surveys listed below were documented through incidental observations within the wildlife and wildlife habitat LAA. Incidental observations were collected using FieldMaps for ArcGIS (© 2018-2022 Esri Inc. version 22.3.1) applications on an Apple device. Data collected include the species, abundance, behaviour, UTM coordinates, the legal subdivision, and any other pertinent information.

Amphibian Auditory/Visual Survey

Amphibian surveys were completed at potential amphibian breeding habitats located within and up to 500 m from the PDA and the Incidental Activity Study Area. A 500 m buffer of the PDA and the Incidental Activity Study Area accounts for the largest provincial maximum activity restriction setback for northern leopard frog (*Lithobates pipiens*; GOS 2017a). Amphibian habitat sites were selected during desktop analysis and confirmed in the field before surveys were initiated. Sites surveyed supported potential breeding habitat for northern leopard frog, wood frog (*Lithobates sylvaticus*), boreal chorus frog (*Pseudacris maculata*), Canadian toad (*Anaxyrus hemiophrys*), and/or western tiger salamander (*Ambystoma mavortium*).

Amphibian surveys included auditory and visual components that were completed on June 10, 15, and 19, 2022. Amphibian surveys completed in 2023 (May 10, 29, and June 7) only included auditory surveys. In 2022, three survey visits were completed at one location, two survey visits were completed at four locations, and one survey visit was completed at seven locations (n = 12). In 2023, three survey visits were completed at 16 locations, two survey visits were completed at three locations, and one survey visit was completed at seven locations (n = 26). Surveys were only completed on subsequent visits if habitat was still suitable for breeding (i.e., water present in wetlands). Auditory surveys were completed from 30 minutes after sunset to 01:00, under appropriate environmental conditions (i.e., temperature >6°C, wind <20 km/h, and no precipitation; SK ENV 2020a). At each wetland, surveys began following a two-minute waiting period to allow disturbance associated with site access to subside. This was followed by a three-minute passive observation period during which all frog and toad calls heard were recorded using an abundance index outlined in the survey protocol (SK ENV 2020a) and species identified.

In 2022, visual surveys were completed in the PDA during day-light hours and under appropriate environmental conditions (i.e., temperature >6°C, wind <13 km/h, and no precipitation; SK ENV 2020b). At each wetland, the entire wetland edge was surveyed for amphibian eggs, larvae, and adults. Survey durations varied with wetland size and all species identified, including calls heard, were recorded.

Prairie Raptor Survey

Raptor stick nest surveys were completed on June 9, 2022, and April 28 and May 3, 2023. The surveys targeted all suitable habitat (e.g., tree bluffs, isolated trees) within the wildlife and wildlife habitat LAA, which represents the maximum activity restriction setback (1 km) for ferruginous hawk (*Buteo regalis*) nests (GOS 2017a).

A ground-based survey for stick nests was conducted using roadside methods during daylight hours when visibility was good (i.e., no precipitation or fog). The observer assessed suitable habitat and scanned trees and shrub patches looking for stick nests. If a stick nest was observed, activity was recorded, the presence of adults and/or young, behaviour (i.e., defensive display, incubating), size of the nest, location, and surrounding habitat were documented (GOA 2013).

Sharp-tailed Grouse Lek Survey

Sharp-tailed grouse lek surveys followed methods outlined in the standardized SK ENV Species Detection Survey Protocols (SDSP) for sharp-tailed grouse (SK ENV 2020d). Surveys were completed at suitable lekking habitat (e.g., native grassland and tame pasture) up to 400 m from the PDA and the Incidental Activity Study Area, per SK ENV (2020d) and the SK ENV maximum activity restriction guideline setback distance for leks (GOS 2017a). Stations were surveyed between a half hour before sunrise and three hours after sunrise during two visits on April 28 and May 4, 2023. All surveys were completed under appropriate environmental conditions (i.e., temperature less than -10°C, wind <20 km/h, and little to no precipitation; SK ENV 2020d).

Survey stations were spaced approximately 800 m apart at sites with a high vantage overlooking potential lek habitat. At each survey location, the observer waited for two minutes to allow disturbances associated with site access to subside before beginning a fifteen-minute survey listening and scanning suitable habitat with binoculars and a spotting scope (SK ENV 2020d). If an active lek was observed, its location was plotted, and the observer recorded the number of male and female grouse present.

Grassland Breeding Bird Survey

Breeding bird surveys were completed in the PDA and the Incidental Activity Study Area on June 10 and 28, 2022 and June 10, 21, and 22, 2023. Survey locations were selected to cover representative land cover classes (i.e., low vegetation, forested, and wetland) within the wildlife and wildlife habitat LAA while avoiding any overlap in-between survey radii of 100 m.

The surveys followed methods outlined in the standardized SK ENV SDSP for grassland breeding birds (SK ENV 2020c). Two survey visits were completed at five locations between sunrise and no more than four hours after sunrise and under appropriate environmental conditions (i.e., temperature >0 degrees Celsius (°C), wind <20 kilometres per hour (km/h), precipitation not exceeding a light intermittent drizzle; SK ENV 2020c). At each survey location, the observer waited for two minutes to allow disturbances associated with site access to subside before beginning a five-minute passive observation period. All birds observed were recorded but detection efforts were focused on a 100 m radius from the survey location's centre (i.e., observer). Birds observed outside the 100 m radius were recorded as incidental observations and the habitat composition and environmental conditions were recorded for every survey location.

Yellow Rail Survey

Yellow rail surveys were completed at potential yellow rail breeding habitats (e.g., wetlands dominated by sedges/emergent vegetation, wet meadows, bogs) located within and up to 350 m from the PDA and the Incidental Activity Study Area. A 350 m buffer accounts for the provincial maximum activity restriction setback for Yellow rail (GOS 2017a). Yellow rail habitat sites were selected during desktop analysis and confirmed in the field before surveys were initiated. Yellow rail surveys were completed on June 10, 19, 2022 and May 16, 29, and June 7, 11, 2023. The surveys followed methods outlined in the standardized SK ENV SDSP for yellow rails (SK ENV 2014). Two survey visits were completed at eleven locations in 2022 and three survey visits were completed at five locations and two survey visits were completed at one location in 2023, (n = 6). Surveys were completed between 23:00 and 03:00 under appropriate environmental conditions (i.e., temperature >0°C, wind <20 km/h, no precipitation; SK ENV 2014). At each survey location, the observer waited for two minutes to allow disturbances associated with site access to subside before beginning a five-minute passive observation period, followed by three-minutes of call playback, and another two-minute passive observation period. The habitat composition and environmental conditions were recorded for every survey location.

Migratory Bird Concentration Survey

Roadside bird migration surveys were completed on April 28 and May 3, 2023 to gain an understanding of waterbird use in the wildlife and wildlife habitat LAA and identify sensitives areas where birds could concentrate during spring migration. Surveys began in the eastern portion of the wildlife and wildlife habitat LAA and progressed to the west with vehicle speeds approximately 50 km/h or lower (Bibby *et al.* 2000). When birds were observed, the vehicle was stopped to aid in accurate identification of species and abundance. Data collected for each observation included UTM coordinates, bird species, abundance, and information on bird activity (e.g., loafing, flight direction, flight height, local movement). Surveys were conducted between 8:00 and 16:00 (Bibby *et al.* 2000), in good environmental conditions (i.e., wind <20 km/h, precipitation not exceeding a light intermittent drizzle; Ralph *et al.* 1995).

14.2.5.2 Existing Conditions

The Project is within in the Aspen Parkland ecoregion of the Prairie ecozone that supports a wide variety of wildlife species, including 55 species of mammals, 320 species of birds, and 11 species of amphibians and reptiles (Acton et al. 1998). Habitat for wildlife in the ecoregion is comprised predominantly of native grasslands, wooded groves, and wetlands that provide important breeding and staging habitats for waterfowl and a diverse number of wildlife species.

14.2.5.2.1 Desktop

There is a total of 46 SOCC (2 mammal, 42 bird, and 2 amphibian) that have the potential to occur in the wildlife and wildlife habitat LAA based on species range overlap (Cornell Lab of Ornithology and the American Ornithologists' Union 2022) and habitat availability. The HABISask project screening report revealed six known historical occurrences of wildlife SOCC with no critical habitat for federally listed species at risk (i.e., species listed under SARA) within the wildlife and wildlife habitat LAA (Table 14-10, Appendix I, SK ENV 2022). There are three Important Bird Areas (IBAs) that have the potential for large concentrations of migratory species and breeding habitat for SOCC. Kutawagon Lake is the nearest area (29 km) to the wildlife and wildlife habitat LAA boundary with Quill Lakes 33 km away, and Last Mountain Lake National Wildlife Area 42 km away. All three areas have known historical and regular occurrences of migrating whooping crane (*Grus americana*) in the spring and fall seasons. Other SOCC occurrences include piping plover (*Charadrius melodus*) and colonial nesting birds like black tern (*Chlidonias niger*) and black-crowned night heron (*Nycticorax nycticorax;* BirdsCanada 2023a, 2023b, 2023c).

Table 14-10 Known Historical Occurrences of Wildlife SOCC in the Wildlife and Wildlife Habitat LAA

Scientific Name	Common Name	Provincial Rank[1]	SARA Status[1]
Anthus spragueii	Sprague's pipit	S3B	Threatened
Euphagus carolinus	rusty blackbird	S3B, SUN	Special Concern
Dolichonyx oryzivorus	bobolink	S5B	Threatened
Hirundo rustica	barn swallow	S4B	Threatened
Podiceps auritus	horned grebe	S5B	Special Concern
Taxidea taxus taxus	American badger	S3	Special Concern

Notes:
[1] SK ENV 2022, S3 – vulnerable, S4 – apparently secure, S5 – secure, B – breeding population, U – status is uncertain, N – non-breeding population

Land cover and habitat information is presented in Section 14.2.4.1.1 and 14.2.4.2.2.

Incidental Activity Study Area

The Incidental Activity Study Area is comprised primarily of cultivated land and hay/forage, which provides limited habitat for most wildlife species. There is some native grassland along the Dellwood Brook as well as scattered remnant patches of native grassland within the Incidental Activity Study Area. There are some portions of quarter sections that are permanently managed as provincial *Wildlife Habitat Protection Act* lands that are native grassland (SK ENV 2023).

Overall, potential wildlife and wildlife habitat associated with the Incidental Activity Study Area is limited due to anthropogenic disturbances (e.g., cultivation, residential development, and infrastructure), however, the native grassland provides a higher habitat value for some wildlife species. Wetlands and forested patches can provide breeding habitat (e.g., raptor and migratory breeding bird nests), forage (e.g., migratory waterfowl), and shelter for small and large mammals (e.g., north American beaver, deer, moose). Cultivated fields can also attract large numbers of migratory waterfowl in the spring and fall for foraging opportunities.

The Incidental Activity Study Area contains historical records of 11 known SOCC with some overlap in species found in the wildlife and wildlife habitat LAA (SK ENV 2023; Table 14-11).

Appendix D provides information on the TransGas study area for the proposed natural gas infrastructure.

Table 14-11 Known Historical Occurrences of Wildlife SOCC in the Incidental Activity Study Area

Scientific Name	Common Name	Provincial Rank[1]	SARA Status[1]
Anthus spragueii	Sprague's pipit	S3B	Threatened
Centronyx bairdii	Baird's sparrow	S4B	Special Concern
Euphagus carolinus	rusty blackbird	S3B, SUN	Special Concern
Dolichonyx oryzivorus	bobolink	S5B	Threatened
Hirundo rustica	barn swallow	S4B	Threatened
Phalaropus lobatus	red-necked phalarope	S4B, S3M	Special Concern
Podiceps auritus	horned grebe	S5B	Special Concern
Riparia riparia	bank swallow	S4B, S5M	Threatened
Taxidea taxus taxus	American badger	S3	Special Concern
Ambystoma mavortium	western tiger salamander	S4	Special Concern

Note:
[1] SKCDC 2022, S3 – vulnerable, S4 – apparently secure, S5 – secure, B – breeding population, U – status is uncertain, M – migrant population, N – non-breeding population

14.2.5.2.2 Field Surveys

Wildlife and wildlife signs (e.g., migratory bird nest, mammal den) incidentally observed within the wildlife and wildlife habitat LAA are listed below in Table 14-12. A complete list of wildlife observed in the wildlife and wildlife habitat LAA during field surveys is presented in Appendix I. Only one SOCC, western tiger salamander (*Ambystoma mavortium*), was incidentally recorded during field surveys (Figure 14-3). The Project overlaps with the western tiger salamander's range and supports habitat for this species (native grassland habitat adjacent to small, shallow, fishless wetlands; ECCC 2023).

Table 14-12 2022 Incidental Wildlife Observations

Scientific Name	Common Name	Abundance	Observation	UTM Coordinates
Ambystoma mavortium*	western tiger salamander*	1 adult (unknown gender)	Ring-billed gull observed feeding on salamander carcass on June 10, 2022	13U 480772 5747818
Buteo jamaicensis	red-tailed hawk	1 female adult and 1 male adult	Perched on June 9, 2022	13U 480108 5747115
Canis latrans	coyote	1 adult (unknown gender)	Adult exiting active den on August 19, 2022	13U 480970 5747547
Circus hudsonius	northern harrier	1 adult (unknown gender)	Flying on June 9, 2022	13U 479730 5747879

Scientific Name	Common Name	Abundance	Observation	UTM Coordinates
Odocoileus hemionus	mule deer	2 adults (unknown gender)	2 adults foraging	13U 480822 5746385
Spizella pallida	clay-colored sparrow	1 female adult	Female flushed from nest while incubating 3 eggs on June 9, 2022	13U 480409 5746951
Notes: *SOCC				

Table 14-13 2023 Incidental Wildlife Observations

Scientific Name	Common Name	Abundance	Observation	UTM Coordinates
Alces Alces	moose	3 female adults and 1 male adult	Feeding and foraging	13U 479226 5748242
Vulpes vulpes	red fox	1 adult (unknown gender)	Loafing, travelling east to west	13U 497304 5743760
Anthus spragueii*	Sprague's pipit*	1 male adult	Singing	13U 478862 5747783
Anthus spragueii*	Sprague's pipit*	1 male adult	Singing	13U 479649 5748014
Anthus spragueii*	Sprague's pipit*	1 male adult	Singing	13U 480144 5748108
Anthus spragueii*	Sprague's pipit*	1 male adult	Singing	13U 480141 5748553
Cathartes aura*	turkey vulture*	5 adults (unknown gender)	Flying/Circling	13U 497850 5741177
Cathartes aura*	turkey vulture*	1 adult (unknown gender)	Flying/Circling	13U 496318 5742021
Hirundo rustica*	barn swallow*	3 adults (unknown gender)	Carrying nesting material	13U 480366 5747850
Spatula discors	blue-winged teal	1 female adult	10 eggs in ground nest	13U 480624 5746314
Notes: *SOCC				

Amphibian Auditory/Visual Survey

No amphibians were detected during the auditory and visual surveys in 2022. An estimate of 357 amphibians (3 species) were recorded during the auditory surveys in 2023 with no SOCC present (Table 14-14).

Table 14-14 2023 Amphibian Observations

Species		Observations and Detectability Criteria			Total Estimated abundance
Scientific Name	Common Name	No overlapping calls	Individual Calls with some overlap	Full chorus	
Pseudacris maculata	boreal chorus frog	32	16	9	343
Lithobates sylvatica	wood frog	3	0	0	5
Anaxyrus hemiophrys	Canadian toad	7	0	0	9

Prairie Raptor Survey

One stick nest was observed outside of the PDA but within the wildlife and wildlife habitat LAA on June 9, 2022, at 13U 479898 5746386. No activity was observed at the nest.

Sharp-tailed Grouse Lek Survey

One sharp-tailed grouse lek was recorded during the surveys. Ten males were observed dancing on the lek site (13U 479507 5747994) with six females also present (*n* = 16). The lek was observed in upland, disturbed habitat (hay/forage) and with low, sparse vegetation.

Grassland Breeding Bird Survey

A total of 27 species of grassland birds were recorded during the 2022 surveys with two identified as SOCC. Five observations of Sprague's pipit (*Anthus spragueii*) were recorded during the surveys with one observation recorded outside of the PDA. Sprague's pipit are listed under the SARA (GOC 2022c) as threatened, and vulnerable under the SKCDC (2022). Two Baird's sparrow (*Ammodramus bairdii*) were recorded during the surveys in the PDA. Baird's sparrow is listed as special concern under the SARA (GOC 2022c) and apparently secure by the SKCDC (2022).

A total of 65 species of grassland birds were recorded during the 2023 surveys with 6 identified as SOCC (Table 14-15).

Table 14-15 SOCC observations during 2023 Surveys

Species		Abundance	Provincial Rank[1]	COSEWIC[2]	SARA (Schedule 1)[2]
Scientific Name	Common Name				
Podiceps auritus	horned Grebe	15	S5B	Special Concern	Special Concern
Hirundo rustica	barn Swallow	2	S4B	Special Concern	Threatened
Anthus spragueii	Sprague's Pipit	4	S3B	Threatened	Threatened
Zonotrichia querula	Harris's Sparrow	1	SUB, S5M	Special Concern	Special Concern
Centronyx bairdii	Baird's Sparrow	5	S4B	Special Concern	Special Concern
Dolichonyx oryzivorus	bobolink	8	S5B	Special Concern	Threatened

Notes:

[1] SKCDC 2022, S3 – vulnerable, S4 – apparently secure, S5 – secure, B – breeding population, M – migrant population, U – status is uncertain

[2] GOC 2023

Yellow Rail Survey

No yellow rails were detected during the 2022 and 2023 surveys.

Migratory Bird Concentration Survey

A total of 17 bird species were observed during the spring surveys, including: waterfowl (839), waterbirds (28), and shorebirds (2). A total of 869 birds were observed during the two survey visits (Table 14-16). Waterfowl comprised of (96%) of total bird observations, followed by waterbirds (3%), and shorebirds (1%). Snow goose were the most abundant species (*n* = 557) followed by Canada goose (*n* = 151; Appendix I). Bird observations during the spring surveys were not concentrated in any single location.

Table 14-16 Bird Counts During Spring Migratory Bird Concentration Surveys

Bird Guilds	Survey Visit 1	Survey Visit 2	Total
Waterfowl	583	256	839
Waterbirds	2	26	28
Shorebirds	0	2	2
Total	585	284	869

14.2.6 HUMAN ENVIRONMENT

Human environment is considered a VC for this assessment as the Project has the potential to affect current land and resource use, employment and the economy, and infrastructure and services. Potential challenges pertaining to the health and social setting of the region are discussed in Section 15.0. This section provides a summary of methods and results of the desktop studies completed for the Project.

The primary focus for this assessment is on:

- Current Land and Resource Use: The Project may have the potential to affect current or future land and resource use, which is important to neighbouring communities (e.g., recreation and tourism), property owners, resource users (e.g., hunters, farmers, commercial operations, general public), and other stakeholders.
- Employment and Economy: The Project is expected to create employment and business opportunities and generate revenue.
- Infrastructure and Services: Project activities, traffic, and the workforce may place increased demands on local services and infrastructure (e.g., accommodations, community and emergency services, transportation).

14.2.6.1 Methods

A desktop review of existing conditions for the human environment were obtained primarily through secondary research. The following sources and types of information were used to characterize baseline conditions:

- existing literature, such as government publications, land use surveys, regional studies, resource management plans, and land use plans
- websites for government and non-government agencies and organizations (e.g., Saskatchewan Hunters and Trappers Guide 2021/22 (GOS 2021b))
- provincial and federal databases, historical data, and relevant literature sources
- planning documents from the RM of Usborne
- vegetation dataset for land cover mapping (Section 14.2.4)
- Statistics Canada 2016 and 2021 census data, including population and community profiles (Statistics Canada 2017a, Statistics Canada 2022a)
- websites for infrastructure and service providers including health care facilities, fire, and police services
- other VC sections (e.g., Section 14.2.5 Wildlife and Wildlife Habitat)

14.2.6.2 Existing Conditions

14.2.6.2.1 Current Land and Resource Use

Land use has been defined based on the land cover types described in Section 14.2.4. The PDA is 64.9 ha and is located on predominantly low vegetation (55.4%), in addition to cleared (29.4%), wetland (14.5%), and forested (0.8%). The LAA, beyond the PDA, is dominated by low vegetation, with some cleared, wetland, and forested land cover areas.

The PDA is located within the RM of Usborne. From their Official Community Plan (RM of Usborne 2012) they state that their vision for the future identifies the region's richness in agriculture, potash, and manufacturing that creates a strong economy for the region and the province; the area supports a variety and abundance of wildlife and numerous tourist sites and opportunities; and that the region contains cooperative and ambitious community spirits that create a unique quality of life for everyone. The RM's resources are described as being largely based in the agricultural land base, where the CLI's land capability for agriculture survey classified a significant portion of the RM as having the highest rated capability grouping for agriculture use. Potash resources are also dominant in the RM. The primary land uses within the RM include agricultural activities pertaining to field crops, pasture lands, and livestock operations. One of the goals of the Official Community Plan is sustainability and environment. The RM has a number of important wildlife habitats and lands that are highly productive from an agricultural point of view, including land that is set aside for community pasture.

The PDA is privately owned and is not accessible for public use. Several waterbodies exist within the LAA, including multiple wetlands, the Dellwood Reservoir, Little Manitou Lake, and Boulder Lake. The PDA is located within Wildlife Management Zone (WMZ) No. 21, and the Southern Fur Conservation Area (SFCA), which governs and places restrictions in terms of hunting and trapping activities (GOS 2021b, GOS 2022f). The seasons for harvesting activities of big game in WMZ No. 21 are primarily within September to December, with specific ranges dependent upon the species (GOS 2021b). The trapping seasons in the SFCA can be year-round for species such as skunk, raccoon and coyote but trapping for the remainder of the species can range from September to June (GOS 2021b). WMZ No. 21 is a part of Game Bird Management Unit 4, as part of the South Game Bird District. The seasons for hunting game birds is also primarily from September to December, with specific ranges dependent upon the species (GOS 2021b).

14.2.6.2.2 Employment and Economy

Population

Statistics Canada population data from 2021 for the RM of Usborne, the town of Lanigan, the village of Drake and the Province of Saskatchewan are presented in Table 14-17. In 2021, the RM of Usborne had a population of 511, a 3.4% decrease since 2016. Whereas the village of Drake had a population of 197 in 2021 and 2016. The town of Lanigan had a population of 1,433 in 2021, a 4.1% increase since 2016. Therefore, in 2021, the LAA, comprised of the RM of Usborne, the town of Lanigan and the village of Drake had a population of 2,141, a 0.2% increase since 2016. This circumstance represents the same rate of growth in comparison to the RAA, or the province overall.

Table 14-17 Population and Population Change in the LAA and RAA

Population	RM of Usborne	Town of Lanigan	Village of Drake	LAA	Saskatchewan RAA
2016	529	1,377	197	2,103	1,098,352
2021	511	1,433	197	2,141	1,132,505
2021-2016 Variation %	-3.4%	4.1%	0.0%	0.2%	0.2%
(Statistics Canada 2022a)					

In 2021, of a 25.0% sample of the LAA, 2.2% of the population identified as Indigenous and 8.6% identified as a visible minority (i.e., non-Indigenous, non-Caucasian). Whereas in the RAA, 17.0% of the population identified as Indigenous and 14.4% identified as a visible minority. Of the LAA, the entire population that identified as Indigenous was located within the town of Lanigan. The primary proportion (85.7%) of the population that identified as visible minority within the LAA was also located within the town of Lanigan (Statistics Canada 2022a).

In 2021, the median age of the residents in the LAA was 43.3 (Table 14-18), which is older than the provincial median age of 38.8. The median age in the RM of Usborne was 43.6. The town of Lanigan had a younger median age, of 42.0; whereas the median age of the village of Drake was older than the LAA and the RAA, with a value of 44.4. In the LAA, 57.5% of the population was between 15-64 years of age, whereas in the RAA, 62.8% of the population fell in the same age bracket. The primary proportion (67.1%) of the percentage of the population in the 15-64 years of age bracket within the LAA was located within the town of Lanigan.

Table 14-18 Population Demographics in the LAA and RAA

Age Characteristics		RM of Usborne	Town of Lanigan	Village of Drake	LAA	Saskatchewan RAA
Age 0-14	Men +	50	150	20	220	114,360
	Women +	55	135	10	200	108,755
	Total	105	290	35	430	223,115
Age 15-64	Men +	145	440	65	650	357,000
	Women +	145	385	60	590	354,410
	Total	285	825	120	1,230	711,405
Age 65 and over	Men +	65	150	15	230	91,765
	Women +	55	170	25	250	106,215
	Total	120	320	40	480	197,980
Total All Persons	Men +	265	740	105	1,110	563,120
	Women +	250	690	90	1,030	569,385
	Total	510	1,430	195	2,135	1,132,505
Median Age	Men +	44	39.6	41.2	41.6	38.0
	Women +	43.2	44.0	52.4	46.5	39.6
	Total	43.6	42.0	44.4	43.3	38.8

Note:
Values include Men+ (includes men (and/or boys), as well as some non-binary persons) and Women+ (includes women (and/or girls), as well as some non-binary persons).
(Statistics Canada 2022a)

Education

Several education institutions operate within the LAA including Drake Elementary School, Lanigan Elementary School and Lanigan Central High School. Within the RAA, there are multiple education institutions at the elementary, secondary, and post-secondary levels. Within the RAA, in proximity to the Project, Carlton Trail College operates out of the city of Humboldt (GOS 2022a). Additionally, in proximity to the Project, the University of Saskatchewan, University of Regina (Saskatoon Campus), St. Thomas More College, The First Nations University of Canada, College of Emmanuel and St. Chad, Horizon College & Seminary, Lutheran Theological Seminary, St. Andrew's College, Saskatchewan Polytechnic, Gabriel Dumont Institute of Native Studies and Applied Research, Saskatchewan Indian Institute of Technologies, and Collège Mathieu are all located in Saskatoon (GOS 2022a).

In 2016, of a 25.0% sample of data, 31.3% of the population of the LAA aged 15 years or older in private households, held a high school diploma or equivalency as their highest level of education completed, compared with 30.5% in the RAA (Table 14-19). Of the same sample, 14.3% of the population of the LAA held an apprenticeship or trades certificate or diploma, compared to 10.4% of the RAA. Whereas 26.6% of the population of the LAA in comparison to 17.1% of the RAA held a college, CEGEP (Collège d'enseignement général et professionnel), or non-university certificate or diploma.

Table 14-19 Education Attainment (15 Years and Older) in the LAA and RAA

Education Characteristics		RM of Usborne	Town of Lanigan	Village of Drake	LAA	Saskatchewan RAA
No certificate, diploma, or degree	**Total**	60	150	35	245	177,210
	%	13.8%	14.5%	30.4%	19.6%	20.7%
Secondary (high) school diploma or equivalency certificate	**Total**	175	285	30	490	261,210
	%	40.2%	27.5%	26.1%	31.3%	30.5%
Apprenticeship or trades certificate or diploma	**Total**	50	190	15	255	89,440
	%	11.5%	18.4%	13.0%	14.3%	10.4%
College, CEGEP or non-university certificate or diploma	**Total**	110	230	35	375	146,770
	%	25.3%	22.2%	30.4%	26.0%	17.1%
University certificate or diploma below bachelor level	**Total**	15	35	0	50	28,195
	%	3.4%	3.4%	0.0%	2.3%	3.3%
University certificate, diploma or degree at bachelor level or above	**Total**	25	145	10	180	154,480
	%	5.7%	14.0%	8.7%	9.5%	18.0%

Notes:
Total values may not sum due to rounding.
25% sample data.
Percentage values are representative of the percentage of the population aged 15 years or older.
CEGEP is a post-secondary education exclusive to Quebec.
(Statistics Canada 2017a)

Employment

Of the current population in the working age group between the ages of 15 to 64 years old, the participation rate (i.e., percentage of people who are either employed or are actively looking for work) for the LAA in 2016 was 67.1% (Table 14-20). This compared to the RAA participation rate of 68.3%. Of the LAA, the greatest participation rate was within the RM of Usborne. The employment rates within the LAA and RAA were 64.0% and 63.5%, respectively. Within the LAA, the greatest employment rate was within the RM of Usborne (Table 14-20). Additional information about the regional economic description is presented in Section 15.3.

Table 14-20 Labour Force in the LAA and RAA

Labour Force Characteristics	RM of Usborne	Town of Lanigan	Village of Drake	LAA	Saskatchewan RAA
Adult Population	435	1,035	120	1,590	857,295
Labour Force	315	645	80	1,040	585,540
Participation Rate	72.4%	62.3%	66.7%	67.1%	68.3%
Employed	300	625	75	1,000	544,095
Unemployed	15	15	10	40	41,445
Employment Rate	69.0%	60.4%	62.5%	64.0%	63.5%
Unemployment Rate	4.8%	2.3%	12.5%	6.5%	7.1%

Notes:
Total values may not sum due to rounding.
Percentage values are representative of the percentage of the population aged 15 years or older.
Adult population is the population aged 15 years and over by Labour force status.
The employment rate shows the percentage of people in the working age group who have been employed for the previous three census years.
25% sample data.
(Statistics Canada 2017a)

14.2.6.2.3 Infrastructure and Services

This section provides an overview of existing conditions for the LAA and RAA with respect to community services such as health, emergency, and social services, and transportation and utility interactions. The LAA is part of the Saskatoon Health Region. Medical services in the LAA include the Lanigan Hospital and the Lanigan & District Medical Clinic. The Lanigan Hospital was built in 1968, and supports acute, palliative, respited, and long-term care, with four acute care beds and six long term care beds. Laboratory and X-Ray services are available Monday to Friday from 8:30 am to 3:30 pm while the hospital's outpatient and emergency departments operate 24 hours a day, seven days a week (Saskatoon Health Region 2020, Town of Lanigan 2022). The Lanigan Hospital is connected to the Central Parkland Lodge retirement complex/assisted living home (Town of Lanigan 2022).

Within the RAA, there are multiple additional health and emergency services in proximity to the Project. Watrous District Health Complex operates out of Watrous as part of the Saskatoon Health Region. The city of Saskatoon is also a part of the Saskatoon Health Region, and includes St. Paul's Hospital, Royal University Hospital, Jim Pattison Children's Hospital, and Saskatoon City Hospital. Additional health services within the RAA in Saskatoon include nineteen minor emergency and walk-in clinics (Saskatoon Health Region 2017). The ongoing COVID-19 pandemic has increased pressure on the provincial healthcare system and has resulted in staff shortages and longer wait times across the province.

Ground ambulance services within the LAA are the responsibility of the Lanigan & District Ambulance, based in Lanigan and connected to the Lanigan Fire Hall. There is a satellite location in LeRoy, Saskatchewan. Lanigan & District Ambulance has a staff of ten paramedics, with a fleet of seven vehicles. Aerial ambulance services are available through Saskatchewan Air Ambulance and STARS (Shock Trauma Air Rescue Service) for Saskatchewan residents. Saskatchewan Air Ambulance is based in Saskatoon, and STARS is based in both Saskatoon and Regina, within the RAA (GOS 2022c).

Additional emergency services within the LAA include the Royal Canadian Mounted Police (RCMP), which have a detachment located in Lanigan, comprised of four members, and a two-member highway patrol. Within the LAA, fire services include the Lanigan Volunteer Fire Department which is based out of the Lanigan Fire Hall.

The primary weight highway in the LAA that will provide access to the Project is the TransCanada Yellowhead Highway 16. Highway 20 is a secondary highway in the LAA, that runs south of the town of Lanigan and passes the village of Drake. The Project is adjacent to Range Road 2241 south of the TransCanada Yellowhead Highway 16. In 2022, the GOS committed more than $50 million to create 28 passing lanes on the TransCanada Yellowhead Highway 16 between Clavet and Dafoe, Range Road 2241 and the Project falls within this range (GOS 2022g). Average annual daily traffic (AADT), as published by the GOS for 2020 was: 2,160 west of the Range Road 2241 intersection; 2,620 east of the Range Road 2241 intersection; 2,680 west of the town of Lanigan. At the north end of Highway 20 just south of the town of Lanigan, the AADT in 2020 was 530, decreasing to 330 near the village of Drake (GOS 2020a).

Rail lines are also present in the LAA, including the Canadian Pacific (CP) main track that runs alongside the TransCanada Yellowhead Highway 16, and the CP main track that runs south from the TransCanada Yellowhead Highway 16 alongside Highway 20 and passes through the village of Drake. In addition to the CP main lines, CP has a spur which runs south from the organized hamlet of Guernsey to the Nutrien Lanigan Potash mine where there are several siding tracks. In addition to the CP siding tracks, Canadian National (CN) has several siding tracks at the Nutrien Lanigan Potash mine. South of the mine, CN has several spurs, which ultimately connects to the CN main track that runs southeast through the town of Watrous (Railway Association of Canada 2022).

14.2.6.2.4 Incidental Activity Study Area

The Incidental Activity Study Area is inclusive of the LAA, and RM of Wolverine. Land and resource use within the Incidental Activity Study Area is primarily based around the agriculture industry, as in the LAA. Land and resource use within the RM of Wolverine consists of a mix of dry land cultivation of grains and oilseeds and livestock production, and a community pasture (RM of Wolverine 2022). The Incidental Activity Study Area is located within WMZ No. 21 and No. 41, and the SFCA (GOS 2021b, GOS 2022f). The seasons for harvesting activities of big game and trapping seasons for the Incidental Activity Study Area are the same as those for the LAA (GOS 2021b). WMZ No. 41 and No. 21 are part of Game Bird Management Unit 4, and therefore, a part of the South Game Bird District (GOS 2021b).

The RM of Wolverine had a 6.5% population increase from 2016 to 2021 (Statistics Canada 2022a). Therefore, overall, the Incidental Activity Study Area, experienced a population change similar to that of the LAA and RAA. In 2021, the median age of the residents was 41.6 for the RM of Wolverine (Statistics Canada 2022a). As in the LAA, the median ages was greater than the RAA. Of the current population in the working age group between the ages of 15 to 64 years old, the participation rate (i.e., percentage of people who are either employed or are actively looking for work) was 77.8% for the RM of Wolverine (Statistics Canada 2017a). This value was significantly greater than the participation rate of the LAA.

Health services provided in the LAA are also those available within the Incidental Activity Study Area. The RCMP detachment within the Incidental Activity Study Area is the detachment in Lanigan. Additional emergency services in the Incidental Activity Study Area beyond those included in the LAA, include the Viscount & District Fire Association which serves the RM of Wolverine (RM of Viscount 2022). The primary weight highway in the Incidental Activity Study Area is the TransCanada Yellowhead Highway 16. Highway 20 is a secondary highway in the Incidental Activity Study Area.

15 Regional Health, Social and Economic Description

15.1 Regional Health Description

The Project is located within an area that is administered by the Saskatoon Regional Health Authority, which is part of the provincial Saskatchewan Health Authority (Saskatoon Health Region 2022, Statistics Canada 2017b). Medical services within the Saskatoon Regional Health Authority in the vicinity of the Project include the Lanigan Hospital and the Watrous District Health Complex, as outlined in Section 14.2.6.2 (Saskatoon Health Region 2017). A summary of the health profile for the Saskatoon Health Region is presented in Table 15-1. For the majority of the health-related indicators outlined in Table 15-1, the Saskatoon Regional Health Authority had values that were comparable to the values of the Province of Saskatchewan as a whole.

Table 15-1 Health Related Indicators

Health Characteristics	Saskatoon Regional Health Authority	Saskatchewan
Life Expectancy[1] (2015-2017)	81.3	80.2
Infant Mortality[2] (2015, per 1000 live births, under 1 year of age)	4.1	5.8
Proportion of Adults (aged 18 years or older) in the Household Population with Underlying Health Conditions (2017/2018)		
At Least 1 Underlying Health Condition[3]	41.1%	42.8%
At least 2 Underlying Health Conditons[3]	12.8%	14.9%
Health Indicators (2019/2020)		
Obese Adults[4]	34.4%	35.8%
Physically Active Adults (150 minutes/week)[4]	54.2%	52.2%
Very Good or Excellent Perceived Mental Health in Adults[4]	63.0%	61.6%
Fair or Poor Perceived Mental Health in Adults[4]	10.2%	9.0%
Social Determinants of Health Indicators (2020)		
Proportion of Children Aged 0-17 in Low Income[5]	12.0%	12.8%
Proportion of Lone Parent Households[5]	14.8%	16.4%
Proportion of Food Insecure Households with Children Aged 4-17[5]	13.6%	15.1%
Proportion of Population Aged 15 and over with no Certificate, Diploma, or Degree[5]	16.3%	20.7%
Proportion of Households with 5 or more People[5]	9.4%	9.6%

Notes:
Total values may not equal the sum due to rounding.
[1]: (Statistics Canada 2019)
[2]: (Statistics Canada 2018)
[3]: (Statistics Canada 2020)
[4]: (Statistics Canada 2022b)
[5]: (Statistics Canada 2021)

In accordance with Health Canada guidance, the Project is not anticipated to require a Human Health Risk Assessment, as Human Health Risk Assessments are typically conducted when it is anticipated that individuals will be exposed to elevated concentrations of chemicals or other disturbances in the environment associated with a proposed project through one or more exposure pathways (Health Canada 2019). In accordance with IAAC guidance, the decision to conduct a Human Health Risk Assessment or a Health Impact Assessment will depend on the Project context and direction provided by IAAC in the Tailored Impact Statement Guidelines (GOC 2020b). Health Impact Assessments assess a broad range of factors that contribute to health (GOC 2020b).

15.2 Regional Social Description

The Project is located within the RM of Usborne, which includes the town of Lanigan, the village of Drake, and the organized hamlets of Guernsey and Lockwood (RM of Usborne 2022). The RM of Usborne, town of Lanigan, and the village of Drake are all respective census subdivisions (Statistics Canada 2022c). The total population of the RM, town, and village in 2021 was 2,141, which was an average increase of 0.23% since 2016 (Table 14-17). There is a higher proportion of individuals in the RM, town, and village that live in single detached homes, as compared to the Province of Saskatchewan (Table 15-2). The average household size in the RM of Usborne is the same as Saskatchewan (2.5), whereas in the town of Lanigan and the village of Drake, the average household size is less (2.4 and 2.2, respectively) (Table 15-2). The age composition of the RM of Usborne, town of Lanigan, and village of Drake shows the predominant age group is 15-64 (Table 14-18). There are approximately 430 people under the age of 14, and 480 people aged 65 and older within three census divisions, cumulatively (Table 14-18).

The proportion of one-parent family households in the RM of Usborne and the village of Drake is significantly less than the provincial average; additionally, the proportion of one-parent family households in which the parent is a woman+ is significantly less than the provincial average (Table 15-2). In the RM of Usborne, 6.5% of census families were one-parent households where the parent is a woman+. In the Province of Saskatchewan, 17.0% of the population identified as Indigenous, whereas 0.0% of the population in the RM of Usborne and the village of Drake identify as Indigenous and only 3.2% in the town of Lanigan. Additional social indicators of the Project region are outlined in Table 15-2.

Table 15-2 Social Related Indicators

Social Indicators	RM of Usborne	Town of Lanigan	Village of Drake	Saskatchewan
Population Density per square kilometre (km^2)	0.6	176.1	307.3	2.0
Total Occupied Private Dwellings	205	578	91	449,581
Proportion of Occupied Private Dwellings that are Single Detached Houses	97.6%	77.6%	94.4%	71.6%
Average Household Size	2.5	2.4	2.2	2.5
Proportion of the Population in Census Families	87.4%	83.9%	82.1%	81.9%
Proportion of One Parent Family Households	9.7%	12.7%	9.1%	17.1%
Proportion of One-Parent Family Households in Which the Parent is a Women+	6.5%	10.1%	9.1%	12.9%
Proportion of Indigenous People	0.0%	3.2%	0.0%	17.0%

Social Indicators	RM of Usborne	Town of Lanigan	Village of Drake	Saskatchewan
Most Common Non-Official Language Spoken at Home	German	Tagalog (Pilipino, Filipino)	Tagalog (Pilipino, Filipino)	Tagalog (Pilipino, Filipino)

Note:
Values include Men+ (includes men (and/or boys), as well as some non-binary persons) and Women+ (includes women (and/or girls), as well as some non-binary persons).
(Statistics Canada 2022a)

15.2.1 GENDER BASED ANALYSIS PLUS

Gender Based Analysis Plus (GBA+ is an analytical framework that analyses how projects may affect diverse or potentially vulnerable population groups. As shown in Table 14-18, the proportion of the total population who identified as Women+ or as Men+ within the RM of Usborne, town of Lanigan, and the village of Drake were similar. Women+ includes women (and/or girls), as well as some non-binary persons; Men+ includes men (and/or boys), as well as some non-binary persons (Statistics Canada 2022a). When looking at those aged 0-14 within the RM of Usborne, town of Lanigan, and the village of Drake, 52% of the population identified as Men+ (220), and 48% of the population identified as Women+ (200) (Statistics Canada 2022a). Of those aged 15-64 52% of the population identified as Men+ (650), and 48% of the population identified as Women+ (590) (Statistics Canada 2022a), 48% of those aged 65 and over identified as Men+ (230), and 52% identified as Women+ (250) (Statistics Canada 2022a).

The Project is in the vicinity of the Humboldt and Area Pride Network, which celebrates gender and sexual diversity in Humboldt, Saskatchewan and surrounding area. The Humboldt and Area Pride Network was founded in 2014. The Humboldt and Area Pride Network also runs Parents of the Rainbow, a peer-led support group for parents of Lesbian, Gay Bi-sexual, Transgender, Queer (LGBTQ) children; and the Youth Rainbow Coffee Group, a peer-led support group for LGBTQ youth (CBC Radio-Canada 2019, Humboldt and Area Pride Network 2022).

The Project is also in the vicinity of Out Saskatoon, Saskatoon and area's LGBTQ2S community centre and service provider. Out Saskatoon began as Gay & Lesbian Health Services in 1991. Out Saskatoon provides support services, youth housing, and education and research services through a harm reduction, culturally informed, equity-seeking, and community-based approach. The mission of Out Saskatoon is to uplift 2SLGBTQ people by leading, serving, and supporting in a dynamic community. Out Saskatoon fosters physical, emotional, mental, and spiritual health through intentional services and meaningful engagement (Out Saskatoon 2022a, 2022b, 2022c).

SaskPower, who is recognized as one of Canada's top 100 employers, is committed to having a culture of diversity and inclusion (D&I) (Canada's Top 100 Employers 2022). SaskPower's commitment to diversity and inclusion is backed by a carefully crafted strategy that aligns with the company's strategic objectives. The company prioritizes its employees, partnerships, and culture to forge a work environment that values diversity and promotes inclusion for sustained growth and progress. Refer to Appendix J for SaskPower's D&I strategy and commitment.

SaskPower aims to reach the Saskatchewan Human Rights Commission's (SHRC) employment equity targets that mirror our province's population. The SHRC provides employment targets for four designated equity groups. These targets reflect the ideal workforce representation of visible minorities, Indigenous persons, people with disabilities, and women in underrepresented occupations. These metrics are a benchmark for employers to evaluate their efforts to recruit and retain employees in the four equity groups (Saskatchewan Human Rights Commission 2023). The targets that SaskPower strives to achieve include:

- Indigenous People – 14%
- People with disabilities – 22.2%
- Visible minorities – 10.6%, and
- Women in underrepresented occupations – 47%

SaskPower has a diversity department with a full-time diversity specialist responsible for the implementation of the corporate D&I strategy. The diversity specialist develops and implements Diversity, Equity and Inclusion (DEI) initiatives that help SaskPower in attracting the best-qualified talent, developing programs and services to support the needs of our people, promoting leadership diversity, being recognized as an inclusive employer by our employees and business partner to our suppliers, customers, and the communities we serve; and positioning us as a source of business innovation and growth while we strive to become the best utility company in Canada. The company fosters an environment where every employee feels valued for who they are, supported in reaching their full potential, and recognized for their unique contributions. For some of these reasons, SaskPower has been recognized as one of Canada's Best Diversity Employers for 14 consecutive years (Canada's Top 100 Employers 2022, SaskPower 2022b).

Last year, SaskPower employed best practices and lessons learned to identify the barriers and implement initiatives and solutions to advance and continue to improve Indigenous recruitment and retention (IRR). The newly developed IRR Strategy supports SaskPower's efforts in becoming an employer of choice for Indigenous People where the importance of Indigenous perspectives within policies, practices and services is recognized (Appendix J). The strategy serves as a broad policy framework that informs the actions SaskPower aims to achieve (Appendix J). As such, the IRR strategy focuses on the following:

1. Increasing Indigenous representation within SaskPower's workforce
2. Growing strong partnerships with Indigenous organizations and communities; and
3. Retaining Indigenous talent within SaskPower's workforce.

SaskPower has been a long-term partner of the University of Regina, for the purpose of providing students and recent graduates with opportunities for entering the workforce. In correlation, SaskPower has been recognized as one of Canada's Top Employer's for Young People for 10 consecutive years, as it offers extensive internship and work placement programs.

SaskPower has been recognized as one of Saskatchewan's Top Employers for 15 consecutive years, as it has numerous strategies to assist employees in balancing their work and personal lives and offers an extensive benefits program including maternity leave top-up payments to new mothers. The company has multiple Employee Resource Groups (ERG) which focus on creating a culture of growth and inclusion, including:

- Indigenous Employees Network (IEN): provides a collective voice and a supportive environment for Indigenous employees, promotes opportunities for Indigenous Peoples within the company, and plays a key role in building a progressive community.
- Pride ERG: raises awareness for the 2SLGBTQ2S+ community within the company and provides support for employees.
- Network for Employees with Disabilities (NED): advises on ways to improve the recruitment and retention of those with disabilities, improves experiences for those with accessibility issues and promotes career development opportunities.
- Cultural Diversity Group (CDG): advocates on cultural diversity concerns, supports the needs of diverse employees, and educates employees on the benefits and rewards of diverse cultures and backgrounds in employment.
- Women's Resource Group (WRG): encourages equitable participation in under-represented occupations and leadership roles and works to assist women in achieving their full career potential.
- Power Gen: aims to shape the next generation of leaders by creating opportunities, connecting employees, and promoting person and professional development.

The construction industry, and the science, technology, engineering, and mathematics (STEM) industries have historically been male dominated, however the construction and STEM industries are now much more inclusive of all genders. As shown in Section 3.0 and Section 4.0, gender gap issues and other disparities were not identified in any of the consultation with the public or Indigenous communities. This outcome was not unexpected, given the rural location of the Project. As presented in Sections 3.0 and 4.0, public and Indigenous engagement was open to all individuals, including Indigenous communities, women+, low income, under or unemployed, disabled, seniors, and systemically marginalized groups.

15.3 Regional Economic Description

In 2020, the median household income in the RM of Usborne was $89,000, which is greater than the median household income in the town of Lanigan and the provincial median household income (Table 15-3). In 2016, 69.0% of the population of the RM was employed, whereas 60.4% of the town of Lanigan was employed (Table 14-20). The unemployment rate was highest in the village of Drake (12.5%), and lowest in the town of Lanigan (2.3%) (Table 14-20). Approximately 40.3% of the RM's workforce and 31.3% of the village of Drake's workforce are employed in the agriculture, forestry, fishing, and hunting industries. Additional key employers in the RM are mining, quarrying, and oil and gas extraction (12.9%), construction (11.3%), and health care and social assistance (9.7%) (Statistics Canada 2017a). In the town of Lanigan, approximately 19.4% of the workforce are employed in the mining, quarrying, and oil and gas extraction industry, and 11.6% of the workforce are employed in the health care and social assistance industry

(Statistics Canada 2017a). Approximately 36.7% of the workforce in the RM work from home, in comparison to 3.2% of the town of Lanigan. Additionally, approximately 35.5% of the workforce in the RM are self-employed, in comparison to 7.8% of the town of Lanigan. Additional economic indicators of the Project region are outlined in Table 15-3.

Table 15-3 Regional Economic Indicators

Economic Indicators	RM of Usborne	Town of Lanigan	Village of Drake	Saskatchewan
Median Total Income of Individuals in 2020[1]	$ 40,400	$44,400	-	$ 42,400
Median Total Income of Households in 2020[1]	$ 89,000	$87,000	-	$ 82,000
Proportion of Individuals who are COVID-19 Emergency and Recovery Benefits Recipients in 2020[1]	9.9%	9.8%	-	24.3%
Median COVID-19 emergency and recovery benefits among recipients in 2020[1]	$ 8,000	$8,000	-	$ 8,000
Prevalence of Low Income[1]	12.4%	9.2%	-	13.4%
Predominant Industry[2]	Agriculture, Forestry, Fishing and Hunting	Mining, quarrying, and oil and gas extraction	Agriculture, Forestry, Fishing and Hunting	Health Care and Social Assistance
Proportion of Workforce who Worked at Home[2]	36.7%	3.2%	18.8%	10.9%
Proportion of Workforce who are Self-Employed[2]	35.5%	7.8%	12.5%	14.8%

Notes:
Total values may not equal the sum due to rounding.
Individuals include those 15 years and over.
Prevalence of low income is based on the Low-income measure, after tax (LIM-AT).
[1]: (Statistics Canada 2021)
[2]: (Statistics Canada 2017a)

As discussed in Section 14.2.6, the peak construction workforce for the Project is estimated to be 450 employees. Labour peaks are anticipated between 2025-2026. During construction, it is anticipated that the Project will create extensive temporary employment opportunities in a broad range of positions including labourers, trades professions, operators, supervisors, and professionals. The Project will not have a construction camp, instead a stipend will be provided to employees for commuting or accommodations. The Project's construction workforce and Project activities will contribute to the local and regional economy through labour income and provision of local good and services. Project expenditures will also generate benefits and opportunities for local businesses related to increased revenue from Project associated spending.

A third-party study done of Saskatoon and surrounding area, including the Project location, forecasted that the risk of a labour shortage during construction is high. There are several competing projects in the region whose labour peaks are also anticipated between 2025-2026. Competing projects are primarily in the industries of metals and minerals, oil and gas production, power, and food and beverage. There are forecasted deficits for the majority of craft trades in the region. Consequently, the Project may require employees to travel from other provinces throughout the Project activities. The Project will rely on multiple subcontractors to perform the work and utilize their in-house labour or attract new labour from throughout Canada utilizing various methods such as living out allowance (LOA), craft bussing or other monetary incentives to ensure the proper workforce is in place. It is expected that the majority of craft will reside in Saskatoon with an average expected commute of less than 100 km each way, and that a construction camp is not anticipated. However, SaskPower recognizes that the Project is in a relatively remote location and will coincide with several competing projects throughout the province. To manage the risk of labour shortage and attract workers to the Project, SaskPower will consider the following strategies:

- Financial incentives: SaskPower will need to include a competitive Live Out Allowance (LOA) to attract craft workers.
- Schedule: Adding duration to key schedule activities can alleviate the peak manpower needs. This approach will help alleviate the number of craft needed to perform the work.
- Subcontracting strategy: Separating the work similar to the execution of the Great Plains Power Station currently under construction near Moose Jaw, with a few changes. Hiring multiple subcontractors will allow individual companies to pull from their own workforce.
- Alternate Work Shifts: With competing projects in the area and in neighbouring provinces, SaskPower will be seeking to jointly agree with the EPC Contractor to implement work shifts that accommodate travel time in order to attract labour from throughout Canada for certain scopes of work.
- Accommodations: Subcontractors have advised against implementing a construction camp in favor of commuting to the jobsite. SaskPower recognizes the inconvenience and/or challenge this situation may present to workers on a daily basis. One option is the potential for a bussing program to and from Saskatoon. This concept is something SaskPower will be looking to explore further with the EPC contractor during the procurement phase of the Project.

SaskPower's approach for sourcing local labour and suppliers for the Project will be consistent with the efforts performed on previous SaskPower projects. SaskPower is committed to utilizing local, Saskatchewan-based companies to execute nearly all the construction and general site services on the Project. During operation and maintenance, the Project will provide employment opportunities for approximately 25 full time staff at the Project. Potential impacts and mitigation measures pertaining to Project employment and the economy include those discussed in Section 14.0 and Section 19.0.

15.4 Health, Social or Economic Derived from Engagement

SaskPower through its commitment to diversity and inclusion, is committed to increasing the diversity of the workforce, advancing women in trades and leadership, increasing the percentage of underrepresented groups, focusing on building strong internal and external partnerships, promoting the value of diversity and ensuring practices are inclusive, creating an environment for people to excel and live up to their full potential, and consistently demonstrating inclusive behaviours and language (SaskPower 2022c). SaskPower has no barriers to equality with respect to decision-making, participation, access, or control over the Project. Engagement and consultation activities to date have been inclusive of women and diverse groups (Section 3.0).

From engagement activities conducted so far, SaskPower has not heard any concerns about potential effects to vulnerable populations. The community has hosted and is hosting construction camps. We recognize that there may be impact if a construction camp is required and are committed to ensuring it is implemented in a safe and responsible way. Although currently there is no indication that a construction camp will be required, in the event that plans were to change, SaskPower will monitor the community and seek feedback prior to proceeding with a proposed construction camp to eliminate risks to vulnerable populations that can occur with an influx of a new labour force. Contractors are required to adhere to SaskPower's health and safety policies. These policies seek to provide protection to all impacted by SaskPower projects.

Like other considerations, SaskPower will continue to work with stakeholders to identify and address any concerns that may arise during the Project. The opportunity to discuss concerns regarding this Project is never closed to the public and SaskPower offers different avenues to the public to reach SaskPower. SaskPower is committed to giving consideration for employment and contracting opportunities that remove barriers to participation. SaskPower has existing policies to ensure safe working conditions for all.

SaskPower records stakeholder interaction using Borealis, a software program designed for stakeholder engagement. Data from stakeholders is collected and recorded in Borealis. SaskPower is committed to continued engagement with the community and considering new ways to hear from different groups. Any potential mitigations will be considered on a case-by-case basis and monitored and reported through Borealis.

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

16 Federal Financial Support

At this time, federal financial support is not anticipated for the Project as there has been no indication that SaskPower would receive funding for financial assistance to address labour and employment issues that may result during the course of the Project.

17 Use of Federal Lands

The Project will not be constructed or operated on federal lands.

18 Project's Environmental Effects Assessment Jurisdictions

18.1 Federal Regulatory Requirements

As discussed in Section 8.0, the Project will be subject to review by IAAC under the IAA. The Project is considered a designated project under Section 30 of The Physical Activities Regulations (GOC 2019b). In addition to the IAAC review process under the IAA, the Project will be subject to the following federal regulatory requirements:

- *Aeronautics Act*
- *Canadian Environmental Protection Act* (CEPA)
- *Canadian Navigable Waters Act*
- *Fisheries Act*
- *Migratory Birds Convention Act* (MBCA) and its regulations
- Proposed CER
- Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity
- *Species at Risk Act* (SARA)
- Standards Respecting Pipeline Crossings Under Railways

Table 18-1 Summary of Potential Federal Legislative and Regulatory Requirements for the Project

Legislation/ Regulations	Overseeing Agency	Description
Aeronautics Act (GOC 1985b)	NAV Canada Transport Canada	SaskPower may be required to submit a Land Use Submission Form to NAV Canada prior to construction (NAV Canada 2022). In accordance with the Canadian Aviation Regulations Standard 621, SaskPower may also be required to submit an Aeronautical Assessment Form for Obstruction Marking and Lighting to Transport Canada, to determine the need for the application of marking and lighting of objects that may pose a hazard to aviation (GOC 2021b, GOC 2021c).
CEPA (GOC 1999)	Environment and Climate Change Canada (ECCC)	In accordance with Sections 48 and 50 of CEPA, the National Pollutant Release Inventory (NPRI) is the public inventory of releases, disposals and transfers which tracks over 320 pollutants from over 7,000 facilities across Canada (GOC 2022d). NPRI collects information on reporting facilities, including: • Releases from facilities to air, water or land • Disposals at facilities or other locations • Transfers to other locations from treatment and recycling • Facilities' activities, location and contacts • Pollution prevention plans and activities The Project is anticipated to be required to be registered as a reporting facility.

Legislation/ Regulations	Overseeing Agency	Description
		In accordance with Part 8 of CEPA, SaskPower will develop protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases that will be included in the ERP (GOC 1999, GOC 2022f). The Environmental Emergency Regulations outline the requirements for facilities to manage toxic or hazardous substances listed in Schedule 1, through assessing the risk of spills, adhering to measures to mitigate the risk of spills, and adhering to response measures to address any potential spills. In accordance with Section 4, should the Project include any of the listed substances, the Project will be required to adhere to the Environmental Emergency Regulations (GOC 2019e, GOC 2022f). The Project will adhere to the Environmental Emergency Regulations through the ERP and Spill Contingency Plan.
Canadian Navigable Waters Act (GOC 1985c)	Transport Canada	The *Canadian Navigable Waters Act* protects navigation in Canadian navigable waters, and applies to anyone who is: • An owner of work(s) on navigable waters. • Interferes with navigation in Canadian navigable waters. • Plans something that will affect navigation in navigable waters. Should the *Canadian Navigable Waters Act* apply to the Project, SaskPower will be required to apply for approval from Transport Canada (GOC 2021d). Navigable water is defined as a body of water that is used or will be used by vessels as a means of transport or travel for commercial or recreational purposes, or as a means of transport or travel for Indigenous Peoples, and: • There is public access by land or by water. • There is no public access by land or by water, but there are two or more riparian owners. • GOC or GOS is the only riparian owner (GOC 1985c). The Project and its incidental activities (as described in Section 14.1.1.2) are not anticipated to interfere with listed or potentially navigable waters, in proximity of the Project (e.g., South Saskatchewan River, Wolverine Lake, Little Manitou Lake). The Project and its incidental activities are not anticipated to effect navigation or navigation safety, and are not anticipated to be constructed in, on, under, over, through or across navigable waterways. In accordance with the Navigation Protection Program's Project Review Tool, the Project does not fall under the Navigation Protection Program's mandate (GOC 2023). None of the natural gas infrastructure potential route options interfere with navigable waterways. Additional details related to potential effects to navigable waterways associated with the natural gas infrastructure is provided in Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.

Legislation/ Regulations	Overseeing Agency	Description
Fisheries Act (GOC 1985a)	Department of Fisheries and Oceans Canada (DFO)	A non-compliance with the *Fisheries Act* could occur if the Project results in any of the following: • The death of any life stage of fish • The harmful alteration, disruption, or destruction (HADD) of fish habitat • The introduction of a deleterious substances or listed substances • The obstruction of free passage of fish DFO outlines measures to protect fish and fish habitat, where if the Project cannot follow the measures, then the Project must submit a Request for Review through the Fish and Fish Habitat Protection Program to determine if the Project will require authorization. If it is determined that the Project requires authorization, then an application for authorization must be submitted to DFO (GOC 2021a). Effects to fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act* are not expected to be caused by the Project or its incidental activities as outlined in Section 19.6.
MBCA (GOC 1994)	ECCC	The MBCA protects and conserves migratory bird populations and individuals and their nests, through the Migratory Birds Regulations and the Migratory Birds Sanctuary Regulations (GOC 2018a). The Project may interact with migratory birds and this document describes appropriate mitigation to avoid potential effects.
Proposed CER (GOC 2022e)	ECCC	The CER are currently being developed for the purpose of driving progress towards a net-zero electricity grid in 2035. The CER are being developed around three principles: • Maximize GHG reductions to achieve net-zero emissions from the electricity grid by 2035. • Ensure grid reliability to support a strong economy and ensure Canadians are safe by having energy to support their cooling needs in the summer and warmth in the winter. • Maintain electricity affordability for homeowners and businesses. The Electrification and Energy Efficiency Overview outlines that as part of a clean energy supply and generation, natural gas projects will be phased down as part of the effort to decrease emitting electricity. Therefore, it is anticipated that the Project will be subject to the CER once they come into effect.
Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity (GOC 2018c)	ECCC	Under Section 3, the Regulations apply to any boiler unit or combustion engine unit that has a capacity of 25 MW or more. Under Section 4, any project with a capacity greater than 150 MW must not emit greater than 420 t of CO2 emissions/ gigawatt hours (GWh) of energy produced in a given calendar year. Therefore, the Project will be required to comply with the Regulations.
SARA (GOC 2002)	ECCC	The SARA applies to listed species and prohibits the killing, harming, harassing, capturing, or taking of species listed as extirpated, endangered or threatened. The SARA also prohibits the damage or destruction of residences of listed species. The status of species is assessed and designated by the COSEWIC. Part of the mandate of the SARA is to identify and protect critical habitat for a listed species through recovery strategies or action plans. Federally listed species at risk may occur near the Project and have the potential to interact with the Project, therefore, this document describes appropriate mitigation to avoid potential effects.

Legislation/ Regulations	Overseeing Agency	Description
Standards Respecting Pipeline Crossings Under Railways (Transport Canada 2000)	Transport Canada	All pipelines (including utilities) that cross under railways must be installed, repaired, maintained, and removed in a safe manner, and must conform with the requirements stated within the Standards Respecting Pipeline Crossings Under Railways. Therefore, the Project will be required to comply with the Standards should any railway crossings occur.

18.2 Provincial Regulatory Requirements

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

- *The Environmental Assessment Act*
- *The Environmental Management and Protection Act*
- *The Heritage Property Act*
- *The Highways and Transportation Act*
- *The Management and Reductions of Greenhouse Gases Act*
- *The Saskatchewan Employment Act*
- *The Water Security Agency Act*
- *The Weed Control Act*
- *The Wildlife Act*

Table 18-2 Summary of Potential Provincial Legislative and Regulatory Requirements for the Project

Legislation/ Regulations	Overseeing Agency	Description
The Environmental Assessment Act (GOS 1980a)	EASB	*The Environmental Assessment Act* legislates EAs in Saskatchewan, to provide a coordinated review of environmental issues associated with projects and developments by ensuring economic developments proceed with adequate environmental safeguards and opportunities for public consultation (GOS 2014a). Projects that are likely to have significant environmental effects require approval from the EASB prior to proceeding. SaskPower will submit a Technical Proposal to the EASB to inform their decision regarding the acceptability of potential environmental effects from the Project. Following the review, the EASB will determine if the Project is deemed a development, in which case an EA will be required.

Legislation/ Regulations	Overseeing Agency	Description
The Environmental Management and Protection Act (GOS 2010b)	SK ENV	Under Section 8 and 9, no substances from the Project may be discharged, and the discharge or discovery of substances must be reported. Under Section 24, a permit is required for the operation of waterworks and sewage works, the construction of water treatment works, water distribution works, sewage treatment works, and sewage collection works. Under Section 38, an aquatic habitat protection permit (AHPP) is required for work in the bed, bank, or boundary of a water body or watercourse, or for any discharge with an adverse effect on water. The Project is anticipated to require an AHPP. The Project will also require approval and an Environmental Protection Plan (EPP) to construct and operate an industrial source facility. Air quality is regulated under the requirements of Chapter E.1.2, of the Saskatchewan Environmental Code, which SaskPower will be requirement to adhere to (GOS 2014b). The Hazardous Substances and Waste Dangerous Goods Regulations outline the requirements and approvals required for storing hazardous substances, transporting hazardous substances and waste dangerous goods, constructing a storage facility, and operating a storage facility for the storage of hazardous substances and waste dangerous goods (GOS 1989). Should the Project include any of the listed hazardous substances and waste dangerous goods, approval will be required for the transportation, storage, and construction and operation of a storage facility.
The Heritage Property Act (GOS 1980b)	HCB	The HCB has designated each quarter section parcel within the southern half of Saskatchewan as either “sensitive” or “non-sensitive” for heritage resources. Developments occurring within a “non-sensitive” land parcel may proceed to development without needing to be submitted to the HCB for evaluation. The Project location, NW 36-33-24 W2M is not heritage sensitive, and can proceed to development without further evaluation by the HCB (GOS 2022c). A heritage resource impact assessment (HRIA) was conducted on the PDA under archaeological resource investigation permit # 22-149. An HRIA may be required for the incidental activities once routes are finalized.
The Highways and Transportation Act (GOS 1997)	MOH	The Project may require roadside development permits for any approaches, pipelines and utilities, roadside development, or use of the highway or its ROW. A permit is required for any work within 90 metres (m) of the property line or ROW edge of a provincial highway. Permits may also be required for the movement of oversized and overweight vehicles on provincial highways; and for on premise and off-premise identification signs (GOS 2022d).
The Management and Reductions of GHGs Act (GOS 2010c)	SK ENV	A regulated emitter is a prescribed person, or a person who is a member of a class of prescribed persons, who emits a GHG, and meets the prescribed requirements. Regulated emitters must reduce their GHG emissions in the prescribed manner, through the prescribed means, and by the prescribed date in accordance with the prescribed programs. The Management and Reduction of GHG (Reporting) Standard outline that a reporting facility is a facility that is owned or operated by a specified emitter that has GHG emissions of at least 10,000 t carbon dioxide equivalent (CO_{2e}) in a given reporting period. A reporting facility must submit a report pertaining to the release of GHGs from the reporting facility by June 1st of the year following the reporting period, which is the previous calendar year (SK ENV 2020e). Should the Project be determined to be a reporting facility, it will be required to adhere to the prescribed programs.

Legislation/ Regulations	Overseeing Agency	Description
The Saskatchewan Employment Act (GOS 2013)	Ministry of Labour Relations and Workplace Safety	Under The Occupational Health and Safety Regulations, the Project is responsible for ensuring the health, safety, and welfare of all workers through the provision and maintenance of the Project, systems of work and working environments; arrangements for the use, handling, storage and transportation of articles and substances; the provision of any information, instruction, training and supervision that is necessary; and the provision and maintenance of a safe means of entrance to and exit from the place of employment and all worksites and work-related areas in or on the place of employment (GOS 2020b). The Project will be required to comply with *The Saskatchewan Employment Act* and The Occupational Health and Safety Regulations.
The Water Security Agency Act (GOS 2005)	SK ENV – Fish, Wildlife and Lands Branch WSA	Under *The Water Security Agency Act*, every person wishing to obtain a water rights licence and approval to construction and operate works must apply for a permit. Under Section 59, approval is required prior to the construction, extension, alteration, or operation of any works. Additionally, approval is required to conduct a groundwater investigation program, to drill a water well and to use groundwater. The Project is anticipated to require a Water Rights Licence and Approval to Construct and Operate Works. SaskPower has obtained a Permit to Conduct a Groundwater Investigation for the Project (File: ES/5713, ES/4795). SaskPower will be required to pay an industrial usage fee as required by WSA.
The Weed Control Act (GOS 2010a)	Ministry of Agriculture RM of Usborne	Under *The Weed Control Act*, the RM of Usborne is able to enforce the control of prohibited, noxious, and nuisance weeds within the RM of Usborne. Early detection and eradication measures are to be taken against prohibited weeds and isolated populations of noxious weeds (less than five ha per quarter section). Containment and integrated control measures are to be taken against established noxious weeds (greater than five ha per quarter section), and integrated control measures may be implemented to bring infestations of nuisance weeds under reasonable control (GOS 2022b). The Project must comply with *The Weed Control Act*.
The Wildlife Act (GOS 1998)	SK ENV – Fish, Wildlife and Lands Branch	Under Section 45 of *The Wildlife Act*, designated plant and animal species include those listed as extirpated, endangered, or threatened (GOS 1998). Under Section 51, designated species are protected from being killed, injured, possessed, disturbed, taken, captured, harvested, genetically manipulated, interfered with, exported, or trafficked without a permit (GOS 1998). SaskPower has obtained a Permit for the field surveys that occurred in 2022 (22SD144). The Project may interact with protected species; therefore, this document describes appropriate mitigation to avoid potential effects.

18.3 Municipal Regulatory Requirements

Regulatory requirements from the RM of Usborne that may affect the Project are described in Table 18-3.

Table 18-3 Municipal Regulatory Requirements

Bylaw or Policy	Overseeing Agency	Description
The Planning and Development Act	RM of Usborne Ministry of Government Relations	SaskPower will be required to submit a development permit application for a municipal development permit to the RM of Usborne (GOS 2007).
Building Bylaw	RM of Usborne	All buildings developed for the Project will be required to comply with the Building Bylaw. SaskPower will obtain the necessary building permits for the Project prior to development (RM of Usborne 2011).
Zoning Bylaw	RM of Usborne Ministry of Government Relations	Under *The Planning and Development Act*, SaskPower will be required to submit a development permit application for a municipal development permit to the RM of Usborne (GOS 2007, RM of Usborne 2014).
Dust Control Policy	RM of Usborne	Addresses dust control procedures within the RM of Usborne, including practices for haul routes and private yard sites (RM of Usborne 2020).

18.4 Regional Plans and Management Frameworks

Regional plans, development plans, and management frameworks applicable to the Project are described in Table 18-4.

Table 18-4 Regional Plans and Management Frameworks Applicable to the Project

Plan	Description
RM of Usborne Official Community Plan	Provides guidance for the management and use of land, and future development within the RM of Usborne (RM of Usborne 2012).
Upper Qu'Appelle River and Wascana Creek Watersheds Source Water Protection Plan	The Project is located within the Lanigan-Manitou Sub-basin of Upper Qu'Appelle River and Wascana Creek Watersheds. The Plan provides guidance for source water management and protection (Saskatchewan Watershed Authority 2008).
Saskatchewan's Growth Plan	Outlines 20 Actions for the 2020s and 30 goals for 2030 to build a strong economy, strong communities, and strong families, to build a stronger Saskatchewan (GOS 2019).
25 Year Saskatchewan Water Security Plan	Provides a comprehensive and integrated approach to water management that includes all of government's core water management responsibilities and technical expertise (WSA 2012)
Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy	Provides a strategy that takes a system-wide approach and includes commitments designed to make Saskatchewan more resilient to the effects of a changing climate (GOS 2017b).
Saskatchewan's Climate Resilience Measurement Framework	Monitors resilience-related progress across 25 indicators. SK ENV reports annually on the indicators to enhance understanding of how Saskatchewan is responding to the effects of climate change (GOS 2018, GOS 2022e).

PART E: POTENTIAL EFFECTS OF THE PROJECT

19 Potential Effects on the Biophysical and Human Environment

19.1 Overview of Environmental Effects and Pathways

The assessment of each environmental component begins with a description of the pathways whereby specific Project activities could result in an environmental effect (i.e., the effects pathways). For each environmental component, the Project's potential effects are identified and assessed in the context of the environmental component's existing conditions, as well as its biophysical or socio-economic characteristics, regulatory context, and any input received from the engagement process.

19.1.1 AIR QUALITY

The Project will result in the release of substances of interest that will change ambient air quality. As previously noted, the focus of the air quality assessment is on Project operation and maintenance because the operation and maintenance phase has the most potential to produce adverse air quality effects. Air emissions associated with Project construction are expected to be minor, occur only for short intervals, and their effects are expected to be limited to the immediate vicinity of the Project area.

The air quality assessment is limited to the consideration of substances for which there are applicable air quality objectives and standards adopted by either or both of the Saskatchewan or federal regulatory agencies (i.e., SAAQS and CAAQS). The predicted effects are assessed relative to these criteria. For this assessment, CO, nitrogen dioxide (NO_2), SO_2, $PM_{2.5}$, PM_{10}, and TPM are the primary substances of interest. These substances of interest are combustion by-products emitted by the Project sources. Table 19-1 shows the maximum potential air emissions associated with the Project including start-up and shutdown emissions for the turbine and auxiliary equipment. The maximum emissions from any operating load and including start-up and shutdown emissions for the combustion turbine were used to demonstrate the maximum potential emissions for each pollutant. Combined-cycle air emissions are based on 8,760 hours per year of operation (100% capacity factor) and simple-cycle air emissions are based on 2,891 hours per year of operation (33% capacity factor). Appendix G provides more detailed description of Project sources and emissions. Additional information on the Project's emissions during the construction and operation and maintenance phases are provided in Sections 24.4 and 24.5, respectively.

Table 19-1 Total Emissions Associated with the Project Operation and Maintenance

Pollutant	Combined-Cycle Project Potential Emissions (tonnes per year)	Simple-Cycle Project Potential Emissions (tonnes per year)
NO_x	469.4	163.5
CO	326.0	201.7
$TPM/PM_{10}/PM_{2.5}$	38.7	13.0
SO_2	29.6	9.8

Plume dispersion modelling, as described in Appendix G, shows that maximum predicted concentrations of the substances of interest are less than the SAAQS for all averaging periods. Maximum predicted concentrations are expected to occur near the Project and decrease with increasing distance from the fence line. Concentrations of the substances of interest at nearby residential receptors are predicted to be less than the 2025 CAAQS. The largest spatial extent within which the Project is expected to have effects on air quality, or the regional context over which cumulative effects may occur, is a 10 km x 10 km buffer of the PDA (i.e., the LAA and RAA for air quality). As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to air quality are expected to occur on federal lands as a result of carrying out the Project. Construction and operation and maintenance mitigation measures are outlined in Sections 19.2.1 and 19.3.1. SaskPower will adhere to federal emission standards and guidelines for new turbine emissions (ECCC 2017).

19.1.2 NOISE

A detailed NIA report for the Project is presented in Appendix H. The NIA report summarizes the method, noise emission sources, prediction results, and assumptions associated with the noise assessment for the Project. Major noise emitting equipment in a combined-cycle power plant consists of one CTG, one HRSG, one STG and an ACC. The NIA quantifies the Project noise effect during normal combined-cycle and simple-cycle steady state operations at the seven nearest residential dwelling receptors (i.e., Rec01 to Rec07) within 1.5 km from the Project property boundary. Incidental activities include distribution power line, transmission power line, and water supply infrastructure. Based on past experience with these activities, the noise effects are expected to be negligible during the operation and maintenance phase. Therefore, these activities are not included in the NIA.

The NIA results indicate that cumulative sound levels (logarithmic sum of Project emitted noise, existing energy-related facility noises, and ambient sound level), are expected to be at or below the PSL at all seven residential dwelling receptors. In addition, low frequency noise analysis indicated that Project related low frequency noise effects are not expected to be an issue. The NIA assumed that operation and maintenance mitigation measures will be implemented during detailed design of the Project. These mitigation measures are presented in Section 19.3.2.

Construction activities will occur in accordance with the construction schedule outlined in Section 11.1. Noise effects associated with construction and upset conditions (e.g., start-up, shutdown, and bypass operations) were assessed qualitatively in the NIA. Noise levels resulting from construction equipment are dependent on several factors, including the number and type of equipment operating, the level of operation, and the distance between sources and receptors. The effects that various construction-related activities

might have will vary considerably based on the proximity to the Project fence line. During a typical day, equipment would not be operated continuously at peak levels. While the average noise levels would represent a noticeable temporary increase over the ambient noise levels near the construction sites, the noise would attenuate with increasing distance, fading into ambient noise background levels at distances over approximately one kilometre (km) from the loudest equipment. During Project commissioning, steam blows will be utilized to remove any debris which may be left inside the system during construction. Steam blowing is a critical activity during the commissioning of the Project. Estimated noise levels from steam blows vary, but the use of silencers can reduce noise emissions down to a level similar to typical construction activities. The number of steam blow vents, pipe diameter, pressure, and mass flow all factor into the noise generated by the steam blow operation. Construction mitigation measures are presented in Section 19.2.2.

The largest spatial extent within which the Project is expected to have effects on noise and the regional context over which cumulative effects may occur is a 1.5 km and 3 km buffer of the PDA (i.e., the LAA and RAA for noise). As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to noise are expected to occur on federal lands as a result of carrying out the Project. Construction and operation and maintenance mitigation measures are outlined in Sections 19.2.2 and 19.3.2. As described in Section 19.8, increased sensory disturbances associated with construction and decommissioning activities (e.g., noise from increased vehicle traffic, heavy equipment, lights) has the potential to result in localized indirect migratory bird habitat loss due to reduced habitat effectiveness in areas adjacent to the work. Construction and operation and maintenance mitigation measures are outlined in Sections 19.2.5 and 19.3.5.

19.1.3 TERRAIN AND SOIL

The Project has the potential to affect terrain and soil through changes in terrain integrity and soil quality and quantity. Terrain integrity includes surface expressions that are influenced by changes in slopes. Soil quality and quantity can be measured as agricultural capability because it is based on several features including soil classification, texture, topsoil depth, erosion, salinity, and stoniness. The effect pathways and mitigation strategies for potential effects are described below. Changes to terrain and soil have the potential to occur within the PDA and Incidental Activity Study Area. As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to terrain and soil are expected to occur on federal lands as a result of carrying out the Project.

19.1.3.1 Change in Terrain Integrity

Construction

Change in terrain integrity has the potential to occur during the construction phase of the Project and incidental activities. During construction, slopes within the PDA and Incidental Activity Study Area will be disturbed during grading activities. Grading can change the terrain, creating new surface expressions on the landscape. Potential interactions of the Project with terrain integrity are not expected to occur within the PDA or Incidental Activity Study Area due to the absence of areas with steep slopes (i.e., greater than a 15% slope gradient). Soil exposure from grading can lead to changes in soil quality and quantity through

increased soil erosion, mass movement, and changes in natural drainage patterns. The disturbance of the soil structure could possibly initiate or accelerate erosional processes.

Operation and Maintenance

Soil disturbance activities are not expected to occur during the operation and maintenance phase of the Project and no additional changes to terrain integrity will occur.

19.1.3.2 Change in Soil Quality and Quantity

Construction

Change in soil quality and quantity will occur predominantly during the construction of the Project and incidental activities and can be measured as change in soil agricultural capability. Soil agricultural capability influences land use, as lower soil quality can restrict the productivity of land. Changes in soil quality and quantity can be caused by loss of topsoil, admixing, erosion, compaction, and rutting. The construction activities that have the potential to affect soil quality include soil stripping, excavation, trenching, grading, piling installation, and heavy equipment and vehicle traffic.

Topsoil loss can be caused by improper soil handling techniques during soil stripping and grading activities. Soil stripping will remove organic materials and topsoil at locations where excavation and/or grading activities are required. Excavation would be necessary with the installation of Project related infrastructure and building foundations. Grading will be required to level the PDA for proper drainage purposes and to facilitate construction activities. Topsoil may be lost during soil stripping activities if topsoil becomes incorporated into the subsoil layer.

Admixing could occur if the topsoil and subsoil are not stripped and/or stored separately. The admixing of subsoil with topsoil can decrease the quality of the topsoil through the loss of organic matter, changing soil chemistry (e.g., increasing soil salinity levels), and increasing stoniness.

The PDA and Incidental Activity Study Area are characterized as having high potential for wind erosion and low potential for water erosion. The potential for erosion will be further increased through the exposure of soil. Soil will be exposed during the construction of the Project and incidental activities during soil stripping, grading, and stockpiling. The combination of exposed soil with strong wind and/or precipitation weather events may further increase erosion potential.

During construction of the Project and incidental activities, repetitive heavy equipment and vehicle traffic can create the risk for admixing, erosion, and topsoil loss through compaction and rutting. Compaction can result in admixing of the topsoil with subsoil and cause changes to infiltration capacity, water-holding capacity, and bulk density of the soil. Reduced water-holding capacity can increase the surface runoff that could lead to water erosion. Rutting creates exposed soil that provides the opportunity for erosion and soil loss. Rutting increases when the soil is saturated, especially during high precipitation events and spring-melt conditions.

Operation and Maintenance

Soil disturbance activities can increase the risk of soil erosion during the operation and maintenance phase of the Project on areas where stockpiled soils are exposed. Like in the construction phase, vehicle traffic on exposed soils (e.g., within the overhead transmission line ROW) during the operation and maintenance phase can create the risk for admixing, erosion, and topsoil loss through compaction and rutting and additional changes to soil quality and quantity can occur.

19.1.4 VEGETATION AND WETLANDS

19.1.4.1 Change in Vegetation and Wetlands

Construction

Project construction has the potential to cause a change in vegetation and wetlands. The PDA covers 64.9 ha and consists of predominantly low vegetation (55.4%) with the remainder comprised of cleared (29.4%), wetland (14.5%), and forested (0.8%) (Table 14-7). The vegetation and wetlands LAA land cover consists of predominately low vegetation (41.9%) with the remainder comprised of cleared (37.4%), wetland (13.7%), forested (6.5%), and waterway (0.5%) (Table 14-7). The Incidental Activity Study Area is comprised of mostly cultivated lands, hay/forage, and tame pasture with patches of native grassland, forested land, and wetlands (SK ENV 2023). Vegetation removal (e.g., brushing, mulching), equipment travel, and introduction or spread of weed species may cause a loss or change in native vegetation communities. Construction of the Project and incidental activities will affect both native vegetation communities (e.g., native grassland, tame pasture, and wetlands) and previously disturbed cleared land cover (e.g., cultivated land and road allowances).

Wetlands of various sizes and classes are distributed throughout the PDA and Incidental Activity Study Area. A loss of wetland area or change in wetland class could occur during vegetation clearing and ground disturbance. It is conservatively assumed that all wetlands will be lost within the PDA. A loss of 9.4 ha of wetlands in the PDA is expected due to construction, including one Class II wetland and three Class III wetlands.

However, siting of the Project's permanent structures and incidental activities will be completed to avoid or span wetlands, where possible. No vegetation will be fully removed, and no wetland class will be lost within the vegetation and wetlands LAA. No vegetation will be fully removed, and no wetland class will be lost within the Incidental Activity Study Area as defined in Section 14.1.1.2, to the extent feasible. Mitigation measures as outlined in Section 19.2.4 and Section 19.3.4, will be used to avoid potential Project-related effects to wetlands. For example, horizontal directional drilling methods may be used at certain locations during the construction of incidental activities to reduce or eliminate effects to wetland habitats, and clearing will be limited to the marked limits of the PDA and reduced to the extent feasible. Additionally, in accordance with Section 12.1.3.1, the distribution power line is designed with poles placed every 90 m, except where wetland areas require the installation of longer spans to avoid the wetland areas.

The Project (including incidental activities) will not interact with water features that provide fish habitat. Routing and siting of incidental activities (e.g., 25 kV overhead distribution line) will avoid fish habitat and therefore, no change in fish habitat or change in fish mortality risk is anticipated as result of the construction.

As described in Section 19.8, the removal of vegetation associated with construction activities has the potential to result in direct habitat loss for nesting migratory birds. Construction activities (e.g., vegetation clearing, vehicle traffic, trenching) occurring during the migratory bird nesting period can result in the destruction of migratory bird nests. The Incidental Activity Study Area is primarily comprised of cultivated land and hay/forage that can support foraging opportunities for migrating waterfowl, including some wildlife SOCC. Mitigation measures that will be implemented during to reduce potential effects on migratory birds are outlined in Sections 19.2.5 and 19.3.5.

The largest spatial extent within which the Project is expected to have effects on vegetation and wetlands and the regional context over which cumulative effects may occur is a 300 m and 5 km buffer of the PDA (i.e., the LAA and RAA for vegetation and wetlands). As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to vegetation and wetlands are expected to occur on federal lands as a result of carrying out the Project.

Operation and Maintenance

Project operation and maintenance activities including vehicle traffic could cause the introduction or spread of weed species within the PDA, ROWs associated with incidental activities, or vegetation and wetlands LAA. No change in fish habitat or change in fish mortality risk is anticipated because the Project is not expected to interact with fish and fish habitat.

19.1.4.2 Change in Plant SOCC

Construction

A change in plant SOCC has the potential to occur during the construction phase of the Project. Vegetation removal and ground disturbance activities (e.g., topsoil stripping, grading) may cause a loss or change in plant SOCC. Although no plant SOCC were observed in the PDA, there is potential habitat for plant SOCC within native plant communities including native grassland, tame pasture, shrubland, forested land, and wetlands associated with the incidental activities. Construction activities may result in the loss of plant SOCC during vegetation removal activities or through increased competition due to the introduction or spread of weed species due to vehicle and equipment movement.

Operation and Maintenance

Project operation and maintenance including vehicle traffic within the ROWs associated with incidental activities may increase competition due to the introduction or spread of weed species.

19.1.5 WILDLIFE AND WILDLIFE HABITAT

19.1.5.1 Change in Wildlife Habitat

This section discusses the direct and indirect pathways for a change in wildlife habitat, including for SOCC, during the construction, operation and maintenance, and decommissioning phases of the Project. An assessment on migratory birds is included in Section 19.8. Construction and operation and maintenance mitigation measures, including those pertaining to migratory birds are outlined in Sections 19.2.5 and 19.3.5.

The largest spatial extent within which the Project is expected to have effects on wildlife and wildlife habitat and the regional context over which cumulative effects may occur is a 1 km and 5 km buffer of the PDA (i.e., the LAA and RAA for wildlife and wildlife habitat). As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to wildlife and wildlife habitat are expected to occur on federal lands as a result of carrying out the Project.

Construction

A change in wildlife habitat has the potential to occur during the construction phase of the Project. Vegetation clearing of the PDA is the primary pathway for habitat loss during site preparation and infrastructure installation activities. Direct habitat loss is expected within the PDA as 70.6% of the area comprises low vegetation, forested, and wetlands supporting migratory birds, including some SOCC, while the remaining 29.4% is cultivated land with dugouts (see Table 14-7 for more details on land cover). The majority of the Incidental Activity Study Area is comprised of cultivated land and hay/forage that can support foraging opportunities for migrating waterfowl, including some SOCC like whooping crane, and transient ungulates (e.g., moose, white-tailed deer [*Odocoileus virginianus*], mule deer [*Odocoileus hemionus*]). The remainder of lands suitable for wildlife habitat in the Incidental Activity Study Area is limited to low vegetation, shrubland, tame pasture, and wetlands. Vegetation loss associated with construction activities (e.g., vehicle and equipment use, development of access roads, etc.) has the potential to result in direct habitat loss and alteration for wildlife.

Sensory disturbances associated with construction activities (e.g., noise from increased vehicle traffic, heavy equipment, lights) have the potential to result in indirect habitat loss outside of the PDA due to reduced habitat effectiveness (i.e., wildlife avoidance of otherwise suitable habitat). The average noise levels would create a noticeable temporary increase over ambient noise but would attenuate with increasing distance, fading into ambient noise background levels at distances of approximately one km (see Section 19.1.2 for more details on noise effects). Wildlife species that reside near the Project may be deterred from using nearby habitats during the construction of all Project components. Construction disturbance may also affect breeding and rearing success for some wildlife species (Bayne et al. 2008; Francis and Barber 2013) if construction occurs during the nesting season. Responses vary by species, but it is expected that wildlife will avoid the Project during construction because of noise, vibrations, and increased human activity (Habib et al. 2007).

Operation and Maintenance

The primary pathways of potential effects on wildlife, during operation and maintenance are associated with the creation of wildlife habitat. The evaporation and storm water ponds will create potential habitat for wildlife, particularly amphibians, waterbirds, and waterfowl (including SOCC and migratory birds). The ponds have potential to support western tiger salamander once aquatic vegetation establishes; however, it is uncertain if native grassland uplands will support loose soil for burrowing (ECCC 2023). Western tiger salamander typically overwinters by burrowing in loose soil or debris, or occupying burrows of other animals, within 250 m of breeding ponds (ECCC 2023). Northern leopard frog was not detected in the PDA during field surveys (Section 14.2.5.2.2) and is not expected to occur or occupy storm water ponds due to a lack of potential overwintering habitat within 1.6 km of the PDA. The ponds are also not likely to maintain suitable water levels, or oxygen levels, to serve as suitable overwintering habitat for northern leopard frog.

The evaporation pond will receive process wastewater streams (i.e., water that cannot be recycled to Project processes). The storm water ponds will have storage, secondary containment, and handling procedures employed on-site, therefore; it is unlikely surface water runoff will encounter contaminants. Water quality in the evaporation and storm water ponds are expected to be similar to other natural habitats and therefore ecological health risks to wildlife are not anticipated.

Sensory disturbance during operation and maintenance may result in indirect habitat loss by altering wildlife habitat availability in the wildlife and wildlife habitat LAA. The increase in noise levels near the PDA during operation and maintenance may result in the displacement of wildlife, however, potentially affected species may return after a period of acclimatization. The operation and maintenance of all incidental activities will include minimal activity and is not expected to impose indirect effects on wildlife and wildlife habitat.

Decommissioning

Direct habitat loss is not expected to occur during the decommissioning phase of the Project. Decommissioning of the Project and transmission line will include removal of the above-ground Project infrastructure while the remaining Project components will be maintained by the RM of Usborne (e.g., road infrastructure) or abandoned or repurposed (e.g., fibre-optic line; Section 9.4.6).

Increased sensory disturbances associated with decommissioning activities (e.g., noise from increased vehicle traffic, heavy equipment, lights) has the potential to result in localized indirect habitat loss due to reduced habitat effectiveness in areas adjacent to the Project. Removal of noise associated with the Project upon decommissioning has the potential to improve habitat effectiveness in the wildlife and wildlife habitat LAA as compared to the construction and operation and maintenance phases.

19.1.5.2 Change in Wildlife Mortality Risk

Construction

Project construction has the potential to result in an increased direct mortality risk for wildlife, including SOCC. Construction activities (e.g., vegetation clearing, vehicle traffic, trenching) during the breeding season can result in the disturbance to, or destruction of, migratory bird nests, as well as den sites and burrows. Ground nesting SOCC (e.g., Sprague's pipit, Baird's sparrow, bobolink) are particularly vulnerable during construction throughout the breeding season. Wildlife mortality of young may also occur if active nests and burrows have been abandoned due to sensory disturbance and the young may not be able to escape the area. Wildlife with decreased mobility (i.e., amphibians, nesting birds, and small mammals) are also more susceptible to direct mortality if individuals are unable to escape construction activities.

There is also an increased mortality risk for wildlife, including SOCC, due to potential vehicle collisions at the Project with increased vehicle traffic along existing access roads in the wildlife and wildlife habitat LAA.

Increased activity and noise during construction may cause an indirect increase in mortality risk from disturbance to wildlife resulting in behavioural changes and increased predation efficiency. Some wildlife species (e.g., amphibians) might move from cover (i.e., behavioural change) because of disturbance from noise and vibration, putting them at greater risk of predation and mortality from exposure.

Operation and Maintenance

Project operation and maintenance has the potential to result in an increased mortality risk to wildlife, including SOCC. Presence of overhead wires, in particular shield wires, pose a collision risk to birds because they are difficult to see during low light conditions. Birds perched on distribution structures are at risk of electrocution due to the potential to touch two energized points at once.

Artificial night lighting has the potential to attract or disorient nocturnally migrating birds that may result in an increased risk of injury or mortality from exhaustion or collisions with Project infrastructure. Any birds attracted to the Project by artificial night lighting could also be exposed to other threats such as predation or collisions with Project vehicles or equipment (e.g., transmission lines). Project lighting may also attract bats and increase bat mortality due to collisions with lit infrastructure. Alternatively, some bat species may avoid lit areas, resulting in increased mortality as a result of increased energy expenditure to fly longer alternative routes between foraging and roosting habitat. Artificial night lighting is not expected to have negative effects on whooping cranes because they primarily migrate during daylight hours for long periods.

Human-wildlife conflict is a mortality risk during construction and operation and maintenance. Poor management of wastes (e.g., garbage, grey water, food wastes) and other attractants (e.g., food, petroleum products, toothpaste) may result in wildlife-human conflict and the destruction of wildlife deemed to be a safety risk. Human-wildlife conflict is mostly likely to effect canids, but may also affect other mammals (e.g., American badger [*Taxidea taxus*]).

There is also an increased mortality risk for wildlife, including migratory birds, due to potential vehicle collisions at the Project, along the access road and roads in the wildlife and wildlife habitat LAA that will be used to bring in equipment and materials to the Project. In addition, there is mortality risk for amphibians moving between the storm water and evaporation ponds within the PDA.

Decommissioning

Similar Project effects during the construction phase have the potential to occur during onset of the decommissioning phase. The removal of above-ground Project infrastructure during the breeding season can result in the destruction of migratory bird nests, as well as den sites and burrows. However, once infrastructure is removed, this can reduce mortality risks to migratory birds (e.g., overhead power lines). The risk is greatest for wildlife with decreased mobility (e.g., amphibians, nesting birds, and small mammals). Movement of Project vehicles and equipment within the Project and along roads accessing incidental activities may also increase mortality risk for wildlife.

19.1.6 HUMAN ENVIRONMENT

19.1.6.1 Change in Current Land and Resource Use

Current land and resource use within the PDA is not expected to change with construction of the Project. The PDA is owned by SaskPower (Appendix F). Within the LAA, there is the potential for the Project to affect current land and resource use through interactions with groundwater, access disruption due to construction traffic, and a loss of available wildlife species due to sensory disturbance (e.g., noise from increased vehicle traffic, heavy equipment, lights, increased human presence) that may deter recreational and resource use activities (e.g., hunting and trapping). Availability of hunted wildlife species may be affected by an increase in mortality due to vehicle-wildlife collisions from increased traffic.

Construction activities may interact with groundwater potentially causing changes to the quality and quantity of water available for human use. These construction activities may include excavation and horizontal directional drilling, if required. Due to the relatively shallow installation depth of infrastructure associated with the Project and the depth of the water table, groundwater quantity and quality are not anticipated to be affected during construction activities.

Drawdown impacts to neighbouring Empress Group Aquifer wells were considered as part of a groundwater investigation for all phases of the Project. Results of the investigation indicated that groundwater use for all phases of the Project would have negligible effects on the aquifer (Appendix E). However, groundwater is only anticipated to be used during the construction phase of the Project and therefore groundwater use is expected to be limited in comparison to the amount that would be required during operation and maintenance and considered within the groundwater investigation (Appendix E).

Change to current land and resource use within the PDA is not expected to occur during the operation and maintenance phase of the Project. Continued sensory disturbance and vehicle-wildlife collisions during operation and maintenance may continue to deter wildlife close to the PDA (thereby deterring recreational activities in the LAA) or reduce availability of hunted wildlife species within the LAA. Temporary disturbance to recreational land use in the LAA is possible during decommissioning activities, but once reclamation is

complete, it is assumed the reduction in sensory disturbance will no longer deter use of the LAA for recreational purposes. Changes in current land and resource use are not anticipated to cause adverse effects within federal jurisdiction.

19.1.6.2 Change in Employment and Economy

It is expected that over its lifetime, the Project will contribute to an increase in employment and economy in the RAA. The Project will provide an economic benefit to the LAA through employment opportunities and will have economic benefits from the purchasing of supplies and services from vendors across central Saskatchewan. As discussed in Section 15.3, it is estimated that during the peak of construction the Project will provide approximately 450 fulltime employment opportunities including a broad spectrum of operators, trades, supervisors, and professionals. During operation and maintenance, the Project will provide employment opportunities for approximately 25 full time staff at the Project.

The Project's construction workforce and Project activities will increase the demand for goods and services, including temporary accommodation, food services, and construction materials. The estimated spend for these services is approximately $40,000,000. These expenditures on goods and services will generate benefits and opportunities for local businesses but may result in a reduction in available capacity or quality of services for residents and visitors to the area. As discussed in Section 15.3, there are forecasted deficits for most craft trades in the Project region. Consequently, the Project may require employees to travel from other provinces throughout the Project phases. Given the relative population of the LAA, the addition of full-time employees are not expected to have a substantial effect on the availability of goods and services for residents.

Effect pathways for change in employment and economy during all Project phases (i.e., construction, operation and maintenance, and decommissioning) will include Project expenditures on local goods and services which will contribute to the local economy of the LAA; Project expenditures on labour will contribute to federal and provincial gross domestic product (GDP) and government revenues. Information on local economic impact is available from the Chinook Power Station completed in 2019 and the Great Plains Power Station currently under construction. These power stations are similar in design to the Project. Based on expenditures at Great Plains Power Station, the Project is expected to obtain over $250 million in goods and services from Saskatchewan based suppliers with an expectation of at least $15 million in goods and services from Indigenous owned suppliers. Many workers from other provinces will temporarily locate in Saskatchewan. Their wages will count as GDP in Saskatchewan, but they will undertake significant expenditures in their home communities in other parts of Canada.

Using expenditure data for capital and Statistic Canada's provincial and territorial input-output multipliers, the total GDP impact (including direct, indirect and induced impacts) on Saskatchewan is projected to be $800 million and the Project will add $200 million in GDP in other Canadian provinces (GOC 2019f). Total Canadian government revenue is projected to be $60 million. After the Project is completed, it will provide ongoing Saskatchewan income of $13 million per year through employment income and demand for goods and services in Saskatchewan. Though construction of the Project will provide economic benefits across Canada, due to its modest size relative to the national Canadian economy, it will not cause any significant shift in labour or other markets outside Saskatchewan; therefore, changes in employment and economy are not anticipated to cause adverse effects within federal jurisdiction.

19.1.6.3 Change in Infrastructure and Services

The Project's construction workforce and Project activities may increase the demand for existing infrastructure and services, such as the road network, rail network, local landfills, health care services, and businesses. The Project is likely to increase traffic on the TransCanada Yellowhead Highway 16, Highway 20, and local roads through the transportation of workers, equipment and materials and will likely also generate solid waste and sewage requiring disposal. The potential increase of traffic on the TransCanada Yellowhead Highway 16, Highway 20, and local roads is expected to be minimal considering the existing capacity and traffic levels of the primary and secondary highway, but may include increased wear and tear, traffic wait-times, and collision risk.

The Project's construction workforce has the potential to result in an increased demand for health, emergency, and protection services, which may increase response times. There is also the potential that the presence of a construction workforce may result in a reduction in available capacity or quality of infrastructure and services for residents and visitors to the area. However, the emphasis on developing a local labour force, and the stipend that will be provided for employees commuting or for their respective accommodations (Section 15.3), may alleviate some pressure on infrastructure and services. The need for emergency services will continue during operation and maintenance, however it is anticipated to be at a reduced level in comparison to the construction phase.

During operation and maintenance, the expected workforce of approximately 25 full time employees will shift the demand from temporary accommodations to more permanent accommodations. There may be an increased workforce during the decommissioning phase that would again increase pressure on existing infrastructure, particularly temporary accommodation. Changes in infrastructure and services are not anticipated to cause adverse effects within federal jurisdiction.

19.2 Construction Mitigation Measures

19.2.1 AIR QUALITY

Air emissions associated with Project construction are expected to be minor and occur only for short intervals. The air emissions generated during construction will result from fuel exhaust (diesel and gasoline) and typical construction activities. Multiple control measures will be implemented during construction to reduce air emissions and potential effects. After grading, the untraveled or lightly travelled locations will be watered, mulched, overlain with a crushed stone layer, or vegetated to reduce fugitive particulate matter ($PM_{2.5}$, PM_{10}, and TPM) emissions. Activities that potentially generate fugitive emissions will be monitored visually by construction personnel. If fugitive emissions become visible, water will be sprayed on the affected areas. The idling of construction equipment and vehicles will be reduced.

Potential air quality effects from construction activities will vary depending on the level of activity, the specific operations, site conditions, control measures, and prevailing weather conditions. Most effects due to construction are expected to occur in areas within the immediate vicinity of the Project. Many of the Project site preparation and construction activities such as land clearing, filling, and grading, will be intermittent and of short duration. These aspects of the construction activities as well as control measures,

will serve to reduce potential effects. Additional information on the Project's emissions during the construction phase is provided in Section 24.4.

19.2.2 NOISE

Project construction will generate noise levels that have the potential to be periodically audible offsite. Construction activities will occur in accordance with the construction schedule outlined in Section 11.1. Construction of the proposed Project is expected to involve site clearing, excavation, placement of concrete, and the use of typical utility construction equipment. The primary sources of construction noise will be associated with equipment operation, use of heavy-duty vehicles, grading, and foundation work activities. Project construction is typically completed in stages, but various construction activities may overlap and with multiple construction crews operating simultaneously. Construction noise mitigation measures that could be implemented include the following actions:

- Conduct construction activities between the hours of 7:00 am and 10:00 pm (Appendix H).
- Advise nearby residences of elevated noise-causing activities in advance and schedule these events to reduce disruption to nearby residences (Appendix H).
- Increase the distance between stationary equipment and noise sensitive receptors to the extent practicable.
- Limit pile driving and impact activities to daytime hours.
- Route construction equipment away from noise sensitive receptors to the extent practicable.
- Turn off idling equipment when not in use.
- Use construction equipment with proper mufflers.
- Advise nearby residents that concerns pertaining to noise may be submitted to the Project's dedicated web page (Aspen Power Station (saskpower.com)), toll-free phone line, or email address. SaskPower will work to respond and resolve concerns as soon as possible, including implementing additional mitigation measures if required (e.g., follow-up monitoring).

For a full listing of SaskPower's standard mitigation measures for noise please refer to SaskPower's Environmental Beneficial Management Practices (BMPs) (SaskPower 2022a).

SaskPower's complaints resolution process includes the following approach:

- Provide multiple channels to report concerns, questions and complaints, including but not limited to: toll-free phone, email, mail, online, and in-person.
- SaskPower also has a secure and confidential third-party website (clearviewconnects.com) where there's an option to submit an anonymous complaint.
- All complaints and questions are brought to the attention of the appropriate parties, depending on the nature of the concern. The response time can vary depending on the nature of the complaint, however; SaskPower, strives to acknowledge receipt of the concern within one business day. Further communication is then provided as to the anticipated response time to rectify or mitigate the concern.

- Each complaint is documented and the status is monitored and tracked until it has been deemed closed.
- When it is requested, SaskPower publicly reports on the number and/or type of complaints and their status (new, active, closed, etc.) to ensure transparency with project stakeholders and local leaders.

In the case of the Project, stakeholders will be notified in advance of any loud construction noise (i.e., pile driving and steam blows). If there are concerns about noise levels during construction, the complaint resolution process will be followed, as is the case with past SaskPower projects. As mentioned in Section 3.5, SaskPower will update the project's webpage that will provide contact information for stakeholders and the public, including but not limited to, newsletters, email, and a toll-free phone number. For an example, the Great Plains Power Station project currently under construction can be viewed at Great Plains Power Station (saskpower.com). As mentioned in Section 3.5.1, the EPC contractor will also develop a webpage to share communication with stakeholders.

Project staff with both SaskPower and the EPC contractor are responsible for monitoring these communication avenues and resolving issues. Stakeholder grievances are logged as action items for tracking to ensure proper resolution. A Project-specific follow-up/monitoring plan has not yet been developed, as it will depend on aspects of detailed design. However, compliance measurements will be completed after construction of the Project. The Project will be designed with sound attenuation measures necessary to meet the limits presented in Appendix H.

19.2.3 TERRAIN AND SOIL

Implementing mitigation measures to reduce Project effects to changes in terrain integrity, soil quality, and soil quantity during construction include, but are not limited to, the following:

- Proper soil handling techniques will be implemented including stripping and storing topsoil and subsoil separately and maintain adequate distance between stockpiles to avoid admixing.
- Topsoil stripping will be monitored to reduce soil quality loss through admixing.
- Erosion control measures will be installed where required to reduce potential for loss of soil quantity. Erosion control measures will include the use of silt fencing around soil stockpiles.
- Soil stockpiles that may be stored for longer durations may be stabilized with temporary seeding.
- Refuelling of equipment will not be completed on topsoil and topsoil/subsoil stockpiles.
- Heavy equipment and vehicle use will be restricted to dry or frozen soil conditions to reduce the potential for compaction and rutting, where feasible.
- When saturated soil conditions are observed during construction, mitigation measures will be implemented including installing matting, avoidance, and/or temporary shutdowns of construction activities.

For a full listing of SaskPower's standard mitigation measures for terrain and soil please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.2.4 VEGETATION AND WETLANDS

There are several mitigation measures that have already been and/or will be implemented to avoid or reduce Project effects to vegetation and wetlands including, but not limited to:

- The Project team designed the Project to be sited within cultivated lands where possible, avoiding suitable habitat for plant SOCC. Incidental activities will be routed and sited to avoid sensitive land types or features (e.g., native grassland, wetlands) to the extent feasible.
- Horizontal directional drilling methods may be used at certain locations during the construction of incidental activities to reduce or eliminate effects to wetland habitats.
- Approvals from the appropriate provincial regulatory agencies (e.g., SK ENV, Water Security Agency) will be obtained prior to the commencement of work in wetlands and work will be completed in accordance with regulatory permit conditions.
- Clearing will be limited to the marked limits of the PDA and reduced to the extent feasible.
- Pre-construction vascular plant surveys will be completed in areas of potential habitat in the Incidental Activity Study Area in accordance with SK ENV Species Detection Survey Protocol 20.0 Vascular Plant Surveys to identify SOCC and weed species locations.
- Known SOCC locations will be avoided, where possible, and applicable SK ENV Saskatchewan Activity Restriction Guidelines for Sensitive Species (2017) setbacks will be applied by staking features (e.g., plant SOCC, if observed, and weed infestations) within the Project prior to construction.
- Vehicles and equipment will be inspected before entering the Project or its incidental activities to make sure they are clean and free of weeds.
- SaskPower's Environmental BMPs (SaskPower 2022a) including BMP01 Surface Water and BMP04 Native Grassland, Agricultural Land, and Sandhills Environments, will be followed during all Project activities. The BMPs includes measures to reduce or avoid changes to the distribution and abundance of native vegetation, plant SOCC, and weeds.
- Disturbed areas will be reclaimed after construction is complete, including topsoil replacement and seeding, when ground conditions and moisture levels permit.
- Reseeding will be completed, in areas where native vegetation has been removed or damaged, using a native seed mix. Seeding will be completed following construction during the optimal seasonal time frame to maximize germination (i.e., spring or fall).
- Native seed mixes that are consistent and compatible with the baseline vegetation community will be used for reclamation. Seed mixes will be certified weed free (i.e., analyzed for species and percentage of prohibited and noxious weeds).
- Appropriate weed control measures will be applied, as necessary.
- Monitoring the success of native vegetation reclamation will be conducted the year after seeding is completed, if applicable.

For a full listing of SaskPower's standard mitigation measures for vegetation and wetlands please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.2.5 WILDLIFE AND WILDLIFE HABITAT

This section includes a discussion of potential effects and mitigation strategies for wildlife and wildlife habitat. Effects to fish and fish habitat and aquatic species are discussed in Section 19.6 and 19.7. Effects to migratory birds are primarily discussed here and are also summarized in Section 19.8.

Project-specific mitigation measures, along with standard industry practices and avoidance measures will be implemented during construction, operation and maintenance to reduce potential effects on wildlife and wildlife habitat. There are several mitigation measures that have already been and/or will be implemented to avoid or reduce Project effects to wildlife and wildlife habitat including, but not limited to:

- The Project team designed the Project to be sited within cultivated lands where possible, avoiding suitable habitat for wildlife SOCC. Incidental activities will be routed and sited to avoid sensitive land types or features (e.g., native grassland, wetlands) to the extent feasible.
- Vegetation removal (e.g., brushing, mulching) will be completed outside of the migratory bird nesting period to the extent feasible, outlined by ECCC (April 22 to August 24; GOC 2018b).
- Sensory disturbances will be reduced by using standard noise abatement equipment on machinery (i.e., mufflers) to control noise levels and avoid unnecessary idling.
- If a SOCC, active nest, or other sensitive wildlife feature is encountered, a species appropriate setback will be applied by staking features within the Project prior to or during construction in accordance with the SK ENV Saskatchewan Activity Restriction Guidelines for Sensitive Species (2017). In addition, construction activities in an area may be temporarily shut down until an acceptable mitigation plan is implemented in consultation with SK ENV, if necessary.
- Pre-construction nest surveys will be completed in areas that contain nesting habitat for any work occurring within the migratory bird nesting period.
- Overhead transmission line routing will avoid high risk mortality locations (e.g., wetlands) where possible. In instances where this is not feasible, mitigation measures will be implemented to increase line visibility to migratory birds (i.e., line markers) and reduce the potential for wildlife mortality following SaskPower's BMPs for line marking (SaskPower 2022a).
- Speed limits will be maintained below 40 km/h on and off the Project and reduced in areas where wildlife SOCC or movement corridors have been identified.
- Vehicle operators will yield the ROW to wildlife and take all reasonable measures to avoid wildlife-vehicle collisions. Any collisions with wildlife will be reported to provincial regulators, as appropriate.
- Personnel will not be permitted to harass or feed wildlife. Nuisance wildlife will be reported to the appropriate authorities.

For a full listing of SaskPower's standard mitigation measures for wildlife and wildlife habitat please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.2.6 HUMAN ENVIRONMENT

Standard industry practices and avoidance measures, in addition to Project-specific mitigation measures will be implemented during construction to reduce effects to the human environment. Mitigation measures to reduce Project effects to changes in current land and resource use, employment and economy, and infrastructure and services during construction include, but are not limited to, the following:

- Property owners, resource users, and stakeholders will be provided with information and updates on ongoing and planned construction activities.
- Appropriate signage indicating access restrictions and the duration of the restrictions will be posted in advance of construction.
- There will be no entry of personnel or equipment, or work conducted on private property without proper agreements in place.
- A security fence will be installed around the active construction zone. Any fences inadvertently damaged adjacent to or within the PDA will be immediately repaired.
- Temporary gates to bypass construction will be installed if neighbouring fence sections need to be moved.
- All buried and overhead lines will be marked with appropriate warning signage.
- Vehicles and equipment will be inspected before entering the Project or its incidental activities to make sure they are clean and free of weeds.
- Project labour agreements for construction work will be developed that respect provincial labour laws and established practices for labour training and supply.
- The hiring of local construction workers, subject to labour availability, cost, and quality considerations will be prioritized, followed by workers from within the province, then from the rest of Canada, then North America, and then overseas countries.
- The local labour force will be supplemented with mobile workers when needed to avoid displacing currently employed individuals in the area.
- Employment and procurement programs will be developed that actively promote local opportunity, including for Indigenous workers and businesses, taking into consideration the competitiveness and relative capacity of local suppliers.
- An ERP will be developed for the Project that will be shared with Project personnel. The ERP will include measures to address emergency response communications, a 24-hour emergency transport to the hospital for occupational and non-occupational injuries, and a plan for fire response and evacuation. Contractors will also be required to have ERPs in place.
- The MOH and RM of Usborne will be coordinated with regarding compliance with applicable road restrictions and transportation requirements during the construction period.
- Potable water will be provisioned in accordance with local regulations.

- During the construction phase, sanitary waste generated onsite will be stored in a septic tank and will be pumped and removed from site by licensed contractors and disposed of in accordance with applicable regulations.
- Solid waste, including construction waste, recyclable material, and some hazardous waste, will be disposed of in accordance with local regulations.
- Project construction-related traffic will be restricted to the PDA to the extent practical and required.
- Roadways used or damaged through construction activities will be maintained and repaired.
- Roads, local highways and rail lines will not be blocked, and crossings will adhere to safety and legal requirements.
- Additional resource requirements for power, heating, traffic, policing, fire protection and snow clearance will be accounted for.

For a full listing of SaskPower's standard mitigation measures for the human environment please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.3 Operation and Maintenance Mitigation Measures

19.3.1 AIR QUALITY

SaskPower will adhere to federal emission standards and guidelines for new turbine emissions (ECCC 2017). In addition, SaskPower commits to meeting ambient air quality objectives, and industry standard best practices for operational emissions. To achieve this, and to reduce potential adverse effects of the Project operation and maintenance on ambient air quality, mitigation measures will include the following:

- Installing the most up-to-date technology including several features intended to reduce overall emissions including ULN burners.
- Increasing the temperature of fuel gas in combined cycle mode using feedwater to improve cycle efficiency, reducing emissions.
- Regular inspection and maintenance of the gas turbines will be completed to support optimum performance and emission reduction.

With the application of the mitigation measures and the fact that predicted ambient concentrations are anticipated to be below the SAAQS and 2025 CAAQS, the effects of the Project on ambient air quality are assessed as being not substantial. Additional information on the Project's emissions during the operation and maintenance phase is provided in Section 24.5.

19.3.2 NOISE

To meet the noise thresholds (i.e., AUC Rule 012 PSL) at nearby dwellings, some of the equipment will require noise mitigation measures in their design. Actual mitigation will be selected during detailed design of the Project. Typical mitigation measures may include silencer, barriers, enclosures, acoustic shrouding,

low noise equipment, acoustic louvers, or building with high sound transmission class rating. A summary of the major equipment noise emission level targets (i.e., sound power level or sound pressure level) are provided in the detailed NIA for the Project in Appendix H. The required sound transmission class (STC) of the combustion- and steam-turbine buildings are also provided in the NIA.

During Project commissioning, steam blows will be utilized to remove any debris which may be left inside the system during construction. Steam blowing is a critical activity during the commissioning of the Project. The steam system feeding the steam turbine must be steam blown to remove debris that could potentially damage the steam turbine blades during operation and maintenance. The steam blow piping will be routed outside the building and the noise generated from the steam exiting the discharge piping will be routed through a silencer to reduce noise emissions.

During the operation and maintenance phase, concerns pertaining to noise may be submitted to the Project's dedicated web page (Aspen Power Station (saskpower.com)), toll-free phone line, or mail address. SaskPower will work to respond and resolve concerns as soon as possible, including implementing additional mitigation measures if required (e.g., follow-up monitoring).

19.3.3 TERRAIN AND SOIL

Implementing mitigation measures to reduce Project effects to changes in terrain stability, soil quality, and soil quantity during operation and maintenance include, but are not limited to, the following:

- Heavy equipment and vehicle use will be restricted to dry or frozen soil conditions to reduce the potential for compaction and rutting, where feasible.
- When saturated soil conditions are observed during operation and maintenance, mitigation measures will be implemented including installing matting, avoidance, and/or temporary shutdowns of operation and maintenance activities.

For a full listing of SaskPower's standard mitigation measures for terrain and soil please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.3.4 VEGETATION AND WETLANDS

Vegetation and wetland mitigation measures during Project operation and maintenance will focus on maintenance of protective measures and on-going application of control measures including the following:

- Operation and maintenance activity will be restricted to the PDA and incidental activities ROWs.
- Vehicles will be clean and free of weeds before entering the Project or its incidental activities.
- Sediment fencing will be maintained as required.
- The PDA will be regularly inspected for weed occurrences and corrective measures applied (e.g., spraying, mowing, hand-pulling), as needed.

For a full listing of SaskPower's standard mitigation measures for vegetation and wetlands please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.3.5 WILDLIFE AND WILDLIFE HABITAT

Wildlife and wildlife habitat mitigation measures during Project operation and maintenance includes protective measures and on-going application of control measures including the following:

- Water quality in the evaporation and storm water ponds are expected to be similar to other natural habitats; as such, mitigation measures to discourage use of the storm water pond by wildlife, including migratory birds, is not deemed necessary.
- Personnel will not be permitted to harass or feed wildlife. Nuisance wildlife will be reported to the appropriate authorities.
- Overhead transmission line routing will avoid high risk mortality locations (e.g., wetlands) where possible. In instances where this is not feasible, mitigation measures will be implemented to increase line visibility (i.e., line markers) to migratory birds and SOCC (e.g., whooping crane) and reduce the potential for wildlife mortality following SaskPower's BMPs for line marking (SaskPower 2022a).

For a full listing of SaskPower's standard mitigation measures for wildlife and wildlife habitat please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.3.6 HUMAN ENVIRONMENT

Standard industry practices and avoidance measures, in addition to Project-specific mitigation measures will be implemented during operation and maintenance to reduce effects to the human environment. Mitigation measures to reduce Project effects to changes in current land and resource use, employment and economy, and infrastructure and services during operation and maintenance include, but are not limited to, the following:

- Property owners, resource users, and stakeholders will be provided with information and updates on planned operation and maintenance activities.
- Vehicle operators will yield the ROW to wildlife and take all reasonable measures to avoid wildlife-vehicle collisions.
- Any fences inadvertently damaged adjacent to or within the PDA will be immediately repaired.
- All buried and overhead lines will be marked with appropriate warning signage.
- The local labour force will be supplemented with mobile workers when needed to avoid displacing currently employed individuals in the area.
- Employment and procurement programs will be adhered to.
- The ERP will be adhered to.
- Ensure roads, local highways and rail lines are not blocked, and crossings adhere to safety and legal requirements.

For a full listing of SaskPower's standard mitigation measures for the human environment please refer to SaskPower's Environmental BMPs (SaskPower 2022a).

19.4 Decommissioning Mitigation Measures

The Project is expected to operate until 2047. Precise timing for the decommissioning of the Project cannot be predicted at this time as it depends solely on the mode of operation. However, all relevant environmental regulations in existence at the time of decommissioning will be adhered to. A (D&RP), as required by the SK ENV, will be developed for the Project outlining the decommissioning and reclamation objectives, methodologies, and estimated costs. This plan is reviewed periodically for completeness and adherence to environmental laws/regulations as they may change periodically. This D&RP will guide SaskPower's activities.

SaskPower anticipates minimal effects to the surrounding communities with respect to employment upon decommissioning of the Project as the addition of full-time employees during operation are not expected to have a substantial effect on the availability and/or consumption of goods and services in the RSA. Local goods and services such as food services, construction materials, sewage disposal, and snow removal, will no longer be required upon decommissioning of the Project which may have an impact on local suppliers.

As mentioned in Section 19.1.6.3, during operation, the Project will provide employment opportunities for approximately 25 people including operators, engineers, and support staff. As is being done with the current decommissioning plans for other facilities in SaskPower's fleet, SaskPower will prioritize the relocation of operation personnel from the Project to other employment opportunities within the company.

19.5 Accidents and Malfunctions

Accidents and malfunctions are unplanned events that have a reasonable chance of occurring, or those that could result in significant environmental effects. Accidents and malfunctions have the potential to occur because of acts of nature, human error, equipment failure, or other possible causes. Potential accidents and malfunctions that may occur during Project construction, or operation and maintenance include hazardous materials spills, natural gas releases, fires, vehicle accidents, and accidental damage to utilities. Potential accidents and malfunctions that would result in radiological/nuclear impacts on human health are not anticipated to be caused by the Project (Health Canada 2017a).

An environmental emergency is defined as an uncontrolled or unexpected incident involving the actual or likely release of a polluting substance into the environment. An ERP and Spill Contingency Plan will be developed for the Project in accordance with the CEPA and the Environmental Emergency Regulations. The ERP and Spill Contingency Plan will include protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases of toxic and hazardous substances listed in Schedule 1 of the Environmental Emergency Regulations (GOC 1999, GOC 2019e, GOC 2022f).

The ERP will be consistent with those in place at existing SaskPower generating facilities, and will include emergency response procedures, incident action protocols, and critical incident response guidance. The ERP will include emergency preparedness and response systems, including direction on coordinating with qualified response organizations within the LAA and RAA. Emergency services within the LAA include the RCMP, which have a detachment located in Lanigan, comprised of four members, and a two-member highway patrol; and fire services, including the Lanigan Volunteer Fire Department which is based out of

the Lanigan Fire Hall. Emergency services within the RAA include the Saskatchewan Spill Control Centre. All staff and contractors that handle toxic and hazardous substances including fuel truck drivers, will have valid and appropriate training and/or certification in accordance with the ERP and Spill Contingency Plan.

The ERP will include procedures for emergency transport, a plan for fire response and evacuation, measures to address emergency response communications plans for the Project. The emergency response communication plans will include community awareness plans for surrounding communities that could be affected by an emergency incident, including instructions in case of an environmental emergency. The procedures will include a combination of urgent immediate actions and longer-term actions including, but not limited to:

- Public notification of safety concerns
- Shelter in place and evacuation directions
- Incident status updates to the Project's dedicated web page that will contain Project information on the dedicated Project webpage (Aspen Power Station (saskpower.com)).
- Incident status updates to the Project's dedicated toll-free phone line and email address that will include all information regarding the Project.

19.5.1 HAZARDOUS MATERIALS SPILLS

Hazardous materials will be stored and used on site during Project construction and operation and maintenance. Improper handling, use, or storage of these materials could result in a release. In addition, the release of hazardous materials could occur through several scenarios including vehicle collisions, refueling, and equipment or machinery breakdowns. Small spills (spills not deemed as reportable to SK ENV under the Environmental Spill Control Regulations) of hazardous materials can usually be contained and cleaned up by onsite staff using standard equipment. Larger spills could result from a vehicle, or mobile equipment collision that ruptures a tank used to store hazardous materials. Hazardous material releases have the potential to affect the health of staff through inhalation, ingestion, and/or direct contact. However, effects to the health of the public as a result of hazardous materials releases during the Project's construction and operation and maintenance phases are not anticipated to occur. The Project-specific ERP will be consistent with those in place at existing SaskPower generating facilities. The ERP will outline emergency response measures and preparedness systems for an event where the health or safety of staff is threatened (e.g., evacuation procedures). The ERP will be developed in accordance with Health Canada guidance (Health Canada 2018a), and emergency response measures will include, but not be limited to:

- Hazardous materials will be transported through less populated areas to the extent feasible.
- Local emergency response (e.g., Lanigan RCMP detachment, Lanigan & District Ambulance, Lanigan Volunteer Fire Department) will be provided with available information regarding potential hazardous material releases to ensure that the local emergency response team is prepared for potential hazardous material releases and impacts to human health to the extent feasible.

- Evacuation and shelter-in place considerations will have public safety as the over-riding priority.
- SaskPower will keep the Project website, dedicated toll-free phone line and email address up to date with educational messages and emergency response guidance to promote community awareness and to assist in communities integrating the Project into their respective emergency management and response plans.

The Project-specific ERP, which will include a Spill Contingency Plan, will be developed to support a response and actions to reduce potential effects to the environment. The Spill Contingency Plan will be consistent with those in place at existing SaskPower generating facilities and will include direction for staff for responding to a spill or unplanned release of a pollutant at the Project site, including guidance for recording and responding to the spill or unplanned release of a pollutant. The direction provided will also include immediate actions to be taken, corrective actions to be taken, and cleanup actions to be taken. The Spill Contingency Plan will also include a list of higher risk chemicals with information on the danger, safety data sheets that will be reviewed by staff prior to handling the listed chemicals, methods of handling spills, precautions to be taken by staff, and equipment required for handling and disposal. Contact information for emergency spill equipment contractors and the Saskatchewan Spill Control Centre will be included in the Spill Contingency Plan.

The Spill Contingency Plan will be developed in accordance with the CEPA and the Environmental Emergency Regulations and will identify protection and emergency response measures to use if there is a release of hazardous materials. Additional mitigation measures available to reduce potential effects for accidental hazardous material releases, including proactive spill prevention mitigation measures that will be incorporated into all phases of the Project, include, but are not limited to:

- Materials will be available at all physical work locations to contain and recover spills.
- Contractors will be responsible for having spill response equipment and materials onsite and readily available.
- Staff and contractors that handle hazardous materials, including fuel truck drivers, will have valid and appropriate training and/or certification.
- All equipment will arrive to the Project free of leaks and in good working condition. Any equipment which does not arrive free of leaks and in good working condition shall not be allowed on site.
- Equipment used in all phases of the Project will be maintained in proper working condition to reduce the potential for leaks.
- The ERP, developed in accordance with CEPA and the Environmental Emergency Regulations will be adhered to.
- All hazardous materials will be stored using adequate secondary containment.
- No fuel, oil or other hazardous material will be stored within 100 m of any water feature.
- Equipment maintenance and servicing will not occur within 100 m of any water feature.
- SaskPower will monitor and assess water resources (e.g., groundwater) in accordance with provincial regulatory and operational permitting requirements.

- All reportable spills (those identified in SK ENV Environmental Spill Control Regulations) will be reported to SK ENV. Soil and water quality tests will be undertaken as needed to assess the damage and to develop a remediation plan if required. Remediation efforts, where required, will be in accordance with SK ENV guidelines and reporting requirements.
- Should a spill occur, the contaminated soil and/or water will be contained to prevent access by species that are consumed as country foods.
- Where necessary, consumption advisories will be developed in accordance with the ERP community awareness plans.
- Where required, SaskPower will facilitate access to reasonable substitutions for contaminated country foods items.

19.5.2 NATURAL GAS RELEASES

Unplanned or planned natural gas releases have the potential to occur during the operation and maintenance phase of the Project. Potential effects that have the potential to result from a natural gas release include but are not limited to soil contamination and groundwater contamination. An ERP will be developed for the Project that will be consistent with those in place at SaskPower generating facilities and will identify emergency response measures to be implemented if a natural gas release occurs.

In the event of an unplanned natural gas release, the plant emergency alarm will be initiated to shut down all work activity and direct all staff to the muster point, where the emergency response measures, and preparedness system outlined in the ERP will be adhered to. Additional mitigation measures in the event of an unplanned natural gas release, include but are not limited to:

- Following the gathering of staff at the muster point, one person will be designated to obtain a calibrated portable gas detector. The readings on the gas monitor will be monitored, and additional testing/monitoring will be conducted as required in other areas of the Project.
- Based on the factors to be considered (e.g., portable gas detector readings, wind direction, noxious odour), it will be determined if it is appropriate for staff to remain in the primary muster point or move locations.
- Alert the local fire department (e.g., Lanigan Volunteer Fire Department).

In the event of a planned natural gas release, access to the areas of the release will be restricted and details of the release (e.g., timing, duration, hazards) will be communicated in advance to staff. In the event that a large quantity of natural gas will be released, such as for maintenance or testing purposes, the Lanigan Volunteer Fire Department will be notified and provided with information prior to release.

19.5.3 FIRES

Fire may be caused by natural events such as lightning strikes, electrically powered Project component malfunction, equipment malfunction, or anthropogenic activities. In the unlikely event of an accidental fire, effects could include the damage or destruction of Project buildings, equipment, and infrastructure. Fires also have the potential to cause loss of life, air quality degradation, vegetation loss, wildlife and wildlife habitat loss, agricultural loss, and infrastructure loss.

An ERP will be developed for the Project and will identify protection and emergency response measures to be implemented if a fire occurs. Mitigation measures that will be implemented to reduce the potential for fires or damages resulting from fires include:

- The Project will be designed with consideration of the potential for fire and explosions and in accordance with insurance requirements, industry best practices, and the National Fire Protection Association fire codes.
- Fires or burning will not be allowed on the construction site.
- The ERP will include coordinating with local first responders.
- Designated smoking areas will be provided.
- Storage tanks will meet provincial code requirements.
- The burning of garbage and debris will be prohibited.
- Project-specific hot work procedures will be followed.
- Idling of vehicles when parked in vegetated areas will be prohibited.
- Safe work practices will be followed when handling flammable materials.
- Necessary fire-fighting equipment will be available and maintained; trained personnel will be present on site.
- Reasonable attempts will be taken to extinguish a fire should one occur.
- Construction and/or operation and maintenance and related activities taking place in the vicinity of a wildfire will cease until it is safe to resume operations.

19.5.4 VEHICLE ACCIDENTS

Movement of vehicles, equipment and personnel to the Project could result in collisions resulting in injury or death to humans and wildlife. Vehicle collisions have the potential to occur under a range of conditions related to road conditions, weather, driver fatigue and distractions, collisions with wildlife, or vehicle malfunctions. These accidents have the potential to occur during any phase of the Project.

Mitigation measures to reduce the risk of vehicle collisions will include:

- Employees and contractors will be required to comply with traffic, highway use and safety laws, and regulatory requirements.
- Project roads will be designed, constructed, and maintained for safe use.

- Speed limits will be implemented on Project roads.
- On-site emergency response personnel or regional emergency services will be contracted for the Project.
- Preventative measures for vehicle accidents will include signage, traffic control flag persons, road surface controls (e.g., dust suppression), maintaining vehicles, and reducing traffic to the Project during construction, and operation and maintenance.

19.5.5 ACCIDENTAL DAMAGES TO UTILITIES

Project activities such as ground disturbance, clearing, and equipment operation have the potential to cause damage to aboveground and underground utilities and infrastructure. Striking utilities or infrastructure can cause damage to communications, electricity transmission and distribution systems, water supply, sewage lines and storage, and natural gas infrastructure. Damages can be caused by hand tools, heavy machinery (e.g., excavators), equipment and vehicle collisions, and operating equipment under overhead lines without proper clearance. Damages to utilities have the potential to cause health and safety consequences, affect air quality, and cause work delays or shutdowns.

Construction, and operation and maintenance safety plans will include following ground disturbance protocols, which will require review of the work and advance planning prior to approval to proceed. The process will include the following measures:

- acquiring up-to-date utility plans/drawings prior to construction
- installing protection and warning materials above new buried utilities
- inclusion of tracing wires in buried plastic piping to enable accurate field location
- conducting public and private line location services in advance of ground disturbance activities, as required
- marking all above and underground utilities prior to excavation with the appropriate signage and flagging prior to construction
- using soft excavation tools when working in proximity to underground utilities or when the location of the utilities is not known
- using barriers or fencing when operating equipment in proximity to aboveground utilities
- installing signage and clearance requirements at overhead power line crossings

19.6 Fish and Fish Habitat

Effects to fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act* are not expected to be caused by the Project or its incidental activities (GOC 1985a). The Project will not interact with water features that provide fish habitat. Routing and siting of incidental activities (e.g., 25 kV overhead distribution line) will avoid fish habitat and therefore, no change in fish habitat or change in fish mortality risk is anticipated. The PDA is located approximately 350 m northwest of Dellwood Brook and approximately 30 m northwest of the Wolverine Lake diversion canal. The Wolverine Lake diversion canal is connected to

Wolverine Lake approximately 11 km upstream from the PDA, however the drain is unlikely to provide fish habitat because it is largely ephemeral (i.e., only containing water seasonally or after precipitation events). Dellwood Brook is the closest potential fish bearing water feature to the PDA and flows southwest through the Incidental Activity Study Area before entering the Dellwood Reservoir, approximately 5.3 km downstream, eventually reaching its confluence with Lanigan Creek approximately 21.5 km south of the Incidental Activity Study Area. Given the distance to Dellwood Brook from the PDA, no interactions with fish or fish habitat are expected to occur.

The Wolverine Lake diversion canal and Dellwood Brook cross the Incidental Activity Study Area a second time approximately 1 km and 2 km, respectively, east of the PDA along TransCanada Yellowhead Highway 16. An unnamed creek also crosses the Incidental Activity Study Area approximately 10 km east of the PDA along TransCanada Yellowhead Highway 16 and flows southwest for approximately 17.6 km before entering the Dellwood Reservoir. The routing and siting of incidental activities considered within the DPD (e.g., 25 kV distribution line) will avoid fish habitat and therefore, no change in fish habitat or change in fish mortality risk is anticipated as result of the construction, operation and maintenance, or decommissioning of the incidental activities considered in the DPD.

If fish habitat is identified during future Project design, including the final routing and siting of incidental activities, SaskPower will comply with the fish and fish habitat protection provisions of the *Fisheries Act* (Sections 32.3, 34.1, 34.4(1), 35, 36; GOC 1985a) and adhere to DFO's Fish and Fish Habitat Protection Policy (DFO 2019), Measures to Protect Fish and Fish Habitat (DFO 2023), and applicable Codes of Practices (DFO 2022), when and where possible. Although it is not anticipated. if Project activities with potential to cause the death of fish, or HADD of fish habitat cannot be avoided, SaskPower will obtain authorization from DFO prior to the start of construction. Further, SaskPower commits to the implementation of BMPs to reduce or avoid potential effects to fish and fish habitat. For a full listing of SaskPower's standard mitigation measures for fish and fish habitat please refer to BMP 01-Surface Water in SaskPower's Environmental BMP Manual (SaskPower 2022a). SaskPower also commits to the development of an ERP and Spill Contingency Plan to prevent and respond to environmental emergencies caused by uncontrolled, unplanned, or accidental releases of toxic and hazardous substances (Section 19.5). The implementation of these plans will support compliance with the *Fisheries Act* by reducing the potential for the release of deleterious substances into waters frequented by fish and preventing the death of fish or HADD of fish habitat.

As mentioned in Section 9.4.5, water for the Project will be supplied by SaskWater infrastructure connected to the existing intake in Zelma Reservoir. According to SaskWater, the intake's design was originally reviewed by DFO whom concluded that the works would not likely result in impacts to fish or fish habitat and therefore did not require a formal approval. SaskWater has indicated that there will be no changes to operating parameters and no changes to the existing facility operating limits and intake to Zelma Reservoir as a result of the Project. This assessment is based on the Project's anticipated water volume requirements amounting to approximately 7% of the intake and pumpstation capacity, therefore no effect on fish or fish habitat at the water source is anticipated.

Potential effects on fish and fish habitat associated with the construction of the proposed natural gas pipeline in the Incidental Activity Study Area is provided in Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care of SaskPower.

19.7 Aquatic Species

There are no known aquatic species at risk, as defined by SARA, expected to occur within the Project LAA and Incidental Activity Study Area and none are expected to occur due to the lack of suitable aquatic habitats (GOC 2002, GOC 2019d). As a result, the Project is not expected to adversely affect aquatic species, as defined by the SARA.

19.8 Migratory Birds

This section summarizes the potential effects on migratory birds and their habitat resources as a result of Project construction, operation and maintenance, and decommissioning activities. Detailed methods (including desktop review and field surveys), existing conditions, and effect pathways, are presented in Sections 14.2.5 and 19.1.5.

The MBCA protects migratory birds, their eggs, and their nests from destruction by any industrial or commercialization activities (GOC 1994). Sections 19.2.5 and 19.3.5 summarize the mitigation measures for construction and operation and maintenance associated with their effects and pathways. These mitigation measures support Project compliance with the MBCA regulations. There are no lands designated as a *Migratory Bird Refuge* which restricts activities from effecting migratory birds within the Project area (GOC 1994).

The removal of vegetation associated with construction activities has the potential to result in direct habitat loss for nesting migratory birds. Construction activities (e.g., vegetation clearing, vehicle traffic, trenching) occurring during the migratory bird nesting period can result in the destruction of migratory bird nests. The Incidental Activity Study Area is primarily comprised of cultivated land and hay/forage that can support foraging opportunities for migrating waterfowl, including some SOCC like whooping crane. If vegetation removal occurs within the Incidental Activity Study Area, it could also result in indirect habitat loss and reducing habitat effectiveness due to sensory disturbances. The presence of overhead wires during operation and maintenance, in particular shield wires, pose a collision risk to birds because they are difficult to see during low light conditions. Birds perched on distribution towers are at risk of electrocutions due to the potential to touch two energized points at once, increasing mortality risk to migratory birds. The removal of vegetation in wetland habitats can also have impacts on migratory birds that use riparian areas and their associated vegetation for nesting habitat.

Increased sensory disturbances associated with construction and decommissioning activities (e.g., noise from increased vehicle traffic, heavy equipment, lights) has the potential to result in localized indirect habitat loss due to reduced habitat effectiveness in areas adjacent to the work. However, removal of noise and infrastructure associated with the Project upon decommissioning has the potential to improve habitat effectiveness and create habitat gain from reclaimed land. Project-specific mitigation measures, along with standard industry practices and avoidance measures will be implemented to reduce potential effects on migratory birds. Residual effects on migratory birds that are expected to occur as a result of the Project are summarized below.

The PDA and wildlife and wildlife habitat LAA consists of less than 15% of wetland habitat and the Incidental Activity Study Area is predominantly situated on cultivated land, hay/forage, and tame pasture that parallel existing anthropogenic disturbances (e.g., residential housing). Development and habitat conversion has compromised the effectiveness of migratory bird habitat in the wildlife and wildlife habitat LAA and parts of the Incidental Activity Study Area. Where suitable wildlife habitat does exist, mitigation measures will be used to reduce direct and indirect Project-related effects on migratory birds. For example, Project clearing and construction will occur during dry conditions outside of the migratory bird nesting period, to the extent feasible. In addition, horizontal directional drilling methods may be used at certain locations during construction of incidental activities to reduce or eliminate effects to wetland habitats.

Migratory bird mortality risk increases during construction activities (e.g., vegetation clearing, ground disturbance, and vehicle or wire collisions). The likelihood of Project activities interacting with migratory birds is greater in areas where natural habitats exist (e.g., wetlands) but the risk is greatly reduced with the implementation of mitigation measures.

The evaporation and storm water ponds will create potential habitat for wildlife, including migratory birds. The evaporation pond will receive process wastewater streams (i.e., water that cannot be recycled to Project processes). The storm water ponds will have storage, secondary containment, and handling procedures employed on-site, therefore; it is unlikely surface water runoff will encounter contaminants. As described in Section 24.1.1, in the unlikely event of a significant influx of hydrocarbons into the storm water pond immediate actions to prevent wildlife, including migratory birds, from contacting the contaminants will be deployed.

To evaluate potential quality of habitat in the evaporation pond, from the perspective of water quality, the estimated water quality of the waste stream discharged from the Project to the evaporation pond during operation and maintenance (Table 24-1) was compared to the water quality guideline values for the protection of freshwater aquatic life (Canadian Council of Ministers of the Environment (CCME) 2023). All applicable parameters that had a screening level listed in the guidelines for the protection of freshwater aquatic life were below the ecological screening levels for freshwater aquatic life except for long-term exposure to iron and chloride (CCME 2023). The predicted iron concentration in the waste stream (10 mg/L) is greater than the CCME guidelines for the protection of aquatic life long-term exposure concentration of 0.3 mg/L (CCME 2023). The predicted chloride concentration in the waste stream (185 mg/L) is greater than the CCME guidelines for the protection of aquatic life long-term exposure concentration of 120 mg/L (CCME 2023). Long-term exposure guidelines are meant to protect against negative effects during indefinite exposures (CCME 2007). Long-term exposure periods are not defined for migratory birds, however they are defined for fish and amphibians, where long-term exposure is considered 21 days or greater in duration for juveniles and adults (CCME 2007).

Iron is the fourth most abundant element, it is naturally occurring, and is generally present in surface waters (ECCC 1999). Iron is essential to all lifeforms and plays an important role in metabolic processes, however at greater concentrations, iron can be toxic (ECCC 1999). The iron concentration in Saskatchewan surface waters ranges from <0.0005 mg/L, to 41.7 mg/L (ECCC 1999). Wetlands classified as swamps commonly have iron-rich layers present (National Wetlands Working Group 1997). Therefore, the predicted iron concentration of 10 mg/L in the waste stream discharged from the Project to the evaporation pond during operation and maintenance falls within the natural range of iron concentrations in Saskatchewan surface waters. Generally, water quality in the evaporation and storm water ponds are expected to be similar to

other natural habitats and therefore, mitigation measures to discourage use of the storm water pond by wildlife, including migratory birds, are not deemed necessary and ecological health risks to migratory birds are not anticipated.

The primary strategy to mitigate the risk of migratory bird mortality during construction includes timing vegetation clearing activities outside of the migratory bird nesting period, outlined by ECCC (April 22 to August 24; GOC 2018b), to the extent feasible, to avoid mortality of ground-nesting or slow-moving wildlife during this sensitive period (i.e., nesting and rearing). The Project is scheduled to be completed in approximately 34 months and year-round construction will be required. If an active nest or other wildlife feature is encountered, a species appropriate buffer will be applied and work in that area may be temporarily shut down until an acceptable mitigation plan is developed in consultation with SK ENV and the Canadian Wildlife Service, as required. Overhead transmission line routing will avoid high risk mortality locations (e.g., wetlands) where possible. In instances where this is not feasible, mitigation measures will be implemented to increase line visibility to migratory birds (i.e., line markers) and reduce the potential for wildlife mortality following SaskPower's BMPs for line marking (SaskPower 2022a).

Mortality risk to migratory birds will be reduced through implementation of a mitigation plan acceptable to SK ENV and ongoing monitoring during construction will occur to identify any conflicts with migratory birds. Reduced speed limits in the wildlife and wildlife habitat LAA and installation of signage where specific wildlife concerns have been identified are also expected to reduce mortality risk to migratory birds. Incorporating line markers to enhance transmission line visibility in high-risk areas will reduce mortality risk for migratory birds during the operation and maintenance phase, however, no areas of risk have been highlighted during the desktop or field investigations.

19.9 Species of Conservation Concern

This section summarizes the potential effects on SOCC and their habitat resources because of Project construction, operation and maintenance, and decommissioning activities. Detailed methods (including desktop review and field surveys), existing conditions, and effect pathways, are presented in Sections 14.2.5 and 19.1.5.

The wildlife and wildlife habitat LAA and the Incidental Activity Study Area is situated predominantly on agricultural lands that parallel existing anthropogenic disturbances (e.g., cultivated areas, residential housing, highways, gravel roads). Development and habitat conversion has compromised the effectiveness of SOCC habitat in the wildlife and wildlife habitat LAA and parts of the Incidental Activity Study Area. The removal of vegetation associated with construction activities has the potential to result in direct habitat loss for birds. Construction activities (e.g., vegetation clearing, vehicle traffic, trenching) occurring during the bird nesting period can result in the destruction of bird nests.

The PDA landcover types are comprised primarily of low vegetation (i.e., native grassland; 55.4%) and wetlands (14.5%) putting SOCC that nest in these habitats at higher risk of being disturbed, including Baird's sparrow, Sprague's pipit, and sharp-tailed grouse. Loss of sharp-tailed lek sites is not expected. Field surveys revealed the presence of one lek site located 200 metres north of the transmission study area within the Incidental Activity Study Area. Construction during the breeding period will need to mitigate disturbance effects to this sharp-tailed grouse lek by applying up to a 400 m setback from March 15 to May 15.

The removal of vegetation in wetland habitats could affect SOCC that use riparian areas for nesting. Loss of vegetation in riparian zones can affect water levels and potentially cause nest failures of SOCC who have floating nests (i.e., horned grebe). Vegetation removal and soil disturbance could affect habitat availability for Western tiger salamander which typically overwinter by burrowing in loose soil or debris, or occupying burrows of other animals, within 250 m of breeding ponds (ECCC 2023). Western tiger salamander was recorded during surveys in 2023 in the PDA. The Incidental Activity Study Area is primarily comprised of cultivated land and hay/forage that has limited breeding potential for most SOCC. Cultivated land and hay/forage provides foraging opportunities for waterbirds, including whooping crane during the migration periods; however, the likelihood of whooping crane foraging in the PDA and Incidental Activity Study Area is considered low, as the nearest IBA having potential to support whooping crane is 29 km away. Removal of Project infrastructure and reclamation of the PDA has the potential to improve habitat effectiveness and create habitat gain for some species of wildlife, including SOCC.

Sensory disturbances associated with construction and decommissioning activities (e.g., noise from increased vehicle traffic, heavy equipment, lights) in the PDA and Incidental Activity Study Area could result in indirect habitat loss and reduced habitat effectiveness for SOCC if activities coincide with spring, summer, and/or fall when SOCC have potential to occur in the Project area. Noise pollution can inhibit mating success, predator detection, parental response, habitat avoidance, and increased energy expenditure on SOCC songbirds (Lackey *et al.* 2012). Nenninger and Koper (2018) also found that the presence of infrastructure, not noise, caused significantly lower songbird abundance of some SOCC including Baird's sparrow and Sprague's pipit. Project-specific mitigation measures, along with standard industry practices and avoidance measures will be implemented to reduce potential effects on SOCC. Residual effects on SOCC that are expected to occur as a result of the Project are summarized below.

Where suitable wildlife habitat does exist, mitigation measures will be used to reduce direct and indirect Project-related effects on SOCC. The likelihood of Project activities interacting with SOCC is greater in areas where natural habitats exist (i.e., native grassland, tame pasture, forests, wetlands) but the risk is greatly reduced with the implementation of mitigation measures.

The primary strategy to mitigate the risk of SOCC mortality during construction includes timing vegetation clearing activities outside of the bird nesting period, outlined by ECCC (April 22 to August 24; GOC 2018b), to the extent feasible, to avoid mortality of ground-nesting or slow-moving wildlife during this sensitive period (i.e., nesting and rearing). Overhead wires could pose a mortality risk to birds during operation, however, risk to SOCC is low as the wildlife and wildlife habitat LAA and Incidental Activity Study Area do not support or attract large concentrations of birds, including whooping crane. The Project is scheduled to be completed in approximately 34 months. If an active nest or other wildlife feature is encountered, a species appropriate buffer will be applied and work in that area may be temporarily shut down until an acceptable mitigation plan is developed in consultation with SK ENV and the Canadian Wildlife Service, as required.

19.10 Summary of Effects

The Project is a 370 MW CCGT natural gas facility. Natural gas generation is a critical component in achieving both an increase in renewable capacity and a reduction in GHG emissions, in accordance with SaskPower's GHG emissions reduction strategy. The Project consists of three phases and is planned to be constructed over a 3-year period. The construction phase will be carried out year-round, with initial construction activities anticipated to start in the spring of 2024.

Air quality emissions will result in negligible effects. The air quality emissions are not expected to exceed SAAQS and CAAQS. The cumulative sound levels of the Project are expected to be at or below the PSLs at all nearby dwellings, and low frequency noise emissions are anticipated to be negligible. Noise emissions from the Project will not exceed AUC Rule 012 – Noise Control.

The Project has the potential to affect terrain and soil through changes in terrain integrity and soil quality and quantity, particularly during the construction phase. Soil disturbance activities are not expected to occur during the operation and maintenance phase of the Project. The construction phase of the Project also has the potential to affect vegetation and wetlands, particularly through vegetation removal, ground disturbance, equipment travel, and the introduction or spread of weed species. The operation and maintenance phase of the Project also has the potential to affect vegetation and wetlands through the introduction or spread of weed species. The Project will adhere to SaskPower's Environmental BMPs to mitigate the potential affects to vegetation and wetlands. Wildlife and wildlife habitat potential effects are also primarily during the construction phase, through a change in wildlife habitat and a change in wildlife mortality risk. Wildlife and wildlife habitat potential effects during the operation and maintenance phase are predominantly associated with a change in wildlife mortality risk. Mitigation measures will include strategic routing and minimizing the extent of vegetation clearing where possible, in addition to adhering to migratory bird and SOCC best practice.

Accidents and malfunctions include hazardous material spills, fires, vehicle accidents, and accidental damages to utilities. The Spill Contingency Plan, ERP, and the listed mitigation measures will address accidents and malfunctions.

Project effects on health, social and economic conditions during construction may include some access disruption to infrastructure and services and resource use locations due to construction traffic. The Project construction will have limited effects on human health since the air quality emissions and noise will be short term and negligible. The construction workforce will be provided with stipends for commuting or accommodations, and therefore is not anticipated to place significant pressure on accommodation, health, or emergency services within the RM of Usborne, town of Lanigan, or village of Drake. Employment of the workforce will provide an economic benefit to the area. Therefore, the effects of the Project on health, social and economic conditions are anticipated to be minimal.

The Project is expected to benefit all communities in the vicinity of the Project, regardless of gender, race, or social status. Consultation with the public have not identified adverse effects of the Project on social, economic or health of inhabitants of the area nor on any diverse or vulnerable groups. The Project is not expected to result in negative effects to vulnerable population groups or result in gender-based violence. The public have not indicated opposition to the Project. Therefore, the Project is expected to benefit the residents of Saskatchewan.

20 Potential Environmental Changes on Federal Lands or Lands Outside of Saskatchewan

The Project site and incidental activities are located on privately owned land. The incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan to the extent feasible. As presented in Section 14.1.1, the study areas selected for the Project (i.e., LAAs and RAAs) represent the spatial extent within which the Project could have effects on specific VCs of the environment and the regional context over which cumulative effects may occur. The largest spatial extent within which the Project is expected to have effects on any VC or the regional context over which cumulative effects may occur is a 10 km x 10 km buffer of the PDA (i.e., the LAA and RAA for air quality). As presented in Section 13.6, the nearest federal lands to the Project are approximately 47 km away (Last Mountain Lake National Wildlife Area). Therefore, no changes to the environment are expected to occur on federal lands as a result of carrying out the Project. In addition, the Project is approximately 252 km from the closest provincial border (Manitoba), and 320 km from the closest national border (United States of America) (Figure 13-1). Therefore, the Project is not expected to cause any changes in the environment that would adversely affect lands outside of Saskatchewan, including other provinces or countries.

21 Indigenous Peoples Potential Impacts

21.1 Potential Environmental Impacts to Indigenous People

The Project is located within Treaty Six and the Métis Nation of Saskatchewan territory and is in close proximity to Treaty Four territory as shown in Figure 13-1. Carrying out the Project is not expected to change the environment such that it would affect Indigenous Peoples, including Aboriginal and Treaty Rights, effects to physical and cultural heritage, the current use of lands and resources (including country foods) for traditional purposes or any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance. Additional detail is provided in the below sections.

21.2 Potential Physical or Cultural Heritage Impacts

WLCS, working in concert with Knowledge Keepers from the George Gordon First Nation, executed a TK&P study that integrated western approaches and Traditional Knowledge. The study involved a desktop review of publicly available data and confirmation of third-party baseline EA data provided by Stantec. In addition, WLCS conducted a TK&P assessment of the PDA on October 20, 2022. The Project site visit had Knowledge Keepers onsite and the methodology that was followed was developed by George Gordon First Nation technicians and Knowledge Keepers. Field activities included a verification of desktop findings, additional observation and documentation of landscape elements and suspected or known cultural elements and completion of ceremonial activities for suspected or known cultural features.

During the field assessment, WLCS confirmed Stantec's findings and observed additional wildlife features including a suspected American Badger burrow along the south boundary of the PDA and five stick nests immediately south of the PDA. The observation of vegetation features that may be of interest to George Gordon First Nation was limited due to the timing of the assessment outside of the active growing season, but WLCS noted that sage was observed.

During the field assessment, the Knowledge Keepers noted area(s) of potential cultural concern and WLCS recommended further assessment be conducted in spring 2023. As a result of these findings, SaskPower engaged the services of a qualified third-party archaeological consultant to conduct a reconnaissance HRIA of the PDA (see Section 21.4). Refer to Appendix C for more information on the TK&P study completed by WLCS.

21.3 Indigenous Peoples Current Use of Lands and Resources for Traditional Purposes

The Project site is located on a quarter section that is owned by SaskPower. The incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan to the extent feasible. The developed road allowances are primarily adjacent to privately owned land zoned for agricultural purposes. Privately owned lands and leased provincial Crown lands are typically not available for TLRU. In addition, given the narrow width of the road allowances, the existing and ongoing disturbance (e.g., cultivation and maintenance of the ditch (i.e., mowing)) and the safety issues associated with exercising traditional activities adjacent to roads, it is unlikely that they are in use for traditional purposes. As a result, the Project is not expected to affect the ability of Indigenous People to exercise Aboriginal and Treaty Rights, or use, access or develop lands and resources (including country foods) currently used for traditional purposes.

In accordance with Health Canada guidance, the Project is not anticipated to affect groundwater or surface water that is used for drinking water, recreational, or traditional purposes (Health Canada 2016b). The Project is not anticipated to affect groundwater or surface water bodies in proximity of the Project, as the majority of water that will be used during Project operation and maintenance will be sourced from the Zelma Reservoir through existing infrastructure operated and maintained by SaskWater, Saskatchewan's Crown water utility. The Zelma Reservoir is a part of a canal system called the Saskatoon Southeast Non-potable Water Supply System. The Saskatoon Southeast Non-potable Water Supply System includes other reservoirs, the closest being the Dellwood Reservoir, located approximately 5.3 km downstream of the Project. Potential groundwater or surface water quality changes and effects on human health are not anticipated as the Project will be utilizing approximately 1.7% of the capacity of the canal that feeds the Zelma Reservoir. The water will be supplied, tracked, and regulated by WSA to ensure that the water usage is in compliance with regulatory requirements for the Project.

As outlined in Section 19.5.1 and Section 19.5.2, the Project has the potential to result in an accident or malfunction that could affect groundwater or surface water. Mitigation measures as described in Section 19.5.1 and Section 19.5.2 will be adhered to. SaskPower will monitor and assess water resources (e.g., groundwater) in accordance with provincial regulatory and operational permitting requirements. SaskPower will continue to monitor engagement activities in accordance with Section 4.4, for potential concerns pertaining to how Indigenous Peoples consume water, or use groundwater and surface water for drinking water, recreational purposes or TLRU.

In accordance with Health Canada guidance, country foods are defined as foods outside of commercial food systems and include any food that is trapped, fished, hunted, harvested or grown for subsistence and/or medical purposes (Health Canada 2018b). Country food consumption is a potential pathway of contamination exposure for TLRU through the consumption of various types of country foods. However, there is no publicly available information on existing contamination in country foods in proximity to the Project. Additionally, as shown in Section 4.3, concerns pertaining to country food consumption related to potential contaminant exposure for TLRU were not expressed during engagement activities.

As discussed in Section 19.1.1, the Project will result in the release of substances of interest that will change ambient air quality, however, concentrations of the substances of interest at nearby residential receptors are predicted to be less than the 2025 CAAQS. The largest spatial extent within which the Project is

expected to have effects on air quality, or the regional context over which cumulative effects may occur, is a 10 km x 10 km buffer of the PDA (i.e., the LAA and RAA for air quality). Therefore, in consideration of the proximity of the Project to unoccupied Crown land and Indigenous communities, it is not anticipated that atmospheric deposition is a potential transport pathway of contaminants of potential concern for the Project.

Potential accidents and malfunctions that may result from the Project as discussed in Section 19.5 (e.g., hazardous material spills and natural gas releases), have the potential to be transport pathways for contaminants of potential concern into country foods. As discussed in Section 19.5 and Section 19.5.1, the Project's ERP and Spill Contingency Plan will include protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases of toxic and/ or hazardous substances in accordance with Health Canada guidance, CEPA, and the Environmental Emergency Regulations (GOC 1999, GOC 2019e, GOC 2022f, Health Canada 2018a). Therefore, potential accidents and malfunctions that may result from the Project are not anticipated to become transport pathways for contaminants of potential concern into country foods.

As described in Section 19.5.1, mitigation measures available to reduce potential effects for accidental hazardous material releases, including proactive spill prevention mitigation measures will be incorporated into all phases of the Project. In accordance with Health Canada guidance (Health Canada 2018b), additional mitigation measures include, but are not limited to:

- Should a spill occur, the contaminated soil and/or water will be contained to prevent access by species that are consumed as country foods.
- Where necessary, consumption advisories will be developed in accordance with the ERP community awareness plans.
- Where required, SaskPower will facilitate access to reasonable substitutions for contaminated country foods items.

SaskPower will continue to monitor engagement activities in accordance with Section 4.5, for potential concerns pertaining to country food consumption related to potential contaminant exposure for TLRU.

As mentioned in Section 4.0, based on SaskPower's engagement with the Indigenous Consultation Unit of the Saskatchewan Ministry of Government Relations, there is no knowledge of TLRUs undertaken in the area. Through engagement efforts with the Indigenous communities to date, SaskPower is not aware of any current use of lands and resources (including country foods) for traditional purposes in the Project area.

The Project and Incidental Activity Study Area boundaries are located within proximity to occupied provincial Crown land administered by the Saskatchewan Ministry of Agriculture. The nearest occupied provincial Crown land is located adjacent to the Incidental Activity Study Area where the proposed distribution line is located within the TransCanada Yellowhead Highway 16 road allowance (NE 02-34-24 W2M, SE 06-34-23 W2M, SW/SE 29-33-22 W2M) (Appendix F). The nearest unoccupied Crown land is outside of the largest LAA and RAA boundaries (air quality), approximately 20 km southeast of the Incidental Activity Study Area boundaries at SE 05-32-20 W2M.

21.4 Archaeological Sites and Significance

The quarter section (NW 36-33-23-W2M) encompassing the Project site does not contain any known archaeological resources and is not considered to be an archaeologically sensitive area by the provincial regulator (Saskatchewan Ministry of Parks, Culture, and Sport). An HRIA was conducted of the PDA (Appendix K). To get a regional overview and provide context for the Project area, an archaeological study area was defined (Appendix K). The study area (an approximate 20 km by 20 km square area around the Project) was designed to include the proposed Project site, the WLSS, and any incidental activities (Appendix K).

There are two clusters of significant archaeological sites within the study area. One cluster (referred to here as the Spooney Lake Archaeological Site Complex) consists of a series of archaeological sites associated with Spooney Lake on the northern boundary of the study area, approximately 6 km north of the Project site. These sites include a medicine wheel, some unusually shaped cairns, and possibly some drive lines for a bison jump or pound. The other cluster (Lanigan West Archaeological sites) is a pair of sites on the eastern edge of the study area, approximately 8 kilometres (km) to the southeast of the Project site. Significant and temporally diagnostic tools have been found at the Lanigan west sites, as well as a carved atlatl (javelin-like dart thrower) weight. These sites are described in detail in Appendix K. Neither of these site areas fall within the PDA of the Project and should be avoided while routing incidental activities.

There are archaeologically sensitive areas in the land parcels adjacent to the Project. Any incidental activities that approach the recorded locations of any of the known archaeological resources will be subjected to a HRIA to evaluate if the resource is at risk of being impacted. Similarly, should the incidental activities infringe upon any of the archaeologically sensitive areas, then they will likewise be subjected to an HRIA. SaskPower will engage a qualified third-party archaeological consultant to conduct the HRIA and will strive to include the participation of Indigenous Peoples in any archaeological investigations.

The proposed distribution line was evaluated separately using SaskPower's Environmental Screening System (the process used to evaluate all distribution projects using the most up to date data from the provincial regulator). The proposed route makes use of previously disturbed road allowances and an existing distribution line easement and will not impact any known archaeological site. Given the limited amount of new ground disturbance associated with this distribution line, no further archaeological investigations are recommended for this incidental project.

In late October 2022, during their survey of the PDA, WLCS identified two cultural features within the same quarter section as the PDA. SaskPower took these findings seriously and contracted a qualified third-party archaeological consultant to conduct a reconnaissance HRIA on the quarter section. The reconnaissance HRIA was conducted on November 1, 2022, under archaeological resource investigation permit # 22-149 (on file with the provincial regulator). The investigating archaeologist concluded that the two cultural sites identified by WLCS were not archaeological in nature (i.e., these objects and features were not manufactured or used during the pre-contact or early historic period), and thus did not need to be recorded as an archaeological resource, nor have their locations reported to the provincial regulator. No further archaeological investigations were recommended at these two sites.

In addition to investigating the cultural features identified by WLCS (through passive, non-invasive means), the archaeological consultant also conducted subsurface testing within the PDA and evaluated the remaining portions of the quarter section for their potential to contain archaeological resources.

The remnants of an old homestead established by Mr. Frank Fach and family in 1906 (situated along the northern boundary of the quarter section, outside of the PDA) were documented in the field and their historical context was researched at the provincial archives. The archival research did not indicate an association between this site and any significant contribution to the development of Saskatchewan. In addition, the condition of the site is considered poor, as only a few foundations/floors remain visible. As such, the archaeological significance of this site is considered low. Nonetheless, the site will be recorded and registered as an archaeological site with the provincial regulator as a matter of due diligence. The archaeological consultant did not recommend any further archaeological investigations at the homestead site. The provincial regulator may yet impose additional mitigation measures (such as avoidance of the site area) pending their review of the consultant report.

The subsurface testing within the PDA did not reveal any buried archaeological components and the archaeological consultant did not recommend further archaeological investigations in this quarter section. The reconnaissance HRIA is considered a thorough archaeological investigation and the likelihood of undiscovered archaeological sites being present within this quarter is extremely low.

The provincial regulator reviewed the consultant report and issued a clearance letter on February 9, 2023. The letter indicated that all regulatory requirements under Saskatchewan's *The Heritage Property Act* had been satisfactorily completed and the regulator had no further concerns with the Project. Since provincial regulatory compliance has been achieved, there are no plans for further archaeological investigations within the PDA. However, additional work may be undertaken if any new concerns regarding archaeological resources are shared with us during the ongoing Indigenous engagement process.

21.5 Engagement Efforts Undertaken with Indigenous Peoples

As mentioned in Section 4.0, to date, no concerns regarding the Project or specific potential adverse impacts to Indigenous communities have been raised through the early engagement activities with Indigenous communities. Engagement with Indigenous communities ongoing, and SaskPower will continue to reach out and be available for discussion as the Project proceeds to address any concerns.

22 Health, Social or Economic Changes to Indigenous Peoples

22.1 Health and Social Changes to Indigenous Peoples

The Project is not expected to affect the health, well-being, and social conditions of Indigenous Peoples. Engagement and consultation activities to date have been inclusive of women+ and diverse groups. SaskPower will include any Indigenous communities who express interest on the contractor bidding list for the Project. SaskPower will develop employment and procurement programs that actively promote local opportunities, including for Indigenous workers and businesses, taking into consideration the competitiveness and relative capacity of local suppliers.

No ingestion or inhalation pathways that could trigger the need for a human health risk assessment are anticipated. Air dispersion modelling conducted for the Project shows that maximum predicted concentrations of the substances of interest are below the relevant regulatory objectives (SAAQS and CAAQS) for all averaging periods. The NIA shows that cumulative sound levels of the Project are expected to be at or below the PSLs at all nearby dwellings, and low frequency noise emissions are anticipated to be negligible. The Project will comply with AUC Rule 012 – Noise Control. Given that the dispersion modelling and NIA indicate that the operation and maintenance of the Project will not cause or contribute to a significant degradation of ambient air quality and that the predicted concentrations of Project related air quality and noise emissions will decrease with distance from the Project, adverse effects to the health, well-being, and social setting of Indigenous communities are not expected (Appendix C). Air quality and noise emissions from the Project are not expected to adversely affect traditionally harvested species, or the health or well-being of Indigenous Peoples including women+ and diverse groups. As outlined in Section 13.5, the Project is not anticipated to have effects on access to traditional land by Indigenous Peoples. In accordance with Health Canada guidance, the Project is also not anticipated to have an effect on sensitive receptors (e.g., hospitals, schools, retirement complexes/assisted living homes) as outlined in Section 14.2.6.2.2 and Section 14.2.6.3 (Health Canada 2016a). The nearest hospital, school, and retirement complex/assisted living home to the Project are located approximately 17 km away in Lanigan, Saskatchewan.

Hazardous material releases have the potential to effect the health of staff through inhalation, ingestion, and/or direct contact. However, effects to the health, well-being, and social conditions of Indigenous Peoples as a result of an accident or malfunction (e.g., hazardous materials release) during the Project's construction and operation and maintenance phases are not anticipated to occur. As described in Section 19.5.1, the ERP will be developed in accordance with Health Canada guidance and will be consistent with those in place at existing SaskPower generating facilities (Health Canada 2018a). The ERP will outline emergency response measures and preparedness systems for in the event the health or safety of staff is threatened (e.g., evacuation procedures).

Impacts to the health, well-being, and social settings of the Indigenous Peoples through a change in TLRU are not expected. Indigenous Peoples have relied on the land within their traditional territory to harvest a range of plants and animals for subsistence, medicinal, spiritual, and utilitarian purposes. Hunting, trapping, fishing, and harvesting continue to be culturally important traditional activities for Indigenous communities across Saskatchewan. The evaluation of potential effects to TLRU assumes that the ongoing ability to

practice traditional activities for all members of Indigenous communities, including women+ and diverse groups, depends on the abundance and health of traditionally harvested species and the continued availability and access to traditional sites and areas.

The Project is located on private land that is owned by SaskPower. The incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan to the extent feasible. Privately owned lands are typically not available for TLRU. Therefore, the Project will not affect Indigenous Peoples' ability to exercise Aboriginal and Treaty Rights, or TLRU through:

- a change in availability of TLRU resources
- a change in access to TLRU resources or areas
- a change in TLRU sites or areas through disruption or alteration of a site or area (e.g., harvesting, habitation, and cultural and spiritual sites or areas)
- a change to the environment that affects cultural value or importance associated with TLRU and experiences

Therefore, the Project is not anticipated to affect the health, well-being, or social settings of Indigenous Peoples, including women+ and diverse groups. Potential effects from the Project to the health, well-being, and social settings of Indigenous Peoples will continue to be evaluated and Project design, monitoring, and mitigation strategies can be altered to reduce or eliminate an effect. Potential effects to the well-being of Indigenous Peoples through potential effects to physical and cultural heritage and structures, sites, and things of historical, archaeological, paleontological, or architectural significance to Indigenous communities, including cultural or ceremonial sites will also continue to be evaluated.

In accordance with Health Canada guidance, the Project is not anticipated to require a Human Health Risk Assessment, as Human Health Risk Assessments are characterized as typically conducted when it is anticipated that individuals will be exposed to elevated concentrations of chemicals or other disturbances in the environment associated with a proposed project through one or more exposure pathways (Health Canada 2019). In accordance with IAAC guidance, the decision to conduct a Human Health Risk Assessment or a Health Impact Assessment will depend on the Project context and direction provided by IAAC in the Tailored Impact Statement Guidelines (GOC 2020b). Health Impact Assessments assess a broad range of factors that contribute to health (GOC 2020b).

SaskPower will continue to provide listed Indigenous communities with information and updates on ongoing and planned construction, operation and maintenance, and decommissioning activities. Should Project effects to the health, well-being or social settings of Indigenous Peoples be identified, SaskPower will provide opportunities for the involvement of the listed Indigenous communities for mitigating said impacts. Future engagement and consultation activities with Indigenous Peoples will continue to be inclusive of all individuals, including women+, low income, under or unemployed, disabled, seniors, and systemically marginalized groups.

22.2 Economic Changes to Indigenous Peoples

Socio-economic effects are anticipated to be positive for Indigenous communities due to opportunities for employment. SaskPower will require the selected EPC partner to have and deliver on Indigenous employment targets that reflect the local Indigenous capacity. As part of the Project's commitment, at least 8% of the subcontract spend will be with Indigenous suppliers. The hiring responsibility falls upon the hired prime contractor. However, SaskPower will operate under an open contract where SaskPower will encourage and influence the hiring of individuals from all employment equity groups whenever feasible, as a way of supporting and giving back to the community. As part of their quarterly updates, the prime contractor will inform SaskPower of their workforce composition.

SaskPower's Indigenous Procurement Department will monitor and assist with identifying opportunities. As an example, the Great Plains Power Station currently under construction in Moose Jaw, Saskatchewan is on track to exceed the local and Indigenous successes from the Chinook Power Station project which included over $140 million in local contracts and $10 million in Indigenous-owned contracts. To date, the Great Plains Power Station project includes over $238 million in participation from local companies and over $64 million in participation from Indigenous-owned companies. Saskatchewan workers make up over 70 per cent of the 700 workers on-site.

SaskPower partners with various Indigenous institutes across Saskatchewan including First Nations University, First Nations Employment Centre, and the University of Regina Aboriginal Student Centre to provide scholarships and opportunities. The Canadian Council for Aboriginal Business has certified SaskPower with Progressive Aboriginal Relations Gold status which recognizes the company's excellence in creating positive, meaningful relationships with Indigenous businesses and communities (SaskPower 2022b).

Prior to any bid packages tendered to the market, the EPC partner will advance engagement with identified local and Indigenous organizations, in addition to meeting with SaskPower stakeholders to ensure all prospective members/participants are aware of the opportunities the Project will bring to the local economy and solicit their input on organizations to specifically target for identified scope. Messages will also be posted on a Project website and local paper for all hiring opportunities for the Project, both craft and supervision. Prospective subcontractor partners will be required to have a plan for meaningful Indigenous training and, working with the local trade schools, establish scholarship and training programs to advance future fostering of necessary trades in the Indigenous communities.

With targets established, the Project team will travel to cities in Saskatchewan including Lanigan, Regina and Saskatoon to meet with the local suppliers and subcontractors individually and collectively. Structured supplier and labour forums will be created to educate and collaborate with potential suppliers and subcontractors. These presentations will be educational surrounding the details of the Project and the execution plan and provide details on the specific subcontract packages under solicitation.

The EPC partner will conduct targeted supplier information sessions for Indigenous and women-owned firms to provide advanced notice in order for smaller firms to properly assemble their internal teams and action plans to be able to respond to bid opportunities. As specific subcontract opportunities are identified in the execution plan, from the information gathered in the proposal phase and at these supplier sessions, and in many cases formal Request for Pre-qualification packages and responses, the EPC partner will

prequalify firms to bid. The EPC partner will then prepare a bidder's list for the specific event, incorporating input either directly from SaskPower, or through their proposal discussions that resulted in the Approved Supplier's List in the Contract.

Throughout the bid phase, the EPC partner will be engaged with the prospective local and Indigenous Suppliers to provide guidance and respond to questions to facilitate a fair competition. The EPC Partner will thoroughly review the packages respecting compliance with the criteria set out in the bid packages and will engage with SaskPower to review.

A Committee established between SaskPower and the EPC Partner will have some level of discretion within the procurement strategy to select Local and/or Indigenous suppliers over non-Local even if they are not scored as the "best/most valued option". Our focus will be on "best value for the Project" instead of strictly "lowest price". Throughout execution of the Project and award of available subcontracts, SaskPower and the EPC Partner will closely track the actual spend versus projected/dedicated spend for Local and/or Indigenous, and Woman-Owned suppliers, and the EPC partner will have the flexibility to adjust procurement decisions as warranted, with concurrence from SaskPower. Performance, schedule, and pricing targets of those selected will be monitored, and that feedback will be provided to each of our selected partners. The strategy will be adjusted, as warranted, by that continuous feedback loop.

23 Greenhouse Gas Emissions Assessment

23.1 Emissions Target

SaskPower has made a commitment to track the emissions outcomes from its generation fleet and project these outcomes according to expansion plans. SaskPower's current forecast outlines expected emission levels from implementation of the SaskPower Supply Plan (SSP), approved in June 2022. The plan was developed in consideration of potential new regulatory requirements for management of GHG emissions and is based on five key themes:

1. Transition away from conventional coal.
2. Expand and integrate renewable resources into the system.
3. Leverage Natural Gas in the short-term.
4. Increase transmission interconnections to support transition to low emitting options.
5. Investigate low or non-emitting supply options for 2035 – including SMRs, natural gas with CCUS, hydroelectric power, and energy storage.

Executing the SSP will achieve corporate GHG reduction goals of -50% GHG levels from 2005 by 2030. These expected reductions will be achieved by near-term reliance on natural gas and imports, reduced reliance on conventional coal, and increased deployment of lower emitting technologies. SaskPower is currently evaluating what would be required to achieve net-zero GHG emissions by 2035 in anticipation of the forthcoming CER.

The Project will enable increased penetration of variable renewable generation, which is the basis for achieving a net-zero electricity system. Backing-up intermittency is indeed a key enabler for larger deployment of renewables until technology such as storage and CCUS are available at sufficient scale.

23.2 Estimation of Net Greenhouse Gas Emissions

For each of its Industrial Source facilities prescribed in *The Environmental Management and Protection Act, 2010*, SaskPower prepares an EPP according to Chapter E.1.2 of the Province's Environmental Code. A key component of each plan is air contaminant modelling to evaluate the likelihood of adverse effects on air quality from emissions associated with fossil fuel-based power generation and to demonstrate whether this activity will result in adherence to provincial ambient air quality standards or will require mitigation measures. The modes of operation will vary significantly year to year, impacting the total fuel consumption at the Project.

Natural gas power stations using combined cycle technology emit 60% less CO_2 compared to conventional coal-fired generation in Saskatchewan. For reference, Units 4 and 5 at SaskPower's Boundary Dam Power Station emit approximately 2.3 million tonnes of CO_{2e} annually to generate 280 MW. Unit 4 was retired in 2021, and Unit 5 is slated for shut down by the end of 2024. The Project will result in a greater generation output (370 MW) with a lower GHG footprint as indicated in Table 24-9 below. As SaskPower phases out conventional coal-fired generation and adds natural gas and renewable generation to the system, the system GHG emissions profile will continue to improve (i.e., reduce emissions).

The Project is not forecasted to reduce GHG emissions directly but rather indirectly as the supply that will be secured from the Project will afford the system the latitude needed to expand the non-emitting resources. With more renewables added to the system, the Project will smooth the transition away from coal-burning and less efficient and older natural gas generators. It is important to recognize that the Project will operate in an integrated electricity system in the context of transition to minimal GHG emissions.

Projections of direct GHG emissions have been calculated according to anticipated construction activities and planned operation and maintenance to 2035. Table 24-7 provides a total estimate of GHG emissions from both personal vehicles and construction equipment over the construction period. The estimated maximum potential direct GHG emissions associated with the Project during operation and maintenance can be found in Table 24-9. Total GHG emissions are presented throughout this report as carbon dioxide equivalents (CO_{2e}). CO_{2e} values account for CO_2 and any other calculated GHG (such as CH_4 or nitrous oxides (N_2O)) to be represented by a single value.

Net GHG emission estimates for each phase of the Project based on equation 1 in the Strategic Assessment of Climate Change (GOC 2020a) are provided below.

Table 23-1 Estimated Net Total GHG (CO_{2e}) Emissions during Construction

Equation 1 Term	Emissions (tonnes)
Net GHG (CO_{2e}) emissions =	22,217
Direct GHG (CO_{2e}) emissions[1]	22,217
+ Acquired energy GHG emissions[2]	0
- CO2 captured and stored[3]	0
- Avoided domestic GHG emissions[4]	0
- Offset credits[5]	0

Notes:
[1] Refer to Table 24-7 for an annual direct GHG (CO_{2e}) emission estimate for each year of construction.
[2] Assumption that the Acquired energy GHG emissions for construction power is negligible.
[3] No CCUS has been modelled for the Project at this time.
[4] There are no quantifiable reductions or removals that can be directly assigned to the Project.
[5] No offset credits identified for the Project at this time.

Table 23-2 Estimated Net Annual GHG (CO_{2e}) Emissions during Operation and Maintenance

Equation 1 Term	Emissions (tonnes)
Net GHG (CO_{2e}) emissions =	1,252,885
Direct GHG (CO_{2e}) emissions[1]	1,252,885
+ Acquired energy GHG emissions[2]	0
- CO2 captured and stored[3]	0
- Avoided domestic GHG emissions[4]	0
- Offset credits[5]	0

Notes:

[1] Refer to Table 24-10 for a theoretical maximum annual direct GHG (CO_{2e}) emission estimate for the full design capacity of the Project (i.e., combined-cycle turbine operation at 100% capacity factor, with heater, fire pump and diesel generator operation). It should be noted that the maximum emissions are irrelevant of mode of operation as the source of emissions is the gas turbine, which will operate in either simple or combined cycle mode.

[2] Assumption that the Acquired energy GHG emissions for operation power is negligible.

[3] No CCUS has been modelled for the Project at this time.

[4] There are no quantifiable reductions or removals that can be directly assigned to the Project.

[5] No offset credits identified for the Project at this time.

Table 23-3 Estimated Net Total GHG (CO_{2e}) Emissions during Decommissioning

Equation 1 Term	Emissions (tonnes)
Net GHG (CO_{2e}) emissions =	22,229
Direct GHG (CO_{2e}) emissions[1]	22,229
+ Acquired energy GHG emissions[2]	0
- CO2 captured and stored[3]	0
- Avoided domestic GHG emissions[4]	0
- Offset credits[5]	0

Notes:

[1] Assumption that decommissioning emission estimates for GHG (CO_{2e}) are assumed to be equivalent to construction emissions shown in Table 24-7 and diesel fire pump emissions shown in Table 24-11.

[2] Assumption that the Acquired energy GHG emissions for construction power is negligible.

[3] No CCUS has been modelled for the Project at this time.

[4] There are no quantifiable reductions or removals that can be directly assigned to the Project.

[5] No offset credits identified for the Project at this time.

23.3 Mitigation and Monitoring Measures

To mitigate GHG, SaskPower has more than doubled its wind capacity in 2022, with plans for another 320 MW and 700 MW of renewables in-service by 2026 and 2028. To support the integration of renewables, natural gas is currently the only option available to Saskatchewan at the scale required to enable such a significant addition of intermittent renewable generation.

CO_{2e} emissions intensity (expressed as kilograms per megawatt hour (kg CO_{2e}/MWh) is directly related to the efficiency of the Project. Therefore, the Project will be designed with the following considerations:

- Selecting a gas turbine and steam turbine capable of producing the 370 MW need identified by SaskPower, in combined cycle mode, without the need for supplemental duct firing.
- Selecting the latest F-class turbine technology available from manufacturers, as opposed to an older vintage.
- Increasing temperature of fuel gas in combined cycle mode using feedwater to improve cycle efficiency.
- The use of an ACC does have a slight impact on heat rate (and CO_{2e} emissions intensity by extension). However, considering the arid condition at the Project site, its temperate climate, and the large reduction in water consumption (90% or more compared to a wet cooling tower), it is deemed a worthwhile compromise.

The F-Class GTG will have the most up-to-date technology including several features intended to keep emissions low. NO_x will be controlled through use of ULN burners. Emissions of particulates will be low due to the combustion of clean-burning natural gas. In addition, CO and VOC emissions will be minimized through effectively tuned combustion turbine controls. Further, the natural gas quality expected for the Project site has a very low sulfur content (less than 23 mg/^{3}) which will result in significantly lower SO_2 emissions compared to other fuels. The Project is being designed to achieve ground level effects that will meet the SAAQs and CAAQs.

As the Project will operate as a peaking facility requiring up to 100 starts and 2200 operating hours per year (with an anticipated 15% capacity factor resulting from the unit operating at part load to support renewable integration), the Project will have the capability to operate in simple and combined cycle mode. This assessment will include dispatching the GTG only (no HRSG or STG) for rapid load response to support renewable generation, and be able to transition to combined cycle mode, achieving higher overall thermal efficiency and Project output through utilization of the HRSG and STG. The Project will initially start in simple cycle mode and will transition over to combined cycle operation when increased load is required and will typically operate between 50% and 100% of GTG load.

Currently models predict the Project will run in combined cycle mode 95% of the time. Combined cycle generation is also very flexible and can support renewables. However, as SaskPower looks to increase our non-emitting and renewable generation by up to 50% of our capacity by 2030, SaskPower must carefully plan to ensure a very flexible system. SaskPower has a Renewable Integration Action Team that is assessing many aspects of integrating renewables. This work is on-going, and all solutions are not yet fully defined. Even though internal models do not predict a great need to operate in simple cycle mode SaskPower took the opportunity to design a facility that has the capability to support our large build out of

variable renewables. Additionally, there are a number of scenarios which may require that the unit is dispatched differently than predicted in the models. For example, there may be situations where a sudden spike in electricity demand or drop off in renewables will necessitate the need for rapid additional generation. In a situation like this, SaskPower would most likely dispatch the Project in simple cycle mode until the combined cycle facility can be adequately warmed and brought into service, or until the need for additional generation drops and the simple cycle unit can be turned off. SaskPower will always prefer to use the facility in combined cycle mode as it is the most cost effective and efficient mode of generation.

As previously mentioned in Section 7, the Project is currently needed to provide capacity, back up renewables, and to act as contingency for the situation where load grows, aging units become even less reliable or fail, or other projects such as the SPP import are delayed. With the carbon levy, the Project is among the most expensive units to operate. In the future, operating hours may increase if SaskPower is able to negotiate the ability to operate this lower emitting unit in place of older, higher emitting units.

The Project will be similar in size to SaskPower's Chinook Power Station located near Swift Current, as well as the Great Plains Power Station currently under construction near Moose Jaw. Lessons learned from Chinook were incorporated into the Great Plains Power Station which included an optimized steam cycle with larger HRSG, and a larger ACC controlled with variable frequency drives for better control and reduction in parasitic load. In addition to incorporating the lessons learned from both the Chinook and Great Plains Projects, the Project will include a HRSG bypass stack and dampers, and gas turbine evaporative inlet coolers. This solution will enable faster start responses and support for renewables, with lower auxiliary loads, and higher net Project output.

Only operational during peak summer temperatures, the Project will incorporate gas turbine inlet air evaporative cooling to cool the gas turbine inlet air. The direct impact of cooling the inlet air is power output augmentation and system energy efficiency. This technology is widely used in hot climates with high ambient temperatures that coincide with on-peak power demand periods.

By including a bypass stack with the Project, SaskPower will have the ability to start-up and operate the GTG independently (SCGT) if needed, independent of the steam cycle. Conversely, if demand is high, SaskPower can operate in CCGT mode to maximize output and efficiency. The ability to start and operate in simple cycle enables faster start and response times to support grid response to renewable generation and system disturbances.

- A bypass stack will be connected directly to the GTG exhaust. When operating in simple cycle mode, a damper will divert GTG exhaust gas through this stack, "bypassing" the HRSG and steam cycle.
- When operating in combined cycle mode, the damper will divert GTG gas through the HRSG, where exhaust heat will be recovered to produce steam for the STG.

Table 23-4 provides an illustration of the different potential simple cycle full load operating conditions, in 100% bypass (GTG exhaust gases flow through the HRSG), 100% HRSG bypass (GTG exhaust gases bypassing the HRSG), and with both evaporative coolers both On and Off. In 100% bypass mode, the GTG exhaust gases flow into the HRSG and a constant flow of water must be supplied for steam production, which in-turn requires auxiliary power from pumps and other Project equipment. In start-up or part-load

situations, steam may be produced but not sent to the STG, in which case auxiliary power is being consumed unnecessarily.

Table 23-4 Simple Cycle 100% Bypass versus 100% HRSG Bypass Comparison

Operation	Ambient Temperature (Deg. C)	Project Gross Output (MW)	GTG Gross Lower Heating Value Heat Rate (kJ/kWh)	Auxiliary Load (kW)
SCGT 100% Bypass Evaporative Cooler OFF	20	246	9001	8120
SCGT 100% Bypass Evaporative Cooler OFF	30	229	9176	7824
SCGT 100% HRSG Bypass Evaporative Cooler OFF	20	245	9050	2954
SCGT 100% HRSG Bypass Evaporative Cooler ON	20	251	9050	2954
SCGT 100% HRSG Bypass Evaporative Cooler OFF	30	229	9170	2926
SCGT 100% HRSG Bypass Evaporative Cooler ON	30	248	9170	2926

As illustrated in Table 23-4, at higher ambient temperatures, with no evaporative cooling and 100% bypass, gas turbine power output decreases as temperature increases from 20 to 30˚C, and there are significantly higher auxiliary loads than if the HRSG were to have been 100% bypassed. In contrast, in simple cycle operation, 100% HRSG bypass, there is a significant reduction in auxiliary loads as shown above. Further, the impact of evaporative cooling on gas turbine simple cycle performance, with 100% HRSG bypass, is illustrated in Table 23-4 as well. At 30˚C, in addition to lower auxiliary loads, there is a significant improvement in gas turbine power output in addition to Project cycle efficiency and consequently emissions intensity.

In contrast, when in combined cycle operation, the impact of evaporative cooling can be seen in Table 23-5. As temperatures rise, with evaporative cooling there is an increase in Project gross power output, lower auxiliary loads, and improvements in overall heat rates. This results in a higher Project efficiency with lower emissions per unit of fuel consumed.

Table 23-5 Combined Cycle Operation – Inlet Evaporation Coolers In-Service

Operation	Ambient Temperature (Deg C)	Project Gross Output Improvement (MW)	GTG Gross Lower Heating Value Heat Rate Improvement (kJ/kWh)	Auxiliary Load (kW)
CCGT	20	9.5	87	327
CCGT	30	26	186	407

The Project design enhancements described above were designed to enable:

- A higher number of starts, faster start and electrical grid support response, and lower number of operating hours to support the SSP, with lower overall emissions, and higher integration of intermittent renewable generation.
- Improved power output, Project efficiency, and emissions during peak summer temperatures.
- Improved power output, Project efficiency, and emissions in both simple and combined cycle mode.

To that end, the Project will be dispatched, monitored, and controlled in the Projects local control room as well as SaskPower's grid control centre and will be operated using AGC for the purpose of load following the variable and intermittent renewable generation.

Monitoring of the Projects equipment and systems will be completed internally by SaskPower and the GTG OEM due to the OEMs expertise. Like all SaskPower's generating facilities, the digital control system and OSI Pi Historian will be used by SaskPower to collect, control and monitor equipment and systems health and performance. Like the Chinook and Great Plains projects, a long-term service agreement (LTSA) will be executed with the gas turbine OEM to provide 24-hour support and monitoring of the equipment and systems performance. Under the terms of the LTSAs, the GTG OEM will be contractually responsible for correction and restoration of equipment and system performance after each major maintenance cycle.

In addition, a CEMS will be installed at the Project to measure, monitor, and report emission data per the requirements of the annexed New Source Emission Guidelines for Thermal Electricity Generation.

23.3.1 CARBON CAPTURE UTILIZATION AND STORAGE

SaskPower currently owns and operates the world's only commercial scale CCUS facility on a power generating unit in the world. As such, SaskPower has extensive experience with CO_2 capture, its performance, potential challenges, as well as knowledge of how to effectively utilize this technology in new applications. Studies are currently being conducted on how to best equip the Project with post combustion CO_2 capture technology.

SaskPower has commissioned an engineering study on carbon capture and compression for sequestration on its existing and future natural gas CCGT power stations. The basis of the study was the integration of an Amine based post combustion capture technology (similar to that which is currently being utilized at the Boundary Dam Power Station) with a nominal capture efficiency of 95%. Once equipped, this technology could reduce the overall CO_2 emissions intensity below 30 tonnes CO_2/GWh. The study scope included evaluating the optimal method of incorporating carbon capture on a 350 MW CCGT power station while minimizing unit gross output loss, parasitic power losses, and water requirements. The study also included an estimation of the required footprint for the carbon capture facility. The study assumed a Siemens SGT6-5000F gas turbine, the largest F-Class gas turbine (selected for Chinook and Great Plains Power Stations) that SaskPower is able to integrate into the power grid, meet the North American Electric Reliability Corporations requirements, as well as transmission interchange requirements/agreements with neighbouring jurisdictions.

The study found that by adding an auxiliary boiler, there is no impact on the gross output of power; however, the fuel required for the auxiliary boiler increases the total fuel consumption by 20% and leads to higher CO_2 emissions and a larger carbon capture facility. Results also show that if the steam turbine is modified or replaced to allow steam to be withdrawn from the intermediate pressure-low pressure cross over, the loss of the power station output due to steam extraction was estimated to be 6.6%. By extracting steam from the cold or hot reheat systems without optimizing the steam turbine, the parasitic loss (due to steam extraction) is estimated to be between 9-10% of the gross output. Full load operation has been evaluated, and currently results are being modelled and evaluated for 30%, 50%, and 70% operation.

The estimated CCUS facility footprint was based on information provided by a CO_2 capture technology vendor for another project of similar size and the heat rejection system designed for dry cooling to minimize water consumption. The study found that the carbon capture facility footprint, based on a design ambient temperature ranging between 19 and 28°C, would be between 2.5 ha and 4.4 ha in size, respectively. Existing 350 MW SaskPower CCGT power stations either currently have the required additional space or land is being procured to accommodate the integration of future carbon capture infrastructure.

The high-level estimate of cost for this CCUS facility is in the range of $1B, which is in line with other globally announced projects. This estimate is very preliminary, and will change significantly based on final selected technology, integration methods, as well as current economic factors which are likely to still be present during detailed project development.

As per Section 11.3, space is being left on the east side of the Project site to facilitate future carbon capture integration. Further studies are required to understand the geology in the Project area to determine whether there is a favourable formation to sequester the carbon. As there are currently no natural gas fired CCGT facilities operating with CCUS technology globally, SaskPower is continuing to investigate the feasibility of carbon capture for the Project to ensure it is compliant with the forthcoming CER. It is expected that the technology will prove effective in reducing emissions, as there is heightened global interest in the technology including several commercial projects being developed that will demonstrate the technology in the coming years. Companies such as Capital Power, Heidelberg Materials, and Moraine Power are all set to demonstrate this technology in the coming years, and will set the foundation for the facility, and potentially retrofits to other SaskPower facilities.

Should the results from future studies or real-world performance and costs indicate that CO_2 capture will not be viable for the Project, SaskPower is prepared to comply with the proposed CER regulations, even if that means retiring the facility in 2035. SaskPower fully understands the costs and risks associated with potentially retiring the Project in 2035 and confirms that the Project is still required to provide capacity during the retirement of conventional coal generation and the transition to Net Zero.

23.3.2 NET-ZERO 2050 PLAN

SaskPower is currently planning to reach net-zero GHG emissions by 2050 or sooner. This plan is called the long-term plan and informs the annual supply plan. The long-term plan and the annual supply plan are not locked in, as every year new information results in iterations to the planning process. New regulations, revised cost assumptions, availability of technology, and adjusted load forecast, are a few of the factors that influence the need to revise the plan.

SaskPower is currently in the process of updating the long-term plan and has included public engagement as a key component during this time of energy transition. Public participation is included at each stage of the planning process and a final report is targeted for public release in June 2024. See https://engage.saskpower.com/hub-page/future-supply-plan-2030-and-beyond for more information.

SaskPower is on track to meet interim targets to reduce GHG emissions to 50% below 2005 levels by 2030 and increase total capacity from renewables up to 50% by 2030. The Project is projected to operate to 2047 and be fully decommissioned, including restoration activities by the end of 2049. Any emissions remaining in the SaskPower system post-2050, including emissions from decommissioning activities, for any facility in the whole system, will be brought to net-zero by the compliance mechanisms provided by regulations, including, if available as a compliance instrument, through the purchase or provision of carbon offsets.

SaskPower's annual supply plan follows 5 themes:

- Transition from conventional coal.
- Leverage Natural Gas in the short-term.
- Expand & integrate renewable resources into the system.
- Increase transmission interconnections to bridge to low emitting provincial options; and
- Advance low or non-emitting supply options.

In the near term, natural gas generation is required to provide baseload power as we transition from conventional coal and to enable a significant increase in intermittent renewables providing the means to significantly reduce GHG emissions. However, to further reduce emissions, to reach net-zero GHG emissions, conventional natural gas generation will also need to be replaced or offset.

SaskPower is working now to determine which low and non-GHG emitting technologies will be suitable supply options for Saskatchewan and available in the time required. Saskatchewan signed a memorandum of understanding (MOU) with Ontario, New Brunswick, and Alberta to work together to advance a Canadian approach to SMRs. SaskPower has completed the first two years of an estimated ten-year process to develop a 300 MW nuclear SMR option for potential in-service as early as 2034.

Similarly, work plans to develop other low or non-emitting generation options to replace conventional natural gas generation, to support higher than anticipated loads or to manage potential delays in existing projects are under development. Specifically, this work includes, but may not be limited to:

- Investigating the potential to add CCUS on new or existing natural gas facilities.
- Re-evaluating hydroelectric supply options.
- Investigating the potential to add additional transmission intertie capacity (above the 650 MW SPP addition).
- Assessing additional energy storage options.
- Staying up to date on advances in hydrogen and other alternate fuel supplies in the Saskatchewan context.

As mentioned in Section 12.2.5, SaskPower is also working to increase demand side management and other customer programs. The potential for distributed energy resources will increase as SaskPower's progress on grid modernization continues.

24 Waste and Emissions

24.1 Wastes Generated during Construction and Startup

24.1.1 LIQUID DISCHARGES

The main sources of plausible liquid discharge during the construction phase include sanitary waste, rainwater, snowmelt, and machinery fluids (e.g., diesel fuel, lubricating oils). Each source will be controlled differently to avoid spills and unplanned releases.

During the construction phase, portable toilets will be used by personnel. Sanitary waste will be stored in a septic tank with a holding capacity of approximately 7,570 L and will be pumped and removed from site by licensed contractors and disposed of in accordance with federal, provincial, and municipal regulations.

Rainwater and snowmelt runoff will be monitored and controlled during construction and operation and maintenance of the Project. The Project site will be graded to drain surface water to temporary drainage ditches and a storm water pond. The storm water pond will be designed to collect the main sources of water including surface water runoff and ACC wash water only (see Table 24-2), therefore it is extremely unlikely to come into contact with contaminants given the storage, secondary containment and handling procedures employed at site. The limited possible exception could be very small amounts of hydrocarbons from minor, undetected leakages from vehicles or incidental grease or oil contact when washing dust from the ACC. The storm water pond has been designed to accommodate a 100-year storm event and preliminary design anticipates the pond will be approximately 7,000 m^2 and approximately 2 m deep. The overflow structure will allow for excess water to slowly release over a period of a few days, until the pond is returned to its normal depth of water. This will be done in accordance with a Drainage approval from the WSA and the release of storm water will be designed to maintain existing drainage patterns on the Project site. Water quality in the storm water pond is expected to be similar to that of natural wetland habitats. Regular testing of storm water prior to release is not part of the storm water pond normal operations, as the pond is designed to collect surface water runoff only and is thus highly unlikely to come into contact with contaminants.

Out of an abundance of caution a storm water pond hydrocarbon monitoring and mitigation procedure will be established and employed throughout the life of the Project (including construction and operation and maintenance).

Storm water pond design and function is such that only a water volume attaining sufficient water head height within the pond can be released, via controlled pipe conduit(s). Water below that level is lost only through evaporation to the atmosphere. The pond's controlled pipe conduit(s) will be equipped with manually operated shut-off(s) (i.e., gates. See Photo 1 for an example). These shut-off(s) will be maintained in a normally closed position.

Photo 1 **Example of manually operated shut-off as a control gate from SaskPower's Queen Elizabeth Power Station located in Saskatoon, SK**

Weekly visual inspections for oil sheen will be conducted during dry weather periods and daily visual inspections during wet weather periods (rainfall events) during both construction and operation and maintenance phases. Should an oil sheen be detected then hydro-vac units will be contracted to remove the contamination and take it off site for proper disposal by a licensed operator. Further, prior to release of any storm water pond detained water a visual sheen inspection will be conducted and only if no sheen is detected will the shutoffs be opened and the water allowed to pass. Should an oil sheen be detected then hydro-vac units will be employed per above.

In the event of a larger accidental spill the required response actions will immediately be undertaken to control and isolate the spill, and to remove the contaminant and any effected water or soils from site for proper disposal by a licensed contractor. All remedial actions required, water quality limits and mandatory reports as dictated by the Saskatchewan Ministry of Environment's "Guidance Document: Impacted Sites" established under the Saskatchewan Environmental Code will be adhered to, as well as SaskPower's BMP10 governing spills and releases (SK ENV 2015b). The scheduled visual sheen inspections would serve as an additional backstop to these protective measures.

In the very unlikely event of a significant influx of hydrocarbons into the storm water pond immediate actions to prevent water birds, species at risk, or other wildlife including but not limited to migratory birds, from contacting the contaminants would include deployment of staff with flags to deter them from entering the pond. Additionally, other devices, such as scare cannons, “scary-man” inflatables, etc., would be utilized until hydro-vac units could be summoned to vacuum up the contaminants and remove them from site for proper disposal.

Given the unlikely probability of hydrocarbons being translocated to the storm water pond, from any source, combined with the storm water pond hydrocarbon monitoring and mitigation procedure, any possible wildlife exposure will be extremely small in terms of quantity and time. Any possible exposure to hydrocarbons should not pose a threat to water birds, or other wildlife, that may occasion the storm water pond.

Current site drainage flows from the north and west sides of the Project site to the southeast quadrant over generally flat terrain. The existing site is farmland and the drainage currently flows onto the adjacent native grassland property to the south, which ultimately flows into a man-made ditch. Water flows from the ditch and eventually spills into the Dellwood Reservoir, 6.4 kilometre south of the Project site. The drainage outflow from the storm water pond will be controlled to match pre-construction flows up to and including the 100-year, 24-hour design storm.

Machinery will be kept in proper working order during construction to avoid spills of machinery fluids such as oils, fuels, and coolants. The Project procedures manual will identify proper spill handling techniques such as:

- Having a spill kit (including absorbent material and disposal bags) and emergency spill repair kit available on site.
- Having SaskPower employees and contractors working on the Project informed on spill reporting criteria for the Project.
- Insuring awareness of SaskPower’s incident reporting through e-mail or phone. For a review of SaskPower’s incident mitigation measures and reporting structure.

Please refer to SaskPower’s Environmental BMPs (SaskPower 2022a) for BMP #10 Spills and Releases, and a full listing of SaskPower’s standard mitigation measures.

24.1.2 STARTUP LIQUID DISCHARGES

Startup and commissioning of the Project will require several testing and cleaning processes involving liquid waste. First, the HRSG will be filled with a chemical solution to clean boiler tubes of mill scale and debris accumulated throughout construction. The cleaning solution will be contained at all times within the HRSG, and upon completion, will be collected through HRSG drains into temporary holding tanks, where it will be hauled off-site and disposed of by a licensed contractor in accordance with applicable regulations.

Piping will by hydrostatically pressure tested in accordance with governing codes. Additionally, steam lines will be hydrolazed. Hydrolazing involves spraying high pressure (HP) water along the interior surface of pipes to remove mill scale and construction debris. Both hydrolazing and hydrostatic test water will drain through piping low points to building floor drains, and ultimately flow to the wastewater evaporation pond. These processes will not result in any liquid effluent from the Project site.

Finally, prior to first start-up of the GTG the Project will undergo “steam blows”. Steam blows involve running the Project to generate steam, before being admitted to the steam turbine, steam is initially vented to atmosphere to ensure HRSG and pipe cleanliness. As steam is vented to atmosphere, a considerable amount of demineralized water make-up will be required. During this time, several mobile water treatment trailers will be rented to support the additional demand. The mobile trailers will include RO units, which will produce demineralized water and reject water steams. While the rental trailers are on-site, any RO reject water produced will be routed to the wastewater evaporation pond via temporary piping and hoses.

24.1.3 SOLID WASTES

Solid wastes that will be generated during construction and startup will be typical of activities associated with power generation construction, such as packing materials, office wastes, scrap lumber, excess concrete, metals, cables, glass, cardboard containers, and other miscellaneous debris. Solid waste will be sorted and any recyclable materials (e.g., cardboard, wood, and metal) will be diverted for recycling, where facilities or programs for that material are available. Waste will be collected in labelled, designated waste containers and regularly hauled off and disposed of by licensed waste contractors in accordance with federal, provincial, and municipal regulations. Waste disposal will only occur at either locally or regionally approved facilities.

24.2 Wastes Generated During Operation and Maintenance

24.2.1 LIQUID DISCHARGES

The storm water pond described in the previous section will remain in service throughout the operation and maintenance stage of the Project. Additionally, the Project will generate various sources of possible liquid discharges that must be controlled once operational. The Project will utilize an ACC which significantly reduces the water consumption and associated discharges. The estimated process wastewater that will be discharged during normal operation and maintenance will range between 46-150 L/minute (67-216 m^3/day) across various ambient conditions. Table 24-1 describes the estimated water quality for the waste stream. The wastewater discharge stream will be limited to the waste stream from the ultrafilter and RO system. The waste stream will be primarily cycled-up water with some chemical additives in the feedwater cycle, including phosphate and ammonia from the HRSG blowdown, chlorine from service water use, and anti-scalant, sulfite/sulfate, and caustic, chemically converted to additional sodium bicarbonate, from the RO system. Since a rental mixed bed ion exchange system will be used, all regeneration will take place offsite at the supplier’s facility, and no waste disposal is expected from the mixed bed.

Table 24-1 Estimated Water Quality of the Waste Stream (mg/L) Discharged from the Project to the Project Site Evaporation Pond During Operation and Maintenance

Parameter	Concentration (mg/L)
Total Dissolved Solids (TDS)	5,400
Cations	
Calcium (Ca)	695
Magnesium (Mg)	640
Sodium (Na)	2,380
Iron (Fe)	10
Anions	
M-Alkalinity (M-Alk) Amount of base needed to reach a pH of 4.5	768
Sulphate (SO_4)	2,680
Chloride (Cl)	185
Nitrate (NO_3)	Non-detectable
CO_2	20
Silicon Dioxide (SiO_2)	50
Notes: Cations are reported as $CaCO_3$, all others as ion. Estimates are based on the water quality of the on-site wells.	

The wastewater generated from the Project will mainly consist of effluent water from the water treatment process and will be discharged to an on-site evaporation pond. The evaporation pond will have a HDPE or clay liner to prevent seepage of wastewater into the soil.

The evaporation pond will be sized based on the Project site climate and the necessary rate of evaporation. Based on preliminary design, the bottom of the pond is estimated to be approximately 9.58 ha (95,800 m^2) and approximately 2.5 m deep. The evaporation pond will be sized to receive the waste volume described above, as well as account for annual expected rainfall. The average rate of evaporation is assumed to be approximately 75 cm. The average annual precipitation rate for the area is assumed to be approximately 36 cm, giving a net evaporation rate of approximately 39 cm. After using a factor of safety of 1.5 and a correction for salinity of 0.90, a design evaporation rate of 23 cm per year will be used. A yearly water level variation of approximately 60 cm was also provided. There will be an added 10 cm of design depth to allow for the occurrence of a 100-year rainfall event along with an added 10 cm for salt storage. The total design life of the evaporation pond will be 30 years. No dredging of the evaporation pond is expected. In the event of potential excess volume and overtopping of the evaporation pond, contingency options would include transportation of excess process water to an approved disposal site (i.e., local sewage lagoon, disposal well) in accordance with municipal and provincial regulations.

During operation and maintenance of the Project, sanitary waste will be collected and pumped to an on-site septic tank and leach field. The design of the leach field (i.e., absorption field) will be in accordance with the Saskatchewan Onsite Wastewater Disposal Guide Version 3 (GOS 2018) and will be permitted through the Saskatoon Health Region and comply with the requirements of *The Public Health Act, 1994* and will be regulated by *The Private Sewage Works Regulations.*

In addition to the liquid stream during operation and maintenance, there are also other liquid waste streams associated with maintenance work. These streams are usually intermittent flows such as gas turbine compressor wash, ACC wash, lube oil, etc. Details regarding the disposal and effects of the intermittent flows can be found in Table 24-2.

Table 24-2 Summary of the Estimated Quantities of the Intermittent Liquid Waste Streams

Liquid Waste	Description	Volume		Containment	Disposal Method	Potential Effects on the Environment
		Normal	Maximum			
Waste effluent from HRSG blowdown	Blowdown from HRSG HP, IP, and low-pressure drums. Used to maintain boiler chemistry by blowing down solids from the bottom of the boiler drums into a blowdown tank. Liquid effluent is quenched and sent to the Project sump and vapor is sent to an atmospheric vent	7.8 m^3/hour	8.2 m^3/hour	Project Sump	Recycled back to service water storage tank and filtered in Project demineralizer.	None
Waste effluent from evaporative cooler blowdown	Blowdown from GTG air inlet evaporative cooler. Only operational during peak summer temperatures.	N/A	3.6 m^3/hour	Evaporation Pond	Effluent will be pumped to the evaporation pond.	None
Waste effluent from demineralized water treatment plant	Water treatment plant discharge waste stream	2.7 m^3/hour	4.3 m^3/hour	Evaporation pond	Effluent will be pumped to the evaporation pond.	None
Sampling discharge	Sample panel drains	0.9 m^3/hour	0.9 m^3/hour	Project Sump	Recycled back to service water storage tank and filtered in Project demineralizer.	None

Table 24-2 Summary of the Estimated Quantities of the Intermittent Liquid Waste Streams

Liquid Waste	Description	Volume		Containment	Disposal Method	Potential Effects on the Environment
		Normal	Maximum			
Drainage within powerhouse building	Miscellaneous floor drains and equipment drains	2.3 m^3/hour	2.3 m^3/hour	Project Sump	Water will be sent through oil/water separators and recycled back to the service water tank or sent to the evaporation pond.	None; oil/water separators will have oil level switches and pump interlock to prevent discharging oil laden water. Oil will be trucked offsite.
Gas turbine water wash	Gas turbine compressor water wash will be a combination of water and cleaning agent that will be collected in a drains tank and trucked offsite.	5.2 m^3/hour	7.9 m^3/hour	Water Wash Drains Tank	Will be treated as hazardous waste and trucked offsite.	None
ACC water wash	ACC fin wash to remove dust accumulation on the outside of the ACC fins.	200 m3 per wash (wash quantity dependent on weather cycles, est. 2 washes per year)	N/A	N/A	Plant storm water system.	Extremely minimal; clean plant water is used in the pressure washer. Potential rare occurrence for hydrocarbons to be present on the ACC and contaminate the waste wash water.
Used oil and other solvents (hazardous waste)	Used lube oil and control oil for turbines and other cleaners used in plant.	TBD	TBD	Plastic totes or barrels	Oil will be sold or recycled to/by qualified carrier.	None
Sewage	Sanitary waste from admin building.	5 m^3/day	N/A	N/A	Sewage will be pumped to an on-site septic tank and leach field.	None

Note:
1. Information in this table is preliminary and values will be updated as required during permit application process.

24.2.2 ACCIDENTS AND MALFUNCTIONS

In the event of a liquid discharge due to an accident or equipment malfunction, wastewater drains from the area around the equipment that have the potential to be contaminated will be gravity drained and directed through the oil/water separator. Oil/water separator effluent will be pumped and discharged to the water treatment building sump for reuse. Oil will be stored in the separator and removed periodically by a vacuum truck and disposed of at an appropriate facility offsite.

Floor and equipment drains or trenches will be located near equipment which contains or uses oil. The floor trenches will be used to collect and convey drainage inside the Project. Containment curbs, floor trenches, and underground piping will contain, collect, and transport oil contaminated drainage to the oil/water separator(s) for treatment. Oil containment areas will be provided with normally closed isolation valves and gravity drain to the oily drains system.

Oil releases have the potential to effect the health of staff through inhalation, ingestion, and/or direct contact. However, effects to the health of the public as a result of oil releases during the Project's construction and operation and maintenance phases are not anticipated to occur. The ERP will be consistent with those in place at existing SaskPower generating facilities. The ERP will outline emergency response measures and preparedness systems in the event the health or safety of staff is threatened (e.g., evacuation procedures). The ERP will be developed in accordance with Health Canada guidance as described in Section 19.5.1 (Health Canada 2018a).

24.2.3 SOLID WASTES

Solid wastes generated during the operation and maintenance phase of the Project will be typical of activities associated with the operation of a power generation facility. Wastes will include domestic and office waste generated by operations personnel, packaging wastes from supplies, as well as wastes from ongoing maintenance activities (e.g., oil containers, rags, etc.). Wastes generated during operation and maintenance will be disposed of by licensed waste contractors in accordance with federal, provincial, and municipal regulations using approved facilities. Table 24-3 provides the estimated quantity of solid wastes that will be generated during operation and maintenance of the Project.

Table 24-3 Estimated Quantity of Solid Wastes Generated from the Project During Operation and Maintenance

Waste Material	Disposal Method	Estimated Annual Quantity (tonnes)
Waste oil/hazardous waste/oily rags/aerosol cans	Collected and disposed of through registered collectors and recovered/recycled through registered processors/disposal class 2 landfill.	3
Domestic waste	Municipal landfill	3
Paper/cardboard/tin/plastic	Approved recycling facility	8-15
Scrap metal	Approved recycling facility	15

24.3 Wastes Generated During Decommissioning

The main sources of liquid discharge during the decommissioning phases will include sanitary waste, rainwater, snowmelt, and machinery fluids (e.g., diesel fuel and lubricating oils). Each source will be controlled differently to avoid spills and unplanned releases.

Portable toilets will be used by personnel. Sanitary waste will be stored in portable toilets and will be pumped and removed from site by licensed contractors and disposed of in accordance with federal, provincial, and municipal regulations.

Rainwater and snowmelt runoff will be monitored and controlled during decommissioning in a manner consistent with the operation and maintenance of the Project up until the decommissioning phase requires removal of the evaporation and storm water ponds.

Solid wastes that may be generated during decommissioning fall into several categories:

- Regulated and Universal Waste (i.e., oils, fluids, mercury, bulbs, ballasts, batteries, freon, lead based paint, etc.)
- Asbestos Containing Materials (i.e., insulation on units, floor tile, mastics, etc.)
- Construction and demolition debris
- Scrap Steel (Ferrous and Non- Ferrous)
- Residual Fuels (#6 Fuel Oil, combustion source, etc.)

Solid waste will be collected, hauled off, and recycled and/or disposed of by licensed waste contractors in accordance with federal, provincial, and municipal regulations. Waste disposal will only occur at either locally or regionally approved facilities.

24.4 Mobile Combustion Emissions Generated During Construction

Air emissions generated during construction of the Project will result from fuel exhaust (diesel and gasoline) and typical construction activities. TPM is the term used to refer to solid particles and liquid droplets found in the air and is produced as a combustion by-product. TPM is reported according to the diameter of the particle size; PM_{10} refers to coarse dust particles 10 microns in diameter or smaller. $PM_{2.5}$ refers to fine particles 2.5 microns or less in diameter and can only be seen with an electron microscope. Fueled construction equipment will also release NO_x, non-methane hydrocarbons (NMHC), and CO as combustion by-products.

In general, the process of estimating construction emissions is dependent on the Project schedule and construction equipment plan. The estimated equipment to be used for construction of the Project is provided in Table 24-4, with a breakdown of hours expected for each of the three years of construction. Once the type and quantity of construction equipment is estimated, emissions factors are applied to the expected work hours along with any applicable correction factors.

Table 24-4 Estimated Construction Equipment to be Used for the Project

Equipment Type	Fuel Type	Quantity	Estimated Work Hours On-Site		
			Year 1 (hours / year)	Year 2 (hours / year)	Year 3 (hours / year)
Vibratory Compactor	Diesel	3	2,625	0	0
Motor Grader	Diesel	1	1,463	2,925	975
Dump Truck	Diesel	3	1,875	0	0
Wheel Loader	Diesel	3	3,000	0	0
Dozer	Diesel	3	1,875	0	0
Excavator	Diesel	5	7,500	0	0
Scraper	Diesel	3	1,875	0	0
Pavers	Diesel	1	0	500	0
Trencher	Diesel	2	2,600	0	0
Skid Steer	Diesel	2	260	3,118	1,819
Concrete Truck	Diesel	2	4,000	500	0
Concrete Pump Truck	Gasoline	2	2,000	250	0
Flat Bed Truck	Diesel	1	1,000	1,500	0
Water Truck	Diesel	1	2,000	2,000	1,000
Forklift 5 Ton	Diesel	5	779	7,274	3,118
Generators/Compressors/ Welding Rigs	Diesel	11	2,338	13,769	2,598
Pick-up Truck	Gasoline	9	6,149	18,446	8,573
Light Towers	Diesel	45	12,470	37,411	7,274
Manlift	Diesel	20	520	24,161	2,078
Crawler Cranes <200T	Diesel	2	2,600	8,775	2,275
Crawler Cranes >200T	Diesel	3	87	2,901	0
Rough Terrain Cranes	Diesel	5	130	6,105	1,559

The potential diesel exhaust emissions from construction equipment are summarized in Table 24-5. The United States (US) Environmental Protection Agency (EPA) emissions standards were used to determine the PM, CO, NO_x, and NMHC emissions from fueled construction equipment. For conservativeness, it was assumed that PM_{10} and $PM_{2.5}$ combustion emissions from the Project are equivalent to TPM emissions, as there are no PM_{10} and $PM_{2.5}$ emissions standards.

TPM emissions presented in Table 24-5 are estimated from fuel combustion only. Additional TPM emissions may be generated through fugitive dust associated with typical construction activities such as vehicle traffic, earthwork, or grinding and crushing. To control fugitive emissions, water trucks will be used regularly to spray down heavy traffic areas on disturbed or unpaved surfaces.

To estimate potential CO_{2e} emissions from the construction equipment emissions factors for CO_2, methane (CH_4), and nitrous oxides (N_2O) were obtained from the National Inventory Report (NIR) 1990-2020: Greenhouse Gas Sources and Sinks in Canada, Part 2, Annex 6, Table A6.1-14 and ratioed with their appropriate Global Warming Potentials (GWP) obtained from Schedule 3 of the *Greenhouse Gas Pollution Pricing Act*. The potential GHG construction emissions were calculated using operating hours shown above and GHG emission factors.

Table 24-5 Estimated Air Emissions from Construction Equipment

Pollutant	Construction Year 1 (tonnes / year)	Construction Year 2 (tonnes / year)	Construction Year 3 (tonnes / year)	Total Construction Equipment Emissions (tonnes)
NO_x + NMHC	23	23	5	51
SO_2	< 0.1	< 0.1	< 0.1	< 0.1
CO	21	22	5	48
TPM/PM_{10}/$PM_{2.5}$	1.2	1.4	0.3	2.9
CO_2	5,580	5,424	1,269	12,272
CH_4	0.2	0.2	0.1	0.5
N_2O	< 0.1	< 0.1	< 0.1	0.1
CO_{2e}	5,630	5,472	1,280	12,382

In addition to the on-site construction equipment listed above in Table 24-4, there will be daily vehicle traffic along TransCanada Yellowhead Highway 16 as workers commute to and from the Project site. Most workers are expected to reside in the Saskatoon metro area with a daily commute of approximately 100 km, each way. Table 24-6 provides an estimate of GHG emissions associated with personal vehicles over the construction period, assuming an average of two passengers per vehicle.

Table 24-6 Estimated GHG Emissions from Personal Vehicle Usage While Commuting to the Project

Pollutant	Construction Year 1 (tonnes / year)	Construction Year 2 (tonnes / year)	Construction Year 3 (tonnes / year)	Total Personal Vehicle Emissions (tonnes)
CO_2	1,863	5,590	2,320	9,773
CH_4	0.1	0.3	0.1	0.5
N_2O	< 0.1	0.1	< 0.1	0.2
CO_{2e}	1,875	5,625	2,335	9,835

Table 24-7 provides a total estimate of GHG emissions from both personal vehicles and construction equipment over the construction period.

Table 24-7 Estimated Maximum Potential Annual GHG Emission Rates of the Project During Construction

Pollutant	Construction Year 1 (tonnes / year)	Construction Year 2 (tonnes / year)	Construction Year 3 (tonnes / year)	Total Emissions (tonnes)
CO_2	7,443	11,014	3,589	22,045
CH_4	0.4	0.6	0.2	1.0
N_2O	0.2	0.3	0.1	0.5
CO_{2e}	7,505	11,097	3,615	**22,217**

24.5 Stationary Combustion Emissions Generated During Operation and Maintenance

Emission of air contaminants during operation and maintenance of the Project will result from the combustion of natural gas in the proposed combustion turbine. There will also be emissions of air contaminants generated from the emergency diesel generator, emergency diesel fire pump, and dew point heater. The maximum emissions from any operating load including start-up and shut down emissions for the combustion turbine were used to demonstrate the maximum potential emissions for each pollutant. The maximum potential air emissions associated with the Project, based on 8,760 hours per year of operation in combined cycle mode, including start-up and shut down emissions for the turbine plus auxiliary equipment emissions, can be found in Table 24-8.

Table 24-8 Theoretical Maximum Potential Air Emissions Associated with the Project During Combined Cycle Operation and Maintenance

Pollutant	Theoretical Maximum Potential Combined Cycle Air Emissions (tonnes per year) [a, b]
NO_x	469.4
CO	326.0
TPM/PM_{10}/$PM_{2.5}$	38.7
SO_2	29.6
CO_2	1,250,698
CO_{2e}	**1,252,885**

Notes:

(a) Based on 8,760 hours of turbine and heater operation (100% capacity factor), 95 starts per year, and 100 hours of fire pump and generator operation per year.

(b) Estimated steady-state fuel usage corresponding to these estimates is:

- 2,700 MMBtu/hr (2,838 GJ/hr), HHV, consumption for natural gas equipment. This equates to 2.87 millions standard cubic feet per hour (MMSCF/hr) (81,000 m^3/hour) based on an expected higher heating value (HHV) of 939.4 Btu/ft^3 (35 MJ/m^3)
- 253 gal/hr (958 L/hr) consumption for diesel equipment

The CO_{2e} estimate in Table 24-8 is based on a combined cycle operating scenario of 100% load for 100% of the year, which is not a realistic operating profile for this peaking facility. Capacity factor is defined as the ratio of actual electrical energy output over a given period of time to the theoretical maximum electrical energy output over that period. SaskPower currently anticipates this unit will primarily provide reserve capacity margin and back-up generation to renewables and therefore expects the Project will not exceed a 15% capacity factor. This results in CO_{2e} emissions of approximately 188,415 tonnes/year (Table 24-9). This scenario assumes 1,314 operating hours of the gas turbine and the natural gas dew point heater, includes 95 combustion turbine starts a year based on cold start emissions, and 100 operating hours for the emergency fire pump and emergency diesel generator. The estimated maximum potential GHG emissions associated with the Project during operation and maintenance using this scenario can be found in Table 24-9. SaskPower's SSP forecasts the combined cycle facility to operate at a variable load rate while maintaining the 15% capacity factor resulting in approximately 100 starts/year and not exceeding 2200 operating hours per year.

CO_{2e} emissions from the combustion turbine are due to CO_2, CH_4, and N_2O produced from the combustion of natural gas. Combustion turbine CO_{2e} emissions were estimated based on emission information from the gas turbine OEM for CO_2. Emission factors for CH_4 and N_2O for natural gas were obtained from the NIR 1990-2020: Greenhouse Gas Sources and Sinks in Canada for the combustion turbine and auxiliary equipment. The appropriate GWP obtained from Schedule 3 of the *Greenhouse Gas Pollution Pricing Act* were used to estimate CO_{2e} emissions for the combustion turbine and auxiliary sources. The GWP of CH_4 and nitrous oxide emissions are normalized to the warming potential of CO_2 (as CO_{2e}) by multiplying the CH_4 emissions by 28 and the nitrous oxide emissions by 265. Despite the higher warming potentials of CH_4 and N_2O compared to CO_2, it is expected that CO_2 emissions will still account for over 99 percent of the CO_{2e} for this combustion turbine.

Table 24-9 Estimated Potential Annual GHG Emissions Associated with the Project During Operation and Maintenance (15% Capacity Factor)

Pollutant	Combined-Cycle Combustion Turbine (tonnes per year)	Dew Point Heater (tonnes per year)	Emergency Diesel Fire Pump (tonnes per year)	Emergency Diesel Generator (tonnes per year)	Piping Fugitives (tonnes per year)	Circuit Breakers (tonnes per year)	Total (tonnes per year)[a, b]
CO_2	187,525	64	12.4	93.6	-	-	187,695
CH_4	4.7	0.02	0.001	0.004	16.2	-	20.9
N_2O	0.5	0.002	0.0001	0.001	-	-	0.5
CO_{2e}	187,783	65	12	94	452	8.5	**188,415**

Notes:

(a) Based on 1,314 hours of turbine and heater operation (15% capacity factor), 95 starts per year, and 100 hours of pump and generation operation per year.

(b) Estimated steady-state fuel usage corresponding to these estimates is:

- 2,700 MMBtu/hr (2,838 GJ/hr), higher heating value (HHV), consumption for natural gas users. This equates to 2.87 MMSCF/hr (81,000 m^3/hour) based on an expected HHV of 939.4 Btu/ft^3 (35 MJ/m^3)
- 253 gal/hr (958 L/hr) consumption for diesel equipment

When looking at capacity factor (i.e., measure of how often a plant is running at maximum power), while 100% load for 100% of the year is not realistic (i.e., 100% capacity factor) for the expected operation it is theoretically possible. The estimated maximum potential GHG emissions associated with the Project during operation and maintenance for the 100% load scenario can be found in Table 24-10.

Table 24-10 Estimated Potential Annual GHG Emissions Associated with the Project During Operation and Maintenance (100% Capacity Factor)

Pollutant	Combined-Cycle Combustion Turbine (tonnes per year)	Dew Point Heater (tonnes per year)	Emergency Diesel Fire Pump (tonnes per year)	Emergency Diesel Generator (tonnes per year)	Piping Fugitives (tonnes per year)	Circuit Breakers (tonnes per year)	Total (tonnes per year)[a, b]
CO_2	1,250,165	427	12.4	93.6	-	-	1,250,698
CH_4	31.5	0.11	0.001	0.006	16.2	-	47.8
N_2O	3.2	0.011	0.0001	0.001	-	-	3.2
CO_{2e}	1,251,884	433	12	94	452	8.5	**1,252,885**

Notes:

(a) Based on 8,760 hours of turbine and heater operation (100% capacity factor), 95 starts per year, and 100 hours of pump and generation operation per year.

(b) Estimated steady-state fuel usage corresponding to these estimates is:

- 2,700 MMBtu/hr (2,838 GJ/hr), HHV, consumption for natural gas users. This equates to 2.87 MMSCF/hr (81,000 m^3/hour) based on an expected HHV of 939.4 Btu/ft^3 (35 MJ/m^3)
- 253 gal/hr (958 L/hr) consumption for diesel equipment

However, even if the Project did need to be relied on all of the time there would still be needed periods of shut down for maintenance. In the case that conditions evolve, and the Project has to run at a higher capacity factor, a realistic operating profile for the Project would be a cycle operating scenario of an overall 85% capacity factor as shown in Table 24-11. SaskPower anticipates this unit would then provide mainly baseload generation along with limited reserve capacity margin and load following generation for renewables.

Table 24-11 Estimated Potential Annual Greenhouse Gas Emissions Associated with the Project During Operation and Maintenance (85% Capacity Factor)

Pollutant	Combined-Cycle Combustion Turbine (tonnes per year)	Dew Point Heater (tonnes per year)	Emergency Diesel Fire Pump (tonnes per year)	Emergency Diesel Generator (tonnes per year)	Piping Fugitives (tonnes per year)	Circuit Breakers (tonnes per year)	Total (tonnes per year)[a, b]
CO_2	1,062,640	363	12.4	93.6	-	-	1,063,110
CH_4	26.8	0.09	0.001	0.006	16.2	-	43.14
N_2O	2.7	0.009	0.0001	0.001	-	-	2.7
CO_{2e}	1,064,102	368	12	94	452	8.5	**1,065,038**

Notes:

(a) Based on 7,446 hours of turbine and heater operation (85% capacity factor), approximately 100 starts per year, and 100 hours of pump and generator operation per year.

(b) Estimated steady-state fuel usage corresponding to these estimates is:

- 2,700 MMBtu/hr (2,838 GJ/hr), HHV, consumption for natural gas users. This equates to 2.87 MMSCF/hr (81,000 m^3/hour) based on an expected HHV of 939.4 Btu/ft^3 (35 MJ/m^3)
- 253 gal/hr (958 L/hr) consumption for diesel equipment

The Project is expected to emit between 338 kg/MWh to 383 kg/MWh of CO_{2e} during combined cycle operation at full load, depending on ambient conditions. As mentioned previously, one of the primary differences from previous SaskPower projects will be the addition of a HRSG bypass stack, to permit simple-cycle operation. When operating in SCGT mode, total emissions will remain the same, but the MW generated will be reduced. Therefore, CO_{2e} emissions intensity will increase to between 510 kg/MWh to 548 kg/MWh at full load, depending on ambient conditions. These emission rates are based on the unit in a new and clean condition, with no consideration for Project degradation.

In 2018, Canada enacted the *Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity* (under CEPA*, 1999*). The regulation covers natural gas plants that have a minimum installed capacity of 25 MW, sell or distribute more than 33% of their average annual potential electricity output to the grid, and receive more than 30% of their heat input from natural gas. The standards are set at 420 t CO_2/GWh (420 kg/MWh) for units with capacity of at least 150 MW or 550 t CO_2/GWh for units with capacity between 25 MW and 150 MW (see Canada Statutory Orders and Regulations (SOR/2018-261).

As the Project has a combustion turbine with a 250 MW nominal capacity, SaskPower will be required to limit capacity factor of the Project to 33% or less (or 2,891 hours per year) considering SCGT operation. In the event that both simple and combined cycle operating modes are used in the same calendar year, SaskPower will be required to limit overall capacity of the Project so as to maintain annual average CO_2 emissions intensity below 420 kg CO_2/MWh. However, as mentioned previously, the forecasted capacity

factor for Project (regardless of operating mode) is not expected to exceed 15%, corresponding to 2200 operating hours or less.

Table 24-12 Theoretical Maximum Potential Air Emissions Associated with the Project During Simple Cycle Operation and Maintenance

Pollutant	Potential Simple Cycle Air Emissions (tonnes per year)[a, b]
NO_x	163.5
CO	201.7
$TPM/PM_{10}/PM_{2.5}$	13.0
SO_2	9.8
CO_2	413,088
CO_{2e}	419,229

Notes:

(a) Based on 2,891 hours of turbine and heater operation (33% capacity factor), 95 starts per year, and 100 hours of fire pump and generator operation per year.

(b) Estimated steady-state fuel usage corresponding to these estimates is:

- 2,700 MMBtu/hr (2,838 GJ/hr), HHV, consumption for natural gas equipment. This equates to 2.87 MMSCF/hr (81,000 m^3/hour) based on an expected HHV of 939.4 Btu/ft^3 (35 MJ/m^3)
- 253 gal/hr (958 L/hr) consumption for diesel equipment

24.5.1 GAS TURBINE GENERATOR

Emissions from the F-Class GTG are dependent on the ambient temperature conditions and operating load. To account for representative seasonal climatic variations, potential emissions from the proposed combustion turbine were analyzed at minimum emissions compliance load (MECL), 50, 75, and 100 percent load conditions for ambient temperatures ranging from -30 degrees °C to +39°C. Projected emissions were based on data provided by the potential F-Class combustion turbine manufacturers and/or from AP-42 emission factors.

In addition to the combustion turbine, there will also be emissions of air contaminants generated from the emergency diesel generator, emergency diesel fire pump, and dew point heater. Detailed calculations of the combustion turbine and auxiliary equipment's emissions are provided in Appendix G.

24.5.2 EMERGENCY DIESEL FIRE PUMP

An emergency diesel fire pump will be built to support the Project in case of a fire. The emergency diesel fire pump is expected to have a maximum power output of 237 horsepower and will be fired solely by ultra-low sulfur #2 fuel oil. The Project expects to operate the emergency diesel fire pump for up to 100 hours annually for testing and maintenance purposes, and therefore supports a limit on routine hours of operation of the emergency diesel fire pump. Vendor data, AP-42 emission factors, and NIR emission factors were used to determine emissions for the fire pump.

24.5.3 EMERGENCY DIESEL GENERATOR

An emergency diesel generator will be built to provide essential services to the Project in case of a power interruption. The emergency diesel generator is expected to have a maximum power output of 1,250 kW and will be fired solely by ultra-low sulfur #2 fuel oil. The Project expects to operate the emergency diesel generator for up to 100 hours annually for testing and maintenance purposes, and therefore supports a limit on routine hours of operation of the emergency diesel generator. Vendor data, AP-42 emission factors, and NIR emission factors were used to determine emissions from the emergency diesel generator.

24.5.4 CIRCUIT BREAKER EQUIPMENT

Nine sulfur hexafluoride (SF_6) containing circuit breakers (245-kilovolts (kV) each), is proposed for the substation. Annual potential to emit emissions of SF_6 from the circuit breakers were based on maximum leakage rate of 0.5 percent per year, the amount of SF_6 in each circuit breaker, and the GWP. Project potential emissions of CO_{2e} leakage from all proposed circuit breakers combined are estimated to be 8.5 tonnes per year.

24.5.5 VENTING AND FUGITIVE EMISSIONS GENERATED

Fugitive emissions will come from small leaks in equipment connections throughout the Project. The estimated number of connectors, flanges, open ended lines, pump seals and valves were determined from engineering plans for the Project. Equation A3.2-14 as described in NIR 1990-2020: Greenhouse Gas Sources and Sinks in Canada was used.

$$EMIS_{i,j,k,l,m} = \frac{FC_{j,k} \times CPF_{j,k,l} \times LDAR_{j,k,m} \times EF_{l,m} \times x_i \; x \; 8760}{THC_k \times 10^9}$$

$EMIS_{i,j,k,l,m}$ = Emissions for gas species i, facility type j, product type k, component l and LDAR scenario m (kt)
$FC_{j,k}$ = Facility count for facility type j and product type k
$CPF_{i,k,l}$ = Number of components l, per facility type j and product type k
$LDAR_{j,k,m}$ = LDAR proportion per facility type j, product type k and LDAR scenario m
$EF_{l,m}$ = Emission factor for component l and LDAR scenario m (g THC/hr)
x_i = mass fraction of species i
THC_k = Mass fraction of Total Hydrocarbons per product type k (g THC/g total gas)
8,760 = number of hours per calendar year (24 h/d × 365 d/yr)
10^9 = g per kt

The emissions were estimated using the emission factors listed in Table A3 2-15: Fugitive Equipment Leak Emission Factors in NIR 1990-2020: Greenhouse Gas Sources and Sinks in Canada. Saskatchewan regulations require Leak Detection and Repair (LDAR) surveys twice per year at gas production and processing facilities; therefore, Policy 2 LDAR scenario emission factors were utilized for the emissions calculations. The mass fraction of species (CH_4) and mass fraction of THC are sourced from Table A3.2-17. Further, Schedule 3 of the *Greenhouse Gas Pollution Pricing Act* was referenced for the Global Warming Potentials utilized to convert methane to CO_{2e} fugitive emissions. The estimated potential CO_{2e} fugitive emissions are shown in Table 24-13.

Table 24-13 Estimated Potential Annual Fugitive Emissions Associated with Natural Gas

Natural Gas			CO_2e
Equipment Type	**Equipment Quantity**	**Emission Factors[a] (g-THC /hr/source)**	**Potential to emit (tonnes / year)**
Connectors	279	0.267	17.5
Flanges	465	1.099	120.0
Open Ended Lines	30	35.764	251.9
Valves	856	0.314	64.1
Total			**452**

Note:
(a) Canada National Inventory Report 1990-2020 table A3.2-15 Fugitive Equipment Leak Emission Factors - Natural Gas, Process Gas, Policy 2

24.6 Emissions Generated During Decommissioning

During the decommissioning phase, fugitive dust and fine particulate emissions will be generated from demolition activities, material handling, and vehicles creating dust by traveling on land. In addition, off-road construction equipment (excavator, dozers, etc.) will release combustion by-products such as NO_x, CO, and VOCs when they operate by combusting fuel.

During the decommissioning phase the Project will be idle; however, it is anticipated that the fire protection system will remain operational. As such, the periodic testing required of the diesel fire pump will generate emissions in this phase.

Precise activities, timing, and emissions estimates for the decommissioning of the Project cannot be predicted at this time, as they depend on many variables that will be determined in the future. The expected decommissioning emissions would be consistent with construction emissions (Table 24-7) and diesel fire pump emissions. In general, the overall duration of the decommissioning process, as well as the size of the crews involved, are expected to be substantially less than that required for construction of the Project. All relevant environmental regulations in existence at the time of decommissioning will be adhered to.

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Appendix A Stakeholder Engagement

We want your input on a

PROJECT NEAR YOU

SaskPower will potentially build up to two new natural gas power stations by the end of the decade.

As we plan the future power system, we're looking at a range of power generation options. Natural gas is one of them.

Given the demand for power from large urban centres, we're looking for site locations in the Regina and Saskatoon regions. We're also evaluating gas quality and supply in the Estevan area.

Please join us for a workshop.

At this early stage, we're working with municipalities, Indigenous rightsholders and regional planning groups around Saskatoon and Regina to get feedback on:

- The study areas in each region;
- Our expression of interest process to find potential sites;
- Future development plans in each region; and
- How you'd like to stay in touch throughout the process.

The workshops in **Saskatoon** will be held:

Tuesday, March 24, 2020
and
Tuesday, March 31, 2020

8:30 AM to 1 PM
Saskatoon Travelodge
Hercules Room

The workshops in **Regina** will be held:

Thursday, March 26, 2020
and
Thursday, April 2, 2020

8:30 AM to 1 PM
Mackenzie Art Gallery
Agra Torchinsky Salon

Please RSVP by March 20, 2020. Lunch and refreshments will be provided.

If you're unable to make it to a workshop, we're happy to meet with you in your community. Please call or email with your preference. Contact information below.

1-855-566-2903
PublicConsultation@SaskPower.com

SaskPower
Powering the future®

We want your input on a

PROJECT NEAR YOU

Chinook Power Station near Swift Current is a 350 MW natural gas power generation facility. It closely resembles what we'll potentially build.

Why natural gas?

Natural gas is an important part of SaskPower's plans to ensure reliable electricity, while meeting environmental regulations and an increasing need for power. It's also a baseload source of power that supports renewable generation such as wind and solar power. We expect we'll need more power generation by 2027 and beyond. We're considering a range of options and natural gas power generation is one of them.

What does SaskPower consider when choosing sites?

As a starting point, SaskPower considers environmental factors, Indigenous knowledge, land use, social aspects, technical components, and cost.

Why are you looking for land now when a new facility isn't needed until 2027?

Finding land that's suitable for large power plants takes time. There's lots of information to collect and consider. In early 2022 we'll decide whether to proceed with a natural gas power station and determine the size and location at that time as well. Before that happens, we need to select potential sites, complete technical and environmental studies, and fulfill both provincial and federal regulatory review processes.

1-855-566-2903
PublicConsultation@SaskPower.com

SaskPower
Powering the future®

CONSIDERATIONS FOR GAS SITING

WHY NATURAL GAS?

- Provides ideal back-up to wind and solar.
- Option for baseload power.
- Lower CO2 emissions than coal.
- Mature technology.
- Emissions Regulations add risk.

NATURAL GAS GENERATES POWER BY USING THE HEAT OF COMBUSTION TO TURN A TURBINE. Simple cycle plants produce power from gas turbines alone.

COMBINED CYCLE GAS PLANTS ARE ABOUT 15% MORE EFFICIENT. They use the gas turbine exhaust heat to generate steam that turns another turbine to create additional power.

RELIABILITY	COST RATING	GREENHOUSE GAS EMISSIONS
HIGH	MEDIUM	MEDIUM

APPLICATIONS OF NATURAL GAS GENERATION

Simple Cycle

- Provides peak load and load following capability
- Provides fast start-up.
- Faster and less expensive to construct.
- Less equipment, smaller footprint.
- Less water usage.

Combined Cycle

- Provides intermediate and base-load capability.
- Gas is utilized more efficiently.
- Load following capability.
- Lower emissions output per kW.

SIMPLE CYCLE GAS FACILITY

- Typical footprint for a 50-100 MW facility is about 20 acres.
- Requires minimal staff, up to 2 employees, may be operated remotely.
- Construction duration is 2.5 years, with up to 200 people at peak manpower.

Ermine Power Station

COMBINED CYCLE GAS FACILITY

- Typical footprint for a 350 MW facility is 40 – 75 acres.
- Requires 20-25 staff.
- Creates up to 35 other positions to provide services to the plant.
- Construction duration is 3 years, with up to 500 people at peak manpower.

Chinook Power Station

SITING CONSIDERATIONS

ENVIRONMENT

We consider many factors like land cover, wetlands, waterbodies, and potential archaeology, as well as potential impact on rare and endangered plant and animal species and their habitats.

When avoidance isn't possible, we will work with stakeholders and regulators to find the most responsible way to offset or mitigate effects and impacts. We follow Environmental Beneficial Management Practices.

INDIGENOUS KNOWLEDGE

We engage Indigenous communities to seek invaluable knowledge. Local and Indigenous knowledge refers to the understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings like hunting, fishing, trapping, ceremonial and spiritual uses.

LAND USE

We recognize that land and resource use is important to agricultural operations, property owners, communities and resource users like hunters and trappers, commercial operators, nature, environmental organizations and the public.

We consider how resources or access to resources may be affected as well as community land use plans and proximity to communities, residences, habitable buildings, outbuildings.

SOCIAL

We consider the social value communities place on landscapes, points of interest, economic benefits to local communities, job opportunities and recreation activities.

TECHNICAL

We consider engineering and construction standards as well as access, terrain, design, system reliability, proximity to required and other existing infrastructure.

SaskPower is committed to ensuring public safety and safe access for construction and maintenance activities.

COST

We consider capital costs (project budget), operating budget (long term maintenance), land acquisition costs and impact on power rates.

WHAT ELSE SHOULD WE BE CONSIDERING?

From: Public Consultation
Bcc:

Subject: Workshops cancelled, exploring other alternatives
Date: Wednesday, March 18, 2020 7:51:51 AM

In follow-up to an invitation we sent out last week asking for your participation in a SaskPower workshop, we'd like to provide an update.

The safety of our staff, stakeholders and customers is SaskPower's priority. Unfortunately, we need to cancel the face-to-face workshops. Given current COVID-19 events and how rapidly new information is evolving, we felt this was the right thing to do.

We are evaluating the other options available to us. We'll reach out soon to let you know what those options are and get a better sense of what will work for you.

If you have any thoughts or preferences right now as to what would work for you, please let us know.

Kind regards,

Erin

Erin Lord, B.Comm SaskPower | Consultant, Stakeholder Engagement, Corporate Relations and Communications
toll free. 1.855.566.2903 | publicconsultation@saskpower.com
2NE - 2025 Victoria Avenue, Regina, SK, S4P 0S1

From: Public Consultation
Sent: March 11, 2020 4:19 PM
Subject: Siting for Potential Natural Gas Power Stations - Workshop Invitation

Good afternoon,

SaskPower will potentially build up to two new natural gas power stations by the end of the decade. As we plan the future power system, we're looking at a range of power generation options. Natural gas is one of them.

Given the demand for power from large urban centres, we're looking for site locations in the Regina and Saskatoon regions. We're also evaluating gas quality and supply in the Estevan area.

You're invited to our workshop and have four dates to choose from (see below or the attached invite).

At this early stage, we'd like to work with municipalities, Indigenous rightsholders and regional planning representatives around Saskatoon and Regina to get feedback on:

- The study area in each region;
- Our expression of interest process to find potential sites;
- Future development plans in each region; and
- How you'd like to stay in touch throughout the process.

Further information is in the attached pdf. **Please RSVP by March 20th by replying to this email.** Make sure to let us know who from your organization will attend and dietary restrictions. Lunch will be included.

Event details:

The workshops in **Saskatoon** will be held:

The workshops in **Regina** will be held:

Tuesday, March 24, 2020 and Tuesday, March 31, 2020 8:30 AM to 1 PM Saskatoon Travelodge Hercules Room	Thursday, March 26, 2020 and Thursday, April 2, 2020 8:30 AM to 1 PM Mackenzie Art Gallery Agra Torchinsky Salon

If this format doesn't work for you, please let us know how we can exchange information with you as we build this new siting process.

We'll follow up with your office to confirm receipt of this email and answer questions.

Warmest regards,

Erin

Erin Lord, B.Comm SaskPower | Consultant, Stakeholder Engagement, Corporate Relations and Communications

toll free. 1.855.566.2903 | publicconsultation@saskpower.com | 2NE - 2025 Victoria Avenue, Regina, SK, S4P 0S1

Public Engagement & Stakeholder Consultation
2 NE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
PublicConsultation@saskpower.com

July 16, 2021

LETTER TO STAKEHOLDERS AT WOLVERINE & SHAND

Re: Evaluating Sites for New Natural Gas Power Stations

SaskPower is looking at a range of options to meet Saskatchewan's future power generation needs. Natural gas generation is one supply option being evaluated. A decision to proceed with new natural gas generation has not been made. However, we are looking for suitable sites now so that if a decision to proceed is made, we will be ready to move forward. We expect a supply decision could be made as early as 2022.

You are receiving this letter because you own land near one of the two sites being studied:

- NW 36-33-24 W2M, near our Wolverine Switching Station; or
- S 03-02-07 W2M, the site of our Shand Power Station.

We want to learn from our stakeholders what they would like us to consider as we continue to evaluate these sites. We'd also appreciate if you'd share your local knowledge about these sites to help in our evaluation. These sites were evaluated using a consistent set of siting criteria which included seeking to understand Indigenous Knowledge, land use, social considerations, potential environmental concerns, technical requirements, and cost implications. Moving forward, further analysis will be conducted concerning the criteria and stakeholder feedback.

Each of these sites is being considered for potential natural gas generation ranging from 50 to 350 megawatts (MW). We are considering smaller simple cycle gas turbines and larger combined cycle plants. This decision will depend on many factors, such as the forecast for future power demand and the availability of other supply options. SaskPower also continues to explore the potential to add or replace generation at existing facilities to fill the province's future power generation needs.

An information sheet about both types of gas generation and our siting considerations is attached. You can also visit our website at www.saskpower.com/futuresite for information on the sites that were included in the initial evaluation.

We'd like to hear your thoughts on potential future gas generation at Wolverine or Shand. Please contact us by email at publicconsultation@saskpower.com or telephone at

..../2

855-566-2903 to let us know how you'd like to exchange information. We can arrange video conference or teleconference meetings at your convenience.

Thank you in advance for taking time to participate in our process. Your input is important to us as we plan for future generation.

Sincerely,

<Original signed by>

Christine Enmark
Public Engagement & Stakeholder Consultation
Enc.

Learn more about our supply planning and help us plan our power future at:
https://www.saskpower.com/Our-Power-Future/Powering-2030/Help-Plan-Our-Power-Future

Sign up for updates on natural gas siting at: saskpower.com/futuresite

Public Engagement & Stakeholder Consultation
9 SE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
PublicConsultation@saskpower.com

July 12, 2022

LETTER TO STAKEHOLDERS AT SHAND

Re: Proposed Natural Gas Power Station

Dear NAME,

We're writing to provide you an update on land SaskPower was evaluating for a proposed natural gas power station: S 03-02-07 W2M, SaskPower's Shand Power Station.

After further study, SaskPower has selected land near our Wolverine Switching Station in the Lanigan area. A decision to proceed with new natural gas generation has not been made. Our next step is to collect input from stakeholders that will help inform a decision in early 2023 to build this project.

The Lanigan-area site was selected based on the opportunities it presented such as road access, potential for groundwater availability, proximity to natural gas and transmission infrastructure and cost.

We continue to study other possibilities at Shand, including natural gas generation options that may be better suited to the natural gas availability in the area. Please contact us by email at publicengagement@saskpower.com or telephone at 855-566-2903 if you have any questions or comments.

Thank you for taking time to participate in our process. Your input is important to us as we plan for future generation.

Sincerely,

<Original signed by>

Christine Enmark
Public Engagement & Stakeholder Consultation

Public Engagement & Stakeholder Consultation
9 SE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
PublicConsultation@saskpower.com

July 12, 2022

LETTER TO STAKEHOLDERS AT WOLVERINE

Re: Proposed Natural Gas Power Station

Dear NAME,

SaskPower has been evaluating land for a potential new natural gas power station. We're writing to let you know we've now selected our land, NW 36-33-24 W2M, near our Wolverine Switching Station, in the Lanigan area.

We selected the Lanigan site based on the opportunities it presented such as road access, potential for groundwater availability, proximity to natural gas and transmission infrastructure and cost.

As a landowner near this site, we also wanted to reach out to you to outline next steps. Our next priority is to learn from stakeholders– like you– to understand what you want us to consider as we continue to evaluate this project.

We want your input! Please get in touch by email at publicengagement@saskpower.com or phone at 855-566-2903 to let us know how you'd like to exchange information. As a nearby landowner, it'd be our pleasure to meet with you in-person on July 26th or July 28th at the Lanigan Town Hall. Please call to book a time. We'll also hold an open house for the general public on July 27th from noon to 7 p.m. at the Lanigan Town Hall.

Please note: we haven't made a final decision to build the new power station. Your input will help inform the engagement process, project interests and concerns.

About the project
As we begin to phase out conventional coal power, we'll need to replace it with another source of reliable power. Natural gas is our best option for meeting this need in the near term. It will help us meet environmental regulations because it produces half the emissions of conventional coal. And it will support us in bringing more renewable generation options online, like wind and solar.

As a result, we're looking to build a 370-megawatt (MW) combined cycle natural gas power station near Lanigan. A 260-MW combustion turbine, for simple cycle dispatch, is forecast to be in-service in 2027, and the remainder of the plant would be built by 2028. The facility will be designed to have the capability to operate in both simple cycle and combined cycle mode, which will have more flexibility when demand for power changes. This plan may need to shift based on future regulations that may come through the Government of Canada's Clean Electricity Standard.

Thank you in advance for taking time to participate in this process. Your input is important to us as we plan for future generation.

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Christine Enmark
Public Engagement & Stakeholder Consultation

We want your input on a

PROJECT NEAR YOU

POTENTIAL NATURAL GAS POWER STATION

Come and go from Lanigan Town Hall:

Noon to 7 p.m. on July 27

SaskPower
Powering our future®

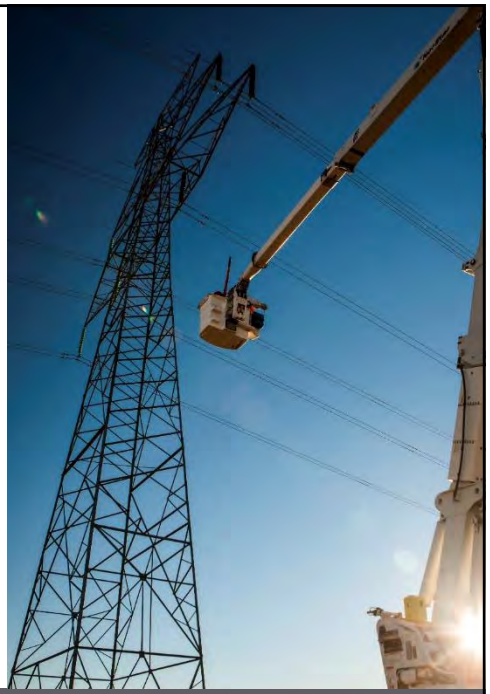
POTENTIAL LANIGAN NATURAL GAS POWER STATION

July 2022

SaskPower
Powering our future

TOPICS FOR DISCUSSION

- Project Need
- Site Selection Process
- Feedback from You
- Group Discussion
- Next Steps



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WHY THIS, WHY NOW?

Changing Expectations

Changing Federal Regulations

New Technology

NATURAL GAS GENERATION

Reliability

Cost

Emissions

Simple Cycle

Combined Cycle

NATURAL GAS GENERATION

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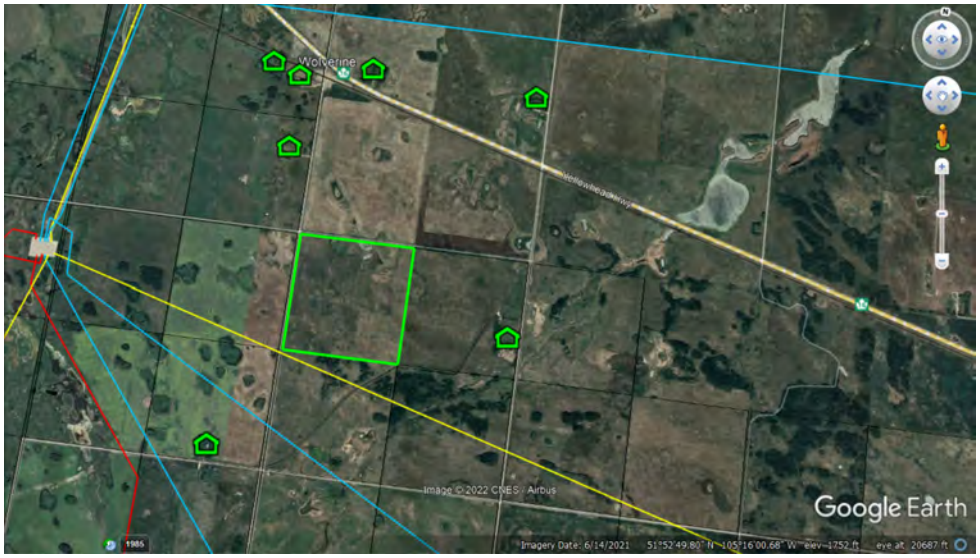
SITE SELECTION PROCESS



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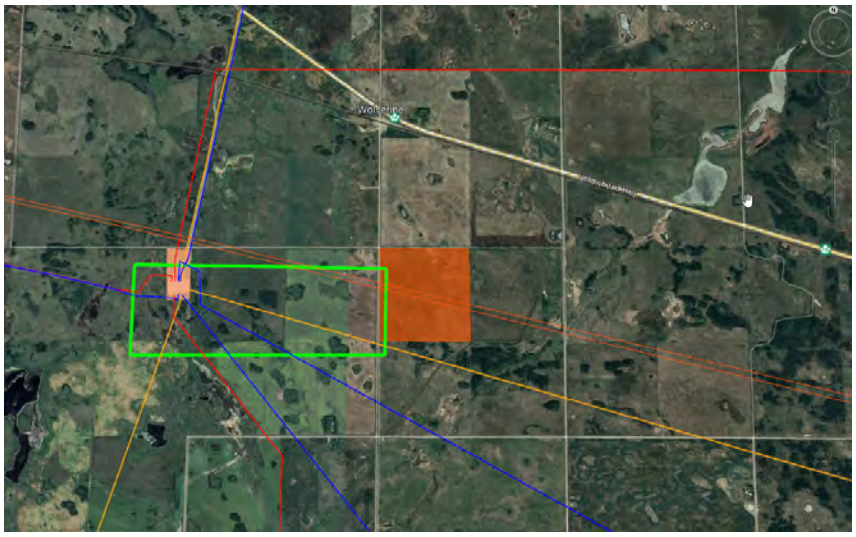
SITE SELECTION PROCESS



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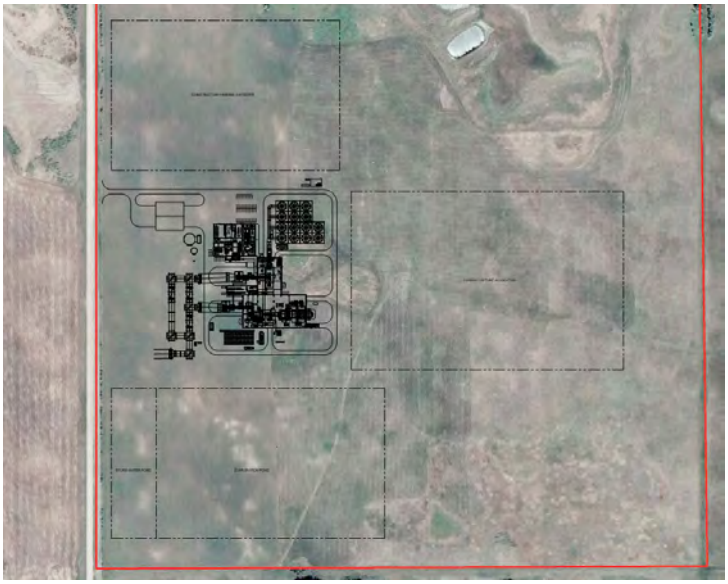
SITE SELECTION PROCESS



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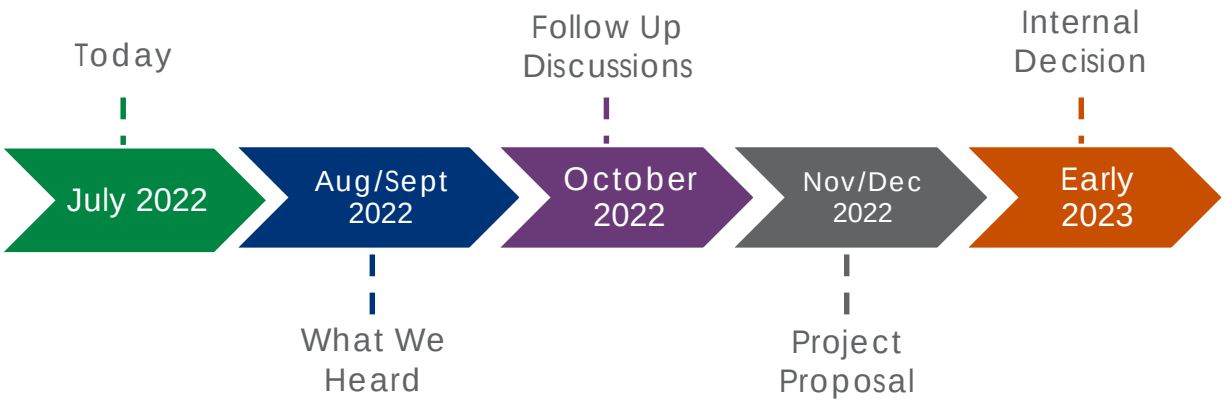
FEEDBACK AND DECISION



DISCUSSION

Noise	Emissions	Light
Water	Environment	Traffic
Transmission	Community	Other

WHAT'S NEXT?

- Session Summary
- Future Engagement Opportunities
- **Sign up for the newsletter at the project page:**

  https://www.saskpower.com/Our-Power-Future/Infrastructure-Projects/Construction-Projects/Current-Projects/Potential-Lanigan-Natural-Gas-Power-Station

TRAFFIC

Get familiar with the

POTENTIAL NATURAL GAS POWER STATION

Construction at Great Plains Power Station

WE'RE INVESTING IN SASKATCHEWAN'S POWER FUTURE

We've selected land near our Wolverine Switching Station, by Lanigan, to potentially build a natural gas power station. We're looking to build a facility with the ability to produce up to 370 megawatts (MW) of power— enough to power about 370,000 homes. SaskPower's goal is to reduce carbon dioxide emissions by at least 50% by 2030 from 2005 levels. Natural gas generation is part of our plan to reach that goal.

WHY WE NEED NATURAL GAS GENERATION

We're beginning to phase out using coal as a power source. This means we'll need to replace it with another reliable source of power. Natural gas is our best option for meeting our province's power needs in the near future. It will help us meet environmental regulations and produces half the emissions of conventional coal.

PROJECT BENEFITS AND OPPORTUNITIES

- Supports renewable power generation, like wind and solar
- Can act as a baseload source, meaning it's available 24/7
- Provides operational flexibility
- Creates job opportunities during and after construction

WHAT WE'VE DONE SO FAR

SaskPower purchased this site in 2013 in anticipation of needing a future site for a natural gas power facility. In 2020, we started to look at many sites to ensure that if we need new natural gas stations leading up to 2030, we were ready to move forward. We selected this site based on:

- Road access
- Potential for groundwater availability
- Proximity to infrastructure
- Cost

Get familiar with the

POTENTIAL NATURAL GAS POWER STATION

WHAT WE'RE LOOKING FOR FEEDBACK ON

We want your input on how to engage with you during this project, your project interests and any concerns you have. We are interested in your perspectives like:

- How the project might affect you
- How we can lessen effects; and
- What else we should know as we complete our site studies

Our goal is to maintain open communication channels throughout this project.

CURRENT STATUS

Technical studies are underway for the project. We are working with local municipalities, First Nations and Metis communicates and local landowners to collect feedback. A decision to build this project will be brought forward in early 2023.

PROJECT OVERVIEW

The facility will initially be built with a 260-MW combustion turbine for simple cycle dispatch. After that, we'll add a combined cycle function that will allow the power station to generate 370 MW.

This will allow SaskPower flexibility to use the facility to support solar/wind on calm or cloudy days, or provide baseload, 24/7 power to the province.

ANTICIPATED TIMELINE

- Public engagement – July 2022 – late 2022
- Decision to build – early 2023
- Construction start – mid-to-late 2024
- Simple cycle facility – operational early 2027
- Combined cycle facility – operational mid-to-late 2028

IF YOU HAVE QUESTIONS, OR WOULD LIKE TO KNOW MORE ABOUT THIS PROJECT, PLEASE CONTACT SASKPOWER.

1-855-566-2903
PublicEngagement@SaskPower.com

SaskPower, Stakeholder Consultation & Public Engagement

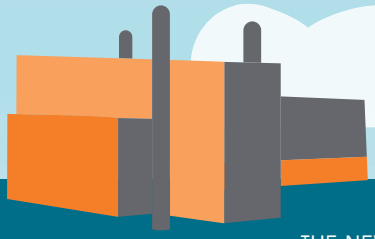
9SE, 2025 Victoria Avenue, Regina, SK. S4P 0S1

POTENTIAL LANIGAN NATURAL GAS POWER STATION

AIR QUALITY

AIR EMISSIONS FROM A NATURAL GAS POWER STATION INCLUDE:

- NITROGEN OXIDE
- PARTICULATE MATTER
- CARBON MONOXIDE AND CARBON DIOXIDE
- SULPHUR DIOXIDE



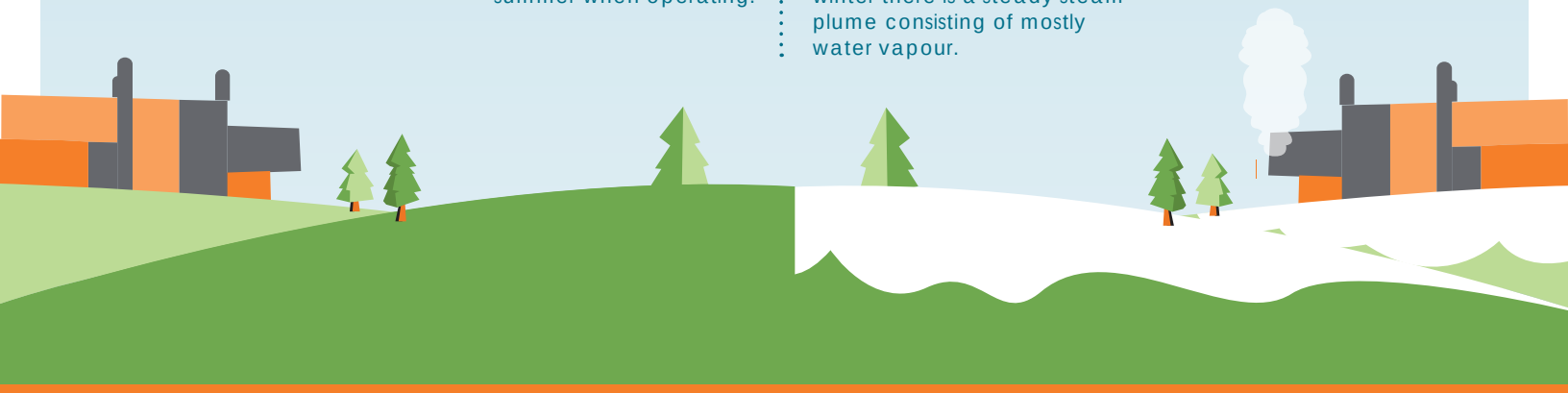
THE NEW FACILITY WILL FOLLOW **PROVINCIAL AND FEDERAL AIR QUALITY STANDARDS.** THIS WILL HELP:

1. Minimize risk to human health
2. Minimize risk to environment

A CLOUD OR "PLUME" WILL EXIT THE PLANT'S STACK. IT WILL LOOK DIFFERENT DEPENDING ON THE TEMPERATURE.

There is little to no plume in the summer when operating.

Like your furnace chimney in winter there is a steady steam plume consisting of mostly water vapour.



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POTENTIAL LANIGAN NATURAL GAS POWER STATION

NOISE

SOUND IS MEASURED IN DECIBELS (dB)

20 dB RUSTLING LEAVES

50 dB A CONVERSATION AT HOME

70 dB A VACUUM CLEANER

100 dB A LAWNMOWER OR MOTORCYCLE

150 dB A JET TAKING OFF

PLANT OPERATION **40-50 dB** FROM THE NEAREST HOUSE

CONSTRUCTION NOISE **60 dB+** FOR LIMITED DAYS

SOME SUBSTANTIAL NOISE WILL BE UNAVOIDABLE

- **Early construction** - pile driving for a suitable foundation. This is typically during the daytime and takes a couple months.
- **End of construction** - steam blows to clean out our piping. This noise will be off-and-on for a few weeks.

When possible, we'll let you know about these events in advance.

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POTENTIAL LANIGAN NATURAL GAS POWER STATION

WATER USE

MOST OF THE WATER WILL BE USED TO **GENERATE STEAM.**

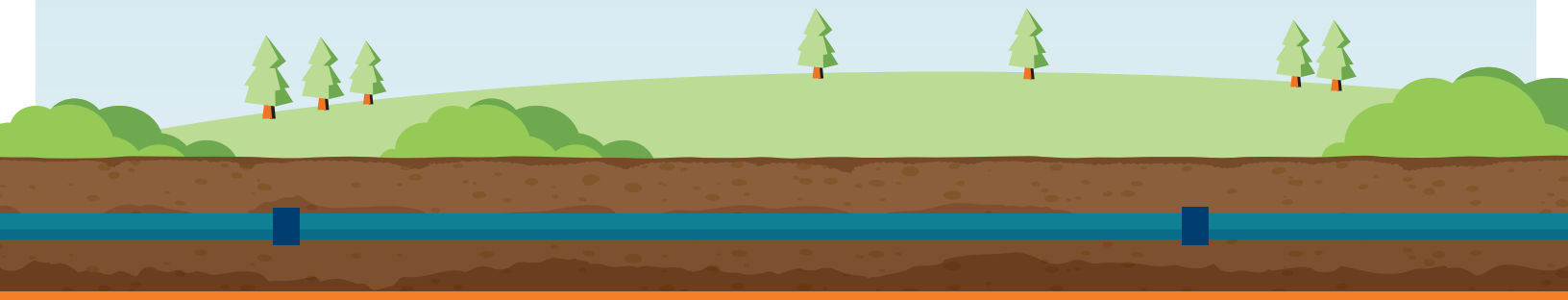
WE MUST USE VERY CLEAN WATER TO PUT IT THROUGH THE STEAM TURBINE.

THIS WON'T IMPACT YOUR ABILITY TO GET WATER.

How will SaskPower use water responsibly?

65%

OF WATER USED WILL BE RECYCLED



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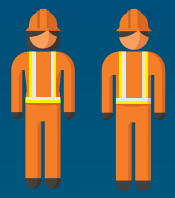
POTENTIAL LANIGAN NATURAL GAS POWER STATION

LIGHTING



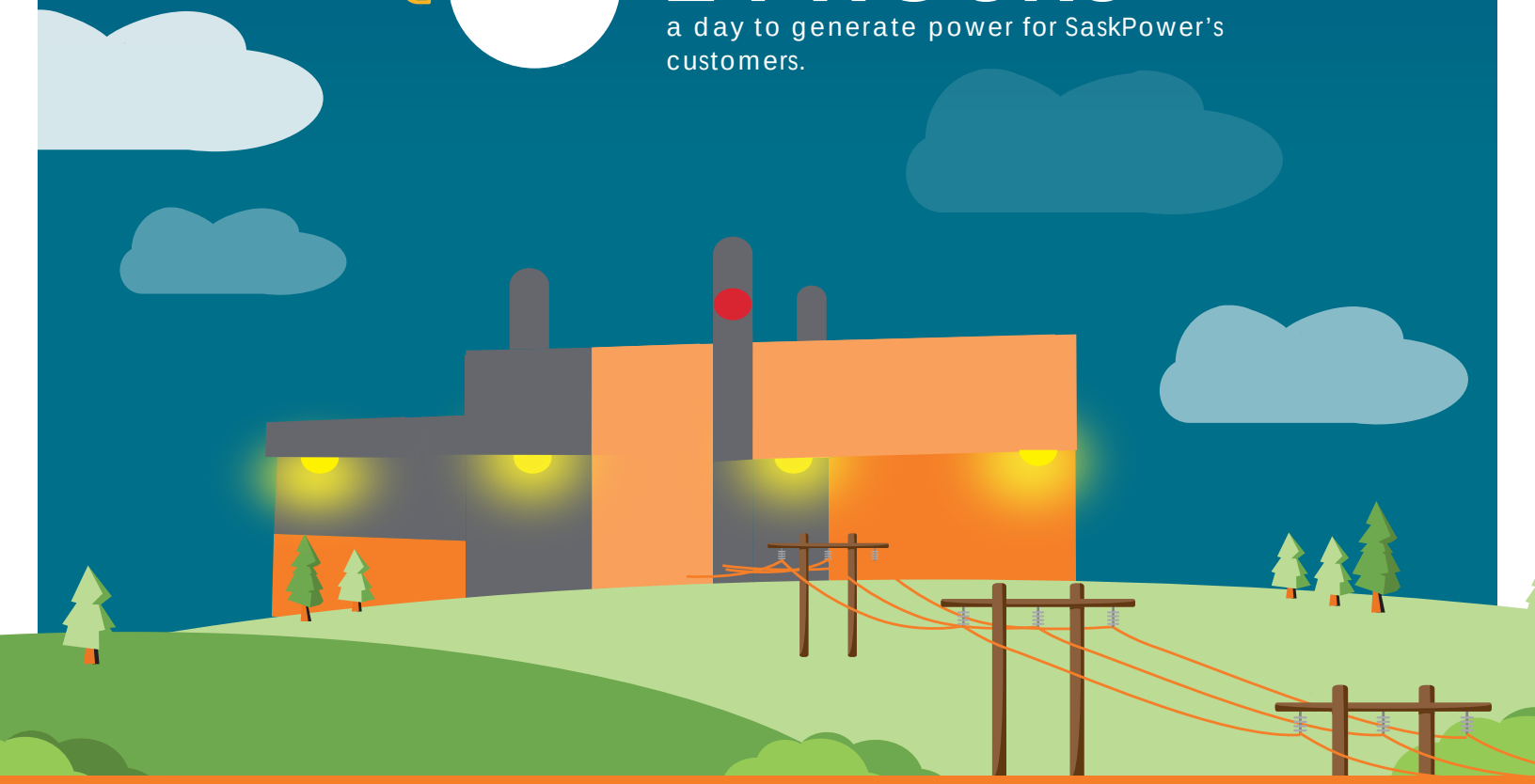
SAFETY FIRST

Our top priority is to make sure all personnel on site are safe and we're visible to aircraft.

The lights will be kept on

24 HOURS

a day to generate power for SaskPower's customers.



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POTENTIAL LANIGAN NATURAL GAS POWER STATION

ENVIRONMENT

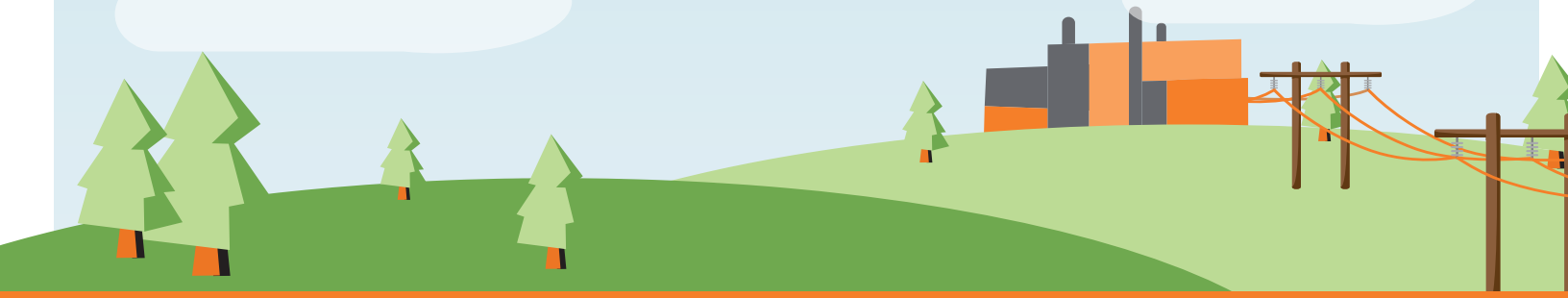
WE RECOGNIZE THAT WHAT WE DO TODAY IMPACTS OUR FUTURE. AS WE PLAN PROJECTS, WE:

USE TOOLS LIKE DATABASES, SATELLITE IMAGERY AND FIELD SURVEYS TO UNDERSTAND THE ENVIRONMENT

ENSURE ALL PROTECTION STANDARDS ARE IN PLACE

DEVELOP A PLAN TO REDUCE OR AVOID IMPACTS TO RARE AND ENDANGERED SPECIES, HABITATS, SENSITIVE LANDSCAPE FEATURES OR HERITAGE RESOURCES

We'll follow all applicable federal and provincial environmental assessment and approval processes.



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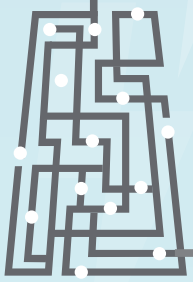
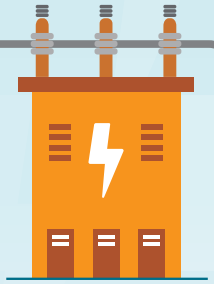
POTENTIAL LANIGAN NATURAL GAS POWER STATION

TRANSMISSION

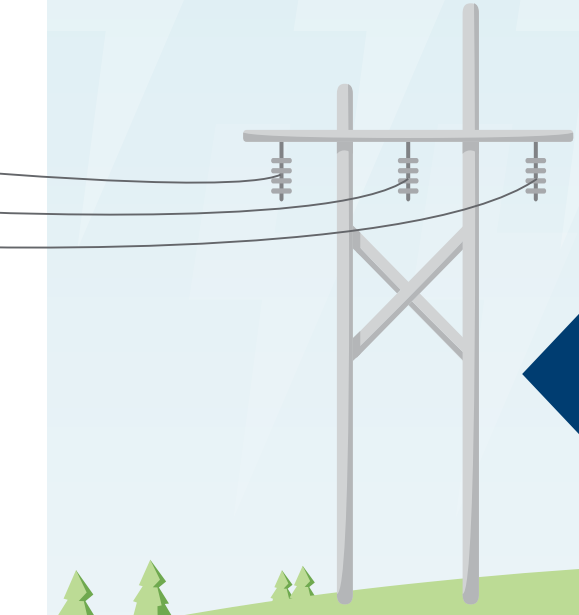


POWER LINES DELIVER ELECTRICITY TO OUR CUSTOMERS THROUGHOUT SASKATCHEWAN

THE POTENTIAL FACILITY WILL BE CONNECTED AT **WOLVERINE SWITCHING STATION**



WE'LL WORK WITH STAKEHOLDERS ON A **PREFERRED ROUTE FOR THE POWER LINE**



WE WILL NEED TO SECURE A **RIGHT-OF-WAY** – AN EASEMENT THAT ALLOWS SASKPOWER TO ACCESS PROPERTY TO MAINTAIN POWER LINES

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WHAT WE DID

On July 26 and 27, 2022, we hosted workshops and an open house to hear feedback on a potential power station. Participants included stakeholders, landowners and interested parties.

Thank you to those who gave their time and offered their sincere perspectives. We appreciate your participation.

WHAT WE HEARD

We compiled what we heard into ten themes. Each theme includes our comments. We did our best to summarize conversations. If you see something missing or misconstrued, please reach out to us by email at **publicengagement@saskpower.com** or phone at 855-566-2903 so we can make corrections.

LOCATION

Many people wanted to know how we chose this location.
SaskPower purchased this land in 2013 anticipating the need for a power station site. We've been evaluating this land since that time. As some recalled, this site was our second choice when we built Chinook, near Swift Current. In 2021, we once again considered Lanigan and also considered Estevan. After studying each area, we chose Lanigan based on the following opportunities:

- road access
- potential for groundwater availability
- proximity to natural gas and transmission infrastructure
- cost

There is interest in what SaskPower will do with unused portions of the site if we build the facility.
SaskPower currently rents out the land. Once we build the facility, our renter may use the unused land. If the renter cancels their lease, we will re-evaluate what is available and what is best for the facility.

There is concern with the aesthetics of the power station.
The closest house is approximately half a kilometre away from the site. We will work with landowners on options for improving their line of sight and creating visual buffers.

There is interest in how SaskPower will secure the facility.
We'll enclose the entire facility with a fence. With electrical infrastructure present, it's our duty to keep the public safe. We will also work to keep cattle and wildlife nearby safe and away from the facility. We'll watch the site with closed-circuit television (CCTV) and only those with key passes will have access.

There is concern about garbage at the site.
During construction, we'll conduct daily walks to address safety and housekeeping. We'll ensure contractors dispose of waste and prevent it from blowing around the site.

WHY NATURAL GAS

There are questions about why we are building natural gas over other options.
We're beginning to phase out using conventional coal as a power source. This means we'll need to replace it with another reliable source of power. Natural gas is our best option for meeting our province's near-term power needs. We're on track to reduce our greenhouse gas (GHG) emissions by at least 50 per cent below 2005 levels by 2030. And we're working on how to make even deeper cuts to GHG emissions – like achieving a net zero future.

There was interest in nuclear, wind, solar and other options for the future.
We continue evaluating different options for how we'll supply power to Saskatchewan. We recognize the decisions we make today will impact you and future generations. Anyone interested in our future plans can take part in **Planning Our Power Future**. Read more about different supply options at **Balancing Supply Options**.

There was interest in the lifespan of this facility.
It will take three or four years to build the facility. Construction would start in late 2024 or early 2025. Typical life expectancy of the facility is 25 years. The actual lifespan will depend on any new regulations and how we decide to balance power supply.

There was interest in who this facility would serve.
Power from the facility would go to the provincial power grid serving all our customers. The grid functions like a pool, so it's difficult to say who uses the electricity.

NATURAL GAS SUPPLY

There are questions about where the natural gas is from.

TransGas will be routing a natural gas line to the site from the Patience Lake area. TransGas is in their planning phase. They're looking at opportunities to use the line for other customers as well as SaskPower.

There are existing high-pressure gas lines that run through our quarter section. These are at capacity, so we cannot use them for our facility. TransGas will reroute existing lines so we can build on the site.

TRANSMISSION

There is interest in how the facility will connect to SaskPower's grid.
We'll need to build a power line. It will connect the new facility to Wolverine Switching Station, two quarter sections west. We will work with landowners to find a line route that reduces impact to their property.

Once we find a route, we'll negotiate landowner agreements to help us build, operate and maintain the line. We'll let landowners know if construction activity will take place on their property.

Be respectful of the land.
Landowners shared that previous line construction had left their land in poor shape. We apologize and will ensure future contractors better restore the construction area.

A SaskPower supervisor will oversee the contractor. This will ensure they are following SaskPower's standard and policies. This includes having a clean job site and leaving the area in the same or better condition.

NOISE

There's concern with how loud the facility will be in operation and construction.
During operation, noise must stay below 50 decibels (dB) during the day and 40 dB during night. We are conducting noise studies in the area and will share results when they are available.

Some construction stages have unavoidable noisy activities – pile driving and steam blows. The noise will be intermittent. The highest noise recorded when we built Chinook Power Station was 85 dB. As a reference, a vacuum cleaner is around 70 dB in use. We'll do our best to let nearby landowners know about pile driving and steam blows in advance.

There is some existing noise from our Wolverine Switching Station.
Landowners identified they can hear noise at our existing facilities. This hum comes from our transmission lines as they carry electricity. It may be more noticeable with different wind directions.

WATER

We need clean water to run the facility.
SaskWater is studying the best way to supply water to the facility so it doesn't impact other users. There are three wells on the site that we're testing to determine how much water they supply. We'll share results from this study when available. The Zelma or Dellwood Reservoir can supply additional water that's needed through a pipeline.

We'll build a water treatment facility on site to ensure the water used in the process is very clean. This allows the facility to operate efficiently. The water we use at the facility will not impact your water supply.

LOCAL IMPACTS AND ECONOMICS

There is interest in how many people will work at the facility.
We estimate that during construction there will be 375 people on site with a peak of around 500 people. We're looking into construction camps to accommodate these large numbers. In operation, the power station will employee approximately 25 people.

Local suppliers want to be part of the project.
A partner will work with us to build the power station. We'll assess potential partners on how they plan to work with local and Indigenous suppliers. We'll ensure they meet their commitments. Once we select our partner, we'll hold open houses in Regina, Saskatoon and in the community. This gives local and Indigenous suppliers the chance to meet them. They'll also get on bid lists so they know about opportunities.

There were questions about taxes on the property.
Power generation facilities are tax exempt through the Grants-in-Lieu of Property Tax Policy. This facility would be part of this policy.

There were concerns about impacts to local restaurants, accommodations and the hospital.
This is something we will need to consider with the large number of workers that can be on site at one time. We want to be responsible in the community and will create plans for safety.

ENVIRONMENT

We heard information about local wildlife.

Residents shared that they have observed elk, deer, hawks and grouse on the site. We're committed to environmental stewardship and sustainability. A third-party environmental assessment program began this year. It is ongoing and will help us understand the current environmental conditions. We look for plants, animals, archaeological resources and natural

water patterns for example. We expect to share our findings with the federal and provincial regulators next year.

During construction, unavoidable noise may deter wildlife from the area. But once in operation, the facility shouldn't continue to deter local wildlife.

TRAFFIC AND ROADS

There were questions about traffic to the site.
We'll need to widen the grid road from Highway 16 south to our site. This will accommodate the construction traffic. We'll work with the RM to determine road use plans.

There were concerns with the increase in dust.
We will take steps to reduce dust from construction traffic. We'll work with the RM and community to determine dust control methods. We'll stay in touch with local landowners to identify problems as they arise so we can find solutions.

Public Engagement & Stakeholder Consultation
9 SE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
PublicConsultation@saskpower.com

September 26, 2022

Re: Proposed Natural Gas Power Station

Dear Sir or Madame,

In July 2022 we hosted workshops and an open house to hear feedback on a potential power station in the Lanigan area. We appreciate everyone who took the time to share their perspectives with us. If you missed it – don't worry! You can learn more about the project and what we heard from the consolidated feedback summary which is attached for your review. If you see something missing or misconstrued, please reach out so we can make corrections.

We'd like to continue conversations once you've had a chance to review the feedback summary. We are planning to be back in the area later this fall and we can also have video conference or teleconference meetings at your convenience prior to then. Please contact us by email at publicengagement@saskpower.com or telephone at 855-566-2903 to let us know how you'd like to continue to exchange information.

Again, thank you for taking time to participate in our process. Your feedback is important as we plan for the future.

Sincerely,

<Original signed by>

Christine Enmark
Public Engagement & Stakeholder Consultation
Encl.

Give input on a project
NEAR YOU

SaskPower is in the process of deciding whether to build a natural gas power station in the Lanigan area.

Visit our site office, where you can get an update on the project, tell us about the area and ask questions.

TWO IN-PERSON EVENTS

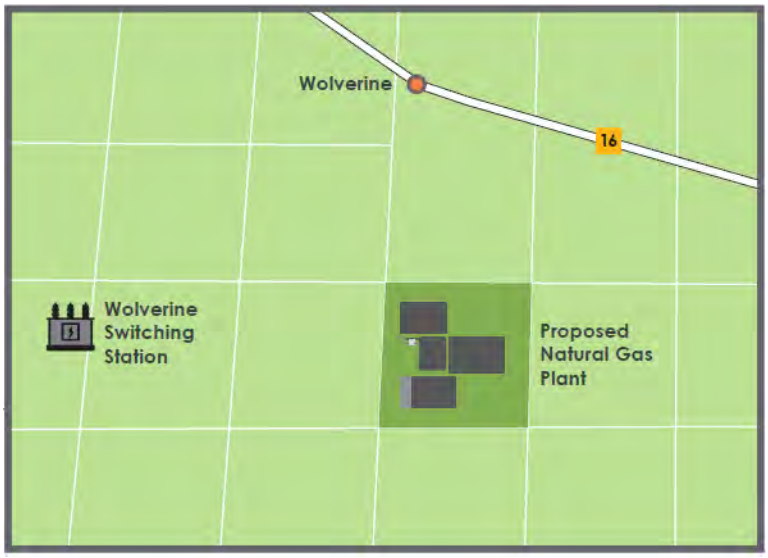
No registration necessary

Merry Mixers Hall, 53 Main Street

Oct. 25, 2022	**Oct. 26, 2022**
1 - 6 p.m.	9 a.m - noon
Come-and-go	Come-and-go

SaskPower
Powering our future®

Get familiar with the POTENTIAL NATURAL GAS POWER STATION



WE'RE INVESTING IN SASKATCHEWAN'S POWER FUTURE

We've selected land near our Wolverine Switching Station, by Lanigan, to potentially build a natural gas power station. We're looking to build a facility with the ability to produce up to 370 megawatts (MW) of power— enough to power about 370,000 homes. SaskPower's goal is to reduce carbon dioxide emissions by at least 50% by 2030 from 2005 levels. Natural gas generation is part of our plan to reach that goal.

PROJECT OVERVIEW

The facility will be built with a 260 MW combustion turbine for simple cycle dispatch and an additional 110 MW combined cycle function that will allow the power station to generate 370 MW.

This will allow SaskPower flexibility to use the facility to support solar/wind on calm or cloudy days, or provide baseload, 24/7 power to the province.

ANTICIPATED TIMELINE

- Public engagement – July 2022 – late 2022
- Decision to build – early 2023
- Federal and Provincial environmental determinations – mid-to-late 2023
- Construction start – mid-to-late 2024 (pending regulatory decisions)
- Simple and combined cycle facility – operational mid-2027

NEXT STEPS

The project team will provide a recommendation through the SaskPower governance process regarding whether to proceed with the project. The decision to proceed with the project will be finalized in early 2023.

SaskPower will submit a Project Description to the Impact Assessment Agency of Canada in early 2023. A determination from the Agency will inform next steps of the process. A provincial environmental submission will follow in mid-2023.

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WHAT WE'RE LOOKING FOR FEEDBACK ON

We want your input on how to engage with you during this project, your project interests and any concerns you have. We are interested in your perspectives like:

- How the project might affect you
- How we can lessen effects; and
- What else we should know as we complete our site studies

Our goal is to maintain open communication channels throughout this project.

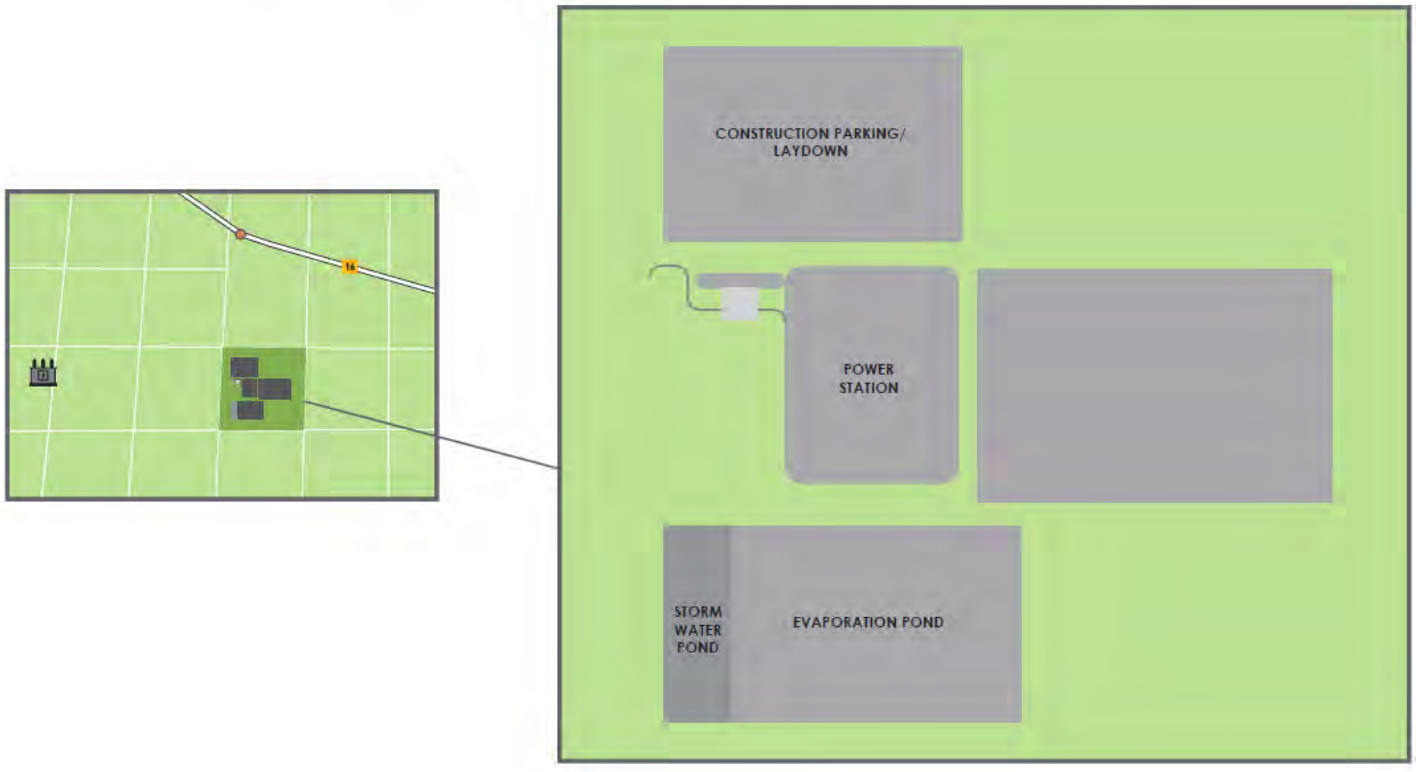
IF YOU HAVE QUESTIONS, OR WOULD LIKE TO KNOW MORE ABOUT THIS PROJECT, PLEASE CONTACT SASKPOWER.

1-855-566-2903
PublicEngagement@SaskPower.com

SaskPower, Stakeholder Consultation & Public Engagement

9SE, 2025 Victoria Avenue, Regina, SK. S4P 0S1

LANIGAN AREA NATURAL GAS POWER PLANT



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TECHNICAL STUDIES

Since we last met studies have been underway at the site. The results of the studies have been summarized. Please reach out if you have further questions.

ENVIRONMENT

SaskPower contracted an environmental consultant to conduct a desktop analysis and biological field assessment in the summer of 2022 to characterize baseline environmental conditions on the project site. The assessment looked at terrain and soils, wildlife and wildlife habitat, vegetation, and wetlands. Based on the assessment, land cover on the quarter section is a combination of cultivation (29%), tame pasture (23%), native grassland (32%), wetlands (15%) and forested (1%). Four seasonal wetlands were identified on the quarter section. Two wildlife species of conservation concern were observed. No rare plants were observed but four noxious weed species were documented. The results of the assessment will support future mitigation planning as well as the development of the environmental assessment applications.

WATER

A hydrogeologic investigation to test the existing two wells on the proposed natural gas facility site has been completed. The wells draw from the Empress Group Aquifer. It was found that the Empress Group Aquifer has approximately 100 meters of available drawdown. At the anticipated peak flow at the facility of 6.5 liters per second, SaskPower does not anticipate any detrimental impact to current or future neighboring wells.

The existing wells on site have the capacity to provide the water needed for the facility under normal operating conditions, however extra capacity is needed to satisfy NFPA 850 fire regulations. SaskPower needs to determine whether to develop a third well or build a pipeline to meet these requirements. We are considering water quality in addition to the capacity of the aquifer.

NOISE

The noise impact assessment at the site for the proposed natural gas power station has been completed. This assessment determines the sound level limits applicable to the project. Saskatchewan does not currently have guidelines regarding noise limits, so the Alberta Utilities Commission (AUC Rule 12) limits are used as the permissible limits. Noise models were developed using receivers in the area along with historical and vendor data. These models analyzed for operation of the facility in combined cycle and simple cycle mode. The results for nighttime operation (the lowest permissible sound level) have been summarized.

Operation in simple cycle is slightly louder than in combined cycle. During the day the permissible sound level is 50dB from the nearest house. At night the permissible sound level is 40dB. A conversation is about 50dB. In both operation modes the natural gas facility meets the permissible sound levels.

AIR

The air dispersion modelling is underway using the Saskatchewan Air Quality Modelling Guideline. Initial model results have determined the project will not exceed emissions requirements and the project will not cause or contribute a significant degradation to ambient air quality.

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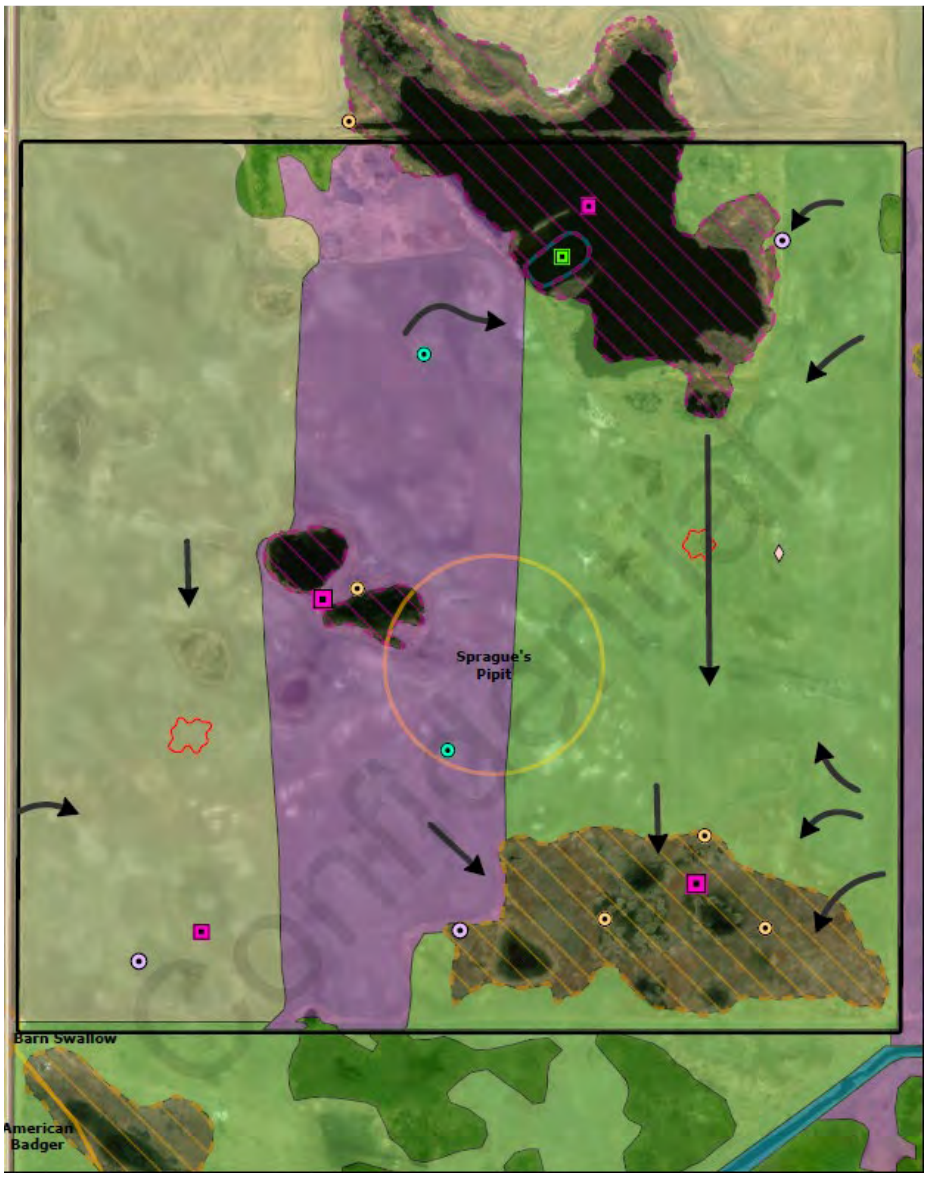
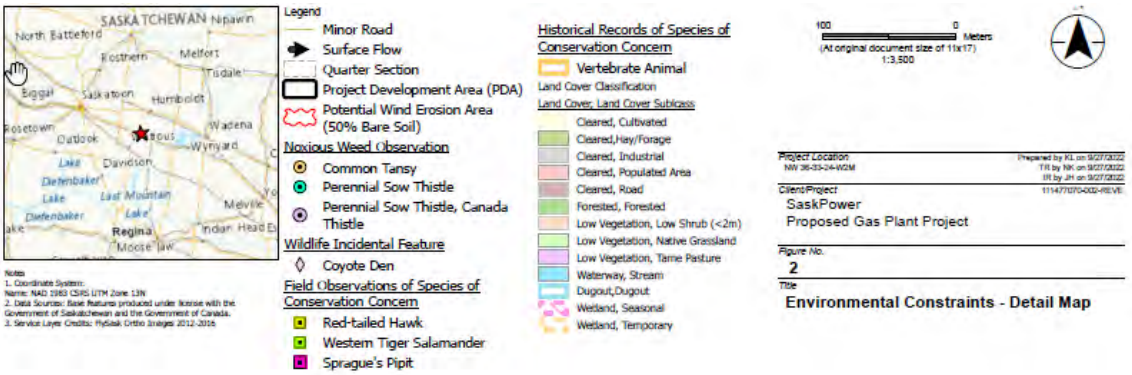
POTENTIAL NATURAL GAS POWER STATION

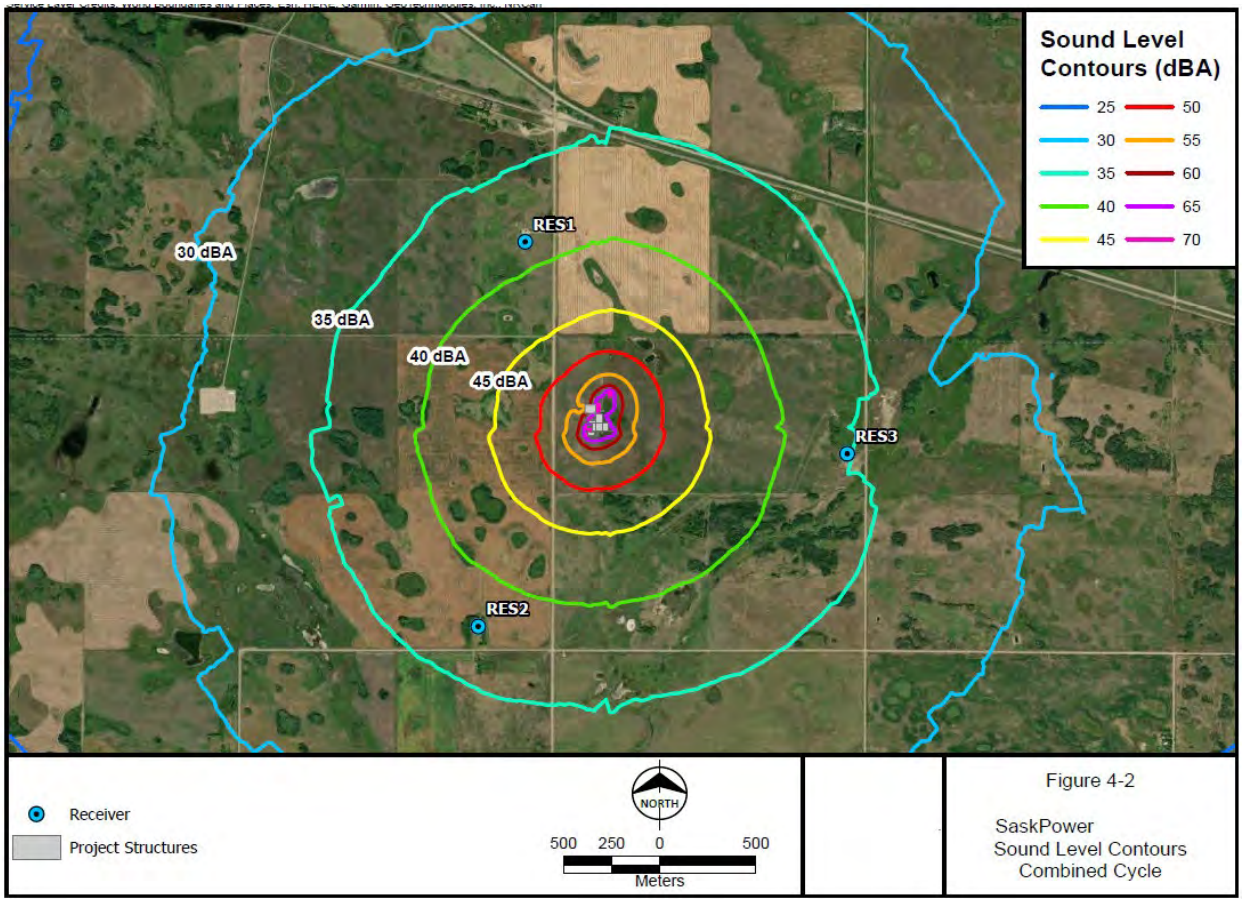
Environmental Constraints Map Summary





Combined Cycle Sound Levels (dBA)

Receiver	Modeled Project Sound Level	Existing Substation Estimated Sound Level	Assumed Nighttime Ambient Sound Level	Operational Nighttime Sound Level	Nighttime Permissible Sound Level
RES1	38.3	22.8	35	40	40
RES2	37.3	23.3	35	39	40
RES3	35.4	15.3	35	38	40



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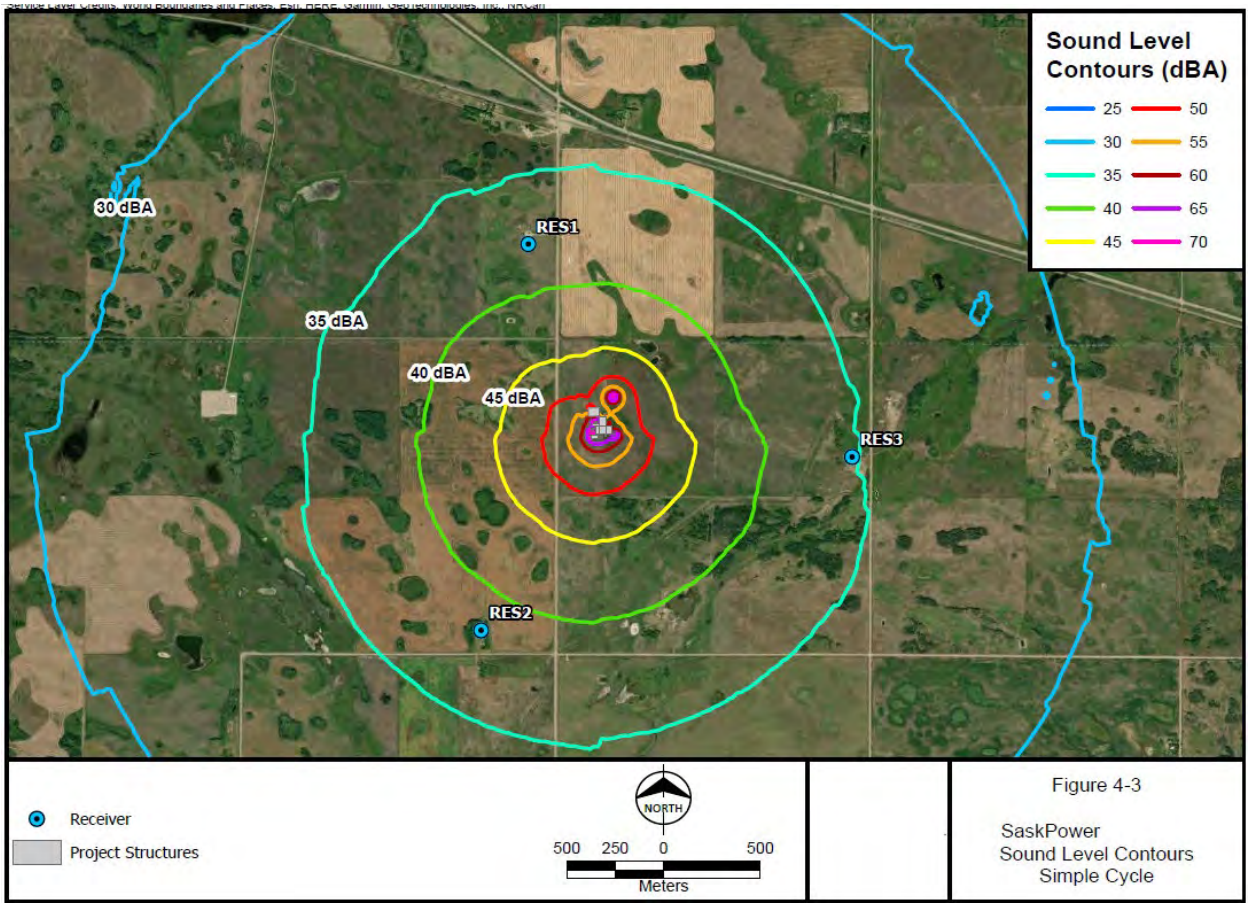
Simple Cycle Sound Levels (dBA)

Receiver	Modeled Project Sound Level	Existing Substation Estimated Sound Level	Assumed Nighttime Ambient Sound Level	Operational Nighttime Sound Level	Nighttime Permissible Sound Level
RES1	37.8	22.8	35	40	40
RES2	38.2	23.3	35	40	40
RES3	35.6	15.3	35	40	40



LOOKING FOR INPUT ON A PROJECT NEAR YOU

EVALUATING SITES FOR NEW NATURAL GAS POWER STATIONS - JUNE 2020

As we begin to phase out conventional coal, we need to replace it with another source of reliable power. Natural gas is an option for meeting this need. It can help us meet environmental regulations because it produces half the greenhouse gas emissions of coal. It also supports renewable sources of power like wind and solar. By the end of 2021, we'd like to have 2 sites selected.

In March 2020, SaskPower invited you to attend a workshop to learn more about this project and include your feedback in our site selection process. Due to COVID-19, we needed to cancel the session. Now, we're looking to exchange information with you in different ways as we settle into our new normal.

We're working to evaluate land SaskPower already owns in the Saskatoon and Lanigan areas. We're also exploring opportunities in Estevan. At the same time, we want to consider new potential land options. This is where you come in.

Below are some ways to provide your input and stay in touch.

TAKE THE 5-MINUTE SURVEY

Our first step is getting to know your preferences.

Let us know how you'd like to provide input and receive information about this project.

TAKE THE SURVEY

STAY IN THE LOOP

To continue to receive newsletters as we hit major project milestones, subscribe to our mailing list.

By the end of this year, we'll share the feedback we've received to date and our preferred site options.

SUBSCRIBE

HAVE A CONVERSATION WITH US

Do you have questions or concerns? We're happy to chat with you one-on-one.

CONTACT US

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REMINDER: YOUR FEEDBACK IS NEEDED

Complete the 5-minute survey below by July 31. Let us know the best way to share information with you, learn about your concerns, and answer your questions. We want to hear from you!

LOOKING FOR INPUT ON A PROJECT NEAR YOU

EVALUATING SITES FOR NEW NATURAL GAS POWER STATIONS

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EVALUATING SITES FOR NEW NATURAL GAS POWER STATIONS

LANIGAN SELECTED FOR POTENTIAL NATURAL GAS POWER STATION

In 2021, we narrowed down potential locations for a new natural gas power station near Lanigan and Estevan. After studying each area, we've chosen the Lanigan site — located near our existing Wolverine Switching Station. We selected and purchased this site in 2015 in anticipation of needing a future site for a natural gas power facility.

Natural gas is our best option for meeting our province's power needs in the near future. It will help us meet environmental regulations and produces half the emissions of conventional coal. As a power source that can be available 24/7, it will also support renewable generation sources — like wind and solar — as we add them to our power grid.

This decision wasn't easy. We made the choice based on the following opportunities at the Lanigan site, such as:

- road access
- potential for groundwater availability
- proximity to natural gas and transmission infrastructure
- cost

We plan to add more natural gas generation in the future. We'll continue to study other possibilities at Shand Power Station in Estevan — including natural gas and other generation options for the Estevan area.

YOUR INPUT MATTERS!

We'll begin engaging with stakeholders and members of the Lanigan community this summer. We want your input to help inform the engagement process, project interests and concerns. We expect to make a final decision to build the new natural gas power station in 2023, after we complete our evaluations.

Watch for updates about engagement at the link below.

STAY INFORMED

STAYING IN TOUCH!

Now that our site location has been chosen, the siting process that began in 2019 has officially finished. This is our last newsletter.

Looking to stay informed about the Potential Lanigan Natural Gas Power Station project? Sign up below!

SIGN UP

FUTURE PLANNING

To reduce greenhouse gas (GHG) emissions, we must change how we design and generate power.

Learn more about our power future at the link below.

LEARN MORE

NATURAL GAS EXPANSION PROJECTS

As part of this site selection process, we're also adding natural gas turbines to the existing Yellowhead and Ermine Power Stations.

This is a fast and cost-effective way to add more 24/7 baseload power to our grid.

Learn more about these projects at the link below.

LEARN MORE

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POTENTIAL LANIGAN NATURAL GAS POWER STATION

KEEPING YOU IN THE LOOP

We held landowner workshops and an open house on July 26 and 27 in Lanigan. We wanted to discuss and learn about local interests and concerns. Thanks to everyone who took time to come and talk with us. If you missed it – don't worry! You can learn more about the project and what we heard below.

We'll have more information to share this fall. Stay tuned as we plan for our next sessions in the area!

DISCOVER MORE

WE WANT YOUR FEEDBACK!

SPREAD THE WORD

How are you affected by the project? What can we do to reduce the impact?

We'd like you to let us know! How? It's easy!

Email us below or call us at 1-855-566-2903 (toll-free).

Your feedback will be used to help inform the engagement process, project interests and concerns.

Do you know someone who might be interested in updates for the potential gas power station?

Help them stay informed. Share the link below so they can stay up to date with the latest information by signing up for this newsletter.

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POTENTIAL LANIGAN NATURAL GAS POWER STATION

WE'RE LOOKING FOR YOUR FEEDBACK

We’re coming back to Lanigan to hear from you! Feel free to pop by the Merry Mixers Hall at 53 Main Street during one of the below time slots to chat with our team.

Oct. 25
1 to 6 pm

Oct. 26
9 am to noon

At the session, you'll get to:

- hear updates about the project
- tell us more about the project area
- discuss your interests and concerns

We’d like to thank everyone who has taken time to talk with us so far about the potential natural gas power station in the Lanigan area.

If you can’t make it to either of the sessions, but have questions about the project, email us.

Learn more about the project at the link below:

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Appendix B Summary of Issues Concordance Table

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
Fish and Fish Habitat			
1	Need for information on how the proposed water withdrawal during project operation may affect fish and fish habitat at the water source and related water bodies, and how these effects will be addressed.	12	Refer to updated Section 9.4.5 for information on the Project water sources. Refer to updated Section 19.6 for information on the potential effects to fish and fish habitat at the water source.
2	Clarify potential effects to fish and fish habitat in relation to the natural gas supply pipeline and how these effects will be addressed.	12	The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower. Refer to updated Appendix D, Sections 2.1, and 1.0 (Figure 1 - General Location Map that depicts an overview of the potential gas supply line options provided by TransGas). TransGas supply lines have not been finalized and therefore a detailed wetland/watercourse list has not been developed at the time of DPD submission. Refer to updated Appendix D, Sections 2.3.2, 5.6, and 5.6.1 for additional information relating to potential effects to fish and fish habitat in relation to the natural gas supply pipeline and how these effects will be addressed and mitigated. Refer to the TransGas shapefile provided that outlines the area in which the potential gas supply lines may be located. This information is preliminary and is subject to change. At the IPD stage, there were two options under consideration: Option A was proposed to be routed adjacent to TransGas' existing right-of-way beginning at SW-16-36-3-W3M east of Saskatoon, Saskatchewan to the Project at NW-36-33-24-W2M near Lanigan, Saskatchewan. Option B was proposed to begin at an existing TransGas facility at SW-12-38-28-W2M near Prud'homme, Saskatchewan to the Project. The natural gas pipeline route with the shortest possible distance from point A (compressor station) to point B (our existing infrastructure near Colonsay, Saskatchewan) was buffered as the original study area. This study area was preliminary and had not yet had a detailed desktop analysis completed at the time of the IPD. While preparing the information for inclusion in the DPD, the TransGas project team executed a routing exercise where several GIS layers were consulted to determine the best possible route from an environmental, engineering, land and Indigenous perspective. At this point, Option A was removed from further consideration. The north/south portion of Option B was widened to avoid sensitive species and species at risk, land ownership such as conservation easements and Crown land and specific land uses such as sensitive habitat, water and native prairie landscapes. Based on continued routing assessments, four potential routes have been identified in the north/south portion of the study area. The routing is still being finalized; however, efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructure. The west/east portion of the study area boundary was further defined and narrowed as the route follows existing infrastructure, where feasible. Several options are being considered as engagement and field studies have not yet occurred to aid in narrowing down a final route.
Migratory Birds, Other Birds and Their Habitats			
3	Potential for effects to migratory birds during all project phases, and corresponding obligations stemming from the Migratory Birds Convention Act, 1994 and its regulations.	13	The *Migratory Birds Convention Act* (MBCA) protects migratory birds, their eggs, and their nests from destruction by any industrial or commercialization activities (GOC 1994). Section 19.8 summarizes effects to migratory birds during all project phases. Updated Sections 19.2.5 and 19.3.5 summarize potential effects and mitigation measures for wildlife and wildlife habitat including migratory birds during the Project's construction and operation and maintenance phases. Mitigation measures will be implemented to support project compliance with the MBCA. Additional details related to potential effects to migratory birds and proposed mitigation measures associated with the natural gas infrastructure is provided in updated Appendix D, Sections 5.7, 5.7.1, and 6.0. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
4	Potential effects to migratory birds from the Project related to road construction, increased traffic, sensory disturbances, linear disturbances, and the need for information on sources of sensory disturbances, migratory paths, monitoring, and how potential effects will be addressed.	5, 13	Pathways of effects to migratory birds are described in updates Sections 19.1.5. Section 19.8 summarizes effects to migratory birds during all project phases. Updated Sections 19.2.5 and 19.3.5 summarize potential effects and mitigation measures for wildlife and wildlife habitat including migratory birds during the Project's construction and operation and maintenance phases. Mitigation measures will be implemented to support project compliance with the MBCA. Additional details related to potential effects to migratory birds and proposed mitigation measures associated with the natural gas infrastructure is provided in updated Appendix D, Section 5.7.1. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
5	Clarify how and when vegetation clearing will be conducted.	13	As outlined in updated Section 11, vegetation clearing is anticipated to occur in April-May 2024 if an impact assessment in accordance with the *Impact Assessment Act* is not required. Otherwise, vegetation clearing is anticipated to occur in April-May 2026. Mechanical site preparation measures will be used for vegetation clearing. Refer to updated Section 19.8 and new Section 19.9 for mitigation measures for migratory birds and species of conservation concern. Additional details related to vegetation clearing associated with the natural gas infrastructure is provided in updated Appendix D Section 5.7.1. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
Species at Risk, Terrestrial Wildlife and Their Habitats			
6	Need for information related to the potential presence of Western Tiger Salamander and Northern Leopard Frog in the project area, their potential use of the stormwater pond, and identification of mitigation measures to address effects.	13	Updated Section 14.2.5.1.2 describes amphibians having potential to breed within and up to 500 metres of the Project Development Area, which includes northern leopard frog and western tiger salamander. Supplemental information has been added to updated Section 19.1.5.1 that describes the potential use of ponds by amphibians.
7	Comment regarding potential project effects to species at risk such as sensory disturbances, and how potential effects will be addressed.	13	Updated Section 19.1.5.1 provides an assessment of sensory disturbance (e.g., noise) effects on wildlife and wildlife habitat, which includes species of conservation concern. Updated Section 19.2.5 describes mitigation for effects on wildlife including species of conservation concern. New Section 19.9 discusses effects for species of conservation concern. Additional details related to sensory disturbance associated with the natural gas infrastructure is provided in Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
8	Need for information related to the potential presence of Whooping Crane, Baird's sparrow, Sprague's pipit and other grassland nesting birds in the project area, potential effects to these species, and identification of mitigation measures to address effects.	13	Updated Section 14.2.5.2.1 provides information related to Important Bird Areas and potential presence of whooping cranes in the Project area. Updated Section 19.1.5.2 describes potential effects to whooping cranes during operation and maintenance. Section 19.3.5 provides mitigation measures for wildlife, including whooping crane. As described in new Section 19.9, the likelihood of whooping crane inhabiting the Project Development Area and Incidental Activity Study Area (as defined in updated Section 4.2.1) is considered low; the nearest potential staging habitat (i.e., Important Bird Area) is located 29 km away. Additional details related to potential effects to migratory birds and proposed mitigation measures associated with the natural gas infrastructure is provided in Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
Climate Change and Greenhouse Gas Emissions			
9	Describe the Project's resilience to future climate change, and where relevant, how it is considered in project design.	13	As more extreme climatic events can derate plant capacities or disrupt their operations, the Project helps SaskPower meet the Planning Reserve Margin (PRM) by providing extra load availability in case it is needed, to avoid unserved energy demand. As mentioned in Section updated 7.3, the Project will be designed with the ability to operate in either flexible simple cycle or efficient combined cycle mode to maximize flexibility to support the addition of renewable generation. As for the resilience of the Project, the design calls for sufficient capacity to fulfill system (grid) reliability and renewable support roles even if operating at a derated capacity due to ambient conditions. The design allows for operation in simple cycle mode, (i.e., operating without the steam turbine generator) in the event of interruption or constraints to the water supply. In addition, the Project will utilize an ACC which significantly reduces the water requirements.
10	Clarify the Project's greenhouse gas emissions and contribution to climate change with consideration of the Strategic Assessment of Climate Change and the Government of Canada's long-term goal to achieve net-zero emissions by 2050. Provide a description of the planned mitigation measures, technologies, and best practices to be applied, including measures being considered to reduce the Project's greenhouse gas emissions on an ongoing basis.	10, 13	Refer to updated Sections 7.2, 9.4.6 and 23 for clarification.
11	Comment related to broadening the consideration of components in the effects assessment in relation to greenhouse gas emissions.	5	Refer to updated Section 23. The draft *Technical Guide Related to the Strategic Assessment of Climate Change* only requires the proponent to provide an estimate of the maximum annual net GHG emissions for each phase of a project during the planning phase. Should the Project require an Impact Assessment, SaskPower will follow the technical guide and provide the information required during the impact statement phase.
12	Concern regarding long-term investments in fossil fuel electricity generation and carbon emissions.	6	Refer to updated Section 7.2 and new Sections 12.2.3 and 12.2.4.
13	Need for fuel consumption estimates for different capacity scenarios including details on simple cycle generation scenarios and greenhouse gas implications.	13	Refer to updated Section 23.3 and updated Tables 24-8 through 24-12 for estimated steady state fuel usage.
14	Clarify units and scope of the Project's emissions estimates.	10, 13	Refer to updated Tables 23-1 and Table 24-12 for additional clarity. Table 24-12 is the theoretical maximum potential air emissions during simple cycle operation and maintenance which has both CO2 and CO2e clearly labelled in the left column "Pollutants". Tables 23-1, 23-2, and 23-3 have had "CO2e" added into the column headers to provide additional clarity. Table 23-1 - Total GHG was removed from the table header, only "Emissions (tonnes)" is presented. The first column of the table clarifies what the emissions are for. Table 23-2 - Total Annual GHG was removed from the table header, only "Emissions (tonnes)" is presented. The first column of the table clarifies what the emissions are for. Table 23-3 - Total GHG was removed from the table header, only "Emissions (tonnes)" is presented. The first column of the table clarifies what the emissions are for. Edits were made to Table 24-12 to clarify unclear language.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
15	Need for additional information on project greenhouse gas emissions estimates, including emissions from land-use change.	13	As per updated Section 14.1.1.1, the PDA was conservatively defined as the entire quarter section (64.9 ha) even though the total disturbance footprint, including temporarily disturbed areas during construction, is expected to be approximately 39.4 ha. As per updated Section 19.1.4.1, the PDA covers 64.9 ha and consists of predominantly low vegetation (55.4%), cleared land (29.4%), wetland (14.5%) and forested lands (0.8%). Based on the finite duration of the Project and plans to return the site to its original state, SaskPower submits that the land use change emissions are negligible.
Indigenous Peoples' Spiritual, Physical, and Cultural Heritage			
16	Comment on adequacy of archaeological study and potential project effects to archaeological, physical and cultural heritage resources.	5	Refer to updated Section 21.4.
Indigenous Peoples' Current Use of Lands and Resources for Traditional Purposes			
17	Clarify potential or perceived project effects to wildlife and vegetation, corresponding potential effects to traditional food sources and food security of Indigenous groups, and how these effects will be addressed.	11	As outlined in updated Section 13.5, the Project is located on land that is owned by SaskPower and the incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan. While the Project is within the traditional territory of Indigenous communities, it is not on land used specifically for traditional purposes by Indigenous Peoples. Given that the Project and incidental activities are not located on land likely to be currently used for traditional purposes such as gathering of traditional foods, the Project is not anticipated to have effects on traditional food sources or food security of Indigenous communities. As outlined in updated Sections 3 and 4.3, no concerns regarding potential effects to traditional food sources and food security have been identified by Indigenous communities currently engaged for the Project. SaskPower is committed to ongoing engagement with Indigenous communities throughout development of the Project and will address concerns regarding potential effects of the Project to access to traditional land should they arise. The nearest occupied provincial Crown land is located adjacent to the Incidental Activity Study Area where the proposed distribution line is located within the TransCanada Yellowhead Highway 16 road allowance (NE 02-34-24 W2M, SE 06-34-23 W2M, SW/SE 29-33-22 W2M) (Appendix F). The nearest unoccupied Crown land is outside of the largest Local Assessment Area and Regional Assessment Area boundaries (air quality), approximately 20 km southeast of the Incidental Activity Study Area boundaries at SE 05-32-20 W2M.
18	Clarify land use by Indigenous groups, including locations, and whether and how access to traditional land may be affected by the Project.	11	As outlined in updated Section 13.5, the Project is located on land that is owned by SaskPower and the incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan. While the Project is within the traditional territory of Indigenous communities, it is not on land used specifically for traditional purposes by Indigenous Peoples. Given that the Project and incidental activities are not located on land likely to be currently used for traditional purposes such as gathering of traditional foods, the Project is not anticipated to have effects on traditional food sources or food security of Indigenous communities. As outlined in updated Sections 3 and 4.3, no concerns regarding potential effects to traditional food sources and food security have been identified by Indigenous communities currently engaged for the Project. SaskPower is committed to ongoing engagement with Indigenous communities throughout development of the Project and will address concerns regarding potential effects of the Project to access to traditional land should they arise. The nearest occupied provincial Crown land is located adjacent to the Incidental Activity Study Area where the proposed distribution line is located within the TransCanada Yellowhead Highway 16 road allowance (NE 02-34-24 W2M, SE 06-34-23 W2M, SW/SE 29-33-22 W2M) (Appendix F). The nearest unoccupied Crown land is outside of the largest Local Assessment Area and Regional Assessment Area boundaries (air quality), approximately 20 km southeast of the Incidental Activity Study Area boundaries at SE 05-32-20 W2M.
Indigenous Engagement and Consultation			
19	Need for meaningful engagement with Indigenous groups, clarity on engagement that has taken place, and any updates to information on engagement and pending engagement. Include health or specific determinants of health-related issues raised by each Indigenous group, and proposed measures to mitigate any issues raised by the community members.	11	Refer to updated Section 4 for updated Indigenous engagement and future planning.
Health Conditions of Indigenous and Non-Indigenous Peoples			
20	Need for the location of sensitive receptors (e.g., hospitals, schools, retirement complexes, assisted care homes) and traditional land use when identifying potential project-related air quality impacts on human health.	16	As outlined in updated Section 19.1.1, Section 22.1, and Appendix G, the largest spatial extent within which the Project is expected to have effects on air quality is a 10 kilometre by 10 kilometre buffer of the PDA. As outlined in Section 13.5, the PDA is not on land available for traditional use by Indigenous Peoples; therefore, the Project is not anticipated to have effects on access to traditional land by Indigenous communities. As described in updated Section 14.2.6.2.3 and Section 22.1, in accordance with Health Canada guidance, the nearest sensitive receptors (e.g., hospitals, schools, retirement complexes/assisted living homes) are not within the largest spatial extent within which the Project is expected to have effects on air quality or the regional context over which effects may occur. As outlined in updated Section 14.2.1, Section 19.1.1, and Appendix G, the air quality modelling was conducted in accordance with the Saskatchewan Ambient Air Quality Standards and the Canadian Ambient Air Quality Standards. As outlined in updated Section 3 and Section 4.3, concerns regarding potential effects to diverse or potentially vulnerable population groups, or Indigenous communities' traditional land and resource use were not expressed during engagement activities. SaskPower is committed to ongoing engagement with Indigenous communities throughout the development of the Project and will address concerns pertaining to air quality effects to diverse or potentially vulnerable population groups, or Indigenous communities' traditional land and resource use should they arise.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
21	Clarify potential surface water and groundwater quality changes from the Project, including consideration on how Indigenous Peoples consume water, and effects on human health.	16	As outlined in updated Section 19.1.1, the Project is not anticipated to result in extensive air deposition onto surface water bodies in proximity of the Project as the Project is anticipated to be in accordance with the Saskatchewan Ambient Air Quality Standards and the Canadian Ambient Air Quality Standards requirements. Additionally, the largest spatial extent within which the Project is expected to have effects on air quality or the regional context over which effects may occur is a 10 kilometre by 10 kilometre buffer of the PDA. As described in updated Section 19.1.6 and 21.3, the Project is not anticipated to affect surface water or groundwater that is used for drinking water, recreational, or traditional purposes. The Project will utilize approximately 1.7% of the capacity of the canal that feeds the Zelma Reservoir. Surface water and groundwater quality will be monitored throughout the lifetime of the Project. As outlined in updated Section 4.3, concerns pertaining to the Project and how Indigenous Peoples consume water, or use surface water and groundwater for drinking water, recreational purposes, or traditional land and resource use have not been expressed by Indigenous communities engaged on the Project. SaskPower is committed to ongoing engagement with Indigenous communities throughout the development of the Project and will address concerns pertaining to how Indigenous Peoples consume water, or use surface and groundwater for drinking water, recreational purposes, or traditional land and resource use should they arise.
22	Use of Health Canada guidance documents when assessing the health effects of projects.	16	SaskPower has used the published Health Canada guidance documents for assessing potential Project-related health effects. Specifically, the following guidance documents were used: • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality was used in Section 22.1in response to comment 20 (HC-01). • Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods was used in Sections 19.5.1, 21.1, and 21.3 in response to comment 23 (HC-04). • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality was used in Section 21.1 in response to comment 21 (HC-03). • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment was used in Sections 15.1, and 22.1 in response to comment HC-06. • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise was used in Sections 13.4.1, 19.1.2, 19.2.2, and 19.3.2 in response to comment 37 (HC-02). • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Radiological Impacts was used in Section 19.5 in response to comment 22 (HC-07). • Guidance for the Environmental Public Health Management of Crude Oil Incidents was used in Sections 19.5.1, 22.1, and 24.2.2 in response to comment 55 (HC-05). Should the Project be subject to an impact assessment under the *Impact Assessment Act*, the Project will adhere to Health Canada's draft Interim Guidance Document for the Health Impact Assessment of Designated Projects under the *Impact Assessment Act* for development of a Health Impact Assessment.
23	Need for information on country foods used by Indigenous Peoples, including information on existing contamination and any possible increase of contamination and projected effects on human health.	16	As described in updated Section 21.3, the Project is located on a quarter section that is owned by SaskPower. The incidental activities will be developed primarily within private agricultural land as well as developed road allowances owned by the Province of Saskatchewan. Privately owned lands and leased provincial Crown lands are typically not available for traditional land and resource use and as such, the Project is not expected to affect the ability of Indigenous Peoples to exercise Aboriginal and Treaty Rights, or use, access or develop lands and resources (including country foods) currently used for traditional purposes. The Project's Emergency Response Plan and Spill Contingency Plan will include protocols and mitigation measures in accordance with Health Canada guidance, the *Canadian Environmental Protection Act*, and the Environmental Emergency Regulations. The implementation of these plans will reduce the potential for accidents and malfunctions that may result from the Project to create transport pathways for contaminants of potential concern into country foods. As outlined in updated Section 4.3, no concerns pertaining to country food consumption and potential contaminant exposure were expressed by Indigenous communities during engagement activities. SaskPower is committed to ongoing engagement with Indigenous communities throughout the development of the Project and will address concerns pertaining to country food consumption and potential contaminant exposure should they arise.
Social and Economic Conditions of Indigenous Peoples			
24	Clarify how the increased demands on local services will impact Indigenous groups and how potential effects will be addressed.	11	As discussed in updated Section 14.2.6, the peak construction workforce is estimated to be 450 employees. Given the relative population of the Local Assessment Area, the addition of full-time employees are not expected to have a substantial effect on the availability of goods and services for residents or nearby Indigenous communities. During operation and maintenance, the expected workforce of approximately 25 full time employees is not anticipated to increase demand on local services to a point that would potentially affect Indigenous communities' ability to access those services. SaskPower is committed to ongoing engagement with Indigenous communities throughout development of the Project and will address concerns regarding potential effects of the Project to access to local services should they arise.
25	Clarify any Indigenous employment targets that may be identified for the Project.	10	Refer to updated Section 22.2 for Indigenous employment targets for the Project.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
Social and Economic Conditions of Non-Indigenous Peoples			
26	Clarify hiring strategy, including permanent employment anticipated, source and quantify of labour, how peak construction workforce will be staffed and how labour shortages and/or accessibility to trained labour were considered.	10, 15	Refer to updated Section 15.3 and 22.2 for the Project hiring strategy.
27	Clarify the economic viability of the Project.	5	Refer to updated Sections 7.2 and 7.3 for additional clarity of the economic viability of the Project.
28	Need for information on economic, social and ecological effects as well as employment opportunity effects on communities.	16	Refer to updated Section 19.1.6.2 for updated information on potential economic effects of the Project.
29	Clarify whether any federal financial assistance is anticipated to address labour and employment issues that result from the Project.	15	Refer to updated Section 16 for additional clarity.
30	Need for empirical evidence to support that the Project will be of economic benefit to the province and will improve federal gross domestic product.	15	Refer to updated Section 19.1.6.2 for information on how the Project will be of economic benefit to the province.
31	Clarify how the Project's decommissioning will impact employment.	15	Refer to updated Section 19.4 for additional clarity.
Vulnerable Population Groups (Gender-Based Analysis Plus)			
32	Clarify how inclusion will be tracked and how gaps in representation will be addressed with respect to engagement.	14	Refer to updated Section 3.4 and 15.4 for how SaskPower plans to track inclusion with respect to engagement.
33	Need for more data within the regional and local areas and consider a Gender-Based Analysis Plus approach. Include consideration of gender-based violence and recruitment and hiring practices.	14	Refer to updated Sections 15.2.1 and 15.4 for clarity on SaskPower's Diversity & Inclusion Strategy and commitment.
34	Clarify the mitigation measures that consider the differential impacts on various population groups.	14	Refer to updated Section 15.4 for additional clarity.
35	Consider Gender-Based Analysis Plus throughout the project lifecycle, engagement, consultation, mitigation, and to create baseline conditions. Include potential gender- based violence risks.	14	Refer to Section 3.2 where one of the goals of SaskPower's engagement work was to understand who else SaskPower should be talking with and in Section 3.4 where the goal includes learning about local interest and concerns. Clarification added to Section 3.4.
36	Need for a detailed description of the Proponent's corporate diversity strategy and how it is relevant to Gender-Based Analysis Plus and employment and labour issues regarding the Project.	15	Refer to updated Section 15.2.1 and new Appendix J for SaskPower's Diversity & Inclusion strategy and its relevancy to Gender-Based Analysis Plus and employment and labour issues regarding the Project.
Acoustic Environment			
37	Need for information on noise effects considering vulnerable populations and Indigenous groups' uses of the land.	16	As described in Section updated 13.4.1, the rural residences in proximity of the Project are not defined as sensitive receptors in accordance with Health Canada guidance. The closest school and hospital are located in Lanigan, approximately 16 km east of the PDA. As per Table 4-2, the closest reserve is located 68 km from the PDA. As described in Section 13.5, while the Project is within the traditional territory of Indigenous communities, it is not specifically on land used for traditional purposes by Indigenous Peoples. As outlined in Section 4.3, no concerns pertaining to noise effects to diverse or potentially vulnerable population groups, or Indigenous communities' traditional land and resource use were expressed by Indigenous communities during engagement activities. SaskPower is committed to ongoing engagement with Indigenous communities throughout the development of the Project and will address concerns pertaining to noise effects to effects to diverse or potentially vulnerable population groups, or Indigenous communities' traditional land and resource use should they arise. As described in Section 14.2.2, Section 19.1.2, and Appendix H, the noise impact assessment (including the quantification of the ambient sound levels, and the cumulative sound levels at the nearby receptors) was conducted in accordance with the Alberta Utility Commission (AUC) Rule 012. The noise attenuation is outlined in Section 19.1.2. To meet the permissible sound level (PSL) of 40 dBA at the nearest receptor, a night time ambient sound level of 35 dBA was assumed as permitted under AUC Rule 012 – Section 2.1(8). Ambient noise surveys have not yet been completed, but are anticipated as the Project progresses. Refer to Appendix F for details of the noise impact assessment. As described in Section 19.1.2 and Section 19.2.2, construction activities will occur in accordance with the construction schedule outlined in Section 11.1 and the Project's cumulative sound levels and low frequency noise effects are not anticipated to be an issue. Noise mitigation measures associated with the construction and operation and maintenance phases of the Project are included in Section 19.2.2, Section 19.3.2, and Appendix H.
38	Need information related to ambient noise surveys, timing of construction activities, predicted noise levels during construction and operations and mitigation of noise effects.	16	Refer to Appendix H for the Noise Impact Assessment that details the noise estimates during operation and maintenance. Refer to Addendum 1 in Appendix H for construction noise estimates. Noise adjustments for time of day (day/night) are detailed in Appendix H. No tonal and/or impulsive noises are expected as part of the Project. Refer to Section 19.2.2 and 19.3.2 for noise mitigations during construction and operation and maintenance.
39	Clarify noise complaints and resolution procedures, and noise attenuation plans.	16	Refer to updated Section 19.2.2 for clarity on noise mitigation and complaints resolution process and sound attenuation measures.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
Surface Water and Groundwater			
40	Consideration of potential effects to groundwater including potential contamination from spills.	7	As described in updated Section 12.1.3, SaskPower is currently analyzing the water quality of water from the wells to evaluate specifically regarding corrosion potential. Currently, it is expected that the use of water from the wells will greatly accelerate the wear on Project components, including the treatment plant. Therefore, the underground water supply pipeline (Section 9.4.5) is considered the preferred water supply option until further economical analysis can be completed. As a result, effects to groundwater quantity as a result of Project are not anticipated (Section 9.4.5 and Section 19.1.6.1). As described in Section 19.5, Section 19.5.1 and Section 19.5.2, in accordance with the Emergency Response Plan and Spill Contingency Plan, no equipment maintenance or service or fuel, oil or other hazardous material storage will occur within 100 metres of any water feature. Surface water and groundwater will be monitored within the PDA throughout the lifetime of the Project. In accordance with the Saskatchewan Spill Control Centre and the Saskatchewan Ministry of Environment Environmental Spill Control Regulations, all reportable spills will be reported. Soil and water quality tests will be undertaken, and a remediation plan will be developed as required in accordance with the Saskatchewan Ministry of Environment guidelines and reporting requirements. Should an unplanned release occur, SaskPower will adhere to the Emergency Response Plan and Spill Contingency Plan, in accordance with the Saskatchewan Spill Control Centre and the Saskatchewan Ministry of Environment Spill Control Regulations in order to avoid potential effects to groundwater, to the extent feasible.
41	Identify contingency options to manage potential excess water volumes should the evaporation pond reach capacity.	13	Refer to updated Section 24.2.1 for contingency options in the event of excess volumes in the evaporation pond.
42	Need information on the possible project-related changes to water availability, local weather and water bodies in consideration of climate change.	5	As mentioned in Section 23.3.2, SaskPower is currently planning to reach net-zero greenhouse gas emissions by 2050 or sooner. It is on track to meet interim targets to reduce greenhouse gas emissions to 50% below 2005 levels by 2030 and increase total capacity from renewables up to 50% by 2030. An acceleration in the transition from conventional fossil fuel energy to renewable energy can decrease the amount of water withdrawals required for cooling systems. As mentioned in updated Section 12.2.5, SaskPower is also working to increase demand side management and other customer programs, which can result in a decrease in its water consumption and increase water efficiency. Should it be required per Project requirements, a Climate Change Resiliency Assessment would be conducted at a later stage of the Project, which would further assess risks related to local weather and climate change hazards. Specifically, a methodology in alignment with Infrastructure Canada's Climate Lens guidance would be used to identify potential climate change risks and suggest resilience measures. Expected changes or impacts to drinking water and water used for recreation and traditional purposes associated with the listed sources are anticipated to be minimal. This is due to the fact that the Project will use approximately 1.7% of the capacity of the canal that feeds the Zelma Reservoir. Water usage from aquifers and reservoirs is closely monitored by the Water Security Agency to confirm it remains within acceptable limits. Any potential contamination from surface water runoff will be contained within bermed boundaries, evaporation ponds, and stormwater ponds. During the construction phase, sewage will be transported off-site for treatment, while during the operation and maintenance phase, on-site sewage treatment will be conducted using a regulated leach field system. SaskWater also employs water level stations and continuous monitoring systems to ensure proper management of the Saskatoon Southeast Water Supply System.
43	Clarify which water sources are anticipated to be affected by the Project and how potential effects will be addressed.	16	Refer to updated Section 9.4.5 and 21.1 and 19.1.6 for clarification on the Projects water sources and the potential effects on these sources and human health.
44	Potential effects to water quality and corresponding, obligations stemming from the Fisheries Act and its regulations.	13	The Project and its incidental activities, as described in updated Section 14.1.1.2 and Section 18.1, are not anticipated to affect water quality. Supply water is expected to be sourced from Zelma Reservoir using existing intake infrastructure that has been approved by Fisheries and Oceans Canada. Supply water will be sampled, tracked, and regulated by the Saskatchewan Water Security Agency for compliance with water quality and usage limits. Surface water runoff from the Project will be retained within the bermed boundaries of SaskPower's property, and within evaporation and stormwater ponds. During the construction phase, on-site sewage will be trucked off-site for treatment at an appropriate facility. During the operation and maintenance phase, sewage will be treated on-site via a leach field system. As described in Section 19.5, SaskPower will commit to the development of a Emergency Response Plan and Spill Contingency Plan for the Project in accordance with the *Canadian Environmental Protection Act* and the Environmental Emergency Regulations. The Emergency Response Plan and Spill Contingency Plan will include protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases of toxic and hazardous substances listed in Schedule 1 of the Environmental Emergency Regulations. The implementation of these plans will support compliance with the *Fisheries Act* by reducing the potential for the release or deposition of a deleterious substance in waters frequented by fish and prevent the death of fish or the HADD of fish habitat and subsequent violations of the *Fisheries Act*. Additional details related to potential effects to water quality associated with the natural gas infrastructure is provided in updated Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.

Appendix B Summary of Issues Concordance Table

No.	Issue	Registry Comment Number	SaskPower Response
Navigable Waters			
45	Clarity on whether and how any project component(s), including incidental activities, may affect a navigable waterway, and how these effects will be addressed.	9	The Project and its incidental activities, as described in updated Section 14.1.1.2 and Section 18.1 are not anticipated to interfere with listed or potentially navigable waterways located in proximity of the Project (e.g., South Saskatchewan River, Wolverine Lake, Little Manitou Lake). The Project and its incidental activities are not anticipated to affect navigation or navigation safety, and are not anticipated to be constructed in, on, under, over, through or across navigable waterways. In accordance with the Navigation Protection Program's Project Review Tool, the Project does not fall under the Navigation Protection Program's mandate. None of the natural gas infrastructure potential route options interfere with navigable waterways. Additional details related to potential effects to navigable waterways associated with the natural gas infrastructure is provided in Updated Appendix D, Section 2.1.1. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
Wetlands			
46	Need for additional information on wetlands to better understand potential effects to migratory birds and wildlife species at risk, including potential for direct and indirect impacts, types of wetlands that may be impacted, the regional importance of potentially impacted wetlands and regional cumulative impacts due to wetland loss.	13	Updated Section 19.1.4.1 discusses potential changes in wetlands due to construction of the Project. A cumulative effects assessment is not required as part of the Initial Project Description or the Detailed Project Description in accordance with the *Impact Assessment Act* and the Information and Time Management Regulations. However, as part of the provincial regulatory requirements, SaskPower will conduct a cumulative effects assessment (inclusive of vegetation and wetlands) for the Project as part of the provincial regulatory application. Updated Section 19.1.5.1 discusses the lack of suitable overwintering habitat for northern leopard frog within the PDA. Updated Section 19.8 and new Section 19.9 discusses overall effects of vegetation loss within wetland habitats and alterations within the Project area for migratory birds and species of conservation concern (e.g., whooping crane, grebe, western tiger salamander). Updated Sections 19.2.4, 19.2.5, and 19.35, and Section 19.3.4 discuss mitigation measures pertaining to vegetation and wetlands, and wildlife and wildlife habitat, inclusive of mitigation measures pertaining to migratory birds and species of conservation concern, for the construction and operation and maintenance phases of the Project. As outlined in updated Section 19.2.4 incidental activities will be routed to avoid wetlands to the extent feasible, approvals from the appropriate provincial regulator will be obtained prior to commencing work in wetlands, and clearing will be limited to the PDA. Additional details related to potential effects to wetlands, migratory birds, and species of conservation concern regarding the natural gas infrastructure is provided in Appendix D. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower.
Cumulative Effects			
47	Need for consideration of cumulative effects.	7	A cumulative effects assessment is not required as part of the Initial Project Description or the Detailed Project Description in accordance with the *Impact Assessment Act* and the *Information and Time Management Regulations*. However, SaskPower is developing and submitting a provincial environmental assessment screening (Technical Proposal), to the Saskatchewan Ministry of Environment - Environmental Assessment and Stewardship Branch for the Project. SaskPower will conduct a cumulative effects assessment for the Project as part of the Technical Proposal in accordance with provincial guidelines.
Need for the Project			
48	The Project would provide a local source of energy, help to reduce wasted energy and help meet carbon emission targets.	8	Refer to Section 7.3 for the potential benefits of the Project.
49	The Project will likely create positive social and economic impacts and assist in reducing greenhouse gas emissions.	7	Refer to Section 19.1.6.2 for the potential economic benefits to Saskatchewan and Canada.
Alternative Means of Carrying Out the Project			
50	Need for clarification on alternatives or mitigations with respect to greenhouse gas emissions, such as Grid Enhancing technology, Carbon Capture Utilization Storage, battery storage from renewable energies (e.g., solar, wind) and fuel cells, including their feasibility and cost effectiveness, that were considered.	5, 6, 10, 13	Refer to updated Sections 7.2, 12.2 and 23.3 for clarification on alternatives and mitigations with respect to greenhouse gas emissions. Refer to updated Section 23.3.1 for clarity on Carbon Capture Utilization Storage information Refer to updated Section 7.2 for clarity on capacity arrangements with Manitoba Hydro Refer to updated Section 12.2 for clarity on electricity Imports Refer to updated Section 12.2 for details on energy management, distributed generation, and grid modernization Refer to updated Section 7.2 for details on Project need and refer to updated Section 12.2 for details relating to the alternatives to the Project. Refer to updated Section 23.3.1 for details on carbon capture and Section 23.4 Net-Zero 2050 Refer to updated Section 7.2 and 12.2 to discuss alternative technologies to the Project and why the Aspen Project is required.
51	Clarify details of the proposed alternatives for water supply including source waters, related potential effects, and water needs during operations and maintenance.	IAAC, 5, 7	Refer to Section 9.4.5, 12.1.3.3, 19.1.6.1, and 21.3 for details of the proposed options for water supply including source water option, related potential effects, and water needs during operation and maintenance.

No.	Issue	Registry Comment Number	SaskPower Response
52	**Clarify which alternative pathways for sharing Planning Reserve Margins with neighbours were considered, if any.**	10	Planning Reserve Margin cannot be shared by two Balancing Authorities in any identical period, however, they could be shared seasonally (i.e. one Balancing Authority counts a resource as theirs in the winter months and the other counts the same resource as theirs in the summer months.) The current issue is that both Manitoba and Alberta are like Saskatchewan wherein Manitoba experiences similar winter peaking, and Alberta experiences similar winter peaking and summer derates. Therefore, there is no such opportunity to share Planning Reserve Margins. The opportunity potentially exists with SPP to the south, however, there is currently no transmission available to accommodate such an arrangement. No change to the DPD.
Alternatives to the Project			
53	Need for consideration of and further information on alternative options to the Project to substantiate why the Project is considered the ideal option for enabling renewable generation and achieving emissions reductions.	5, 6, 10	Refer to updated Sections 7.2, 12.2 and 23.3.1 regarding the consideration of alternative options to the Project. Refer to Summary of Issues response to issue No.50.
Accidents and Malfunctions			
54	Need for further information on the potential project effects and how these effects will be mitigated including consideration of spills or releases of hazardous or deleterious substances from unplanned accidents and malfunctions.	13	As described in Section 19.5, the Emergency Response Plan will be consistent with those in place at existing SaskPower generating facilities and will include emergency preparedness and response systems, including coordinating with qualified response organizations, training requirements for staff and contractors, and emergency communication plans, including community awareness plans for the Project. As described in Section 19.5.2, the Emergency Response Plan will include emergency response measures to be implemented if an unplanned or planned natural gas release occurs.
55	Need for further information on potential accident and malfunction scenarios that could lead to the release of contaminants into the surrounding environment for each phase of the Project, and the potential effects on human health.	16	As described in Section 19.5.1, hazardous material releases have the potential to effect the health of staff through inhalation, ingestion, and/or direct contact. However, effects to the health of the public as a result of hazardous materials releases during the Project's construction and operation and maintenance phases are not anticipated to occur. The Emergency Response Plan will outline emergency response measures and preparedness systems if the health or safety of staff is threatened. The Emergency Response Plan will be consistent with those in place at existing SaskPower generating facilities, and will be developed in accordance with Health Canada guidance.
56	Follow the Canadian Environmental Protection Act, 1999 and regulations when developing the emergency preparedness plan.	13	As described in Section 18.1 and Section 19.5 of the Detailed Project Description, the Project's Emergency Response Plan and Spill Contingency Plan will be developed in accordance with the *Canada Environmental Protection Act* and the Environmental Emergency Regulations. In accordance with Part 8 of the *Canada Environmental Protection Act*, SaskPower will develop protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases that will be included in the Emergency Response Plan. The Environmental Emergency Regulations outline the requirements for facilities to manage toxic or hazardous substances listed in Schedule 1, through assessing the risk of spills, adhering to measures to mitigate the risk of spills, and adhering to response measures to address any potential spills. In accordance with Section 4, should the Project include any of the listed substances, the Project will be required to adhere to the Environmental Emergency Regulations. As described in Section 19.5 of the Detailed Project Description, the Emergency Response Plan will be consistent with those in place at existing SaskPower generating facilities and will include emergency preparedness and response systems, including coordinating with qualified response organizations, training requirements for staff and contractors, and emergency communication plans, including community awareness plans for the Project. As described in Section 19.5.1 of the Detailed Project Description, a Spill Contingency Plan will be developed for the Project that will identify protection and emergency response measures to use if there is a release of hazardous materials. The Spill Contingency Plan will be developed in accordance with the *Canadian Environmental Protection Act* and the Environmental Emergency Regulations. Table 18-1 provides a summary of potential federal legislative and regulatory requirements for the Project.
57	Development of a Spill Contingency Plan.	13	As described in Section 9.2.1.1 of the Detailed Project Description, a Spill Contingency Plan will be developed as part of the Environmental Management Plan prior to contractor mobilization. Section 19.5.1 of the Detailed Project Description indicates that the Spill Contingency Plan for the Project will be developed to support a response and actions to reduce potential effects to the environment. The Spill Contingency Plan will identify protection and emergency response measures to use if there is a release of hazardous materials. Section 19.5.1 of the Detailed Project Description lists the mitigation measures to reduce potential effects for accidental hazardous material releases, including proactive spill prevention mitigation measures that will be incorporated into all phases of the Project. The Spill Contingency Plan will be consistent with those in place at existing SaskPower generating facilities and will include direction for staff for responding to a spill or unplanned release of a pollutant, including guidance for recording and responding to the spill or unplanned release of a pollutant. The direction provided will also include immediate actions to be taken, corrective actions to be taken, and cleanup actions to be taken. The Spill Contingency Plan will also include a list of higher risk chemicals with information on the danger, safety data sheets that will be reviewed by staff prior to handling the listed chemicals, methods of handling spills, precautions to be taken by staff, and equipment required for handling and disposal. Contact information for emergency spill equipment contractors and the Saskatchewan Spill Control Centre will be included in the Spill Contingency Plan.
58	Need for further information on the Community Awareness and Emergency Communications plans.	13	Refer to updated Section 19.5 for additional information on the community awareness and emergency communications plans.

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No.	Issue	Registry Comment Number	SaskPower Response
Waste and Emissions			
59	Need to assess the option for the Project to go waste-free.	5	As per Section 9.3.2, aside from stormwater runoff, the Project will not discharge any liquid waste off site during operation and maintenance. As per Section 24.2.3 wastes generated during operation and maintenance will be disposed of and/or recycled by licensed waste contractors in accordance with federal, provincial, and municipal regulations using approved facilities. Refer to Section 24 for more information regarding waste that is generated and managed during construction, operation and maintenance, and decommissioning and reclamation phases of the Project.
60	Clarify the methodology and supporting information for the calculation of fugitive emissions.	13	Refer to updated Section 24.5.5 for additional clarity on the emissions calculation methodology including emission factor selection process and sources.
61	Need for air quality information about emissions and dispersion of air contaminants from project activities.	16	Refer to updated Section 14.2.1.2 that clarifies the background concentrations are based on air quality data collected by the Central Region air quality monitoring stations located in Saskatoon. Sensitive receptors near the site were investigated and the closest sensitive receptors are a hospital and elementary school located in Lanigan, SK approximately 16 km east of the Project. The closest reserve lands are approximately 60 km to the south-east. Modeling was performed to demonstrate compliance with SAAQS and CAAQS with receptor grids out to 10 km and 2 km respectively. The modeled impacts are below the SAAQS for all operational scenarios. Seven residential receptors were identified within a 2 km radius of the Project. All impacts are below the CAAQS thresholds at each of these receptors. Therefore, the impacts at the closest non-residential sensitive receptors 16 km away are below the SAAQS and CAAQS. The nearest unoccupied Crown land is outside of the largest LAA and RAA boundaries (air quality), approximately 20 km southeast of the Incidental Activity Study Area boundaries at SE 05-32-20 W2M.
62	Need for complete inventory of all potential air pollutants (including diesel exhaust emissions), predicted residual effects on air quality from project construction, operations, and maintenance, and an exclusion list of all air pollutants and the justification for exclusion.	16	Emissions associated with diesel exhaust (DE) from the operation of heavy equipment and generators during the construction phase was not independently called out and was instead incorporated into Table 24-5: Estimated Air Emissions from Construction Equipment. As stated in Section 19.9, air quality emissions are not expected to exceed SAAQS or CAAQS which justifies the conclusion that ambient air quality will be maintained. Refer to updated Section 24.4.
General Project Description			
63	Additional information on incidental activities (including natural gas supply lines) such as routing, portions that are solely for the benefit of the Project, potential effects, and how they will be addressed.	IAAC, 12	Refer to updated Section 19.6 for information on incidental activities related to the Project and their potential effects on fish and fish habitat. Additional details related to the natural gas supply line and its potential effects/mitigation on fish and fish habitat is provided in updated Appendix D (Executive Summary and Section 2.1, and 5.6.1. The natural gas infrastructure is incidental to the Project, will be developed by TransGas Limited, and is outside the care and control of SaskPower. At the IPD stage, there were two options under consideration: Option A was proposed to be routed adjacent to TransGas' existing right-of-way beginning at SW-16-36-3-W3M east of Saskatoon, Saskatchewan to the Project at NW-36-33-24-W2M near Lanigan, Saskatchewan. Option B was proposed to begin at an existing TransGas facility at SW-12-38-28-W2M near Prud'homme, Saskatchewan to the Project. The natural gas pipeline route with the shortest possible distance from point A (compressor station) to point B (our existing infrastructure near Colonsay, Saskatchewan) was buffered as the original study area. This study area was preliminary and had not yet had a detailed desktop analysis completed at the time of the IPD. While preparing the information for inclusion in the DPD, the TransGas project team executed a routing exercise where several GIS layers were consulted to determine the best possible route from an environmental, engineering, land and Indigenous perspective. At this point, Option A was removed from further consideration. The north/south portion of Option B was widened to avoid sensitive species and species at risk, land ownership such as conservation easements and Crown land and specific land uses such as sensitive habitat, water and native prairie landscapes. Based on continued routing assessments, four potential routes have been identified in the north/south portion of the study area. The routing is still being finalized; however, efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructure. The west/east portion of the study area boundary was further defined and narrowed as the route follows existing infrastructure, where feasible. Several options are being considered as engagement and field studies have not yet occurred to aid in narrowing down a final route.
Other – Editorial Comments on the Initial Project Description			
64	Clarify references to decommissioning emissions.	13	Refer to updated Table 23-9 and Table 24-9 and updated Section 24.6 for clarification of decommissioning emission references.
65	Project lifespan should be included in the introductory section.	15	The anticipated start/end dates were referenced in several sections of the IPD including Section 9.5, Tables 11-1 and 11-2, Section 11.2, and Section 11.4, in addition to Section 19.4. Refer to updated Section 1.1.

Appendix C Indigenous Engagement

C.1 Indigenous Engagement

We want your input on a

PROJECT NEAR YOU

SaskPower will potentially build up to two new natural gas power stations by the end of the decade.

As we plan the future power system, we're looking at a range of power generation options. Natural gas is one of them.

Given the demand for power from large urban centres, we're looking for site locations in the Regina and Saskatoon regions. We're also evaluating gas quality and supply in the Estevan area.

Please join us for a workshop.

At this early stage, we're working with municipalities, Indigenous rightsholders and regional planning groups around Saskatoon and Regina to get feedback on:

- The study areas in each region;
- Our expression of interest process to find potential sites;
- Future development plans in each region; and
- How you'd like to stay in touch throughout the process.

The workshops in **Saskatoon** will be held:

Tuesday, March 24, 2020
and
Tuesday, March 31, 2020

8:30 AM to 1 PM
Saskatoon Travelodge
Hercules Room

The workshops in **Regina** will be held:

Thursday, March 26, 2020
and
Thursday, April 2, 2020

8:30 AM to 1 PM
Mackenzie Art Gallery
Agra Torchinsky Salon

Please RSVP by March 20, 2020. Lunch and refreshments will be provided.

If you're unable to make it to a workshop, we're happy to meet with you in your community. Please call or email with your preference. Contact information below.

306.566.2514
IndigenousRelations@SaskPower.com

SaskPower
Powering the future®

We want your input on a

PROJECT NEAR YOU

Chinook Power Station near Swift Current is a 350 MW natural gas power generation facility. It closely resembles what we'll potentially build.

Why natural gas?

Natural gas is an important part of SaskPower's plans to ensure reliable electricity, while meeting environmental regulations and an increasing need for power. It's also a baseload source of power that supports renewable generation such as wind and solar power. We expect we'll need more power generation by 2027 and beyond. We're considering a range of options and natural gas power generation is one of them.

What does SaskPower consider when choosing sites?

As a starting point, SaskPower considers environmental factors, Indigenous knowledge, land use, social aspects, technical components, and cost.

Why are you looking for land now when a new facility isn't needed until 2027?

Finding land that's suitable for large power plants takes time. There's lots of information to collect and consider. In early 2022 we'll decide whether to proceed with a natural gas power station and determine the size and location at that time as well. Before that happens, we need to select potential sites, complete technical and environmental studies, and fulfill both provincial and federal regulatory review processes.

306.566.2514
IndigenousRelations@SaskPower.com

SaskPower
Powering the future®

From:	Indigenous Relations
To:	Indigenous Relations
Subject:	Siting for potential Natural Gas Power Stations - Workshop Invitation
Date:	Wednesday, March 11, 2020 4:23:46 PM
Attachments:	Workshop Invitation - Indigenous Relations Contact.pdf image001.jpg

---

Good afternoon,

SaskPower is looking for two sites that could potentially host new natural gas power stations. We are consulting with municipalities, Indigenous rightsholders, and other planning groups to help us identify a willing host and potential land locations.

You are invited to attend any of four workshops to provide input. Workshop information is in the attached pdf.

Please RSVP by March 20th and let us know who from your organization will be attending and if any dietary restrictions exist.

Event dates are:

The workshops in **Saskatoon** will be held:
Tuesday, March 24, 2020
and
Tuesday, March 31, 2020
8:30 AM to 1 PM
Saskatoon Travelodge
Hercules Room

The workshops in **Regina** will be held:
Thursday, March 26, 2020
and
Thursday, April 2, 2020
8:30 AM to 1 PM
Mackenzie Art Gallery
Agra Torchinsky Salon

We hope you can make it to one of the workshops. If not, please let us know how we can start to share information and learn from you as we build this new siting process.

Regards,

Indigenous Relations
Corporate and Regulatory Affairs
SaskPower
email (indigenousrelations@saskpower.com) | saskpower.com
f. 306-566-2548
2 NE, 2025 Victoria Avenue
Regina, SK, S4P 0S1

Indigenous Relations
9 SE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
IndigenousRelations@saskpower.com

July 12, 2022

LETTER TO INDIGENOUS GROUPS

Re: Proposed Natural Gas Power Station

Dear Rightsholder,

As you are aware, SaskPower was evaluating land for a potential new natural gas power station. We have now selected our land, NW 36-33-24 W2M, near our Wolverine Switching Station, in the Lanigan area. We selected the Lanigan site based on the opportunities it presented such as road access, potential for groundwater availability, proximity to natural gas, transmission infrastructure and cost.

We are reaching out to learn from First Nations and Métis communities to understand what we need to consider as we continue to evaluate this project. **We need your input! Please get in touch by email indigenousrelations@saskpower.com or phone at 855-566-2903 to discuss further.** Your input will help inform the final decision in early 2023. Please note: A final decision has not been made to build the new power station.

About the project
As we begin to phase out conventional coal power, we will need to replace it with another source of reliable power. Natural gas is our best option for meeting this need. It will help us meet environmental regulations because it produces half the emissions of conventional coal. It will support us in bringing more renewable generation options online, like wind and solar.

As a result, we are looking to build a 370-megawatt (MW) combined cycle natural gas power station near Lanigan. A 260-MW combustion turbine is forecast to be in-service in 2027, with the expansion of the plant built by 2028. The facility will be designed to have the capability to operate in both simple cycle and combined cycle mode, which will provide more flexibility when demand for power changes. This plan may need to shift based on future regulations that may come through the Government of Canada's Clean Electricity Standard.

Thank you in advance for taking time to participate in this process. Your input is important to us as we plan for future generation.

Sincerely,

SaskPower Indigenous Relation

Indigenous Relations
9 SE – 2025 Victoria Avenue
Regina SK Canada S4P 0S1
Toll free: 1-855-566-2903
IndigenousRelations@saskpower.com

October 31, 2022

LETTER TO INDIGENOUS GROUPS

Re: Proposed Natural Gas Power Station

Dear Rightsholder,

In July 2022, SaskPower reached out to share information and to see if there were any questions regarding the proposed Natural Gas Power Station near Lanigan, Saskatchewan. To date SaskPower has not received your response so we are following up. As mentioned, SaskPower has selected NW 36-33-24 W2M, near our Wolverine Switching Station, in the Lanigan area based on the opportunities it presented such as road access, potential for groundwater availability, proximity to natural gas and transmission infrastructure and cost. Please note: we haven't made a final decision to build the new power station. In fact, your input will help inform the final decision in early 2023.

We would like input from First Nation and Metis communities. Please get in touch by email indigenousrelations@saskpower.com or phone at 855-566-2903 to let us know how you'd like to exchange information.

As we begin to phase out conventional coal power, we'll need to replace it with another source of reliable power. Natural gas produces half the emissions of conventional coal, and it will support more renewable generation options like wind and solar. The facility will have the capability to operate in both simple cycle and combined cycle mode, which will provide more flexibility when demand for power changes.
Thank you in advance for taking time to participate in this process. Your input is important to us as we plan for future generation.

Sincerely,

SaskPower Indigenous Relations
Enc.

C.2 Traditional Knowledge and Protocol Study

Wolverine Project: SaskPower
Traditional Knowledge and Protocol Study
Letter to Impact Assessment Agency of Canada

Wicehtowak Limnos Consulting Services LP
A George Gordon First Nation Company
November 25, 2022

ATTN: Impact Assessment Agency of Canada

Introduction

Wicehtowak Limnos Consulting Services LP (WLCS) conducts environmental and consultation work on behalf of George Gordon First Nation. WLCS meets the criteria used to determine if a business entity is Indigenous and we are registered on the federal PSIB database.

WLCS has extensive experience in assessing projects using a braided approach that constructively relies on braiding western approaches and Indigenous Knowledge. This focus has been used successfully on other large projects and we have conducted work for the Impact Assessment Agency of Canada (IAAC) on the Deltaport Expansion Project.

WLCS was approached in Q3 of 2022 by SaskPower (the proponent) to co-develop and execute a Traditional Knowledge and Protocol (TK&P) study for the proposed Wolverine Project. Our goal is to document the following:

- Provide regulatory context from the perspective of George Gordon First Nation
- Provide a statement of knowledge ownership
- Define methodologies and protocols
- Provide desktop and field assessment results
- Define next steps

We would like to acknowledge the proponent for their proactive approach to project assessment and we are hopeful that the IAAC finds the information useful moving forward in project assessment.

Regulatory Context

This document is provided to the proponent in support of their initial project description to the IAAC regarding the Wolverine Project. We have provided the proponent with an analysis of the role of the IAAC in assessing projects such as these, but have also identified other key federal acts, laws, and policies that define the roles and responsibilities that George Gordon First Nation considers when engaging proponents, the Crown and their agents. It is beyond the scope of this document to provide this summary, but we wish to be transparent with the IAAC that regulatory oversight defined in the Impact Assessment Act does not fulsomely encompass the obligations of the Crown to Section 35 Rights Holders; and other acts, laws and policies may inform Indigenous-based assessments and be the basis for consultation. Within the context of this submission we do not provide any information to be considered other than what

should be reasonably considered by the IAAC.

Knowledge Ownership and Usage

All data contained within this document may be released publicly and used by the proponent and the Crown for the limited purpose of informing the submission of an initial project description by the proponent to the IAAC. All intellectual property within this document remains the exclusive domain of George Gordon First Nation and may not be relied on any other party and may not be relied upon by the proponent or the IAAC for subsequent steps in the regulatory process without written consent.

Methodology and Protocol

WLCS working in concert with Knowledge Keepers developed a braided approach to conducting work that relied on accepted western approaches with necessary Protocols. All results communicated in this document were determined using a braided approach. Western approaches mirrored those undertaken by western technicians working with the proponent and the Crown but were done so following internal Protocols developed by our Knowledge Keepers. The site visits had Knowledge Keepers present and all work presented here has been reviewed by George Gordon First Nation and can be relied upon as defined above.

Desktop Review

As part of the scope of work for this project, WLCS undertook a desktop review of publicly available data for the site. This was largely focused on confirmation of third-party data provided by Stantec to SaskPower. We did not note any errors or issues. We would like to ensure that the IAAC understands that there are a plurality of landscape, environmental and historical variables important to Indigenous Rights Holders that are not captured in any provincial or federal databases. Within this context we are satisfied with the desktop findings assessed using western methodologies and databases, but offer no opinion regarding valued Indigenous components (VICs) through desktop assessment.

Site Visit

Background

As part of this review, WLCS travelled to the location on two dates. On October 14, 2022, the site was accessed to conduct a reconnaissance assessment of safety, access and other considerations that may have impacted the subsequent field assessment. On October 20, 2022, WLCS returned to the location to undertake our initial traditional knowledge and protocol assessment. WLCS met with two SaskPower team members on location and the assessment was observed by all six persons present. Assessments took place without snow cover, but vegetation was dormant and therefore a complete assessment was not possible.

Methodology

The methodology followed for this project was developed by George Gordon First Nation technicians and Knowledge Keepers and braids western approaches with Indigenous Knowledge. This approach relied upon observations of the site, and when necessary conducting appropriate protocol activities to allow for further work. Field activities included:

- Verification of Stantec findings
- Observation and documentation of landscape elements not noted in the Stantec field assessment.
- Observation and documentation of suspected or known cultural elements.
- Ceremony completed for suspected or known cultural features.

The site was inspected in fair weather conditions and was free of snow. The entire location was inspected with the exception of the active laydown yard which is located in the northwest corner of the site.

Results

The location consists of roughly 1/3 cultivated land in the western area of the site, with the eastern 2/3 being uncultivated with low shrubs and wetlands, as described by Stantec (2022). Our field observations largely confirm Stantec's findings, with some additional information. This document provides a summary of findings that can be released publicly, but the proponent is in receipt of detailed field reports that have proprietary and confidential information. As stated above the Crown may rely only on the data shared in this document, but we will consider sharing more information if requested by the Crown.

Wildlife

One large suspected American Badger burrow as noted along the south portion of the site, and five stick nests were noted in the wooded area immediately south of the site. None of these features are of immediate concern but should be reassessed in spring 2023.

Vegetation

Our assessment of vegetation features of interest to George Gordon First Nation was limited due to the late season. We noted sage, but no other traditionally important plants. Many plant species of concern are difficult to assess unless actively growing. We suggest a site vegetation assessment during growing conditions in Spring 2023.

Historic Resources and Occupation History

Large willow trees were noted in the north area of the site and were interpreted to be associated with a former homestead structure and yard. Some remnants of the foundation were observed along with other features consistent with a homestead site. A tree core was taken from one of the willow trees and rings were provisionally counted in the field. A nominal age of 90 years was ascribed to the tree but this should be confirmed through a more thorough dendrochronological assessment in spring 2023.

The evaluation of historic resources in Saskatchewan is governed by the provincial Heritage Conservation Branch. Under this legislation and current practice, only those with a Master's or Ph.D. in Archaeology may access historical resource records or complete assessments that may be considered under provincial regulatory practices. The federal Crown has no heritage resource function and as such assigns all heritage resource regulation to the province. Within the current system, we have no ability to acquire or assess heritage resource data, nor provide mitigation that conforms to provincial regulation unless completed by an accredited archaeologist. We therefore have no comment on any heritage resource data held by the provincial Crown. Due to the current regulatory regime we refer to all areas that may be heritage resources as area(s) of cultural concern. Given the sensitivity of these areas, we are not providing detailed information in this document but we have provided the proponent with sufficient information to support interim mitigation measures and protocol considerations.

We conducted a field assessment of the site and noted area(s) of cultural concern. These area(s) need further assessment in spring of 2023. The proponent has confirmed that there are no planned disturbances in the area(s) of concern prior to our planned next assessment steps. As such, there are no specific concerns with these area(s) and/or temporary or permanent mitigation steps to be undertaken supporting the proponent's submission of an initial project description.

Next Steps

Information shared in this document is applicable only to the submission of an initial project description by the proponent to the IAAC. This section defines suggested next steps to further the assessment of the project in subsequent stages of the IAAC process and to gather more pertinent data using our braided model. We feel it is appropriate for the IAAC to commit to resourcing WLCS to complete this work, as it directly informs the decision-making process undertaken by the Crown without limitation to the consideration of Section 35 Rights. This support should not be extended under a participant funding program model as that perpetuates asymmetric resourcing for Indigenous Knowledge acquisition as compared to resourcing for Crown-led western approaches.

Desktop Review

At this time there are no immediate action items. We anticipate that further desktop reviews will be required. Our suggested approach is to ensure that WLCS is mirroring the activities undertaken by SaskPower's technical consultant to continue to provide an Indigenous lens for submissions to the IAA and/or other regulators.

Field Assessment

At this time there are no immediate action items.

- The area(s) of cultural concern noted in this report remain unassessed and warrant further examination in spring. We suggest co-developing a heritage resources scope of work for Q2 2023 following regulatory requirements and Indigenous Protocols.
- Traditional plants remain unassessed. We suggest conducting an independent field assessment in Q2 of 2023.

- We anticipate that SaskPower's technical consultant will reassess nests and burrows in 2023. We request field participation in this activity.
- The occupation history (colonial and Indigenous) of the site is not complete at this time. We have requested third party information that may allow for a better understanding of occupation. If warranted we will request that SaskPower supports field activities to define occupation in Q2 of 2023.

Regulatory Considerations

Our analysis of the pertinent laws, acts and policies that may affect this project in particular, but also other SaskPower initiatives is provided to give context to the stewardship obligations of George Gordon First Nation and our understanding of the various options available to the Nation to ensure that interests are protected. By having WLCS involved at this early stage of the project we hope to demonstrate that inclusion of Indigenous Knowledge as a core part of the impact assessment process reduces risk and allows for a more complete submission to the IAAC. As the project moves through the regulatory process, we aim to remain involved in the same fashion. We are hopeful that practice emerging from the Impact Assessment Act supported by the IAAC allows Section 35 Rights Holders to meaningfully and fully participate in Impact Assessment in a manner that respects Protocols and precludes the need for George Gordon First Nation to rely on other Crown acts, laws, regulations or practices to achieve our affirmed stewardship obligations.

Conclusions

WLCS would like to acknowledge SaskPower for this opportunity to redefine the process by which Indigenous Knowledge is meaningfully included in project assessment activities. We are confident that the data included in this report has provided SaskPower with timely information assessed using Traditional Knowledge approaches that creates more certainty for the project. We look forward to feedback and next steps.

Scott Barnes, Ph.D., P.Ag.
President, Wicehtowak Limnos Consulting Services LP

A George Gordon First Nation Company

C.3 Traditional Knowledge and Protocol Study Clearance Letter

WLCS LP
#234 - 400 Broad Street
Regina, SK S4R 1X3
Phone: 1.306.596.1119
Web: http://wlcs.ca/

Date: April 18, 2023
To: Terry Bird, SaskPower, Director of Indigenous Relations

From: Scott Barnes, Ph.D.,, P.Ag.; President
Josh Montana, BBA, Vice President of Stewardship and Relations

Re: Archaeology study provided by WSP Canada Inc. referencing the Wolverine site (NW-36-33-25 W2M)

WLCS LP was contracted by SaskPower to conduct a Traditional Knowledge Study at the above referenced location. Our final report indicated that there are two areas of potential cultural significance. After receipt of this report SaskPower contracted WSP Canada Inc. to reassess the location for heritage resources. This reported no evidence of heritage features as defined by the Heritage Conservation Branch of the Government of Saskatchewan.

At this time we have no evidence to dispute the findings of the WSP Canada report and see no barriers to SaskPower pursuing the necessary heritage regulatory clearances from the Province. If more evidence regarding either location becomes available we will work with SaskPower on appropriate mitigation.

Sincerely,

Scott Barnes, Ph.D., P.Ag.
President WLCS
<Original signed by>

Josh Montana
Vice President of Stewardship and Relations
<Original signed by>

Appendix D Natural Gas Infrastructure

REPORT

SaskPower Aspen Power Station

Detailed Project Description Appendix - TransGas Components

Submitted to:

Ashley Syrgiannis, PAg
Manager, Environmental Assessment
SaskEnergy
300-1777 Victoria Avenue
Regina, Saskatchewan

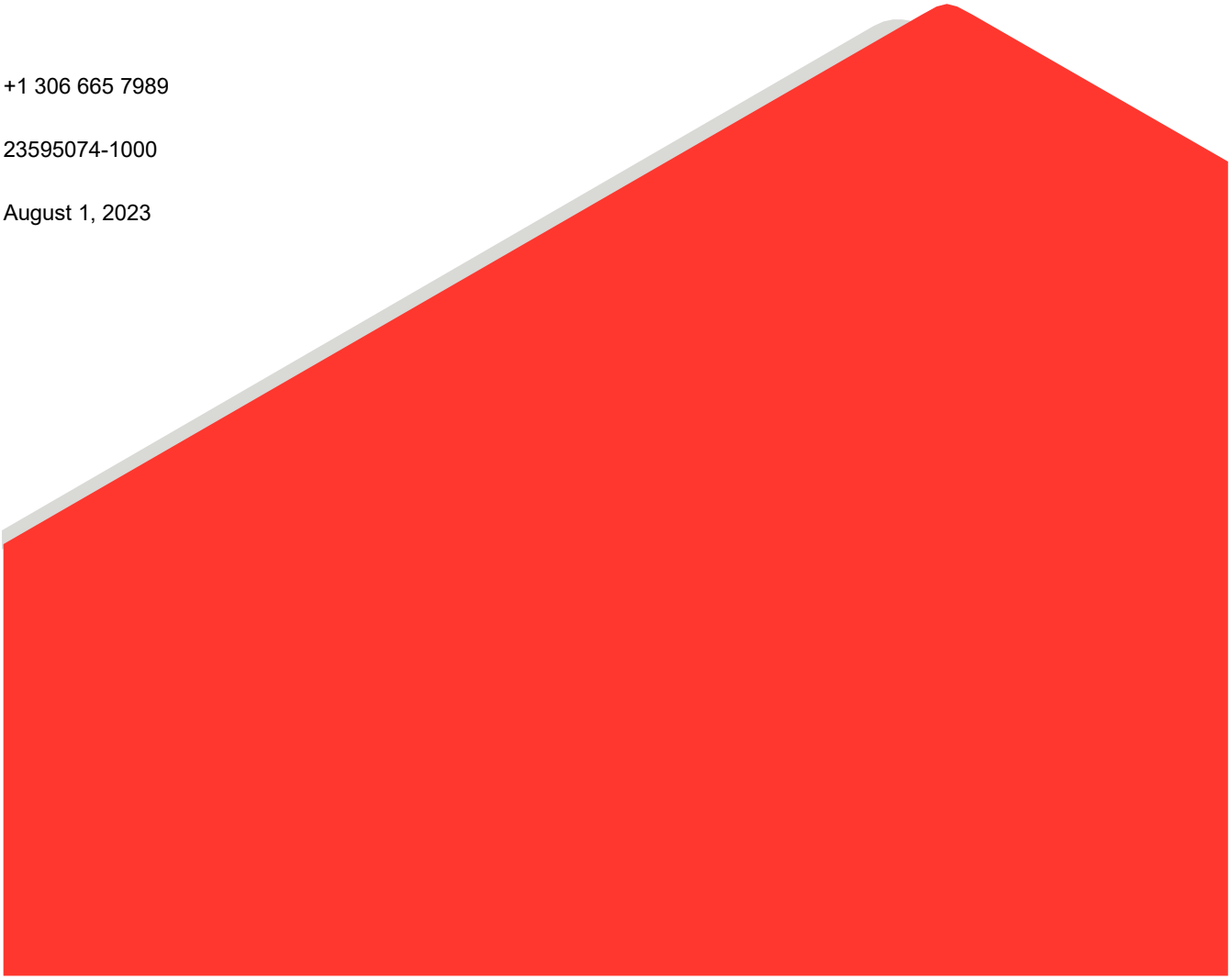
Submitted by:

WSP Canada Inc.
1721 8th Street East, Saskatoon, Saskatchewan, S7H 0T4, Canada

+1 306 665 7989

23595074-1000

August 1, 2023



Executive Summary

TransGas Limited (TransGas) has prepared an environmental overview for the proposed construction of a natural gas line, meter station on a 200 m by 200 m parcel of land and a new compressor station or an upgrade to an existing compressor station east of Saskatoon, Saskatchewan (the Project). The Project is being considered to service the proposed Saskatchewan Power Corporation (SaskPower) Aspen natural gas power station.

The Project will include the installation of approximately 80 km of 406.4 mm (nominal pipe size [NPS] 16) high pressure natural gas line. The Initial Project Description identified two potential routing options; however, the north route, initially identified as Option B, was selected. Option B originates at an existing TransGas facility at SW-12-38-28-W2M near Prud'homme, Saskatchewan ending at the proposed SaskPower Aspen natural gas power station in the NW-36-33-24-W2M near Lanigan, Saskatchewan. Based on continued routing assessments, four potential north routes have been identified between the start and end location. The route finalization is still underway; however, efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructures as possible.

SaskPower is the proponent developing the proposed Aspen natural gas power station and will be the owner-operator. TransGas is the proponent for the construction of the proposed compressor station, meter station and natural gas line (up to the SaskPower property boundary) required to supply natural gas to the proposed Aspen natural gas power station. The proposed Project will be subject to the regulatory approval process under the Saskatchewan Ministry of Environment (ENV), Saskatchewan Ministry of Energy and Resources (MER), and the Ministry of Parks, Culture and Sport. TransGas will make applications to these regulators to obtain approval to proceed with the Project prior to beginning construction.

Final routing and siting of the Project is currently in progress. As a result, this environmental overview will identify potential environmental concerns within a Project area in which the proposed gas line, meter station and a new compressor station or an upgrade to an existing compressor station may be constructed. Customer specific compression facilities may be required to meet minimum delivery pressure requirements. The requirements, and potential location for compression assets are being evaluated in association with the routing evaluation. The environmental overview describes the mitigation measures that will be implemented during construction to reduce or avoid effects associated with the construction and operation of the proposed Project.

All TransGas projects are planned and designed through an integrated approach between the Environment & Sustainability, Land Services, Indigenous Engagement, System Planning, and Pipeline Engineering departments. This approach allows potential environmental considerations and landowner concerns to be integrated into the engineering concept and design decisions very early in project conception. In addition to selecting a route that TransGas feels will have the least adverse impact on the physical environment and land use, construction and subsequent operation, maintenance, and future abandonment of the natural gas line will be in accordance with industry best practices, SaskEnergy/TransGas Environmental Protection Standards (2020), and regulatory approvals.

Though no First Nation reserve lands are encountered or encroached by the Project, TransGas' Indigenous Engagement department is committed to contacting identified First Nations communities that may have interest in the Project prior to construction.

The Project footprint is located predominantly on private but also crosses crown lands designated under the *Wildlife Habitat Protection Act* (*WHPA),* land designated as conservation easements under the *Conservation Easements Act,* and Fish and Wildlife Development Fund lands designated under the *Natural Resources Act,* of which approximately 65.7 to 68.4%, depending on route, is cultivated cropland. In addition to these lands, the Project will cross a railway, highways, and municipal and provincial roads.

The landscape throughout the Regional Study Area (RSA) has been extensively modified for agriculture, annual crop or hay production and livestock grazing. The majority of the Project route crosses cultivated land. The remaining portion of the route crosses modified pasture, wetland habitat, native grassland, coniferous forest, deciduous forest, and anthropogenic disturbance.

The majority of the LSA has been disturbed for agricultural activities including cultivated cropland and modified pasture. Cultivated cropland is the most common Ecological Land Classification (ELC) unit of the LSA. Modified grassland is the second most common ELC unit within the LSA, followed by wetland habitat, native grassland, anthropogenic, coniferous forest, deciduous forest and shrubland.

A review of the Hunting, Angling, and Biodiversity (HABISask) Database (SKCDC 2023a) and the Tracked Vascular Plant Taxa by Ecoregion (SKCDC 2023c) were completed to assess the potential for federally listed and provincially tracked plant species within the RSA. Identified 128 previously recorded occurrences of four provincially tracked species present within the Project LSA. Species include large yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens* a by E*;* n=36), plains rough fescue *(Festuca hallii*; n=8), marsh feltwort (*Lomatognium rotatum* var. *fontanum*; n=8), and pale bulrush (*Scirpus pallidus;* n=76). No federally listed plant species have been previously observed within the Project LSA.

A review of the HABISask database (SKCDC 2023a) was completed to assess the potential for federally listed and provincially tracked wildlife species within the LSA. Fourteen occurrences of provincially tracked and/or federally listed wildlife species have been historically documented within the LSA, American badger (*Taxidea taxus taxus*), Baird's sparrow (*Centronyx bairdii),* bank swallow (*Riparia riparia*), barn swallow (*Hirundo rustica*), bobolink (*Dolichonyx oryzivorus*), common nighthawk (*Chordeiles minor),* Coopers hawk (*Accipiter cooperii),* horned grebe (*Podiceps auritus*), piping plover (*Charadrius melodus circumcinctus*), Quensel's ground beetle (*Amara quenseli*), rusty blackbird (*Euphagus carolinus*), Sprague's pipit (*Anthus spragueii*), turkey vulture (*Cathartes aura)* and whooping crane (*Grus americana*) (SKCDC 2023a).

A review of the HABISask database (SKCDC 2023a) was completed to assess the potential for federally listed and provincially tracked fish species within the LSA. Based on historical records, no occurrences or such species have been documented in waterbodies crossed by the Project. The Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Map (DFO 2022b) was reviewed, and no critical habitat or known aquatic species listed under the *SARA* occur within the Project area.

Potential adverse effects from construction will largely be mitigated during the planning, routing, and final design stages by avoiding wetlands, where possible. It is estimated that, depending on the selected route, 16.7 to 19.2 ha of wetland habitat will be crossed by the Project; however, all wetland habitat temporarily affected by the Project will be reclaimed post-construction. It is anticipated that wetlands crossed by the Project will be dry at time of construction and open-cut techniques with sediment and erosion controls will be implemented. Where standing water is present at time of construction, mitigative techniques (i.e., HDD) will be implemented to alleviate potential effects to these surface hydrological features and important habitat. Disturbance to native grassland and wetland habitats with high potential to support species of concern is limited and largely mitigated through avoidance of sensitive landscape features during Project planning. Should construction activities overlap with the breeding season for migratory birds and amphibians, an Environmental Monitor will be on-site to establish setbacks to known nesting and breeding locations to minimize disturbance.

The assessment provided within this report assumes that the maximum area of disturbance (i.e., within the entire right-of-way [ROW]) will occur during construction, and therefore, maximum spatial effects are anticipated for this period. This assumption is conservative as portions of the Project ROW will remain undisturbed because of horizontal direction drills (HDD) of wetlands and drainages that contain water at the time of construction, narrowing the ROW width at open-cut crossing locations, and varying the width of topsoil stripping based on variations in localized topography, soil conditions and land use (i.e., cultivated versus grassland). Typically, on cultivated lands the trench line and spoil side of the ROW will be stripped, while on level grasslands (both native and modified grassland or tame pasture), only blade width over the trench line will be stripped. Where grading is required to safely conduct construction or where there is concern of excessive topsoil pulverization, compaction or rutting, the entire ROW width may be stripped.

The Project was submitted to the Heritage Conservation Branch (HCB) for review to determine if a Heritage Resource Impact Assessment (HRIA) is required as per Section 63 of *The Heritage Property Act*. The HCB response indicated that there are no known archaeological sites in conflict with and the Project will occur in previously disturbed (cultivated) lands. The potential to impact intact heritage resources is considered low. As a result, further HRIA is not required.

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APPENDICES

APPENDIX A
HABISask Project Screening Report

1.0 INTRODUCTION

TransGas Limited (TransGas) has prepared an environmental overview for the proposed construction of a natural gas line, meter station on a 200 m by 200 m parcel of land, and potential compression facility east of Saskatoon, Saskatchewan (the Project) (Figure 1). The Project is being considered to service the proposed Saskatchewan Power Corporation (SaskPower) Aspen natural gas power station.

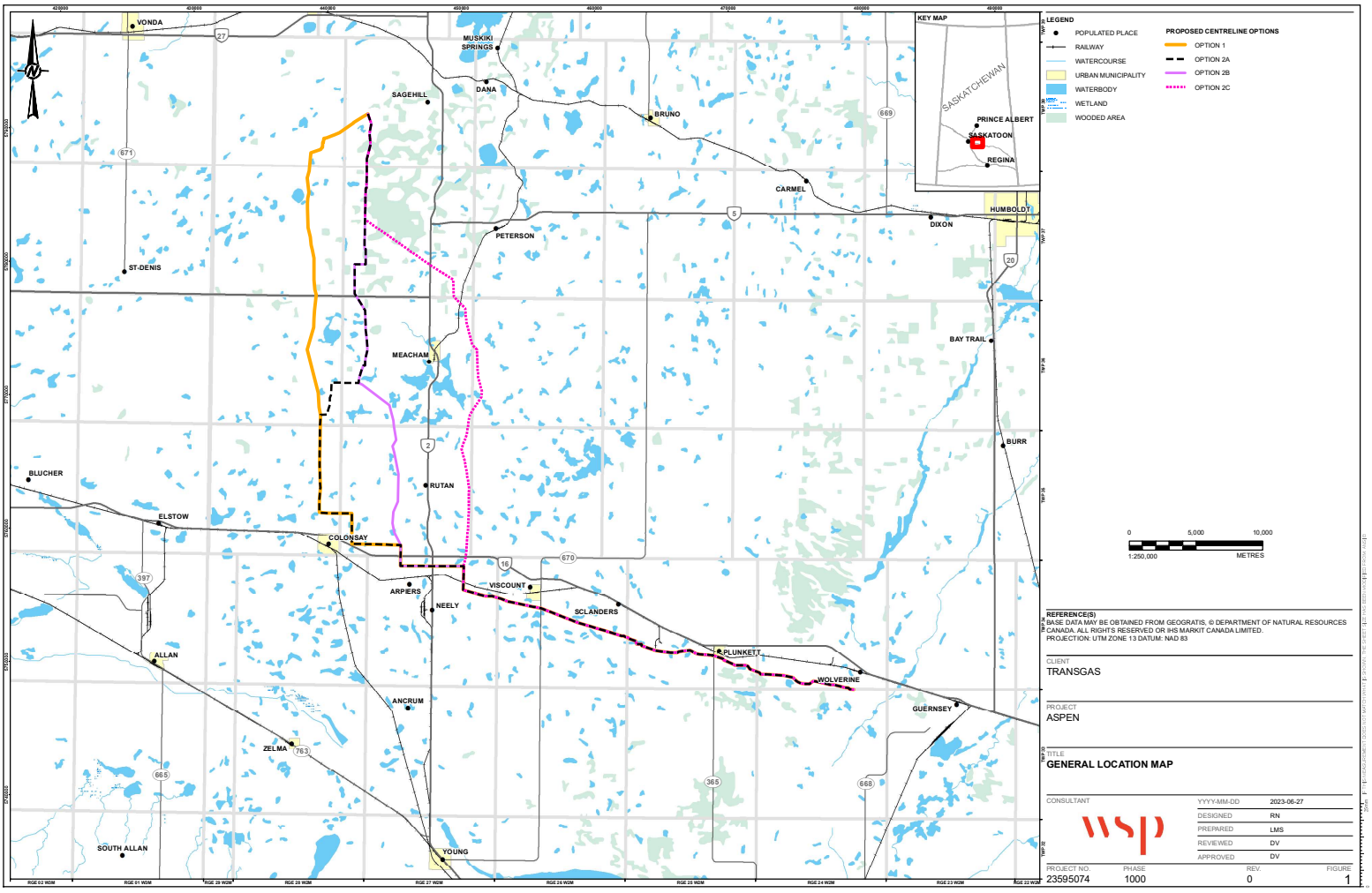
The Project will include the installation of approximately 71.6 to 81.6 km of a 406.4 mm (nominal pipe size [NPS] 16) high pressure natural gas line. The Project is proposed to begin at an existing TransGas facility at SW-12-38-28-W2M near Prud'homme, Saskatchewan ending at the proposed SaskPower Aspen natural gas power station proposed at NW-36-33-24-W2M near Lanigan, Saskatchewan. Based on continued routing assessments, four potential routes have been identified between the start and end location. The routing is still being finalized; however, efforts will be made to parallel existing disturbances such as roads and other TransGas/SaskEnergy infrastructure.

SaskPower is the proponent for developing the Aspen natural gas power station and will be the owner-operator. TransGas is the proponent for the construction of the proposed compressor station, meter station and natural gas supply line (up to the SaskPower property boundary) required to supply natural gas to the proposed Aspen natural gas power station. The proposed Project will be subject to the regulatory approval process under the Saskatchewan Ministry of Environment (ENV), Saskatchewan Ministry of Energy and Resources (MER), and the Ministry of Parks, Culture and Sport. TransGas will make applications to these regulators to obtain approval to proceed with the Project prior to beginning construction.

The Project footprint is located predominantly on private land, but also crosses lands designated under the *Wildlife Habitat Protection Act* (*WHPA),* land designated as conservation easements under the *Conservation Easements Act*, and Fish and Wildlife Development Fund lands designated under the *Natural Resources Act.* Depending on final route selection the footprint consists of approximately 65.8 to 68.4% cultivated cropland, 9.5% to 12.4% modified grassland, 8.5% to 9.4% native grassland, 6.9% to 8.5% wetland habitat, 0.8% to 1.9% forest (including deciduous and coniferous), 0.1% to 0.9% shrubland and 2.3% to 4.5% anthropogenic disturbance. In addition to these lands, the Project will cross a railway, highways, and municipal and provincial roads.

Access to the majority of the gas line right-of-way (ROW) will be from existing roads running parallel to or intersected by the route. During construction, temporary trails may be required to access points along the ROW because of physical barriers, terrain features or to maximize use of existing road or highway approaches.

During construction, temporary workspace (TWS) of various sizes will be required for road, foreign lines, and wetland crossings, pipe side bends, and for temporary support infrastructure use such as access, pipe yards, cleaning stations, and contractor staging sites. Typically, these will be adjacent to, or in close proximity to, the ROW.



REFERENCE(S)
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PROJECTION: UTM ZONE 13 DATUM: NAD 83

CLIENT
TRANSGAS

PROJECT
ASPEN

TITLE
GENERAL LOCATION MAP

CONSULTANT
wsp

YYYY-MM-DD	2023-06-27
DESIGNED	RN
PREPARED	LMS
REVIEWED	DV
APPROVED	DV

PROJECT NO.	PHASE	REV.	FIGURE
23595074	1000	0	1

1.1 Project Proponent

SaskPower is the proponent for developing the Aspen natural gas power station and will be the owner-operator. TransGas is the proponent for the construction of the proposed compressor station, meter station and natural gas supply line (up to the SaskPower property boundary) required to supply natural gas to the proposed Aspen natural gas power station.

SaskEnergy Incorporated (SaskEnergy), a provincial Crown Corporation, is responsible for the transportation and distribution of natural gas within Saskatchewan. Currently there are over 390,000 customers throughout Saskatchewan. Approximately 93% of Saskatchewan communities in the province currently receive natural gas.

TransGas is a wholly owned subsidiary of SaskEnergy governed by the *SaskEnergy Act*. The key business purpose of TransGas, with its franchise of high-pressure natural gas transmission, is to provide its customers with safe, reliable, and economical natural gas transportation and storage services. The company owns and operates transmission facilities, including over 15,000 km of gathering and transmission natural gas lines, throughout Saskatchewan.

1.2 Contact Information

The TransGas contact person for the environmental and heritage regulatory approvals/permits component of the Project is:

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1.3 Regulatory Approvals and Permits

Provincial regulatory approval for the natural gas line will be obtained through the submission of an Oil and Gas Proposal (OGP) to the Saskatchewan Ministry of Environment. The OGP will adhere to the *Technical Proposal Guidelines – A Guide to Assessing Projects and Preparing Proposals under The Environmental Assessment Act* (Government of Saskatchewan 2021a) and *Environmental Review Guidelines for Oil and Gas Activities* (Government of Saskatchewan 2022). The Oil and Gas Proposal provides Project information, identifies potential environmental effects associated with the Project, and provides a summary cumulative and residual effects as well as proposed mitigations to allow the Ministry of Environment (ENV) to conduct a detailed screening of the Project.

Additional regulatory approvals, permits, and associated conditions may be required prior to and during construction of the Project. Table 1 provides a summary of the potential regulatory approvals and permits.

Table 1: Summary of Regulatory Approvals, Permits, and Conditions Required Prior to and During Construction

Jurisdiction	Ministry / Agency	Statute	Associated Regulation	Permit / Approval	Conditions
Federal	ECCC	*Migratory Birds Convention Act* s. 12 (1)	-	-	Vegetation clearing will occur outside of the bird nesting period (i.e., April 19 to August 31 (Nesting Zone B4; ECCC 2020a). However, if activities are required, non-intrusive, pre-disturbance breeding bird surveys will be conducted in accordance with the *Act*. If a migratory bird or migratory bird nest is observed within the Project area, buffer zones and setback distances will be determined by an experienced avian ecologist by evaluating alert distance, flush distance, and level of disturbance.
	ECCC	*Species at Risk Act (SARA)* s. 32, 33, 58	-	-	If listed species are observed within the Project area, appropriate set-back distances will be implemented, as required, in accordance with the *Act*.
	DFO	*Fisheries Act* s. 35(1), 35(2)(b)	-	-	The fish and fish habitat protection provisions of the *Fisheries Act* and the measures to protect fish and fish habitat and DFO's codes of practice will be adhered to.
	MH	*Highways and Transportation Act 1997*	-	Road Crossings	Roadside development permits for any new approaches or any work within 90 metres (m) of a provincial highway will be obtained.
	TC	*Canadian Navigable Waters Act (CNWA)*	*Navigable Waters Works Regulations*	Notification of Work on Non-Scheduled Waterways	Transport Canada administers the *Act* through the Navigation Protection Program (NPP) on all waters that the public may use for travel or transport. Pipelines buried under the bed of a navigable water are considered Minor Works if the crossing is less than 50 m in width when measured from the ordinary high-water mark and the construction or placement of the work is completed within two weeks after the day of which construction or placement of the works has started. Minor Works under the *CNWA* may proceed without application as long as they comply with the legal requirements set out in the Minor Works Order. In the event that a watercourse is crossed, the watercourse will be screened against the Project Review Tool on the Navigation Protection Program External Submission Site to determine responsibilities under the *Act* (Government of Canada 2023),
Provincial	ENV	*The Wildlife Act* s. 51(1), 32	*The Wildlife Regulations*	Species Detection Survey Permit	If designated species are observed within the Project area, appropriate set-back distances will be implemented. Setback distances and timing restrictions will be based on the *Saskatchewan Activity Restriction Guidelines for Sensitive Species* (ENV 2017). No plants, wildlife, or eggs or nests of any bird protected under the *Act*, or regulations pursuant to the Act, will be knowingly or wilfully destroyed or disturbed without a licence to do so. Surveys and research will be conducted under a Species Detection Survey Permit.

Table 1: Summary of Regulatory Approvals, Permits, and Conditions Required Prior to and During Construction

Jurisdiction	Ministry / Agency	Statute	Associated Regulation	Permit / Approval	Conditions
Provincial	ENV	*Environmental Management and Protection Act 2010* s. 38(4), 35 (5)	*The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations Discharge and Discovery Reporting Standard*	Aquatic Habitat Protection Permit	An Aquatic Habitat Protection Permit (AHPP) will be obtained to address potential accidents and malfunctions associated with the crossing of wetlands. Discharges of substances that may cause or are causing an adverse effect will be reported to the ENV.
			The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations Discovery Reporting Chapter Chapter C.3.1 Hydrostatic Testing Chapter	-	Hydrostatic testing will be conducted as specified under the Chapter.
	ENV	*The Environmental Assessment Act* s. 7.2(1)	-	-	Review is required; an Oil and Gas Proposal will be submitted to ENV for review.
	ENV	*The Wildlife Habitat Protection Act*	The Wildlife Habitat Lands Disposition and Alteration Regulations (Chapter W-13.2 Reg 1)	-	A disposition is required for oil and natural gas activities on lands designated under the *WHPA*. The *Act and* associated Regulations will be adhered to.
	ENV / AG	*Provincial Lands Act*	*Provincial Lands Regulations*	-	The *Act* will be adhered to.
	AG	*The Weed Control Act* s. 14, 15	*The Weed Control Regulations (Chapter W-11.1 Reg 1)*	-	The *Act* will be adhered to if prohibited, noxious or nuisance weeds are located on the Project.
	AG	*The Pest Control Act* s. 4, 5, 6	*The Pest Declaration Regulations (Chapter P-7 Reg 2)*	-	The *Act* will be adhered to.
	WSA	*The Water Security Agency Act* s. 50(1), 57(1)	-	Temporary Water Rights License for Industrial Use	Temporary Water Rights License for Industrial Use will be required if water is sourced for directional drilling or hydrostatic testing from a non-municipal water source.
	PCS	*The Heritage Property Act* s. 63	-	Heritage Resource Impact Assessment	The Heritage Conservation Branch review of the Project determined that a Heritage Resource Impact Assessment was not required and provided clearance for the Project.

Table 1: Summary of Regulatory Approvals, Permits, and Conditions Required Prior to and During Construction

Jurisdiction	Ministry / Agency	Statute	Associated Regulation	Permit / Approval	Conditions
Provincial	MER	*The Oil and Gas Conservation Act* s. 3(1)	*The Oil and Gas Emissions Management Regulations*	-	The *Act* will be adhered to.
	MER	-	*GL99-01 Drill Waste Management Guideline*	Notification of Drill Waste Disposal Form	Disposal methods of drill waste fluids will be acceptable as per the Drill Waste Management Guidelines
	RMs	*Rural Municipality*	-	Road Crossings	RM policies for pipeline crossings through developed roads and/or road allowances will be adhered to.

ECCC = Environment and Climate Change Canada; DFO = Fisheries and Oceans Canada; MHI = Ministry of Highways; TC = Transport Canada; ENV = Saskatchewan Ministry of Environment; AG = Saskatchewan Ministry of Agriculture; WSA = Water Security Agency; PCS = Saskatchewan Ministry of Parks, Culture and Sport; MER = Saskatchewan Ministry of Energy and Resources; RMs = Rural Municipalities

2.0 PROJECT DESCRIPTION

2.1 Route Selection

All TransGas projects are planned and designed through an integrated approach between their internal Environment & Sustainability, Land Services, Indigenous Engagement, System Planning, and Pipeline Engineering departments. This approach allows potential environmental considerations and landowner concerns to be integrated into the engineering concept and design decisions very early in project conception.

A preliminary series of four potential route options (Figure 1) are currently available, with the final route to be chosen following personal consultation with landowners and lessees. Incorporating engineering objectives and constraints with the route evaluations in the early planning and design phase, coupled with obtaining landowner input, completing field investigations, environmental sensitivities, setbacks and timing and adjusting the route as needed, will be collectively used to select the final Project ROW. Through application of this interactive approach, the majority of the route will cross lands previously modified for agriculture and avoid waterbodies and sensitive habitat to limit effects to environmental sensitivities to the extent possible.

Upon selection of a final route field investigations will be conducted following provincial guidelines to provide an overview of the environmental setting:

- terrain and soil survey to determine topsoil depth and identify any areas of concern that may be affected by Project construction, operation, or decommissioning
- vegetation, wetland, and wildlife surveys as directed by ENV's Species Detection Survey Protocols and conducted under a Species Detection Survey Permit
- surveys to assess hydrological connectivity to known fish bearing waterbodies. If hydrological connectivity is identified, fish and fish habitat assessments will be completed to furth assess fish presence
- completion of a Heritage Resource Impact Assessment (HRIA) if required as per Section 63 of *The Heritage Property Act following* review by the Heritage Conservation Branch (HCB)

The natural gas line will be routed to avoid further dissecting quarter sections which has potential to limit future landowner development or land uses. The route will be selected to maintain setbacks from existing infrastructure, residences, address landowner requests, accommodate road or buried utility crossings, and to avoid environmental features (e.g., permanent wetland features, setbacks from wildlife features) identified during field investigations. Field investigations will also help to inform additional mitigation measures to be implemented during Construction, Operations, and Decommissioning.

2.1.1 Navigable Water

None of the potential route options cross any watercourses. As such no navigable waterways will be impacted during construction, operation or decommissioning of the project.

In the event the route deviates and a watercourse is crossed, the watercourse will be screened against the Project Review Tool on the Navigation Protection Program External Submission Site to determine responsibilities under the Canadian Navigable Waters Act. (Government of Canada 2023), Any impacts during construction will be temporary in nature. Prior to construction TransGas will contact the regional Navigation Protection Program's office to discuss the crossing and discuss ways to limit impact to navigation.

Once the natural gas line is operational, no impacts to navigation are anticipated as the natural gas line will be buried below the watercourse and will not impact navigation.

2.2 Project Components

2.2.1 Natural Gas Line

A summary of the design details for the proposed natural gas line are provided in Table 2. Several above ground structures associated with the natural gas line will be installed including:

- A new compressor station or upgrade adjacent to an existing compressor station; and
- An above ground meter station on a 200 m by 200 m parcel of land.

Table 2: Design Details for the TransGas Aspen Natural Gas Line Project

Feature	Description
Length	Approximately 71.6 to 81.6 km depending on route ~55 km of new installation, 32 km looping existing gas lines
Tie-in locations	New Install: SW 12-38-28 W2M to NW 20-34-26 W2M Looping: NW 20-34-26 W2M to NW 36-33-24 W2M
Pipe sizes	406.4 mm (NPS 16)
Pipe material types, grades, and categories	ERW Pipe, Cat II, FBE & FBE + AP coating, CSA Z245.1 Standards
Design pressure	9,657 kPa (1,401 psi)
Maximum operating pressure	8,620 kPa (1,250 psi)
Pipe wall thickness	General – 7.9 mm Rail – 9.5 mm
Pipe Grade	414 MPa
Product	Dry, sweet natural gas
ROW width	30 m
Typical trench width	0.5 to 1.0 m
Minimum depth of cover	1.2 m
Construction schedule	2025-2026
In-service date	December 2026

SE = southeast; W2M = West of the second Meridian; kPa = kilopascal; PSI = pounds per square inch; NPS = nominal pipe size

2.3 Construction

2.3.1 Natural Gas Line Construction

Typical standard activities associated with natural gas line construction are described in Table 3 and are presented in the order of occurrence.

Table 3: Activities Associated with Natural Gas Line Construction

Natural Gas Line Construction Phase	Description of Activities
Engineering Design	The Project will follow the requirements of the latest version of Canadian Standards Association Oil and Gas Pipeline Systems (CSA Z662-23).
Surveying	Flagging and staking the ROW, any TWS, and pre-approved temporary access. Marking of the trench line and any utilities crossings. Includes marking any sensitive areas and setbacks to be avoided such as wetlands, listed plant locations, wildlife features (i.e., active nests), unique habitat features, and heritage resources.
ROW Preparation	Includes the placement of warning signs, identification of underground and above ground facilities/utilities, installation of temporary gates at fence crossings, and installation of ROW delineation or exclusion fencing where livestock are present.
Clearing	The removal of trees, brush, stumps, or other obstacles within the confines of the ROW and TWS that may potentially impair stripping, grading or trenching operations and vehicle movement, and/or threaten the safety of construction personnel. Equipment used for clearing may include a mulcher, mower, power saws for hand clearing, dozers, and support trucks.
Stripping/ Salvage	To maintain the growth medium, topsoil will be stripped and salvaged for replacement during clean-up and reclamation. Stripping depth will be pre-determined, and storage will be confined within the ROW or TWS. Width of stripping will vary depending on localized topography, soil conditions, land use (i.e., cultivated versus grassland), and landowner requests. Salvaged topsoil is typically stored in windrows or piles along the outer perimeter of one or both sides of the ROW. Equipment used during stripping may include dozers, graders, and excavators.
Grading	Grading may be required at some locations to establish a level and safe working surface, as well as to maintain a vertical trench. This can include installation of ramps, two-toning the ROW, and any other work required to facilitate the movement of equipment onto and within the ROW. Grade modifications are also done to eliminate or reduce sags, over bends and side bends of the pipe so as not to exceed permissible limits. Equipment involved with grading may include bulldozers, grader, and excavators
Stringing and Welding	Sections of steel pipe will be transported to the ROW by flatbed trailer and placed adjacent to the trench line. Joint ends are welded together and then radiographically tested. The welded joints are then taped with slip-on or wrap around shrink sleeves or specialty applied coatings. Equipment used includes pipe trucks, side booms, bending machines, wheeled tow-behind compressors, one-ton flat deck trucks, pickup trucks, and mobile x-ray or ultrasonic test equipment.
Trenching	The trench will be excavated to provide a minimum cover depth of 1.2 m and a width of up to 1.0 m, possibly wider in sandy soils. Additional cover depths up to 2.5 m may be required in some areas such as transportation and wetland crossings or other underground crossings. Subsoil (spoil) removed from the trench will be placed adjacent to the trench opposite the working side. Salvaged topsoil and the spoil will be stored apart to avoid admixing. Equipment involved will include excavators, backhoes, wheel ditchers, and support vehicles.
Pipe Lowering	Welded pipe sections are lowered into the trench using sidebooms and/or excavators. Trench dewatering may be required prior to lowering in the welded pipe (i.e., to ensure appropriate base for the pipe, to prevent the pipe from floating, and for completing section joining welds). Water will be discharged to a well-vegetated area and allowed to naturally filter away from the disposal location. Energy dissipation will occur at the point of discharge, and erosion and sediment control measures will be installed, as necessary. If rocky or saturated subsoils are encountered, trenching padding (i.e., sand) may be placed in the trench to protect the pipe and enhance water movement. In low areas or areas with a high-water table, weights (e.g., saddle bag) may be placed on the natural gas line to contour buoyancy.

Table 3: Activities Associated with Natural Gas Line Construction

Natural Gas Line Construction Phase	Description of Activities
Backfilling	The trench will be back filled with the excavated spoil immediately after the pipe has been lowered in. Excess stones/rocks or excessively larges rocks will be removed to a suitable location (i.e., existing rock piles). A grader or heavy piece of wheeled equipment with one set of tires or track in the trench will then make multiple passes along the trench to compact the replaced spoil. Equipment used will include graders and bulldozers. In areas that have soils with high rock/stone content, rock shields may be installed over or around the pipe prior to backfilling.
Drainage/ Wetland, Steep Terrain, Transportation, and Utility Crossings	Where trenchless methods or HDD is used, a small bellhole (e.g., 2 m x 2 m) will be excavated using a excavator or backhoe at the entry point to accommodate the drill entry and to capture drilling fluid returns. A hole slightly larger than the pipe is drilled and reamed horizontally below the crossing and the made-up pipe (drag section) is pulled back through and into place. Additional information on HDD crossings methods is located in Section 2.3.2. In addition to crossing transportation infrastructure and buried utilities, trenchless crossing methods may also be used for semi-permanent and permanent drainages and wetland crossings, as well as drainages that are observed to be flowing or contain surface water. If conditions dictate, open-cut or isolation crossing methods may be used to cross wetlands and drainages. Open-cut and isolation crossings involve the crossing of wetlands or drainages via trenching across a wetland or perpendicular to a drainage. Once the pipe is laid in the trench and backfilled, the bed and banks are restored immediately to pre-construction conditions. Additional information on open-cut or isolation is located in Section 2.3.3.
Clean-up and Reclamation	Immediately following pipe installation and backfilling, work will commence on removing surplus material and all construction debris will be collected and removed from the ROW and TWS. Slopes and graded areas will be re-contoured to their pre-construction or stable profiles. Salvaged topsoil and/or sod will be replaced over the trench once the trench is well compacted. Topsoil replacement will be completed during dry soil conditions to maintain soil structure and promote even distribution.
Waste Disposal	Anticipated wastes include scrap materials, used lubricants, welding rods, and domestic garbage. All wastes will be disposed of at an approved site and chemical containers returned to their manufacturer.
Gas Line Integrity Validation and Testing	Following construction, the pipe will be pressure tested to confirm its integrity. Hydrostatic testing will be used and involves filling the pipe with water under pressure, greater than the maximum operating pressure, and then dewatering the natural gas line. Warning signs will be erected indicating “Pipeline Under Test” at all public crossings or exposed pipe locations. Prior to hydrostatic testing, a notification will be submitted through the Saskatchewan Environment Portal. Hydrostatic testing will be completed in accordance with the *Saskatchewan Environmental Code Adoption) Regulations Discovery Reporting Chapter C.3.1 Hydrostatic Testing Chapter.* An environmental monitor will be on site prior to and during discharge activities. Water used for the hydrostatic test will be sampled and submitted to an accredited laboratory for analysis to confirm it is within water quality parameters outlined in Table 1 of hydrostatic test chapter prior to filling the line. Once the hydrostatic test is complete, water will be field-tested to ensure it remains below acceptable levels prior to discharge. Discharge will be into appropriate filter cloth to capture pipe scale, rust or other sediments. Hydrostatic test water will be discharged to a well vegetated area and allowed to naturally filter away from the disposal location. Energy dissipation will occur at the point of discharge, and erosion and sediment control measures will be installed, as necessary.
Public Awareness Program/Emergency Response Plan	TransGas will have a public awareness and ERP in place for the Project that meets or exceeds regulatory requirements. TransGas will communicate with emergency response personnel and key affected landowners in the area and will work co-operatively to link company emergency plans appropriately into plans maintained by other affected agencies. Continued communication and dialogue with landowners and the public will occur during the course of the natural gas line life cycle through the company’s awareness program.

Note: ROW = right-of-way; TWS = temporary workspace; HDD = horizontal directional drilling; ERP = emergency response plan.

2.3.2 Horizontal Directional Drilling

To mitigate disturbance, maintain terrain integrity, preserve wildlife movement corridors, and avoid excessive reclamation and stabilization inputs, TransGas is proposing to use the horizontal HDD method to cross Class IV or higher wetlands or Class I to III wetlands and drainages that are observed to be flowing or contain surface water at the time of construction, whether fish are present or not. In addition, HDD will be used to cross transportation infrastructures and buried utilities.

The majority of entry/exit points will require TWS to provide sufficient work space to set up and operate the drill rig, create a safe work area, and store both the extra topsoil that will be stripped and increased volume of spoil that will be excavated from the bell holes.

Drilling is generally accomplished in three stages. The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The second stage involves enlarging this pilot hole to a diameter which will accommodate the natural gas line. The third and final phase is completed by pulling the made-up natural gas line segment back into the enlarged hole.

The pilot hole is typically started from the lower side of the crossing if not spatially restricted. As the pilot hole is advanced, drilling mud is used to carry the cuttings from the drill head back to an excavated fluid return pit at the starting point of the pilot hole located at the drill location. Once the pilot hole has been completed, reaming passes are used to enlarge the hole diameter.

Recovered drilling fluids will be recycled as appropriate, while surplus fluids and cuttings will be disposed of appropriately (e.g., land spraying, landfill, or other approved disposal locations) in accordance with environmental regulations. Approval from landowners will be obtained in advance for any land spraying and the receiving soils and fluids tested before the application.

Once the hole has been reamed to a large enough diameter, the pre-welded section of pipe is pulled back through the hole towards the HDD rig. It is preferable to have the entire section of pipe fully prepared (e.g., drag section welded together and tested) prior to pulling back through to avoid unnecessary stops or delays, thereby reducing the potential for sloughing within the bore hole.

TransGas or their drilling contractor will investigate water source options to use in the make-up of the drilling fluids which may include watercourses or larger wetlands in the area and municipal sources. As per provincial requirements, a Temporary Water Rights Licence for Industrial Use will be obtained from the Water Security Agency if water is sourced for directional drilling from a non-municipal water source. The withdrawal and use of surface water from wetlands and watercourses for purposes such as hydrostatic testing, fire and dust suppression will avoid impacts to abundance and distribution of fish populations by adhering to conditions of the Temporary Water Rights License, DFO’s Measures to Protect Fish and Fish Habitat as well as to DFO’s interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater will be followed (DFO 2023; DFO 2022a). Impacts to fish habitat quality and quantity will also be avoided through the implementation of erosion control and water quality testing mitigations. All applicable authorizations, permits, and notifications will be submitted and obtained from the associated regulatory agencies prior to construction.

2.3.3 Open-cut and Isolation Crossings

During route selection, avoidance of wetlands and drainages will be the primary goal. If avoidance is not possible, HDD will be considered. However, if conditions dictate, open-cut crossing methods may be used to cross wetlands and drainages where Class I to III wetlands are dry at the time of construction. Open-cut and isolation crossings involve the crossing of wetlands or drainages via trenching at the crossing points. Once the pipe is laid in the trench and backfilled, the bed and banks are restored immediately to pre-construction conditions.

Trenching is completed only in isolated, frozen, or dry conditions. An open-cut crossing refers to the crossing of a dry or frozen wetland or drainage whereas isolation crossings are completed when water is present at the time of crossing. Isolation crossings involve the placement of dams or other isolation barriers upstream and often downstream of the crossing location. Bypass pumps are used to maintain downstream flow during isolation while the isolated area is de-watered onto a vegetated area to filter back into the waterbody downstream of the work area. Once the isolated area is de-watered a trench is excavated across the wetland or drainage and the pipe is installed. After the trench is backfilled, the bed and bank materials are then restored, and erosion mitigation put in place prior to isolation removal.

If conditions dictate and open-cut crossings are determined to be appropriate the following mitigation measures will be implemented, as outlined in the SaskEnergy/TransGas Environmental Protection Standards (2020):

- If the waterbody or watercourse gradient has adequate slope, so that the pumped water does not impact the downstream side of the excavation, a downstream flume seal or dam may not be required. The length of the isolated area will be sized to ensure that trench sloughing will not threaten the integrity of the dam.
- Trenching activities will stop short of waterbody or watercourse banks to prevent highly turbid trench water from entering waterbodies or watercourses. Hard trench plugs will be left in place until the crossing has been initiated. When hard plugs are removed, soft plugs will be installed where needed to prevent turbid water in the trench from entering the waterbody or watercourse.
- Water from the trenches will be pumped onto stable vegetated ground surfaces such that the water will not flow directly back into the water.
- Wet crossings will be excavated by draglines or excavators equipped with mats or wide pads. A minimum of 1.5 m of fill will cover submerged pipe or as directed by design.
- Excavate the gas line trench working from both banks or, if required, within the waterbody or watercourse, to complete in-water trenching activities in the shortest practical time period, where possible.
- Disturbance to natural drainage channels will be minimized. The gradient of the bed will be maintained. Blocking channels with graded material will be avoided.

If conditions dictate and isolation crossings are determined to be appropriate, the following mitigation measures will be implemented, as outlined in the SaskEnergy/TransGas Environmental Protection Standards (2020):

- Water from flumes, pump-around, diversions, or other methods used to maintain downstream flow must not cause erosion or introduce avoidable sediment into the channel. Hoses and pipes must be securely placed, weighted, or strapped.
- Earthen berms should not be used for isolation. All berms and materials must be completely removed from the channel and bed, and bank profiles must be returned to preconstruction conditions at the end of the Project.

- Sediment laden water in the work area must be discharged to an upland vegetated area prior to removal of the isolation dams. Energy dissipation and erosion control equipment shall be utilized.

If waterbodies or watercourses that are being crossed contain fish at any time during any given year or are connected to a waterbody or watercourse that contains fish at any time during any given year, a DFO Request for Review would be submitted for approval prior to the crossing. DFO's Measures to Protect Fish and Fish Habitat (DFO 2023) as well as the following DFO Codes of Practice will be followed, as applicable:

- Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater;
- DFO Code of practice: Temporary fords; and
- Interim code of practice: Temporary cofferdams and diversion channels (DFO 2022a).

2.4 Operation and Maintenance

Prior to being placed into operation, natural gas line sections are pressure tested to confirm the integrity and operational safety of the natural gas line. Once operational, the natural gas line will be continuously monitored for anomalies or leaks. All anomalies will be assessed to determine if repairs are required, to prevent leaks from occurring, and to keep the natural gas line operating safely. In the event a leak is detected, block valves may be shut remotely or manually to isolate that portion of the natural gas line.

The Project will adhere to TransGas' existing emergency response plans (ERP). As part of the ERPs, TransGas will work closely with local and provincial emergency response agencies and establish appropriate levels of communication, understanding, and co-operation.

Regular preventative maintenance programs, such as internal pipe inspections (e.g., smart pigging) and cathodic protection monitoring, along with natural gas line markers at road crossings, will be incorporated into the design and operation of the natural gas line. Further, regular fly-over and, as needed, walk-over inspections are conducted as part of TransGas' operation programs to proactively identify any concerns on the ROW or threats to natural gas line integrity (e.g., development encroachment, nearby third-party excavations).

Once in operation, the ROW will be returned to pre-construction land uses, excluding strategic points where above ground structures (e.g., block valves) are installed. TransGas retains responsibility for the ROW throughout the life of operation and will respond in a timely fashion to deficiencies or concerns on the ROW (e.g., trench settling, weed infestation, poor plant/crop establishment) identified by TransGas staff through routine inspections or reported by landowners.

2.5 Decommissioning and Abandonment

The natural gas line is expected to operate for 100 years or more. Decommissioning, abandonment, and any site reclamation of the natural gas line and associated components will comply with all applicable federal and provincial regulatory requirements relevant at the time.

3.0 ENGAGEMENT PROGRAM

Engagement is a valuable aspect of TransGas' Project planning process. The objectives of the engagement program include:

- dissemination of information to communities to foster an understanding of the Project, including rational for the Project, potential environmental and socio-economic effects, and planned mitigation and monitoring throughout various phases of the Project
- provide an opportunity for people in the area to show support and/or identify concerns about the potential effects of the Project through public notification and involvement
- provide an opportunity to build relationships with the nearest residents to the Project, and discuss and incorporate local concerns into Project planning
- work jointly with First Nations and Métis community representatives to identify Indigenous interests and concerns, the extent of any potential adverse effects to asserted Indigenous rights, and how those interests and concerns will be addressed
- actively seek comments regarding existing environmental and socio-economic conditions in the Project area, document and respond to concerns raised by the public regarding the Project in an effective and timely manner

The following sections provides and overview of the typical engagement activities TransGas undertakes for similar Projects.

3.1 Public Engagement Activities

For similar natural gas line projects TransGas completes public engagement activities throughout the route selection process by sending invitation letters to landowners and stakeholders along the route to attend open houses regarding the Project. Additionally, advertisements for the open house are posted on community websites, in local newspapers, and on the TransGas website.

The purpose of the open house's is to explain the Project in more detail, including the need for the Project, natural gas line route, natural gas line safety, environmental protection and the planning, construction, and operation practices, as well as to collect feedback from the attendees. During the open house, poster boards are displayed to provide attendees with information about the Project. Brochures are also distributed that outline an overview of the Project, natural gas line safety, answers to frequently asked questions, environmental considerations specific to the development of the Project, and information regarding which regulatory agencies are involved in reviewing the Project.

Guests are invited to take part in a questionnaire where respondents are asked to identify concerns about the environment, safety, the potential for the natural gas line to affect livelihood, and the proposed route. The questionnaire also invites respondents to provide personal contact information, should the respondent wish to be contacted in response to their concerns.

Throughout the open house, representatives of TransGas are available to answer questions and address concerns. Concerns raised by attendees are recorded, including responses provided and further follow up, if required. Following an open house, the Project team will meet to review and address the potential concerns that were raised and determine if they need to be addressed.

3.2 Landowner Relations

TransGas provides information on the Project through mail-outs, as well as in-person meetings with individual landowners that could potentially be directly affected by proposed project route(s). Outreach discussions with landowners during the initial scoping phases of the Project provides guidance with regards to Project routing. Through all phases of planning and negotiation, TransGas encourages landowners to provide individual feedback and offers face-to-face meetings whenever requested.

3.3 Indigenous Engagement Activities

Although no First Nation reserve lands are encountered or encroached by the Project, the TransGas Indigenous Engagement department will contact identified First Nations communities that may have interest in the Project. TransGas will discuss Benefit Agreements with these communities to provide First Nation Environmental Monitors during construction and opportunity to bid on services they may be able to provide during construction. TransGas will also host an “Indigenous Networking Event” to connect local indigenous business owners to potential contractors.

3.4 Government and Regulatory Agencies

TransGas is committed to working with government authorities at the municipal, local, provincial and federal level throughout the planning, application, construction, and operation phases to develop a Project design that will be acceptable to the stakeholder regulatory agencies, where applicable.

4.0 ENVIRONMENT AND SOCIO-ECONOMIC ASSESSMENT

4.1 Assessment Approach

The environmental assessment process is an important tool used to integrate biophysical, cultural, and social factors into project planning and decision-making. Information used in the environmental assessment process includes the scope of the proposed Project, results from desktop analysis and development of appropriate mitigation measures. The goal of the environmental assessment process is to identify appropriate mitigation to avoid, limit, and rehabilitate (i.e., re-establish or reclaim) the overall biophysical, cultural, and socio-economic effects attributed to the Project.

The purpose of this assessment is to provide an overview of the biophysical and socio-economic environment, and to identify potential effects and proposed mitigation measures required for the Project. The assessment approach is based on biophysical, cultural, and socio-economic principles and environmental best practices and includes the following key element steps, with further detail on each step provided in subsequent sections.

Key elements of the assessment approach include:

- identifying valued components (VCs)
- identify the range of spatial scope for each component (e.g., effects study area) and temporal boundaries (e.g., development phases [construction, operation, and abandonment])
- Project interactions and mitigation practices (e.g., the plan to mitigate potential adverse environmental effects from the Project due to construction and operation activities)

Once the Project route and components are finalized, further baseline studies will be completed to develop additional project-specific mitigation measures, to assess/predict residual effects, and identify appropriate construction monitoring and follow-up programs.

4.2 Valued Components

This assessment element focuses on the VC's that were deemed to have the greatest relevance in terms of value and sensitivity, and which are likely to be affected by the Project. Valued components represent physical, biological, cultural, social, and economic properties of the environment that are most often considered to be important by society. The VCs selected for this assessment are:

- atmospheric environment
- geology and hydrogeology
- terrain and soils
- vegetation and wetlands
- fish and fish habitat
- wildlife and wildlife habitat
- land and resource use
- heritage resources
- socio-economic environment

To focus the effects analysis for each VC, one or more key indicators were selected. A key indicator represents a primary issue related to the VC that has the potential to change as a result of the Project. A key indicator can be described as an aspect or characteristic of the VC that, if changed as a result of the Project, may result in an effect on the VC. The VCs and key indicators selected to address the issues identified in relation to this Project are presented in Table 4.

Table 4: Valued Components and Key Indicators

Valued Components	Key Indicator	Expression of Change	Rationale
Atmospheric Environment	Air Quality	■ Change in air quality	Saskatchewan Ambient Air Quality Standards
	Acoustic Environment	■ Increase in noise levels	Disturbance to nearby residences
Geology and Hydrogeology	Groundwater Quality and Quantity	■ Change in groundwater quality and quantity	Regulatory (e.g., *Saskatchewan Water Security Act*) and potential public concern
Fish and Fish Habitat	Fish and Fish Habitat	■ Change in fish habitat quality and quantity, including for *SARA* species ■ Change in abundance and distribution of fish populations, including *SARA* species	Regulatory requirements (*Fisheries Act* and *Species at Risk Act*) and potential public concern

Table 4: Valued Components and Key Indicators

Valued Components	Key Indicator	Expression of Change	Rationale
Terrain and Soils	Soil Distribution and Quality	■ Change in soil distribution or quality caused by wind and/or water erosion ■ Loss or alteration of area of soil map units ■ Changes in soil distribution and quality caused by disturbance to the soil profile (i.e., soil loss, admixing, and compaction) ■ Change in soil quality because of admixing where saline soils are present	Agriculture is the primary land use and economic activity in the Project area
	Terrain Distribution	■ Change in terrain distribution and increased erosion and sediment in areas adjacent to waterbodies	Change in terrain distribution could increase the potential for water erosion and sediment migration into adjacent waterbodies
Vegetation and Wetlands	Vegetation Communities and Composition	■ Change in area of vegetation (i.e., treed cover, wetlands, native grassland) important to wildlife	Vegetation communities provide food and habitat for wildlife
		■ Loss or alteration of wetland and/or drainage cover and function	Regulatory requirements (e.g., *The Environmental Management and Protection Act, The Water Security Agency Act*) and potential public concern, and to support healthy aquatic ecosystems
		■ Introduction or spread of designated weed species	Regulatory requirements to control noxious weeds and eliminate prohibited weeds (e.g., *The Weed Control Act)*
	Listed Plant Species	■ Loss or alteration of listed plant species	Regulatory requirements (e.g., *SARA*, COSEWIC, *The Wildlife Act*, SKCDC)
Wildlife and Wildlife Habitat	Ungulates, Mammals, Raptors, Amphibians, Breeding Birds, Listed Wildlife Species	■ Change in habitat availability ■ Change in movement patterns ■ Change in wildlife abundance due to increased mortality risk	Regulatory requirements (e.g., *Migratory Bird Act*, *SARA*, *Saskatchewan Wildlife Act*, SKCDC, COSEWIC), and potential public concern
Land and Resource Use	Agriculture	■ Disruption of agricultural activity and/or loss of land base	Potential disruption of agricultural activity and disturbance of land base due to construction activities
	Other Land Use	■ Disruption of other land uses and/or loss of land base	Potential disruption of other land uses (e.g., oil and gas) and disturbance of land base due to construction activities
	Recreational Activities	■ Disruption of hunting and fishing activities due to increased human activity	Potential disruption of current hunting and fishing activities due to construction activities
	Visual Aesthetics	■ Alteration of viewscapes and visual aesthetics	Potential alteration of the existing viewscape
Heritage Resources	Protection of Heritage Resources	■ Potential disturbance or destruction of Heritage Resources	Regulatory requirement (*Saskatchewan Heritage Property Act*), potential stakeholder concern

Table 4: Valued Components and Key Indicators

Valued Components	Key Indicator	Expression of Change	Rationale
Socio-economic Environment	Well-being	■ Disruption to well-being during construction from increased traffic and noise	Potential disruption to well-being during construction from increased traffic and noise
	Economic Development	■ Increase of economic opportunities	Potential increase of economic opportunities
	Existing Services and Infrastructure	■ Disruption to users of existing services and infrastructure	Potential disruption of users of existing services and infrastructure

Note: COSEWIC = Committee on the Status of Endangered Wildlife in Canada; *SARA* = *Species at Risk Act*; SKCDC = Saskatchewan Conservation Data Centre

4.3 Temporal Boundaries

The temporal boundaries for the effects assessment will encompass the construction, operation and maintenance and decommissioning and abandonment phases of the Project. Construction is scheduled to begin in 2024 and will take approximately one year to construct including clean-up. The Project has been designed to operate for 100 years or more. Consequently, the operation and maintenance phase of the Project is expected to continue until beyond 2064. Decommissioning and abandonment phases of the Project will continue immediately after the operation phase.

4.4 Study Areas

Project study areas are used to capture the potential direct and indirect effects of the Project on each VC and their associated key indicator(s), as well as to understand the context in which the effects can occur. The spatial boundaries or study areas considered in the description of the environmental setting and assessment of potential Project effects on the VCs include one or more of the following: Project footprint, Local Study Area (LSA), and Regional Study Area (RSA).

The Project footprint represents the physical area required for all Project components, including the ROW and TWS required during construction, and the permanent natural gas line ROW and above ground facilities required during operation.

The LSAs and RSAs used in the environmental setting vary among different VCs. The LSAs are established to assess the potential, largely direct, effects of the Project on the local environment. Each VC and baseline setting component is considered in defining the LSA. The RSAs are established to assess the potential, largely indirect effects of the Project in the broader, regional context. The study areas for each VC are summarized in Table 5.

Table 5: Study Areas Typically Used in the Environmental Setting and Effects Assessment

Valued Component	Description of the Local Study Area (LSA)	Description of the Regional Study Area (RSA)
Atmospheric Environment	The LSA is defined as a contiguous 1.5 km buffer surrounding the Project footprint	The RSA boundary extends 50 km from the Project footprint
Geology and Hydrogeology	The LSA is defined as the Project footprint	The RSA boundary extends 5 km from the Project footprint
Terrain and Soils	The LSA is defined as the Project footprint	A separate RSA is generally not considered
Vegetation and Wetlands	The LSA is defined as a contiguous 1 km buffer surrounding the Project footprint	The RSA boundary was defined based on wildlife habitat considerations and extends 5 km from the Project footprint
Fish and Fish Habitat	The LSA includes Project footprint within the wetlands and drainages, extending up to 100 m upstream and 100 m downstream from the extents of crossing footprint	A separate RSA is generally not considered
Wildlife and Wildlife Habitat	The LSA is defined as a contiguous 1 km buffer surrounding the Project footprint	The RSA boundary extends 5 km from the Project footprint
Land and Resource Use	The LSA boundary was defined based on land use considerations, which is a contiguous 1 km buffer surrounding the Project footprint	The RSA boundary was defined based on land use considerations and extends 5 km from the Project footprint
Heritage Resources	The LSA is defined as the Project footprint	A separate RSA is generally not considered
Socio-economic Environment	The LSA is defined as a contiguous 10 km buffer surrounding the Project footprint	A separate RSA is generally not considered

Note: LSA = Local Study Area; RSA = Regional Study Area

4.5 Potential Interactions and Mitigations

This assessment element identifies and evaluates the potential interactions between Project components or activities, and the corresponding predicted environmental effects to VCs. The process begins with the identification of all potential interactions for the Project. These interactions identify the way a Project can directly or indirectly affect the identified VCs. Each potential interaction is evaluated to determine if mitigation can be developed and incorporated to remove the interaction or limit the potential environmental effect to VCs.

Mitigation can include Project design elements and employment of environmental best practices, management policies and procedures, and social programs. Mitigation practices are developed through an iterative process between the Project's engineering and environmental teams to avoid or limit environmental effects.

5.0 ENVIRONMENTAL SETTING, POTENTIAL EFFECTS AND MITIGATIONS

The following sections provide an overview of the environmental setting in the region containing the proposed Project and includes potential Project effects and proposed mitigation measures to be implemented prior to, during and post construction of the Project. The information provided is based on a review of literature, satellite imagery, provincial and federal database searches, and map interpretation.

5.1 Study Areas

The spatial boundaries or study areas considered in the description of environmental setting for the environmental components include one or more of the following: Project footprint, LSA, and RSA, and were defined in Section 4.4. These study areas were used to capture the potential direct and indirect effects of the Project on each VC and their associated key indicator, as well as to understand the context in which the effects can occur.

5.2 Atmospheric Environment

5.2.1 Air Quality

The Project is predominantly located within Saskatchewan's Western Yellowhead Air Management Zone (WYAMZ). The end point of the route extends beyond into the North East Air Zone (NEAZ); an inactive air zone.

The WYAMZ contains a station at Clavet, an active monitoring station records nitrogen dioxide (NO_2; where NO + NO_2 = NO_x), particulate matter under 2.5 microns ($PM_{2.5}$) and ozone (O_3).

Environment and Climate Change Canada's (ECCC) National Pollutant Release Inventory (NPRI) online database was used to identify existing industrial air emission sources within the RSA (ECCC 2023). The NPRI database was also used to obtain the criteria air contaminant (CAC) emissions for this area, as well as total emissions in Saskatchewan and Canada.

Year 2021 (latest available) emissions of CACs (i.e., oxides of nitrogen represented as NO_2, carbon monoxide (CO), total particulate matter (TPM), particulates with an aerodynamic diameter of less than 10 micrometres (PM_{10}), and particulates with an aerodynamic diameter of less than 2.5 micrometres [$PM_{2.5}$]) from facilities within the RSA are presented in Table 6 (ECCC 2023). Only the facilities that report emissions to NPRI and/or the national Greenhouse Gas (GHG) emissions reporting program are included.

Table 6: Emissions Sources from Facilities in the Regional Study Area

Emissions Source	NO_x as NO_2[(a)] (tonnes/yr)	CO[(a)] (tonnes/yr)	TPM[(b)] (tonnes/yr)	PM_{10} (tonnes/yr)	$PM_{2.5}$[(a)] (tonnes/yr)	GHG (tonnes/yr)
G3 Canada Limited	-	-	10.8	6.3	5.1	--
Mosaic Potash Canada Ltd. - Colonsay	40.7	-	660.6	169.2	56.9	18227
PotashCorp - Lanigan Division	37.8	65.2	1072.4	656.8	384.7	88005
Total	**78.5**	**65.2**	**1,743.8**	**832.3**	**446.7**	106232

(a) NPRI emissions were not reported if facility emissions do not exceed predetermined NPRI thresholds for reporting.

TPM = total particulate matter; PM_{10} = particulate matter 10 micrometres and less; $PM_{2.5}$ = particulate matter 2.5 micrometres and less; tonnes/yr = tonnes per year; '-' = not applicable.

Table 7 presents the 2021 annual CAC emissions for Saskatchewan and Canada, excluding natural emissions sources (ECCC 2023).

Table 7: Annual Emissions without Natural Sources in Saskatchewan and Canada

Region	NO_2 (tonnes/yr)	CO (tonnes/yr)	TPM (tonnes/yr)	GHG (tonnes/yr)
Saskatchewan	49,537	35,495	29,686	25,296,000
Canada	515,785	867,881	497,110	273,208,000

Note: TPM = total particulate matter; tonnes/yr = tonnes per year.

The construction of a new compressor is included in the current proposed Project scope, but designs have not been finalized. For comparison purposes, TransGas reported 15 compressor stations within Saskatchewan to NPRI in 2021.The primary pollutant will be NO_X; the existing compressor stations emit 24-306 tonnes per year depending on the station size; Table 8. GHG emissions are reported for 2020.

Table 8: Emissions Sources from TransGas Compressor Stations within Saskatchewan

Emissions Source	NO_X as NO_2[(a)] (tonnes/yr)	CO[(a)] (tonnes/yr)	TPM[(b)] (tonnes/yr)	PM_{10} (tonnes/yr)	$PM_{2.5}$[(a)] (tonnes/yr)	GHG (tonnes/yr)
Pierceland West	24.3	59.4	--	--	--	--
Macklin	68.9	43.7	-	-	-	-
Beacon Hill C	26.0	--	-	-	-	-
Herbert	171.3	63.4	--	--	--	--
Cabri	216.9	53.8	-	-	-	-
Moosomin	114.9	29.5	--	--	--	-
Grenfell	198.9	45.8	-	-	-	--
Burstall	291.3	59.6	-	-	0.46	704,811
Regina	175.5	45.3	--	--		224,583
Caron	306.0	68.5	-	-	0.39	--
Unity	33.8	24.6	-	-	--	-
Beacon Hill	26.5 (2020)	--	--	--	-	-
Rosetown	38.5	-	--	-	-	--
Bayhurst	152.1	171.0	--	0	0	-
Success	93.3	85.6	--		0.31	-
Minimum	24.3	--	--	--	--	-
Maximum	306.0	171.0	--	--	0.46	--

(a) NPRI emissions were not reported if facility emissions do not exceed predetermined NPRI thresholds for reporting.

TPM = total particulate matter; PM_{10} = particulate matter 10 micrometres and less; $PM_{2.5}$ = particulate matter 2.5 micrometres and less; tonnes/yr = tonnes per year; '-' = not applicable.

5.2.1.1 Potential Effects and Mitigations

Emissions from the Project gas line to the air include CACs and GHGs from construction, which can result in a change in ambient CAC concentrations and/or a change in GHGs. As operation and maintenance of the gas line will produce only trace or intermittent emissions of CACs and GHGs, the assessment of Project effect on air quality focuses on construction and decommissioning phase emissions. Further emissions would be limited to a leak or rupture of the natural gas line and are considered in Section 5.11.

Project emissions occurring in the construction phase of the Project construction effects are expected to be transient in location and ephemeral in duration. Systems will be designed, maintained, and operated so that emissions do not result in exceedances of the Saskatchewan Ambient Air Quality Standards (ENV 2015a) beyond the Project boundary. Potential effects and proposed mitigations for air quality are presented in Table 9.

The compressor station has not finalized design and this assessment assumes that the compressor station will be similar in nature to existing stations. The operation of the compressor station will have emissions of CAC and GHG of unknown quantity; the expectation is the compressor will be sized between the largest and smallest current compressor stations.

Table 9: Potential Effects and Proposed Mitigations for Air Quality

Interaction(s)	Potential Effect(s)	Mitigation
Construction and Decommissioning	Reduced air quality from criteria air contaminants and greenhouse gas emissions	■ Mobile equipment and vehicles on the ROW will be operated at low speeds to reduce dust generation. ■ Idling of equipment will be reduced as feasible. ■ Equipment will be well-maintained. ■ In the event of dry and/or windy conditions topsoil handling may be limited to reduce dust generation. ■ Travel lanes and stored soils on the ROW may be watered in dry conditions to limit/ supress dust. ■ Dust suppression will be employed as necessary near homes along grid roads used for access. ■ Operation systems will be designed to meet the Saskatchewan Ambient Air Quality Standards, and Saskatchewan Upstream Petroleum Industry Associated Gas Conservation Direction S-10. ■ TransGas remotely monitors all their natural gas lines continuously and any abnormal pressure changes will invoke a response including remote or in-field isolation.
Operations	Reduced air quality from criteria air contaminants and greenhouse gas emissions	■ Operation systems will be designed to achieve the Saskatchewan Ambient Air Quality Standards, and Saskatchewan Upstream Petroleum Industry Associated Gas Conservation Direction S-10. ■ TransGas remotely monitors all their natural gas lines continuously and any abnormal pressure changes will invoke a response including remote or in-field isolation.

5.2.2 Acoustic Environment

The Government of Saskatchewan does not have specific standards or guidelines for assessing effects to the acoustic environment but does indicate that industrial facilities are expected to comply with current best operating practices associated with noise production. In the absence of Saskatchewan-specific guidance, Project effects to the acoustic environment will be assessed using guidance from the Alberta Energy Regulator (AER) document *Directive 038: Noise Control* (EUB 2007).

Publicly available satellite imagery was used to identify noise sources that may influence existing noise levels at receptors in the LSA, which extends 1.5 km from the Project footprint. Existing noise sources include:

- traffic on Highway No. 2, Highway No. 5, and Highway No. 16
- trains and train whistles on the Canadian National (CN) rail line that passes through the LSA

- traffic on local roads
- natural sources, such as birds, wind, insects, and wildlife
- agricultural activities and machinery
- residential activities and dogs
- community activities along proposed route
- existing industrial facilities include the Colonsay Mosaic Potash mine and the Lanigan Nutrien Potash mine to the east of the Project

AER *Directive 038* (EUB 2007) provides a desktop method for estimating existing noise levels based on time of day and proximity to noise sources. Once Project routing is complete, this desktop method will be used to establish existing noise levels at receptors in the LSA including farmhouses and residences along the route. Note the AER *Directive 038* (EUB 2007) defines daytime as the period from 7 am to 10 pm and night-time as the period from 10 pm to 7 am. In accordance with AER *Directive 038* (EUB 2007), noise levels are expressed in A-weighted decibels (dBA), which reflect the frequency sensitivity of the human auditory system.

5.2.2.1 Potential Effects and Mitigations

Acoustic effects during Project construction will vary based on the type of construction activities. Grading, trenching, and lowering-in activities will require the most equipment and create the most noise. The primary noise sources associated with construction will be large off-road equipment such as bulldozers, backhoes, excavators, graders, side booms, and other smaller equipment such as welding units. The HDDs will be required at points where the proposed natural gas line must crossroads, utility lines, drainages, and wetlands/drainages. Due to their tonal character, back-up alarms installed on mobile equipment are also considered an important noise source when assessing potential acoustic effects from Project construction. Noise levels at receptors during construction activities will depend primarily on the number, type, and proximity of noise sources. Construction noise levels will decrease as the distance between the receptors and construction activities increases.

AER Directive 038 (EUB 2007) does not specify limits or thresholds for construction noise. Instead, AER Directive 038 (EUB 2007) recommends the following mitigation measures, which can be implemented to reduce potential effects to nearby noise receptors during construction activities:

- Conduct construction activities during the daytime period (i.e., 7 am to 10 pm).
- Advise nearby residents of noisy activities and schedule these activities to reduce disruption.
- Install appropriate and well-maintained muffler systems on engine-driven equipment.
- Respond expeditiously to noise complaints and take appropriate action to address such complaints.

Where practical, TransGas will implement the noise mitigation measures listed above during Project construction. The HDDs are currently scheduled to be active during daylight hours if downhole conditions permit. If downhole conditions are not suitable (e.g., borehole collapses, potential for drilling tools getting stuck), it may be necessary to continue drilling activities 24 hours per day; however, the duration of HDD activities is not expected to exceed one or two days at smaller crossings.

Noise emissions associated with Project operation are expected to be minimal. There will be no above ground noise sources associated with normal operation and noise generated by the buried natural gas line is expected to be undetectable. With the exception of periodic maintenance activities, such as inspection from ground-based vehicles or aircraft and potential natural gas line pigging (i.e., internal pipe inspection), no additional noise is expected as a result of Project operation. Noise associated with maintenance will be temporary in nature and will occur periodically over the life of the Project. Operation and maintenance activities are not expected to result in long-term changes to existing noise levels in the LSA.

It is expected that decommissioning and abandonment of the Project will be completed over a shorter timeframe than Project construction and using a smaller equipment fleet. In addition, Project decommissioning and abandonment activities will make use of the same noise mitigation measures as Project construction activities. As such, changes to existing noise levels during Project decommissioning are expected to be less than during Project construction and occur for a shorter period of time.

The potential effects on the acoustic environment from construction and decommissioning and abandonment, and proposed mitigation are listed in Table 10.

Table 10: Potential Effects and Proposed Mitigations for Acoustic Environment

Interaction(s)	Potential Effect(s)	Mitigation
Construction and Decommissioning	Increase in noise levels	■ Conduct construction activities during the daytime period (i.e., 7 am to 10 pm), where practical. ■ Advise nearby residents of noisy activities and schedule these activities to reduce disruption, where practical. ■ Install appropriate and well-maintained muffler systems on engine-driven equipment. ■ Respond expeditiously to noise complaints and take appropriate action to address and such complaints.

Operation	Increase in noise levels	■ Install appropriate and well-maintained muffler systems on engine-driven equipment.
		■ Respond expeditiously to noise complaints and take appropriate action to address and such complaints.
		■ No noise mitigation is necessary for the gas line and meter station Project operation because:
		  ■ No noise emissions to the acoustic environment are expected from the underground pipeline operation. No major noise sources are expected at the meter station associated with the Project. Any above ground Project infrastructure, including the meter station, are expected to have minimal operating noise emissions.
		  ■ Noise associated with general maintenance will be temporary in nature and will occur periodically over the life of the Project.
		■ A baseline noise assessment will be completed and in the absence of provincial noise regulations or guidelines applicable to industrial facilities in Saskatchewan, the AER Directive 038: Noise Control (AER 2007) will be followed. Cumulative noise levels at dwelling receptors due to noise from compressor station operation will not exceed mandated Permissible Sound Level (PSL) limits.

AER = Alberta Energy Regulator.

5.3 Geology and Hydrogeology

Upon final route selection, WSP will contract EcoLog ERIS to conduct an environmental (hazardous material storage sites, spills, hazardous substance storage sites etc.) search of their federal, provincial and private sector databases for information on the Project and surrounding area, including a 300 m radius from the centre of proposed alignment.

Aquifers within the RSA are the primary hydrogeological receptors to potential impacts from the project. Based on WSA mapping reports by Millard (1990) and Simpson (2000) the following aquifers are expected within the RSA:

- Surficial Group Aquifers,
- Saskatoon Group Aquifers,
- Sutherland Group Aquifers,
- Empress Group Aquifers.

The distribution of aquifers and other subsurface information will be compiled through a desktop study to provide a geological and hydrogeological characterization of the RSA. The RSA for geology and hydrogeology is generally a 5 km buffer from the Project footprint. Compilation of existing information will include the collection of existing borehole information from the Water Security Agency's (WSA) Online Drillers Reports database (WSA 2021). Private and licenced water well information will be collected from WSA to assess the potential impact to the subsurface water supply.

5.3.1 Potential Effects and Mitigations

The key indicators selected to represent the VC of hydrogeology are groundwater quality and quantity. Shallow aquifers may be present along the natural gas line alignment and measures will be taken during construction to minimize impacts to surficial aquifers. Shallow aquifers in the area can be used for drinking water supply and a reduction in quality and quantity may affect groundwater users. Steps will be taken during construction to mitigate the uncontrolled egress of foreign substances into groundwater. Effects to the groundwater environment were assessed for the duration of construction and operation of the Project. The potential effects resulting from Project activities and proposed mitigation to address these issues are summarized in Table 11.

Table 11: Potential Effects and Proposed Mitigations for Groundwater Quality and Quantity

Interaction(s)	Potential Effect(s)	Mitigation
Construction and Operation	Change in groundwater quality including altered water chemistry	■ Drill fluid pressures and volumes will be monitored during HDD operations. A change in pressure/volume may be an indicator of a possible fluid loss. If this occurs, progress will be halted for assessment. ■ Depending on soil conditions, casing may be used at HDD entry/exit points to provide isolation from shallow groundwater zones. ■ In some cases, drill fluid additives may be necessary to control the density and viscosity of the drill fluid, friction on the drill pipe, and buoyancy forces on the drill pipe. All required additives will be approved by TransGas representatives prior to use and the use of non-toxic drilling additives will be promoted. If toxicity levels of drill fluid exceed established guidelines, proper disposal methods will be followed. ■ Trenching will be approximately 1.2 m to 2 m deep. This has potential to impact the surficial aquifer near the central portion of the Project. As mitigation original backfill material will be used to backfill the trench. ■ Spill response will ensure fluids do not percolate to shallow groundwater zones. ■ All Project components will be constructed and operated in accordance with The Gas lines Act and Regulations, as well as CSA Z662-15.
	Change in groundwater quantity	■ Construction of the natural gas line is not anticipated to affect groundwater quantity as the ground disturbance will generally be less than 2 m in depth and may range from 2 to 5 m in depth at buried foreign and road crossing locations. ■ After installation, the trench will be well compacted during backfilling to mitigate change in subsurface flow or percolation (i.e., reduce parallel flow along the pipe in less consolidated material). When required, trench breakers will be installed during backfilling to intercept parallel flow within the trench.

Note: HDD = horizontal directional drill.

5.4 Terrain and Soils

A review of the surficial geology mapping of Saskatchewan (Simpson 1997, Saskatchewan Geological Survey 2017) indicates that the Project crosses morainal, glaciolacustrine and glaciofluvial landforms. These glacially derived materials were deposited on the land surface as glacial ice retreated north during the Wisconsinan deglaciation, approximately 12,000 years ago (Christiansen 1978).

According to Simpson (1997), the morainal or till deposits crossed by the Project consist of an unsorted mixture of gravel, sand, silt, and clay deposits. Morainal landforms found in the northernmost portion of the Project are characterized by an undulating to rolling landscape with moderate to high relief that is commonly greater than 2 m while the topography of till deposits in the east central portion of the Project are level to gently rolling. Glaciolacustrine landforms that underlie the west central and easternmost aspect of the Project consist of layered and sorted sands, silts and clays developed on glacial lake bottoms or glaciolacustrine deltas. Glaciofluvial outwash plains consisting of poorly to well sorted gravel, sand, and silt material underlie the east central portion of the Project. The landscape of the central and eastern portions of the Project is level to gently rolling with relief generally less than 2 m.

Topography in the Project is generally subdued with elevation increasing from east to west and south to north from 540 metres above sea level (masl) at the eastern boundary and 600 masl at the north aspect.

The Project is located entirely within the Dark Brown Soil Zone of Saskatchewan. Soils along the Project route are predominantly Dark Brown and Black Chernozemic soils from the Elstow, Keppel, Oxbow, Weyburn and Wyandotte soil associations developed on medium to moderately fine textures (dominantly loam, silty clay loam

and clay loam) (SLRU 2004). As such, susceptibility to wind and water erosion is generally moderate to low with localized areas of high and very high susceptibility to water erosion where slopes are greater than 10% and high susceptibility to wind erosion in areas with coarser textured (gravelly loam and loamy sand) soils (SLRU 2004). Soil salinity within the Project is generally moderate with some areas along the route having high salinity that may require alternative soil handling measures during Project construction. High saline areas are generally isolated to the bottoms and edges of depressions, sloughs or runways (SLRU 2004).

Once the Project route is finalized, information from Saskatchewan Land Resource Unit (SLRU 2004) will be reviewed to complete a detailed desktop assessment of the baseline terrain and soil conditions within the Project footprint. The assessment includes summarizing parent material, slope, soil texture, agriculture capability, salinity, stoniness, and wind and water erosion potential. Data will be summarized by soil map units (SMUs) crossed by the Project footprint.

5.4.1 Potential Effects and Mitigations

The key indicators selected to represent the VC of terrain and soils are soil distribution and quality, and terrain distribution. Project interactions such as construction, operation, and decommissioning may affect terrain and soils through loss, re-distribution, or alteration of soil quality. Changes to terrain and soil resources could increase the potential sediment migration into adjacent waterbodies or the ability for soil to support agriculture and other vegetation communities. The potential effects resulting from Project activities, proposed mitigation to address these issues are summarized in Table 12.

Table 12: Potential Effects and Proposed Mitigations for Soils and Terrain

Interactions(s)	Potential Effect(s)	Mitigation
Construction, Operation, and Decommissioning	Changes to terrain distribution due to increased erosion and sediment migration into drainages or waterbodies caused by changes to terrain	■ Before starting any earthwork associated with construction of the Project, if there is potential for offsite migration or movement of soil, sediment control (e.g., silt fencing) will be installed on the upland adjacent to any waterbodies, drainages and associated riparian area to prevent excessive sedimentation transfer into the hydrological feature. ■ The Project area will be routinely inspected to assess soil stability on slopes. Areas of concern will be promptly addressed by implementing appropriate stabilization and/or remedial measures. ■ The drainages and waterbodies will be routinely inspected to assess soil stability. Areas of concern will be promptly addressed by implementing appropriate stabilization and/or remedial measures. ■ Disturbed drainages will be recontoured and stabilized after reclamation.

Table 12: Potential Effects and Proposed Mitigations for Soils and Terrain

Interactions(s)	Potential Effect(s)	Mitigation
Construction	Change in soil distribution and quality caused by wind and/or water erosion during soil handling	■ Progressive reclamation will occur during construction (i.e., follow closely behind backfilling and any surface recontouring). Surface facilities will be reclaimed during decommission and abandonment. ■ After recontouring and following topsoil replacement on non-cultivated lands, reclaimed areas will be seeded with grass mixtures to assist with the re-establishment of a self-sustaining vegetation cover. ■ In the event of dry and/or windy conditions topsoil handling may be limited to reduce dust generation. ■ Appropriate erosion control measures will be used during construction and reclamation. On non-cultivated land, temporary control measures such as mulches, erosion blankets, tackifiers, or straw crimping can be used to control erosion prior to establishing a protective vegetative cover. ■ Erosion control practices will be applied to salvaged topsoil as necessary to reduce potential erosion and sediment transport off-site. This can include seeding stockpiles to provide a temporary vegetation cover (if soil will be stored for extended periods of time) to protect against wind and water erosion, as well as to maintain soil quality and volume. ■ On native grassland and modified grassland habitats, seeding with a certified seed mix appropriate to the area or as requested by the landowner will be used to help mitigate erosion and promote site stabilization. ■ Maximum use of adjacent trails and roads will be used for access to the ROW and TWS by construction equipment and support vehicles. This is anticipated to limit new di433sturbance and associated potential increase in soil erosion.
Construction and Decommissioning	Alteration of terrain because of site grading due to soil handling and equipment operation	■ The Project has been routed to avoid areas of unstable and steep terrain to the extent possible. ■ If required, tracked, low ground pressure vehicles will be used on steep terrain to minimize disturbance. ■ Soil disturbance will be limited to only those areas required for safe Project construction. ■ Disturbed areas will be re-contoured and reclaimed to a stable surface profile.
	Loss or alteration of soil quantity through changes to distribution of soil map units due to soil handing and equipment operation	■ Temporary access will be constructed using minimal disturbance techniques where feasible. ■ Soil disturbance will be limited to only those areas required for Project construction, operation, and future decommissioning. ■ Soil disturbance will be isolated to the designated ROW and TWS. ■ Disturbed areas will be re-contoured and reclaimed to a stable surface profile to maintain existing land uses. ■ Topsoil will be stripped and salvaged over the trench line and spoil side on cultivated land, over the trenchline (e.g., blade width) on level grasslands, as well as bell holes and any areas requiring grading to conserve the resource; topsoil will be stored separate from excavated or graded subsoils to avoid admixing. ■ The Project has been designed to maximize use of existing roads, trails, field lines or other disturbance corridors to access Project areas. ■ Temporary workspace will be used only where necessary to complete construction. ■ Disturbed areas will be re-contoured and reclaimed to a stable surface profile to maintain existing land uses (e.g., cropland will be reclaimed to cropland).

Table 12: Potential Effects and Proposed Mitigations for Soils and Terrain

Interactions(s)	Potential Effect(s)	Mitigation
Construction and Decommissioning	Changes in soil quality caused by disturbance to the soil profile (i.e., soil loss, admixing, and compaction). Changes in soil quality because of admixing where saline soils are present due to soil handling and equipment operation	■ Temporary access will be constructed using minimal disturbance techniques where feasible (e.g., use of access mats). ■ Where required to facilitate construction, areas will be cleared of trees, brush, and stumps. The woody debris will be either be mulched or left on these surfaces to cushion the soils from vehicle impact or salvaged for spreading over non-cultivated potions of the ROW or TWS during reclamation to assist with erosion protection and create safe-sites for regenerating/germinating plants. ■ Soil disturbance will be limited to only those areas required for Project construction, operation, and future decommissioning. Adjacent trails and roads will be used to access the Project by construction equipment and support vehicles where feasible. This is anticipated to limit new disturbance corridors. ■ Ground disturbance activities will be completed during non-saturated or frozen conditions, where and when practical, to reduce soil compaction and/or rutting. When feasible, transporting equipment/material will be postponed during adverse weather or wet ground conditions to limit rutting, admixing, and compaction. ■ Topsoil will be stripped and salvaged where grading is required to reduce admixing with the subsoil. The width of stripping will accommodate variations in localized topography, soil conditions and land use (i.e., cultivated versus grassland). ■ Topsoil will be stripped and stored separately from graded or excavated subsoil to mitigate admixing or loss. Soil storage will be confined within the Project area and/or TWS. ■ The topsoil and subsoil from saline areas will be isolated from the other surrounding soils to limit salinity leaching onto surrounding areas and minimize admixing saline with non-saline soils. ■ During reclamation, if soil compaction has occurred on cultivated land during construction, the soil may be deep ploughed to alleviate compacted soils except in areas where subsoil is saline. ■ Where grading is required, the topsoil will be stripped from the areas prior to grading the underlying subsoils. ■ Topsoil and organic material (containing seed bank and propagules on non-cultivated lands) will be salvaged then replaced during reclamation. ■ The length of time the soil is stockpiled with be limited as much as possible. Topsoil will be replaced on reclaimed areas as soon as feasible. ■ Appropriate erosion control measures will be used during reclamation. On non-cultivated land, control measures such as mulches, erosion blankets, wattles, or straw crimping can be used to control erosion and sediment transfer prior to the establishment of a protective vegetative cover. ■ If requested by the landowner, cultivated lands may be seeded with annual cover crop (e.g., cereal or forage seeds) or straw crimped if soils are suitable. Otherwise, the cultivated lands will be left in a state that can be used for crop production.

Note: ROW = right-of-way; TWS = temporary workspace.

5.5 Vegetation and Wetlands

The Project is located within the Moist Mixed Grassland Ecoregion of the Prairie Ecozone of Saskatchewan (Acton et al. 1998). Vegetation within the Moist Mixed Grassland Ecoregion is historically characterized by a mosaic of mid- and short-grasses like wheatgrass (*Elymus* spp.), speargrass (*Hesperostipa* spp.), and blue grama grass (*Bouteloua gracilis*), with trembling aspen (*Populus tremuloides*) groves generally occurring along riparian edges of natural wetlands. This ecoregion has been altered by agricultural use and is now predominantly cropland (Acton et al. 1998). Within the Moist Mixed Grassland Ecoregion, the Project occurs within the Elstow Plain, Quill Lake Plain, and Minichinas Upland Landscape Areas (Acton et al. 1998). While most of the native vegetation in this area has been cultivated, areas of native mixed-grass vegetation are present in areas unsuitable for agriculture (i.e., stony and steeply sloping landscapes; Acton et al. 1998).

Vegetation Communities and Wetlands

The vegetation communities and wetlands in the Project LSA were classified by land cover type and area using the Annual Crop Inventory (ACI 2021) dataset. This dataset provides a high-level summary of landcover with a focus on crop production and has not been field verified or desktop mapped by an ecologist. Wetlands identified in the ACI (2021) dataset are not differentiated into wetland classes based on the Stewart and Kantrud (1971) wetland classification system, nor have they been delineated, or field verified by an ecologist. The majority of the LSA has been disturbed for crop production to be used as cropland (Table 13). Modified grassland (i.e., grassland communities dominated by non-native grass species) and native grassland comprise a majority of the permanent vegetation cover are the next most common landcovers. The remaining permanent vegetation cover consists of coniferous forest, deciduous forest, mixedwood forest, and shrubland (Table 13). Wetlands cover and anthropogenic disturbance accounts for the remaining portion of the LSA (Table 13).

Table 13: Land Cover Units in the Project LSA

.Land Cover Type[(a)]	Route 1		Route 2A		Route 2B		Route 2C	
	Area (ha) [(a)]	Percent (%)	Area (ha) [(a)]	Percent (%)	Area (ha) [(a)]	Percent (%)	Area (ha) [(a)]	Percent (%)
Upland Ecosystems								
Cropland	10,525.5	64.1	10,373.9	62.7	9,090.3	59.6	8,630.3	58.6
Coniferous Forest	485.6	3.0	542.0	3.3	540.5	3.5	585.9	4.0
Deciduous Forest	63.6	0.4	323	2.0	321	2.1	405	2.8
Mixedwood Forest	-	-	- -		-	-	-	-
Native Grassland	1,118.6	6.8	1,132.4	6.8	1,133.3	7.4	1,187.7	8.1
Modified Grassland	1,417.3	8.6	1,235.4	7.5	1,243.1	8.1	1,213.8	8.2
Shrubland	32.8	0.2	94.5	0.6	93.0	0.6	135.1	0.9
Upland Subtotal	*13,643.4*	*83.1*	*13,701.4*	*82.8*	*12,421.5*	*81.4*	*12,158.1*	82.5
Wetland Ecosystems								
Wetland	1,426.8	8.7	1,583.6	9.6	1,555.5	10.2	1,369.2	9.3
Water	703.5	4.3	661.1	4.0	751.3	4.9	689.7	4.7
Wetlands Subtotal	*2,130.3*	*13.0*	*2,244.7*	*13.6*	*2,306.8*	*15.1*	*2,058.9*	*14.0*
Anthropogenic Disturbances	644.1	3.9	600.4	3.6	535.8	3.5	517.7	3.5
Total	**16,417.8**	**100.0**	**16,546.5**	**100.0**	**15,264.1**	**100.0**	**14,734.7**	**100.0**

(a) Land Cover Type and Area calculations from the Annual Crop Inventory (ACI 2021) data.

Note: Some numbers are rounded for presentation purposes; therefore, totals may not equal the sum of the individual values.

Listed Vegetation

A review of the provincial HABISask database (SKCDC 2023a) identified 128 previously recorded occurrences of four provincially tracked species present within the Project LSA (Table 14; Figure 2). Species include large yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens;* n=36), plains rough fescue *(Festuca hallii*; n=8), marsh feltwort (*Lomatognium rotatum* var. *fontanum*; n=8), and pale bulrush (*Scirpus pallidus;* n=76). No federally listed plant species have been previously observed within the Project LSA (Table 14 and Appendix A).

Table 14: Provincially Tracked Element Occurrences Historically Observed within the Project LSA

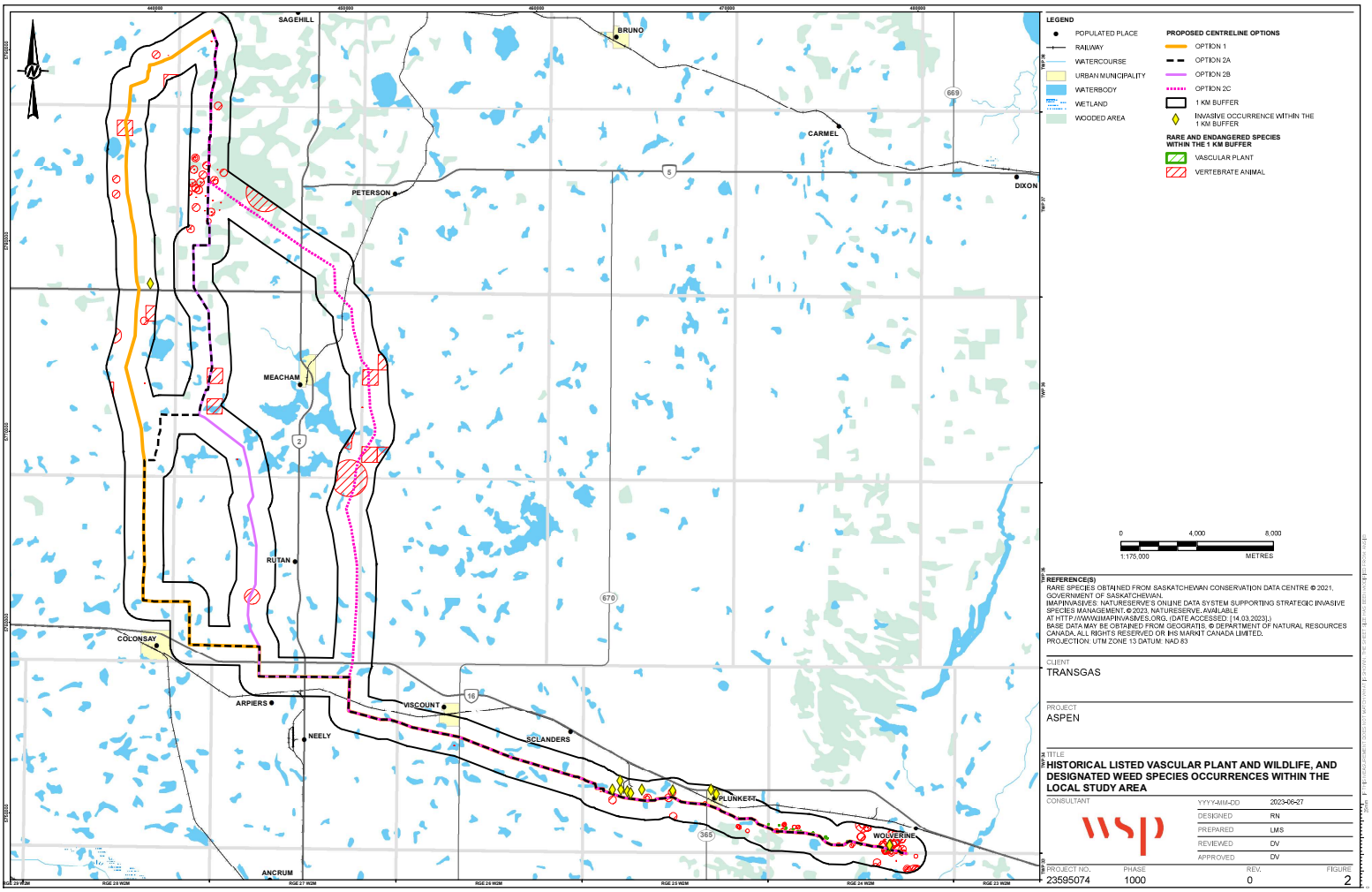
Scientific Name	Common Name	S Rank[(a)]	Date of Last Observation	Habitat[(b)]
Cypripedium parviflorum var. *pubescens*	large yellow lady's-slipper	S2	2019	Mesic-moist forests, shrub-thickets, forest borders, clearings, low meadows, fens/bogs margins, and shores
Festuca hallii	plains rough fescue	S3	2014	Dry-fresh prairies
Lomatognium rotatum var. *fontanum*	marsh feltwort	S3	2019	Moist-wet often saline meadows, fens, prairie depressions, stream shores, and mudflats
Scirpus pallidus	pale bulrush	S3	2013	Marshy shores, moist ravine bottoms, sloughs, and low meadows

(a) SKCDC (2023a), where;

S2 = imperiled – at high risk of extinction or extirpation due to a very restricted range, very few populations, steep declines, threats or other factors

S3 = vulnerable - at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors (NatureServe 2012).

(b) Harms (2017).



REFERENCE(S)

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PROJECTION: UTM ZONE 13 DATUM: NAD 83

CLIENT
TRANSGAS

PROJECT
ASPEN

TITLE
HISTORICAL LISTED VASCULAR PLANT AND WILDLIFE, AND DESIGNATED WEED SPECIES OCCURRENCES WITHIN THE LOCAL STUDY AREA

CONSULTANT

YYYY-MM-DD	2023-06-27
DESIGNED	RN
PREPARED	LMS
REVIEWED	DV
APPROVED	DV

PROJECT NO.	PHASE	REV.	FIGURE
23595074	1000	0	2

Designated Weed Species

A review of Saskatchewan's invasive species database (*i*Map Invasives 2023) indicates 12 observations of six weed species designated as noxious under *The Weed Control Act* (2010) have been observed within the LSA (Table 15; Figure 2).

Table 15: Designated Weed Species Historically Observed within the Project LSA

Scientific Name	Common Name	Designation[(a)]	Date of Observation	Coordinates (UTM Zone 13U; NAD 83)	
				Easting	Northing
Artemisia absinthium	absinthe	Noxious	2017	465527	5751211
Centaurea diffusa	diffuse knapweed	Noxious	2016	464771	5751119
			2017	464397	5751708
Euphorbia cyparissias	cypress spurge	Noxious	2017	469450	5750971
Gypsophila paniculata	baby's breath	Noxious	2016	469151	5751208
Silene vulgaris	bladder campion	Noxious	2017	464954	5751053
Tanacetum vulgare	common tansy	Noxious	2014	439778	5777737
			2017	467141	5751198
			2017	463979	5751230
			2017	464433	5751230
			2019	478534	5748329
			2019	478535	5748331

(a) The Weed Control Act (2010).

5.5.1 Potential Effects and Mitigations

Effects to vegetation and wetlands will be evaluated relative to the proposed Project footprint. The key indicators selected to represent the vegetation and wetland VCs are vegetation communities and function, listed plant species designated weeds. Effects to these indicators were predicted from changes in area of vegetation and wetland types (i.e., vegetation and wetland land cover types), changes to wetland function, area of habitat with potential to support listed plant species, and through the introduction and spread of weed species. Potential changes in the abundance and distribution of land cover types are expressed in percent change of area relative to the LSA. Permanent vegetation cover (i.e., deciduous and coniferous forest, shrubland, native and modified grassland, and wetlands) is important to wildlife and provides potential habitat for listed plant species. The introduction of weed species can adversely influence the stability, resilience and overall health of a plant community.

Loss or Alteration of Permanent Upland Vegetation Cover

The Project ROW crosses predominantly upland ecosystems, wetland ecosystems, and anthropogenic disturbance (Table 16). The most common upland land cover type intersected by the Project is cropland, followed by modified grassland and native grassland (Table 16). Tree cover (coniferous forest and deciduous forest) and shrubland comprise the remainder of the upland land cover types intersected by the Project.

Table 16: Range of Land Cover Intersected by the Project ROW, Proportion of Change, and Overall Change of each Land Cover Unit in the Project LSA

Land Cover Type	Range of Project ROW (ha)	Range of % of Project ROW	Range of LSA Total (ha)	Range of % Change
Upland Ecosystems				
Cropland	141.8 - 164.9	65.6 - 68.4	8,630.3 - 10,525.5	1.6
Coniferous Forest	2.0 - 4.2	0.8 -1.9	485.6 - 585.9	0.4 - 0.7
Deciduous Forest	0.3 - 3.0	0.1 - 1.4	63.6 - 405.5	0.5 - 0.7
Mixedwood Forest	-	-	-	-
Native Grassland	20.1 - 21.0	8.5 - 9.4	1,118.6 - 1,187.7	1.7 - 1.9
Modified Grassland	20.5 - 27.8	9.5 - 12.4	1,213.8 - 1,417.3	1.7 - 2.2
Shrubland	0.3 - 1.9	0.1 - 0.9	32.8 - 135.1	0.8 - 1.6
Uplands Subtotal	*191.4 - 214.5*	*87.6 - 89.9*	*12,158.1 - 13,701.4*	*1.6*
Wetland Ecosystems				
Wetland	14.1 - 15.7	5.9 - 6.7	1,369.2 - 1,583.6	0.9 - 1.0
Water	2.6 - 3.9	1.1 - 1.8	661.1 - 751.3	0.4 - 0.6
Wetlands Subtotal	*16.7 - 19.2*	*6.9 - 8.5*	*2,058.9 - 2,306.8*	*0.8 - 0.9*
Anthropogenic Disturbance	4.9 - 11.1	2.3 - 4.5	517.7 - 644.1	1.0 - 1.8
Total	**214.6 - 244.8**	**100.0**	**14,734.7 - 16,546.5**	**-**

Note: Some numbers are rounded for presentation purposes. Values with only one number presented have equal minimums and maximums.
*The anthropogenic disturbance land cover type will remain after the Project therefore = not applicable.

Construction will require vegetation removal and disturbance to the growing medium (i.e., surface soils). Vegetation resources will be affected directly by vegetation loss and may be affected indirectly by the loss of habitat to support a vegetation resource. Potential Project effects on vegetation relate to loss, alteration, or disturbance because of clearing activities and surface disturbances in the Project ROW. Site clearing involves the direct removal or partial removal of vegetation land cover types through mulching or mowing of vegetation. Surface disturbances within the Project footprint may involve the removal of the uppermost layer of soil, including associated vegetative propagules, during topsoil stripping and where grading is required.

This assessment assumes that the maximum level of vegetative cover disturbance (i.e., within the entire ROW and TWS) will occur during the construction period, and therefore, maximum effects are anticipated for this period; however, typically on cultivated lands, the entire ROW is stripped; on level grasslands (both native and modified), only the trench line or blade width is stripped. Where grading is required to safely conduct construction, the entire ROW width may be stripped. It is also anticipated that within TWS, disturbance may be limited to off-ROW access around wetlands. Therefore, the footprint total provides a conservative estimate of disturbance for the Project.

Short-term or isolated disturbances associated with construction, including access, soil stripping, trenching, and pipe hauling, are anticipated to occur within a maximum 30 m wide ROW to accommodate materials and equipment. During the early stages of construction, vegetation clearing is anticipated to remove shrub and tree cover within the ROW that will impede travel, trenching and soil storage. Project construction will be scheduled when soils are suitably dry. This is anticipated to reduce the potential adverse effects to upland land cover types. If construction activities are to occur during wet conditions, additional protective actions (e.g., rig mats) will be used to reduce the potential effects from rutting, soil admixing and soil compaction. As construction progresses, a reclamation plan will be developed and refined based on site-specific conditions and, in areas where vegetation is removed or damaged the areas will be restored back to the land cover type present prior to Project activities.

A Project-specific biosecurity management plan will be developed prior to construction and will include baseline sampling for clubroot.

Loss or alteration of wetland and/or drainage cover and function

The wetland land cover type occupies only a minor portion of the Project footprint, comprising approximately 16.7 to 19.2 ha (6.9 to 8.5%) depending on route option. As stated in Section 5.5 Vegetation Communities and Wetlands, the ACI dataset (2021) does not differentiate wetlands based on the Stewart and Kantrud (1971) classification system, nor have they been delineated, or field verified by an ecologist. Due to extensive cropland in the Project LSA, it is likely that many of these wetlands are currently being impacted by annual cultivation practices. The crossing method for drainages and Class I, Class II, and Class III wetlands will be dependent on water levels at time of construction. It is anticipated that wetlands basins that are dry at the time of crossing will be crossed by open-cut techniques (Section 2.3.3). Where construction will encroach upon wetlands, sediment and erosion control practices will be implemented during construction (e.g., silt fencing, erosion control blankets) on site-specific conditions and will remain in place until vegetation recovery is sufficient to stabilize soils and prevent siltation of wetlands and drainages. For Class IV and higher wetlands, or where standing water is present at time of construction, additional mitigative techniques (i.e., HDD) will be implemented to alleviate potential effects (Section 2.3.2). Direct wetland disturbance will be limited to those Class I, Class II and Class IIII wetlands that are dry at the time of crossing and the bed and banks will be restored and stabilized immediately after crossing. No filling of wetlands or watercourses will be permitted. If wetlands are impacted (i.e., open-cut) during construction, measures outlined in Section 2.3.3 will be followed.

Upon selection of a final route field investigations will be conducted following provincial guidelines to provide an overview of the environmental setting including vegetation and wetland surveys as directed by ENV's Species Detection Survey Protocols and conducted under a Species Detection Survey Permit. The final route will be selected to avoid environmental features such as permanent wetland features identified during field investigations. Field investigations will also help to inform additional mitigation measures to be implemented during Construction, Operations, and Decommissioning.

Loss or change to wetland land cover types and/or function may occur as a result of vegetation clearing, soil disturbance and compaction, and erosion during construction, as well as sedimentation during and after construction until pre-disturbance land use resumes, or stable vegetation cover is established; however, potential adverse effects from construction will be largely mitigated through the planning, routing, and final design stages by avoiding wetlands, where possible.

An Aquatic Habitat Protection Permit (AHPP) from ENV containing construction mitigation will be obtained for any wetlands that cannot be avoided. Temporary access trails will be set back 30 m from wetlands, where feasible. Wetlands within the ROW will be staked to define equipment setback distances prior to construction and construction activities should remain within these limits to reduce loss of surrounding vegetation and compaction of surrounding soils. Construction will be scheduled for dry conditions as much as possible and will be postponed when soils are excessively wet. Further, erosion and sediment control measures implemented during construction will be left in place until vegetation recovery is sufficient to stabilize soils and prevent siltation of wetland land cover types. Natural vegetation recovery is expected to be sufficient for revegetation of wetlands, however, if required, an appropriate seed mix will be applied as needed to assist in restoration to pre-disturbance construction conditions.

Loss or alteration of listed plant species

No federally listed vascular plant species have been recorded in the LSA; however, 128 occurrences of four provincially tracked vascular plant species have been documented in the LSA (SKCDC 2023b), with 76 occurrences of pale bulrush observed within the Project footprint (Figure 2). A majority of the Project footprint is disturbed by cultivation. Remnant habitat that may support listed plant species is present in the Project footprint through native and modified grassland, deciduous and coniferous forest, shrublands, and wetlands, therefore there is potential habitat where listed plant species may be present. Removal of upland native vegetation communities due to Project activities may result in the potential loss of 43.2 to 57.8 ha along with the potential removal of 16.7 to 19.2 ha of wetland habitat.

Upon selection of a final route, field investigations will be conducted following provincial guidelines to provide an overview of the environmental setting including vegetation and wetland surveys as directed by ENV's Species Detection Survey Protocols and conducted under a Species Detection Survey Permit. The final route will be selected to avoid environmental features such as listed plant species identified during field investigations. Field investigations will also help to inform additional mitigation measures to be implemented during Construction, Operations, and Decommissioning.

Introduction and spread of designated weed species

No designated weed species have been recorded within the Project footprint, however nine observations of six weed species designated as noxious under *The Weed Control Act* (2010) have been observed within the LSA (*i*Map Invasives 2023; Figure 2). The construction and operation of the Project has the potential to introduce or spread designated weed species, especially when moving from areas with known occurrences of weeds (i.e., inadvertent transport of weed propagules) or through the transportation of weed propagules on equipment to site. The introduction of designated weeds can result in a change in vegetation community composition (e.g., increasing the potential to displace native and/or desirable species in an area) or a decrease in vegetation community productivity (Clark 2003; Ding et al. 2008).

To prevent the introduction of new weed or other invasive species, equipment used during Project activities will be cleaned and inspected prior to entry onto the ROW. Any equipment that arrives in a dirty condition will not be allowed on the ROW until the equipment is cleaned manually or by high pressure water or compressed air at a designated cleaning station or other off-site washing/cleaning facility. Any seed purchased for Project reclamation will be verified weed free and reviewed and approved by TransGas prior to application. Weed control measures will be applied for prohibited or noxious weed species infestations for species designated under *The Weed Control Act* (2010). The localized spread of weed species would result in minor and local changes to the composition of upland vegetation communities and wetland land cover types; however, the implementation of mitigation as well as agricultural best management practices, including herbicide use, will reduce the potential for introduction or spread of weed species and will likely control or prevent the spread of these weeds within the LSA.

Summary

The potential effects to vegetation and wetlands resulting from Project activities and recommended mitigation to address these issues are summarized in Table 17.

Table 17: Potential Effects and Proposed Mitigations for Vegetation and Wetlands

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation, and Decommissioning	Loss or alteration of permanent upland vegetation cover due to clearing and revegetation measures	■ Construction activities and equipment will be kept within the boundaries of the designated Project footprint or surveyed boundaries. ■ During vegetation clearing (mulching and mowing) disturbance areas will be minimized as much as possible under dry/frozen conditions and outside of sensitive species timing windows to the extent possible. Clearing, construction, and reclamation activities are scheduled to occur outside of the bird nesting period (i.e., April 14 to August 31; Nesting Zone B4) (ECCC 2020a). However, if vegetation clearing is required between April 14 and August 31, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA (ECCC 2020b; ENV 2017). ■ Mulchers, mowers, or other equipment used to clear vegetation will be operated in such a manner to maintain an intact ground surface in areas where grading is not necessary (i.e., ground-level cutting instead of grubbing when possible). ■ Where tree and shrub cover is encountered, the woody species will be mowed, hand-cleared or mulched. The resulting material from mowing or mulching can spread on the work side of the ROW where it was removed from to cushion the soils from vehicle impact. Alternatively, hand-cleared slash and mulch will be stored in piles to later be spread over reclaimed portions of the ROW that are not cultivated during clean-up. However, if requested by a landowner, the mulch or slash will be hauled off-site as salvage or disposal. Where they do not impair construction, short shrub species will be “walked down” or simply driven over to preserve the growth crown and root network, thereby enhancing regeneration after construction is complete. ■ Appropriate erosion and sediment controls including slope stabilization, soil handling, and soil storage methods will be implemented to limit soil disturbance and loss and promote natural revegetation of non-cultivated lands following clearing activities. ■ Topsoil (containing seed bank and propagules) will be stripped and salvaged prior to grading and trenching, then replaced during reclamation of the ROW. ■ Where feasible, stripping within areas of native grassland and modified grassland will be limited to the trenchline or blade width only. ■ On non-cultivated lands, natural plant regeneration will be promoted; however, all disturbed areas will be reclaimed to pre-construction land cover types, stabilized, and as required, seeded with a certified seed mixture. ■ Reclamation will occur as soon as practical but may be delayed into the following spring season (2026) if topsoil conditions are not suitable (e.g., frozen, wet, snow cover) after backfilling. ■ Vegetation recovery and/or establishment on native and modified grasslands and all non-cultivated areas will be assessed annually and thereafter as required until a desired and stable, self-sustaining vegetation cover is established. Inadequately vegetated areas will be evaluated to determine the cause and appropriate additional or complementary revegetation programs will be designed.

Table 17: Potential Effects and Proposed Mitigations for Vegetation and Wetlands

Interaction(s)	Potential Effect(s)	Mitigation

Construction, Operation, and Decommissioning	Loss or alteration of wetland and/or drainage cover and function due to clearing, surface water management, soil handling, and revegetation measures
	
	Change in quality or quantity of wetland and/or drainage cover and function due to clearing, surface water management, soil handling, and revegetation measures
		■ During vegetation clearing (mulching and mowing) and wetland open cuts, disturbance areas will be minimized as possible.
		■ Spoil generated during trench and/or bell hole excavation will be stored above the high-water mark. A silt fence or other barrier will be used to prevent down-slope movement of stored topsoil and subsoil into wetlands.
		■ Any extra workspace required near wetland edges will be separated from the wetland basin by a minimum of 10 m when feasible.
		■ Appropriate erosion and sediment control will be installed up slope as needed of any wetlands crossed or encroached by the ROW to mitigate transport of material (e.g., soil) into water. Erosion and sediment controls may be used temporary during construction and for longer periods as needed after reclamation if their installation does not interfere with post-construction land use (e.g., cultivation).
		■ To minimize surface compaction and rutting potential and protect vegetation in wetlands, grading in wetlands and adjacent vegetation buffers, will be restricted to the extent practical. If required, grading will move material away from wetland areas for storage.
		■ Where possible crossings will be completed under dry or frozen conditions.
		■ Maintain and/or re-establish natural surface water flow and drainage patterns to wetlands and from adjacent upland areas by:
		  ■ Installing trench breaks (e.g., hard or soft plugs) at the edge of wetlands to prevent unconsolidated organic and mineral soils from sloughing into the wetland, if warranted.
		  ■ Installing berms and/or cross ditches and/or silt fences at the base of approach slopes to wetlands.
		  ■ Leave gaps in the trench crown at surface water run intersections, on side hill terrain and wherever seepage occurs to maintain unimpeded runoff (i.e., prevent surface flow from following into the trench or trench crown directly to a defined wetland or drainages).
		  ■ Re-establishing surface drainage patterns to preconstruction conditions.
		  ■ Leaving a low-profile trench crown to allow for settlement of backfill with gaps in the crown at obvious runoff routes or evident drainages that cross the ROW to avoid altering or changing pre-construction surface drainages.
		■ Pumps used for dewatering of the trench during trenching and lowering activities will have erosion and sediment protection at the hose outflow point (e.g., filter cloth/bags, geotextile fabric, straw bales) and will not be discharged directly into a watercourse/wetland or at a location that will flow directly into a watercourse/wetland.
		■ Any surface water withdraw from wetlands or watercourses will be completed under a Temporary Waters Right License for Industrial Use.
		■ All water intakes will adhere to DFO's end-of-pipe fish protection screens for small water intakes in freshwater interim code of practice.

Table 17: Potential Effects and Proposed Mitigations for Vegetation and Wetlands

Interaction(s)	Potential Effect(s)	Mitigation
		■ Hydrostatic testing will be completed in accordance with the *Saskatchewan Environmental Code Adoption) Regulations Discovery Reporting Chapter C.3.1 Hydrostatic Testing Chapter* . An environmental monitor will be on site prior to and during discharge activities. Water used for the hydrostatic test will be sampled and submitted to an accredited laboratory for analysis to confirm it is within water quality parameters outlined in Table 1 of hydrostatic test chapter prior to filling the line. Once the hydrostatic test is complete, water will be field-tested to ensure it remains below acceptable levels prior to discharge. Discharge will be into appropriate filter cloth to capture pipe scale, rust or other sediments. Hydrostatic test water will be discharged to a well vegetated area and allowed to naturally filter away from the disposal location. Energy dissipation will occur at the point of discharge, and erosion and sediment control measures will be installed, as necessary. ring de-watering (i.e., after hydrostatic testing); sediment traps and/or barriers will be installed at the release site to capture any residual material entrained from inside the pipe. ■ Dissipaters will be installed at the release site to reduce flow velocity and energy, thereby minimizing the potential for water erosion during release. ■ If hydrostatic test water is used it will be analyzed prior to release to confirm it meets current water quality standards.
Construction	Loss or alteration of listed plant species due to vegetation clearing	■ If previously unidentified listed plants are found prior to or during construction, a management strategy will be prepared in consultation with ENV. ■ Topsoil (containing seed bank and propagules) will be stripped and salvaged prior to grading then replaced during reclamation of the gas line ROW. ■ Where possible, construction will be scheduled outside of sensitive species windows (May 15 – September 15). Clearing, construction, and reclamation activities are scheduled to occur outside of the bird nesting period (i.e., April 14 to August 31; Nesting Zone B4) (ECCC 2020a). However, if vegetation clearing is required between April 14 and August 31, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA (ECCC 2020b; ENV 2017).
Construction, Operation, and Decommissioning	Introduction or spread of designated weed species due to vegetation clearing, soil handling, and revegetation measures	■ Equipment will arrive at the Project site clean and free of soil or vegetative debris. Any equipment that arrives in a dirty condition shall not be allowed on the site until it has been cleaned. ■ Equipment may require cleaning (i.e., pressure washing) if moving from a weed infestation into non-infested areas. ■ Stripped or stored soil will not be moved between field lines. ■ Stripped soil stockpiles will be monitored for weed growth during the course of construction and implement corrective actions (e.g., herbicide application, mowing, handpicking) where infestations occur. ■ Reclamation will occur as soon as practical. ■ Weed control management will be implemented throughout the life of the Project.

Note: ROW = right-of-way; HDD = horizontal directional drill; ENV = Ministry of Environment; DFO = Fisheries and Oceans Canada.

5.6 Fish and Fish Habitat

A review of the HABISask database (SKCDC 2023a), Saskatchewan Parks and Renewable Resources (SPRR 1991) and satellite imagery was completed to assess potential fish presence within waterbodies and drainages intersected by the Project. Results indicated there are no known fish presence in any waterbodies crossed by the Project; however, the east terminus of the route occurs in close proximity to Dellwood Brook. Dellwood Brook flows to Dellwood Reservoir, which is a known fish-bearing waterbody that provides habitat for both small and large bodied fish species. Satellite imagery suggests there may be hydrological connectivity of Dellwood Brook with wetlands in the vicinity.

Aquatic species listed under the Species at Risk Act (*SARA*) in Saskatchewan include Bigmouth Buffalo (*Ictiobus cyprinellus*), Brassy Minnow (*Hybognathus hankinsoni*), Lake Sturgeon (*Acipenser fulvescens*), Mountain Sucker *(Pantosteus platyrhynchus*), Plains Minnow (*Hybognathus placitus*), Plains Sucker (*Catostomus platyrhynchus*), and Shortjaw Cisco (*Coregonus zenithicus*). The Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Map (DFO 2022b) was reviewed, and no critical habitat or known aquatic species listed under the *SARA* occur within the Project area. Furthermore, based on a review of the available aquatic habitat within the Project area, and historical fisheries information for waterbodies crossed by the Project, no aquatic *SARA* species are expected.

As part of the wetland classification surveys that will be completed to collect baseline data for the Project, hydrological connectivity to known fish bearing waterbodies will be assessed. If hydrological connectivity is identified, fish and fish habitat assessments will be completed to furth assess fish presence.

5.6.1 Potential Effects and Mitigations

Loss or alteration of fish and fish habitat is not anticipated. Mitigation measures that protect wetlands also protect fish and fish habitat. The potential effects resulting from Project activities and recommended mitigation to address these issues are presented in Table 18. Should the route cross fish bearing waterbodies, mitigations will involve crossing via the HDD crossing method which mitigates impacts to fish and fish during construction and operation. If an HDD inadvertent drill fluid release occurs, it may temporarily reduce the amount and quality of fish habitat and temporarily displace fish. Inadvertent release monitoring will occur during crossing to identify a potential release and drilling will cease to limit impacts to fish and fish habitat. In the even a release is identified drilling will stop and the drill will add thickening agents or pull back and redrill to prevent further release. All drill additives will be non-toxic and will be approved prior to use by an environmental monitor. Any release will be cleaned up if possible and reported to the appropriate agencies ENV/DFO.

In the event that the crossing cannot be completed using HDD, TransGas will submit an Aquatic Habitat Protection permit to ENV and a Request to Review to DFO for approval prior to construction. If during the Request for Review process DFO determines that Harmful Alteration, Disruption and Destruction (HADD) will result from the Project, habitat offsetting and compensation will be required resulting in no net loss of habitat or fish populations. During construction, mitigation strategies for an alternate crossing technique (e.g., open cut) or selection of a new location to re-attempt an HDD will be provided to regulatory agencies for review and approval. Construction will be scheduled for dry conditions. Further, erosion and sediment controls implemented during construction (e.g., silt fencing, erosion control matting) will remain in place until vegetation recovery is sufficient to stabilize soils and prevent sediment laden water from reaching the watercourse. If a watercourse is crossed using the open-cut method while containing water, then isolation crossing measures will be used. Isolation crossings involve the use of non-erodible dams or other isolation barriers upstream and often downstream of the crossing. Bypass pumps are placed to maintain downstream flow during construction. Fish are removed from the isolated

area and released alive back into the watercourse. Once isolated and dewatered a trench is cut perpendicularly to the watercourse. The bed and bank materials are then restored, and erosion mitigations are put in place prior to dam removal.

Impacts during operation to fish and fish habitats are not expected to occur as the pipe will be installed under the watercourse and will not have an impact on fish and fish habitat.

Table 18: Potential Effects and Proposed Mitigation for Fish and Fish Habitat

Interactions	Potential Effect(s)	Mitigation
Construction	Change in fish habitat quality and quantity (from increased sediment loading, inadvertent mud release and/or physical disturbance to habitat) due to directional drilling under watercourses	▪ The HDD method will be used to cross Class IV or higher wetlands or Class I to III wetlands and drainages that are observed to be flowing or contain surface water at the time of construction, whether fish are present or not. ▪ As per provincial requirements, a Temporary Water Rights Licence for Industrial Use will be obtained from the Water Security Agency if water is sourced for directional drilling from a non-municipal water source. The withdrawal and use of surface water from wetlands and watercourses for purposes such as hydrostatic testing, fire and dust suppression will avoid impacts to abundance and distribution of fish populations by adhering to conditions of the Temporary Water Rights License. ▪ DFO's Measures to Protect Fish and Fish Habitat as well as to DFO's interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2023; DFO 2022a) will be followed. ▪ Appropriate erosion and sediment control will be installed up slope of all crossings to mitigate transport of material (e.g., soil) into the watercourse channels or associated wetlands. ▪ Monitoring during HDD will occur to detect inadvertent mud releases; if an inadvertent mud release occurs, activity will stop and appropriate mitigation and containment will be implemented. ▪ All inadvertent drill fluid releases will be reported as required. ▪ No soil material or debris will be allowed to enter watercourse channels during the HDD. ▪ Substrate (i.e., bed and banks) will be returned to pre-disturbance conditions if inadvertently disturbed by HDD. ▪ HDD will be used to avoid disturbing riparian vegetation. ▪ Disturbed areas will be reclaimed, stabilized, and seeded with an appropriate seed mixture.

Table 18: Potential Effects and Proposed Mitigation for Fish and Fish Habitat

Interactions	Potential Effect(s)	Mitigation
Construction	Change in fish habitat quality and quantity (from isolation and construction during open-cut of watercourses)	■ Open-cut crossing methods may be used to cross wetlands and drainages where Class I to III wetlands are dry at the time of construction. ■ If a watercourse is crossed by isolation methods, the isolated area will be salvaged of all fish at the time of construction so that work can occur in the dry. ■ A fish salvage will be completed, and all captured fish will be released alive back into the watercourse near the work area. ■ Bed and banks will be restored and stabilized immediately after crossing to limit erosion and sedimentation potential once flows return. ■ Once isolation is removed fish will return to the area and no changes to fish population abundance and distributions are anticipated. ■ Construction methods will adhere to DFO's Measures to Protect Fish and Fish Habitat. ■ If during the Request for Review process DFO determines a HADD will result from the Project, habitat offsetting and compensation will be required resulting on no net loss of habitat or fish populations.
Operation	Change in fish habitat quality and quantity (from operation)	■ Inspection of lines will be conducted on a regular basis and crossing locations will be inspected to monitor for leaks or potential pipe exposure. ■ Natural gas line will be installed at a sufficient depth during construction to avoid potential impacts to watercourses.

HDD = Horizontal Directional Drilling; DFO = Fisheries and Oceans Canada; HADD = Harmful Alteration, Disruption and Destruction.

5.7 Wildlife and Wildlife Habitat

The Project is located primarily within the Elstow Plain, Quill Lake Plain, and Minichinas Upland Landscape Areas. landscape areas are situated within the Moist Mixed Grassland Ecoregion. Wildlife species assemblage is typically dependent on the habitat type and time of year; species using the region include birds of prey (raptors), songbirds, waterfowl, large mammals (e.g., ungulates and carnivores), small mammals, reptiles and amphibians. Wetlands and watercourses with their associated riparian areas provide habitats for breeding and migrating waterbirds, while smaller wetlands in the upland areas provide isolated nesting habitat for waterfowl and other avian species. Wetlands and watercourses are also key habitats for amphibians and reptile species.

The combination of habitat types available in the Moist Mixed Grassland Ecoregion (i.e., grasslands, wooded groves, wetlands) supports as many as 51 species of mammals (Acton et al. 1998). Despite the relatively high biodiversity of wildlife possible in the Moist Mixed Grassland Ecoregion, the distribution and frequency of occurrence of these species depends on the availability of suitable habitat. The presence of wildlife is often greater in non-cultivated land, wetlands, treed areas, and abandoned farmyards. However, several mammal species have adapted or acclimated to these modified landscapes (e.g., white-tailed deer [*Odocoileus virginianus*], coyote [*Canis latrans*], red fox [*Vulpes vulpes*], and striped skunk [*Mephitis mephitis*]).

Due to the diversity of habitats available in the Moist Mixed Grassland Ecoregion, 198 species of birds have been recorded (Acton et al. 1998). Some species are year-round residents, while others are seasonal migrants that breed in the area or pass through as transients between their breeding and wintering grounds.

Thirteen species of amphibians and reptiles occur in the Moist Mixed Grassland Ecoregion including the barred tiger salamander (*Ambystoma mavortium*), boreal chorus frog (*Pseudacris maculata*), wood frog (*Lithobates sylvaticus*), northern leopard frog, and garter snake species (*Thamnophis spp.*) (Acton et al. 1998). Several of these species utilize or depend on wetland habitats for at least part of their lifecycles.

Within the RSA, extensive agricultural, industrial, transportation, and rural development has influenced habitat suitability and use by wildlife species. While the landscape has been extensively fragmented by anthropogenic influences, the habitat that remains provides suitable nesting and foraging habitat for birds, protective cover for small mammals, and browse and cover for ungulates.

The wildlife habitat in the LSA and RSA consists of a modified landscape comprised predominantly of agricultural land uses. The majority of the LSA is located in cultivated cropland, with coniferous, deciduous forest, native grassland, modified grassland and shrubland accounting for the remaining upland habitat (Table 13). Land with sandy soils, sufficient enough woody vegetation or wetlands to discourage cultivation is often used as pasture and provides suitable habitat for cover and foraging for wildlife species while cultivated land can provide forage for ungulate species. Wetlands ranging from ephemeral (Class I) to semi-permanent (Class IV), provide potential breeding habitat for local amphibians and reptiles.

The Project route crosses provincial Crown land including land designated as conservation easements under the *Conservation Easements Act,* lands designated under the WHPA, and Fish and Wildlife Development Fund lands designated under the *Natural Resources Act* (Table 19).

Table 19: Provincial Crown Land within the LSA

Designation	Legislation	Jurisdiction	Location	Distance from Proposed Project (m)
Conservation Easement	*Conservation Easement Act*	Saskatchewan Ministry of Environment	SE 06-38-27-2 Ext 0	32
			SE 12-38-28-2 Ext 0	0
			NW 03-34-25-2 Ext 2	910
			NE 10-37-28-2 Ext 0	927
			NE 17-38-27-2 Ext 0	719
			NE 30-37-27-2 Ext 0	0
			SE 30-37-27-2 Ext 0	0
			SW 07-38-27-2 Ext 0	307
			Blk/Par A-Plan 101700289 Ext 18	338
			NW 01-34-25-2 Ext 0	82
			NW 06-34-24-2 Ext 0	0
			SW 13-37-28-2 Ext 0	671
			SE 02-38-28-2 Ext 0	107
			SW 18-38-27-2 Ext 0	0
			NW 06-38-27-2 Ext 1	974
			Blk/Par B-Plan 101700290 Ext 19	575
			NW 15-37-27-2 Ext 0	449
			NE 16-37-27-2 Ext 0	0
			NE 01-34-25-2 Ext 0	0
			NE 06-34-24-2 Ext 0	0
			NW-4-34-24-2	280
			SW-09-34-24-2	943

Table 19: Provincial Crown Land within the LSA

Designation	Legislation	Jurisdiction	Location	Distance from Proposed Project (m)
Wildlife Habitat Protection	*Wildlife Habitat Protection Act*	Saskatchewan Ministry of Environment	SW-07-34-24-2	459
			NW-34-33-24-2	293
			NE-32-33-24-2	1000
			NW-32-33-24-2	780
			SW-05-34-24-2	524
			SW-06-34-24-2	242
			NE-29-37-27-2	760
			SW-05-34-24-2	550
			SE-03-34-24-2	0
			SW-04-34-24-2	0
			SW-29-37-27-2	26
			SW-05-34-24-2	158
			SW-07-34-24-2	315
			SW-05-34-24-2	481
			NW-29-37-27-2	0
			SE-03-34-24-2	0
			SE-07-34-24-2	529
			SW-05-34-24-2	71
			SE-29-37-27-2	829
			SW-05-34-24-2	328
			SE-06-34-24-2	192
			SE-05-34-24-2	0
Fish and Wildlife Development Fund	*The Natural Resources Act*	Ducks Unlimited Canada	NW-14-37-28-2	0
		Saskatchewan Ministry of Environment	NW-21-37-27-2	863

Note: m = meters.

The federal *Migratory Birds Convention Act* [1994] *(MBCA)* and attendant *Migratory Birds Regulation* [1994] protect migratory birds, their eggs, and nests. Schedule 1 of the modernized *Migratory Birds Regulations 2022* came into effect July 30, 2022 and provides year-round nest protection for 18 species. Schedule 1 species that may nest in the general Project area include pileated woodpecker (*Dryocopus pileatus*), black-crowned night heron (*Nycticorax nycticorax*) and great blue heron (*Ardea herodias*).

The *MBCA* applies to most migratory birds. Birds that are not protected under federal jurisdiction within Canada include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, kingfishers, and some species of blackbirds. However, bird species not protected under the *MBCA* may be protected under *The Saskatchewan Wildlife Act.* The primary mitigation to achieve compliance with Canada's MBCA is to conduct activities outside of the migratory bird nesting period to avoid incidental take. Environment Climate Change Canada (ECCC) defines the general migratory bird nesting period as the period when nesting is most likely to occur for most species of migratory birds within a nesting zone (ECCC 2018). However, that is not always achievable and mitigations such non-intrusive, pre-disturbance breeding bird surveys must be implemented to ensure compliance with the *MBCA*. Clearing, construction, and reclamation activities are scheduled to occur outside of the bird nesting period (i.e., April 14 to August 31; Nesting Zone B4) (ECCC 2020a). However, if vegetation clearing is required between April 14 and August 31, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA and in line with guidance from the Saskatchewan Activity Restriction Guidelines for Sensitive Species (ECCC 2020b; ENV 2017).

A review of the HABISask database (SKCDC 2023a) and the Tracked Taxa List: Vertebrates (SKCDC 2023d) was completed to determine the historical presence of wildlife within the Project area as well to determine which species have the potential to occur in the Project area. Known species are species that have been recorded in the Project area and expected species are species that are predicted through modelling to be present in the Project area (SKCDC2021). All species occurrences within the LSA were cross-referenced with provincial (SKCDC 2023d) and federal (Government of Canada 2021) status lists to determine if listed species have been observed or recorded as occurring within the LSA. Compiling a list of wildlife that may potentially be found within the LSA using published and unpublished literature sources including reports for past projects. This includes the *Atlas of Saskatchewan Birds* (Smith 1996). Table 20 summarizes the known and expected species for the LSA.

Table 20: Known and Expected Species within the LSA

Common name	Scientific name	Provincial Rank[a]	COSEWIC[b]	*SARA* Status[c]
Known Species				
American badger	*Taxidea taxus taxus*	S3	Special Concern	Special Concern
Baird's sparrow	*Centronyx bairdii*	S4B	Special Concern	Special Concern
Bank swallow	*Riparia riparia*	S4B, S5M	Threatened	Threatened
Barn swallow	*Hirundo rustica*	S4B	Special Concern	Threatened
Bobolink	*Dolichonyx oryzivorus*	S5B	Special Concern	Threatened
Common nighthawk	*Chordeiles minor*	S4B	Special Concern	Special Concern
Coopers hawk	*Accipiter cooperii*	S4B, S2N, S2M	Not at Risk	-
Horned grebe	*Podiceps auritus*	S5B	Special Concern	Special Concern
Piping plover	*Charadrius melodus circumcinctus*	S3B	Endangered	Endangered
Quensel's ground beetle	*Amara quenseli*	S3	-	-
Rusty blackbird	*Euphagus carolinus*	S3B, SUN	Special Concern	Special Concern
Sprague's pipit	*Anthus spragueii*	S3B, SUN	Threatened	Threatened
Turkey vulture	*Cathartes aura*	S3B, SUN	-	-
Whooping crane	*Grus American*	SXB, S1M	Endangered	Endangered
Expected Species				
American badger	*Taxidea taxus taxus*	S3	Special Concern	Special Concern
Baird's sparrow	*Centronyx bairdii*	S4B	Special Concern	Special Concern
Bank swallow	*Riparia riparia*	S4B, S5M	Threatened	Threatened
Bobolink	*Dolichonyx oryzivorus*	S5B	Special Concern	Threatened
Common nighthawk	*Chordeiles minor*	S4B	Special Concern	Special Concern
Feruginous hawk	*Buteo regalis*	S3B	Special Concern	Threatened
Horned grebe	*Podiceps auritus*	S5B	Special Concern	Special Concern
Loggerhead shrike	*Lanius ludovicianus excubitorides*	S3B	Threatened	Threatened
Northern harrier	*Circus hudsonius*	S4B	Not at risk	-
Northern leopard frog	*Lithobates pipiens*	S3	Special Concern	Special Concern
Piping plover	*Charadrius melodus circumcinctus*	S3B	Endangered	Endangered
Red knot	*Calidris canutus rufa*	S2M	Endangered	Endangered
Short-eared owl	*Asio flammeus*	S3B, S2N	Threatened	Special Concern
Sprague's pipit	*Anthus spragueii*	S3B, SUN	Threatened	Threatened

(a) (SKCDC 2022a).

(b) (COSEWIC 2021).

(c) (*SARA* 2002).

Provincial Rank Definitions:

- S1 Extremely Rare - 5 or fewer occurrences in Saskatchewan; or very few remaining individuals.
- S2 Rare - 6 to 20 occurrences in Saskatchewan; or few remaining individuals.
- S3 Rare/Uncommon - 21 to 100 occurrences in Saskatchewan; may be rare and local throughout province or may occur in a restricted provincial range (may be abundant in places).
- S4 Common - more than 100 occurrences; generally widespread and abundant but may be rare in parts of its range.
- S5 Very Common - more than 100 occurrences widespread and abundant but may be rare in parts of its range.
- B - for a migratory species, rank applies to the breeding population in the province.
- M - for a migratory species, rank applies to the transient population in the province.
- N - for a migratory species, rank applies to the non-breeding population in the province.

COSEWIC = Committee on the Status of Endangered Wildlife in Canada; *SARA* = Species at Risk Act

Proposed Baseline Wildlife Field Surveys

Based on the desktop review, it is proposed that several baseline wildlife field surveys be conducted in the Project area. Proposed baseline surveys are summarized with their applicable methods and jurisdictions in Table 21. During the Project observations of wildlife and wildlife sign (e.g., tracks, scat, calls, nests), including mammals, amphibians, reptiles, birds, and listed species that are observed while travelling in the LSA should be recorded opportunistically.

The route will be selected to avoid environmental features such as setbacks from wildlife features identified during field investigations. Field investigations will also help to inform additional mitigation measures to be implemented during Construction, Operation, and Decommissioning.

Table 21: Baseline Wildlife Field Survey Summary

Baseline Survey	Methods	Jurisdiction
Raptor Nest	Sensitive Species Inventory Guidelines[a]	Government of Saskatchewan
Breeding Bird	Species Detection Survey Protocol: Grassland Birds Surveys[b]	Government of Saskatchewan
Amphibian Auditory	Species Detection Survey Protocol: Amphibian Auditory Surveys[c]	Government of Saskatchewan
Amphibian Visual	Species Detection Survey Protocol: Amphibian Visual Surveys [d]	Government of Saskatchewan
Short-eared Owl	Saskatchewan Species Detection Survey Protocols Short-eared Owl Surveys[e]	Government of Saskatchewan
Common nighthawk	Saskatchewan Species Detection Survey Protocol for Common Nighthawk Surveys[f]	Government of Saskatchewan
Sharp-tailed grouse Lek	Saskatchewan Species Detection Survey Protocols: Sharp-tailed Grouse Survey[g]	Government of Saskatchewan

(a) ESRD 2013.
(b) ENV 2020a.
(c) ENV2020b.
(d) ENV2020c.
(e) ENV2020d.
(f) ENV2015b.
(g) ENV2020e.

5.7.1 Potential Effects and Mitigations

The assessment of potential effects from the Project on wildlife and wildlife habitat was completed at the scale of the RSA, to capture potential effects to large ranging species. The VC's selected to represent wildlife are ungulates, mammals, raptors, amphibians, breeding birds, and listed wildlife species. The expression of change assessed for the VCs are change in the abundance and distribution of available habitat (i.e., habitat loss and fragmentation), change in wildlife movement patterns, and change in wildlife abundance due to increased mortality risk.

It is anticipated that potential effects to wildlife will be limited with the implementation of best management practices (BMPs) and mitigation. The wildlife-specific mitigations are described in Table 22.

Table 22: Potential Effects and Proposed Mitigation for Wildlife and Wildlife Habitat

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation and Decommissioning	Loss or alteration of wildlife habitat due to vegetation clearing, sensory disturbance (i.e., presence of people, lights, smells, and noise), soil handling, and revegetation measures	■ Wetlands and drainages may be directional drilled to avoid or limit disturbance to associated wetland and riparian habitats important for wildlife. ■ If a wetland or drainage containing water is crossed by open-cut methods, an AHPP will be submitted to ENV as required and appropriate mitigation strategies will be provided to regulatory agencies for review and approval. ■ Construction is anticipated to be completed during daylight hours and will be temporary in duration. ■ Clearing, construction, and reclamation activities are scheduled to occur outside of the bird nesting period (i.e., April 14 to August 31; Nesting Zone B4) (ECCC 2020a). However, if vegetation clearing is required between April 14 and August 31, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA (ECCC 2020b; ENV 2017). ■ During activities that overlap with the breeding season for migratory birds and/or amphibians, an Environmental Monitor will be on-site to establish setbacks to known nesting and breeding locations to minimize disturbance. ■ Construction methods will increase the rate of natural revegetation (e.g., soil salvage, construction during dry ground conditions, minimizing clearing and grading). Reclamation program will target recovery of wildlife habitat. ■ Idling of vehicles will be limited to the extent practical. ■ Noise suppression (mufflers) will be used on vehicles and will be inspected regularly to ensure proper function. ■ Project personnel will turn off high beams and avoid the use of vehicle horns or alarms upon encountering wildlife at the Project. ■ Wildlife-specific lighting mitigation will be installed on any new lights at the compressor station during operations. Wildlife-specific lighting mitigation may include shielded lights and/or lighting with low-emission or timing measures (e.g., lights are only on when workers are present). ■ A waste management plan will be implemented to avoid attracting scavenger species during operation of the compressor station.

Table 22: Potential Effects and Proposed Mitigation for Wildlife and Wildlife Habitat

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation and Decommissioning	Changes in wildlife movement patterns due to vegetation clearing, sensory disturbance (i.e., presence of people, lights, smells, and noise), soil handling, and revegetation measures	■ Disturbances to riparian edges will be reduced to the extent possible. Where possible, the proposed ROW has been routed to avoid crossing wetlands. Wetlands and drainages with surface waters may employ directional drill methods to minimize disturbance to and to maintain wildlife movement corridors. ■ Regular breaks will be left in soil windrows along the ROW (i.e., at wildlife trails or potential crossing locations) to allow for wildlife movement within the area. ■ Construction is anticipated to be completed during daylight hours and will be temporary in duration. ■ The Project footprint is not located in unique habitat that occurs in the LSA or RSA. ■ Wildlife issues that are identified during construction will be discussed, as necessary, between TransGas Environment & Sustainability, Chief Inspector, Environmental Monitor, and the appropriate regulatory agencies. ■ Ditch plugs will be left in place at identified or potential wildlife crossing sites and removed just prior to the lowering in of the pipe. ■ Sides of the ditch plugs and trench ends will be sloped to allow wildlife and escape route if they inadvertently fall into the gas line trench. ■ The trench will be backfilled as soon as practical to prevent impedance of wildlife movement during construction. ■ Idling of vehicles will be limited to the extent practical. ■ Noise suppression (mufflers) will be used on vehicles and will be inspected regularly to ensure proper function. ■ Project personnel will turn off high beams and avoid the use of vehicle horns or alarms upon encountering wildlife at the Project. ■ Wildlife-specific lighting mitigation will be installed on any new lights at the compressor station during operations. Wildlife-specific lighting mitigation may include shielded lights and/or lighting with low-emission or timing measures (e.g., lights are only on when workers are present).

Table 22: Potential Effects and Proposed Mitigation for Wildlife and Wildlife Habitat

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation and Decommissioning	Changes in wildlife abundance due to increased mortality risk as a result of vegetation clearing, soil handling, and revegetation measures	■ Construction will be temporary in duration. Clearing, construction, and reclamation activities are scheduled to occur outside of the bird nesting period (i.e., April 14 to August 31; Nesting Zone B4) (ECCC 2020a). However, if vegetation clearing is required between April 14 and August 31, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA (ECCC 2020b; ENV 2017). ■ Existing public roads will be used where possible to access the ROW during construction to reduce the amount of new temporary access routes required for the Project. ■ Wildlife habitat features and sensitive species will be identified to the Environmental Monitor who will report the information to the appropriate regulator and a mitigation plan developed, if required. ■ Traffic will be limited to the ROW, TWS and approved access routes. ■ Recreational use of the ROW will be prohibited. ■ Fencing will be erected around open excavations to exclude wildlife interactions. ■ Established speed limits to minimize vehicle-wildlife collisions. ■ Construction is anticipated to be completed during daylight hours when animals are more visible to reduce potential vehicle-wildlife collisions. ■ Wildlife always have the right of way. ■ Project related wildlife deaths/injuries and nuisance animals will be reported to TransGas and appropriate regulators. ■ Wildlife issues that are identified during construction will be discussed, as necessary, between the TransGas Environment & Sustainability, Chief Inspector, Environmental Monitor, and the appropriate regulatory agencies, where necessary. ■ If identified as necessary prior to or during construction, silt fencing will be installed along the boundaries of designated work areas or ROW to impede amphibians or reptiles from accessing these areas.

Note: AHPP = Aquatic Habitat Protection Permit; MBCA = *Migratory Bird Convention Act;* ENV = Ministry of Environment; LSA = Local Study Area; RSA = Regional Study Area; ROW = Right of Way; HDD = horizontal directional drill.

Loss or alteration of wildlife habitat

It is likely that non-tilled wetland habitat for amphibians will be crossed by the Project. However, potential adverse effects from construction have largely been mitigated during the planning, routing and final design stages by avoiding wetlands where possible, coupled with construction scheduling. In addition, wetlands containing water at the time of construction will be crossed using HDD.

The most common upland land cover type intersected by the Project footprint is cultivated cropland. Upland vegetation cover (i.e., deciduous forest, coniferous forest, mixedwood forest, shrubland, native grassland, and modified grassland), important for wildlife habitat, accounts for 43.2 to 57.8 ha (19.1 to 26.0%) of the Project footprint. The magnitude of potential effects to wildlife upland habitats is expected to be reduced by the implementation of soil salvage techniques during construction and reclamation targeting enhanced rate of revegetation on disturbed areas to wildlife habitat. New fragmentation of wildlife habitat has also been reduced through Project routing and design to follow existing anthropogenic disturbances as much as possible.

Sensory disturbance during construction and reclamation may temporarily reduce wildlife habitat availability in the LSA through habitat avoidance. During the breeding, nesting, and rearing sensitive time periods (i.e., April 14 to August 31; ECCC 2020a) environmental monitors will be on-site to complete pre-construction wildlife sweeps and ongoing monitoring to ensure mitigation outlined in is in place or to make additional recommendations. Some noise and sensory disturbance will occur during deferred or follow-up reclamation and operations which may affect wildlife distribution around the Project footprint, but effects are reversible following abandonment.

Cultivated land, modified pasture and hay land are anticipated to be the habitats most influenced by disturbance associated with the Project. Most of the length of the Project parallels or is near existing disturbance corridors (roads) and agricultural land.

The direct removal or change to wildlife habitat during Project construction is anticipated to impact some wildlife over the construction phase. Sensory disturbance during construction is assumed to degrade the quality of wildlife habitat temporarily in the LSA and may lead to indirect habitat loss; however, the degree to which habitat would be avoided by wildlife is variable among species and so the effect is conservatively considered to be likely to occur. Change in habitat availability from both direct and indirect habitat loss will be temporary in nature during the construction phase of the Project.

Changes in wildlife movement patterns

The Project may create temporary changes in wildlife movements during construction if wildlife species perceive the Project ROW as a barrier due to construction activities or prior to revegetation. During construction, the Project ROW and temporary workspace will increase habitat fragmentation from some species (e.g., less mobile species, habitat specialists) within the RSA, which may alter wildlife movement patterns.

Disturbance activities from the construction phase of the Project could result in effects to breeding, nesting, or rearing behaviours of avian and terrestrial wildlife species due to temporary avoidance of the LSA. However, much of the Project is in an area where sensory disturbance from municipal road traffic and agricultural development is present. It is predicted that most wildlife species along much of the proposed route have experienced sensory disturbances in the area and have capacity to adapt to temporary indirect effects during construction of the Project.

Habitat fragmentation changes connectivity and movement patterns. Fragmentation can result from linear corridor development through contiguous habitats, which can decrease species densities (Andrews 1990; Bayne et al. 2005; Bayne et al. 2008). In areas where vegetation cover is removed, most notably tree cover, higher predation

rates have also been observed along linear corridors as predators often use these landscape features to increase their chances of encountering prey species (Benitez-Lopez et al. 2010; Whittingham et al. 2011). Barrier effects or alterations in species movement patterns could also result from linear corridors intersecting habitats (Carthew et al. 2009; Dunne and Quinn 2009). During Project planning, the Project was routed to parallel existing anthropogenic disturbances as much as possible to minimize new fragmentation.

Most of the LSA crosses cultivated cropland and natural and modified grassland while only 3.3% to 3.5% of the Project crosses deciduous, coniferous, or mixedwood forest. Considering this and the very nature of the Moist Mixed Grassland Ecoregion with its characteristic open habitats, the development of a linear corridor from the Project is unlikely to have the same effect on wildlife as a linear corridor in continuous forest habitat. Where the Project crosses permanent vegetation cover (i.e., deciduous forest, coniferous forest, mixedwood forest, shrubland, native grassland and modified pasture), additional habitat fragmentation of the landscape will occur by creating smaller patches of habitat. Routing the Project within the previously disturbed agricultural landscape will mitigate effect to wildlife from increasing edge habitat.

Avian nest predation risk is linked to how landscapes affect the distribution and behavior of predators (DeGregorio et al. 2014). In a study in Illinois of forest bird nests, predation by American crows and nest parasitism by brown-headed cowbirds increased near powerlines, while predation by raptors decreased (DeGregorio et al. 2014). For all nesting species combined in the study, the distance to unpaved roads influenced predation and daily nest survival the greatest (DeGregorio et al. 2014). The Project will not change the landscape with additional high perching sites for avian predators and is not anticipated to change the distribution and behavior of avian or terrestrial predators beyond the construction phase and the effect of habitat fragmentation from the Project is not likely to be as pronounced in open habitats (i.e., cultivated cropland, modified pasture, native grassland).

Amphibians may be negatively affected by noise and lights; individuals have been found to remain immobile when exposed to generalized noise, which may impede feeding and breeding behaviour (Nash et al. 1970). Sensory disturbance from the Project will be limited to the construction phase during daylight hours. If reclamation activities occur during the breeding, nesting, and rearing sensitive time periods an environmental monitor will be on-site to complete pre-construction wildlife sweeps and to monitor that mitigation outlined in is in place or to make additional recommendations.

Changes in habitat quality from sensory disturbance do not necessarily result in demographic consequences to populations (Gill et al. 2001). Most effects from indirect changes in habitat quality from the Project are anticipated to be related to a local shift in distribution during the construction phase with little influence on survival and reproduction rates. Birds in agricultural areas are acclimated or habituated to the current environment (e.g., extensive agricultural activity during breeding and nesting periods) and can respond to temporal disturbances. Wildlife-specific lighting mitigation will be installed on any new lights at the compressor station during operations. Wildlife-specific lighting mitigation may include shielded lights and/or lighting with low-emission or timing measures (e.g., lights are only on when workers are present). In addition, breeding habitat is available elsewhere within the RSA. Consequently, it is anticipated there will be little change in abundance and distribution.

The effects from changes to wildlife movement patterns are anticipated to be small because most wildlife species are highly mobile, and construction will mostly occur outside of the primary breeding and rearing seasons and only small shifts in movement patterns are expected from potential fragmentation barriers and sensory disturbance.

Changes in wildlife abundance due to increased mortality risk

Most of the traffic associated with the Project is expected to use Highway 16, Highway 5, Highway 2, secondary highways, and grid roads in the area. Many wildlife species are either naturally nocturnal or crepuscular or have adapted their behaviour and activity to these time periods to avoid human interactions. Wildlife-vehicle collisions have been observed to occur at higher rates near preferred wildlife habitat (e.g., wetlands, forested areas) (Rodriguez et al. 1997). Traffic volume is expected to increase during Project construction. The increase in traffic volume will be short-term, occurring during construction. The mitigation proposed (e.g., enforcing speed limits and working during daylight hours) will reduce wildlife-vehicle collisions within the LSA from increased traffic caused by the Project during construction.

The MBCA prohibits the destruction of migratory bird nests (e.g., passerines and waterfowl). Birds, eggs, and nests could be destroyed (incidental take) during Project activities. Incidental take of migratory birds is not anticipated given that Project clearing activities (e.g., mowing, mulching) are expected to be completed outside of the primary breeding and nesting period for migratory birds (i.e., April 14 to August 31; ECCC 2020a). If clearing activities are required within the breeding and nesting period, non-intrusive, pre-disturbance breeding bird surveys will be conducted and appropriate setbacks would be applied, as required in accordance with the MBCA (ECCC 2020b; ENV 2017). To reduce mortality risk for amphibians, wetlands containing water at the time of construction will be crossed using HDD. An Environmental Monitor will be on site to establish setbacks to known nesting and breeding locations to minimize effects from direct disturbance as well as sensory disturbance to migratory birds, raptors, and amphibians.

Potential reductions in wildlife abundance resulting from increased mortality risk following the implementation of mitigation due to vehicle collisions, and construction activities are likely to occur but at a low magnitude and periodic frequency.

5.8 Land and Resource Use

The Project ROW crosses through the Rural Municipality (R.M). of Grant No. 372, Bayne No. 371, Colonsay No. 342, Viscount No. 341, Wolverine No. 340 and Usborne No. 310. The northern terminus of the Project is located approximately 9.3 km southeast of the Village of Prud'homme, Saskatchewan and the eastern terminus is located approximately 6 km east of the Hamlet of Guernsey, Saskatchewan. Additionally, multiple communities are located within 5 km of the proposed Project route, including those listed in Table 23.

Table 23: Communities within 5 km of the Proposed Project

Community Name[(a)]	Community Designation	Crossed by the Project (Y/N)
Plunkett	Village	N
Colonsay	Town	N
Meacham	Village	N
Neely	Hamlet	N
Viscount	Village	N

(a) Localities not included in summary of communities.

Land use in the LSA is predominantly cultivated cropland (Section 5.5) with the majority of the crop rotations including cereal and oilseed. Within the LSA, a small amount of native grassland remains on land unsuitable for cultivation. There is also a small amount of modified grassland habitat assumed to be used for hay production and tame pasture for cattle.

Within the LSA, the majority of land is private. However, provincial crown land within the LSA includes conservation easements designated under *The Conservation Easement Act,* including both private and crown consecration easements and lands designate as Wildlife Habitat Protection under the WHPA (Table 19). Conservation easements are in place to preserve natural features and resources on private land while the WHPA protects and conserves agricultural and wildlife land by preventing the sale and alteration of those designated lands.

There are no First Nation reserves within the LSA or RSA. The only federal crown land within the LSA are two Canada Post Offices and one Royal Canadian Mounted Police Detachment.

Industrial activity in the Project RSA includes infrastructure services (e.g., powerlines, gas lines), and mining activity, including the Colonsay Potash Mine.

Based on aerial imagery the Project route crosses 35 roads, including Highway 2, Highway 5 and Highway 16. The remainder of the roads are secondary highways (Highway 365 and Highway 670) and unpaved local gravel or dirt roads. Approximately 20 isolated farmhouses/acreages also occur within the LSA.

Outdoor recreational activities in the RSA would include hiking, quadding, snowmobiling, bird and wildlife watching and hunting that are permitted on private and provincial Crown land. There are no regional parks, provincial parks, or national parks in the LSA; however recreational activities are facilitated by the communities within the RSA including baseball diamonds, a tobogganing hill, outdoor pool, and a golf course (Village of Prud'homme 2019, Town of Colonsay 2023).

The Project crosses three Wildlife Management Zone (WMZ) including WMZ No. 21, WMZ No. 22 and WMZ No. 41. The big game hunting seasons occurs in fall and winter, ranging from September to January (Table 24). The LSA is located within the South Game Bird District (Game Bird Management Unit 4), which has a hunting season from September 1 to December 31; this season varies depending on the bird species. Upland bird game species open for hunting within the South Game Bird District include sharp-tailed grouse, ring-necked pheasant (*Phasianus colchicus*), gray (Hungarian) partridge (*Perdix perdix*), and ruffed grouse (*Bonasa umbellus*) (Government of Saskatchewan 2023a). Migratory bird species open for hunting in the South Game Bird District include ducks, dark geese (e.g., Canada goose [*Branta canadensis*]), white geese (e.g., snow goose [*Chen caerulescens*], Ross' goose [*Chen rossii*]), sandhill crane (*Grus canadensis*), coots and snipe.

Table 24: Wildlife Management Zone Summary (2022-2023 Season)

Wildlife	Weapon Type	Dates		
		WMZ No. 21	WMZ No. 22	WMZ No. 41
Draw Moose – either sex	Archery, muzzleloader, crossbow, shotgun and rifle	Oct. 1-14 and Nov. 1-14		
Draw Elk – either sex	Archery, muzzleloader, crossbow, shotgun, rifle	Sept. 15 – Sept. 30 and Dec. 10 – Dec. 19		
Draw Antlerless Elk	Archery, muzzleloader, crossbow, shotgun, rifle	Oct. 15 – Oct. 31 and Nov. 10 – Nov. 19		Oct. 15 – 31, Nov 10 – 10 and Dec 30 – Jan 14
Draw Mule Deer – either sex	Archery	Sept. 1 – Oct. 31		
	Muzzleloader, crossbow	Oct. 1 to Oct. 31		
	Rifle	Nov. 1 – Nov. 14		
Draw Antlerless Mule Deer	Archery	Sep. 1 – Oct. 31		
	Muzzleloader, crossbow	Oct. 1 – Oct. 31		
	Rifle	Nov. 10 – Dec. 7		
Draw White-tailed Deer – either sex	Rifle	Nov. 20 – Dec. 2		

Source: Government of Saskatchewan (2023).

Note: WMZ = Wildlife Management Zone; Sept. = September; Oct. = October; Nov. = November; Dec. = December; Jan = January.

5.8.1 Potential Effects and Mitigations

Effects on land use were assessed for Project construction and operation. The potential Project-related effects on land use and proposed recommended mitigation are described below and summarized in Table 25. Potential affects and proposed mitigations to land use from accidents and malfunctions are discussed in Section 5.11.

Reduction in agricultural land area and agricultural land use

Agriculture is the main land use of the ROW (162.2 to190.9 ha of cultivated cropland and modified grassland) (Table 13). Land used for agricultural purposes along the ROW is predominantly cultivated land 141.8 to 164.9 ha (65.6% to 68.4%) as well as 20.5 to 27.8 ha (9.5% to 12.4%) of modified pasture. Native grassland accounts for 21.0 to 20.1 ha or 8.5% to 9.4% of the Project ROW. Combined, agricultural land use, not including native grassland, accounts for approximately 75.6% to 79.2% of the ROW area, which equates to 1.6% of the available agricultural land within the LSA.

Table 25:Potential Effects and Proposed Mitigations for Land Use

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation, and Decommissioning	Reduction in area of agricultural land and disruption of agricultural land use	■ All work will be kept within the surveyed ROW and other approved work areas. ■ The Project design considered landowner feedback, and the ROW has been routed to accommodate landowner concerns on agricultural land to the extent possible. ■ Landowners will be compensated if loss of production on agricultural lands occurs. ■ To minimize potential introduction or spread of weeds which can affect agricultural land use, all equipment will arrive at the Project site clean and free of soil or vegetative debris. Equipment may require cleaning (i.e., pressure washing) if moving from a weed infestation into non-infested areas. Post-construction monitoring will assess, crop production, revegetation progress and weed occurrences, as well as determine if follow-up measures are required. ■ A Clubroot Management Plan will be implemented during construction of the ROW in cultivated areas. The Canadian Association of Petroleum Producers recommends the practice of good sanitation to restrict the movement of potential soil contaminated with clubroot spores into a new are and/or between fields. The resting spores are more likely to spread via contaminated soil. Moderate to high infestations will leave high spore concentrations in soil on field machinery, thus sanitation is very important. In addition to having all equipment clean and sanitized before arriving on-site, additional wash station locations may be determined in the Clubroot Management Plan and located in close proximity to areas considered to have higher risk for infection and where requested by landowners. ■ Equipment will arrive on-site either sanitized or disinfected to mitigate the spread of crop diseases. Equipment and vehicles will be re-sanitized as necessary or when requested by landowners when moving from one land parcel to another. ■ Existing public roads will be used where possible to access the ROW during construction to reduce the amount of new temporary access routes required for the Project. ■ The Project footprint will be reclaimed to pre-existing land use (e.g., cropland will be returned to cropland land use).
	Reduce area and use of land available for purposes other than agriculture (e.g., traditional land use, hunting and recreation)	■ All work will be kept within the surveyed ROW and other approved work areas. ■ The Project design has considered landowner and stakeholder feedback, and the ROW has been routed to accommodate concerns to the extent possible. ■ The Project was routed adjacent to or within areas of existing disturbance (e.g., highways, gravel roads, powerlines, natural gas lines) to the extent possible in order to minimize new disturbance corridors. ■ Existing public roads will be used where possible to access the ROW during construction to reduce the amount of new temporary access routes required for the Project. ■ Public roads will be crossed using HDD or bored to minimize disturbance to road users. The railway will also be crossed using HDD. ■ There is a large amount of potentially suitable and alternate upland game bird, waterfowl, and ungulate habitat in the LSA and RSA; therefore, Project activities are not expected to decrease hunting opportunities. ■ Disturbances to riparian edges will be reduced to the extent possible. Where possible, the proposed ROW has been routed to avoid crossing wetlands and watercourses, and to cross ephemeral/temporary wetlands at suitable locations. Wetlands and drainages with surface waters may employ HDD methods to minimize disturbance. ■ To minimize potential introduction or spread of weeds which can affect land use, all equipment will arrive at the Project site clean and free of soil or vegetative debris. Equipment may require cleaning (i.e., pressure washing) if moving from a weed infestation into non-infested areas. Post-construction monitoring will assess revegetation progress and weed occurrences, as well as determine if follow-up measures are required. ■ The Project footprint will be reclaimed to pre-existing land use after construction and operation.

Note: ROW = right-of-way; HDD = horizontal directional drilling; e.g., = for example; LSA = Local Study Area; RSA = Regional Study Area.

Reduction in area of agricultural land and disruption of agricultural land use

The majority of potential disturbance to agricultural land area and land use will occur during construction. Physical disturbances during construction will include clearing, soil stripping/salvage, and grading. The Project has been routed to accommodate landowner concerns to the extent possible. Weed management, including equipment cleaning, will be implemented to mitigate the introduction and spread of weeds along the Project ROW. Crop pest and disease management will also be implemented if requested by the landowner or deemed necessary by TransGas as part of industry best practices.

After natural gas line installation and backfilling, clean-up will commence, and slopes and graded areas will be re-contoured, and topsoil will be replaced over the trench. After clean-up activities have been completed, land use will be returned to the pre-existing land use with reclamation practices and monitoring.

Reduction in land area and land use available for purposes other than agriculture

The majority of the Project ROW (162.2 to 190.9 ha; 75.6% to 79.2%) crosses land used for agriculture (Table 13). Approximately 20.8% to 24.4% of the ROW (49.4 to 56.9 ha) may be used for purposes other than agriculture or in conjunction with agriculture (e.g., snowmobiling), such as recreation and hunting.

Physical disturbances have low potential to affect activities such as snowmobiling and hunting. This is due to the amount of agricultural and private land the Project crosses. The Project will be routed with consideration of landowner and stakeholder feedback, and will be located on, adjacent to or in close proximity to areas of existing disturbance to the extent possible. Where possible access to the ROW will use existing roads. Weed management, including equipment cleaning, will be implemented to mitigate the introduction and spread of weeds along the Project ROW.

The Project LSA and RSA include extensive ungulate, upland game bird and waterfowl habitat that provide hunting opportunities; therefore, Project activities are not expected to decrease overall hunting or recreation opportunities in the LSA and RSA. Mitigations implemented during construction will limit impacts to wetlands and drainages and prevent potential disturbance to hunting and recreation. To maintain useable habitat, wetlands and drainages that contain surface water will be crossed using HDD and adequate setbacks will be put in place to minimize disturbance to the adjacent riparian or transitional boundary zones.

5.9 Heritage Resources

In Saskatchewan, a heritage resource is broadly defined as any object that is of interest for its architectural, historical, cultural, environmental, archaeological, paleontological, aesthetic, or scientific value. Heritage resources are property of the Provincial Crown, and as such, are protected under *The Heritage Property Act*.

To understand the archaeological setting and existing heritage resources documented in the LSA, a desktop assessment will be undertaken once the Project route is finalized. Several data sources will be consulted included the provincial Archaeological Sites Database and Developer's Online Screening Tool maintained by the Heritage Conservation Branch (HCB 2022); previous archaeology assessment reports; peer-reviewed journals; relevant publications, and online resources. Information from these sources is used to identify previous archaeological research carried out in the region, as well as the types of heritage resources known to occur or that could potentially occur in the LSA.

Based on the results of the desktop study, the proposed LSA (Project footprint) may be submitted to the HCB for review to determine if a Heritage Resource Impact Assessment (HRIA) is required as per Section 63 of *The Heritage Property Act*. The HCB has identified two primary factors for determining if a HRIA is required for a project. This includes the presence of previously recorded heritage resources and the archaeological sensitivity or

potential for undocumented heritage resources to be present in a project footprint. Secondary factors include the nature and extent of previous land disturbance (including cultivation), and nature and scope of proposed land alteration.

For southern Saskatchewan (grasslands and southern parklands) the HCB considers lands to be heritage sensitive if they are:

- within the same quarter-section or within 500 m of a Site of Special Nature or other previously recorded site unless shown to be of low significance
- within 1 km of permanent river/stream
- within 1 km of well-formed valleys containing permanent and/or seasonal watercourses
- within 1 km of permanent/seasonal water bodies greater than 2 km in length
- within 1 km of permanent/seasonal water bodies located in well-defined drainage basins
- adjacent to readily identifiable strandlines (ancient lake shores)
- on islands greater than 1 km in length
- on hummocky/pothole slough terrain
- within or on periphery of sand dune complexes
- on escarpments, prominent uplands and hills/ridges

Heritage resources have been identified as a VC because they are considered important to government agencies, Indigenous peoples, and the general public. Potential Project effects to heritage resources are typically tied to ground disturbance activities during construction that can permanently damage or destroy an archaeological site. Heritage resources are considered property of the Government of Saskatchewan and are protected under provincial legislation. This legislation also determines when a HRIA is required for a project to mitigate against potential impacts to unrecorded heritage resources. In Saskatchewan this is outlined under Section 63 of *The Heritage Property Act.* The Saskatchewan Heritage Conservation Branch will review proposed projects, determine potential effects to heritage resources and outline any necessary HRIA requirements.

5.9.1 Potential Effects and Mitigations

Potential affects to heritage resources within the Project LSA can occur during ground disturbance activities associated with construction (e.g., topsoil stripping, ditching). Precontact surface features such as stone circles, medicine wheels, and cairns, as well as historic structures such as buildings, foundations or cellar depressions could be damaged or destroyed during these activities. The displacement of soils and sediment can also negatively affect buried heritage resources such as campsites, bison kill sites, and human burials, if present. In sites such as these, context is important, and the value of the archaeological resource may be destroyed or reduced significantly once it has been impacted. Impacts to heritage resources are permanent and irreversible.

The location of the eastern end of the natural gas line at the proposed SaskPower Aspen natural gas power station in the NW-36-33-24-W2M near Lanigan was submitted to the HCB for regulatory review. In a response dated June 1, 2023 (Appendix B), it was determined that the eastern end of Project is not in conflict with known archaeological sites and it will occur in lands previously disturbed by cultivation. The potential to impact intact heritage resources was, therefore, considered low. Once a Project route is finalized, a referral to the HCB will be

completed to determine if an HRIA is required for the remaining portion of the Project. In the event unanticipated heritage resources are identified during construction, all activities will cease and TransGas chance find protocols will be followed.

The potential effects resulting from Project activities, recommended mitigation to address these issues are summarized in Table 26.

Table 26: Potential Effects and Proposed Mitigation for Heritage Resources

Interactions	Potential Effect(s)	Mitigation
Construction, Operation and Decommissioning	Loss of heritage resources	■ The final route of the Project will be submitted to HCB for review to determine the potential to impact heritage resources. ■ Should an HRIA be required archaeological monitors will be onsite during excavation within the sensitive areas. ■ In the event unanticipated heritage resources are identified during construction or decommissioning, all activities will cease and TransGas chance find protocols followed.

HRIA = Heritage Resource Impact Assessment.

5.10 Socio-Economic Environment

The socio-economic environment LSA encompasses communities within a 10 km buffer around the Project ROW that may be directly affected by the Project. Communities within the LSA include Plunkett, Colonsay, Meacham, Neely, Viscount, Guernsey, Peterson and Prud'homme. The Project crosses through six R.M.s including the R.M. of Grant No. 372, R.M. of Bayne No. 371, R.M. of Colonsay No. 342, R.M. of Viscount No. 341, the R.M of Wolverine No. 340 and R.M. of Usborne No.310. Two additional R.M.s are located within the LSA including the R.M. of Morris No. 312 and the R.M. of Blucher No. 343. There are no First Nations Reserves within the LSA, with the nearest Reserve (One Arrow Indian Reserve 95-1E) positioned approximately 29 km from the Project ROW.

Baseline socio-economic information was collected from a range of information sources and analysed to submit a profile for the social and economic conditions in the socio-economic environment LSA. Baseline information was collected from the following sources:

- Statistics Canada census and national household survey
- local service provider websites
- municipal government websites
- federal government website

Population, Demographics, and Labour Force

Population and demographic data for the R.M.s and communities within the socio-economic environment LSA are provided in Table 27. The statistics for the Hamlet of Neely and Hamlet of Peterson are included with the R.M. of Colonsay and R.M. of Bayne, respectively. Communities within the LSA that had population growth between 2016 and 2021, include the village of Viscount and the village of Prud'homme, while all other communities saw populations remain neutral or decrease during that period.

The median age of all communities within the LSA is 42.8 and is higher than the median age for the Province of Saskatchewan (38.8; Statistics Canada 2021). The median age of all the R.M.'s within the LSA is 43.4 and is also higher than the median age for the Province of Saskatchewan (38.8).

Table 27: Population, Demographic, and Labour Force Characteristics of the Socio-economic Environment Local Study Area (2016 and 2021)

Characteristic	Village of Plunkett	Town of Colonsay	Village of Meacham	Village of Viscount	Hamlet of Guernsey	Village of Prud'homme	R.M. of Grant No. 372	R.M of Bayne No. 371[b]	R.M of Colonsay No. 342[a]	R.M. of Viscount No. 341	R.M. of Wolverine No. 340	R.M. of Usborne No. 310
Population and Demographic Characteristics												
Total Population in 2016	60	451	99	232	97	167	466	467	269	338	480	529
Total Population 2021	60	446	96	282	95	177	525	461	260	320	511	511
2011 to 2016 population change (%)	0	-1.1	-3.0	21.6	-2.1	6.0	12.7	-1.3	-3.3	-5.3	6.5	-3.4
Median Age of the Population	57.6	40.0	42.8	36.8	42.8	37.2	39.2	43.2	44.4	47.2	41.6	43.6
Total Private Dwellings	36	199	51	149	51	87	215	202	112	145	222	236
Labour Force Status												
Population Aged 15 and Over	45	345	55	220	80	155	435	390	215	250	405	375
Population in the Labour Force	20	225	30	130	25	110	330	310	145	190	350	255
Employed Population	20	210	30	115	20	85	315	295	130	185	340	240
Unemployed Population	0	20	10	15	10	25	15	15	20	0	10	15
Participation Rate (%)	44.4	65.2	54.4	59.1	31.3	71.0	75.9	79.5	67.4	76.0	86.4	68.0
Unemployment Rate (%)	0	8.9	33.3	11.5	40.0	22.7	4.5	4.8	13.8	0	2.9	5.9

Source: Statistics Canada 2021.
(a) Contains occupants of Neely.
(b) Contains occupants of Peterson.
R.M. = Rural Municipality; No. = number.

Agriculture is the main industry supporting the labour force in the socio-economic environment LSA. Other main industries supporting the labour force in the LSA include healthcare, mining, retail trade and construction (Statistics Canada 2023b).

Economic Development

The land use in the socio-economic environment LSA is primarily agricultural, with areas of rural development (i.e., acreages and farmyards), urban development (e.g., Town of Colonsay), and an industrial potash mine. These areas provide recreation-related tourism opportunities such as hiking, quadding, snowmobiling, bird and wildlife watching and hunting that are permitted on private and provincial Crown land. In addition, the LSA includes parks and indoor and outdoor recreation facilities administered by communities within the LSA. Combined, these facilities provide further recreation-related tourism opportunities such as camping, swimming, ice sports (e.g., hockey), ball diamonds, golf and community gatherings.

The majority of commercial businesses within the LSA are located in Viscount and Colonsay and are related to agriculture, trades (welding, mechanic, plumbing, construction, plumbing), trucking, finance and insurance, hospitality, grocery, outdoor recreation, and arts and entertainment.

Services and Infrastructure

There are a few health centres within the socio-economic environment LSA with the nearest hospitals occurring in Saskatoon, Humboldt, Lanigan, and Watrous (Government of Saskatchewan 2023b).

Law enforcement within the LSA is provided by the Royal Canadian Mounted Police (RCMP). The Colonsay and Saskatoon detachment offices services for the entire Project footprint. Firefighting services are provided by volunteer fire departments in Prud'homme, Viscount, Colonsay, and Meacham (Village of Prud'homme 2019, RM of Usborne 2023, Town of Colonsay 2023, Village of Meacham 2022, Village of Viscount 2023).

Waste disposal in the LSA is serviced using local transfer stations. Waste transfer stations within the LSA include those within the communities of Viscount, Colonsay, Meacham, and Prud'homme. There are no open landfills within the LSA (Government of Saskatchewan 2023c). Natural gas and power services for the R.M.'s and communities located within the LSA are typically serviced by SaskEnergy/TransGas and SaskPower. Within the LSA TransGas natural gas lines of various lengths, as well as numerous SaskEnergy distribution lines occur.

In the LSA, the Project can be accessed via Highway 2 Highway 5 and Highway 16. The 2021 Average Annual Daily Traffic Count in the LSA is presented in Table 28.

(Government of Saskatchewan 2021b). The average annual daily traffic count is highest along Highway 16 immediately west of Colonsay and decreases moving east, past the Project location. The average annual daily traffic count along Highway 2 increases with travel from north to south, likely associated with the potash mine located south of the Highway 2 and Highway 16 junction. The average annual traffic count along Highway 5 increases moving east from the Highway 2 intersections towards Humboldt.

Highway 2 runs parallel to the north/south portion of the Project, while Highway 16 runs parallel to the east/west portion of the Project. Both highways are crossed by the Project route near Colonsay. Highway 5 intersect the Project near the north terminus of the route.

Table 28: Average Annual Daily Traffic Count in the Local Study Area (2021)

Highway Location	Short Term Count
Highway 16	
Immediately East of Colonsay	3,340
West of Lanigan	2,720
Highway 5	
Highway 2 and Highway 5 junction (west side)	1,960
Highway 2 and Highway 5 junction (east side)	2,560
Highway 2	
North of Highway 16 junction	500
South of Highway 16 junction	1,490

Source: Government of Saskatchewan 2021b.

5.10.1 Potential Effects and Mitigations

Effects on the socio-economic environment were assessed for Project construction, operation, and decommissioning within the socio-economic environment LSA. The potential Project-related effects on the socio-economic environment and recommended mitigations are described below. Potential affects to the socio-economic environment from accidents and malfunctions are discussed in Section 5.11.

Increase in traffic volume

During construction and operation, vehicles travelling to access the Project will range between regular sized vehicles (e.g., pickup trucks) to large, heavy equipment. Traffic counts within the LSA indicate a moderate to high volume of daily traffic on the main routes around the Project. The Project can be accessed via Highway 2, Highway 5 and Highway 16, as well as secondary Highway 365 and Highway 670. There will also be increases in traffic unpaved local roads intersecting the Project route but will be temporary as the construction progressively moves through an area. Therefore, an increase in traffic will likely result in minimal affects to traffic infrastructure and traffic volume.

To mitigate potential effects, workers will carpool where possible and TransGas will also work with local R.M.s and Ministry of Highways to address potential traffic and transportation infrastructure concerns. Signage will be installed near the work area(s) and when crossing main intersections and will be highly visible to travelling public. When working near or crossing primary or secondary highways (e.g., Highway 2, 5, and 16), a traffic management plan will be in place to notify road users and enhance safety for construction personnel. All traffic laws, including speed limits, will be followed by all workers.

Increase in noise

Noise during Project construction will vary based on the type of construction activities. Grading, trenching, and lowering-in activities will require the most equipment and create the most noise. The primary noise sources associated with construction will be large off-road equipment such as bulldozers, backhoes, excavators, graders, side booms, and other smaller equipment such as welding units. The HDDs will be required at points where the proposed natural gas line must crossroads, utility lines, drainages, and wetlands/drainages. Due to their tonal character, back-up alarms installed on mobile equipment are also considered an important noise source when assessing potential acoustic effects from Project construction. Noise levels at receptors during construction

activities will depend primarily on the number, type, and proximity of noise sources. Construction noise levels will decrease as the distance between the receptors and construction activities increases.

AER Directive 038 (EUB 2007) does not specify limits or thresholds for construction noise. Instead, AER Directive 038 (EUB 2007) recommends the following mitigation measures, which can be implemented to reduce potential effects to nearby noise receptors during construction activities:

- Conduct construction activities during the daytime period (i.e., 7 am to 10 pm)
- Advise nearby residents of noisy activities and schedule these activities to reduce disruption
- Install appropriate and well-maintained muffler systems on engine-driven equipment
- Respond expeditiously to noise complaints and take appropriate action to address such complaints

Where practical, TransGas will implement the noise mitigation measures listed above during Project construction. The HDDs are currently scheduled to be active during daylight hours if downhole conditions permit. If downhole conditions are not suitable (e.g., borehole collapses, potential for drilling tools getting stuck), it may be necessary to continue drilling activities 24 hours per day; however, the duration of HDD activities is not expected to exceed one or two days at smaller crossings.

Noise emissions associated with Project operation are expected to be minimal. There will be no above ground noise sources associated with normal operation and noise generated by the buried natural gas line is expected to be undetectable. With the exception of periodic maintenance activities, such as inspection from ground-based vehicles or aircraft and potential natural gas line pigging (i.e., internal pipe inspection), no additional noise is expected as a result of Project operation. Noise associated with maintenance will be temporary in nature and will occur periodically over the life of the Project. Operation and maintenance activities are not expected to result in long-term changes to existing noise levels in the LSA.

It is expected that decommissioning and abandonment of the Project will be completed over a shorter timeframe than Project construction and using a smaller equipment fleet. In addition, Project decommissioning and abandonment activities will make use of the same noise mitigation measures as Project construction activities. As such, changes to existing noise levels during Project decommissioning are expected to be less than during Project construction and occur for a shorter period of time.

Table 29: Potential Effects and Proposed Mitigation for Socio-Economic Environment

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation, and Decommissioning	Use of commercial accommodations	▪ TransGas will encourage construction contractors to source workers and services locally to the extent possible. ▪ A construction camp will not be required for the Project. It is expected construction workers will travel from Saskatoon or other surrounding communities. ▪ Saskatoon and surrounding communities are anticipated to adequately provide accommodations for the construction workforce, without limiting access to accommodations for use by others.
	Use of emergency and protective services	▪ All TransGas employees and contractors will complete or have safety training prior to commencing work. ▪ In the event of an emergency, contractors will follow the TransGas emergency response plan (ERP) and/or their own ERP developed for the Project. ▪ Access to first aid will be available on-site. ▪ If required, emergency and protective services in Saskatoon will be used to support the Project. However, potential use of services is anticipated to be unlikely.
	Use of waste management services	▪ Contractors will follow the TransGas Environmental Protection Standards and regulatory guidelines when dealing with Project-related waste. ▪ Materials will be recycled where practical. ▪ Good housekeeping practices will be employed and littering will be prohibited. ▪ Contaminated materials will be disposed of using an approved waste contractor and deposited at an appropriate waste facility. ▪ Lightweight, non-hazardous materials will be collected on-site and disposed of at an approved landfill.

Table 29: Potential Effects and Proposed Mitigation for Socio-Economic Environment

Interaction(s)	Potential Effect(s)	Mitigation
Construction, Operation, and Decommissioning	Traffic volume	▪ Transport workers to and from work site by multi-passenger vehicles, wherever practical. ▪ TransGas will work with local R.M.s and Ministry of Highways to address traffic and transportation infrastructure concerns. ▪ Construction will occur sequentially along the ROW (i.e., not along the entire ROW at once), limiting traffic to the specific area where work is taking place. ▪ The ROW is accessible via several routes, including Highways 1 and 39 as well as numerous mid and high-grade grid roads. ▪ Drivers will comply with speed limits and all other traffic laws. ▪ Signage, barricades, and other warnings will be securely installed in a place highly visible to the travelling public. ▪ Dust suppression will be employed as necessary near homes along grid roads used for access. ▪ When working in close proximity to or crossing roads and highways, appropriate warning will be given to road users to ensure the safety of the travelling public.
	Noise from Project activities	▪ All equipment will be fitted with standard mufflers or silencers and will be kept in good working order. ▪ Where possible, the Project will take advantage of acoustical screening from existing buildings, wooded areas and terrain features to shield dwellings from construction equipment noise. ▪ TransGas or contractors will advise nearby residents of particularly noisy activities and schedule these activities to reduce disruption to nearby residents. ▪ TransGas will respond to noise complaints and take appropriate action to manage noise complaints. ▪ The majority of construction (and decommissioning and abandonment) activities will be between the hours of 7 am and 10 pm, as recommended by AER Directive 038 (EUB 2007).

Note: ROW = right-of-way; e.g., = for example; R.M. = Rural Municipality.

5.11 Accidents and Malfunctions

Accidents and malfunctions can occur during all Project phases and activities. The Project will be designed, constructed, operated, and decommissioned, using applicable standards and industry BMPs, which are expected to limit the potential occurrence of an accident or malfunction related to the Project.

The potential effects associated with the construction and operation of the Project on accidents and malfunctions include:

- soil contamination due to accidental spills and waste
- surface water contamination due to accidental spills and waste
- fire
- natural gas line failure during operation

Execution of application engineering standards, BMPs and mitigation measures outlined in sections above will work towards preventing and mitigating accident and malfunctions.

5.11.1 Drilling mud release into water

An inadvertent mud release during HDD may occur in permeable soils, gravel substrates, or fractures in clay and rock structures. Subsurface releases may also occur. TransGas will implement the following provisions to minimize the risk of adverse effects during directional drilling in the event of drilling mud spills or unexpected discharge from the drill hole to the surface resulting in a drilling mud release into water.

- TransGas will notify and seek approval from the appropriate agencies prior to commencement of a drill in accordance with regulatory permit conditions.
- The drilling mud composition will be limited to bentonite and fresh water. Additives, if required, will be non-toxic (e.g., mud conditioners).
- A site-specific ERP may be developed for longer engineered crossings, or where it is deemed there is an increased risk of release. Contingency measures will be outlined in the mud release ERP where applicable.
- The contractor will maintain equipment and contingency material on-site in sufficient quantities during drilling operations to contain any inadvertent drilling mud releases. Where accessibility from one side of the crossing to the other is limited, response equipment may be required on both sides of the water crossing.
- Maintain water quality sampling equipment on-site during drilling operation.
- Monitor the quantity of fluid return to the mud tank/pit and the quantity of make-up drilling fluid required in the mixing tanks during drilling of the pilot hole and hole opening.
- Monitor both onshore and in-water portions of the drill path on a regular basis for signs of drilling mud release.
- Ensure communications equipment, if required, is on-site and available for use in monitoring operations.
- Assign supervisory personnel to be on-site at all times during drilling, reaming, and pullback operations to ensure that response measures will be implemented immediately and effectively.

5.11.2 Soil contamination caused by spills and waste

Potential soil contamination from spills and waste can occur during the construction, operation, and decommissioning phases of the Project. TransGas will implement a Spill Prevention and Response Plan, including the following provisions:

- all personnel on-site will be trained in spill prevention and response;
- refueling of vehicles/equipment will be completed in a manner and mitigation will be implemented to reduce the risk of spills (e.g., use drip pans when re-fuelling on-site, use automatic shutoff valves);
- refueling, servicing, and repairs will be done at roadsides or in areas where the topsoil has been removed and stockpiled;
- all spills and incidents will be reported and documented, including an analysis of ways to improve procedures to prevent repeat occurrences; and
- spills or release that might cause, is causing, or has caused adverse effects on the environment will be immediately reported as outlined by applicable regulations.

5.11.3 Surface Water Contamination Caused by Inadvertent Mud Release, or Spills and Waste

One of the highest risks for effects to water quality is the potential for a spill of a deleterious substance to surface water along a drainage pathway where runoff could transport material downstream or downslope to a water feature. Surface water quality may be affected by a leak or spill of a deleterious substance into a surface water body or an active drainage flow path. This could occur during the construction period from equipment used for construction or from materials/fluids stored on-site. Clean up procedures would be followed in the event of a spill or leak on soil or directly into surface water.

Introduction of fine sediment into wetlands and drainages from an inadvertent mud release during a HDD or activities during an open-cut, or runoff and erosion from the construction ROW can degrade the habitat and function of wetlands and drainages for plants and wildlife. These effects can be minimized by implementing effective sediment and erosion control measures before starting work and inspecting them regularly during construction.

5.11.4 Fire

A fire may result from Project construction and operation activities which could adversely affect community health and/or property. TransGas has an ERP prepared for use in the event of an emergency during construction and operations. This will be supplemented with a Project-specific ERP prepared by the contractor. In the event of a fire, TransGas will immediately notify the appropriate regulators in the event of any health or environmentally threatening emergency or spill. The ERP will be made available to lead Project construction personnel and posted at work sites (e.g., trailer warehouse, staging/pipe yard, Project office site), and available upon request, as appropriate. Following construction, the natural gas line and facilities will be maintained by TransGas, and standard industry accepted protocols will be implemented to address accidents and malfunctions.

SaskEnergy is required to submit an annual Wildfire Prevention and Preparedness Plan (WPPP) to ENV outlining how work will be performed during fire season (April 1 to October 31) in accordance with *The Saskatchewan Wildfire Act* and The Wildfire Regulations. SaskEnergy has submitted their *Construction Wildfire Prevention and Preparedness Plan: 2023* (SaskEnergy 2023a) and *Facilities Wildfire Prevention and Preparedness Plan: 2023*

(SaskEnergy 2023b) to ENV which meets this requirement. The Plans will be followed throughout construction and operation activities.

5.11.5 Natural Gas line failure during operation

Natural gas line failure during operation, resulting in product released could cause contamination or alteration of the environment that may adversely affect soil, water, wildlife including fish, vegetation and human health, depending on the severity of the accident. Natural gas is considered non-toxic but will displace breathing air in high concentrations and cause suffocation. Natural gas is lighter than air and will rise.

Although it is unlikely for a natural gas line failure to go undetected long enough for damage to vegetation to occur, natural gas leaks may cause the vegetation above the natural gas line leak to die. Natural gas is not directly toxic to plants, but it may displace oxygen in soil pore spaces and cause anaerobic conditions. These anaerobic conditions eventually result in the production of hydrogen sulfide gas which inhibits root respiration and nutrient uptake, which causes root death and eventually plant death (University of Maryland 2021).

Strategically placed block valves will be installed along the natural gas line to shut-in and isolate sections that may be damaged or develop leaks. TransGas remotely monitors all their natural gas lines continuously and any abnormal pressure changes will invoke a response including remote or in-field isolation.

A natural gas line failure or gas rupture can cause a gas explosion and fire but is unlikely to contaminate soil or water. The natural gas to be transported does not have any significant fluids and if there is a leak, the gas will rise through the medium (water, soil) and being lighter than air, will dissipate into the atmosphere. By employing various mitigation techniques during construction and operation, the potential effects relating to natural gas line failure will be reduced.

SaskEnergy/TransGas's *Construction, Operation and Maintenance Practices; Incident Response - Emergency Response Plan 2016-05-09* includes emergency numbers and response to any incidents or emergencies such as leaks, ruptures, and accidental pipe contacts.

Given the implementation of recommended mitigation measures including Project monitoring and the emergency and contingency response plans, such an event is unlikely; therefore, effects from accidents and malfunctions are predicted to be not significant.

6.0 INSPECTIONS AND ENVIRONMENTAL MONITORING

6.1 Reclamation Plan

TransGas will develop a reclamation plan that will include vegetation management procedures for addressing weed infestations and plant community establishment on any non-cultivated lands. Reclamation decisions will be made in consultation with landowners and applicable regulatory agencies.

6.2 Construction and Operation

TransGas will provide a third party on-site Environmental Monitor during the construction of critical phases of the Project, or as prescribed by ENV. The Environmental Monitor would assist TransGas with compliance with the mitigation and reclamation measures identified in this report, as well as any conditions forwarded by regulatory agencies. The Environmental Monitor will also be involved with determining the need for and implementation of site-specific stabilization and reclamation measures. The Environmental Monitor will have the authority to stop work as needed.

Regular preventative maintenance programs such as aerial and foot patrols, reclamation inspections, internal pipe inspections (i.e., pigging) and cathodic protection monitoring, along with natural gas line markers at roads, will be incorporated into the design and operation of the natural gas line.

Signature Page

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APPENDIX A

HABISask Project Screening Report

Project Screening Report

Notes: Aspen Re-routes North Route

Report Generated
03/06/2023

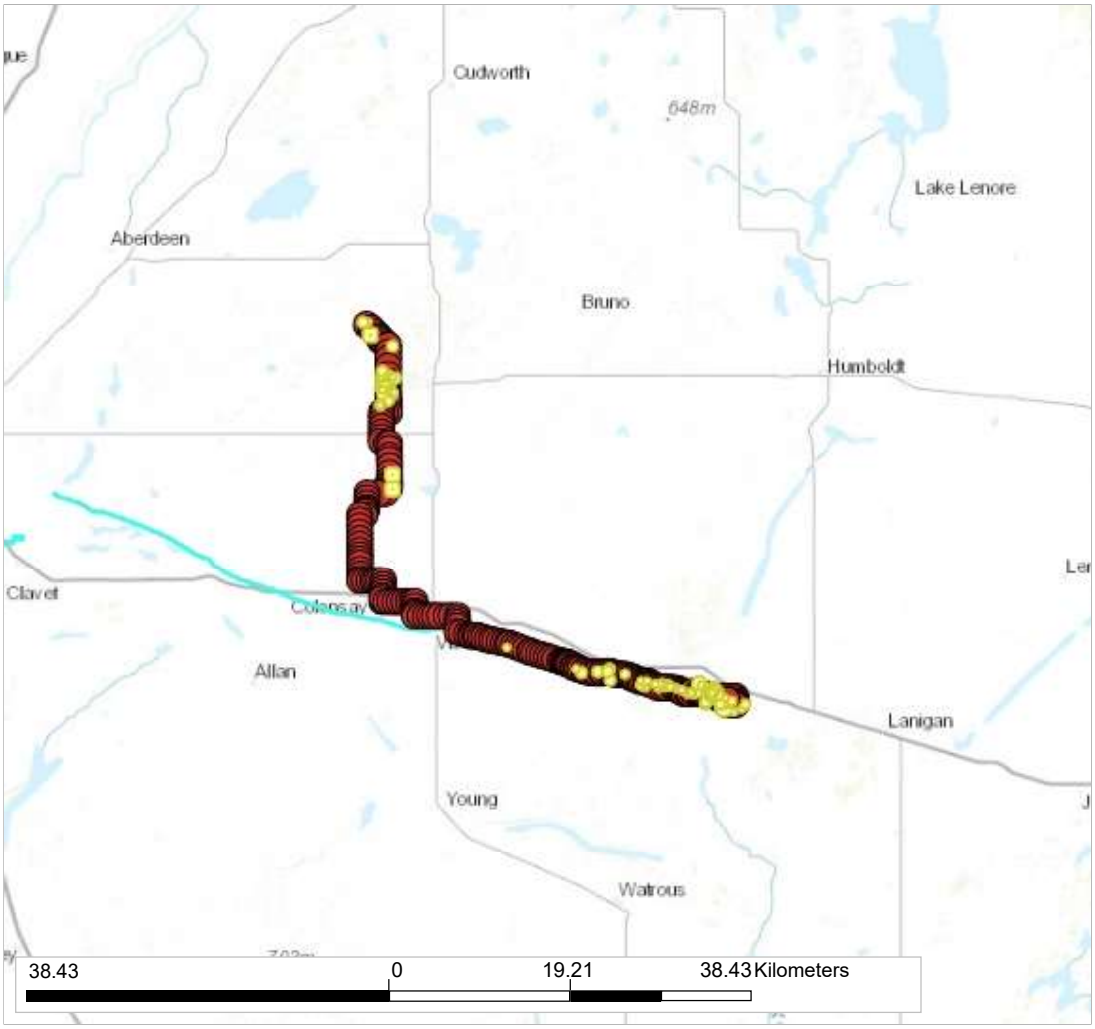
Map Information

Buffer Size:

1 Kilometers

Coordinates:
Lat: 52.00932° N
Lon: -105.69336° W

Area of Interest



Screened Areas:

- Ecological Management Specialist (EMS) District
- Compliance & Field Service Area
- Compliance & Field Service (CFS) Region
- Area Fisheries Ecologists
- Area Wildlife Ecologists
- Rural Municipality
- Indian Reserve
- Rare and Endangered Species
- Fish Species
- Woodland Caribou Range
- Species Predictive Models
- Whooping Crane Corridor
- Federal Critical Habitat
- Emergency Protection Order
- Wind Energy Avoidance Zones
- Important Natural Areas
- Provincial Parks
- Recreation Sites
- Game Preserves
- National Wildlife Areas
- Federal Pastures
- Community Pastures
- Wildlife Habitat Protection Act Lands
- Fish & Wildlife Development Fund Lands
- Migratory Bird Sanctuary
- Wildlife Refuge
- Conservation Easements
- Crown Conservation Easements
- Ecological Reserves
- Ramsar Wetlands
- Reservoir Development Areas
- Representative Areas

Species Likely to be Present

Known Species

"Known" species are species that have known occurrences in the area from the Saskatchewan Conservation Data Centre's Rare and Endangered Species map layer. However, absence of species observation records does not preclude the existence of species in the area of interest. Observations may simply not have been recorded for the given area or may not have yet been entered into the ministry data holdings – new observation records are continuously being discovered. Information accessible through HABISask is not intended to be a definitive statement on the presence, absence or status of a species within a given area, nor as a substitute for onsite surveys.

Rare and Endangered Species

Category: Vascular Plant

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Large Yellow Lady's-slipper	*Cypripedium parviflorum var. pubescens*	G5T5	N5	S2			
Marsh Felwort	*Lomatogonium rotatum var. fontanum*	G5TNR	NNR	S3			
Pale Bulrush	*Scirpus pallidus*	G5	N4	S3			
Plains Rough Fescue	*Festuca hallii*	G5	N5	S3			

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	
Baird's Sparrow	*Centronyx bairdii*	G4	N4B,N4M	S4B	Special Concern	Special Concern	
Bank Swallow	*Riparia riparia*	G5	N5B,N5M	S4B,S5M	Threatened	Threatened	
Barn Swallow	*Hirundo rustica*	G5	N3N4B, N3N4M	S4B	Special Concern	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Common Nighthawk	*Chordeiles minor*	G5	N4B,N3M	S4B	Special Concern	Special Concern	
Cooper's Hawk	*Accipiter cooperii*	G5	N5B,N5N, N4N5M	S4B,S2N, S2M	Not at Risk		
Horned Grebe	*Podiceps auritus*	G5	N5B,N5N, N5M	S5B	Special Concern	Special Concern	
Rusty Blackbird	*Euphagus carolinus*	G4	N4B,NUN, N4M	S3B,SUN	Special Concern	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B, N3N4M	S3B	Threatened	Threatened	
Turkey Vulture	*Cathartes aura*	G5	N5B,N5M	S3B			
Whooping Crane	*Grus americana*	G1	N1B	SXB,S1M	Endangered	Endangered	Endangered

Fish Atlas

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations

Expected Species

"Expected" is based on a modelled prediction if a species might occur in areas based upon developed statistical relationships between local and landscape characteristics and species presence. Models utilized by this report have only been created in the prairie ecozone for a selection of species. The boreal plain, boreal shield and taiga shield will not return any expected species results. Models are not a substitute for on the ground surveys to determine species presence.

Species Predictive Models

Category: Invertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Monarch	*Danaus plexippus plexippus*	G4T3	N3B,NNRM	S2B,SNRM	Endangered	Special Concern	

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	

Baird's Sparrow	*Centronyx bairdii*	G4	N4B,N4M	S4B	Special Concern	Special Concern	
Bank Swallow	*Riparia riparia*	G5	N5B,N5M	S4B,S5M	Threatened	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Common Nighthawk	*Chordeiles minor*	G5	N4B,N3M	S4B	Special Concern	Threatened	
Ferruginous Hawk	*Buteo regalis*	G4	N3B,N3N, NUM	S3B	Special Concern	Threatened	
Horned Grebe	*Podiceps auritus*	G5	N5B,N5N, N5M	S5B	Special Concern	Special Concern	
Loggerhead Shrike	*Lanius ludovicianus excubitorides*	G4T4	N3B	S3B	Threatened	Threatened	
Northern Harrier	*Circus hudsonius*	G5	N5B,N4N	S4B	Not at Risk		
Northern Leopard Frog	*Lithobates pipiens*	G5	N5	S3	Special Concern	Special Concern	
Piping Plover	*Charadrius melodus circumcinctus*	G3T3	N3B	S3B	Endangered	Endangered	Endangered
Red Knot	*Calidris canutus rufa*	G4T2	N1B, N3N4N, N3M	S2M	Endangered	Endangered	
Short-eared Owl	*Asio flammeus*	G5	N4B,N3N, N4M	S3B,S2N	Threatened	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B, N3N4M	S3B	Threatened	Threatened	

Whooping Crane Corridor 50% Core Area

Whooping Crane Corridor 95% Core Area

Whooping Crane Corridor 75% Core Area

Woodland Caribou Habitat

Detailed information concerning woodland caribou habitat, administration units and Caribou Habitat Management areas is provided below.

Currently, information on woodland caribou habitat potential is not available in this report, but users are encouraged to view the dataset "Woodland Caribou Habitat Potential" to determine whether your project falls within high, moderate or low caribou habitat potential areas.

Woodland Caribou Conservation Unit(s): Nothing found

Woodland Caribou Administrative Unit(s): Nothing found

Woodland Caribou Habitat Management Area Tier category: Nothing found

Species with Critical Habitat Present

This dataset displays the geographic areas within which federal Critical Habitat for species at risk listed on Schedule 1 of the federal Species at Risk Act (SARA) occurs in Saskatchewan. Please be aware that not all of the area within these boundaries is necessarily Critical Habitat. To determine if a specific area is Critical Habitat and if your activity might be considered "destruction" of Critical Habitat, other information available in each individual species' Recovery documents (http://www.sararegistry.gc.ca) need to be considered, including biophysical attributes and activities likely to result in destruction of Critical Habitat.

Note that recovery documents (and therefore Critical Habitat) may be amended from time to time. Species are added as the data becomes ready, which may occur after the recovery document has been posted on the SAR Public Registry. Although HABISask will try to provide the latest data, the SAR Public Registry should always be considered as the official source for Critical Habitat information.

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
No Critical Habitat found							

Emergency Protection Order

This dataset is comprised of areas under the federal Emergency Order for the Protection of the Greater Sage-Grouse in Canada. The exterior extent polygons are derived from the detailed dataset of the Government of Canada Emergency Order dataset. For specific information regarding the order and the prohibitions set out in the Emergency Order please consult the official documents on the Species at Risk Registry (sararegistry.gc.ca)

Common Name	Scientific Name
No species found	

Important Natural Areas

Important Natural Areas are sites in Saskatchewan that are considered to have conservation significance, but are not necessarily legally protected.

Name	Type

Nothing Found

Wind Turbine Avoidance Zones Present

The Wind Energy Avoidance Zones were designed to enhance environmental protection and provide more certainty to future wind energy developments. These guidelines clearly identify environmentally sensitive areas that should be avoided for projects that include the siting of wind turbines but can be helpful in siting any development project. The complete report entitled, Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects, can be found on the Government of Saskatchewan website or by selecting the following link: https://publications.saskatchewan.ca/#/categories/78

Land Type

Wildlife Habitat Protection Lands

Conservation Easements

Managed Areas

Managed areas are a diverse collection of lands and waters on which the conservation of biodiversity and ecosystem function are among the goals of the land management programs. Each of the unique or sensitive landscapes, within the network of managed areas, have some level of protection or activity restrictions placed on them by legislation, agreement or policy. These lands include provincial and national parks, ecological reserves, wildlife lands, game preserves, conservation easements and other privately held stewardship lands.

Conservation Easement

Yes

Crown Conservation Easement

Yes

Ecological Reserve

Nothing Found

Fish & Wildlife Development Fund (FWDF)

Nothing Found

Former Federal Pasture

Nothing Found

Game Preserve

Nothing Found

Migratory Bird Sanctuary

Nothing Found

National Wildlife Area

Nothing Found

Provincial Park

Nothing Found

Provincial Pasture

Nothing Found

Ramsar Wetland

Nothing Found

Recreation Site

Nothing Found

Representative Area Ecological Reserve

Nothing Found

Reservoir Development Area

Nothing Found

Wildlife Habitat Protection Act (WHPA)

Yes

Wildlife Refuge

Nothing Found

Rare and Endangered Species Occurrences

The absence of information provided by the Saskatchewan Conservation Data Centre (SKCDC) does not categorically mean the absence of sensitive species or features. The quantity and quality for data collected by the SKCDC are dependent on the research and observations of many individuals and organizations. SKCDC reports summarize the existing natural heritage information, known to the SKCDC, at the time of the request.

SKCDC data should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The user therefore acknowledges that the absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Occurrence ID: 9999114712 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 6 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114716 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114713 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114714 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114715 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114718 **First Observation:** 2019-08-29
Occurrence Class: Vascular Plant **Last Observation:** 2019-08-29
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 2 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 999972995 **First Observation:** 2014-06-12
Occurrence Class: Vascular Plant **Last Observation:** 2014-06-12
Scientific Name: Festuca hallii
Common Name: Plains Rough Fescue
Occurrence Rank:
General Description: species observed (2014)
Occurrence Data:
Directions: RP-SE-4-34-24-W2

Occurrence ID: 999972996 **First Observation:** 2014-06-12
Occurrence Class: Vascular Plant **Last Observation:** 2014-06-12
Scientific Name: Festuca hallii
Common Name: Plains Rough Fescue
Occurrence Rank:
General Description: species observed (2014)
Occurrence Data:
Directions: RP-SW-4-34-24-W2

Occurrence ID: 9999114717 **First Observation:** 2019-08-29
Occurrence Class: Vascular Plant **Last Observation:** 2019-08-29
Scientific Name: Lomatogonium rotatum var. fontanum
Common Name: Marsh Felwort
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 999972987 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NE-6-34-24 W2

Occurrence ID: 999972988 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NE-6-34-24 WL1

Occurrence ID: 999972990 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NE-6-34-24 WL4

Occurrence ID: 999972992 **First Observation:** 2013-10-08
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-08
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NW 5-34-24WL3

Occurrence ID: 999973002 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-3-34-24 WL1

Occurrence ID: 999973004 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-4-34-24 WL1

Occurrence ID: 999973006 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-5-34-24 WL2

Occurrence ID: 999973007 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-5-34-24 WL3

Occurrence ID: 999973009 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SW-12-34-25 WL1

Occurrence ID: 999972986 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NE-5-34-24 WL1

Occurrence ID: 999972989 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NE-6-34-24 WL3

Occurrence ID: 999972991 **First Observation:** 2013-10-08
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-08
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NW 5-34-24 WL1

Occurrence ID: 999972993 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NW-6-34-24 WL1

Occurrence ID: 999972994 **First Observation:** 2013-11-01
Occurrence Class: Vascular Plant **Last Observation:** 2013-11-01
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: NW-6-34-24 WL2

Occurrence ID: 999973003 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-3-34-24 WL2

Occurrence ID: 999973005 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-5-34-24 WL1

Occurrence ID: 999973010 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SW-12-34-25 WL2

Occurrence ID: 999981180 **First Observation:** 2011-06-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-22
Scientific Name: Accipiter cooperii
Common Name: Cooper's Hawk
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 9999120908 **First Observation:** 2018-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2018-06-06
Scientific Name: Accipiter cooperii
Common Name: Cooper's Hawk
Occurrence Rank:
General Description: 1 Adult(s) Unknown Sex; Breeding Bird Status: H; (2018)
Occurrence Data:
Directions: 13UDT48.02

Occurrence ID: 999954447 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954455 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954479 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954480 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999981099 **First Observation:** 2009-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981103 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981106 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981115 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2009, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981120 **First Observation:** 2010-05-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981124 **First Observation:** 2010-05-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981172 **First Observation:** 2009-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 9999107351 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 999954449 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999981095 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981126 **First Observation:** 2009-06-18
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2009, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981128 **First Observation:** 2009-06-18
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-18
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 3 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 9999107339 **First Observation:** 2019-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 9999107340 **First Observation:** 2019-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 9999107350 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 9999107352 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 999954499 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Cathartes aura
Common Name: Turkey Vulture
Occurrence Rank:
General Description: 4 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954490 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Cathartes aura
Common Name: Turkey Vulture
Occurrence Rank:
General Description: 4 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999981130 **First Observation:** 2012-06-16
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Cathartes aura
Common Name: Turkey Vulture
Occurrence Rank:
General Description: Species detected (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981151 **First Observation:** 2009-05-12
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-12
Scientific Name: Centronyx bairdii
Common Name: Baird's Sparrow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981093 **First Observation:** 2008-07-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-07-03
Scientific Name: Centronyx bairdii
Common Name: Baird's Sparrow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999954485 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Chordeiles minor
Common Name: Common Nighthawk
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954494 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Chordeiles minor
Common Name: Common Nighthawk
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999942121 **First Observation:** 2012-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-30
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Singing (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954461 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954463 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954465 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954482 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954484 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954486 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954495 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954497 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999978844 **First Observation:** 2012-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-15
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981078 **First Observation:** 2009-05-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-22
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981083 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981086 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-18
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981094 **First Observation:** 2008-06-08
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-08
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981098 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981105 **First Observation:** 2008-06-08
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981110 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981125 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981127 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981153 **First Observation:** 2009-05-25
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-25
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 9999107353 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 9999107365 **First Observation:** 2019-06-20
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-20
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2019)
Occurrence Data:
Directions:

Occurrence ID: 999941539 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999942109 **First Observation:** 2012-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-30
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Incidental observation (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954462 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954464 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954466 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954467 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954475 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954481 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954488 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954493 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999978827 **First Observation:** 2012-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-30
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981097 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981101 **First Observation:** 2008-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-13
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981109 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981114 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981116 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981119 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981123 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981152 **First Observation:** 2009-05-21
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-21
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 9999107338 **First Observation:** 2019-05-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-13
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999107354 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 999981162 **First Observation:** 2008-06-16
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-16
Scientific Name: Euphagus carolinus
Common Name: Rusty Blackbird
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981082 **First Observation:** 2008-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-17
Scientific Name: Euphagus carolinus
Common Name: Rusty Blackbird
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 9999104194 **First Observation:** 1988-10-21
Occurrence Class: Vertebrate Animal **Last Observation:** 1988-10-21
Scientific Name: Grus americana
Common Name: Whooping Crane
Occurrence Rank:
General Description: 2 Adult(s) (Unknown Sex); 1 Juvenile(s); Breeding Bird Status: Migrant; (1988)
Occurrence Data:
Directions: 3MI S OF COLONSAY

Occurrence ID: 9999104237 **First Observation:** 1989-09-15
Occurrence Class: Vertebrate Animal **Last Observation:** 1989-09-15
Scientific Name: Grus americana
Common Name: Whooping Crane
Occurrence Rank:
General Description: 3 Adult(s) (Unknown Sex); 0 Juvenile(s); Breeding Bird Status: Migrant; (1989)
Occurrence Data:
Directions: 10KM S OF PRUD'HOMME

Occurrence ID: 9999104993 **First Observation:** 2010-04-26
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-04-26
Scientific Name: Grus americana
Common Name: Whooping Crane
Occurrence Rank:
General Description: 1 Adult(s) (Unknown Sex); 0 Juvenile(s); Breeding Bird Status: Migrant; (2010)
Occurrence Data:
Directions: SW OF MEACHAM

Occurrence ID: 23013 **First Observation:** 2021-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2021-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank: E - Verified extant (viability not assessed)
General Description:
Occurrence Data: 1 Unknown Sex/Age; Nest/Burrow/Den; (2021)
Directions: NW-12-38-28-2 on back of west side of building

Occurrence ID: 999941275 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions: SW 31-33-23 W2M

Occurrence ID: 999941283 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954487 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 10 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954492 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999978858 **First Observation:** 2012-05-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-09
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 Adult(s) (Unknown Sex); (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981080 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981096 **First Observation:** 2010-06-13
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981108 **First Observation:** 2008-07-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981113 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-22
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981118 **First Observation:** 2010-05-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981122 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-15
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981163 **First Observation:** 2008-07-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-07-02
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981165 **First Observation:** 2008-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981179 **First Observation:** 2011-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-10
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981369 **First Observation:** 2012-06-12
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-12
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 9999120906 **First Observation:** 2018-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2018-06-06
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Adult(s) Unknown Sex; Breeding Bird Status: H; (2018)
Occurrence Data:
Directions: 13UDT48.10

Occurrence ID: 9999120911 **First Observation:** 2018-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2018-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 12 Adult(s) Unknown Sex; Breeding Bird Status: M; (2018)
Occurrence Data:
Directions: 13UDT48.04

Occurrence ID: 23623 **First Observation:** 2012-05-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-09
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank: E - Verified extant (viability not assessed)
General Description:
Occurrence Data: 5 Adult(s) (Unknown Sex); (2012)
Directions:

Occurrence ID: 999941281 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions: NW 35-33-24 W2M

Occurrence ID: 999941282 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954443 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954483 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954489 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 6 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954496 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 10 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954498 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 6 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999978845 **First Observation:** 2012-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-15
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981077 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981100 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981104 **First Observation:** 2010-06-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2010, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981107 **First Observation:** 2010-06-13
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981112 **First Observation:** 2011-06-26
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-26
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981121 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981154 **First Observation:** 2011-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-10
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981157 **First Observation:** 2010-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981161 **First Observation:** 2011-06-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981166 **First Observation:** 2008-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-30
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981167 **First Observation:** 2008-05-30
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-30
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981370 **First Observation:** 2012-06-12
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-12
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 9999138990 **First Observation:** 2021-05-25
Occurrence Class: Vertebrate Animal **Last Observation:** 2021-05-25
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2021)
Occurrence Data:
Directions: NW-12-38-28-2

Occurrence ID: 999978801 **First Observation:** 2012
Occurrence Class: Vertebrate Animal **Last Observation:** 2012
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Adult(s) (Unknown Sex); (2012-unknown)
Occurrence Data:
Directions:

Occurrence ID: 999981081 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981117 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 5 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981146 **First Observation:** 2009-05-21
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2009, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981148 **First Observation:** 2011-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-07-02
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981156 **First Observation:** 2009-05-12
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-07
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2009, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981160 **First Observation:** 2010-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-07
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981371 **First Observation:** 2012-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981373 **First Observation:** 2012-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954468 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999978722 **First Observation:** 2012-06-26
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-26
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Adult(s) (Unknown Sex); 0 Adult Male(s); 0 Adult Female(s); 0 Juvenile(s); (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981079 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981102 **First Observation:** 2009-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981111 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981147 **First Observation:** 2011-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-10
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 4 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981149 **First Observation:** 2008-05-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981150 **First Observation:** 2011-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-10
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981158 **First Observation:** 2010-06-16
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-16
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981164 **First Observation:** 2008-06-05
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981168 **First Observation:** 2009-05-12
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-12
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981169 **First Observation:** 2008-05-16
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-16
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981171 **First Observation:** 2008-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-03
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981173 **First Observation:** 2008-06-16
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981178 **First Observation:** 2009-05-25
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2009, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981365 **First Observation:** 2012-05-13
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981372 **First Observation:** 2012-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 9999120907 **First Observation:** 2018-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2018-06-06
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 1 Adult(s) Unknown Sex; Breeding Bird Status: H; (2018)
Occurrence Data:
Directions: 13UDT48.10

Occurrence ID: 999981364 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Riparia riparia
Common Name: Bank Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 9999115760 **First Observation:** 2008-07-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-07-09
Scientific Name: Taxidea taxus taxus
Common Name: American Badger
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Wild Species Research Permitting

A Research Permit is required to detect or observe plants or wildlife for commercial purposes, such as pre-screening surveys to collect baseline data or other activities, or to conduct academic research. Research Permits are not required if you are doing surveys for personal, recreational, educational or other non-commercial purposes. Revisions were made to Section 21 of The Wildlife Act in 2015 and to Section 6.2 of The Wildlife Regulations in 2016.

See the Government of Saskatchewan Wild Species Research Permitting page for more information.

All forms and related information pertaining to Research Permits can be found in the Publications Centre. Be sure to check out the Conservation Standards Terms and Conditions for Research Permits for general, wildlife and research-specific and information submission conditions that pertain to all research permits.

Subscribe to our Mail-out List Subscriptions for updates regarding Species Detection Permits, SKCDC Lists and Ranks, Legislation and Policy and HABISask.

Species Detection Survey Protocols

The Species Detection Survey Protocols are used to detect rare and sensitive species so Activity Restriction Guidelines can be applied. Their use is required by industry/ environmental consultants for proposed or existing commercial activities.

Activity Restriction Guidelines for Sensitive Species

The Activity Restriction Guidelines for Sensitive Species outline restricted activity periods and distance setbacks for rare and sensitive species to assist proponents in minimizing impacts to rare and sensitive species and habitats.

Administrative Areas

8	Ecological Management Specialist (EMS) District(s)
6	Ecological Management Specialist (EMS) District(s)
Saskatoon	Compliance and Field Services Area(s)
Humboldt	Compliance and Field Services Area(s)
Saskatoon	Compliance and Field Services Region(s)
Saskatoon	Area Fisheries Ecologist Area(s)
PARKLAND REGION	Area Wildlife Ecologist(s)
372 - GRANT	Rural Municipality
342 - COLONSAY	Rural Municipality
340 - WOLVERINE	Rural Municipality
371 - BAYNE	Rural Municipality
341 - VISCOUNT	Rural Municipality
310 - USBORNE	Rural Municipality
Nothing Found	First Nation Reserve

Contact Us

For more information, please contact our Client Service Office:
Email: centre.inquiry@gov.sk.ca
Tel (toll free in North America): 1-800-567-4224
Tel (Regina): 306-787-2584

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Appendix E Groundwater Investigation Report

Water Supply Wells 13-01 & 13-02
Licensing and Testing
NW 36-33-24-W2M
Wolverine, Saskatchewan

SaskPower

WM608 27 September 2022

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27 September 2022
File: WM608

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Attn: Mr. Riley Chesterton

Subject: Water Supply Wells 13-01 & 13-02
Well Testing
NW 36-33-24-W2M
Wolverine, Saskatchewan

We are pleased to present our final report for the above noted hydrogeologic investigation. This well licensing report documents the investigation completed to characterize the Empress Group Aquifer water supply wells 13-01 and 13-02 located on NW 36-33-24-W2M.

The characterization confirmed the following:

- 13-01 and 13-02 are both sustainable for normal operating flow rates (1.5 L/s) specified by SaskPower. 13-02 is sustainable for peak operating flow rates (6.5 L/s) specified by SaskPower. We recommend 13-02 be utilized as the primary water supply.
- The Empress Group Aquifer is capable of producing significant quantities of groundwater for fire suppression refill (28.9 L/s). A larger (254 mm or 305 mm diameter) water supply well will be required to achieve rates of this magnitude.

We will forward a copy of this report to Water Security Agency for their review, along with an Application for Water Rights License and Approval to Construct and Operate Works under *The Water Security Agency Act*. Please call if you have any questions regarding this work program.

Yours truly,

WaterMark Consulting Ltd.

<Original signed by>

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Executive Summary

SaskPower is in the process of constructing a gas switching facility on NW 36-33-24-W2M, roughly 2 km southeast of Wolverine, Saskatchewan. SaskPower completed two (2) water supply wells (13-01, & 13-02) and a monitoring piezometer (13-03) on the site in the winter of 2013. SaskPower has indicated that the proposed facility will require a continuous flow rate of approximately 1.3 L/s (20 USgpm) for normal operations, with peak continuous rates of roughly 6.5 L/s (102 USgpm) anticipated during summer months. Significantly higher yields in the order of 28.9 L/s (458 USgpm) are required for fire suppression tank refills in the case of emergency, however these rates are only required for short periods in the order of 8-hours.

A well testing program was completed between 06 and 08 September 2022 to test the water supply wells and determine the hydraulic characteristics of the Empress Group Aquifer and make recommendations for long-term sustainable flow rates and pump settings. The results of this investigation are contained within this engineering report.

A 24-hour constant flow rate pumping test was completed on 13-02 on 07 September 2022. Total drawdown within 13-02 at the completion of the 24-hour constant rate pumping test was 12.0 m at a continuous flow rate of 6.2 L/s (98.3 USgpm). The specific capacity of 13-02 was estimated to be approximately 0.65 L/s per meter drawdown. The well head loss component of the total measured head loss was estimated to be approximately 9.9 m at a flow rate of 6.2 L/s.

An abbreviated 6-hour constant flow rate pumping test was completed on 13-01 on 06 September 2022. Total drawdown within 13-01 at the completion of the 6-hour constant rate pumping test was 36.4 m at a continuous flow rate of 3.5 L/s (55.5 USgpm). The specific capacity of 13-01 was estimated to be approximately 0.12 L/s per meter drawdown. The well head loss component of the total measured head loss was estimated to be approximately 33 m at a flow rate of 3.5 L/s.

Based upon the 13-02 pumping test drawdown data, the Empress Group Aquifer transmissivity was found in the range of 1,578 m^2/day with a hydraulic conductivity of $2.4x10^{-4}$ m/s, consistent with a clean sand deposit. Average storativity was found to be in the order of $2x10^{-4}$.

Water supply wells 13-01 and 13-02 were both interpreted to be sustainable at the SaskPower continuous flow requirement of 1.3 L/s (20 USgpm) for normal operation. Water supply well 13-02 is interpreted to be sustainable for the peak continuous flow rate of 6.5 L/s (98.3 USgpm) for summer use. It has not been confirmed whether 13-01 is sustainable for 6.5 L/s; theoretical drawdown interpretation indicates flow rates in the order of 6.5 L/s for 13-01 may be possible however it is approaching the maximum capacity for a 102 mm diameter pump with that

magnitude of drawdown. Confirmation of well losses and drawdown will be necessary at this elevated flow rate. It is recommended that 13-02 be operated as the primary water supply while 13-01 remain available as a backup water supply in the event that 13-02 becomes inoperable.

Impacts to neighbouring well users have also been considered in our analysis. Four (4) wells completed into the Empress Group Aquifer occur within a 3.2 km radius of the production wells. The nearest neighbouring well completed into the Empress Group Aquifer is located approximately 1,500 m northwest of the study site. At this distance radial drawdown impact is anticipated to be in the order of 1.4 m over the course of 30 years of continuous use at 6.5 L/s. This impact assumes continuous use at the peak summer flow rate and does not take into account recharge to the aquifer. The predicted radial impact of 1.4 m is considered a conservative estimate and actual drawdown impact is anticipated to be less.

Water supply well 13-02 is to be utilized as the primary water supply. Pump settings for 13-02 have been interpreted as follows:

- The maximum flow rate shall not exceed 6.5 L/s (102 USgpm).
- The pump intake should be set at approximately 26.4 m below ground surface, based upon the following:
    - Static water level 4 m below ground surface.
    - Long-term drawdown within 13-02 of 14.4 m within 13-02 well casing.
    - A buffer of 8 m to account for any future well deterioration, hydrogeologic boundaries, or natural piezometric variation within the aquifer.

Water Supply well 13-01 is suitable as a backup water supply. Pump settings for 13-01 have been interpreted as follows:

- The maximum flow rate shall not exceed 4 L/s (63 USgpm).
- The pump intake should be set at approximately 59 m below ground surface, based upon the following:
    - Static water level 4 m below ground surface.
    - Long-termed drawdown within 13-01 well casing of 47 m.
    - A buffer of 8 m to account for any future well deterioration, hydrogeologic boundaries, or natural piezometric variation within the aquifer.

The Empress Group Aquifer is regionally extensive, greater than 70 m in thickness locally, and is highly transmissive. Water supply wells 13-01 and 13-02 are 127 mm diameter completions and were constructed with minimal (3 m) screen lengths; these are both limiting factors when it

comes to the efficient extraction of groundwater. With use of a larger diameter (254 mm or 305 mm) water supply well with a more significant screened section we anticipate sustainable yields in the order of 28.3 L/s (458 USgpm) are feasible for short-term use thereby satisfying the requirements for fire suppression volumes.

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1.0 INTRODUCTION

1.1. General

SaskPower is in the process of constructing a gas switching station on NW 36-33-24-W2M, roughly 2 km southeast of Wolverine, Saskatchewan. The study site is presented in Drawing WM608-1. SaskPower owns two (2) existing 127 mm diameter water supply wells (13-01, & 13-02) and one 51 mm diameter monitoring piezometer (13-03) on the property which were constructed in 2013. The wells have not been utilized since their installation however SaskPower intends to utilize them following construction of the new station for process, sanitary, fire suppression, etc. It is our understanding that the SaskPower facility will typically require continuous flow rates in the order of 1.3 L/s (20 USgpm) for operation, with peak flow rates of approximately 6.5 L/s (102 USgpm) for operation during the summer months.

In addition to the operational yields described above, significantly higher yields in the order of 28.9 L/s (458 USgpm) are required to replenish a 1,900 m^3 (500 kgal) storage tank in the event of emergency over period of less than 8-hours. Flow rates of this magnitude are not possible from a 127 mm diameter water supply due to the limitations of available 102 mm diameter submersible pumps, however the current study reflects on the potential of the aquifer to sustain this demand.

WaterMark Consulting Ltd. was commissioned in summer 2022 by SaskPower to oversee the testing of existing water supply wells and to analyze and interpret the pump testing data for the purposes of confirmation of sustainable well yields, well licensing with Water Security Agency, and providing recommendations for further well installations, if necessary.

This document summarizes the results of 13-01 & 13-02 well testing that was conducted between 06 and 08 September 2022 and was prepared in partial fulfilment of the requirements of the application for a Water Rights License and Approval to Construct and Operate Works under *The Saskatchewan Watershed Authority Act, 2005*.

1.2. Scope of Work

Detailed engineering tasks associated with the well testing work program include:

- Review the regional geology and hydrogeology using available information;
- Review the well construction details and interpret the well completion based on the above noted regional information;

- Complete a 24-hour constant rate pumping test on one (1) supply well and complete a 6-hour constant rate pumping test on the other.
- Collect a water sample from the wells for laboratory analysis.
- Analysis of the aquifer hydrogeologic properties and well characteristics.
- Interpret the anticipated long-term drawdown and make recommendations for pump settings.
- Identify other wells and yard sites within a 3.2 km radius of the site.
- Assess potential impacts resulting from the new production well on surrounding users.
- Prepare and submit the Application for Approval to Construct and Operate Water Works and a Water Rights License to the Saskatchewan Water Security agency.

The results of the above detailed investigation are summarized within this engineering report in partial fulfilment of the licensing requirements from Saskatchewan Water Security Agency.

2.0 REGIONAL SETTING

2.1. Regional Geomorphology

The geomorphology of the region is highlighted by the geographical low surrounding the site. The low consists predominantly of glaciolacustrine delta and glaciolacustrine plain landforms that extend south from site to the area north of Manitou Lake. The local geomorphology for the study area indicates that the dominant landform covering NW 36-33-24-W2M is glaciolacustrine delta. This landform is deposited from the delta plain of quaternary aged glacial lakes and are associated with clay, silt, and sand sediments.

Ground elevations in the region range from 730 mASL on the Touchwood uplands east of the site to 487 mASL on the lowland surrounding Last Mountain Lake. The site is in a lowland north of Manitou Lake at an elevation of approximately 535 m. The drainage of the site appears to occur southerly across the site where it is collected and travels south towards Dellwood Reservoir, the southern tip of the reservoir drains south into the Dellwood Brook where it will meet Last Mountain Lake roughly 50 km south of the site.

2.2. Regional Geology

The regional geology was interpreted using the Geology and Hydrostratigraphy of the Wynyard Area (72P), Saskatchewan report developed by SRC (Simpson, 2000) and the analysis of the Water Security Agency Water Well Drillers Database (WSA, 2022). Supplemental information was obtained using the information obtained from the drilling program to construct and test water supply wells 13-01 and 13-02 and monitoring piezometer 13-03.

A regional geologic cross section has been prepared through the study area for this report. Drawing WM608-3 presents the cross section location plan and cross section A-A'. The geology of the region is comprised of the following, in order of increasing age and depth.

2.2.1. Surficial Stratified Drift

Surficial stratified drift occurs on surface regionally and it is composed primarily of stratified sand and silt deposits. These sediments range from 0 to 5 meters thick in the region and comprise of deltaic sand and silt. Surficial stratified drift is not interpreted to be found at the study area.

2.2.2. Quaternary Drift

Quaternary drift sediments were deposited by glacial processes and are typically separated into two distinct units; the younger, shallower Saskatoon Group, and the older, underlying Sutherland Group. Both of these units are dominantly composed of clay rich glacial till soils and often contain thin, discontinuous sand and gravel lenses. Along with thin, discontinuous sand units, the Saskatoon Group and Sutherland Group units can contain large scale sand and gravel deposits which form local or regional aquifers throughout Saskatchewan. The Saskatoon Group and Sutherland Group are often undifferentiable in drill cuttings and as such have not been differentiated for the purposes of this study.

2.2.3. Empress Group

Empress Group sediments occur widely across Saskatchewan, and are composed of stratified gravel, sand, silt, and clay sediments that are predominantly confined to buried bedrock valleys. Regionally, they occur within a historic preglacial fluvial valley known as the Hatfield Valley. The Empress Group sediments underly the Quaternary Drift and they are bounded laterally and underneath by the bedrock sediments of the Pierre Shale Formation. When present, the Empress Group sediments are expected to be found at a depth of approximately 150 m to 210 m below ground surface corresponding with structural elevations of 400 mASL and 340 mASL. The Empress Group ranges in thickness from near zero up to almost 140 m in the region.

2.2.4. Pierre Shale Formation

The Pierre Shale Formation is a non-calcareous silty marine shale which is devoid of groundwater resources forming the base of conventional groundwater exploration in the region. The Pierre Shale Formation is anticipated to occur at a depth of roughly 210 m surrounding the study site corresponding to a structural elevation of roughly 340 mASL.

2.3. Regional Hydrogeology

The regional hydrogeology was interpreted using the Geology and Hydrostratigraphy of the Wynyard Area (72O), Saskatchewan report developed by SRC (Simpson, 2000) and the analysis of the Water Security Agency Water Well Drillers Database (WWDR) (2022). Supplemental information was obtained using the information obtained from the drilling program to construct and test water supply well 13-01, 13-02, and 13-03.

Four (4) potential aquifers are identified in the region:

- **Saskatoon Group Aquifer** – The Saskatoon Group Aquifer is an intraglacial (within) aquifer which separates the tills of the Saskatoon Group. This aquifer is interpreted to occur at depths of less than 50 m at the study site, corresponding to structural elevation in the order of 480 mASL to 530 mASL.
- **Interglacial Aquifer –** The Interglacial (between) Aquifer occurs between the base of the Saskatoon Group tills and the underlying Sutherland Group tills. This aquifer is interpreted to occur at depths of 50 to 80 m at the study site, corresponding to structural elevations of 450 mASL to 480 mASL.
- **Sutherland Group Aquifer** – The Sutherland Group Aquifer is an intraglacial aquifer which separates the tills of the Sutherland Group. This aquifer is interpreted to occur at depths of 100 m to 140 m at the study site, corresponding to structural elevation in the order of 410 mASL to 450 mASL.
- **Empress Group Aquifer –** This aquifer is formed by the sand and gravel units of the Empress Group Formation and is regional in scale. The Empress Group Aquifer is encountered at structural elevations ranging between 350 mASL and 400 mASL and is anticipated to be intersected at the study site at depths in the order of 130 m to 180 m. Water supply wells 13-01 and 13-02, which are the subject of this report, are completed into the Empress Group Aquifer.

2.4. Neighbouring Private Wells

A private well records search was completed for the study area using the Water Security Agency Water Well Driller Record Database. The results are summarized in Table 2.1. A total of 14 well records were identified within a 3.2 km radius of the study site, one of which is the water well driller record associated with water supply well 13-01 owned by SaskPower. Of the 13 remaining well records identified, four (4) are interpreted to be completed into the Empress Group Aquifer, eight (8) are interpreted to be completed into the Saskatoon Group Aquifer, and one (1) is interpreted to be completed into the Interglacial Aquifer.

Available satellite imagery in combination with a field verified confirmation located farmyards and industrial yard-sites as part of this well record inventory. Only one (1) active yardsite was identified for which no associated water well driller record appears to exist. This yardsite is located on SW 30-33-23-W2M roughly 3.0 km to the southeast and appears to have a dugout water supply. The spatial distribution of the available well driller information and farm-locations are presented in Drawing WM608-4. Private well and yard site information is tabulated in Table 2.1.

Table 2.1
Historic Wells & Yardsites within 3.2 km

Land Location	Listed Owner	Distance (km)	Water Use	WWDR #	Year	Depth (m)		Completion
						Well Tip	Water	
Within 800 m radius								
NW-36-33-24-W2M	Power Corp.	0.0	Industrial	234370	2013	172.8	3	Empress
SE-36-33-24-W2M	Jansen	0.7	Domestic	21537	1966	9.1	-	Saskatoon
Within 1.6 km radius								
SE-35-33-24-W2M	Ritter	1.4	Domestic	21536	1966	15.2	-	Saskatoon
SE-02-34-24-W2M	Loessl	1.5	Domestic	222304	2011	106.7	6.1	Empress
Within 3.2 km radius								
NE-01-34-24-W2M	Bushman	1.9	Domestic	70349	1981	16.5	10	Saskatoon
NE-01-34-24-W2M	Bushman	1.9	Domestic	79282	1984	19.5	-	Saskatoon
NW-01-34-24-W2M	Nagus	1.9	Domestic	21539	1966	11.0	-	Saskatoon
NE-06-34-23-W2M	McMeans	2.0	Domestic	21404	1920	4.0	3	Saskatoon
NE-30-33-23-W2M	Dyck	2.5	Domestic	21395	-	76.2		Intraglacial
NE34-33-24-W2M	Power Corp.	2.5	Industrial	49731	1977	7.6	-	Saskatoon
NE-30-33-23-W2M	Baker	2.8	Domestic	109034	1997	114.6	1.8	Empress
NE-24-33-24-W2M	Weber	3.0	Domestic	21528	1947	100.0	69	Empress
NE-24-33-24-W2M	Weber	3.0	Domestic	21530	1961	100.9	-	Empress
NE-24-33-24-W2M	Weber	3.0	Domestic	21532	1971	24.7	-	Saskatoon
Yardsites within 3.2 km								
SW-30-33-23-W2M		3.0	Dugout					active

The nearest neighbouring well completed into the Empress Group Aquifer (WWDR# 222304) is located approximately 1.5 km northwest of 13-01 and 13-02. This distance is considered for drawdown impact interpretations presented in Section 4.5.4.

2.5. Climate Normals

Temperature and precipitation Normal data for the region surrounding the site were taken from Environment Canada data measured at Watrous, Saskatchewan between 1981 and 2010. Evaporation data was taken from PFRA data collected at Wynyard, Saskatchewan between 1965 and 2004. Climate Normals are summarized in Table 2.2.

The mean annual temperature for the region surrounding the site is 2.7 ºC, with daily average temperatures ranging between -15.1 ºC in January and 18.4 ºC in July. Freezing (sub-zero ºC) daily average temperatures generally occur between November and March of each year.

The mean annual precipitation for the region surrounding is 449 mm, with the majority of rainfall occurring between the months of May and September. Over the course of a typical year, the annual precipitation is comprised of 365 mm of rainfall and 84 mm (water equivalent) of snowfall.

Table 2.2
Climate Normals for the Study Area

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature:													
Daily Average (°C)	-15.1	-12	-5.3	4.4	11	15.8	18.4	17.5	11.5	4.1	-5.7	-12.8	2.7
Standard Deviation	4.5	4.1	3.3	2	1.7	1.7	1.3	1.8	1.6	1.7	3.7	4.5	1.1
Daily Maximum (°C)	-10.2	-7.1	-0.3	10.7	17.8	22.2	25.1	24.6	18.2	10	-1.3	-8.1	8.5
Daily Minimum (°C)	-20	-16.8	-10.2	-2	4.1	9.4	11.7	10.4	4.8	-1.8	-10.1	-17.3	-3.2
Extreme Maximum (°C)	7.2	9	20	30.5	37	39.5	37.5	38.9	36.1	31.1	22.2	14.5	
Date (yyyy/dd)	1964/01	1991/05	1993/23	2001/28	1980/23	1988/05	1988/22	1961/16	1967/05	1964/13	1975/05	1997/14	
Extreme Minimum (°C)	-43	-41.5	-40.6	-28.3	-11.1	-3.3	1.7	-1.5	-16.1	-22.2	-34	-41	
Date (yyyy/dd)	1997/26	1979/16	1962/01	1954/02	1954/01	1964/01	1962/10	1979/14	1961/30	1957/25	1985/30	1983/23	
Precipitation:													
Rainfall (mm)	0.2	0.3	5.6	22.4	52	85.9	67	59	48.1	21.3	2.3	0.9	364.9
Snowfall (cm)	15.5	10.7	12.9	6.4	1.5	0	0	0	0.8	6.6	11.6	17.9	83.9
Precipitation (mm)	15.7	10.9	18.5	28.8	53.5	85.9	67	59	48.9	28	13.9	18.8	448.8
Extreme Daily Rainfall (mm)	14.5	2.8	17.8	37.3	51.2	69.1	59	73.4	83	64	12.7	27.7	
Date (yyyy/dd)	1975/19	1984/14	2000/29	1955/19	1982/28	1973/03	1983/08	1995/13	1997/15	1969/02	1967/22	1972/21	
Extreme Daily Snowfall (cm)	25.4	17.8	12.7	20.3	11	0	0	0	8.4	20.3	15.2	30	
Date (yyyy/dd)	1964/21	1953/08	1953/13	1966/26	1999/10	1953/01	1953/01	1953/01	1984/21	1956/27	1971/04	1972/28	
Extreme Daily Precipitation (mm)	25.4	17.8	17.8	41.1	55.2	69.1	59	73.4	83	64	15.2	30	
Date (yyyy/dd)	1964/21	1953/08	2000/29	1955/19	1982/28	1973/03	1983/08	1995/13	1997/15	1969/02	1967/22	1972/28	
Extreme Snow Depth (cm)	29	31	29	14	11	0	0	0	0	23	19	29	
Date (yyyy/dd)	1997/04	1994/24	2006/05	1997/02	1999/11	1991/01	1991/01	1991/01	1991/01	1998/12	1996/23	1996/28	
Gross Evaporation:													
Minimum (mm)	0	0	0	32.2	103.1	109.3	112.7	116	88.3	38.3	0	0	665
Maximum (mm)	0	0	0	77.3	177.7	233.1	223	212.8	158.2	72.1	0	0	1047
Average (mm)	0	0	0	52.6	135.4	154.9	164.5	160.2	112.4	55.9	0	0	836
Net Evaporation (mm)	-15.7	-10.9	-18.5	23.8	81.9	69	97.5	101.2	63.5	27.9	-13.9	-18.8	387.0

Notes: - Temperature & precipitation data collected from Environment Canada Station at Watrous station, SK (1981-2010)
- Gross Evaporation data collected from PFRA Station at Wynyard, SK (1965-2004)

The gross evaporation for the region was obtained from PFRA data for Wynyard, Saskatchewan, for the period between 1965 and 2004. The gross evaporation annual total is estimated to be 836 mm, just under double the mean annual precipitation of 449 mm.

The difference between mean gross evaporation and total precipitation is termed net evaporation and is about 387 mm for this site. The cumulative flux on a water surface is net upwards (net evaporative) between the months of April and October. The net evaporative flux peaks during the months of May and August when the evaporation exceeds precipitation by 350 mm through these months. Between the months of November and March, the net cumulative flux on a water surface is downwards (net precipitation), mostly because the gross evaporation is at or near zero through the winter months.

3.0 FIELD INVESTIGATION DETAILS

3.1. Field Investigation

A field drilling program was completed on NW 36-33-24-W2M between February and March of 2013 by Stantec Consulting Ltd. The drilling contractor for this investigation was Stauber Drilling, of Southey, Saskatchewan.

One (1) piezometer (13-03) and two (2) water supply wells (13-01 & 13-02) were constructed as part of this drilling program. Water supply well 13-02 and piezometer 13-03 are located at approximately 25 m west and 70 m west of 13-01, respectively. A summary of the drilling information details for water supply wells 13-01, 13-02 and observation well 13-03 are provided in Table 3.1. The locations of water supply wells 13-01, 13-02 and observation well 13-03 can be seen in the local site plan presented in Drawing WM608-2. Details of the geological logging by Stantec Consulting Ltd. personnel can be found in the test hole logs presented in the appendices. The 13-01 and 13-02 well construction details are presented graphically in Drawing WM608-5 & WM608-6.

Table 3.1
Summary of Drilling Program

Test Hole	Land Location	Distance (m)	UTM Location (m)			Depth to tip (m)	Completion
			Easting	Northing	Elev *		
13-01	NW 36-33-24-W2M	-	13U 481060.5	5,747,217	533	172.8	Water Supply
13-02	NW 36-33-24-W2M	25	13U 481035.4	5,747,220	533	172.8	Water Supply
13-03	NW 36-33-24-W2M	70	13U 480990.6	5,747,223	533	172.8	Piezometer

Notes: * elevations estimated from hand held device, mapping and visual assessment.

3.2. Local Geology

The local geology has been interpreted based upon the water well driller records for water supply wells 13-01 and 13-02. A local geologic cross section is presented in Drawing WM608-4 to supplement the discussion. The local geology at NW 36-33-24-W2M is as follows:

- **Quaternary Drift** occurs from surface to a depth of approximately 100 m corresponding to a structural elevation of in the order of 435 mASL. According to the driller report, Quaternary Drift is composed of clay rich till with traces of silt and sand. A discontinuous sand seam was interbedded within the till.
- **Empress Group** sediments were encountered directly underlying Quaternary Drift sediments at a depth of 100 m corresponding to a structural elevation of 435 mASL. The Empress Group sediments are composed of gravel and sand with intermittent clay seams.
- **Pierre Shale** sediments directly underly the Empress Group at depths of approximately 177 m corresponding to a structural elevation in the order of 358 mASL. The Pierre Shale is composed of non-calcareous marine silty clay which forms the bedrock surface beneath the study site and is anticipated to be roughly 190 m in thickness in the area.

3.3. Production Well Construction Details

The wells discussed in this report are existing wells and as such information has been obtained from the corresponding water well driller records acquired from the Stantec Consulting Inc. report (Stantec, 2013). Both production wells, 13-01 and 13-02, were drilled and installed by Stauber Drilling Ltd. of Southey, Saskatchewan.

Production well 13-01 was constructed on 10 February 2013. The well screen assembly for 13-01 consists of a 3.0 m length of 127 mm diameter 0.33 mm slotted stainless steel screen extending from 169.8 m to 172.8 m below ground surface. The top of the screen assembly was attached to a length of 141 mm outer diameter steel well casing extending to ground surface. Water supply well 13-01 construction details are presented graphically in Drawing WM608-5.

Production well 13-02 was constructed on 03 March 2013. The well screen assembly for 13-02 consists of a 3.0 m length of 127 mm diameter 0.33 mm slotted stainless steel screen extending from 169.8 m to 172.8 m below ground surface. The top of the screen assembly was attached to a length of 141 mm outer diameter steel well casing extending to ground surface. Water supply well 13-02 construction details are presented graphically in Drawing WM608-6.

4.0 HYDROGEOLOGIC ANALYSIS

4.1. Step Testing Summary

Step testing was completed on both water supply wells prior to initiating constant flow rate pump testing. The results of the step tests completed are presented below for each water supply well at the SaskPower site on NW 36-33-24-W2M.

4.1.1. 13-01 Step Testing Summary

A stepped flow rate test was completed on 13-01 on 06 September 2022. The first step was completed at a flow rate of approximately 1.5 L/s (23.8 USgpm), the second step was completed at a flow rate of approximately 3.0 L/s (47.6 USgpm), and the third step was completed at a flow rate of approximately 4.2 L/s (66.6 USgpm). A plot of measured drawdown during the stepped flow rate test is presented in Figure 4.1. Raw data from the stepped flow rate test is presented in Table A.1 in Appendix A.

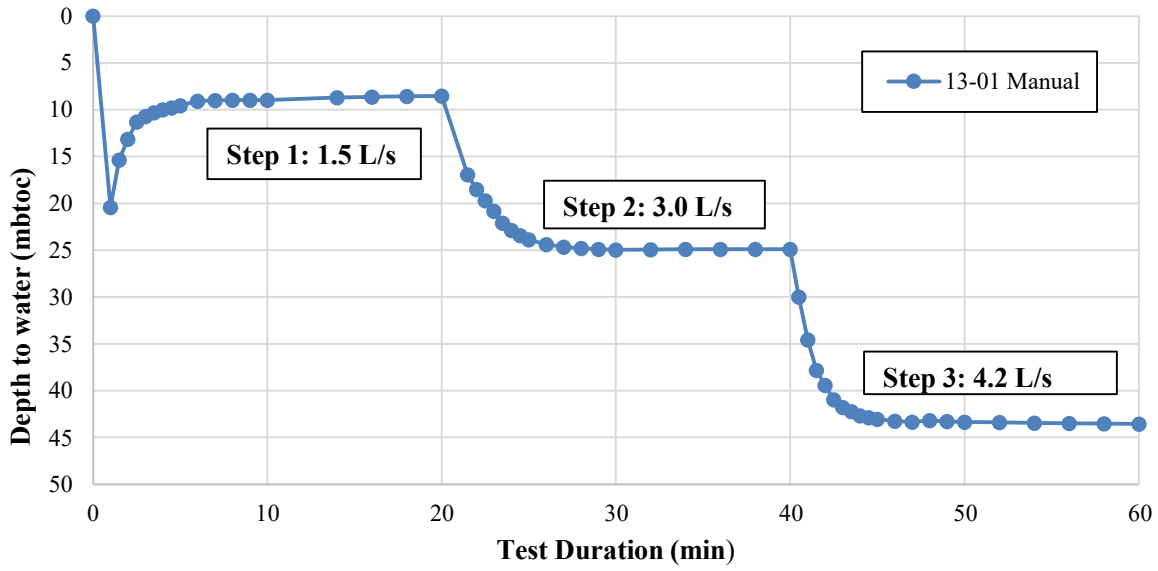


Figure 4.1 *Measured depth to water within 13-01 during the 06 September 2022 stepped flow rate pumping test.*

The step test confirmed that water supply well 13-01 would be capable of providing sustained flow rates in the order of 3.5 L/s for the 6-hour constant rate test.

4.1.2. 13-02 Step Testing Summary

A stepped flow rate test was completed on 13-02 on 07 September 2022. The first step was completed at a flow rate of approximately 1.3 L/s (20.6 USgpm), the second step was completed at

a flow rate of approximately 2.9 L/s (46.0 USgpm), and the third step was completed at a flow rate of approximately 6.2 L/s (98.3 USgpm). The final step flow rate of 6.2 L/s was considered the maximum yield from the submersible pump installed in 13-02. A plot of measured drawdown during the stepped flow rate test is presented in Figure 4.2. Raw data from the stepped flow rate test is presented in Table A.2 in Appendix A.

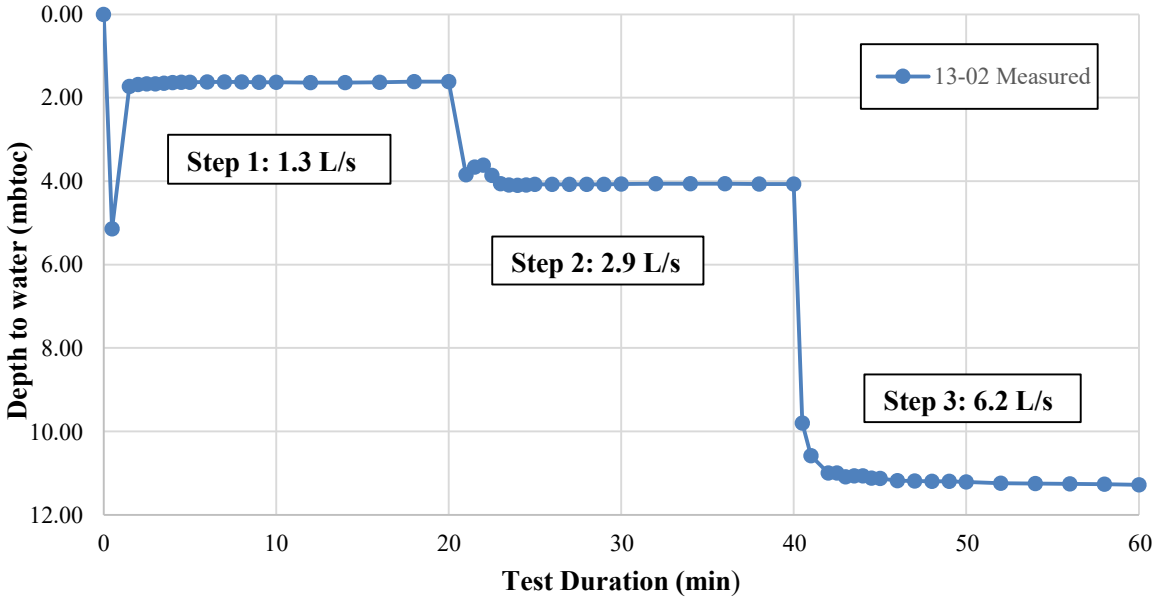


Figure 4.2 *Measured depth to water within 13-02 during the 7 September 2022 stepped flow rate pumping test.*

The step test confirmed that water supply well 13-02 would be capable of providing sustained flow rates at the maximum pumping rate of 6.2 L/s for the 24-hour constant rate test.

4.2. Pump Testing Summary

Pump testing was completed on the two (2) water supply wells between 06 and 08 September 2022. All wells were shut in prior to completion of pump testing and during each pump test only the pumping well was operated. Water level was monitored within both the wells and piezometer (13-03) for the duration of each pump test. Water supply well 13-02 was tested on 07 September 2022 for a duration of 24-hours. As both wells and piezometer are completed into the same aquifer within 70 m of one another, an abbreviated 6-hour constant flow rate test was completed on water supply well 13-01.

4.2.1. 13-01 Pump Test Summary

A 6-hour constant flow rate pumping test was initiated on 13-01 on 06 September 2022. Based on step test drawdown data an average constant flow rate of 3.5 L/s (55.5 USgpm) was selected for the 6-hour constant flow rate pumping test. An average continuous flow rate of 3.5 L/s was maintained for duration of the 6-hour constant flow rate pumping test.

Manual depth to water was measured from the production well (13-01) and two (2) monitoring wells, 13-02 and 13-03 through the duration of the pumping test and recovery period. Monitoring wells 13-02 and 13-03 are located at distances of approximately 25 m and 70 m from 13-01, respectively.

A summary of the measured drawdown through the 6-hour constant flow rate pumping test and 60-minute recovery period is presented in Figure 4.3. Raw data collected during the pumping test is presented in Table A.3 in Appendix A.

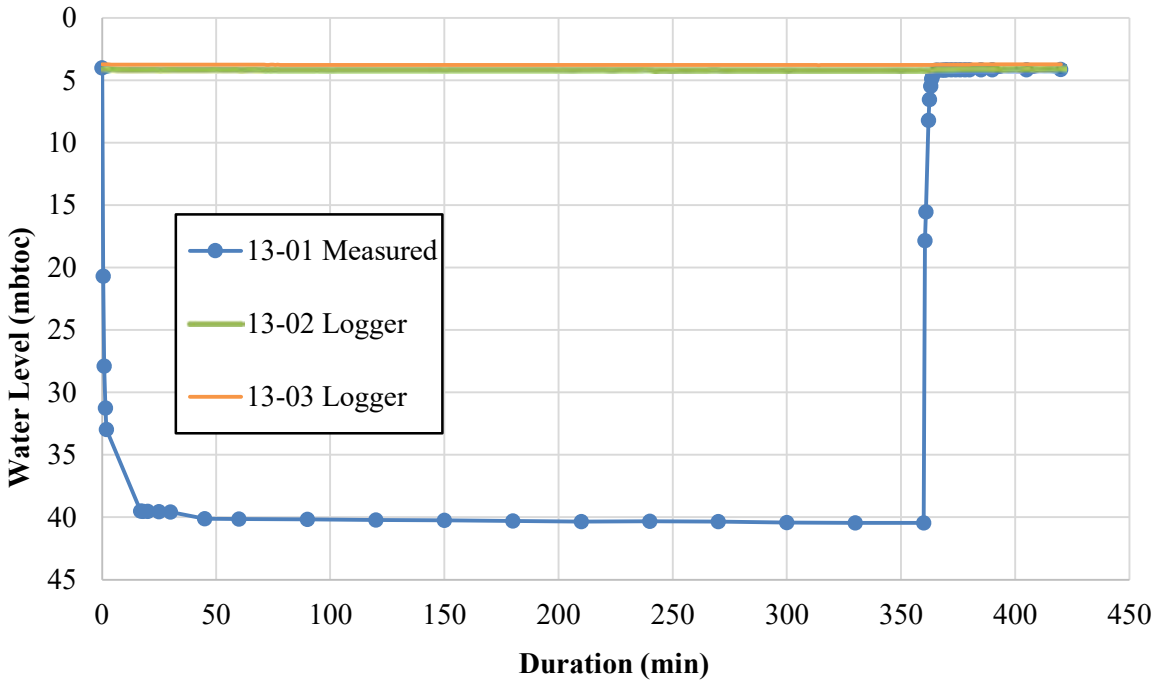


Figure 4.3 *Measured depth to water within 13-01, 13-02, and 13-03 through the duration of the 13-01 6-hour constant flow rate pumping test.*

The cumulative drawdown measured in 13-01 through 6-hours of pumping was 36.4 m. After 60 minutes of recovery monitoring, the water level within 13-01 had recovered to within 99% of static water level. Following 6-hours of pumping, the cumulative drawdown measured within monitoring wells 13-02 and 13-03 was 0.13 m and 0.13 m, respectively. After 60 minutes of

recovery monitoring water level within 13-02 and 13-03 had recovered to 76% and 46% of static water level, respectively.

4.2.2. 13-02 Pump Test Summary

A 24-hour constant flow rate pumping test was initiated on 13-02 on 07 September 2022. Based on step test drawdown data an average constant flow rate of 6.2 L/s (98.3 USgpm) was selected for the 24-hour constant flow rate pumping test. An average continuous flow rate of 6.2 L/s was maintained for the duration of the 24-hour constant flow rate pumping test.

Manual depth to water was measured from the production well (13-02) and two (2) monitoring wells, 13-01 and 13-03 through the duration of the pumping test and recovery period. Monitoring wells 13-01 and 13-03 are located at distances of approximately 25 m and 45 m from 13-02, respectively.

A summary of the measured drawdown through the 24-hour constant flow rate pumping test and 180-minute recovery period is presented in Figure 4.4. Raw data collected during the pumping test is presented in Table A.4 in Appendix A.

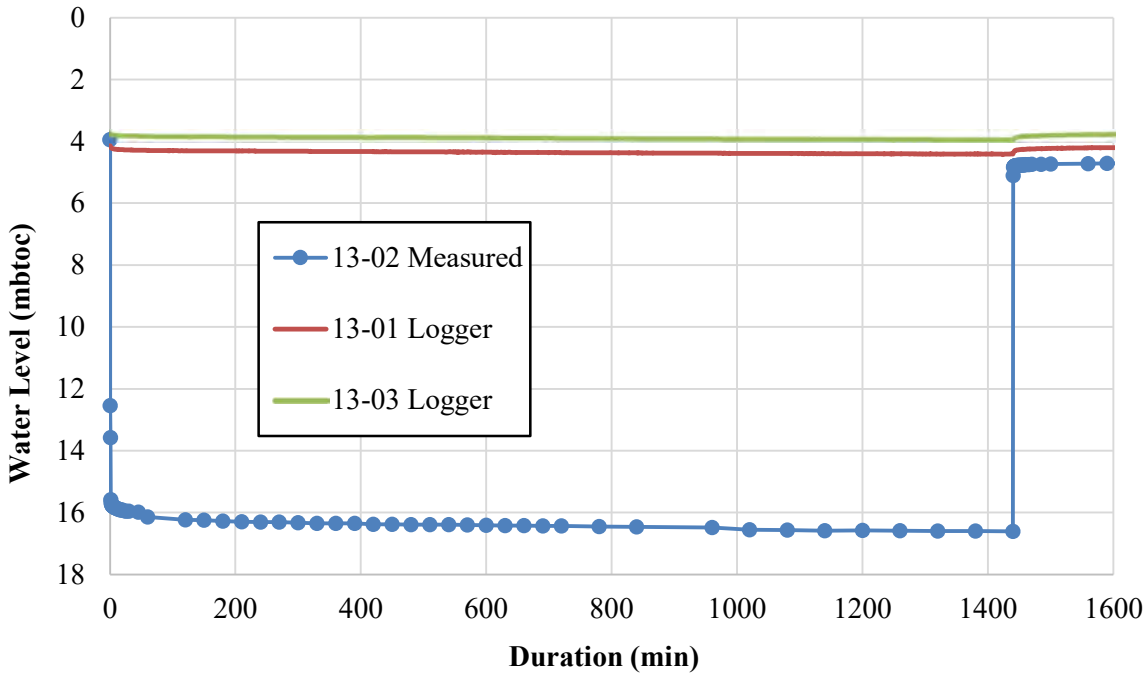


Figure 4.4 *Measured depth to water within 13-01, 13-02, and 13-03 through the duration of the 13-02 24-hour constant flow rate pumping test.*

The cumulative drawdown measured in 13-02 through 24-hours of pumping was 16.4 m. After 180 minutes of recovery monitoring, the water level within 13-02 had recovered to within 93% of

static water level. Following 24-hours of pumping, the cumulative drawdown measured within 13-01 and 13-03 was 0.28 m and 0.25 m, respectively. After 180 minutes of recovery monitoring water level within 13-01 and 13-03 had recovered to 75% and 68% of static water level, respectively.

4.3. Aquifer Hydrogeologic Characterization

4.3.1. Production Well Specific Capacity

The specific capacity of a production well is a simple term to relate the measured cumulative drawdown within a well to the flow rate. The specific capacity term is a generic hydraulic term that includes all hydraulic effects of the production well, including both aquifer and well head losses. This term does not differentiate between the transmissivity and storage of the aquifer from head losses associated with an inefficient production well. This term does not correlate to the sustainable yield of the production well, although it is indirectly related. Drawdown, flow rate and specific capacity data for 13-01 and 13-02 are summarized in Tables 4.1 and 4.2, respectively.

Table 4.1:
Summary of Specific Capacity – 13-01

Pumping Test	Duration (min)	Flow Rate (L/s)	Drawdown (m)	Specific Capacity (L/s/m)
Step Test:				
Step 1	20	1.5	8.54	**0.18**
Step 2	20	3.0	24.91	**0.12**
Step 3	20	4.2	43.55	**0.10**
Constant Rate Test:	20	3.51	35.52	**0.10**
			Average:	**0.12**

Table 4.2:
Summary of Specific Capacity – 13-02

Pumping Test	Duration (min)	Flow Rate (L/s)	Drawdown (m)	Specific Capacity (L/s/m)
Step Test:				
Step 1	20	1.3	1.62	**0.80**
Step 2	20	2.9	4.07	**0.71**
Step 3	20	6.2	11.28	**0.55**
Constant Rate Test:	20	6.2	11.98	**0.52**
			Average:	**0.65**

The specific capacity of water supply well 13-01 was approximately 0.12 L/s (1.9 USgpm) per meter of drawdown. This low value is interpreted to be indicative of significant well losses, as we know the Empress Group is an extensive aquifer capable of high yielding water supply wells.

The specific capacity of water supply well 13-02 was approximately 0.65 L/s (10.3 USgpm) per meter of drawdown. This value is typical of a moderate yielding aquifer.

4.3.2. Aquifer Hydraulic Properties

The aquifer characteristics were determined from two (2) constant rate pumping tests. Cooper-Jacob time-drawdown and Theis Recovery methods of analysis were used to evaluate the measured rate of drawdown within each pumping well and monitoring well 13-03. Results of the analysis are summarized in Table 4.2. Detailed graphical presentation of the aquifer property interpretation is presented in Appendix C.

Table 4.3:
Summary of Aquifer Properties – Constant Rate Pump Tests

Monitoring Location	Radial Distance (m)	Method of Analysis	Transmissivity (m^2/day)	Ksat (m/s)	Storativity
13-01 -Test					
13-01	-	Cooper-Jacob	131	2.0E-05	
		Theis Recovery	524	8.1E-05	
13-02	23.5	Cooper Jacob	1470	2.3E-04	2.0E-04
		Theis	1360	2.1E-04	2.3E-04
		Theis Recovery	1380	2.1E-04	
		Agarwal + Theis	1330	2.1E-04	1.6E-04
13-03	70	Cooper Jacob	2270	3.5E-04	1.5E-04
		Theis	1930	3.0E-04	1.9E-04
		Theis Recovery	1430	2.2E-04	
		Agarwal + Theis	1360	2.1E-04	6.4E-04
13-01 Pump Test Analysis Geometric Mean			1079	1.7E-04	2.3E-04
13-02 Test					
13-02	-	Cooper Jacob	310	4.8E-05	
		Theis Recovery	1730	2.7E-04	
13-01	23.5	Cooper Jacob	2160	3.3E-04	1.3E-04
		Theis	1600	2.5E-04	4.4E-04
		Theis Recovery	1680	2.6E-04	
		Agarwal + Theis	1750	2.7E-04	1.5E-04
13-03	46.5	Cooper Jacob	2030	3.1E-04	1.6E-04
		Theis	1900	2.9E-04	1.6E-04
		Theis Recovery	1820	2.8E-04	
		Agarwal + Theis	1810	2.8E-04	3.0E-04
13-02 Pump Test Analysis Geometric Mean			1528	2.4E-04	2.0E-04

Production well 13-01 testing indicated Empress Group Aquifer transmissivity ranging between 131 m^2/day and 2270 m^2/day with a geomean value of 1079 m^2/day. The hydraulic conductivity of the aquifer was roughly $1.7x10^{-4}$ m/s, consistent with a clean sand deposit. Production well 13-01 testing indicated a storativity value in the range of $2.3x10^{-4}$, a reasonable value for the Empress Group Aquifer.

Production well 13-02 testing indicated Empress Group Aquifer transmissivity ranging between 310 m^2/day and 2160 m^2/day with a geomean value of 1528 m^2/day. The hydraulic conductivity of the aquifer was roughly $2.4x10^{-4}$ m/s, consistent with a clean sand deposit. Storativity determined from 13-02 testing data was identified in the range of $2x10^{-4}$.

As seen in Table 4.3 and Appendix C, drawdown data from both 13-01 and 13-02 pump testing determined transmissivity within the monitoring wells to be consistently and significantly greater than the transmissivity determined for the pumping well. Based upon 24-hour pump test data from water supply well 13-02, it appears there is a delayed drawdown response in the monitoring wells, where following roughly 600 minutes of pumping the rate of drawdown begins to increase. Curve fitting to these later portions of the drawdown curve for the monitoring wells provides transmissivity values which closely match transmissivity of the pumping well, albeit with storativity values considered unreasonable for the Empress Group Aquifer.

This aquifer behaviour is thought to be related to variability in aquifer characteristics between well locations, along with vertical components of drawdown related to partial completion at all well locations (only 3 m of screens in an aquifer with greater than 70 m thickness). The aquifer is known to extend over a significant area in the order of thousands of km^2 and the nearest aquifer boundary is mapped roughly 10 km southwest of the study site as seen in Drawing WM608-7. Theis analysis indicates that at this distance, boundary effects would cause 0 m of drawdown impact over the course of a 24 hour pumping test. In addition, drawdown data from the pumping well does not indicate any significant change in rate of drawdown through the duration of the 24-hour pumping test. As such, the behaviour at the monitoring wells is not interpreted to be related to boundary conditions.

4.3.3. Well Efficiency

Drawdown within a production well has two head loss components; head loss associated with aquifer losses, and head loss associated with well losses. The latter is associated with the convergence of groundwater toward the well screens and a general poor hydraulic connection between the screens and the surrounding formation. Understanding the aquifer head losses and well head losses is important in the determination of long-term sustainable yields of the well.

The well efficiency of the new production well was estimated by comparing the actual measured drawdown within the production wells and piezometer to the theoretical drawdown using Theis predictive methods. The transmissivity and storativity values documented in Table 4.3 above were utilized in this interpretation. Figure 4.5 presents measured drawdown and theoretical drawdown in production wells 13-01 and 13-02 through the duration of the two (2) pump tests completed at the SaskPower site. Theoretical drawdown within each pumping well is presented both with and without the influence of well losses.

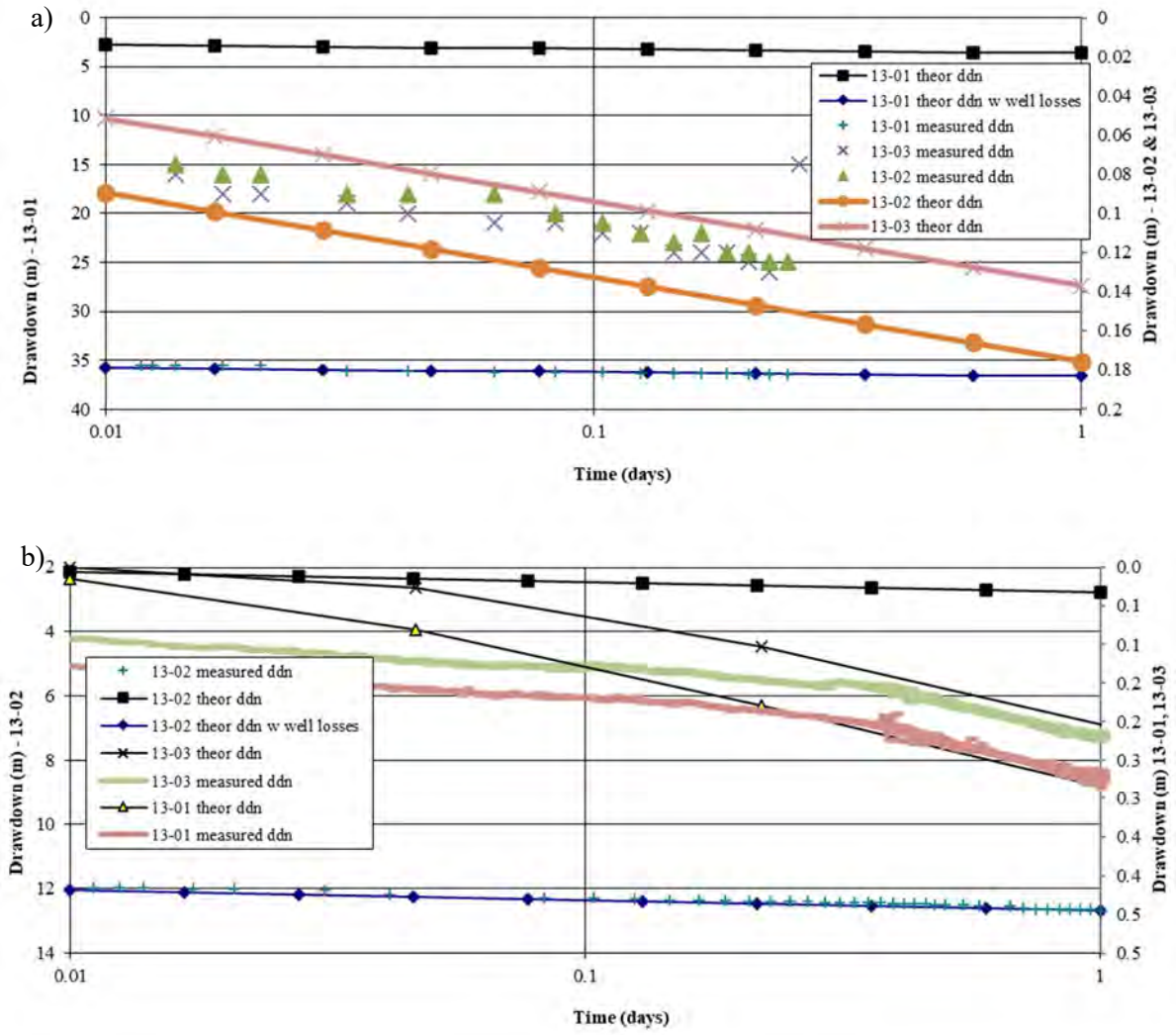


Figure 4.5: *Graphic method used to interpret well head losses within a) 13-01 and b) 13-02.*

As seen in Figure 4.5 drawdown in the monitoring wells is accurately predicted within 0.03 m of measured data while pumping well drawdown is underpredicted, requiring a well head loss component of 33 m for 13-01, and 9.9 m for 13-02, to accurately match the measured drawdown. When factored to flow rate, the well head loss determined from the 13-01 pumping test equates to approximately 9.4 m of well head losses per L/s flow rate. The factored well head loss determined from 13-02 pumping test is roughly 1.6 m of well head losses per L/s. Production well 13-02 is significantly more efficient than 13-01.

4.3.4. Hydrogeologic Boundaries

As previously discussed in Section 4.3.2, the drawdown data acquired from the 24-hour constant flow rate pumping test completed on water supply well 13-02 identified an increased rate of

drawdown in monitoring wells 13-01 and 13-03 beginning at roughly 600 minutes duration. This increased rate of drawdown was not observed in the pumping well. It is interpreted that the increased rate of drawdown observed in 13-01 and 13-03 is related to the vertical components of drawdown resulting from 13-01, 13-02, and 13-03 being partial completion wells. Variability in aquifer properties between the well and monitoring well locations may also play a role in this behaviour.

The mapped boundary of the Empress Group Aquifer occurs at a distance of roughly 10 km to the southwest of the study site as seen in Drawing WM608-7. Theis analysis indicates no drawdown impact would be observed at any of the monitoring locations through the duration of the 13-02 24-hour pump test as a result of a hypothetical low permeability hydrogeologic boundary occurring at this distance. In short, there is no evidence of any hydrogeologic boundaries occurring which would affect well operation.

4.4. Water Quality Analysis

A water sample was collected from water supply wells 13-01 and 13-02 on 06 and 08 September 2022, respectively. The water sample was sent to ALS Environmental Canada laboratory to be tested for routine (major ions), dissolved metals, phenol alkalinity, reactive silica, and total suspended solids groundwater analysis. The Certified Laboratory Report is provided in Appendix C. Table 4.4 documents the groundwater chemical analysis from 13-01 and 13-02 water samples and compares the results to the Guidelines for Canadian Drinking Water Quality and Saskatchewan Drinking Water Quality Standards and Objectives.

The groundwater from both 13-01 and 13-02 was found to be below average quality with a total dissolved solids concentration of 3,080 mg/L and 3,030 mg/L, respectively. The water quality characteristics of the Empress Group Aquifer groundwater indicates a sodium sulphate type groundwater.

The water quality test at the study site indicates that the hardness, TDS, sulfate, iron, manganese, sodium, and sulfur concentrations exceed aesthetic objectives for one or both of the comparison guidelines in both 13-01 and 13-02. Manganese concentration exceeds the maximum acceptable concentration (MAC) for both comparison guidelines used for this study. The measured concentration of manganese was 0.16 mg/L in both 13-01 and 13-02, narrowly exceeding the guidelines values of 0.12 mg/L. The implications of accumulation of this mineral are known to cause neurological defects and if this supply is to be utilized as a drinking water source treatment will be required.

Table 4.4 **WM608**
Water Quality Summary **SaskPower - Wolverine**

Analyte	Unit	13-01 Empress 06-Sep-22	13-02 Empress 08-Sep-22	Guidelines for Canadian Drinking Water Quality	Sask. Drinking Water Quality Standards and Objectives
Physical Parameters					
Alkalinity, Total	mg/L	406	400	-	500 (AO)
Alkalinity, Bicarbonate (as CaCO3)	mg/L	406	400	-	-
Alkalinity, Bicarbonate (as HCO3)	mg/L	496	488		
Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	-	-
Alkalinity, Carbonate (as CO3)	mg/L	<1.0	<1.0		
Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0		
Alkalinity, Hydroxide (as OH)	mg/L	<1.0	<1.0		
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	<1.0	<1.0		
Hardness	mg/L	948	975	-	800 (AO)
Total Suspended Solids (TSS)	mg/L	12	14.6		
Conductivity	uS/cm	3900	3900	-	-
pH	pH	7.82	7.88	7-10.5	7-10.5
TDS (calculated)	mg/L	3080	3030	≤ 500 (AO)	1500 (AO)
Anions and Nutrients					
Chloride	mg/L	119	110	≤ 250 (AO)	250 (AO)
Fluoride	mg/L	<0.4	<0.4		
Nitrate+Nitrite-N	mg/L	<0.447	<0.447	-	-
Nitrate-NO3	mg/L	<0.400	<0.400	10.0 (MAC)	45.0 (MAC)
Nitrite-NO2	mg/L	<0.200	<0.200	1.0 (MAC)	-
Sulfate -SO4	mg/L	1710	1690	≤ 500 (AO)	500 (AO)
Silicate (as SiO2)	mg/L	21.7	22.7	-	-
Ion Balance					
Anion sum	meq/L	47.1	46.3		
Cation sum	meq/L	47.7	47.2		
Ion Balance (APHA)	%	0.633	0.962	-	-
Ion Balance (cations/anions)	%	101	102		
Dissolved Metals					
Aluminum	mg/L	<0.0050	<0.0050	< 0.1 (OG)	-
Antimony	mg/L	<0.00050	<0.00050	0.006 (MAC)	-
Arsenic	mg/L	0.00801	0.00762	0.01 (ALARA)	0.01 (MAC)
Barium	mg/L	0.00562	0.00589	2.0 (MAC)	1.0 (MAC)
Berylium	mg/L	<0.000100	<0.000100	-	-
Bismuth	mg/L	<0.000250	<0.000250	-	-
Boron	mg/L	0.741	0.704	5.0 (MAC)	5.0 (IMAC)
Cadmium	mg/L	<0.0000250	<0.0000250	0.007 (MAC)	0.005 (MAC)
Calcium	mg/L	200	209	-	-
Cesium	mg/L	<0.000050	<0.000050	-	-
Chromium	mg/L	<0.00050	<0.00050	0.05 (MAC)	0.05 (MAC)
Cobalt	mg/L	<0.00050	<0.00050	-	-
Copper	mg/L	<0.00100	<0.00100	1.0 (AO)	1.0 (AO)
Iron	mg/L	4.43	4.2	≤ 0.3 (AO)	0.3 (AO)
Lead	mg/L	<0.000250	<0.000250	0.005 (ALARA)	0.01 (MAC)
Lithium	mg/L	0.228	0.209	-	-
Magnesium	mg/L	109	110	-	200 (AO)
Manganese	mg/L	**0.16**	**0.16**	≤ 0.12 (MAC)	0.05 (AO)
Mercury	mg/L	<0.0000050	<0.0000050	0.001 (MAC)	0.001 (MAC)
Molybdenum	mg/L	0.00741	0.0072	-	-
Nickel	mg/L	<0.00250	<0.00250	-	-
Phosphorus	mg/L	<0.250	<0.250	-	-
Potassium	mg/L	9.6	9.69	-	-
Rubidium	mg/L	0.00427	0.00393	-	-
Selenium	mg/L	<0.000050	<0.000050	0.05 (MAC)	0.01 (MAC)
Silicon	mg/L	11.5	11.3	-	-
Silver	mg/L	<0.000050	<0.000050	-	-
Sodium	mg/L	652	627	≤ 200 (AO)	300 (AO)
Strontium	mg/L	1.58	1.58	7.0 (MAC)	-
Sulfur	mg/L	646	636	≤ 500 (AO)	500 (AO)
Tellurium	mg/L	<0.00100	<0.00100	-	-
Thallium	mg/L	<0.000050	<0.000050	-	-
Tin	mg/L	<0.00050	<0.00050	-	-
Titanium	mg/L	<0.00150	<0.00150	-	-
Tungsten	mg/L	<0.00050	<0.00050	-	-
Uranium	mg/L	0.000327	0.000348	0.02 (MAC)	0.02 (MAC)
Vanadium	mg/L	<0.00250	<0.00250	-	-
Zinc	mg/L	<0.0050	<0.0050	≤ 5.0 (AO)	5.0 (AO)
Zirconium	mg/L	<0.00100	<0.00100	-	-

Notes: Underlined values exceed Aesthetic Objectives (AO)

Bolded values exceed Maximum Acceptable Concentration (MAC) or Interim Maximum Acceptable Concentration (IMAC)

Italicized values exceed Operational Guidance Value (OG) or As Low As Reasonably Achievable (ALARA) concentrations

Figure 4.6 presents the Stiff Diagrams of the water samples collected from water supply wells 13-01 and 13-02. The primary cation in this groundwater is sodium with lesser amounts of calcium and magnesium. The primary anion is sulphate with lesser amounts of bicarbonate and chloride. This figure clearly demonstrates the consistent groundwater chemistry composition in the Empress Group Aquifer.

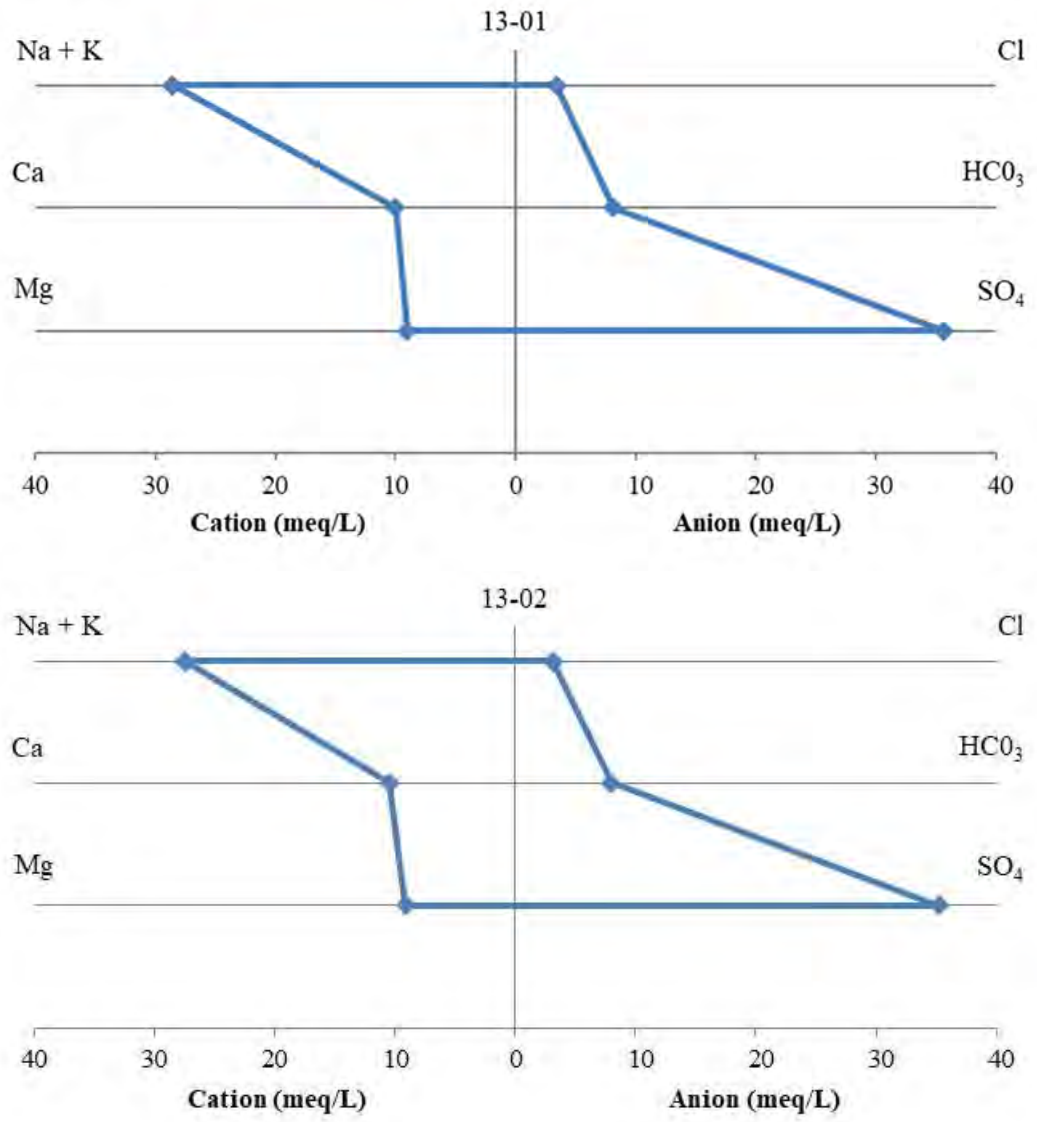


Figure 4.6: *Stiff Diagram of water sample collected from 13-01 and 13-02.*

4.5. Sustainable Yield Analysis

The sustainable yield analysis for the two water supply wells was interpreted utilizing the hydrogeologic interpretation completed from the well testing program. The aquifer and well hydraulic properties discussed in Section 4.3 were used in this analysis.

As previously noted, it is our understanding that the normal continuous operating flow rate for the proposed SaskPower facility will be 1.3 L/s (20 Usgpm), with peak flow rates during the summer months in the order of 6.5 L/s (102 USgpm). The fire suppression system requires significantly higher yields in the order of 28.9 L/s (458 USgpm) to refill storage tanks over an 8-hour period.

Both 13-01 and 13-02 are constructed with 127 mm inner diameter casing and are therefore unable to achieve the yields required for storage tank refills based on the limitations of available 102 mm diameter submersible pumps. Long-term drawdown prediction is therefore discussed in relation to the normal operating rate of 1.3 L/s and peak operating rate of 6.5 L/s. Long-term sustainability predictions are provided for a period of 30-years; the anticipated operating lifespan of the facility.

4.5.1. 13-01 Long-Term Drawdown Prediction

Figure 4.7 presents the interpreted long-termed drawdown within water supply well 13-01 at the pumping test continuous flow rate of 3.5 L/s over a period of thirty (30) years.

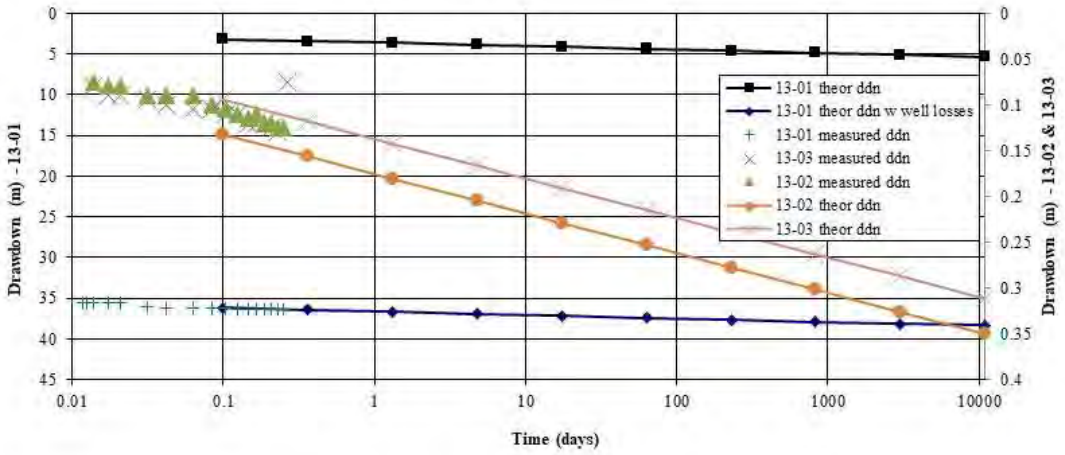


***Figure 4.7**: Plot of the theoretical long termed drawdown in 13-01 at 3.5 L/s.*

Based on Theis analysis, long term (30 year) drawdown of 39 m is anticipated within 13-01 well casing at a long-term continuous flow rate of 3.5 L/s. Excluding the effects of well losses, roughly 5 m of impact within the Empress Group Aquifer directly adjacent to the well casing. Minimal drawdown impact of less than 0.4 m is interpreted at adjacent water supply well 13-02 as a result of

long-term operation of 13-01 at 3.5 L/s. Despite significant well losses, 13-01 is interpreted to be sustainable at the pumping test flow rate of 3.5 L/s.

It is possible that 13-01 may be sustainable for use at greater flow rates however due to the significant well losses observed at 3.5 L/s it is difficult to predict potential long-term drawdown within the well at increased flow rates. Factoring up of well-losses recorded during pump testing at 3.5 L/s indicates the well may be sustainable at the SaskPower peak rates of 6.5 L/s with long term drawdown within the well in the order of 80 m predicted. Well losses may however be exacerbated at increased flow rates resulting in greater drawdown than is predicted.

4.5.2. 13-02 Long-Term Drawdown Prediction

Figure 4.8 presents the interpreted long-termed drawdown within water supply well 13-02 at the SaskPower peak continuous flow rate of 6.5 L/s (102 USgpm), a nominal increase from the 24-hour pumping test flow rate of 6.2 L/s. Long-term drawdown predictions have been made for a period of thirty (30) years; the expected operating lifespan of the SaskPower facility.

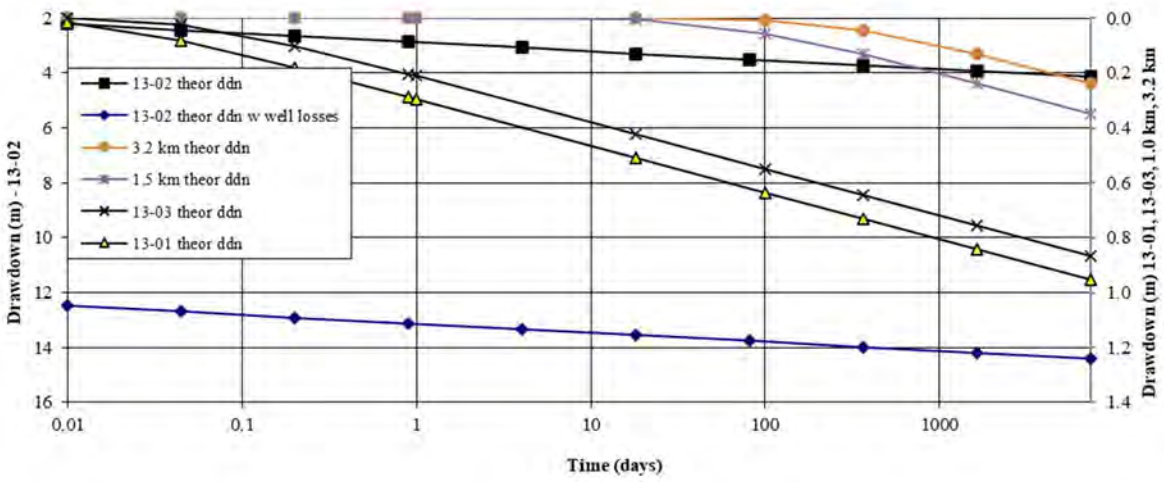


***Figure 4.8**: Plot of the theoretical long termed drawdown in 13-02 at 6.5 L/s.*

Based on Theis analysis, long term (30-year) drawdown of roughly 14.4 m is anticipated within water supply well 13-02 at a continuous flow rate of 6.5 L/s. Excluding the effects of well losses, roughly 4.2 m of drawdown is expected to occur within the Empress Group Aquifer directly adjacent to the well casing. Minimal drawdown impact of less than 1 m is interpreted at adjacent water supply well 13-01 as a result of long-term 13-02 operation at 6.5 L/s. Approximately 160 m of available drawdown exist in the 13-02 well casing to the top of screens, and roughly 100 m of available drawdown exists from static water level to the top of the Empress Group Aquifer.

Roughly 96% of available drawdown is therefore interpreted to remain to the top of the Empress Group Aquifer following 30-years of continuous use.

The anticipated long-term drawdown for 13-02 leaves room for any future fluctuations in the short-term flow rate, drawdown interference from existing and potential future adjacent wells, future hydrogeologic boundaries, or natural fluctuations in the piezometric surface. In addition, water supply well 13-02 will not be continually operated at a flow rate of 6.5 L/s – this represents peak use during the summer months and long-term drawdown prediction at this rate therefore represents a conservative estimate of long-term dynamic water level within the Empress Group Aquifer. Production well 13-02 is considered sustainable for continuous use at flow rates up to 6.5 L/s.

It should be noted that the Empress Group Aquifer appears capable of supporting a significantly higher yield than 6.5 L/s, however a larger diameter well would be required in order to accommodate pumping infrastructure capable of increased flow rates.

4.5.3. Modified Moell Method

In addition to Theis analysis, well sustainability was interpreted using the Modified Moell Method which is encouraged for use as the preferred method to evaluate long-term safe yield by the Government of Alberta (Government of Alberta, 2011).

The Modified Moell Method indicates a safe yield in the order of 6.4 L/s for water supply well 13-01. This well was tested at a relatively low flow rate, owing to the size of pump available, therefore this prediction will need to be confirmed at the higher flow rate. We expect the possibility of yield limitations in this well as well losses typically exacerbate with increased flow rate and this well was found to be inefficient at lower yields. While 13-01 appears sustainable at the SaskPower anticipated normal operating rate of 1.3 L/s, it is unlikely to be capable of maintaining the peak seasonal operating rate of 6.5 L/s.

The modified Moell Method indicates a safe yield in the order of 31 L/s for water supply well 13-02. This is misleading, as the largest pump available for a 127 mm diameter casing could not produce more than 7.6 L/s with the recorded dynamic water levels. In short, the Modified Moell Method confirms long-term operation of 13-02 at the SaskPower seasonal peak rate of 6.5 L/s will not be detrimental to the long-term health of the well or the surrounding region.

4.5.4. Impacts to Neighbouring Private Wells

Four (4) private wells have been interpreted to be completed into the Empress Group Aquifer within a 3.2 km radius of NW 36-33-24-W2M. The nearest Empress Group Aquifer water supply

well is located roughly 1.5 km southeast of the subject site on SE 02-34-24-W2M and radial drawdown impact as a result of well operation is therefore interpreted for this distance. Figure 4.9 presented below documents the anticipated radial drawdown surrounding the study site over a 30-year period of continuous well use at the SaskPower peak flow rate of 6.5 L/s. The aquifer property values utilized for the neighbouring well impact interpretation reflect the properties observed at 13-02 during the 13-02 pumping test. These values provide a conservative long-term radial drawdown prediction and it is likely that actual long-term drawdown impact will be less than what is presented below.

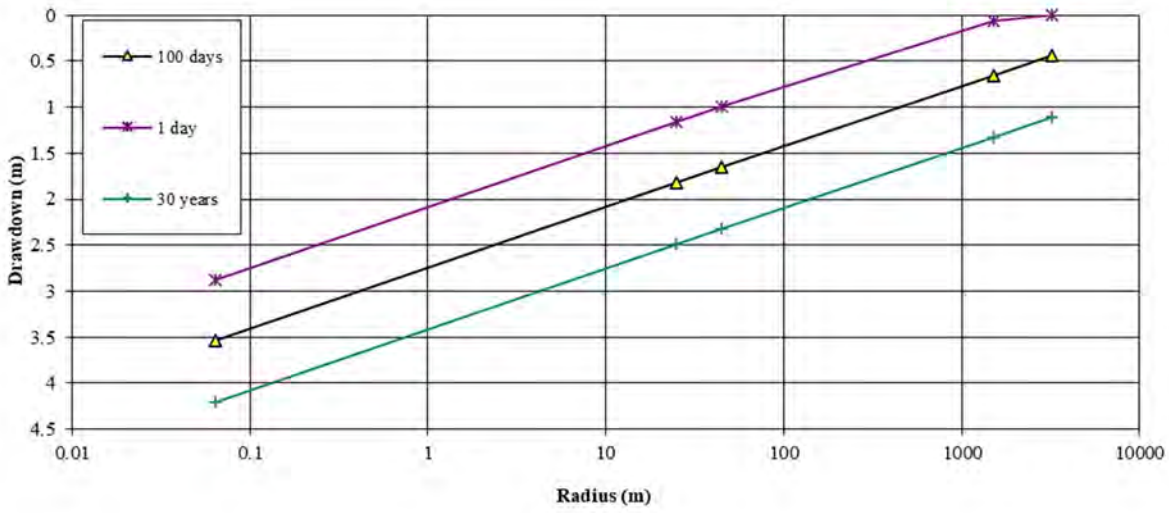


Figure 4.9: *Plot of the theoretical radial drawdown surrounding water supply well 13-02 as a result of long-term continuous operation at 6.5 L/s.*

As seen in Figure 4.9 interpreted drawdown within the Empress Group Aquifer surrounding water supply well 13-02 peaks at approximately 4.3 m directly adjacent to 13-02 well casing, decreasing to approximately 1.1 m at a distance of 3.2 km after a period of 30 years of continuous use at 6.5 L/s. At a radius of 1.5 km, the approximate horizontal distance from the SaskPower site to the nearest neighbouring well, long term radial drawdown impact of roughly 1.4 m is interpreted following 30 years of continuous use.

Drawdown impact estimates are considered conservative as the methods of analysis used do not take into account recharge to the aquifer via infiltration. Additionally, as previously mentioned, the most conservative aquifer property values interpreted from 13-02 testing were utilized for this calculation and actual long-term drawdown impact is therefore likely to be less than what is presented. Finally, the above noted calculations were based on the seasonal peak flow rate of 6.5 L/s, while the long termed average demand will be about 1.5 L/s.

Considering neighbouring Empress Group Aquifer water supply wells have roughly 100 m of available drawdown the interpreted radial drawdown impact is considered negligible at the long-term SaskPower peak flow rate of 6.5 L/s. We do not anticipate extraction of groundwater from the Empress Group Aquifer at rates of 6.5 L/s will detrimentally impact any current or future neighbouring wells.

4.5.5. Aquifer Sustainability

Calculations are often made to ensure the anticipated groundwater extraction rates are balanced by regional infiltration into the aquifer. Infiltration generally occurs as excess precipitation over a region. Canadian Climate Normals (1981-2010) for Watrous, Saskatchewan identified a mean annual precipitation rate of 449 mm/year. Owing to the medium textured regional geology an infiltration rate of 7% to the Empress Group aquifer is considered reasonable and likely conservative. This equates to a mean annual net infiltration of roughly 31 mm/year for the region.

SaskPower require a peak continuous flow rate of 6.5 L/s for operation during summer months. During off peak seasons the anticipated flow rate may be as low as 1.3 L/s, however SaskPower cannot bracket their intended use fully. Using a continuous peak supply of 6.5 L/s demand suggests the annual allocation will not exceed 205 dam^3/year. Although peak flow rates are not intended to be utilized through the entire year, this allocation remains a conservative estimate of use and leaves room for any future expansion, unforeseen use, system inefficiency, etc. The areal contribution of infiltration required to balance the proposed extraction rate of approximately 205 dam^3/year from the Empress Group Aquifer is approximately 6.2 km^2, equivalent to an area with an approximate radius of roughly 1.4 km surrounding the well.

The Empress Group Aquifer is known to occur extensively across the region, extending over thousands of km^2. Based upon the radial drawdown interpretation presented in Figure 4.9, significant available drawdown remains after 30 years of use at the peak flow rate of 6.5 L/s indicating good storage. Between groundwater available in storage and groundwater being replenished by annual recharge to the Empress Group Aquifer, the allocation is interpreted to be sustainable.

4.5.6. Empress Group Fire Flow Capacity

The above discussions addressed the limitations with the 127 mm diameter wells with respect to supply of the fire flow refill demand of 28.9 L/s for a period of about 8 hours. These 127 mm wells can only fit 102 mm diameter pumps and the maximum theoretical yield of a 102 mm diameter pump is in the order of 7.6 L/s.

As part of the interpretation of the Empress Group Aquifer, we have considered the construction of a larger diameter well capable of achieving these higher volumes.

To accommodate the required fire flow rate a 152 mm diameter pump or larger will be required. The actual pump specification will be dependent upon the hydraulic behaviour of the well, and cannot be defined pre-emptively. A 203 mm diameter well may be sufficient to fit the pump, however the well hydraulics will be greatly enhanced with construction of a 254 mm or 305 mm diameter well. Also, increasing the length of screens to better reflect the aquifer producing zone will dramatically improve the well hydraulics.

Using the aquifer hydrogeologic properties and theoretical well efficiencies we can clearly demonstrate that the Empress Group Aquifer has sufficient size to support a withdrawal of 28.9 L/s. The anticipated drawdown within the aquifer surrounding the well while operating at 28.9 L/s is in the order of 3 m after 24 hours of operation. The well losses are unknown as they are well specific, however as a worst case scenario we can estimate 50 m based on factoring up the hydraulic performance of well 13-02. A properly designed well should improve this dramatically with larger and longer screens. The Empress Group Aquifer appears to be capable of producing over 28.9 L/s for a period of 8 hours.

5.0 SUMMARY OF RESULTS

WaterMark Consulting Ltd. completed a hydrogeologic investigation to test and license existing water supply wells 13-01 and 13-02 for SaskPower on NW 36-33-24-W2M. The wells are intended for future use at a proposed gas switching facility which will require a water supply capable of providing a continuous groundwater supply of roughly 1.3 L/s (20 USgpm) for normal operation with peak continuous flow rates in the order of 6.5 L/s (102 USgpm) during summer months. Short-term (roughly 8-hour) peak flow rates in the order of 28.9 L/s (458 USgpm) are required for fire suppression tank refills in the case of emergency. The results of this investigation are summarized below:

- Two existing water supply wells (13-01 and 13-02) are completed into the Empress Group Aquifer on NW 36-33-24-W2M.
- A stepped flow rate pumping test was initiated on 13-01 on 06 September 2022 to determine a sustainable flow rate for the 6-hour constant flow rate pumping test.
- A 6-hour constant flow rate pumping test was initiated on 13-01 on 06 September 2022. The 6-hour constant flow rate pumping test was completed at an average flow rate of

3.5 L/s (55.5 USgpm). This flow rate was sustained for the duration of the 6-hour pumping test.

- A stepped flow rate pumping test was initiated on 13-02 on 07 September 2022 to determine a sustainable flow rate for the 24-hour constant flow rate pumping test.
- A 24-hour constant flow rate pumping test was initiated on 13-02 on 07 September 2022. The 24-hour constant flow rate pumping test was completed at an average flow rate of 6.2 L/s (98.3 USgpm). This flow rate was sustained for the duration of the 24-hour pumping test.
- Analysis of drawdown data from the pump tests provided the following:
    - Interpretation of the drawdown characteristics of the stepped flow rate test and constant flow rate test identified 13-01 to have a specific capacity of approximately 0.12 L/s per meter drawdown.
    - Interpretation of the drawdown characteristics of the stepped flow rate and constant rate pumping test identified 13-02 to have a specific capacity of approximately 0.65 L/s per metre drawdown.
    - Interpretation of the drawdown characteristics from constant flow rate pump testing completed on production well 13-01 identified Empress Group Aquifer transmissivities in the range of 1,079 m^2/day and storativity in the order of $2.3x10^{-4}$.
    - Interpretation of the drawdown characteristics from constant flow rate pump testing completed on production well 13-02 identified Empress Group Aquifer transmissivities in the range of 1,578 m^2/day and storativity of $2.0x10^{-4}$
    - The hydraulic conductivity of the Empress Group Aquifer sediments is in the range of $2x10^{-4}$ m/s, consistent with a clean sand deposit.
    - Estimates of well head losses within 13-01 were approximately 33 m at the pumping test flow rate of 3.5 L/s. When factored to flow rate, well head losses are roughly 9.4 m per L/s in 13-01.
    - Estimates of well head losses within 13-02 were approximately 9.9 m at the pumping test flow rate of 6.2 L/s. When factored to flow rate, well head losses are roughly 1.6 m per L/s in 13-02. Water supply well 13-02 is significantly more efficient than 13-01.

- The groundwater was found to be a sodium sulphate type groundwater. The groundwater identified manganese concentrations to exceed Saskatchewan and Canadian Drinking Water Guidelines.

The following points summarize the sustainable yield of the water supply well and aquifer:

- The following predictive analysis was interpreted for 13-01:
  - The well was found to be sustainable for continuous use at the pumping test flow rate of 3.5 L/s (55.5 USgpm) thus satisfying the normal operating demand of 1.3 L/s specified by SaskPower.
  - 13-01 is unlikely to be sustainable at the peak continuous flow rate of 6.5 L/s specified by SaskPower due to significant well losses associated with higher rates of pumping.
  - The long-termed drawdown due to continuous use at the projected continuous flow rate of 3.5 L/s is 38 m within 13-01 well casing; 33 m of this total anticipated drawdown is comprised of well head losses due to well inefficiency.
- The following predictive analysis was interpreted for 13-02:
  - The well was found to be sustainable for long-term use at the continuous flow rate of 6.5 L/s (102 USgpm) specified by SaskPower for peak summer use.
  - The long-termed drawdown due to continuous use at a continuous flow rate of 6.5 L/s is 14.4 m within 13-02 well casing; roughly 10.2 m of this total anticipated drawdown is interpreted to be comprised of well head losses due to well inefficiency.
- Drawdown impacts to neighbouring Empress Group wells were also considered:
  - Drawdown impact to the nearest neighbouring well, which occurs on a yard site 1.5 km away, was estimated at roughly 1.4 m for long-term use over 30 years at the peak rate of 6.5 L/s. Drawdown impact decreases to roughly 1.1 m at a distance of 3.2 km.
  - This level of magnitude is nominal when compared to the roughly 100 m of available drawdown available in the Empress Group Aquifer and will not create detrimental impact to the aquifer or the use of the aquifer.
- The Empress Group Aquifer is deemed to be sustainable at an allocation of 205 dam^3/year

6.0 RECOMMENDATIONS

6.1. Pump Settings

As described previously it appears that water supply well 13-02 is sustainable for long-term continuous use at the peak summer flow rate of 6.5 L/s while 13-01 may only be suitable for continuous use at the normal operating rate of 1.3 L/s. Neither 13-01 or 13-02 are capable of supplying the yield of 28.9 L/s (458 USgpm) required for fire suppression storage refill in the case of emergency.

Considering the two available water supply wells on site, we recommend relying on 13-02 as the primary water supply. The following pump settings have been provided for primary water supply well 13-02.

- The recommended maximum flow rate is 6.5 L/s (102 USgpm).
- The pump intake should be set at 26.4 m below ground surface. This has been estimated based upon the following:
    - Static water level 4 m below ground surface.
    - Long termed drawdown of 14.4 m within 13-02 well casing. Well losses are anticipated to account for roughly 10.2 m of this total long-term drawdown.
    - A buffer of roughly 8 m to account for any future well deterioration, impact from future neighbouring wells, hydrogeologic boundaries, or natural piezometric variation within the aquifer.
- Installation of a 102 mm diameter Goulds 80GS75 high-capacity submersible pump, or a pump with equivalent operating ranges, will provide capacity to achieve the above noted flow rate.

Water supply well 13-01 has not been verified to be capable of yields greater than about 4 L/s. This well would be useful as a backup water supply for the proposed development, however it has not been confirmed to be capable of the peak seasonal demand of 6.5 L/s. Based on these limitations we have provided the following pump settings for 13-01:

- The recommended maximum flow rate is 4 L/s (63 USgpm).
- The pump intake should be set at 59 m below ground surface. This has been estimated based upon the following:
    - Static water level 4 m below ground surface.

- Long termed drawdown of 47 m within 13-02 well casing. Well losses are anticipated to account for roughly 40 m of this total long-term drawdown.
- A buffer of roughly 8 m to account for any future well deterioration, hydrogeologic boundaries, or natural piezometric variation within the aquifer.

It may also be prudent to complete additional testing on 13-01 to confirm if it is sustainable for use at flow rates higher than 4 L/s. This will require installation of the largest 102 mm diameter pump available (Goulds 80GS75 or equivalent). If it is confirmed to be suitable for use up to 6.5 L/s then it could operate as a backup water supply to 13-02. Alternatively, we recommend installation of an alternate backup water supply well for operational use.

6.2. Operational Supply Well Construction

The operational water supply well would be suitable for operating yields ranging from 1.3 L/s up to 6.5 L/s (& possibly higher). The recommended operational use water supply well would have a 203 mm diameter construction suitable for use of a 152 mm diameter pump. We would also recommend a more robust screening of the Empress Group Aquifer to improve the well efficiency and yield. Screen lengths in the order of 15 m length or more would not be unreasonable, however the drilling would confirm design recommendations. Use of a 152 mm diameter pump with a variable frequency drive (VFD) controller would be optimal.

6.3. Fire Flow Supply Well Construction

The range in water supply rates for operational use (1.3 L/s to 6.5 L/s) and fire flow supply (28.9 L/s) generally precludes the ability of the wells to be multi-tasked. The size of pump to supply the fire flow demand would not lend well for the operational demand requirements. As a result, we recommend a separate well construction to supply the fire flow resupply demand.

In order to achieve the high yields required for fire suppression storage refills we recommend that a larger diameter (254 mm or 305 mm diameter) water supply well be installed and licensed at the site. The larger diameter well will permit the space to accommodate a larger diameter pump, and more importantly include larger diameter screens which will be instrumental in reducing the drawdown within the well casing.

6.4. Well Maintenance

We recommend that specific capacity of the production wells be recorded annually and that well maintenance be completed when specific capacity reduces by 20%, or on an approximate 5 to

10 year interval. Maintenance of the wells may include either physical, and/or chemical treatment of the well as well as inspection of the pump.

7.0 REFERENCES

- Simpson, M.A., 2000. Geology and Hydrostratigraphy of the Wynyard Area (72P), Saskatchewan. SRC Publication No. 10416-1C00. SRC.
- Stantec Consulting Ltd., 2013. Test Well Drilling and Hydrogeological Evaluation – Wolverine Site. Engineering report prepared for SaskPower. Dated May 2013
- Water Security Agency, 2022. Saskatchewan Water Well Driller's Database.

8.0 CLOSURE

The investigation detailed within this report was prepared for the exclusive use of our client, SaskPower. Any use of this report by a third party, without the written consent of either SaskPower or WaterMark Consulting Ltd. is prohibited.

Our conclusions and recommendations are based upon information collected from the review of available records and field subsurface investigation. Also, subsurface conditions may vary between bore holes or with time, and the nature and extent of these variations may not become evident until further investigation. If additional information becomes available which may be relevant to the conclusions, recommendations, or design elements in this investigation, please notify WaterMark Consulting Ltd. or immediately so that we may re-evaluate our conclusions and recommendations.

WATERMARK CONSULTING LTD.

<Original signed by>

Association of Professional Engineers & Geoscientists of Saskatchewan

CERTIFICATE OF AUTHORIZATION

Watermark Consulting Ltd.

Number C1203

Permission to Consult held by:

Discipline	Sk. Reg. No.	
Hydrogeology	09445	<Original signed by>

Association of Professional Engineers

Rory G. Copithorn, B.Sc., P. Geo.

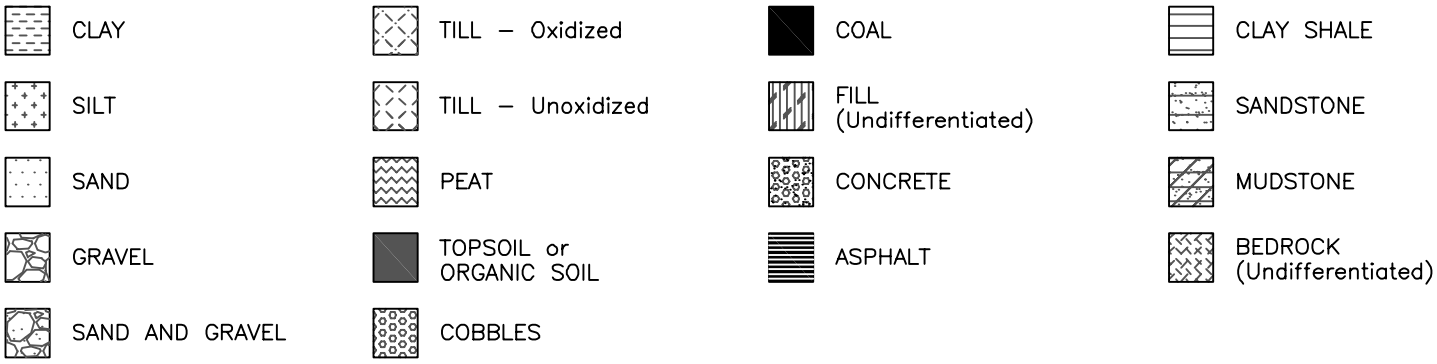
<Original signed by>

David J. Tratch, M.Sc., P.Eng.

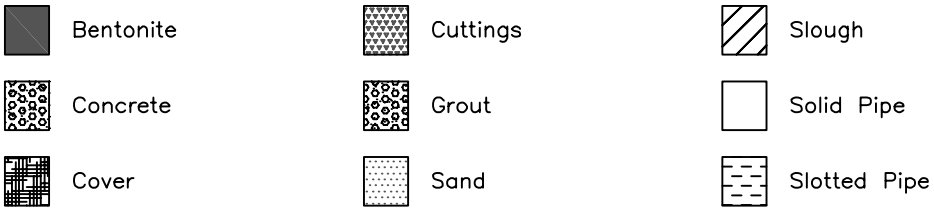
SYMBOLS AND TERMS

Symbols Used On Bore Hole Logs And Geologic Cross Sections

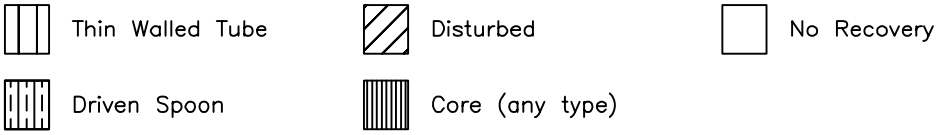
Lithology Type



Bore Hole Completion and Backfill Materials



Soil Sample Type



Groundwater Symbols

▼ Piezometric elevation as determined by a piezometer installation

▽ Water levels measured in borings at time and under the conditions noted

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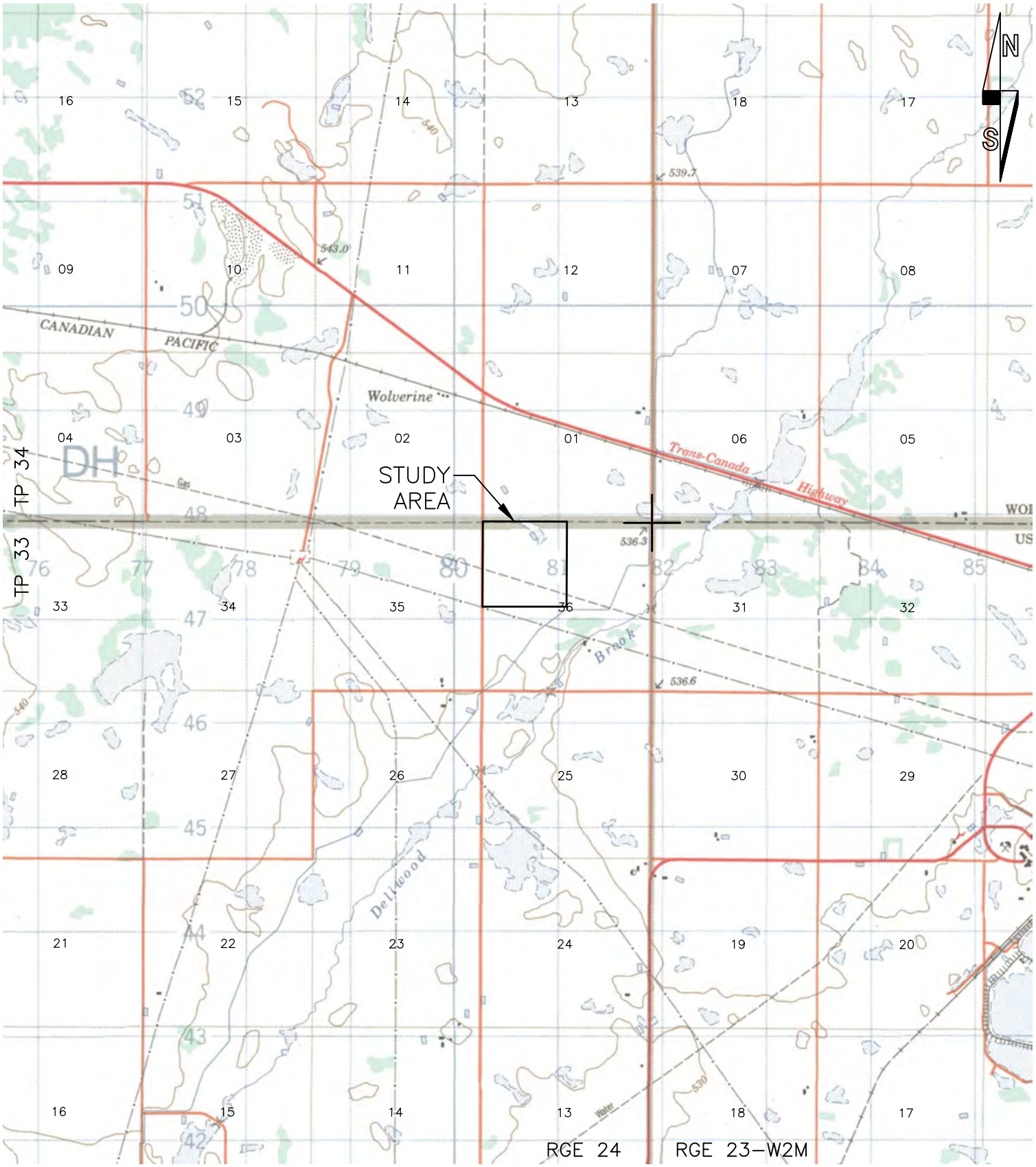
DRAWINGS

WM608 Site Plan.dwg



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CLIENT: SASKPOWER – WOLVERINE

PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: REGIONAL LOCATION PLAN

WM608 Site Plan.dwg

LEGEND

WELL LOCATION

PIEZOMETER LOCATION

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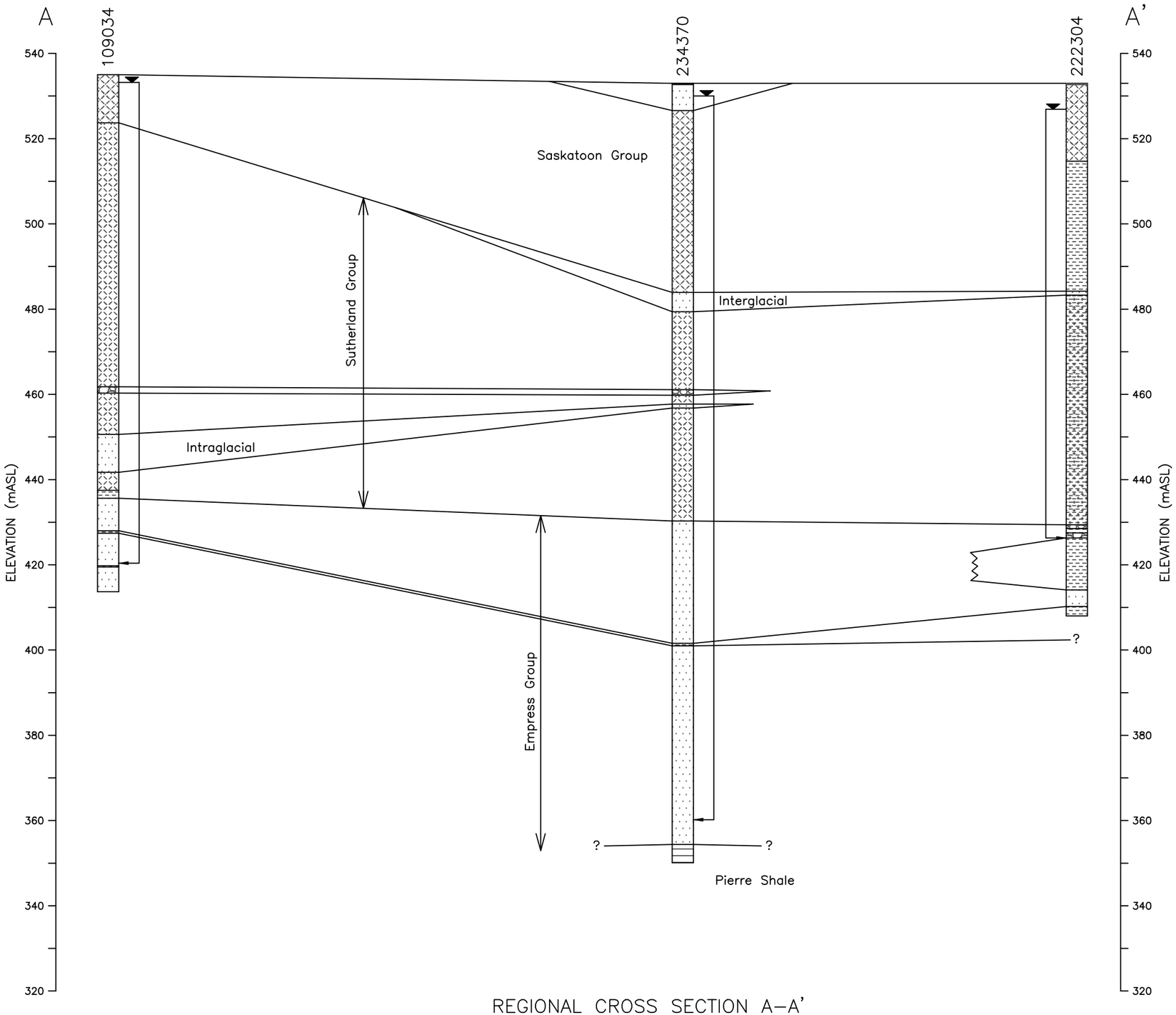
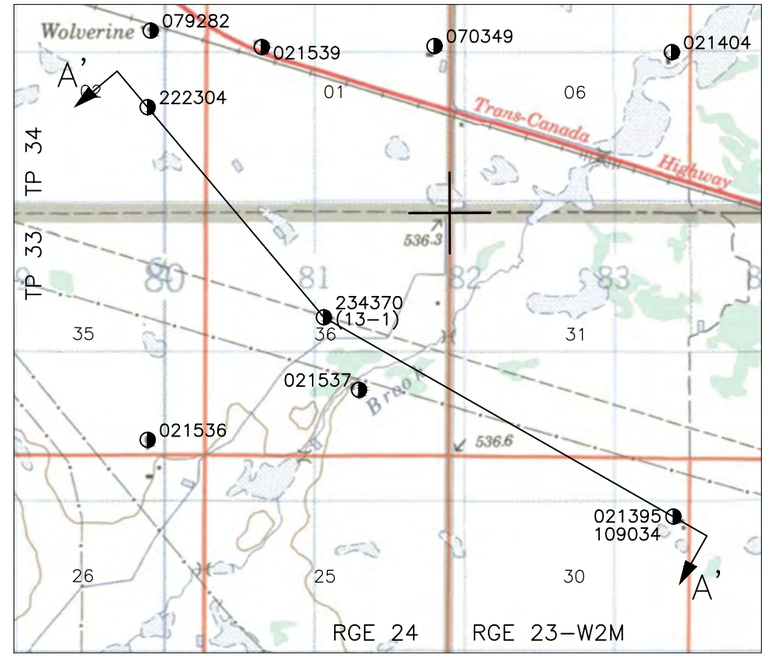
CLIENT: SASKPOWER – WOLVERINE

PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: LOCAL SITE PLAN





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LEGEND

WELL LOCATION

REGIONAL CROSS SECTION A–A'

HORIZONTAL SCALE: 1:20,000

VERTICAL SCALE: 1:1,000

NOTE: CONTACTS BETWEEN GEOLOGIC UNITS HAVE BEEN ESTABLISHED ONLY AT BORE HOLE LOCATIONS. BOUNDARIES HAVE BEEN INTERPRETED FROM GEOLOGIC EVIDENCE AND MAY BE SUBJECT TO ERROR BETWEEN BORE HOLES.

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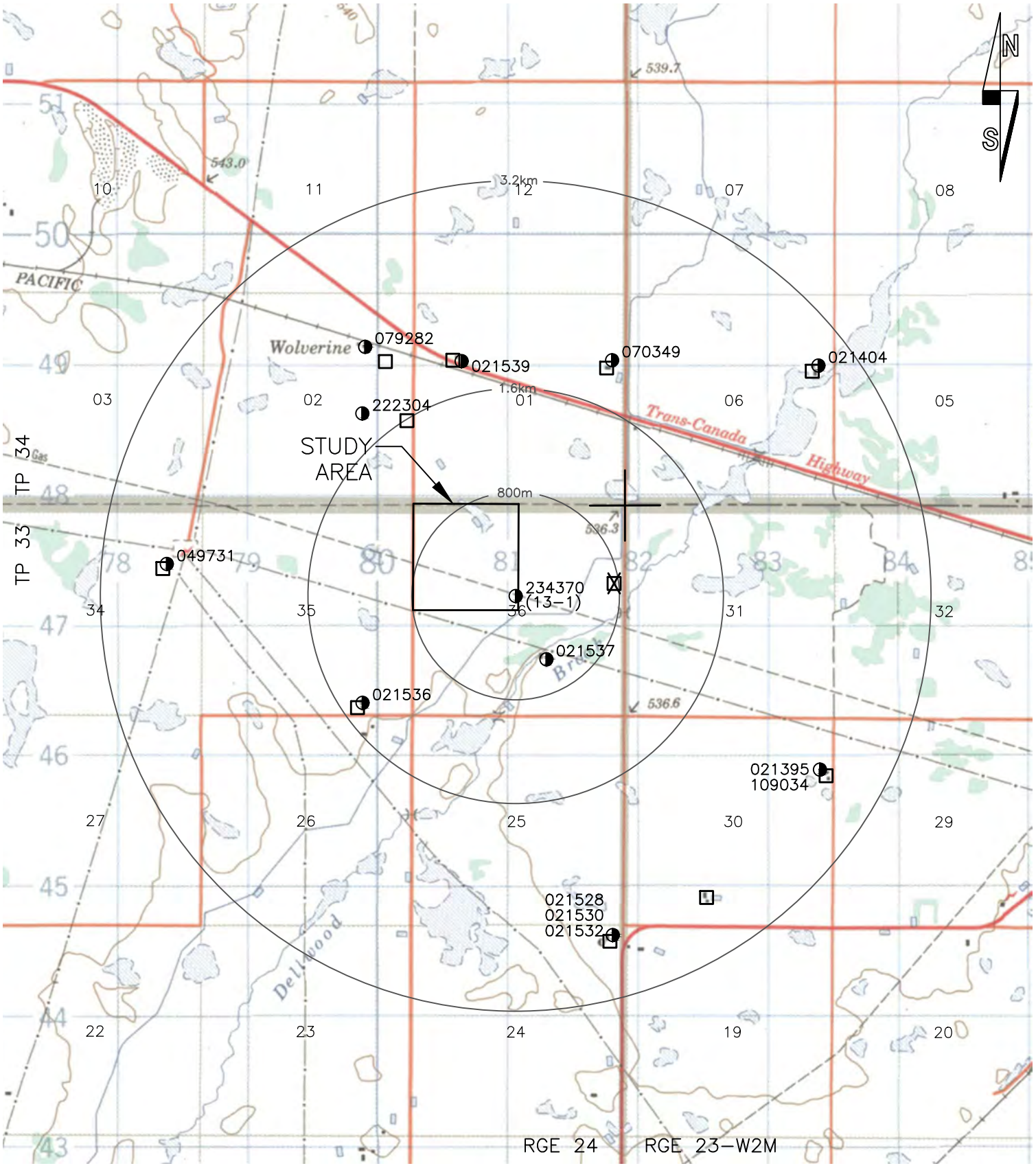
CLIENT: SASKPOWER – WOLVERINE

PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: REGIONAL CROSS SECTION A–A'

WM608 Site Plan.dwg

WM608 Site Plan.dwg



LEGEND

- PRIVATE WELL LOCATION
- ACTIVE YARDSITE LOCATION
- ABANDONED YARDSITE LOCATION

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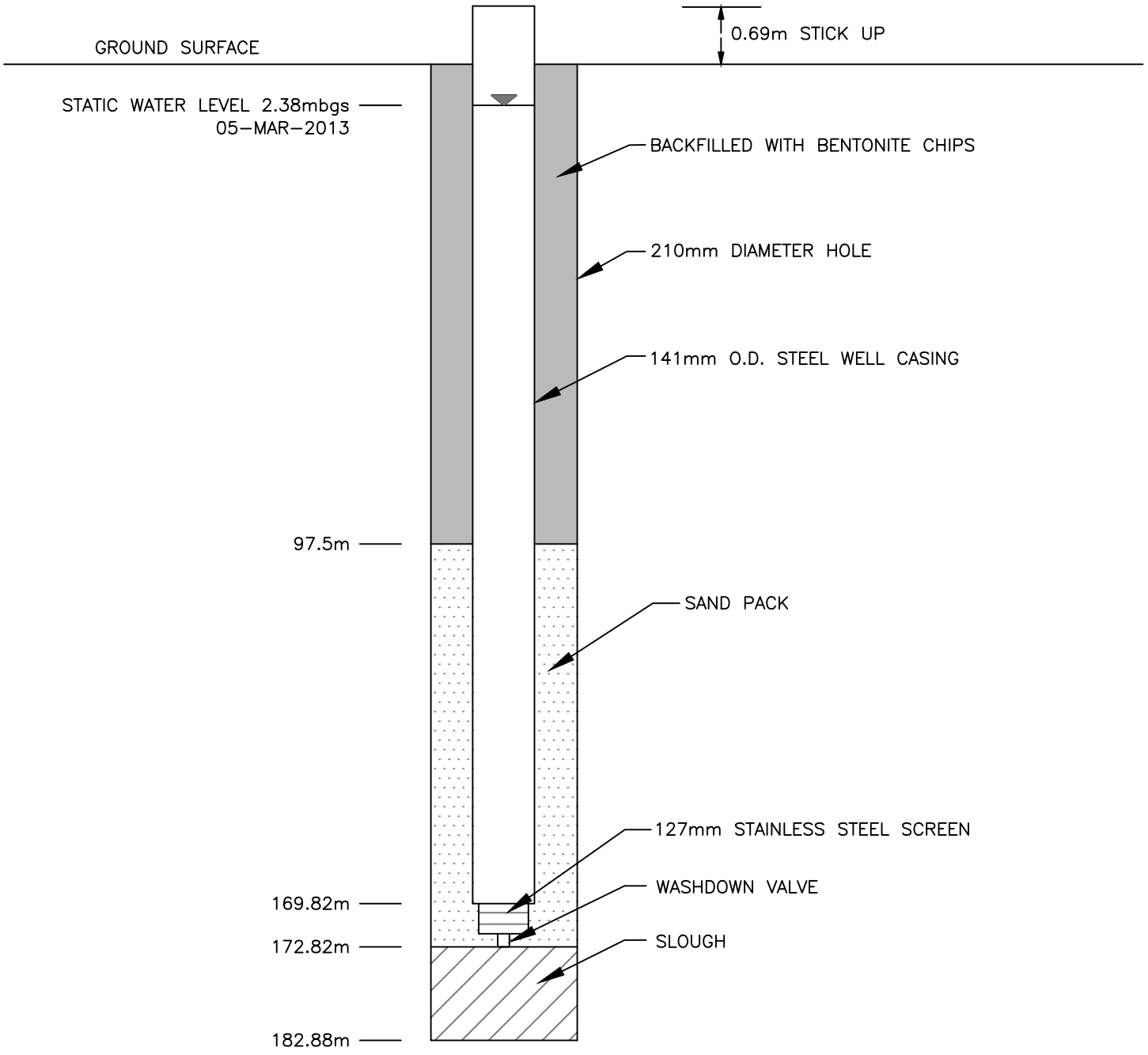
PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: NEIGHBOURING WELL LOCATION PLAN

WM608 Well Completion Details.dwg



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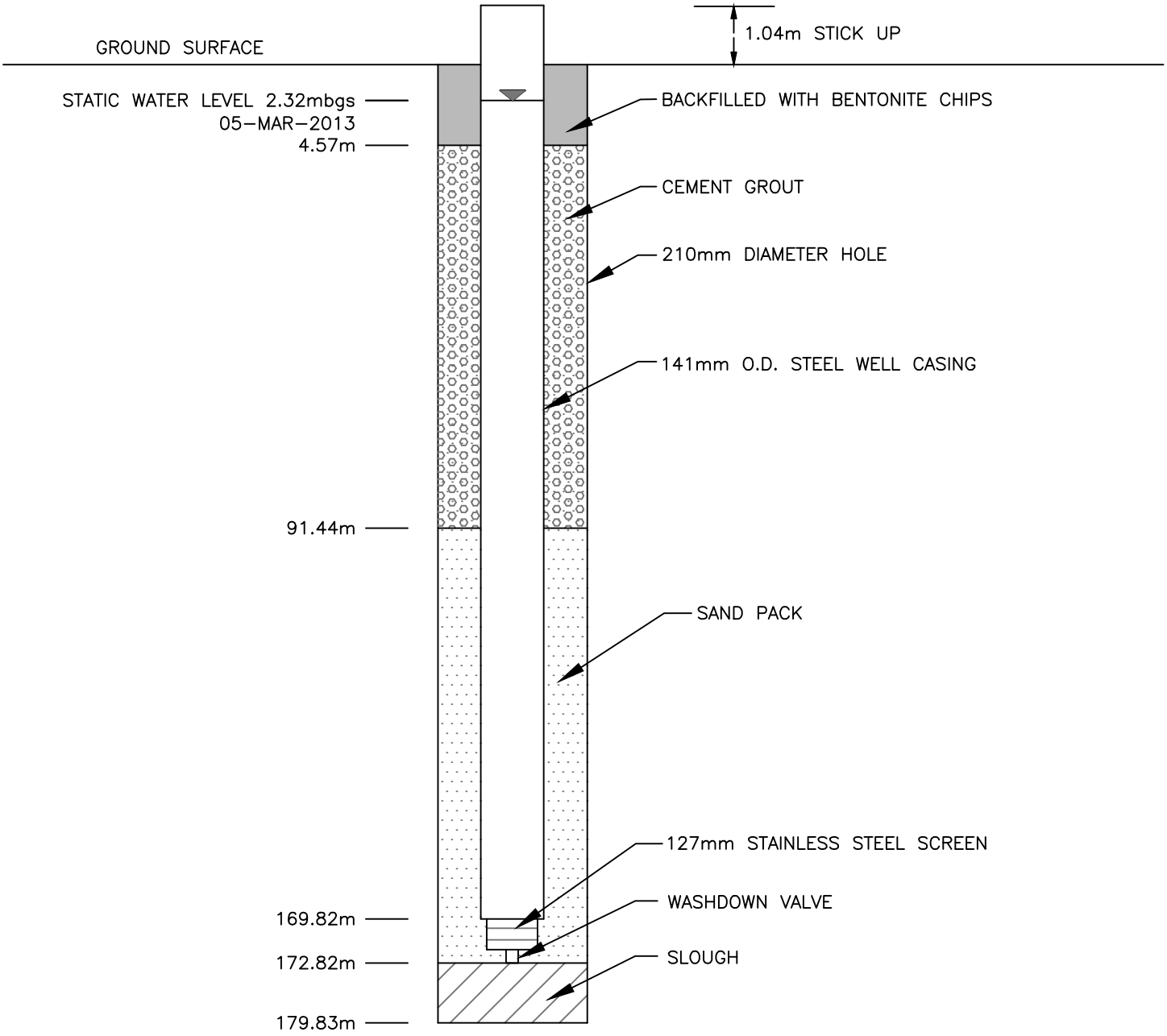
CLIENT: SASKPOWER – WOLVERINE

PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: 13–1 WELL CONSTRUCTION DETAILS

WM608 Well Completion Details.dwg



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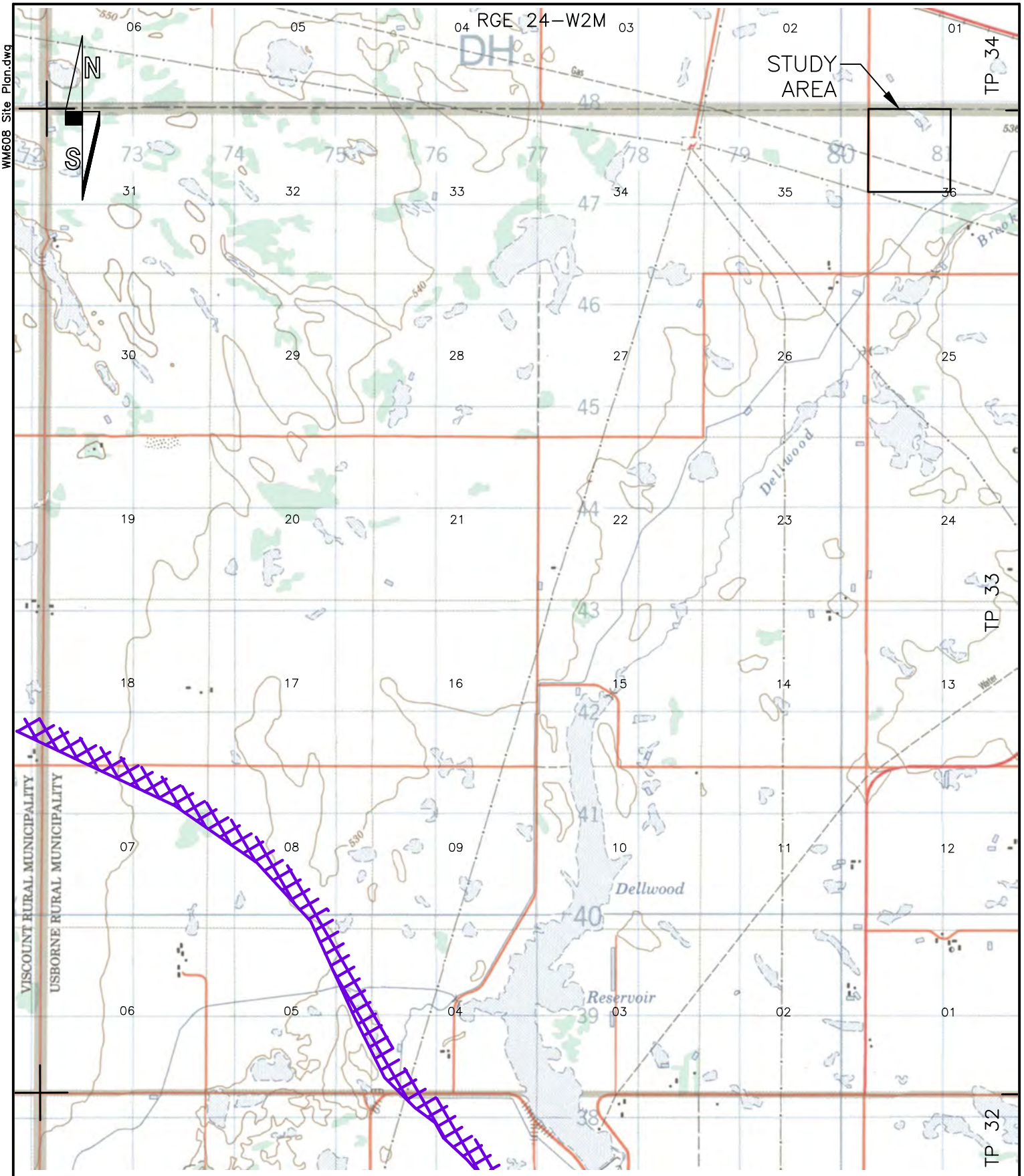
CLIENT: SASKPOWER - WOLVERINE

PROJECT: HYDROGEOLOGIC INVESTIGATION

TITLE: 13-2 WELL CONSTRUCTION DETAILS



LEGEND

EMPRESS GROUP AQUIFER BOUNDARY

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CLIENT:	SASKPOWER – WOLVERINE
PROJECT:	HYDROGEOLOGIC INVESTIGATION
TITLE:	EMPRESS GROUP AQUIFER BOUNDARY

BOREHOLE LOGS & PIEZOMETER COMPLETION DETAILS

Stantec

WELL RECORD

13-1

CLIENT SASKPOWER

PROJECT No. 111100094.500.300

LOCATION Wolverine Groundwater Investigation : NW36-33-24-W2

Borehole Coordinates
N: 5747218
E: 481059

DATES (mm/dd/yyyy): BORING 2/5/2013 WATER LEVEL 2.38 mbgs (03/05/2013)

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : Stauber Drilling Drilling Method : Mud Rotary Logged By : D.King/D.Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
								STAINLESS STEEL WELL CASING STICK-UP + 0.69 m
0	536.00							
	535.70	TOPSOIL	0.00 - 0.30m				▼	SWL@ 2.38 mbgs (03/05/2013)
		SAND: with gravel; some silt; poorly sorted coarse grained with fine grained sand and gravel; oxidized.	0.30 - 6.40m					STEEL WELL CASING : 0.141 m (5-9/16") Diam. (O.D.)
	529.60							BENTONITE CHIPS
10		CLAY (TILL): silty some fine gravel; grey; soft; friable.						
20								
30			6.40 - 48.77m					
40								BOREHOLE : 0.210 m (8-1/4") Diameter
								STEEL WELL CASING : 0.141 m (5-9/16") Diam. (O.D.)
	487.23							
50		SAND: brownish grey; fine to medium grained; some coarse grains.	48.77 - 53.34m					
	482.66	CLAY (TILL): some coarse grained sand and gravel: dark grey; hard.						
60			53.34 - 71.63m					
70	464.37							
	463.15	GRAVEL: coarse gravel or cobbles; possibly within CLAY (TILL); slow penetration.	71.63 - 72.85m					
	461.32		72.85 - 74.68m					
	460.41		74.68 - 75.59m					
80	457.67	CLAY (TILL): some sand; dark grey.	75.59 - 78.33m					
		SAND lens						
		CLAY (TILL): dark grey.						
		SILT and SAND (TILL); some clay and gravel; soft.						
90			78.33 - 101.19m					

▼ **Groundwater level measured on date indicated.

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Figure No. 1

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3.GPJ MASTER1.GDT 5/24/13

Stantec

WELL RECORD

13-1

CLIENT SASKPOWER

PROJECT No. 111100094.500.300

LOCATION Wolverine Groundwater Investigation : NW36-33-24-W2

Borehole Coordinates
N: 5747218
E: 481059

DATES (mm/dd/yyyy): BORING 2/5/2013 WATER LEVEL 2.38 mbgs (03/05/2013)

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : Stauber Drilling Drilling Method : Mud Rotary Logged By : D.King/D.Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
	536.00							
100	434.81	SAND; some silt; grey-brown; fine to medium grained; well graded.						Bottom of Bentonite @ 97.5 m Sand Pack and Slough from 97.5 - 182.88 m
110			101.19 - 130.45m					
120								
130	405.55							
	404.94	CLAY: with calcareous deposits; soft grey.	130.45 - 131.06m					
140		SAND: grey-brown; fine grained.						
150			131.06 - 177.39m					
160								
170								Top of 127mm (5") Stainless Steel Screen @ 169.82 m Bottom of Screen @ 172.82 m 1-1/4" WASHDOWN @ 172.82 m Sand and Slough
	358.61							
180	353.12	SHALE and SILTSTONE: grey; - difficult to penetrate; only very small fragments in return from rock bit.	177.39 - 182.88m					End of Borehole @ 182.88 m
		End of borehole at 182.88 m.						
190								

▼ **Groundwater level measured on date indicated.

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Figure No. 1

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3.GPJ MASTER1.GDT 5/24/13

Stantec

WELL RECORD

13-2

CLIENT SASKPOWER

PROJECT No. 111100094.500.300

LOCATION Wolverine Groundwater Investigation : NW36-33-24-W2

Borehole Coordinates
N: 5747223
E: 481036

DATES (mm/dd/yyyy): BORING 2/5/2013 WATER LEVEL 2.32 mbgs (03/05/2013)

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : Stauber Drilling Drilling Method : Mud Rotary Logged By : D.King/D.Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0	535.00							STAINLESS STEEL WELL CASING STICK-UP + 1.04 m
	534.70	TOPSOIL.	0.00 - 0.30m				▼	
		SAND: fine to medium grained; well sorted; beige; oxidized.	0.30 - 6.71m					SWL@ 2.32 mbgs (03/05/2013)
	528.29							BENTONITE CHIPS (0 - 4.57 m)
	527.68	GRAVEL: with large cobbles; some silt.	6.71 - 7.32m					Cement Grout (4.57 - 91.44m)
10		CLAY: grey; hard; high plastic						
20			7.32 - 35.05m					
30	499.95							
	498.42	SAND: with silt: fine to medium grained; poorly sorted.	35.05 - 36.58m					
40		SILT and GRAVEL (TILL): with coarse gravel; grey; soft						BOREHOLE : 0.210 m (8-1/4") Diameter
								STEEL WELL CASING : 0.141 m (5-9/16") Diam (O.D.)
50			36.58 - 71.63m					
60								
70	463.37							
	462.46	GRAVEL: coarse.	71.63 - 72.54m					
		SILTY (TILL): some clay; grey; soft						
80								
			72.54 - 101.50m					
90								Bottom of Bentonite @ 91.44 m
								Sand Pack and Slough from 91.44 - 179.83

▼ **Groundwater level measured on date indicated.

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Figure No. 2

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3 GPJ MASTER1.GDT 5/24/13

Stantec

WELL RECORD

13-2

CLIENT **SASKPOWER**

PROJECT No. **111100094.500.300**

LOCATION **Wolverine Groundwater Investigation : NW36-33-24-W2**

Borehole Coordinates
N: 5747223
E: 481036

DATES (mm/dd/yyyy): BORING **2/5/2013** WATER LEVEL **2.32 mbgs (03/05/2013)**

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : **Stauber Drilling** Drilling Method : **Mud Rotary** Logged By : **D.King/D.Nisbet**

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
	535.00							
100	433.50	SAND: fine to medium grained: well sorted.						
110								
120								
130								
140			101.50 - 176.17m					
150								
160								
170								Top of 127mm (5") Stainless Steel Screen @ 169.82 m Bottom of Screen @ 172.82 m 1-1/4" WASHDOWN @ 172.82 m Sand and Slough
	358.83							
180	355.17	SHALE: light grey; tacky cuttings with small angular black clasts.	176.17 - 179.83m					End of Borehole @ 179.83 m
190								

▼ **Groundwater level measured on date indicated

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Figure No. 2

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3.GPJ MASTER1.GDT 5/24/13

Stantec

WELL RECORD

13-3

CLIENT SASKPOWER

PROJECT No. 111100094.500.300

LOCATION Wolverine Groundwater Investigation : NW36-33-24-W2

Borehole Coordinates
N: 5747228
E: 480990

DATES (mm/dd/yyyy): BORING 2/5/2013 WATER LEVEL 2.295 mbgs (03/05/2013)

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : Stauber Drilling Drilling Method : Mud Rotary Logged By : D.King/D.Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
0	531.00							STAINLESS STEEL WELL CASING STICK-UP + 1.21 m
	530.70	TOPSOIL.	0.00 - 0.30m				▼	STAINLESS STEEL CAP
		SAND: some gravel; brown - grey: fine to medium grained; poorly sorted; oxidized.	0.30 - 6.70m					SWL@ 2.295 mbgs (03/05/2013)
	524.30							STEEL WELL CASING : 0.0505 m (2") Diam. (O.D.)
10		CLAY (TILL): silty; some coarse gravel (near 6.71 m); light grey; soft;						
20								
30			6.70 - 50.30m					
40								BOREHOLE : 0.159m (6-1/4") Diameter
50	480.70							
	477.70	SAND: fine to medium grained sand; fairly well sorted;	50.30 - 53.30m					
		CLAY (TILL): minor coarse grained sand; grey to dark grey; hard.	53.30 - 62.50m					
60	468.50							
	467.00	GRAVEL: coarse.	62.50 - 64.00m					
	465.20	CLAY (TILL): with sand and gravel; grey; soft.	64.00 - 65.80m					
	463.90		65.80 - 67.10m					
70		SAND: fine to medium grained; fairly well sorted.	67.10 - 73.80m					
	457.20							
		CLAY (TILL): silty; with minor sand; light grey; soft.	73.80 - 78.60m					
	452.40							
80	451.75	SILT (TILL): with fine to medium sand.	78.60 - 79.25m					
		GRAVEL: coarse.						
		SILT: sandy; grey; soft.						
90			79.25 - 102.41m					

▼ **Groundwater level measured on date indicated.

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Figure No. 3

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3.GPJ MASTER1.GDT 5/24/13

Stantec

WELL RECORD

13-3

CLIENT SASKPOWER

PROJECT No. 111100094.500.300

LOCATION Wolverine Groundwater Investigation : NW36-33-24-W2

Borehole Coordinates
N: 5747228
E: 480990

DATES (mm/dd/yyyy): BORING 2/5/2013 WATER LEVEL 2.295 mbgs (03/05/2013)

Datum: UTM NAD83 Zone 13N (Hand Held GPS)

Drilling Contractor : Stauber Drilling Drilling Method : Mud Rotary Logged By : D.King/D.Nisbet

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA DEPTH INTERVAL (m)	STRATA PLOT	SAMPLES: SAMPLE TYPE	SAMPLES: SAMPLE NUMBER	Static Water Level	WELL CONSTRUCTION DETAILS
	531.00							
100	428.59	SAND: some silt: grey-brown; fine-medium grained; well graded						
110								
120								
130								
140			102.41 - 176.78m					
150								Bottom of Bentonite @ 149.4 m Sand Pack and Slough from 149.4 - 182.88 m
160								
170								Top of 50mm (2") Stainless Steel Screen @ 169.82 m Bottom of Screen @ 172.88 m 1-1/4" WASHDOWN @ 172.88 m
	354.22	End of borehole at 176.78 m.						Sand and Slough
180								End of Borehole @ 186.78 m
190								

▼ **Groundwater level measured on date indicated.

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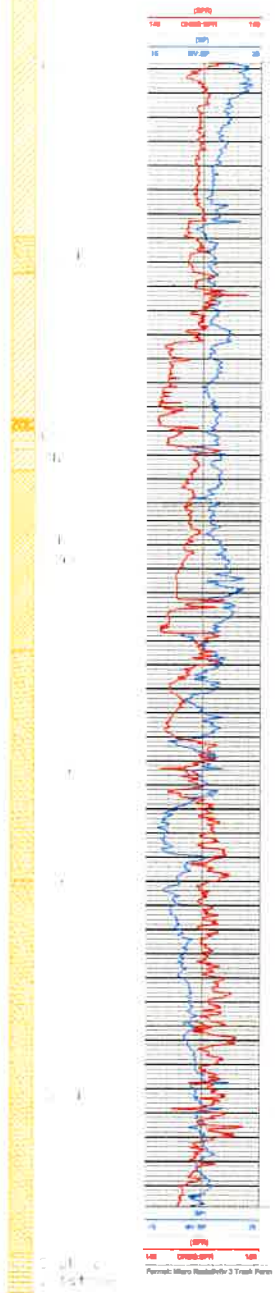
Figure No. 3

STANTED DEEP WELL 1 REV111100094_500_320 BH LOGS BH13_1 BH13_3.GPJ MASTER1.GDT 5/24/13

Resistivity (50)

13-1



Legend

Scale

Client/Project

SASKPOWER

WOLVERINE GROUNDWATER INVESTIGATION

NW36-33-24-W2M : SASKATCHEWAN

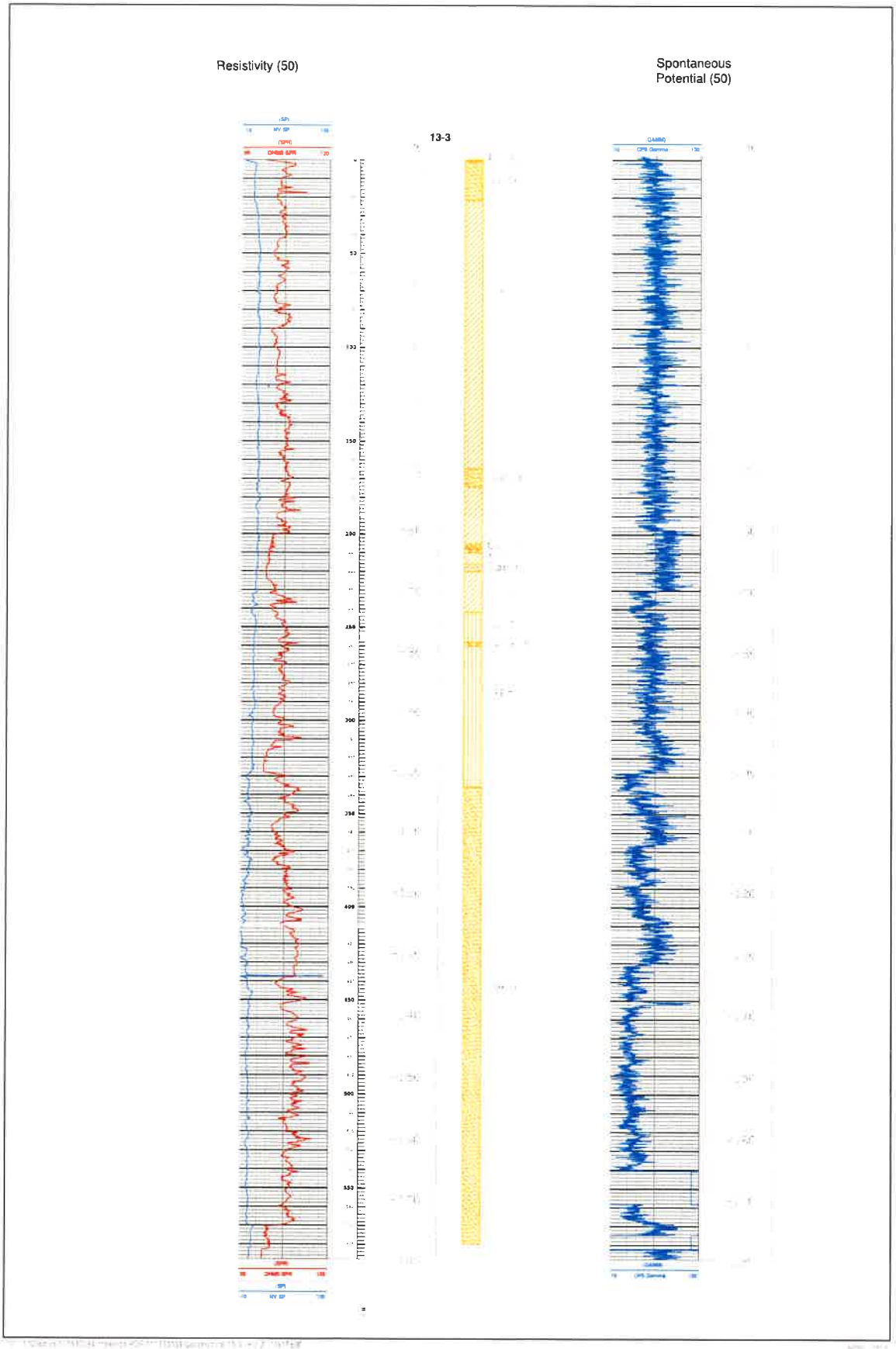
Figure No.

1

Title

Geophysical Logs
Borehole: 13-1

Stantec



Legend

Scale

Stantec

Client/Project
SASKPOWER
WOLVERINE GROUNDWATER INVESTIGATION
NW36-33-24-W2M : SASKATCHEWAN

Figure No.
2

Title
Geophysical Logs
Borehole: 13-3

APPENDIX A

Step Test & Pumping Test Data

Table A.1 **WM608**
Stepped Flow Rate Test - 13-01 **SaskPower - Wolverine**

Test Duration (min)		13-01		Flow Rate
Total	Incremental	Depth To Water (m)	Drawdown (m)	(L/s)
Static:		4.01		
Step 1				
0	0	4.01	0.00	1.5
1	1	24.43	20.42	
1.5	1.5	19.38	15.37	
2	2	17.15	13.14	
2.5	2.5	15.32	11.31	
3	3	14.72	10.71	
3.5	3.5	14.32	10.31	
4	4	14.03	10.02	
4.5	4.5	13.80	9.79	
5	5	13.57	9.56	
6	6	13.10	9.09	
7	7	13.02	9.01	
8	8	13.00	8.99	
9	9	12.99	8.98	
10	10	12.98	8.97	
14	14	12.72	8.71	
16	16	12.65	8.64	
18	18	12.58	8.57	
20	20	12.55	8.54	
Step 2				
21.5	1.5	20.94	16.93	3.0
22	2	22.51	18.50	
22.5	2.5	23.72	19.71	
23	3	24.86	20.85	
23.5	3.5	26.10	22.09	
24	4	26.90	22.89	
24.5	4.5	27.44	23.43	
25	5	27.88	23.87	
26	6	28.40	24.39	
27	7	28.66	24.65	
28	8	28.81	24.80	
29	9	28.92	24.91	
30	10	28.99	24.98	
32	12	28.94	24.93	
34	14	28.92	24.91	
36	16	28.91	24.90	
38	18	28.91	24.90	
40	20	28.92	24.91	
Step 3				
40.5	0.5	34.01	30.00	4.2
41	1	38.58	34.57	
41.5	1.5	41.84	37.83	
42	2	43.44	39.43	
42.5	2.5	44.97	40.96	
43	3	45.79	41.78	

Table A.1 **WM608**
Stepped Flow Rate Test - 13-01 **SaskPower - Wolverine**

Test Duration (min)		13-01		Flow Rate
Total	Incremental	Depth To Water (m)	Drawdown (m)	(L/s)
43.5	3.5	46.25	42.24	4.2
44	4	46.69	42.68	
44.5	4.5	46.88	42.87	
45	5	47.05	43.04	
46	6	47.25	43.24	
47	7	47.35	43.34	
48	8	47.18	43.17	
49	9	47.29	43.28	
50	10	47.35	43.34	
52	12	47.41	43.40	
54	14	47.47	43.46	
56	16	47.51	43.50	
58	18	47.53	43.52	
60	20	47.56	43.55	

Table A.2 **WM608**

24-Hour Constant Rate Pumping Test - 13-01 **SaskPower - Wolverine**

Test Duration (min)		Depth to Water (m)			Drawdown (m)			Flow Rate
Total	Incremental	13-01	13-02	13-03	13-01	13-02	13-03	(USgpm)
	Stickup (m)	0.785	1.21	1.62				
	Static Water Level (m)	4.01	4.06	3.65				
Drawdown								
0	0	4.01	4.06	3.65	0.00	0.00	0.00	
0.5	0.5	20.70			16.69			
1	1	27.89			23.88			
1.5	1.5	31.25			27.24			
2	2	32.96			28.95			
2.5	2.5							56.8
3	3							
3.5	3.5							
4	4							
4.5	4.5							
5	5		4.11*	3.74*		0.05	0.09	
6	6							
7	7							
8	8							
9	9							
10	10		4.11*	3.74*		0.05	0.09	53.9
12	12							56.3
14	14							
17	17	39.51			35.50			56.0
18	18	39.53			35.52			55.7
20	20	39.53	4.14	3.73	35.52	0.08	0.08	55.7
25	25	39.56	4.14	3.74	35.55	0.08	0.09	55.7
30	30	39.57	4.14	3.74	35.56	0.08	0.09	56.8
45	45	40.11	4.15	3.75	36.10	0.09	0.10	56.3
60	60	40.15	4.15	3.75	36.14	0.09	0.10	56.3
90	90	40.18	4.15	3.76	36.17	0.09	0.11	56.3
120	120	40.21	4.16	3.76	36.20	0.10	0.11	56.3
150	150	40.25	4.17	3.76	36.24	0.11	0.11	56.3
180	180	40.30	4.17	3.76	36.29	0.11	0.11	56.3
210	210	40.34	4.18	3.77	36.33	0.12	0.12	56.3
240	240	40.31	4.17	3.77	36.30	0.11	0.12	56.3
270	270	40.35	4.18	3.77	36.34	0.12	0.12	56.3
300	300	40.42	4.18	3.78	36.41	0.12	0.13	56.3
330	330	40.45	4.19	3.78	36.44	0.13	0.13	56.3
360	360	40.45	4.19	3.78*	36.44	0.13	0.13	56.0
Recovery								
360.5	0.5	17.85			13.84			0.0
361.0	1.0	15.54			11.53			
361.5	1.5							
362.0	2	8.21			4.20			

Table A.2 **WM608**

24-Hour Constant Rate Pumping Test - 13-01 **SaskPower - Wolverine**

Test Duration (min)		Depth to Water (m)			Drawdown (m)			Flow Rate
Total	Incremental	13-01	13-02	13-03	13-01	13-02	13-03	(USgpm)
362.5	2.5	6.55			2.54			
363.0	3	5.47			1.46			
363.5	3.5	4.88			0.87			
364.0	4	4.56			0.55			
364.5	4.5	4.39			0.38			
365.0	5	4.20			0.19			
366.0	6	4.18			0.17			
368.0	8	4.17			0.16			
369.0	9	4.17			0.16			
370.0	10	4.17	4.10		0.16	0.04		
372.0	12	4.17	4.10		0.16	0.04		
374.0	14	4.16	4.10		0.15	0.04		
376.0	16	4.16	4.09		0.15	0.03		
378.0	18	4.16	4.09		0.15	0.03		
380.0	20	4.16	4.09	3.73	0.15	0.03	0.08	
385.0	25	4.15	4.09	3.73	0.14	0.03	0.08	
390.0	30	4.15	4.09	3.73	0.14	0.03	0.08	
405.0	45	4.15	4.09	3.72	0.14	0.03	0.07	
420.0	60	4.14	4.09	3.72	0.13	0.03	0.07	

** indicates level logger data*

Table A.3 **WM608**
Stepped Flow Rate Test - 13-02 **SaskPower - Wolverine**

Test Duration (min)		13-02		Flow Rate
Total	Incremental	Depth To Water (m)	Drawdown (m)	(L/s)
Static:				
Step 1				
0	0	3.95	0.00	1.3
0.5	0.5	9.09	5.14	
1.5	1.5	5.68	1.73	
2	2	5.63	1.68	
2.5	2.5	5.62	1.67	
3	3	5.62	1.67	
3.5	3.5	5.60	1.65	
4	4	5.59	1.64	
4.5	4.5	5.58	1.63	
5	5	5.58	1.63	
6	6	5.58	1.63	
7	7	5.57	1.62	
8	8	5.57	1.62	
9	9	5.58	1.63	
10	10	5.58	1.63	
12	12	5.59	1.64	
14	14	5.59	1.64	
16	16	5.58	1.63	
18	18	5.57	1.62	
20	20	5.57	1.62	
Step 2				
21	1	7.80	3.85	2.9
21.5	1.5	7.61	3.66	
22	2	7.57	3.62	
22.5	2.5	7.81	3.86	
23	3	8.01	4.06	
23.5	3.5	8.04	4.09	
24	4	8.05	4.10	
24.5	4.5	8.05	4.10	
25	5	8.03	4.08	
26	6	8.03	4.08	
27	7	8.03	4.08	
28	8	8.03	4.08	
29	9	8.03	4.08	
30	10	8.02	4.07	
32	12	8.01	4.06	
34	14	8.01	4.06	
36	16	8.01	4.06	
38	18	8.02	4.07	
40	20	8.02	4.07	
Step 3				
40.5	0.5	13.75	9.80	6.2
41	1	14.53	10.58	
42	2	14.95	11.00	
42.5	2.5	14.95	11.00	

Table A.3 **WM608**
Stepped Flow Rate Test - 13-02 **SaskPower - Wolverine**

Test Duration (min)		13-02		Flow Rate
Total	Incremental	Depth To Water (m)	Drawdown (m)	(L/s)
43	3	15.04	11.09	
43.5	3.5	15.02	11.07	
44	4	15.02	11.07	
44.5	4.5	15.07	11.12	
45	5	15.08	11.13	
46	6	15.13	11.18	
47	7	15.14	11.19	
48	8	15.15	11.20	
49	9	15.15	11.20	
50	10	15.17	11.22	
52	12	15.19	11.24	
54	14	15.20	11.25	
56	16	15.21	11.26	
58	18	15.22	11.27	
60	20	15.23	11.28	

Table A.4 **WM608**

24-Hour Constant Rate Pumping Test - 13-02 **SaskPower - Wolverine**

Test Duration (min)		Depth to Water (m)			Drawdown (m)			Flow Rate
Total	Incremental	13-02	13-01	13-03	13-02	13-01	13-03	(USgpm)
	Stickup (m)							
	Static Water Level (m)	3.95						
Drawdown								
0	0	3.95	4.14	3.70	0.00	0.00	0.00	
0.5	0.5	12.54			8.59			
1	1	13.58			9.63			
1.5	1.5	15.58			11.63			
2	2	15.67			11.72			
2.5	2.5	15.73			11.78			
3	3	15.75			11.80			
3.5	3.5	15.77			11.82			
4	4	15.78			11.83			
4.5	4.5	15.79			11.84			
5	5	15.80	4.24*	3.78*	11.85	0.10	0.08	98.0
6	6	15.81			11.86			98.0
7	7	15.83			11.88			98.0
8	8	15.84			11.89			98.0
9	9	15.85			11.90			98.0
10	10	15.85	4.26	3.79*	11.90	0.12	0.09	98.0
12	12	15.88			11.93			98.0
14	14	15.89			11.94			98.0
16	16	15.91			11.96			98.0
18	18	15.92			11.97			98.0
20	20	15.93	4.28	3.81	11.98	0.14	0.12	98.0
25	25	15.95	4.28	3.81	12.00	0.14	0.12	98.0
30	30	15.96	4.29	3.82	12.01	0.15	0.12	98.0
45	45	15.99	4.29	3.82	12.04	0.15	0.13	98.0
60	60	16.14	4.30	3.83	12.19	0.16	0.14	98.0
120	120	16.23	4.32	3.85	12.28	0.18	0.16	98.8
150	150	16.25	4.32	3.85	12.30	0.18	0.16	98.8
180	180	16.28	4.32	3.84	12.33	0.18	0.15	98.8
210	210	16.30	4.32	3.85	12.35	0.18	0.16	98.8
240	240	16.31	4.33	3.86	12.36	0.19	0.16	98.8
270	270	16.31	4.33	3.86	12.36	0.19	0.17	98.8
300	300	16.33	4.33	3.86	12.38	0.19	0.17	98.8
330	330	16.35	4.33	3.86	12.40	0.19	0.17	98.8
360	360	16.35	4.33*	3.87	12.40	0.19	0.17	98.8
390	390	16.35	4.33*	3.87	12.40	0.19	0.18	98.8
420	420	16.38	4.33*	3.87	12.43	0.20	0.18	98.8
450	450	16.38	4.33*	3.88	12.43	0.20	0.19	98.8
480	480	16.39	4.33*	3.88	12.44	0.20	0.19	98.8
510	510	16.39	4.34*	3.88	12.44	0.20	0.19	98.8
540	540	16.39	4.34*	3.86*	12.44	0.20	0.17	98.8
570	570	16.40	4.35*	3.86*	12.45	0.21	0.17	98.8
600	600	16.41	4.35*	3.87*	12.46	0.21	0.18	98.8

Table A.4 **WM608**

24-Hour Constant Rate Pumping Test - 13-02 **SaskPower - Wolverine**

Test Duration (min)		Depth to Water (m)			Drawdown (m)			Flow Rate
Total	Incremental	13-02	13-01	13-03	13-02	13-01	13-03	(USgpm)
630	630	16.42	4.36*	3.87*	12.47	0.22	0.18	98.8
660	660	16.42	4.36*	3.87*	12.47	0.22	0.18	98.8
690	690	16.43	4.36*	3.88*	12.48	0.22	0.19	98.8
720	720	16.44	4.37*	3.88*	12.49	0.23	0.19	98.8
780	780	16.46	4.37*	3.89*	12.51	0.23	0.20	98.8
840	840	16.47	4.36*	3.89*	12.52	0.24	0.20	98.8
900	900		4.38*	3.90*		0.24	0.21	
960	960	16.49	4.39*	3.90*	12.54	0.25	0.21	98.8
1020	1020	16.56	4.38	3.93	12.61	0.24	0.24	98.8
1080	1080	16.57	4.40*	3.91*	12.62	0.26	0.22	98.8
1140	1140	16.58	4.40	3.94	12.63	0.26	0.24	98.8
1200	1200	16.58	4.40	3.94	12.63	0.26	0.24	98.8
1260	1260	16.59	4.41	3.93	12.64	0.27	0.24	98.8
1320	1320	16.60	4.42	3.95	12.65	0.28	0.25	98.8
1380	1380	16.60	4.42	3.95	12.65	0.28	0.25	98.8
1440	1440	16.61	4.42	3.95	12.66	0.28	0.25	98.8
Recovery								
1440.5	0.5	5.11			1.16			0.00
1441.0	1.0	4.84			0.89			
1441.5	1.5	4.82			0.87			
1442.0	2	4.81			0.86			
1442.5	2.5	4.81			0.86			
1443.0	3	4.80			0.85			
1443.5	3.5	4.80			0.85			
1444.0	4	4.80			0.85			
1444.5	4.5	4.79			0.84			
1445.0	5	4.79			0.84			
1446.0	6	4.79			0.84			
1448.0	8	4.78			0.83			
1449.0	9	4.78			0.83			
1450.0	10	4.78	4.26		0.83	0.12		
1452.0	12	4.78	*4.26*		0.83	0.12		
1454.0	14	4.77	4.26		0.82	0.12		
1456.0	16	4.77	4.26		0.82	0.12		
1458.0	18	4.77	4.26		0.82	0.12		
1460.0	20	4.76	4.26		0.81	0.12		
1465.0	25	4.76	4.25		0.81	0.11		
1470.0	30	4.75	4.25	3.83	0.80	0.11	0.13	
1485.0	45	4.75	4.24	3.82	0.80	0.10	0.13	
1500.0	60	4.74	4.24	3.82	0.79	0.10	0.12	
1530.0	90		4.23	3.80		0.09	0.11	
1560.0	120	4.73	4.22	3.79	0.77	0.08	0.10	
1590.0	150	4.72	4.21	3.78	0.77	0.07	0.09	
1620	180	4.72	4.21	3.78	0.77	0.07	0.09	

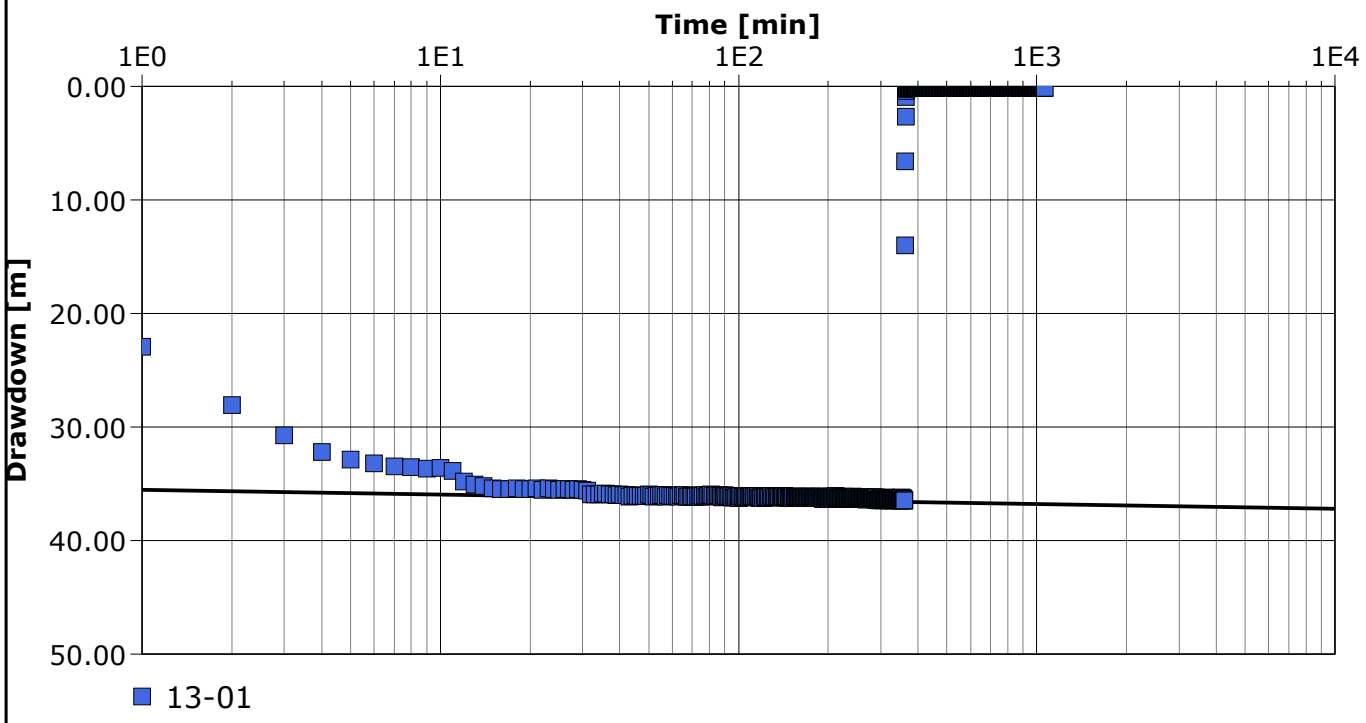
** indicates level logger data*

APPENDIX B

Aquifer Property Interpretation Graphs

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC	13-01 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

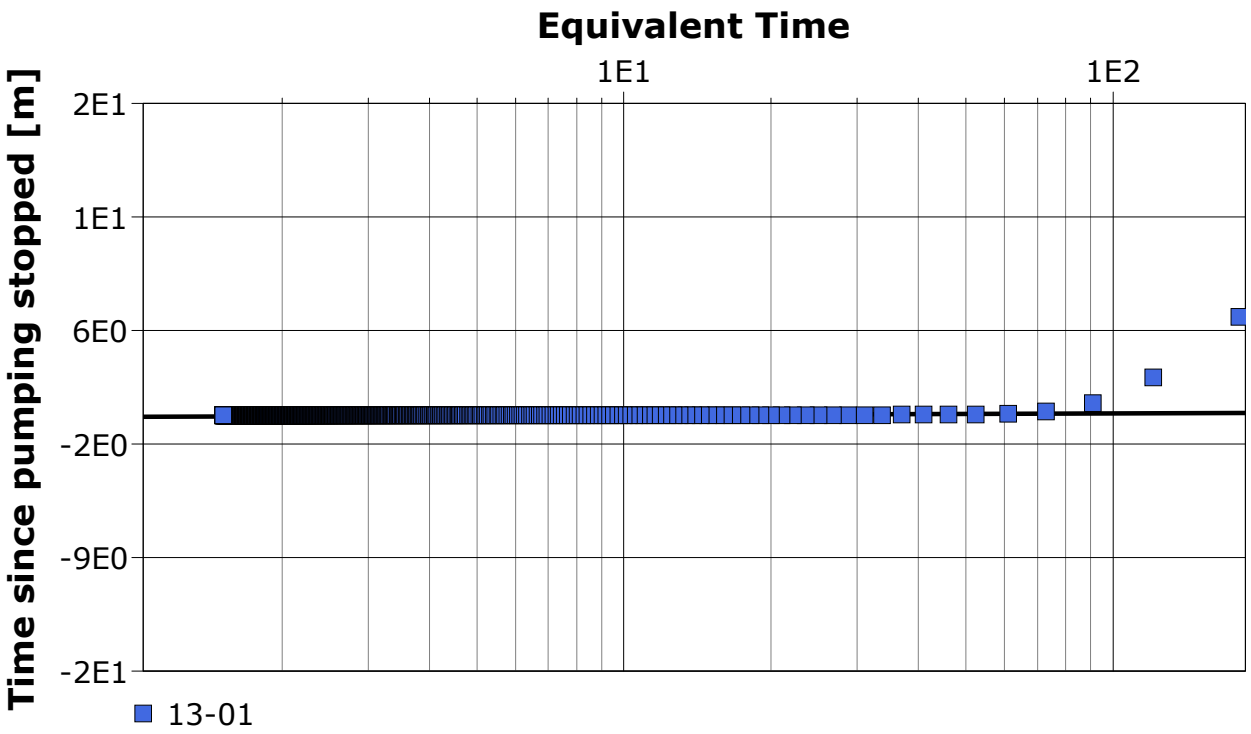


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-01	1.31×10^{2}	1.75×10^{0}		0.06	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC	13-01 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

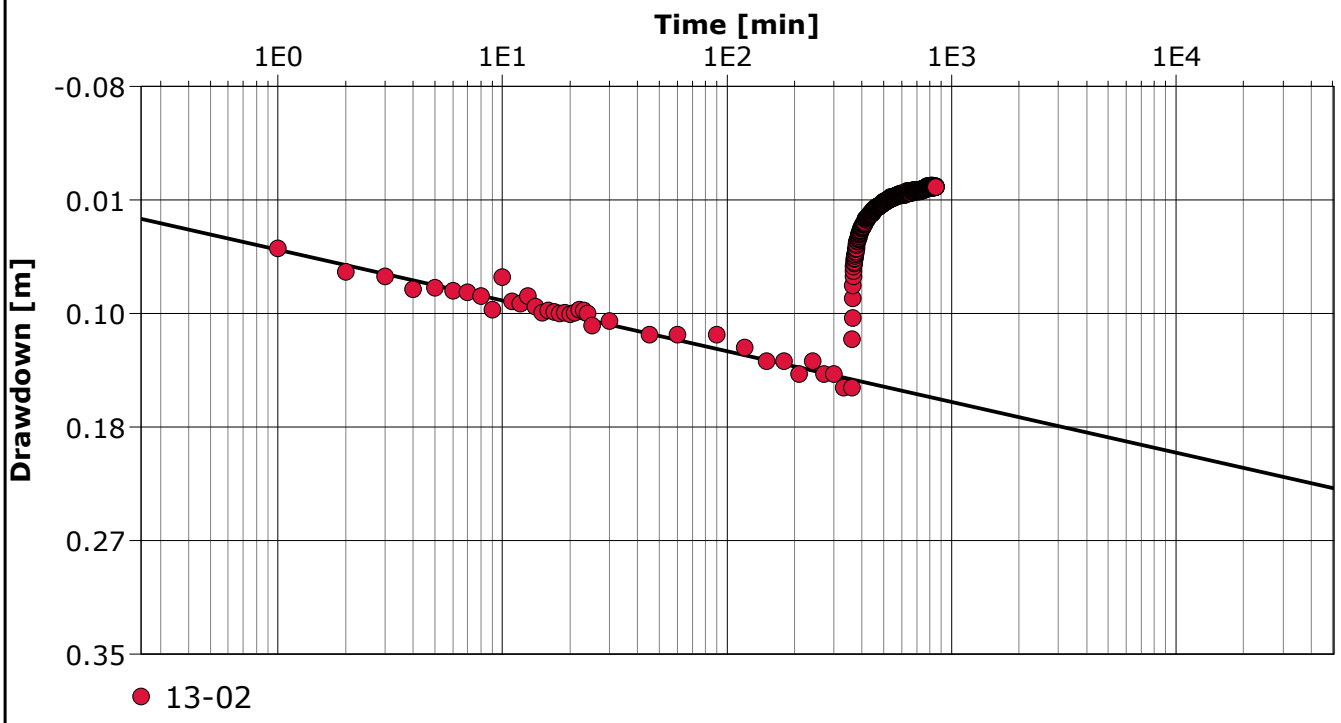


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-01	5.24×10^{2}	7.01×10^{0}	0.06	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC	13-02 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

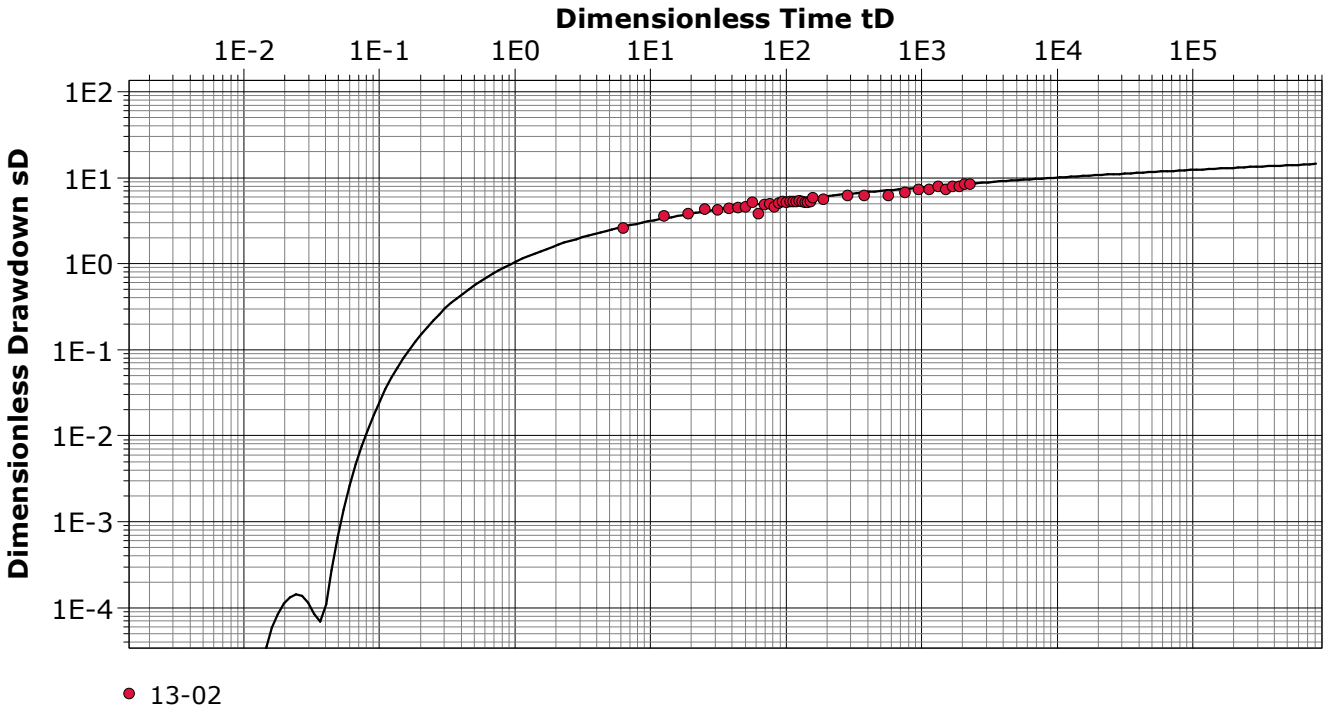


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-02	1.47×10^{3}	1.96×10^{1}	1.96×10^{-4}	25.34	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-02 Theis	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

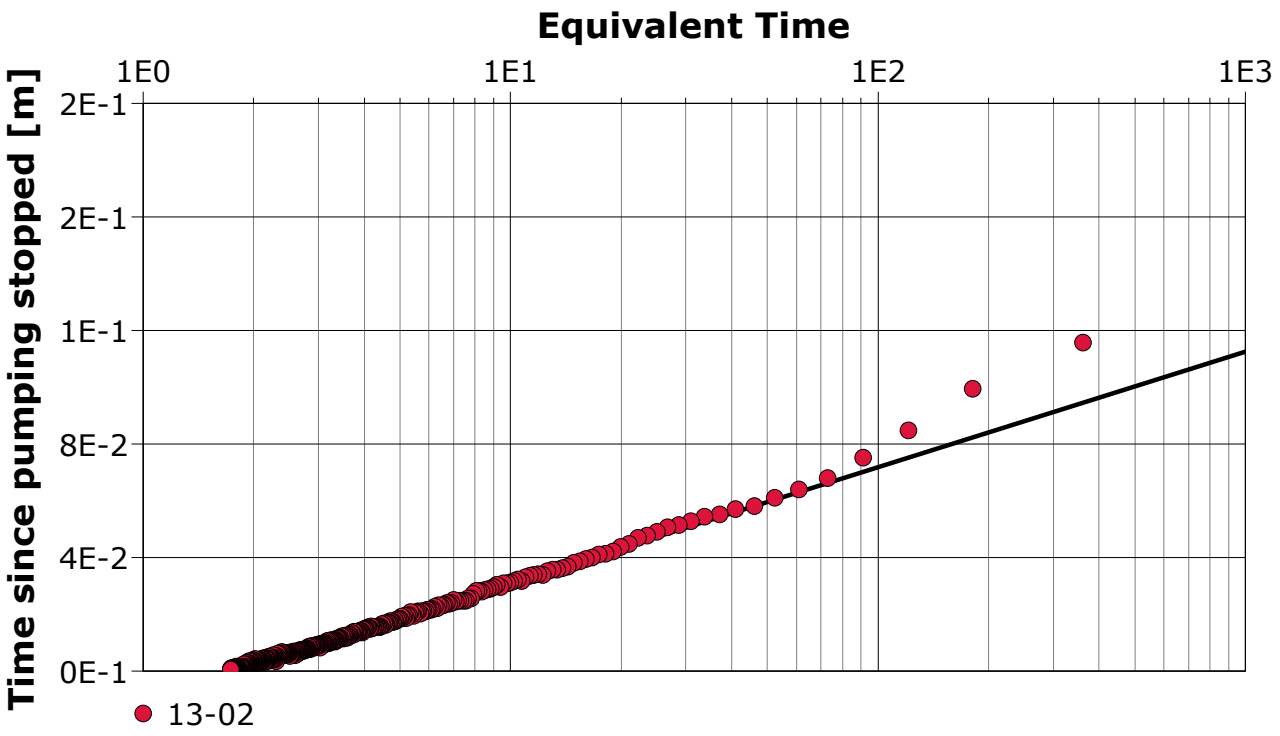


Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-02	1.36×10^{3}	1.81×10^{1}	2.34×10^{-4}	25.34	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-02 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

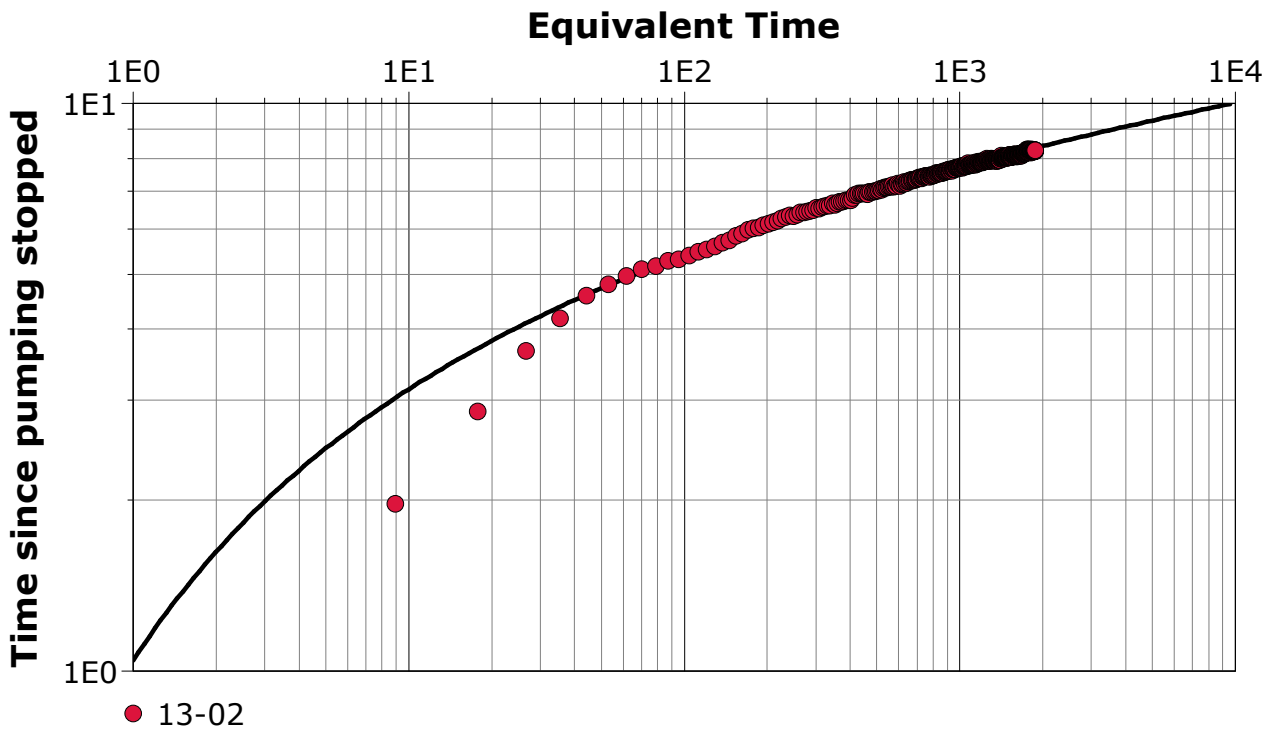


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-02	1.38×10^{3}	1.84×10^{1}	25.34	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-02 Agarwal Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

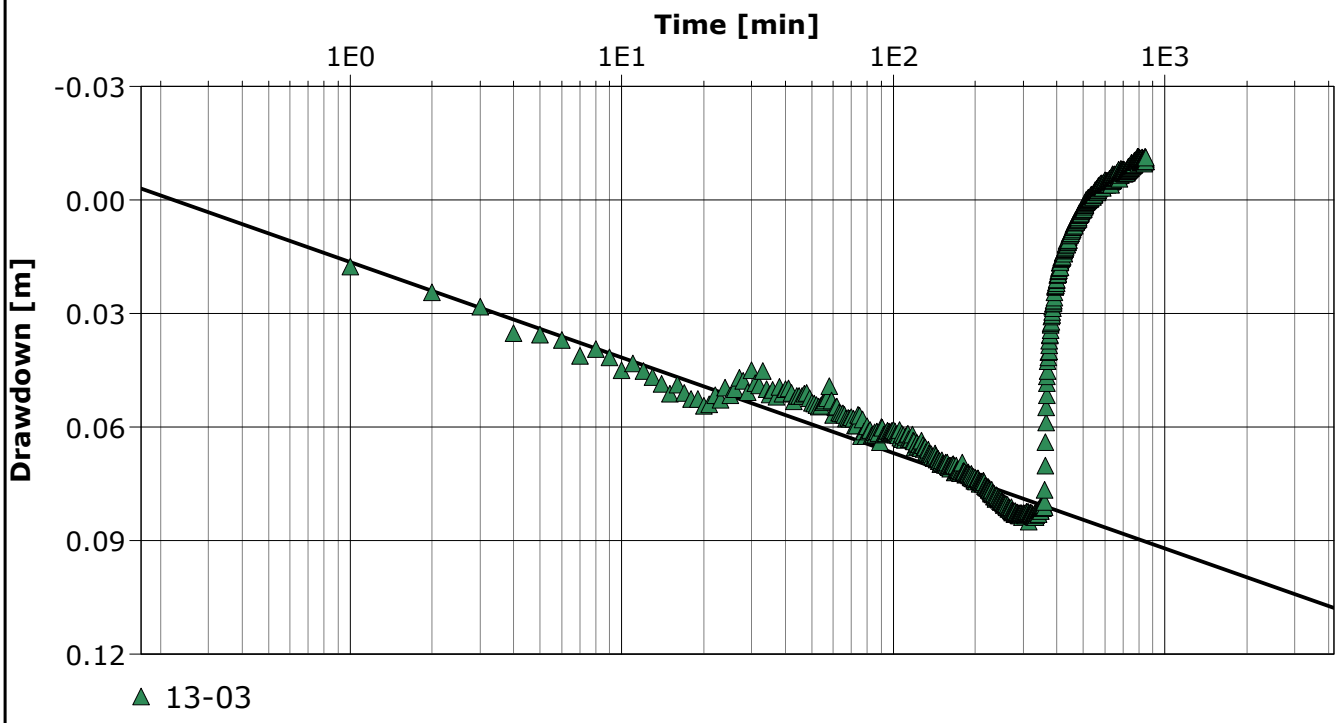


Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-02	1.33×10^{3}	1.78×10^{1}	1.60×10^{-4}	25.34	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-03 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

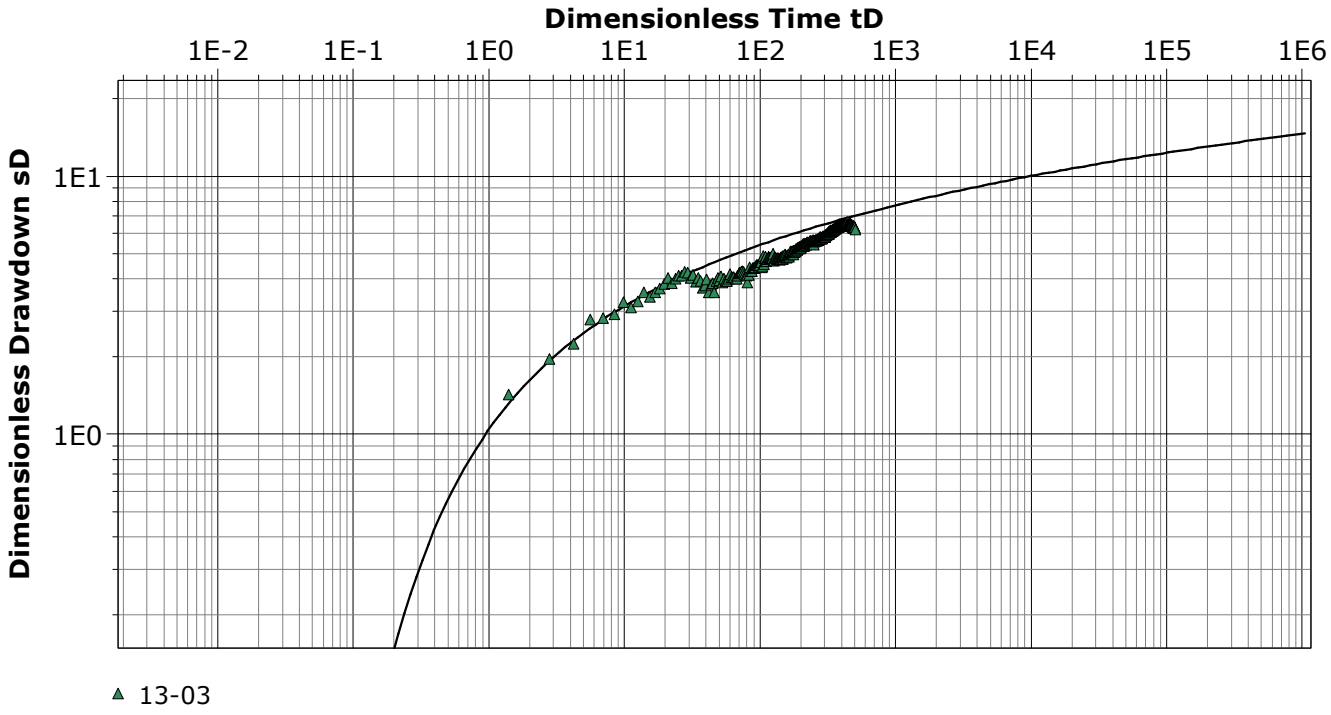


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-03	2.27×10^{3}	3.04×10^{1}	1.50×10^{-4}	70.21	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-03 Theis	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

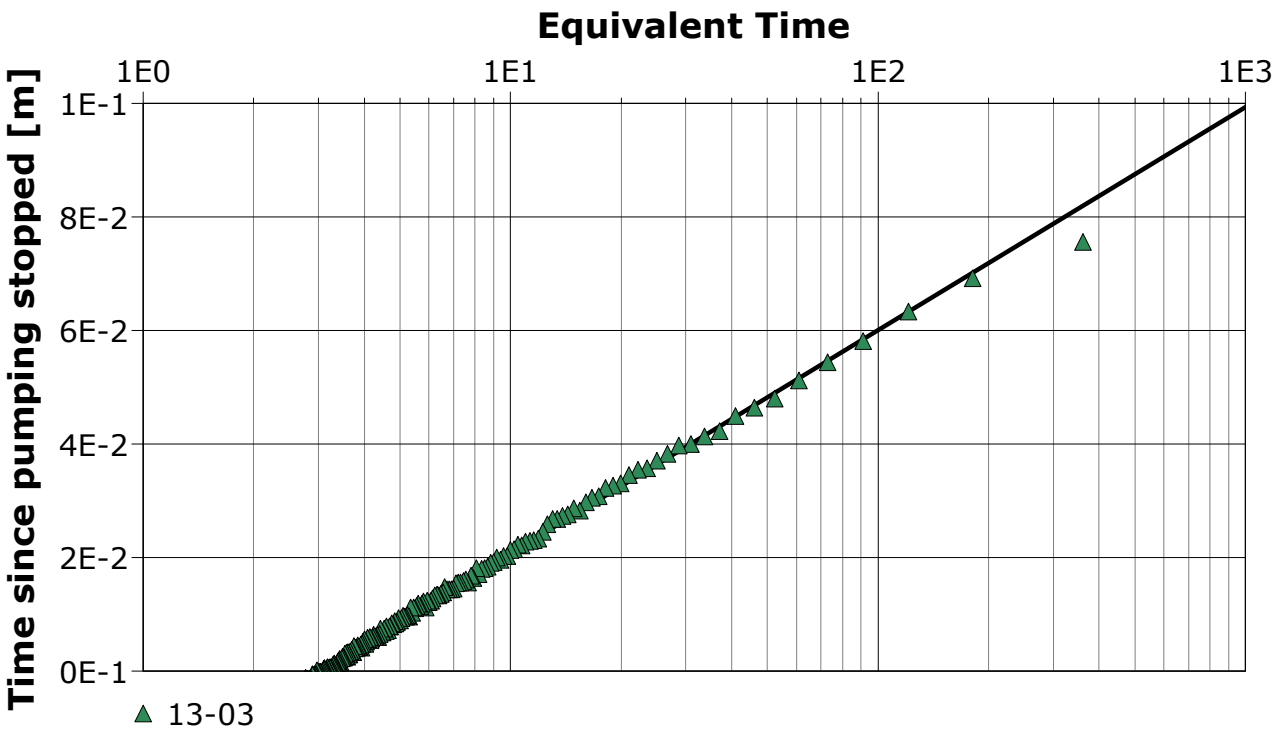


Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-03	1.93×10^{3}	2.58×10^{1}	1.94×10^{-4}	70.21	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-03 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

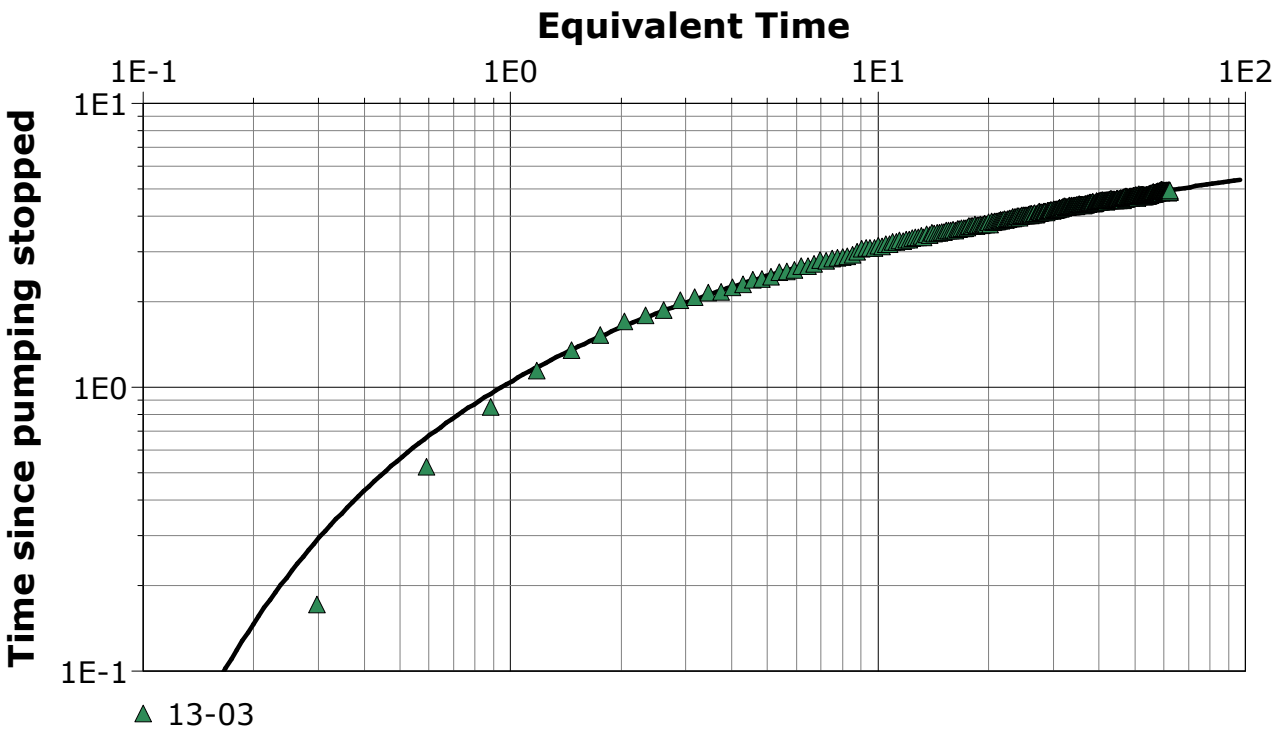


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-03	1.43×10^{3}	1.91×10^{1}	70.21	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Analysis Performed by: RGC/ALG/CPK	13-03 Agarwal Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	



Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-03	1.36×10^{3}	1.82×10^{1}	6.43×10^{-4}	70.21	

Pumping Test Analysis Report

Project: Hydrogeologic Investigation

Number: WM608

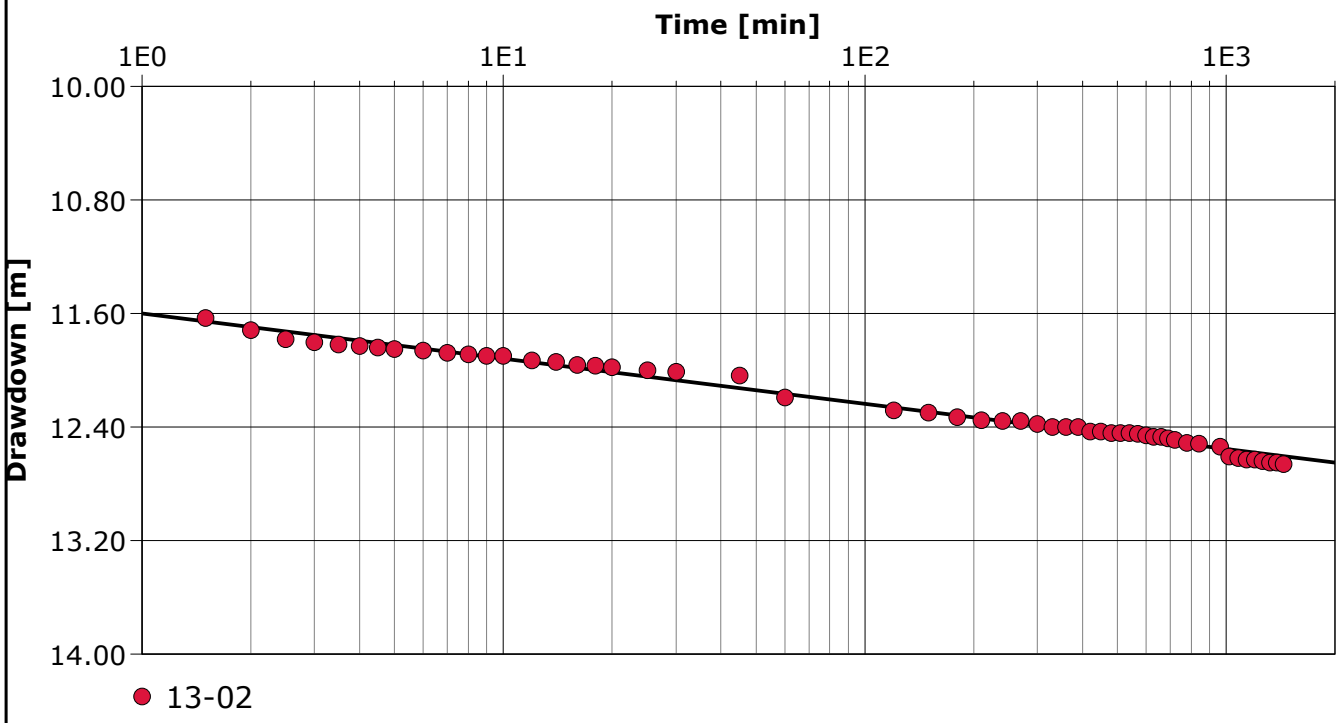
Client: SaskPower

Location:	Pumping Test: 13-01 Pumping Test	Pumping Well: 13-01
Test Conducted by: CPK		Test Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 46.787 [U.K. gal/min]	

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/d]	K [m/d]	S
1	13-01 Cooper Jacob	RGC	2022-09-12	Cooper & Jacob I	13-01	1.31×10^{2}	1.75×10^{0}	
2	13-01 Theis Recovery	RGC	2022-09-12	Theis Recovery	13-01	5.24×10^{2}	7.01×10^{0}	
3	13-02 Cooper Jacob	RGC	2022-09-12	Cooper & Jacob I	13-02	1.47×10^{3}	1.96×10^{1}	1.96×10^{-4}
4	13-02 Theis	RGC/ALG/CPK	2022-09-12	Theis	13-02	1.36×10^{3}	1.81×10^{1}	2.34×10^{-4}
5	13-02 Theis Recovery	RGC/ALG/CPK	2022-09-12	Theis Recovery	13-02	1.38×10^{3}	1.84×10^{1}	
6	13-02 Agarwal Recov	RGC/ALG/CPK	2022-09-12	AGARWAL + Theis	13-02	1.33×10^{3}	1.78×10^{1}	1.60×10^{-4}
7	13-03 Cooper Jacob	RGC/ALG/CPK	2022-09-12	Cooper & Jacob I	13-03	2.27×10^{3}	3.04×10^{1}	1.50×10^{-4}
8	13-03 Theis	RGC/ALG/CPK	2022-09-12	Theis	13-03	1.93×10^{3}	2.58×10^{1}	1.94×10^{-4}
9	13-03 Theis Recovery	RGC/ALG/CPK	2022-09-12	Theis Recovery	13-03	1.43×10^{3}	1.91×10^{1}	
10	13-03 Agarwal Recov	RGC/ALG/CPK	2022-09-12	AGARWAL + Theis	13-03	1.36×10^{3}	1.82×10^{1}	6.43×10^{-4}
					Average	1.32×10^{3}	1.76×10^{1}	2.63×10^{-4}

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-02 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

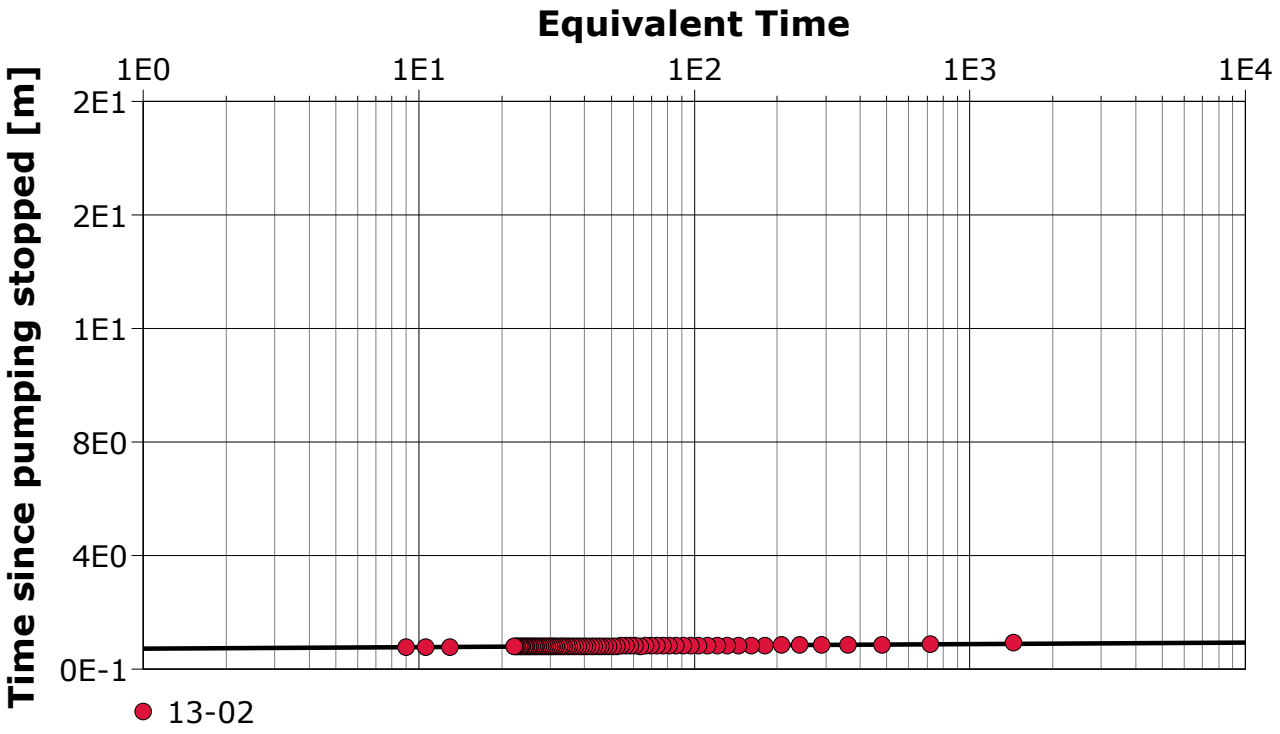


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-02	3.10×10^{2}	4.15×10^{0}		0.06	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-02 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

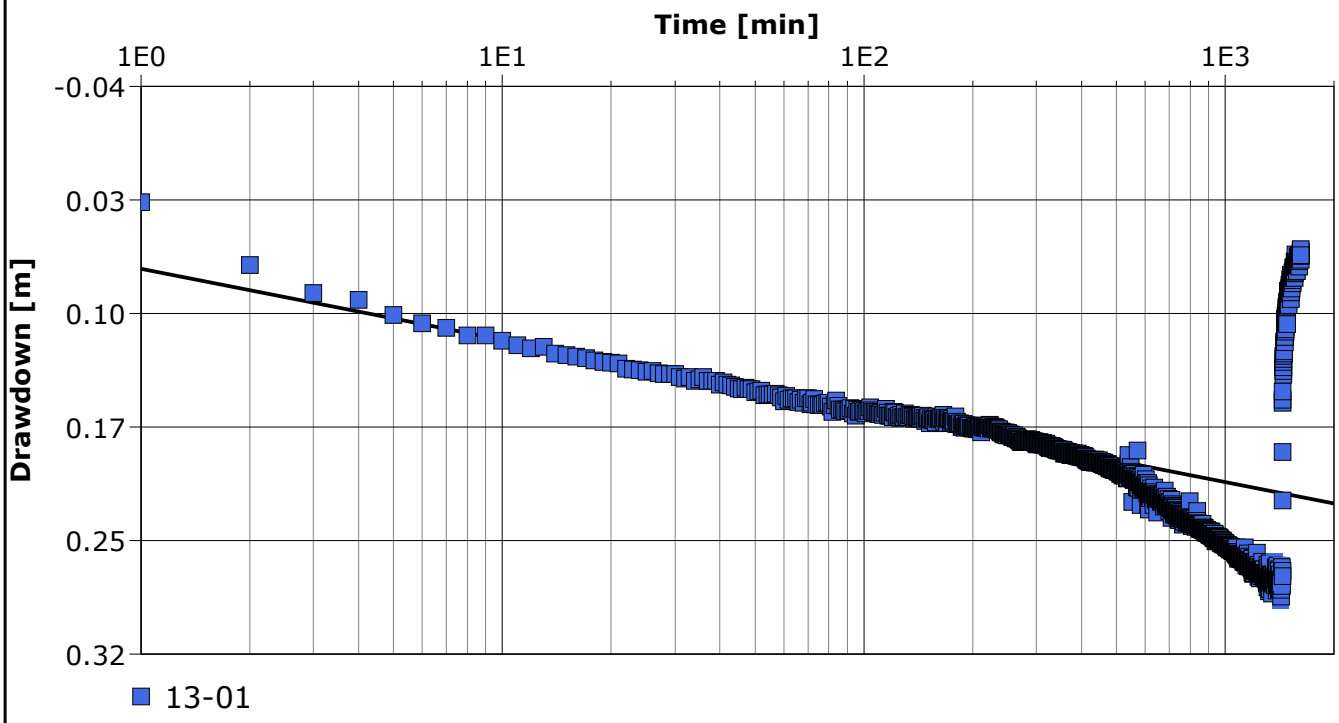


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-02	1.73×10^{3}	2.31×10^{1}	0.06	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-01 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

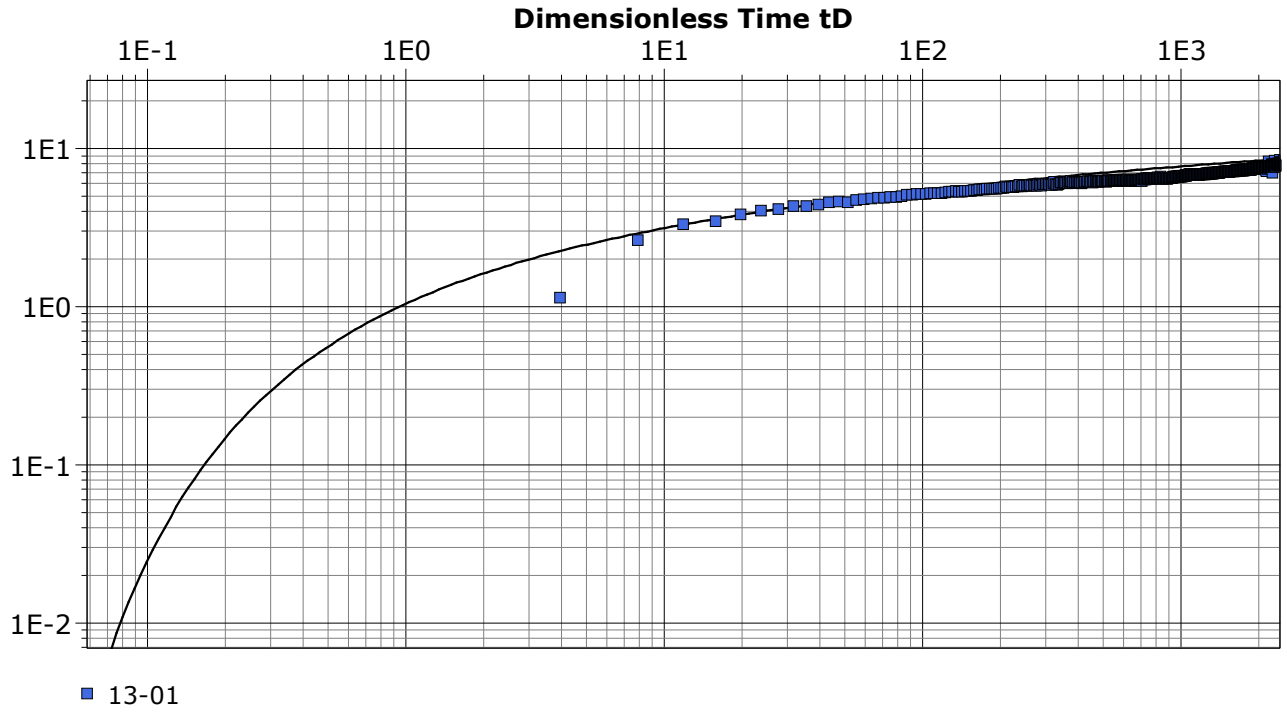


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-01	2.16×10^{3}	2.89×10^{1}	1.31×10^{-4}	25.34	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-01 Theis	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

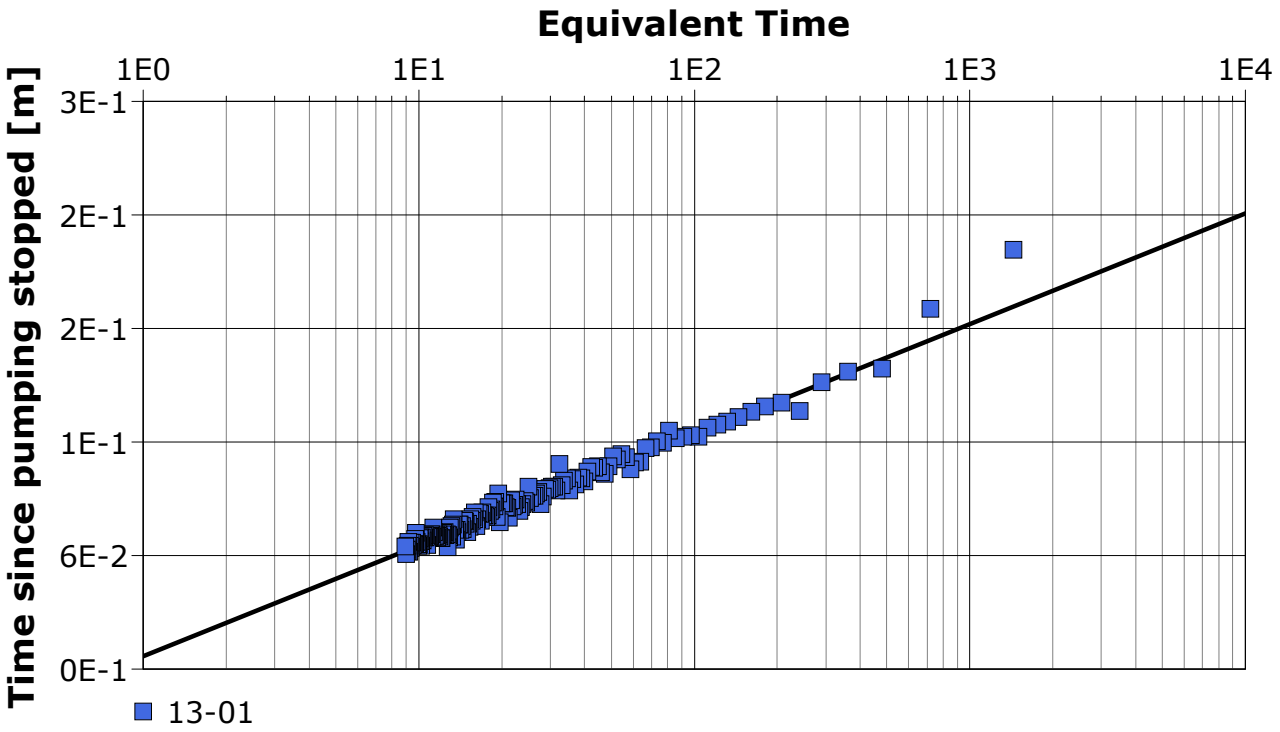


Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Ratio K(v)/K(h)	Radial Distance to PW [m]
13-01	1.60×10^{3}	2.14×10^{1}	4.36×10^{-4}	6.38×10^{-2}	25.34

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-01 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

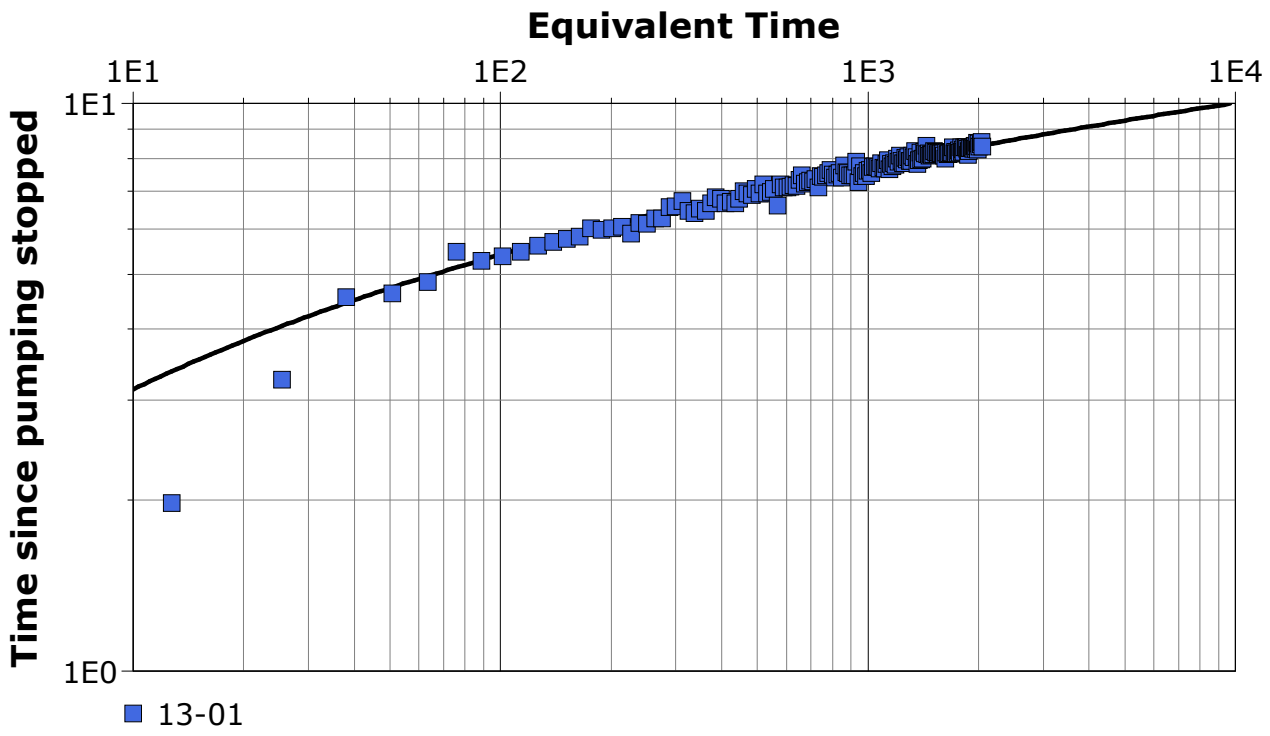


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-01	1.68×10^{3}	2.25×10^{1}	25.34	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-01 Agarwal Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

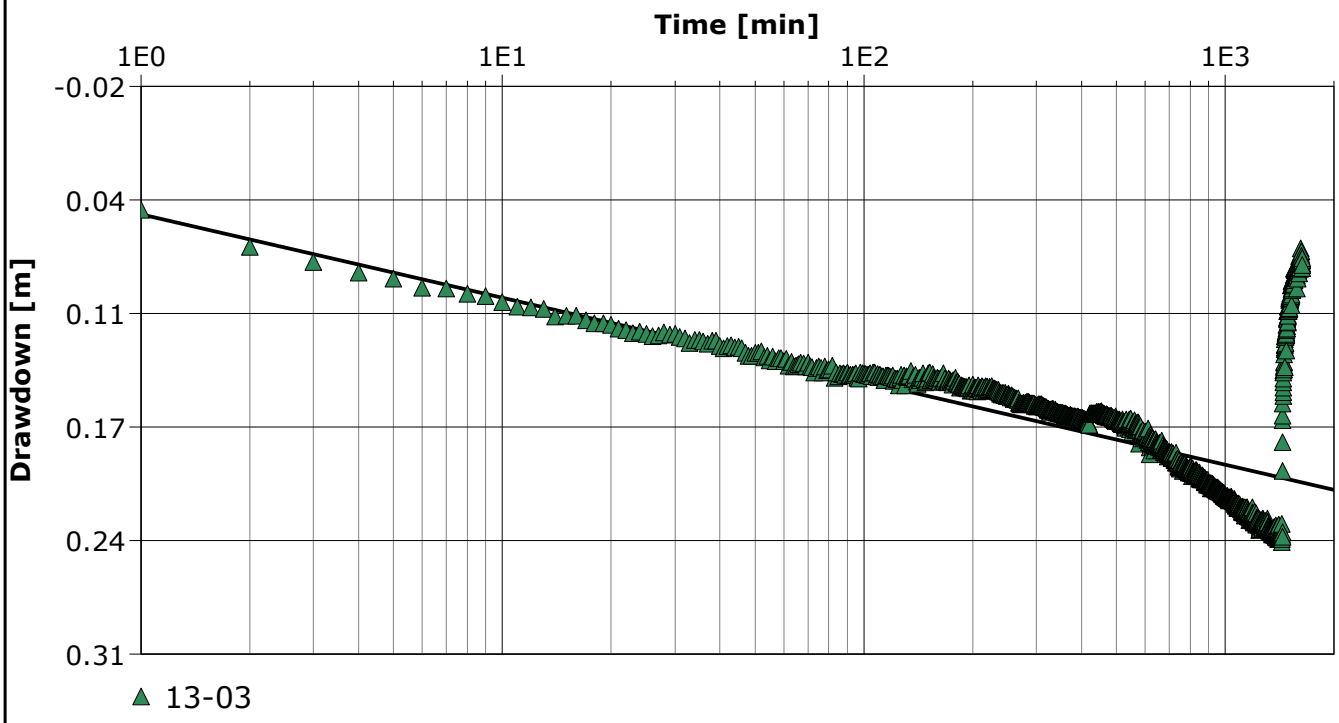


Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-01	1.75×10^{3}	2.35×10^{1}	1.49×10^{-4}	25.34	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-03 Cooper Jacob	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

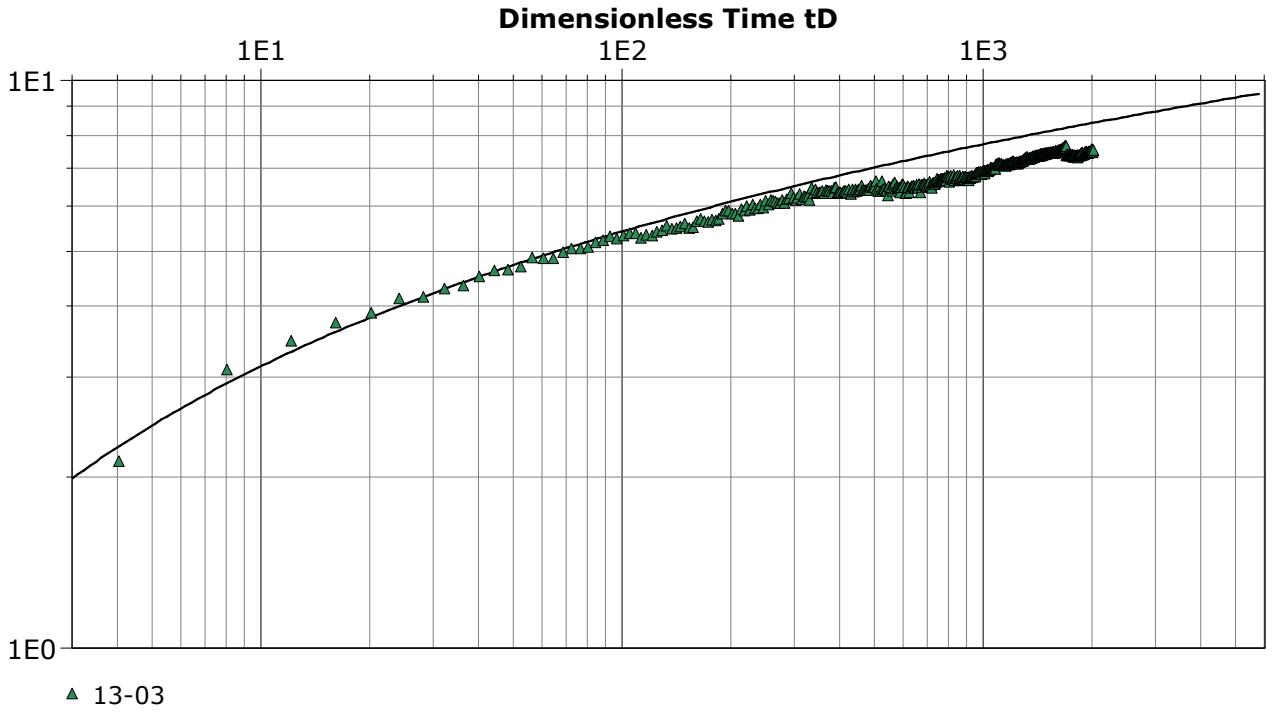


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-03	2.03×10^{3}	2.72×10^{1}	1.42×10^{-4}	44.91	

WaterMark CONSULTING LTD.	**Pumping Test Analysis Report**
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-03 Theis	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

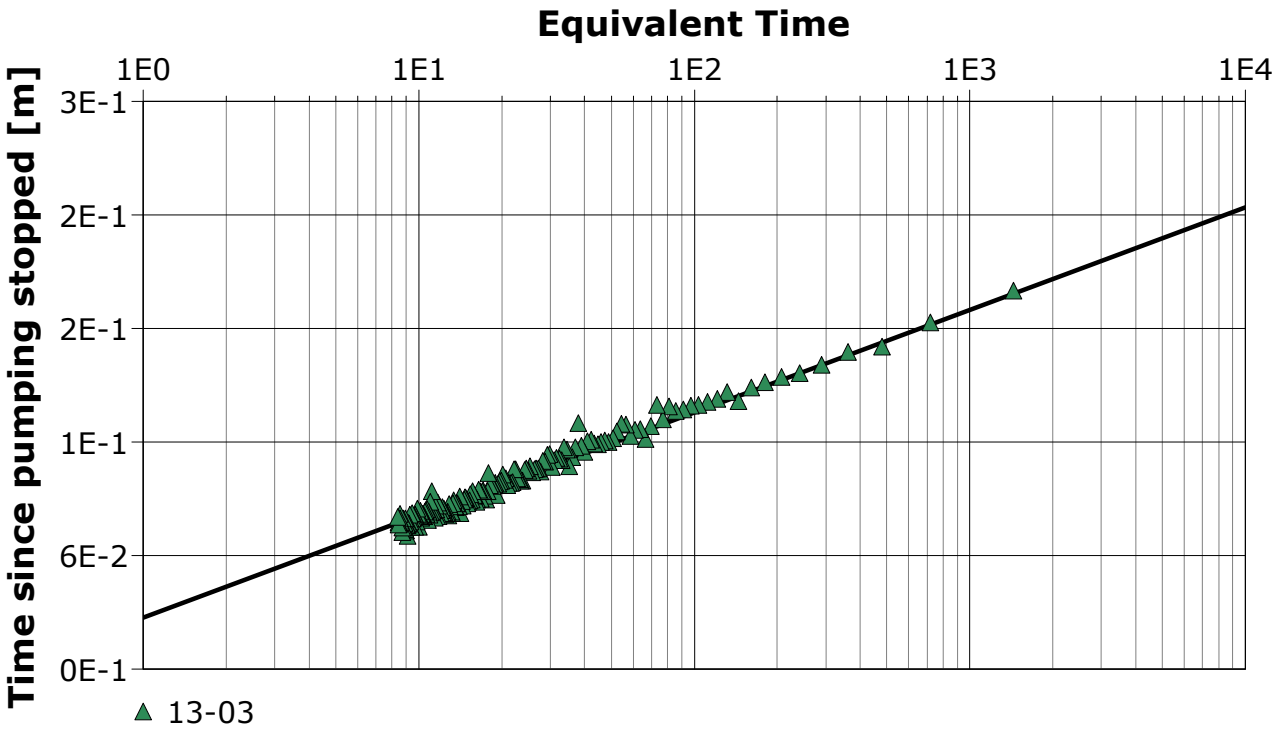


Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Ratio K(v)/K(h)	Radial Distance to PW [m]
13-03	1.90×10^{3}	2.54×10^{1}	1.62×10^{-4}	2.38×10^{-1}	44.91

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-03 Theis Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

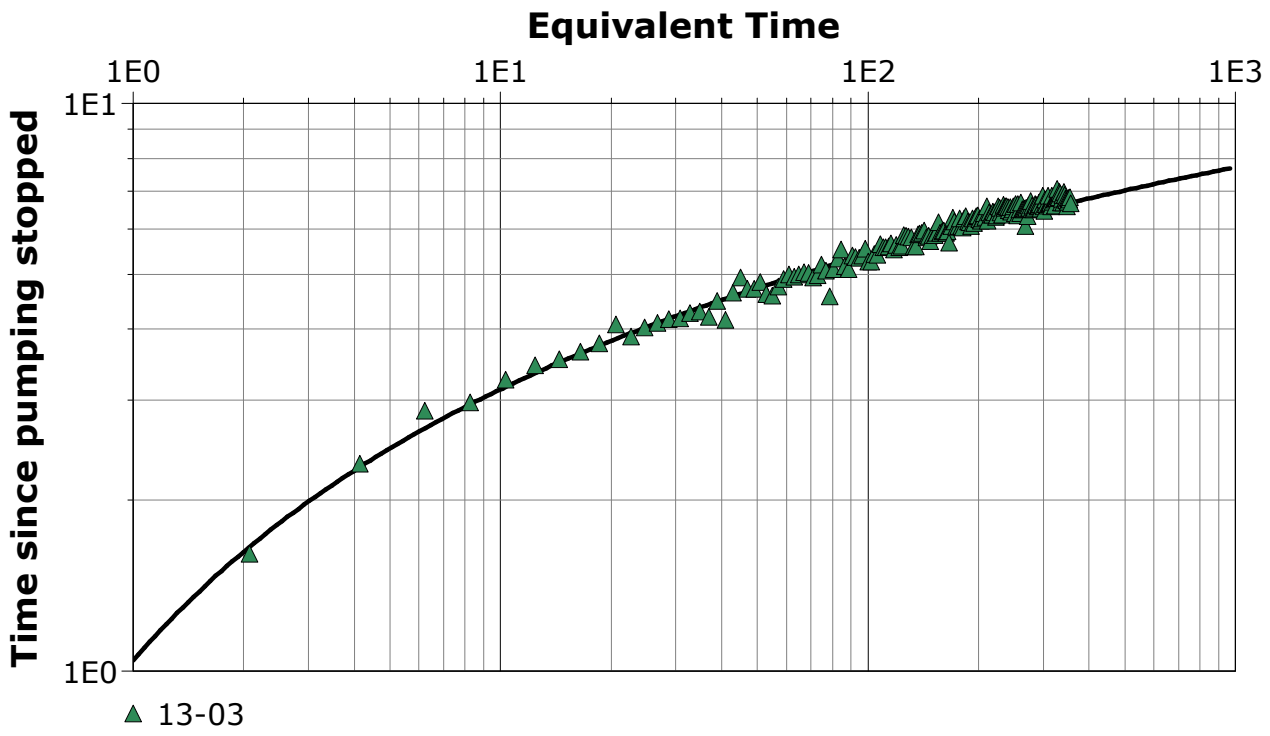


Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
13-03	1.82×10^{3}	2.44×10^{1}	44.91	

	Pumping Test Analysis Report
	Project: Hydrogeologic Investigation
	Number: WM608
	Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Analysis Performed by: RGC/CPK	13-03 Agarwal Recovery	Analysis Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	



Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
13-03	1.81×10^{3}	2.42×10^{1}	3.00×10^{-4}	44.91	

Pumping Test Analysis Report

Project: Hydrogeologic Investigation

Number: WM608

Client: SaskPower

Location:	Pumping Test: 13-02 Pumping Test	Pumping Well: 13-02
Test Conducted by:		Test Date: 2022-09-12
Aquifer Thickness: 74.70 m	Discharge: variable, average rate 82.242 [U.K. gal/min]	

	Analysis Name	Analysis Performed b	Analysis Date	Method name	Well	T [m²/d]	K [m/d]	S
1	13-02 Cooper Jacob	RGC/CPK	2022-09-12	Cooper & Jacob I	13-02	3.10×10^{2}	4.15×10^{0}	
2	13-02 Theis Recovery	RGC/CPK	2022-09-12	Theis Recovery	13-02	1.73×10^{3}	2.31×10^{1}	
3	13-01 Cooper Jacob	RGC/CPK	2022-09-12	Cooper & Jacob I	13-01	2.16×10^{3}	2.89×10^{1}	1.31×10^{-4}
4	13-01 Theis	RGC/CPK	2022-09-12	Theis	13-01	1.60×10^{3}	2.14×10^{1}	4.36×10^{-4}
5	13-01 Theis Recovery	RGC/CPK	2022-09-12	Theis Recovery	13-01	1.68×10^{3}	2.25×10^{1}	
6	13-01 Agarwal Recov	RGC/CPK	2022-09-12	AGARWAL + Theis	13-01	1.75×10^{3}	2.35×10^{1}	1.49×10^{-4}
7	13-03 Cooper Jacob	RGC/CPK	2022-09-12	Cooper & Jacob I	13-03	2.03×10^{3}	2.72×10^{1}	1.42×10^{-4}
8	13-03 Theis	RGC/CPK	2022-09-12	Theis	13-03	1.90×10^{3}	2.54×10^{1}	1.62×10^{-4}
9	13-03 Theis Recovery	RGC/CPK	2022-09-12	Theis Recovery	13-03	1.82×10^{3}	2.44×10^{1}	
10	13-03 Agarwal Recov	RGC/CPK	2022-09-12	AGARWAL + Theis	13-03	1.81×10^{3}	2.42×10^{1}	3.00×10^{-4}
					Average	1.68×10^{3}	2.25×10^{1}	2.20×10^{-4}

APPENDIX C

Certified Laboratory Testing Results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **RG2201224**	Page	: 1 of 5
Client	: **Watermark Consulting Ltd.**	Laboratory	: Regina - Environmental
Contact	: RORY COPITHORN	Account Manager	: Kimberley Head
Address	: 1601 MCARA STREET Regina SK Canada S4N 6H4	Address	: 1119 Osler Street Regina SK Canada S4R 8N5
Telephone	: (306)565-0091	Telephone	: +1 306 525 0970
Project	: WM608	Date Samples Received	: 09-Sep-2022 09:44
PO	: ----	Date Analysis Commenced	: 10-Sep-2022
C-O-C number	: ----	Issue Date	: 15-Sep-2022 16:12
Sampler	: ----		
Site	: NW 36-33-24 W2M		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Quality Systems Coordinator	Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Justin Jackson		Metals, Saskatoon, Saskatchewan
Lee McTavish		Inorganics, Winnipeg, Manitoba
Ruth Islas	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
TPT Nguyen	Laboratory Analyst	Metals, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
%	percent
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	*Comment*
RG2201224-002	13-02	**Sample(s) 001: Exceeded Recommended Holding Time prior to receipt at the lab.**

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: 13-01	13-02	----	----	----
					Client sampling date / time: 06-Sep-2022 20:30	08-Sep-2022 12:30	----	----	----
					RG2201224-001	RG2201224-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	406	400	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	948	975	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L	12.0	14.6	----	----	----
conductivity	----	E100	2.0	µS/cm	3900	3900	----	----	----
pH	----	E108	0.10	pH units	7.82	7.88	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	496	488	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	406	400	----	----	----
solids, total dissolved [TDS], calculated	----	EC103	1.0	mg/L	3080	3030	----	----	----
Anions and Nutrients									
silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	21.7	22.7	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	119	110	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.400 DLDS	<0.400 DLDS	----	----	----
nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.400 DLDS	<0.400 DLDS	----	----	----
nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.200 DLDS	<0.200 DLDS	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	1710	1690	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0500	mg/L	<0.447	<0.447	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	47.1	46.3	----	----	----
cation sum	----	EC101	0.10	meq/L	47.7	47.2	----	----	----
ion balance (APHA)	----	EC101	0.010	%	0.633	0.962	----	----	----
ion balance (cations/anions)	----	EC101	0.010	%	101	102	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0050 DLDS	<0.0050 DLDS	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00050 DLDS	<0.00050 DLDS	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00801	0.00762	----	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	13-01	13-02	----	----	----
					Client sampling date / time	06-Sep-2022 20:30	08-Sep-2022 12:30	----	----	----
						RG2201224-001	RG2201224-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00562	0.00589	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000100 DLDS	<0.000100 DLDS	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.741	0.704	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000250 DLDS	<0.0000250 DLDS	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		200	209	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		4.43	4.20	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.228	0.209	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		109	110	----	----	----
manganese, dissolved	7439-96-5	E421	0.00500	mg/L		0.160	0.160	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00741	0.00720	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		9.60	9.69	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00427	0.00393	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000250 DLDS	<0.000250 DLDS	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		11.5	11.3	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS, DLM	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		652	627	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		1.58	1.58	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		646	636	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000050 DLDS	<0.000050 DLDS	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)					Client sample ID	**13-01**	**13-02**	**----**	**----**	**----**
					Client sampling date / time	06-Sep-2022 20:30	08-Sep-2022 12:30	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**RG2201224-001**	**RG2201224-002**	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00150 DLDS	<0.00150 DLDS	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00050 DLDS	<0.00050 DLDS	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000327	0.000348	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00250 DLDS	<0.00250 DLDS	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00100 DLDS	<0.00100 DLDS	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **RG2201224**	Page	: 1 of 10
Client	: **Watermark Consulting Ltd.**	Laboratory	: Regina - Environmental
Contact	: RORY COPITHORN	Account Manager	: Kimberley Head
Address	: 1601 MCARA STREET Regina SK Canada S4N 6H4	Address	: 1119 Osler Street Regina, Saskatchewan Canada S4R 8N5
Telephone	: (306)565-0091	Telephone	: +1 306 525 0970
Project	: WM608	Date Samples Received	: 09-Sep-2022 09:44
PO	: ----	Issue Date	: 15-Sep-2022 16:13
C-O-C number	: ----		
Sampler	: ----		
Site	: NW 36-33-24 W2M		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Anions and Nutrients	RG2201224-002	13-02	fluoride	16984-48-8	E235.F	68.3 % K	75.0-125%	Recovery less than lower data quality objective
Dissolved Metals	RG2201224-002	13-02	silver, dissolved	7440-22-4	E421	63.4 % MS-Ag	70.0-130%	Recovery less than lower data quality objective

Result Qualifiers

Qualifier	*Description*
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*
MS-Ag	*MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE										
13-02	E235.Cl	08-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
13-01	E235.Cl	06-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
13-02	E235.F	08-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
13-01	E235.F	06-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE										
13-02	E235.NO3	08-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE										
13-01	E235.NO3	06-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	3 days	4 days	×
Anions and Nutrients : Nitrite in Water by IC										
HDPE										
13-02	E235.NO2	08-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC										
HDPE										
13-01	E235.NO2	06-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	3 days	4 days	×
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
13-02	E392	08-Sep-2022	----	----	----		14-Sep-2022	28 days	6 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE										
13-01	E392	06-Sep-2022	----	----	----		14-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
13-02	E235.SO4	08-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
13-01	E235.SO4	06-Sep-2022	10-Sep-2022	----	----		10-Sep-2022	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
13-02	E509	08-Sep-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	5 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid)										
13-01	E509	06-Sep-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
13-02	E421	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
13-01	E421	06-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	180 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
13-02	E290	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
13-01	E290	06-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE										
13-02	E100	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE										
13-01	E100	06-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	28 days	6 days	✓
Physical Tests : pH by Meter										
HDPE										
13-01	E108	06-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
13-02	E108	08-Sep-2022	12-Sep-2022	----	----		12-Sep-2022	0.25 hrs	0.26 hrs	× EHTR-FM
Physical Tests : TSS by Gravimetry										
HDPE										
13-02	E160	08-Sep-2022	----	----	----		12-Sep-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
13-01	E160	06-Sep-2022	----	----	----		12-Sep-2022	7 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	641230	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	641180	1	20	5.0	5.0	✓
Conductivity in Water	E100	641229	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	644576	1	6	16.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	642520	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	641177	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	641178	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	641181	1	20	5.0	5.0	✓
pH by Meter	E108	641228	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	646649	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	641179	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	642954	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	641230	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	641180	1	20	5.0	5.0	✓
Conductivity in Water	E100	641229	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	644576	1	6	16.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	642520	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	641177	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	641178	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	641181	1	20	5.0	5.0	✓
pH by Meter	E108	641228	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	646649	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	641179	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	642954	1	8	12.5	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	641230	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	641180	1	20	5.0	5.0	✓
Conductivity in Water	E100	641229	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	644576	1	6	16.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	642520	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	641177	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	641178	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	641181	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	646649	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	641179	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	642954	1	8	12.5	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	641180	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	644576	1	6	16.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	642520	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	641177	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	641178	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	641181	1	20	5.0	5.0	✓
Reactive Silica by Colourimetry	E392	646649	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	641179	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Saskatoon - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Saskatoon - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Saskatoon - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Saskatoon - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Saskatoon - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 Saskatoon - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 Saskatoon - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Saskatoon - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Saskatoon - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Reactive Silica by Colourimetry	E392 Winnipeg - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Saskatoon - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Mercury in Water by CVAAS	E509 Saskatoon - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Saskatoon - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Saskatoon - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 Saskatoon - Environmental	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Saskatoon - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Saskatoon - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509 Saskatoon - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **RG2201224**	Page	: 1 of 10
Client	: Watermark Consulting Ltd.	Laboratory	: Regina - Environmental
Contact	: RORY COPITHORN	Account Manager	: Kimberley Head
Address	: 1601 MCARA STREET Regina SK Canada S4N 6H4	Address	: 1119 Osler Street Regina, Saskatchewan Canada S4R 8N5
Telephone	: (306)565-0091	Telephone	: +1 306 525 0970
Project	: WM608	Date Samples Received	: 09-Sep-2022 09:44
PO	: ----	Date Analysis Commenced	: 10-Sep-2022
C-O-C number	: ----	Issue Date	: 15-Sep-2022 16:13
Sampler	: ----		
Site	: NW 36-33-24 W2M		
Quote number	: ----		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Quality Systems Coordinator	Saskatoon Inorganics, Saskatoon, Saskatchewan
Colby Bingham	Quality Systems Coordinator	Saskatoon Metals, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
Justin Jackson		Saskatoon Metals, Saskatoon, Saskatchewan
Lee McTavish		Winnipeg Inorganics, Winnipeg, Manitoba
Ruth Islas	Laboratory Assistant	Saskatoon Inorganics, Saskatoon, Saskatchewan
TPT Nguyen	Laboratory Analyst	Saskatoon Metals, Saskatoon, Saskatchewan

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 641228)											
RG2201224-001	13-01	pH	----	E108	0.10	pH units	7.82	7.84	0.212%	3%	----
Physical Tests (QC Lot: 641229)											
RG2201224-001	13-01	conductivity	----	E100	2.0	µS/cm	3900	3880	0.514%	10%	----
Physical Tests (QC Lot: 641230)											
RG2201224-001	13-01	alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	406	400	1.62%	20%	----
Physical Tests (QC Lot: 642954)											
RG2201224-001	13-01	solids, total suspended [TSS]	----	E160	3.0	mg/L	12.0	11.0	1.0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641177)											
RG2201224-001	13-01	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641178)											
RG2201224-001	13-01	nitrate (as N)	14797-55-8	E235.NO3	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 641179)											
RG2201224-001	13-01	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	1710	1720	1.04%	20%	----
Anions and Nutrients (QC Lot: 641180)											
RG2201224-001	13-01	chloride	16887-00-6	E235.Cl	10.0	mg/L	119	119	0.483%	20%	----
Anions and Nutrients (QC Lot: 641181)											
RG2201224-001	13-01	nitrite (as N)	14797-65-0	E235.NO2	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 646649)											
RG2201224-001	13-01	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	21.7	21.7	0.00614%	20%	----
Dissolved Metals (QC Lot: 642520)											
RG2201224-001	13-01	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00050	mg/L	0.00801	0.00768	4.15%	20%	----
		barium, dissolved	7440-39-3	E421	0.00050	mg/L	0.00562	0.00578	2.89%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.050	mg/L	0.741	0.751	1.43%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000250	mg/L	<0.0000250	<0.0000250	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.250	mg/L	200	207	3.50%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 642520) - continued											
RG2201224-001	13-01	chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.050	mg/L	4.43	4.26	3.98%	20%	----
		lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0050	mg/L	0.228	0.225	1.36%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0250	mg/L	109	108	1.21%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00500	mg/L	0.160	0.158	1.44%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000250	mg/L	0.00741	0.00764	3.16%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.250	mg/L	9.60	9.47	1.41%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00100	mg/L	0.00427	0.00386	0.00041	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.250	mg/L	11.5	11.8	3.34%	20%	----
		silver, dissolved	7440-22-4	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.250	mg/L	652	652	0.0596%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00100	mg/L	1.58	1.59	1.13%	20%	----
		sulfur, dissolved	7704-34-9	E421	2.50	mg/L	646	678	4.76%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000050	mg/L	0.000327	0.000342	0.000015	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00250	mg/L	<0.00250	<0.00250	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 644576)											
RG2201224-001	13-01	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 641229)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 641230)						
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 642954)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 641177)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 641178)						
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 641179)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 641180)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 641181)						
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 646649)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Dissolved Metals (QCLot: 642520)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 642520) - continued						
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 644576)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 641228)									
pH	----	E108	----	pH units	6.86 pH units	100	98.0	102	----
Physical Tests (QCLot: 641229)									
conductivity	----	E100	1	µS/cm	1000 µS/cm	98.6	90.0	110	----
Physical Tests (QCLot: 641230)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	237 mg/L	106	85.0	115	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.1	85.0	115	----
Physical Tests (QCLot: 642954)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	110	85.0	115	----
Anions and Nutrients (QCLot: 641177)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	92.4	90.0	110	----
Anions and Nutrients (QCLot: 641178)									
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	94.2	90.0	110	----
Anions and Nutrients (QCLot: 641179)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	95.2	90.0	110	----
Anions and Nutrients (QCLot: 641180)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	92.0	90.0	110	----
Anions and Nutrients (QCLot: 641181)									
nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	92.1	90.0	110	----
Anions and Nutrients (QCLot: 646649)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	103	85.0	115	----
Dissolved Metals (QCLot: 642520)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.0	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	112	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 642520) - continued									
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	119	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	109	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.4	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.6	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.5	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.9	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	96.2	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	99.7	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	109	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	106	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	107	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	100	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	105	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 641177)										
RG2201224-002	13-02	fluoride	16984-48-8	E235.F	0.683 mg/L	1 mg/L	68.3	75.0	125	K
Anions and Nutrients (QCLot: 641178)										
RG2201224-002	13-02	nitrate (as N)	14797-55-8	E235.NO3	2.41 mg/L	2.5 mg/L	96.5	75.0	125	----
Anions and Nutrients (QCLot: 641179)										
RG2201224-002	13-02	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 641180)										
RG2201224-002	13-02	chloride	16887-00-6	E235.Cl	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 641181)										
RG2201224-002	13-02	nitrite (as N)	14797-65-0	E235.NO2	0.454 mg/L	0.5 mg/L	90.9	75.0	125	----
Anions and Nutrients (QCLot: 646649)										
RG2201224-002	13-02	silicate (as SiO2)	7631-86-9	E392	ND mg/L	0.1 mg/L	ND	75.0	125	----
Dissolved Metals (QCLot: 642520)										
RG2201224-002	13-02	aluminum, dissolved	7429-90-5	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 642520) - continued										
RG2201224-002	13-02	nickel, dissolved	7440-02-0	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.5 mg/L	10 mg/L	105	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00254 mg/L	0.004 mg/L	63.4	70.0	130	MS-Ag
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00421 mg/L	0.004 mg/L	105	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.391 mg/L	0.4 mg/L	97.8	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 644576)										
RG2201224-002	13-02	mercury, dissolved	7439-97-6	E509	0.0000869 mg/L	0.0001 mg/L	86.9	70.0	130	----

Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*
MS-Ag	*MS-Ag: Matrix Spike recovery for silver was marginally below DQO (40 to <60%) due to its instability in the sample matrix. Silver was not detected. Reported result (< LOR) is reliable*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number:

Pag

Environmental Division
Regina
Work Order Reference
RG2201224

Telephone : +1 306 525 0970

Report To	Contact and company name below will appear on the final report
Company:	Watermark Consulting Ltd.
Contact:	Rory Copithorn
Phone:	306-533-4761
	Company address below will appear on the final report
Street:	1601 McAra St
City/Province:	Regina, SK
Postal Code:	S4N 64H

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rcopithorn@watermarkconsulting.net
Email 2	ckorchinski@watermarkconsulting.net
Email 3	

Select Service Level Below - Contact your AM t

Regular [R] ☑ Standard TAT if received by 3 p

PRIORITY (Business Days): 4 day [P4-20%] ☑✓ | 3 day [P3-25%] ☑ | 2 day [P2-50%] ☐

EMERGENCY: 1 Busines | Same Day | (Laborato

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level s

Analysis

Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	rcopithorn@watermarkconsulting.net
Email 2	dtratch@watermarkconsulting.net

Project Information	
ALS Account # / Quote #:	
Job #:	WM608
PO / AFE:	
LSD:	NW-36-33-24-W2M

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):	ALS Contact:	Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Routine Chemistry	Dissolved Metals	Phenol Alkalinity	Reactive Silica	TSS	Bicarbonate Alkalinity	SAMPLES ON HOI	SUSPECTED HAZARD (see Special Instructions)
	13-01	06-09-22	20:30	Ground water	5	R	R	R	R	R	R		
	13-02	08-09-22	12:30	Ground water	5	R	R	R	R	R	R		

Indicate Filtered (F), Preserved (P) or Filtere

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
1.0							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Cadre Paige-Yurchinsky	Date: 10-09-22	Time:	Received by: P.Williams	Date: 9 Sep 22	Time: 940	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX D

Modified Moell Method Safe Yield Calculator

van der Kamp and Maathuis Method (Modified Moell Method)

Equation B.2:

$$Q_{20} = \frac{S_f * H_A * Q}{s_{100\min} + \left(s_{20yrs} - s_{100\min}\right)_{theo}}$$

Definitions:

Q_{20} = 20 year safe pumping rate for the well (m^3/day)

T = Transmissivity (m^2/day)

S_f = Safety factor = 0.7 (no units)

H_A = Available head (m)

Q = Pumping rate used during the pumping test (m^3/day)

S_{100min} = Drawdown observed in well during the pumping test at 100 minutes (m)

$(S_{20yrs} - S_{100min})_{theor}$ = The theoretical drawdown in the well after 20 years of pumping minus the theoretical drawdown in the well at 100 minutes, based on the most appropriate theoretical equation for the aquifer, e.g., Theis, Hantush, etc. (m)

*available head in confined aquifer = distance between non-pumping water level and top of aquifer

Input data:

Q (m^3/day) =	306.24	S_{100}min (m) =	36.19	S20 = 38.27
H_A (m) =	100	$(S_{20yrs} - S_{100min})_{theor}$ (m) =	2.08	

Results:

Q_{20} (m^3/day) =	560.15	Q_{20} (m^3/hr) =	23.34
Q_{20} (L/min) =	388.99	Q_{20} (Igpm) =	85.57

Notes:

a. This workbook calculates a 20-year safe pumping rate for a well using the method described in: van der Kamp, G. and H. Maathuis. 2005. The applicability of Q20 methods for determining sustainable groundwater yields. In Proceedings of the 58th Canadian Geotechnical and 7th Joint IAH-CNC and CGS Groundwater Specialty Conference. Saskatoon, SK, Canada.

b. Values in the colour shaded cells can be updated by the user; all other cells are protected.

van der Kamp and Maathuis Method (Modified Moell Method)

Equation B.2:

$$Q_{20} = \frac{S_f * H_A * Q}{s_{100\min} + \left(s_{20yrs} - s_{100\min}\right)_{theo}}$$

Definitions:

Q_{20} = 20 year safe pumping rate for the well (m^3/day)

T = Transmissivity (m^2/day)

S_f = Safety factor = 0.7 (no units)

H_A = Available head (m)

Q = Pumping rate used during the pumping test (m^3/day)

S_{100min} = Drawdown observed in well during the pumping test at 100 minutes (m)

$(S_{20yrs} - S_{100min})_{theor}$ = The theoretical drawdown in the well after 20 years of pumping minus the theoretical drawdown in the well at 100 minutes, based on the most appropriate theoretical equation for the aquifer, e.g., Theis, Hantush, etc. (m)

*available head in confined aquifer = distance between non-pumping water level and top of aquifer

Input data:

Q (m^3/day) =	537	S_{100}min (m) =	12.25	S20 = 14
H_A (m) =	100	$(S_{20yrs} - S_{100min})_{theor}$ (m) =	1.75	

Results:

Q_{20} (m^3/day) =	2685.00	Q_{20} (m^3/hr) =	111.88
Q_{20} (L/min) =	1864.58	Q_{20} (Igpm) =	410.15

Notes:

a. This workbook calculates a 20-year safe pumping rate for a well using the method described in: van der Kamp, G. and H. Maathuis. 2005. The applicability of Q20 methods for determining sustainable groundwater yields. In Proceedings of the 58th Canadian Geotechnical and 7th Joint IAH-CNC and CGS Groundwater Specialty Conference. Saskatoon, SK, Canada.

b. Values in the colour shaded cells can be updated by the user; all other cells are protected.

Appendix F Land Title and Rural Municipality Maps

F.1 Land Title

Province of Saskatchewan
Land Titles Registry
Title

Title #: 144440467
Title Status: Active
Parcel Type: Surface
Parcel Value: $90,000.00 CAD
Title Value: *$90,000.00 CAD*
Converted Title: 73S10799
Previous Title and/or Abstract #: 112495170

As of: 17 Oct 2022 11:10:15
Last Amendment Date: 30 Dec 2015 16:10:47.473
Issued: 05 Dec 2013 08:36:10.906

Municipality: RM OF USBORNE NO. 310

SASKATCHEWAN POWER CORPORATION is the registered owner of Surface Parcel #119232929

Reference Land Description: NW Sec 36 Twp 33 Rge 24 W 2 Extension 0
As described on Certificate of Title 73S10799.

This title is subject to any registered interests set out below and the exceptions, reservations and interests mentioned in section 14 of *The Land Titles Act, 2000.*

Registered Interests:

Interest #:
165080246

CNV Pipeline Easement

Value: N/A
Reg'd: 23 May 1968 01:53:31
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
TRANSGAS LIMITED
700 - 1777 Victoria Ave
Regina, Saskatchewan, Canada S4P 4K5
Client #: 105200985

Int. Register #: 104718001
Converted Instrument #: 68S10971
Feature #: 100065619

Interest #:
167429526

TransGas Easement - SaskEnergy Act (s.19)

Value: N/A
Reg'd: 09 Jun 2014 08:27:13
Interest Register Amendment Date: 30 Dec 2015 16:10:47
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

See Plan of Survey for Gas Pipeline Right of Way on Plan 102200487

Holder:
TRANSGAS LIMITED
700 - 1777 Victoria Ave
Regina, Saskatchewan, Canada S4P 4K5
Client #: 105200985

Int. Register #: 120072978

Interest #:
169026992

Water Security Agency Act Notice (s.64)

Value: N/A
Reg'd: 20 Oct 2014 08:27:43
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
WATER SECURITY AGENCY
101 - 111 Fairford Street East
Moose Jaw, Saskatchewan, Canada S6H 7X9
Client #: 100005174

Int. Register #: 120404764

Addresses for Service:

Name	Address
Owner:	

SASKATCHEWAN POWER CORPORATION 2025 VICTORIA AVE REGINA, SK, Canada S4P 0S1
Client #: 100307618

Notes:

Parcel Class Code: Parcel (Generic)

Back

Back to top

F.2 Rural Municipality of Usborne

RURAL MUNICIPALITY OF USBORNE No. 310

WEST OF 2nd MERIDIAN

Box 310
Lanigan, SK.
S0K 2M0
Ph: 306-365-2924
Fax: 306-365-2129
email: rm310@sasktel.net

Reeve: Jack Gibney
Div. 1: Ryan Morningstar
Div. 2: Darren Carlson
Div. 3: Howard Toews
Div. 4: Lance Gunther
Div. 5: Fred Toman
Div. 6: Don Shantz
Administrator: Anna Wright

Emergency Numbers
CP Emergency: 1-800-716-9132
CN Emergency: 1-800-465-9239
Controlled Burn:1-866-404-4911

Rge. 24 | Rge. 23 | Rge. 22

Twp. 33 | Twp. 32 | Twp. 31

Twp Rd 340 | Twp Rd 335 | Twp Rd 334 | Twp Rd 333 | Twp Rd 332 | Twp Rd 331 | Twp Rd 330 | Twp Rd 325 | Twp Rd 324 | Twp Rd 323 | Twp Rd 322 | Twp Rd 321 | Twp Rd 320 | Twp Rd 315 | Twp Rd 314 | Twp Rd 313 | Twp Rd 312 | Twp Rd 311 | Twp Rd 310

Rge Rd 2250 | Rge Rd 2245 | Rge Rd 2244 | Rge Rd 2243 | Rge Rd 2242 | Rge Rd 2241 | Rge Rd 2240 | Rge Rd 2235 | Rge Rd 2234 | Rge Rd 2233 | Rge Rd 2232 | Rge Rd 2231 | Rge Rd 2230 | Rge Rd 2225 | Rge Rd 2224 | Rge Rd 2223 | Rge Rd 2222 | Rge Rd 2221 | Rge Rd 2220

Rge. 24 | Rge. 23 | Rge. 22

0 5 Kilometers

Watrous Fire 911 | Lanigan Fire 911 | Drake Fire 911

Usborne Grazing Alliance

P.C.S. Mine Site

GUERNSEY | LANIGAN | DRAKE | LOCKWOOD

Little Manitou Lake | Boulder Lake

Dollwood Brook | Dollwood Meadow Brook | Langham Creek

Legend

- Highway
- Primary Grid Road - Paved
- Primary Grid Road - Gravel
- Grid Road
- Main Farm Access Road
- Gravel Road
- Other Road
- Trail
- Fire Boundary
- Division Boundary
- Railway
- Watercourse
- Waterbody
- Vegetation
- Occupied Residence
- Vacant Residence
- Airport
- Cemetery
- Gravel Pit
- Communication Tower
- Waste Disposal Site
- Community Well
- Bridge
- Culvert
- Urban Area
- Crown Land

Residence Listing

Owner_Name	Legal_Description
ANTYPOVICH, John & Shani	SW-2-33-22
BAKER, Allan & Teresa	NE-30-33-23
BANKS, Alan & Nichola	NW-30-31-22
BARTEL, Bryce & Rachel	NE-28-32-22
BARTEL, Chester	SE-9-32-23
BARTEL, Doug	SE-22-32-22
BARTEL, Floyd & Carolyn	NW-4-32-23
BARTEL, Ivan & Irene	NW-8-32-22
BARTEL, James & Kristen	NW-21-32-22
BARTEL, John & Denise	SW-36-32-23
BARTEL, Ken & June	NE-3-33-22
BARTEL, Lorne & Maureen	NW-9-32-22
BARTEL, Quinton & Joanne	NW-17-32-22
BARTEL, Shawn & Allison	SE-25-31-23
BAUMANN, James & Ruth	SW-13-32-23
BERGEN, Allan & Sherilynn	SW-13-32-23
BERGEN, Blake & Lindsay	NW-35-32-22
BERGEN, Ed & Joanne	NW-13-32-22
BERGEN, Henry & Beatrice	NE-35-32-22
BERGEN, Victor & Christine	SE-23-32-22
BERGEN, William	NW-35-32-22
BERGSVEINSON, Shannon, Donn & Maureen	SW-18-31-24
BERNAUER, Alois	SE-34-33-22
BLAIR, Nolan	NE-24-32-23
BLAIR, Scott & Calla	SW-23-32-23
BOEHR, Dan & Kornelia	NW-9-32-24
BOISVERT, Shawn & Dian	NW-26-32-24
BOWMAN, Bruce & Brenda	NW-32-32-23
BOWMAN, Walter & Beatrice	SE-23-33-24
BRAUN, Warren & Corinne	SW-36-31-22
BROADFOOT, Andy & Irena	SW-16-32-24
BURNETT, Howard	NW-35-32-24
BUZTYNSKI, Keith & Susan	SW-28-32-24
CAREY, Allan & Darlene	NE-33-33-23
CARLSON, Garnet & Laurie	NE-3-31-24
CARROLL, Maurice	SW-16-32-22
CHISHOLM, Donald & KARDASH, Kim	SE-9-33-22
CLARK, Leann	NE-7-33-23
COOPER, James & Rhonda	NW-21-32-24
DAIGLE, Michel	NW-31-32-23
DENEIKO, Laurie & Sharlene	SW-4-32-24
DICK, Robert	SE-3-33-24
DICK, Rod & Holly	NW-5-33-23
DICK, Wayne & Janice	NE-12-33-24
DIEHL, Andrew & Susan	NW-15-32-24
DUMANSKI, Jason & Lindsay	NE-4-31-22
DUMANSKI, Ken & Judy	NE-4-31-22
EBY, Curtis & Audrey	NW-10-32-23
EPP, Wesley & Lorraine	NE-11-32-22
EVENSON, Brodie & Erin	NE-2-33-24
EWERT, Charles & Amy	NW-18-32-22
EWERT, D. James	SE-10-32-23
EWERT, Joel & Lois	SE-19-32-22
FAILLER, Curtis & Kim	SW-35-33-22
FAILLER, Dustyn & Jayline	NW-14-33-22
FAILLER, Greg & Connie	NW-14-33-22
FISHER, Jerome & Beth	NW-26-33-23
FRASS, Keith & Lorraine	NW-27-33-22
FRANCIS, Craig & Rhonda	NE-18-33-23
Freshwater Farms Ltd.	SW-9-32-24
FREY, Murray & Lori Ann	NE-6-33-24
FRIESEN, Herb & Donna	SE-31-31-22
FRIESEN, Ken & Betty	SE-6-32-22
FUNK, Ben	SW-18-33-22
GERBRANDT, Reginald	NE-8-31-22
GIBNEY, Jack & Ruth	SE-24-32-23
GIBNEY, Sean	SE-14-32-23
Grazing Alliance Residence	NE-13-31-24
GUENTHER, Brian & Cheryl	SW-3-33-22
GUNTHER, Lance & Darlene	NE-28-32-22
GUNTHER, Shawn	NE-15-33-22
HAEUSLER, Bradley & Nicole	SW-10-33-22
HEIN, James & Rhoda	NE-33-33-23
HELSTROM, Mark & Laura	NE-15-33-22
HUCULAK, Krystal	NE-13-33-24
HUGHES, Estate	NW-15-32-22
HUMMOCK SPRINGS	SW-32-31-24
HURLEY, Brian	SE-13-31-22
ISBISTER, James & Patty	NE-12-32-23

Owner_Name	Legal_Description
JOHNSON, Charles	NW-17-31-24
KARN, Hazel	NW-35-32-24
KISS, Ivan	SE-4-32-24
KLASSEN, Jeff	SW-22-31-23
KLASSEN, Rick	NE-6-33-23
KLASSEN, Woody	NE-8-31-23
KRAUSE, Michael & Amy	NW-32-24
KYRYCHENKO, Vladimir	NW-5-31-22
LAMONT, Carter & Rebecca	SE-32-33-22
LASKOWSKI, Dan & Esther	SW-36-31-23
LASKOWSKI, Emery & Joyce	SW-20-32-22
LEHR, Steven & Tami-Lynn	NW-32-31-22
L'HEUREUX, Gladys	NE-13-33-22
MACKENZIE, Robin	SE-6-31-22
MAFFENBEIER, Mike & Constance	NW-14-33-23
MANN, Darrell	SE-25-33-22
MANN, Doreen	NE-24-33-22
MARTELL, Devon	SE-18-33-23
MARTELL, Greg	SW-30-33-23
MARTENS BARTEL, Ben & Lisa	SW-36-32-23
MAU, Christiaan & Lorraine	NE-1-33-24
MCWILLIE Farms	NW-19-33-24
MEHLMANN, Sergej & Alla	SE-3-33-24
MERRIFIELD, Gerald	NW-19-31-24
MORNINGSTAR, Larry & Dorina	NE-16-31-22
MORNINGSTAR, Ryan & Lisa	NE-16-31-22
MORROW, Clint & Lanette	NW-28-33-22
MORROW, John & Martha	SE-21-33-22
MORROW, Lane	SE-34-33-22
MORROW, Roley & Karen	SE-21-33-22
MULLET, Wendell & Joyce	NE-2-33-24
NEUFELD, Duane & Kristy	SW-22-32-22
NUNAN, Renee	NW-34-33-22
Nutrien Ag Solutions	SW-19-31-24
PICKERING, Craig & Norma	NW-13-33-22
PIPRELL, Cam & Sherri	SW-21-32-22
PURSHEGA, Alex	NE-21-32-23
PURSHEGA, Doug & Laura	SE-34-33-23
RHODE, Thomas & Heike	NW-19-33-23
ROBITAILLE, Johanie	NW-34-32-24
SCHELLENBERG, Ben & Veronica	SE-7-32-24
SCHMIDT, Kelly & Paula	SE-35-31-23
SCHMIDT, Linda	NW-11-32-22
SCOTT, David	NE-12-31-23
SHANTZ, Betty	SW-36-32-24
SIEGFRIED, Brent & Jennifer	SE-1-32-22
SIEMENS, Keith & Glenda	SE-35-32-24
SNIDER, Ken & Michelle	SW-7-33-23
SNIDER, Wilfred & Margaret	SW-7-33-23
SODERBERG, Eldon & Linda	NW-18-33-24
SROCHENSKI, Jeff & Holly	NW-14-33-22
STEPHAN, Linda	NE-29-33-22
STEVENSON, Patrick & Kathy	SE-33-33-22
STRONG, E. Grace	NW-12-32-22
STRONG, Morley & DOTTEN, Ellen	NE-10-32-22
SUNDQUIST, Brandon	NW-20-31-24
SUNDQUIST, Gerald	SW-1-31-24
SUNDQUIST, Glen	SW-29-31-24
SUNDQUIST, Greg & Jo-Anne	SE-3-31-24
SUNDQUIST, Murray & Denise	NW-20-31-24
THIESSEN, David & Patti	SW-30-32-23
TOEWS, Brad & Angel	NE-10-32-24
TOEWS, Devin & Laura	SE-15-33-24
TOEWS, Howard & Lucille	NW-32-31-24
TOEWS, Lester	SW-9-32-24
TOMAN, Fred & Elsie	NW-1-33-24
TOMAN, Randy & Andrea	SE-11-33-24
TOMAN, Rick & Tracy	NE-14-33-24
TREBLE, Murray & Bella	NW-18-32-24
WEBER, Dwight & Sherry	NE-24-33-24
WEBER, Jesse & Claire	SW-4-33-24
WHELER, Gordon & Kathleen	SW-7-32-24
WIEBE, Clifford & Maxine	SW-35-33-23
WIENS, Gerald & Susan	SW-17-31-22
WIENS, Riley & Bethany	NE-18-31-22
WILLEMS, Randall	NE-32-32-22
WILLMS, Philip & Cynthia	SW-20-32-24
WILTON, Garry	SW-27-31-23

Note:

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Updated November 2022

MuniSoft
Municipal Software... and More!

F.3 Rural Municipality of Wolverine

RURAL MUNICIPALITY OF WOLVERINE No. 340

PRAIRIE MAPPING INDUSTRIES LTD.
Box 40, Theodore SK SOA 4CO
Phone (306) 647-2350
Fax (306) 647-2355
EMail prairiemapping@sasktel.net
Website www.prairiemapping.ca
Specializing in G.I.S. Mapping Applications

WEST OF THE SECOND MERIDIAN

Administrator: Sandi Dunne
Box 28
Burr, Saskatchewan S0K 0T0
Phone: (306) 682-3640
Fax: (306) 682-3614
E-mail: rm340@sasktel.net
www.rmwolverine.ca

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FOR MORE DETAILED INFORMATION CONTACT THE RM OFFICE

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IMPROVEMENT ASSESSED VALUE NOT INCLUDED

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RM of Humboldt #370

RM of Viscount #341

RM of Leroy #339

RM of Usborne #310

SCALES

0 1 2 3 4 5
KILOMETERS
0 1 2 3
MILES

Saskatoon Regional Health Authority

Assessment:	230,911,100 (Assessed Value)
Population:	480
Office Days:	Monday to Friday
Meeting:	Monthly as called by Council
Reeve:	Bryan Gibney
Division 1:	
Division 2:	Ron Suchy
Division 3:	Rod Dale
Division 4:	Sandy Flory
Division 5:	Joan Nemeth-Syroteuk
Division 6:	Blaine Possberg

LEGEND

- Provincial Highway (20)
- Primary Grid Road
- Primary Grid (Paved)
- Grid Road
- Main Farm Access
- Special Roads
- Gravel Road
- Bladed Road
- Other Road
- Railway
- Transmission Line
- Pipeline
- Division Boundary
- Residence
- Church
- Cemetery
- Church Monument
- School
- Community Well
- ILO SITE
- Lake
- River/Creek
- Crown Land
- Burr Conservation & Development Area
- North Upper Hunter Creek Water Control Area

NOT ALL FEATURES IN LEGEND NECESSARILY APPEAR ON MAP

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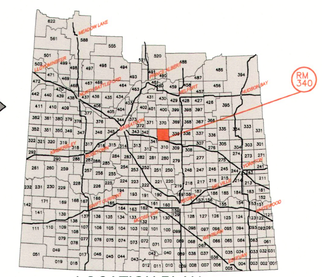
SMALL PARTS INDEX

1	SW-03-34-22	KEITH JEREMY PULLMAN	41000
2	NW-07-34-22	DARCY & WENDY MEHRER	11000
3	NE-07-34-22	KERRY & MARSHA WEST	13900
4	NE-09-34-22	DELWOOD FISH & GAME	16100
5	NW-25-34-22	ANDREW & PAMELA MONCHUK	27600
6	SW-29-34-22	DOUG & CARRIE SENKO	29400
7	SW-33-34-22	KEVIN & GERALDINE EHALT	11000
8	SW-02-34-23	DEREK STADNICHUK	22400
9	SE-03-34-23	LOLA SUCHY	52900
10	NW-03-34-23	NICHOLAS DICK	36300
11	SE-04-34-23	RONALD & MARILYN BIEBER	23200
12	NE-04-34-23	WILLIAM & FLORENCE WARDELL	4000
13	NE-06-34-23	BONNIE BARRE	25500
14	SE-13-34-23	KURT PAVELICH	11000
15	NE-14-34-23	MARTINA SOLMES & MARK LOYNS	44700
16	NW-24-34-23	ROGER CHAPMAN	41400
17	NE-24-34-23	DOUGLAS & ADELE FAILLER	38100
18	NW-01-34-24	LARRY HUBER	23000
19	SW-02-34-24	ESTATE OF ANTHONY PONGRACZ	5600
20	NW-02-34-24	TOMAN AGVENTURES LTD.	13200
21	NE-02-34-24	TOMAN AGVENTURES LTD.	35700
22	NE-02-34-24	MELANIE LOESSL	29600
23	NE-02-34-24	DANIEL G. RITZ	4400
23A	NE-02-34-24	KEITH & JENNIFER FLEISCHACKER	19500
24	SW-07-34-24	CANADIAN PACIFIC RAILWAY	24000
25	NW-07-34-24	CANADIAN PACIFIC RAILWAY	54900
26	SE-08-34-24	CANADIAN PACIFIC RAILWAY	51900
27	SW-08-34-24	TYLER DUST	26400
28	NW-08-34-24	VERONICA MATTSON	4900
29	SE-09-34-24	CAITLIN & DANIEL GURSKOSKI	33100
30	SW-09-34-24	CLINTON CLAVELLE	58400
31	SW-10-34-24	RANDAL TOMAN	23200
32	NE-10-34-24	CANADIAN PACIFIC RAILWAY	21300
33	SW-01-35-22	MADISON WILLIAMS	27500
34	SE-03-35-22	JONATHAN PEARCE & LEAH PEARCE	43700
35	SW-05-35-22	JEFFREY BERGERMANN	11000
36	SW-05-35-22	SHARON ZUBOT	2400
37	SW-05-35-22	GEORGE & GAIL EWEN	6500
38	NE-20-35-22	CRAIG PEIRRARD & MICHAEL LEMMERICH	23800
39	NE-21-35-22	RICHARD & CAROL ZUBOT	22000
40	NE-21-35-22	RICHARD & CAROL ZUBOT	29100
41	SE-30-35-22	DUSTIN EWEN	29800
42	NE-30-35-22	MARY ZUBOT	20400
43	SE-31-35-22	KARLAN HALL	20200
44	SE31-35-22	DEAN LOTHAMMER	28800
45	NW-31-35-22	WOLVERINE CATTLE CO.	32400
46	NE-31-35-22	DANIEL G. RITZ	8800
46A	NE 36-35-22	DENNIS & ENID SIEGEL	29600
47	NE-36-35-22	MURRAY WEGERS	7500
48	NW-05-35-23	CYRIL & HELEN SENKO	12200
49	NW-16-35-23	LAWRENCE & WILLIAM PAWLIUK	99400
49A	NW-10-35-23	OLYSKY LP INC.	14400
49B	NW-11-35-23	OLYSKY LP INC.	16000
50	NW-16-35-23	CYRIL & HELEN SENKO	11200
50A	NE-19-35-23	OLYSKY LP INC.	28600
51	SE-28-35-23	GERARD & MARY POSSBERG	31200
52	SW-31-35-23	LORNE ROBERT & MARILYN GAIL GIDDINGS	15800
53	NE-33-35-23	GERARD & MARY POSSBERG	18300
54	SE-36-35-23	KEVIN & CAROLYNE SPENCER	18000
55	NE-16-35-24	ELISE DALE	35700
56	NW-19-35-24	JEFFREY & BRENDA DALE	3600
57	SW-34-35-24	ERIC BENZ	44400
58	NW-02-36-22	GERALD KIENLEN & ESTER PULVERMACHER	74600
59	NW-02-36-23	GERALD SWAN BATTY	42800
60	NW-06-36-22	NORMAN & REGINNA ORTMAN	61300
61	NW-07-36-22	HILBERT HONEY CO. LTD.	55900
62	SW-15-36-22	MONTY & LYNDA KOVLASKE	26100
63	SW-18-36-22	FRED ERNEST ESTATE	24900
64	SW-18-36-22	CASEY & LAURIE ANNE SMIT	49500
65	SW-19-36-22	KARA BATTY	45900
66	SW-23-36-22	ALEX & JUANITA SARETSKY	35800
67	NW-02-36-23	ROBERT & DONNA BERGERMANN	2500
68	SE-35-36-23	FLORIAN POSSBERG	46500
69	NE 07-36-23	CURT & TRACY BELLS	52200
70	SW-16-36-23	ZACKARY & KAITLYN BIEHN	31000
71	NE 23-36-23	BRIAN C. & SHERI LYNNE YAWORSKI	45700
72	NE 24-36-23	OLYSKY LP INC.	29800
73	NE 30-36-23	DEB MacPHERSON	24000
74	NE 32-35-23	LEO & DEBRA BELLS	19500
75	NW 33-36-23	CYNTHIA GRIEMAN & GARY STADNICHUK	45900
76	NE 36-35-23	BRIAN & BRENDA REIFFERSCHIED	46100
77	NE 36-36-23	RENEE MACKENZIE	45900
78	SE 36-36-23	KEVIN & ELAINE SARETSKY	45900
79	NE 16-36-24	SPENCER & BRITTANY BIEHN	32200
80	SE 25-36-24	STEVEN VICZKO & SHELBY JOHNSON	34000
81	SE 28-36-24	REGAN SCHLACTER	63300
82	SW-30-36-24	BRIAN & RAELEEN KEEN	56300
83	NE 32-36-24	THERESA FORTOWSKY	22700
84	NE 33-35-24	MEGAN DONLEVY	21800
85	SE 35-36-24	DUCKS UNLIMITED CANADA	70500
86	SE 35-36-24	DUCKS UNLIMITED CANADA	63500
87	NW-30-35-22	GILBERT & NORA THURLOW & RODNEY JACQUES	3000
88	NW 34-35-22	1011174S1 SASK. LTD.	40900
89	NE 36-35-22	GLENN & SHERYL KORTE	51000
90	NE 08-36-23	SHAWN & MICHELLE PETERS	58200
91	SW 28-35-23	DANIEL & KATHRYN DUFFLEY	28200
92	NE 35-36-24	RIKARD SARETSKY	28200
93	NW 30-35-23	CARSON SARETSKY & JESSICA WEIMAN	34300
94	NW 11-36-23	TERRY & YVONNE SARETSKY	45800
95	NW 11-36-23	TERRY & YVONNE SARETSKY	5800
96	NW 33-35-24	DARCY WESSEN & LYNSI PARKIN	29400
97	NE 16-34-23	RYAN & KENDRA VEDRESS	27600
98	NE 35-34-22	JOE & SUSAN REITER	4700
99	SE 04-36-22	CHARLENE TOOP	60600
100	SW 36-36-22	BRIAN & JENNIFER HINZ	51400
101	SW 33-36-23	GERARD & NANCY DELEURME & GRANT SCHMIDT	33200
102	SW 31-34-24	BARRY & SANDRA LEIGH SENKO	31100
103	SE 28-34-23	OLEKSANDER & TETIANA RIZNYK	41700
104	NW 27-35-24	R.M. OF WOLVERINE #340	17000
105	NW 34-36-24	MELVIN BOLEN & KAREN HOLDEN	34500
106	SW 16-36-23	SCOTT & TRACY KENNEDY	49000
107	NE 22-35-24	HERMAN POSSBERG	
108	NW 18-36-24	MITCHELL & KATHLEEN KLEITER	29600

LOCATION PLAN



PURCHASING INFORMATION

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Mailing Address: Box 40 Theodore, SK S0A 4C0
Orders may be charged to VISA, MC, paid by Money Order or Certified Cheque.

Revised by: C. Bilokreli May 27, 2022
Drawn by: Bruce Frederickson February 18, 2010

Appendix G Air Dispersion Modelling

Air Dispersion Modelling

SaskPower

Wolverine Power Station
Project No. 146929

Revision 0
11/29/2022

Air Dispersion Modelling

prepared for

SaskPower
Wolverine Power Station
Wolverine, Saskatchewan

Project No. 146929

Revision 0
11/29/2022

prepared by

Burns & McDonnell
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
µg/m^3	microgram per cubic meter
AERMAP	AMS/EPA Regulatory Model's terrain pre-processor
AERMOD	AMS/EPA Regulatory Model
ARM	Ambient Ratio Method
BPIP-PRIME	Building Profile Input Program – Plume Rise Model Enhancements
CAAQ	Canadian Ambient Air Quality Standards
CO	carbon monoxide
g/s	grams per second
GEP	Good Engineering Practice
hp	horsepower
HRSG	heat recovery steam generator
kW	kilowatt
MECL	minimum emissions compliant load
m/s	meters per second
Ministry	Saskatchewan Ministry of Environment
MMBtu/hr	million British thermal units per hour
MW	megawatt
NAD 83	North American Datum of 1983
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
^oC	degrees Celsius

Abbreviation	Term/Phrase/Name
OLM	Ozone Limiting Method
PM_{10}	particulate matter of 10 microns in diameter or smaller
$PM_{2.5}$	particulate matter of 2.5 microns in diameter or smaller
ppm	parts per million
PVMRM	Plume Volume Molar Ratio Method
SAAQS	Saskatchewan Ambient Air Quality Standards
SaskPower	Saskatchewan Power
SO_2	sulphur dioxide
TPM	total particulate matter
U.S. EPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

Pursuant to the Saskatchewan air quality regulatory requirements, Burns & McDonnell Canada LTD was retained by Saskatchewan Power (SaskPower) to perform air dispersion modelling to determine compliance with ambient air quality standards for a proposed combined-cycle power plant. The Wolverine Power Station Project (Project) is anticipated to be a nominal 370 megawatts (MW) gas-fired power plant which will consist of one F-Class combustion turbine with heat recovery steam generator (HRSG), one steam turbine and associated equipment. The Project will be located south of Wolverine, Saskatchewan. The combustion turbine will be designed to utilize pipeline-quality natural gas only. In addition to the combustion turbine, one natural gas-fired dew point heater, an emergency diesel fire pump, and an emergency diesel generator will also be included as part of the Project. The location of the Project is shown in Figure A-1 (Appendix A) and a plot plan of the Project is shown in Figure A-2 (Appendix A).

Emission of air contaminants will result from the combustion of natural gas in the proposed combined-cycle combustion turbine. Simple-cycle emissions will vent from the by-pass stack and combined-cycle emissions will vent from the main stack. There will also be emissions of air contaminants generated from the emergency diesel generator, emergency diesel fire pump, and dew point heater. Table 1-1 shows the maximum potential air emissions associated with the Project including start-up and shutdown emissions for the turbine and auxiliary equipment emissions. The maximum emissions from any operating load and including start-up and shutdown emissions for the combustion turbine were used to demonstrate the maximum potential emissions for each pollutant. Combined-cycle air emissions are based on 8,760 hours per year of operation (100% capacity factor) and simple-cycle air emissions are based on 2,891 hours per year of operation (33% capacity factor).

Table 1-1. Project Potential Emissions

Pollutant	Combined-Cycle Project Potential Emissions (tonnes per year)	Simple-Cycle Project Potential Emissions (tonnes per year)
NO_x	469.4	163.5
CO	326.0	201.7
$TPM/PM_{10}/PM_{2.5}$	38.7	13.0
SO_2	29.6	9.8

1.1 Combustion Turbine

Emissions from the F-Class combustion turbine are dependent on the ambient temperature conditions and operating load, which can vary from minimum emissions compliant load (MECL) to 100 percent for

combined-cycle operation. To account for representative seasonal climatic variations, potential emissions from the proposed combustion turbine was analyzed at MECL, 50, 75, and 100 percent load conditions for ambient temperatures ranging from negative 30 degrees Celsius (°C) to 39°. Projected emissions were based on data provided by the potential F-Class combustion turbine manufacturer and/or from AP-42 emission factors. Detailed calculations of the combustion turbine and auxiliary equipment's emissions are provided in Appendix B. Start-up and shutdown emissions were based on the start-up profile and 95 start-up/shutdown events per year for combined-cycle operation and 95 start-up/shutdown events per year for simple-cycle operation. One start-up/shutdown event is equal to one start-up plus one shutdown. All start-ups were conservatively assumed to be cold start-ups.

1.2 Auxiliary Equipment

Emissions of air contaminants generated from the dew point heater, emergency diesel fire pump, emergency diesel generator are discussed below.

1.2.1 Natural Gas Dew Point Heater

A 9.30 million British thermal units per hour (MMBtu/hr) natural gas-fired dew point heater will be used to heat the natural gas and will be permitted for 8,760 hours of operation per year. AP-42 data was used to estimate the emissions from the heater. Detailed emissions calculations are provided in Appendix B.

1.2.2 Emergency Diesel Fire Pump

An emergency diesel fire pump will be built to support the Project in case of a fire. The emergency diesel fire pump will have a maximum power output of 237 horsepower (hp) and will be fired solely by ultra-low sulphur # 2 fuel oil. The applicant proposes to operate the emergency diesel fire pump for up to 100 hours annually for testing and maintenance purposes, and therefore supports a limit on routine hours of operation of the emergency diesel fire pump. Vendor data and AP-42 emission factors were used to determine emissions for the fire pump. Detailed calculations of diesel fire pump emissions are provided in Appendix B.

1.2.3 Emergency Diesel Generator

An emergency diesel generator will be built to provide essential services to the plant in case of a power interruption. The emergency diesel generator will have a maximum power output of 1,250 kilowatt (kW) and will be fired solely by ultra-low sulphur # 2 fuel oil. The applicant proposes to operate the emergency diesel generator for up to 100 hours annually for testing and maintenance purposes, and therefore supports a limit on routine hours of operation of the emergency diesel generator. Vendor data and AP-42 emission

factors were used to determine emissions from the emergency diesel generator. Detailed calculations of diesel generator emissions are provided in Appendix B.

2.0 AIR DISPERSION MODELLING

Pursuant to the Saskatchewan air quality regulatory requirements, an air dispersion modelling analysis is required for each regulated pollutant. An air quality analysis was performed for nitrogen oxides (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2), total particulate matter (TPM), particulate matter of 10 microns in diameter or smaller (PM_{10}), and particulate matter of 2.5 microns in diameter or smaller ($PM_{2.5}$) using the U.S. Environmental Protection Agency (EPA)-approved AMS/EPA Regulatory Model (AERMOD). The Saskatchewan Air Quality Modelling Guideline was used to conduct the air dispersion modelling analysis for this Project. A summary of the models, the modelling techniques, and modelling results for the Project are discussed in the following sections.

2.1 Air Dispersion Model

Air dispersion modelling was performed using the latest version of the AERMOD model (Version 22112). The AERMOD model is a steady-state Gaussian air dispersion model that is designed to estimate downwind ground-level concentrations from single or multiple sources using detailed meteorological data. AERMOD is a model currently approved for industrial sources. The Saskatchewan Air Quality Modelling Guideline approves the use of AERMOD and SaskPower has chosen to demonstrate regulatory compliance through its use.

Details of the modelling algorithms contained in the AERMOD model may be found in the User's Guide for AERMOD (EPA, 2022). The regulatory default option was selected for this analysis.

The following default model options were used:

- Gradual Plume Rise
- Stack-tip Downwash
- Buoyancy-induced Dispersion
- Calms and Missing Data Processing Routine
- Calculate Wind Profiles
- Calculate Vertical Potential Temperature Gradient
- Rural Dispersion

2.2 Model Parameters

Modelling runs were conducted at full load and partial loads of the combustion turbine to assess the air quality effects of the Project emissions and to demonstrate the compliance of the predicted maximum ground-level concentrations with applicable Saskatchewan Ambient Air Quality Standards (SAAQS) and

Canadian Ambient Air Quality Standards (CAAQS). The expected hourly emission rates and modelling parameters for the combined-cycle combustion turbine and simple-cycle combustion turbine are shown in Table 2-1 and Table 2-2. These emission rates represent projected worst-case ambient conditions under various operating loads and include start-up and shutdown emissions. The annual emissions are based on worst-case annual emissions.

Table 2-1. Combined-Cycle Combustion Turbine Maximum Emissions and Modelling Parameters

Pollutant	100% Load	75% Load	50% Load	MECL[c]	Start-up/ Shutdown
	grams per second (g/s)				
NO_x	14.7[a]	11.9	8.4	6.7	18.9[b]
CO	6.0	2.4	3.8	3.0	341.5[b]
$PM/PM_{10}/PM_{2.5}$	1.2[a]	1.1	1.1	1.1	1.2
SO_2	0.9[a]	0.8	0.5	0.4	0.9
Stack Parameters					
Stack temperature (ºC)[c]	87.4	78.6	47.2	47.2	85.5
Exit velocity (m/s)[c]	17.7	14.3	11.9	10.0	17.4
Stack height (meters)	51.8				
Stack diameter (meters)	6.4				

(a) Maximum annual emission rate ratioed for 8,760 hours per year
(b) Maximum 1-hour start-up emissions (worst-case combustion turbine emissions during start-up)
(c) m/s = meters per second; ºC = degrees Celsius; MECL = minimum emissions compliant load

Table 2-2. Simple-Cycle Combustion Turbine Maximum Emissions and Modelling Parameters

Pollutant	100% Load	75% Load	50% Load	MECL[c]	Start-up/ Shutdown
	grams per second (g/s)				
NO_x	14.7[a]	11.9	8.4	6.7	13.3[b]
CO	6.0	2.4	3.8	3.0	74.5[b]
$PM/PM_{10}/PM_{2.5}$	1.2[a]	1.1	1.1	1.1	1.2
SO_2	0.9[a]	0.8	0.5	0.4	0.9
Stack Parameters					
Stack temperature (ºC)[c]	584.7	599.8	599.8	599.8	584.9
Exit velocity (m/s)[c]	43.4	36.7	30.8	26.3	43.2
Stack height (meters)	51.8				
Stack diameter (meters)	6.4				

(a) Maximum annual emission rate ratioed for 8,760 hours per year
(b) Maximum 1-hour start-up emissions (worst-case combustion turbine emissions during start-up)
(c) m/s = meters per second; ºC = degrees Celsius; MECL = minimum emissions compliant load

The combustion turbine will comply with the guidelines for the reduction of nitrogen oxide emissions from natural gas-fuelled stationary combustion turbines (Government of Canada, 2017). The combustion turbine NO_x emissions in Table 2-1 are based on a NO_x emission limit of 12 parts per million at 15 percent oxygen, which is below the NO_x emission limits published in the guideline. Compliance will be determined with NO_x CEMs.

The expected hourly emission rates and modelling parameters for the auxiliary equipment are shown in Table 2-3. Annual emissions for the emergency diesel fire pump and emergency diesel generator were based on operation of 100 hours per year.

Table 2-3. Auxiliary Equipment Emissions and Modelling Parameters

Pollutant	Dew Point Heater	Diesel Fire Pump	Diesel Generator
	grams per second (g/s)		
NO_x	0.1	0.2 (0.003)[a]	2.2 (0.03)[a]
CO	0.1	0.2	1.2
$PM/PM_{10}/PM_{2.5}$	0.01	0.01 (0.0001)[a]	0.1 (0.001)[a]
SO_2	0.001	0.1 (0.001)[a]	0.2 (0.003)[a]
Stack Parameters			
Stack temperature (ºC)[b]	179.7	530.0	448.9
Exit velocity (m/s)[b]	3.7	44.3	52.2
Stack height (meters)	4.9	4.6	4.6
Stack diameter (meters)	0.8	0.1	0.4

(a) Equivalent g/s emissions averaged over 8,760 hours per year, based on operation of 100 hours, used for annual averaging periods only.
(b) m/s = meters per second; ºC = degrees Celsius

2.3 Modelling Methodology and Parameters

The modelling methodology used for this analysis is summarized in the sections below.

2.3.1 Good Engineering Practice

Emission sources are subject to Good Engineering Practice (GEP) stack height requirements outlined in Section 5.7 of the Saskatchewan Air Modelling Guideline. As GEP height is calculated as the greater of 65 meters (measured from the ground level elevation at the base of the stack) or the height resulting from the following formula:

$$GEP = H + 1.5L$$

Where

H = the height of nearby structure(s) measured from the ground level elevation at the base of the stack; and

L = the lesser dimension (height or projected width) of nearby structure(s) (i.e., building height or the greatest crosswind distance of the building - also known as maximum projected width).

To meet stack height requirements, the point sources were evaluated in terms of the proximity to nearby structures. The purpose of this evaluation is to determine if the discharge from each stack will become caught in the turbulent wake of a building or other structure, resulting in downwash of the plume. Downwash of the plume can result in elevated ground-level concentrations. In EPA's 1985 *Guideline for Determination of Good Engineering Practice Stack Height*, EPA provides guidance for determining whether building downwash will occur. The downwash analysis was performed consistent with the methods prescribed in this guidance document.

Calculations for determining the direction-specific downwash parameters were performed using the most current version of the EPA's Building Profile Input Program – Plume Rise Model Enhancements (Version 04274), otherwise referred to as the BPIP-PRIME downwash algorithm. The BPIP-PRIME model provides direction-specific building dimensions to evaluate downwash conditions. The Project is located in a rural area and the only buildings that could potentially affect emissions from the Project are the on-site structures.

After running the BPIP-PRIME model, it was determined that the GEP stack height for this Project will not exceed 65 meters. A stack height of 51.8 meters (170 feet) was used in the AERMOD modelling. The major on-site buildings and their dimensions are provided in Appendix B.

2.3.2 Receptor Grid

The overall purpose of the modelling analysis is to assess the air quality effects of the Project emissions and to demonstrate the compliance of the predicted maximum ground-level concentrations with applicable SAAQS and CAAQS. The modelling runs were conducted using the AERMOD model in simple and complex terrain mode within a 10- by 10-kilometer Cartesian grid and is shown in Figure C-1 (Appendix C). The grid incorporates the receptor spacing specified in Table 2-4. Receptors were also placed along the fence line boundary at a spacing of 20 meters.

Table 2-4: Receptor Spacing from Fence Line Boundary

Distance from Fence Line (kilometers)	Receptor Spacing (meters)
0 - 0.5	50
0.5 – 2	250
2 – 5	500
5 – 10	1,000

The appropriate Canadian terrain data was downloaded from GeoBase Canada and was used to obtain the necessary receptor elevations. North American Datum of 1983 (NAD 83) was used to develop the Universal Transverse Mercator (UTM) coordinates for this Project.

AERMOD has a terrain preprocessor (AERMAP) which uses gridded terrain data for the modelling domain to calculate not only a XYZ coordinate, but a representative terrain-influence height associated with each receptor location selected. This terrain-influenced height is called the height scale and is separate for each individual receptor. AERMAP (Version 18081) utilized the electronic terrain data to populate the model with receptor elevations.

2.3.3 Meteorological Data

Meteorological data obtained from the Saskatchewan GeoHub were used for the modelling analysis. The data set located closest to the site is AERMOD ID: 519N1049W. Integrated Surface Hourly meteorological data and upper air data from were used for years 2012 to 2016. A profile base elevation of 536 meters was used.

2.3.4 Land Use Parameters

The existing land use for a three-kilometer area surrounding the Project is more than 50 percent rural, and the population density is less than 750 people per square kilometer for the same area. Therefore, rural dispersion coefficients were used in the AERMOD models.

2.3.5 Background Existing Ambient Air Quality

The air quality standards are set up to protect the air quality for all sensitive populations. As such, there is an existing concentration of each criteria pollutant that is present in ambient air that must be included in an analysis to account for items such as mobile source emissions that are not accounted for in the model. Monitored ambient concentrations will be added to the modeled ground level impacts to account for these sources.

For the Project, background values for each pollutant were identified from the representative monitors in the area. The Saskatchewan Ministry of Environment (Ministry) provides regional background air contaminant concentrations for five divisions of Saskatchewan. The values listed in Table 2-5 will be used as background levels and will be added to the modeled impacts for each pollutant for modelling compliance determinations. Per the modelling guideline, for refined modelling, the 90th percentile value from the cumulative frequency distribution of the background monitoring data was used for the 1-hour and 24-hour averaging times. For the annual distribution the 50th percentile was used.

Table 2-5. Central Region Background Concentration

Pollutant	Averaging Period	Percentile	Background Concentration[a]		Region
			ppm	µg/m³	
CO	1-hour	90	0.5	577.0	Central
	8-hour	90	0.4	480.0	
NO_2	1-hour	90	0.021	40.0	Central
	24-hour	90	0.017	32.0	
	Annual	50	0.008	15.0	
SO_2	1-hour	90	0.001	2.6	Central
	24-hour	90	0.001	2.6	
	Annual	50	0.000	0.0	
$PM_{2.5}$	24-hour	90	--	7.5	Central
	Annual	50	--	3.3	
PM_{10}[b]	24-hour	90	--	36.3	Southeastern
PM[c]	24-hour	90	--	7.5	Central
	Annual	50	--	3.3	

Source: Saskatchewan Air Quality Modelling Guideline, 2012
(a) ppm = parts per million; µg/m³ = micrograms per cubic meter
(b) No PM_{10} background was listed in the modelling guidance for the central region; therefore, the southeastern region background was used.
(c) No PM background was listed in the modelling guidance; therefore, the $PM_{2.5}$ central region background was used.

2.3.6 Modelling Thresholds

The SAAQS for the modelled pollutants are shown in Table 2-6.

Table 2-6: Saskatchewan Ambient Air Quality Standards

Pollutant	Averaging Period	SAAQS
		micrograms per cubic meter ($\mu g/m^3$)
CO	1-hour	15,000
	8-hour	6,000
NO_2	1-hour	300
	24-hour	200
	Annual	45[a]
SO_2	1-hour	450
	24-hour	125
	Annual	20[a]
$PM_{2.5}$	24-hour	28[b]
	Annual	10
PM_{10}	24-hour	50
PM	24-hour	100
	Annual	60[c]

Source: SAAQS, https://envrbrportal.crmp.saskatchewan.ca/Pages/SEQS/Table20-SEQS-SAAQS.pdf
(a) Arithmetic mean
(b) The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
(c) Geometric means

The CAAQS for the modelled pollutants are shown in Table 2-7.

Table 2-7: Canadian Ambient Air Quality Standards

Pollutant	Averaging Period	CAAQS		Statistical Form
		Effective 2020	Effective 2025	
		micrograms per cubic meter (µg/m^3)		
NO_2	1-hour	113	79	3-year average of the 98th percentile of the daily maximum 1-hour average concentrations
	Annual	32	23	Average over a single calendar year of all 1-hour average concentrations
SO_2	1-hour	183	170	3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations
	Annual	13	10	Average over a single calendar year of all 1-hour average SO_2 concentrations
$PM_{2.5}$	24-hour	27	--	3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	Annual	8.8	--	3-year average of the annual average of all 1-hour concentrations

Source: CAAQS, https://ccme.ca/en/air-quality-report

2.3.7 Intermittent Sources

The emergency diesel generator and emergency diesel fire pump will operate less than 100 hours annually and are considered intermittent sources. In addition to modelling normal plant operation impacts, emergency condition plant operation was modelled with the emergency equipment operating simultaneous to the combustion turbine and natural gas dew point heater.

2.3.8 NO_2 Modelling – Multi Tiered Screening Approach

The AERMOD model predicts ground-level concentrations of any generic pollutant without chemical transformations. Thus, the modeled NO_x emission rate will predict ground-level modeled concentrations of NO_x. The SAAQS and CAAQS modelling concentration standards are presented as NO_2.

Recommended methods for estimating NO_2 concentrations presented in the order of the most conservative first are:

1. Tier I – total conversion, or all NO_x equals NO_2

2. Tier II – use a default NO_2/NO_x ratio
3. Tier III – case-by-case detailed screening methods, such as the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM)

The ambient ratio method was used to determine all NO_2 Project modeled results. The EPA has replaced the existing Ambient Ratio Method (ARM) with a revised ARM2 option. ARM2 is based on hourly measurements of the NO_2 to NO_x ratios and provides more detailed estimates of this ratio based on the total NO_x present. The EPA default minimum and maximum ratios of 0.5 and 0.9, respectively, were applied to the model to determine the predicted ground-level concentration of NO_2.

2.4 SAAQS Refined Modelling Results

Refined modelling was performed for CO, NO_x, SO_2, and $PM/PM_{10}/PM_{2.5}$ for the Project for normal plant operation for both combined-cycle and simple-cycle operation. The combustion turbine in combined-cycle or simple-cycle operation plus the natural gas dew point heater represents normal plant operation. After examining the modelling results for normal plant operation at all combustion turbine load levels, it was determined that all impacts are below the SAAQS. The maximum operating load modeled concentrations for each pollutant and averaging period are presented in Table 2-8 for combined-cycle operation and Table 2-9 for simple-cycle operation.

Table 2-8. Maximum Operating Load Modelled Concentrations for Normal Combined-Cycle Plant Operation

Pollutant	Averaging Period	UTM Coordinates[a]		Year	Worse-Case Maximum Operating Load[c]	Maximum Concentration			SAAQS Threshold
		Easting (meters)	Northing (meters)			Predicted	Background	Total	
						micrograms per cubic meter (µg/m^3)			
CO	1-hour	480,900.00	5,747,300.00	2016	Starts	985.2	577	1,562.2	15,000
	8-hour	480,800.00	5,747,200.00	2014	Starts	513.5	480	993.5	6,000
NO_2	1-hour	480,600.00	5,747,500.00	2014	100%	77.8[b]	40	117.8	300
	24-hour	480,598.61	5,747,434.42	2016	Starts	28.1[b]	32	60.1	200
	Annual	480,598.61	5,747,453.12	2015	MECL	5.9[b]	15	20.9	45
SO_2	1-hour	481,050.00	5,747,800.00	2013	MECL	3.1	2.6	5.7	450
	24-hour	480,400.00	5,747,200.00	2016	MECL	1.8	2.6	4.4	125
	Annual	480,900.00	5,747,200.00	2015	MECL	0.2	0	0.2	20
$PM_{2.5}$	24-hour	480,598.61	5,747,453.12	5 years	MECL	2.4	7.5	9.9	28
	Annual	480,598.61	5,747,453.12	2015	MECL	0.5	3.3	3.8	10
PM_{10}	24-hour	480,400.00	5,747,200.00	2016	MECL	4.6	36.3	40.9	50
PM	24-hour	480,400.00	5,747,200.00	2016	MECL	4.6	7.5	12.1	100
	Annual	480,598.61	5,747,453.12	2015	MECL	0.5	3.3	3.8	60

(a) Universal Transverse Mercator NAD 83
(b) ARM2 methodology was used
(c) MECL = minimum emissions compliant load

Table 2-9. Maximum Operating Load Modelled Concentrations for Normal Simple-Cycle Plant Operation

Pollutant	Averaging Period	UTM Coordinates[a]		Year	Worse-Case Maximum Operating Load[c]	Maximum Concentration			SAAQS Threshold
		Easting (meters)	Northing (meters)			Predicted	Background	Total	
						micrograms per cubic meter (µg/m^3)			
CO	1-hour	480,598.62	5,747,415.72	2013	Starts	94.3	577	671.3	15,000
	8-hour	480,598.61	5,747,509.21	2012	Starts	39.3	480	519.3	6,000
NO_2	1-hour	480,600.00	5,747,500.00	2014	100%	77.8[b]	40	117.8	300
	24-hour	480,598.61	5,747,434.42	2016	100%	28.2[b]	32	60.2	200
	Annual	480,598.61	5,747,453.12	2015	MECL	5.6[b]	15	20.6	45
SO_2	1-hour	480,598.62	5,747,415.72	2013	100%	1.2	2.6	3.8	450
	24-hour	480,598.61	5,747,434.42	2016	100%	0.3	2.6	2.9	125
	Annual	480,598.61	5,747,453.12	2015	MECL	0.0	0	0.0	20
$PM_{2.5}$	24-hour	480,600.0	5,747,450.0	5 years	100%	2.4	7.5	9.9	28
	Annual	480,598.61	5,747,453.12	2015	MECL	0.5	3.3	3.8	10
PM_{10}	24-hour	480,598.61	5,747,434.42	2016	100%	3.5	36.3	39.8	50
PM	24-hour	480,598.61	5,747,434.42	2016	100%	3.5	7.5	11.0	100
	Annual	480,598.61	5,747,453.12	2015	MECL	0.5	3.3	3.8	60

(a) Universal Transverse Mercator NAD 83
(b) ARM2 methodology was used
(c) MECL = minimum emissions compliant load

The following highs were used for each modelled averaging period:

- 1-hour average used the 9th highest concentration for a single calendar year
- 8-hour average used the 5th highest concentration for a single calendar year
- 24-hour average used the 2nd highest concentration for NO_2, SO_2, PM_{10}, and PM for a single calendar year
- 24-hour $PM_{2.5}$ used the 8th highest concentration (98th percentile) averaged over 5 years
- Annual average used the 1st highest concentration for a single calendar year

Isopleths of the maximum impact concentrations from either combined-cycle or simple-cycle operation for each pollutant and averaging period are shown in Figures C-2 to C-14 in Appendix C. Model input and output files for each pollutant will be provided via electronic file transfer.

In addition to modelling normal plant operation impacts, emergency condition plant operation was modelled with the emergency equipment operating simultaneous to the combustion turbine and natural gas dew point heater. After examining the modelling results for emergency condition plant operation at all combustion turbine load levels, it was determined that all impacts are below the SAAQS. The maximum

operating load modeled concentrations for each pollutant and averaging period for this analysis are presented in Table C-1 for combined-cycle operation and Table C-2 for simple-cycle operation in Appendix C.

2.5 CAAQS Refined Modelling Results

Modelling was performed for NO_x, SO_2, and $PM_{2.5}$ to determine Project impacts for normal plant operation at the nearest residential receptors for comparison to the most conservative CAAQS listed in Table 2-7. The combustion turbine and natural gas dew point heater represent normal plant operation. Impacts at the nearest residential receptors within 2-kilometers of the Project were evaluated. The evaluated receptors are listed in Table 2-10 and are shown in Figure C-15 in Appendix C.

Table 2-10. Nearest Modelled Residential Receptors

Receptor ID	UTM Coordinates[a]	
	Easting (meters)	Northing (meters)
Residence 1	480,110	5,748,440
Residence 2	479,889	5,746,357
Residence 3	481,816	5,747,318
Residence 4	479,890	5,749,084
Residence 5	480,115	5,749,021
Residence 6	480,606	5,749,065
Residence 7	481,788	5,749,025

(a) Universal Transverse Mercator NAD83

After examining the modelling results at all load levels for normal plant operation, it was determined that the impacts are all below the most conservative CAAQS thresholds at the nearest residential receptors. The maximum operating load modeled concentrations for each pollutant and averaging period are presented in Table 2-11 for combined-cycle operation and Table 2-12 for simple-cycle operation.

Table 2-11. Maximum Operating Load Modelled Concentrations for Normal Combined-Cycle Plant Operation

Pollutant	Averaging Period	Receptor ID	Year	Worse-Case Maximum Operating Load[c]	Maximum Concentration			CAAQS Threshold[a]
					Predicted	Background	Total	
					micrograms per cubic meter (µg/m^3)			
NO_2	1-hour	3	5 years	MECL	13.1[b]	40.0	53.1	79
	Annual	3	2015	MECL	0.8[b]	15.0	15.8	23
SO_2	1-hour	3	5 years	MECL	1.1	2.6	3.7	170
	Annual	3	2015	MECL	0.05	0.0	0.05	10
$PM_{2.5}$	24-hour	3	5 years	MECL	0.5	7.5	8.0	27
	Annual	3	5 years	MECL	0.1	3.3	3.4	8.8

(a) The modelled impacts were compared to the most conservative CAAQS threshold
(b) ARM2 methodology was used
(c) MECL = minimum emissions compliant load

Table 2-12. Maximum Operating Load Modelled Concentrations for Normal Simple-Cycle Plant Operation

Pollutant	Averaging Period	Receptor ID	Year	Worse-Case Maximum Operating Load[c]	Maximum Concentration			CAAQS Threshold[a]
					Predicted	Background	Total	
					micrograms per cubic meter (µg/m^3)			
NO_2	1-hour	3	5 years	100%	6.5[b]	40.0	46.5	79
	Annual	3	2015	MECL	0.1[b]	15.0	15.1	23
SO_2	1-hour	3	5 years	100%	0.1	2.6	2.7	170
	Annual	3	2012	MECL	0.004	0.0	0.004	10
$PM_{2.5}$	24-hour	1	5 years	MECL	0.1	7.5	7.6	27
	Annual	3	5 years	MECL	0.01	3.3	3.31	8.8

(a) The modelled impacts were compared to the most conservative CAAQS threshold
(b) ARM2 methodology was used
(c) MECL = minimum emissions compliant load

The following highs were used for each modelled averaging period:

- 1-hour NO_2 used the 8th highest concentration (98th percentile) averaged over 5 years
- 1-hour SO_2 used the 4th highest concentration (99th percentile) averaged over 5 years
- 24-hour $PM_{2.5}$ used the 8th highest concentration (98th percentile) averaged over 5 years
- Annual NO_2 and SO_2 average used the 1st highest concentration over a single calendar year
- Annual $PM_{2.5}$ average used the 1st highest concentration over 5 years

2.6 Conclusion

The modelling results shown in Table 2-8, Table 2-9, Table 2-11, and Table 2-12 demonstrate that no exceedances of the NO_2, CO, SO_2, or $PM_{2.5}/PM_{10}/PM$ modelling levels are predicted; consequently, the Project will be below the SAAQS and CAAQS.

The operation of the Project will not cause or contribute to a significant degradation of ambient air quality. After examining the results of the model, it has been determined that the modelling requirements for CO, NO_2, SO_2, and $PM/PM_{10}/PM_{2.5}$ have been fulfilled, and no further modelling is required.

3.0 REFERENCES

Canadian Council of Ministers of the Environment. Canadian Ambient Air Quality Standards (CAAQS), https://ccme.ca/en/air-quality-report. Accessed October 12, 2022.

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Ministry of Environment. Saskatchewan Air Quality Modelling Guideline. Government of Saskatchewan. March 2012.

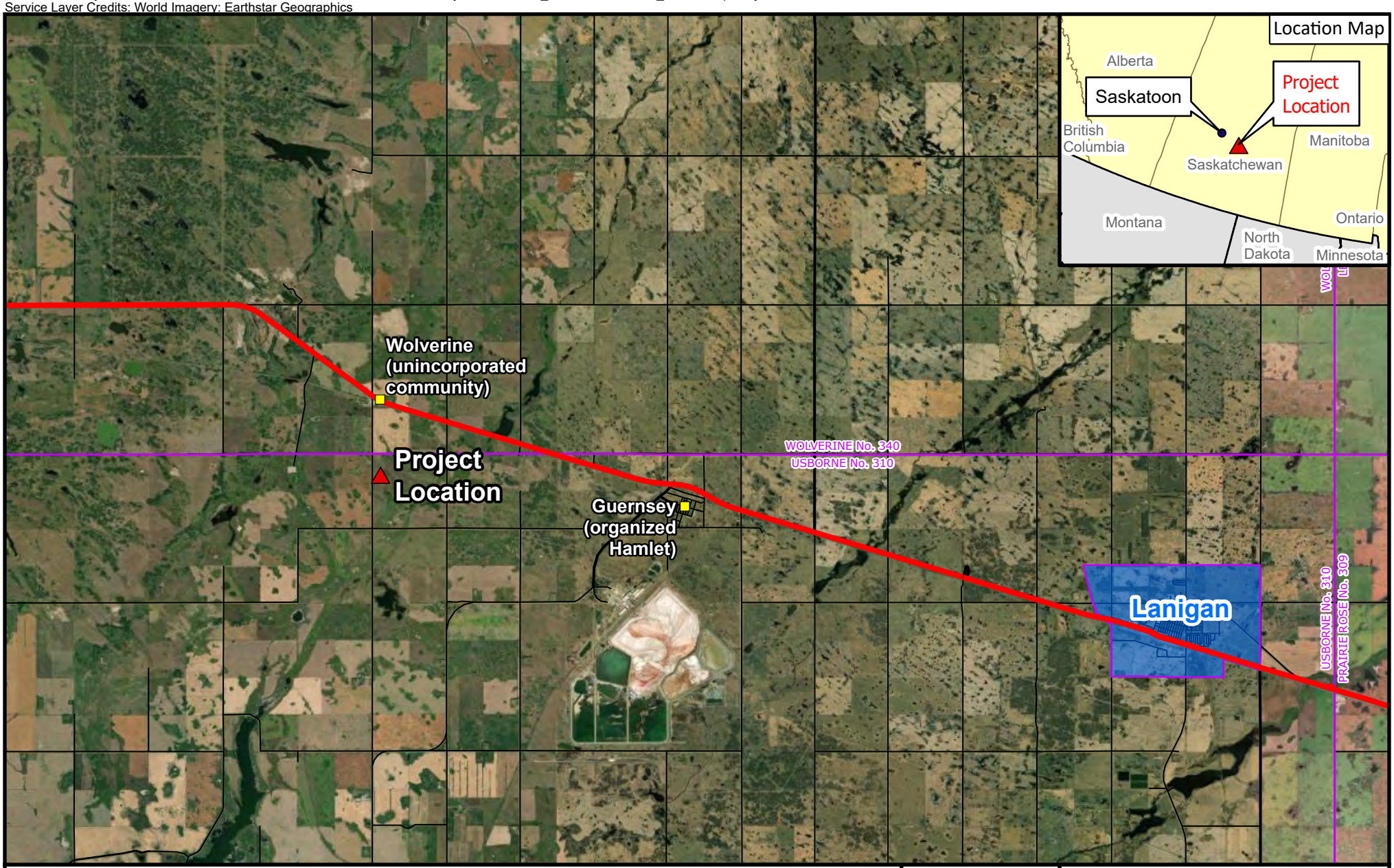
Table 20: Saskatchewan Ambient Air Quality Standards ($\mu g/m^3$). https://envrbrportal.crm.saskatchewan.ca/Pages/SEQS/Table20-SEQS-SAAQS.pdf. Accessed October 12, 2022.

U.S. Environmental Protection Agency. *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations)*. EPA-450/4-80-023LR. North Carolina: Office of Air Quality Planning and Standards, 1985.

U.S. Environmental Protection Agency. *User's Guide for the AMS/EPA Regulatory Model –AERMOD*. EPA-454/B-22-007. North Carolina: Office of Air Quality Planning and Standards, June 2022.

APPENDIX A - FIGURES

Path: C:\Users\tjkimmel\OneDrive - Burns & McDonnell\Documents\ArcGIS\Projects\Wolverine_Location\Wolverine_Location.aprx tjkimmel 10/25/2022
Service Layer Credits: World Imagery: Earthstar Geographics



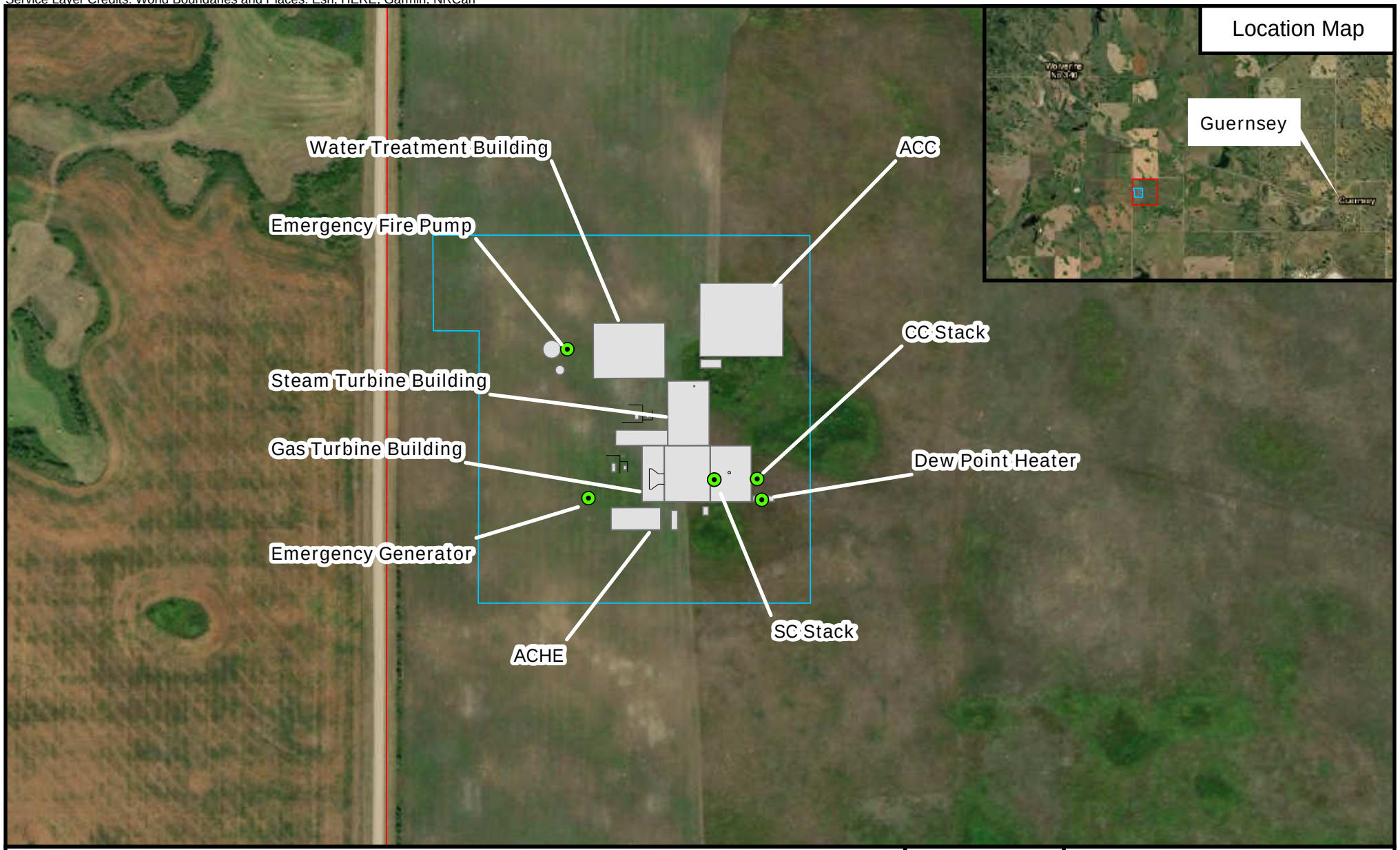
BURNS McDONNELL

Figure A-1
Project Location
Wolverine Power Station
SaskPower

Source: ESRI, Saskatchewan GeoHub, TIGER/Line, and Burns & McDonnell

Issued: 10/25/2022

Path: Z:\Clients\ENR\SaskPwr\146929_WolverineECI\7_Studies\Permitting\Modeling\Air\Layouts\GIS\Wolverine_Air_Modelling_Figures.aprx gweger 10/24/2022
Service Layer Credits: World Boundaries and Places: Esri, HERE, Garmin, NRCan



Project Structures
Property line
Emission Points
Fenceline

NORTH
100 50 0 100
Meters

BURNS McDONNELL

Figure A-2

SaskPower Wolverine
Project Layout

Source: ESRI, Burns & McDonnell

Issued: 10/24/2022

APPENDIX B – EMISSIONS ESTIMATES

Wolverine Power Station Project
Air Dispersion Modeling Inputs

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temperature (°C)	Exit Velocity (m/s)	Stack Diameter (m)	NO_2 24-hour (g/s)	NO_2 Annual (g/s)	NO_2 1-hour (g/s)	CO (g/s)	$PM/PM_{10}/PM_{2.5}$ 24-hour (g/s)	$PM/PM_{2.5}$ Annual (g/s)	SO_2 24-hour (g/s)	SO_2 Annual (g/s)	SO_2 1-hour (g/s)
EP01_100	Turbine 100%	480,557.00	5,747,454.30	532.0	51.8	87.4	17.7	6.4	14.7	14.7	14.7	6.0	1.2	0.4	0.9	0.9	0.9
EP01_75	Turbine 75%	480,557.00	5,747,454.30	532.0	51.8	78.6	14.3	6.4	11.9	14.7	11.9	2.4	1.1	0.4	0.8	0.9	0.8
EP01_50	Turbine 50%	480,557.00	5,747,454.30	532.0	51.8	47.2	11.9	6.4	8.4	14.7	8.4	3.8	1.1	0.4	0.5	0.9	0.5
EP01_MECL	Turbine - MECL	480,557.00	5,747,454.30	532.0	51.8	47.2	10.0	6.4	6.7	14.7	6.7	3.0	1.1	0.4	0.4	0.9	0.4
EP01_SS	Turbine - Starts	480,557.00	5,747,454.30	532.0	51.8	85.5	17.4	6.4	18.9	14.7	18.9	341.5	1.2	0.4	0.9	0.9	0.9
EP02_100	SC Turbine 100%	480,525.60	5,747,454.30	532.0	51.8	584.7	43.4	6.4	14.7	4.9	14.7	6.0	1.2	0.4	0.9	0.9	0.9
EP02_75	SC Turbine 75%	480,525.60	5,747,454.30	532.0	51.8	599.8	36.7	6.4	11.9	4.9	11.9	2.4	1.1	0.4	0.8	0.9	0.8
EP02_50	SC Turbine 50%	480,525.60	5,747,454.30	532.0	51.8	599.8	30.8	6.4	8.4	4.9	8.4	3.8	1.1	0.4	0.5	0.9	0.5
EP02_MECL	SC Turbine - MECL	480,525.60	5,747,454.30	532.0	51.8	599.8	26.3	6.4	6.7	4.9	6.7	3.0	1.1	0.4	0.4	0.9	0.4
EP02_SS	SC Turbine - Starts	480,525.60	5,747,454.30	532.0	51.8	584.9	43.2	6.4	13.3	4.9	13.3	74.5	1.2	0.4	0.9	0.9	0.9
EP03_DPH	Dew Point Heater	480,561.07	5,747,439.43	532.0	4.9	176.7	3.7	0.8	0.1	0.1	0.1	0.1	0.01	0.01	0.001	0.001	0.001
EP04_EG	Emergency Generator	480,421.24	5,747,439.04	532.0	4.9	448.9	52.2	0.4	2.2	0.03	2.2	1.2	0.1	0.001	0.2	0.003	0.2
EP05_EF	Emergency Fire Pump	480,410.72	5,747,555.80	532.0	4.6	530.0	44.3	0.1	0.2	0.003	0.2	0.2	0.01	0.0001	0.1	0.001	0.1

Wolverine Power Station Project

Overall Project Emissions - Combined-Cycle Operation

Maximum Annual Emission Rates

Pollutant	Combined-Cycle Combustion Turbine[a] (tonnes per year)	Dew Point Heater (tonnes per year)	Emergency Diesel Fire Pump (tonnes per year)	Emergency Diesel Generator (tonnes per year)	Total (tonnes per year)
NO_x	464.9	3.6	0.07	0.8	**469.4**
CO	322.5	3.0	0.06	0.4	**326.0**
PM	38.4	0.3	0.004	0.03	**38.7**
PM_{10}	38.4	0.3	0.004	0.03	**38.7**
$PM_{2.5}$	38.4	0.3	0.004	0.03	**38.7**
SO_2	29.4	0.02	0.02	0.09	**29.6**

(a) Represents worse-case emissions scenario

Assumptions

Unit	Limitation	Units
Combined Cycle Operation	8,760	Hours Per Year
Number of Cold Startups per year	95	Events Per Year
Hours of Startup/Shutdowns per year	161	Hours Per Year
Natural Gas Dew Point Heater	8,760	Hours Per Year
Emergency Diesel Fire Pump	100	Hours Per Year
Emergency Diesel Generator	100	Hours Per Year
Heating Value of Natural Gas		
Natural Gas	1,020	MMBtu/MMCF

Combined Cycle Combustion Turbine

Hours per year: 8,760
Number of Units: 1

Source Description	Operating Load	NOx Emission Rate (g/s)	CO Emission Rate (g/s)	$PM/PM_{10}/PM_{2.5}$ Emission Rate (g/s)	SO2 Emission Rate (g/s)
Turbine\ HRSG	100%	14.7	6.0	1.2	0.9
	75%	11.9	2.4	1.1	0.8
	50%	8.4	3.8	1.1	0.5
	50%	6.7	3.0	1.1	0.4

Emissions Including Startup/Shutdown Operation
Predicted Annual Emission Rates - Combined Cycle Combustion Turbine

Pollutant	Emissions (Tonnes per year) per Turbine		
	Normal Operation	Startup/ Shutdown	Max Total Turbine Emissions
NO_x	456.3	8.6	464.9
CO	185.5	137.0	322.5
$PM/PM_{10}/PM_{2.5}$	37.7	0.3	38.0
SO_2	28.9	0.2	29.1

Emissions Including Normal Operation Only
Predicted Annual Emission Rates - Combined Cycle Combustion Turbine

Pollutant	Emissions (Tonnes per year) per Turbine		
	Normal Operation	Startup/ Shutdown	Max Total Turbine Emissions
NO_x	464.8	--	464.8
CO	189.0	--	189.0
$PM/PM_{10}/PM_{2.5}$	38.4	--	38.4
SO_2	29.4	--	29.4

Wolverine Power Station Project

Overall Project Emissions - Simple-Cycle Operation

Maximum Annual Emission Rates

Pollutant	Simple-Cycle Combustion Turbine[a] (tonnes per year)	Dew Point Heater (tonnes per year)	Emergency Diesel Fire Pump (tonnes per year)	Emergency Diesel Generator (tonnes per year)	Total (tonnes per year)
NO_x	159.0	3.6	0.07	0.8	**163.5**
CO	198.2	3.0	0.06	0.4	**201.7**
PM	12.7	0.3	0.004	0.03	**13.0**
PM_{10}	12.7	0.3	0.004	0.03	**13.0**
$PM_{2.5}$	12.7	0.3	0.004	0.03	**13.0**
SO_2	9.7	0.02	0.02	0.09	**9.8**

(a) Represents worse-case emissions scenario

Assumptions

Unit	Limitation	Units
Simple-Cycle Operation	2,891	Hours Per Year
Number of Cold Startups per year	95	Events Per Year
Hours of Startup/Shutdowns per year	55	Hours Per Year
Natural Gas Dew Point Heater	8,760	Hours Per Year
Emergency Diesel Fire Pump	100	Hours Per Year
Emergency Diesel Generator	100	Hours Per Year
Heating Value of Natural Gas		
Natural Gas	1,020	MMBtu/MMCF

Simple-Cycle Combustion Turbine

Hours per year: 2,891
Number of Units: 1

Source Description	Operating Load	NOx Emission Rate (g/s)	CO Emission Rate (g/s)	$PM/PM_{10}/PM_{2.5}$ Emission Rate (g/s)	SO2 Emission Rate (g/s)
Turbine\ HRSG	100%	14.7	6.0	1.2	0.9
	75%	11.9	2.4	1.1	0.8
	50%	8.4	3.8	1.1	0.5
	50%	6.7	3.0	1.1	0.4

Emissions Including Startup/Shutdown Operation
Predicted Annual Emission Rates - Simple-Cycle Combustion Turbine

Pollutant	Emissions (Tonnes per year) per Turbine		
	Normal Operation	Startup/ Shutdown	Max Total Turbine Emissions
NO_x	150.4	8.6	159.0
CO	61.2	137.0	198.2
$PM/PM_{10}/PM_{2.5}$	12.4	0.3	12.7
SO_2	9.5	0.2	9.7

Emissions Including Normal Operation Only
Predicted Annual Emission Rates - Simple-Cycle Combustion Turbine

Pollutant	Emissions (Tonnes per year) per Turbine		
	Normal Operation	Startup/ Shutdown	Max Total Turbine Emissions
NO_x	153.4	--	153.4
CO	62.4	--	62.4
$PM/PM_{10}/PM_{2.5}$	12.7	--	12.7
SO_2	9.7	--	9.7

Wolverine Power Station Project
Start-up Emissions - Combined-Cycle Operation

Client SaskPower
Project SaskPower Self Build Combined-Cycle

PRELIMINARY Combined-Cycle Startup Emissions Estimate
1x1 5000F5ee Configuration

	CO		NOx		VOC		SO2		PM	
	g/Start		g/Start		g/Start		g/Start		g/Start	
	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2	GT3	GT4
Cold Start	1,275,502	N/A	71,214	N/A	176,901	N/A	1,269.4	N/A	2,268.0	N/A
Warm Start	1,033,737	N/A	53,977	N/A	119,295	N/A	997.6	N/A	1,814.4	N/A
Hot Start	266,259	N/A	16,783	N/A	32,205	N/A	400.8	N/A	453.6	N/A
Shutdown	166,468	N/A	19,051	N/A	21,047	N/A	568.4	N/A	907.2	N/A

	CO		NOx		VOC		SO2		PM	
	g/s		g/s		g/s		g/s		g/s	
	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2
Cold Start	341.5	N/A	18.9	N/A	48	N/A	0.3	N/A	0.6	N/A
Warm Start	322.6	N/A	16.4	N/A	38	N/A	0.3	N/A	0.6	N/A
Hot Start	197.8	N/A	12.6	N/A	24	N/A	0.3	N/A	0.5	N/A
Shutdown	274.7	N/A	20.2	N/A	35	N/A	0.4	N/A	0.6	N/A

Notes

1) Startup for the Permit is defined as the operation period beginning when continuous fuel flow to the gas turbine is initiated and ending when stack emissions compliance is achieved.

2) Startup for the Contract is defined as the operation period beginning when the gas turbine start is initiated and ending when the steam turbine is accepting full steam flow.

Startup Times

	Permit Time	Contract Time
	Minutes	
Cold Start	70	296
Warm Start	53	195
Hot Start	22	104
Shutdown	32	32

Wolverine Power Station Project
Start-up Emissions - Simple-Cycle Operation

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Client SaskPower
Project SaskPower Self Build Simple Cycle

PRELIMINARY Simple Cycle Startup Emissions Estimate
1x1 5000F5ee Configuration

	CO		NOx		VOC		SO2		PM	
	lb/Start		lb/Start		lb/Start		lb/Start		lb/Start	
	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2	GT3	GT4
Cold Start	560	N/A	28	N/A	63	N/A	0.3	N/A	1.9	N/A
Shutdown	310	N/A	21	N/A	35	N/A	0.2	N/A	1.3	N/A

	CO		NOx		VOC		SO2		PM	
	lb/hr		lb/hr		lb/hr		lb/hr		lb/hr	
	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2	GT1	GT2
Cold Start	591.44	N/A	105.91	N/A	69.65	N/A	5.20	N/A	1.86	N/A

Notes

1) Startup for the Permit is defined as the operation period beginning when continuous fuel flow to the gas turbine is initiated and ending when stack emissions compliance is achieved.

2) Startup for the Contract is defined as the operation period beginning when the gas turbine start is initiated and ending when the steam turbine is accepting full steam flow.

Startup Times

	Permit Time
	Minutes
Cold Start	20
Shutdown	15

Wolverine Power Station Project
Buildings

Building ID	Building Name	Number of Tiers	Tier Number	Base Elevation (m)	Tier Height (m)	Number of Corners	Corner 1 East (X) (m)	Corner 1 North (Y) (m)	Corner 2 East (X) (m)	Corner 2 North (Y) (m)	Corner 3 East (X) (m)	Corner 3 North (Y) (m)	Corner 4 East (X) (m)	Corner 4 North (Y) (m)	Corner 5 East (X) (m)	Corner 5 North (Y) (m)	Corner 6 East (X) (m)	Corner 6 North (Y) (m)	Corner 7 East (X) (m)	Corner 7 North (Y) (m)	Corner 8 East (X) (m)	Corner 8 North (Y) (m)	Corner 9 East (X) (m)	Corner 9 North (Y) (m)	Corner 10 East (X) (m)	Corner 10 North (Y) (m)
ACHE	Air Cooling Heat Exchanger	1	1	532	6.4	4	480,482.93	5,747,431.00	480,444.65	5,747,431.84	480,444.27	5,747,414.49	480,482.55	5,747,413.65												
GEN	Generator Building	1	1	532	3.0	4	480,423.55	5,747,443.46	480,419.56	5,747,443.42	480,419.56	5,747,434.58	480,423.56	5,747,434.58												
FP	Fire Pump Building	1	1	532	3.4	4	480,412.82	5,747,551.70	480,412.91	5,747,560.08	480,408.23	5,747,560.14	480,408.14	5,747,551.75												
DPH	Dew Point Heater Building	1	1	532	3.0	4	480,553.98	5,747,438.06	480,553.98	5,747,442.56	480,566.98	5,747,442.56	480,566.98	5,747,438.06												
CTG1	Electrical Room	5	1	532	8.1	10	480,520.06	5,747,531.56	480,488.30	5,747,531.98	480,488.27	5,747,493.60	480,447.96	5,747,493.60	480,447.96	5,747,481.69	480,469.88	5,747,481.69	480,469.97	5,747,437.28	480,552.88	5,747,437.38	480,552.88	5,747,481.69	480,520.10	5,747,481.69
CTG1	Gas Turbine Building	*	2	*	10.7	8	480,520.06	5,747,531.56	480,488.30	5,747,531.98	480,488.30	5,747,481.69	480,469.88	5,747,481.69	480,469.97	5,747,437.28	480,552.88	5,747,437.38	480,552.88	5,747,481.69	480,520.10	5,747,481.69				
CTG1	Steam Turbine Building	*	3	*	19.8	6	480,520.06	5,747,531.56	480,488.30	5,747,531.98	480,488.30	5,747,437.28	480,552.88	5,747,437.38	480,552.88	5,747,481.69	480,520.10	5,747,481.69								
CTG1	Gas Turbine Building	*	4	*	24.8	5	480,488.30	5,747,481.69	480,488.30	5,747,437.28	480,552.88	5,747,437.38	480,552.88	5,747,481.69	480,520.10	5,747,481.69										
CTG1	Gas Turbine Building	*	5	*	40.4	4	480,529.81	5,747,481.69	480,529.81	5,747,437.28	480,552.88	5,747,437.38	480,552.88	5,747,481.69												
WTB	Water Treatment Building	1	1	532	7.6	4	480,430.83	5,747,533.01	480,430.83	5,747,575.68	480,486.35	5,747,575.68	480,485.93	5,747,533.44												
ACC	Air Cooled Condenser	1	1	532	24.4	4	480,513.56	5,747,549.63	480,577.57	5,747,549.77	480,577.44	5,747,607.20	480,513.43	5,747,607.06												

Wolverine Power Station Project
Auxiliary Combustion Sources Emissions Calculations

Dew Point Heater

Size	9.30	MMBtu/hr
HHV	1,020	Btu/cf
Operation	8,760	hours/year

Dew Point Heater Stack Parameters

Height (meters)	Temp. (ºC)	Velocity (m/s)	Diameter (meters)	Stack Discharge Type	Fuel
4.9	176.7	3.7	0.8	Vertical	Natural Gas

	Emission Factors			Emissions	
Pollutant	lb/MMcf	lb/MMBtu	Source	g/s	tonnes per year
NO_X	100.0	0.10	AP-42[a]	0.1	3.6
CO	84.0	0.08	AP-42[a]	0.10	3.0
$PM/PM_{10}/PM_{2.5}$	7.6	0.007	AP-42[a]	0.01	0.3
SO_2	0.6	0.0006	AP-42[a]	0.001	0.02

(a) AP-42 Section 1.4 (7/98)

Emergency Fire Pump

Size	237.0	HP
	1.7	MMBtu/hr
	12.0	gal/hr
Operation	100.0	hours/year

Emergency Fire Pump Stack Parameters

Height (meters)	Temp. (ºC)	Velocity (m/s)	Diameter (meters)	Stack Discharge Type	Fuel
4.6	530.0	44.3	0.1	Vertical	Diesel

	Emission Factors				Emissions		
Pollutant	g/kw-hr	g/hp-hr	lb/hp-hr	Source	g/s	tonnes per year	g/s Equivalent
NO_X	4.0	3.0	--	NSPS[a]	0.2	0.1	0.003
CO	3.5	2.6	--	NSPS[a]	0.2	0.06	--
$PM/PM_{10}/PM_{2.5}$	0.2	0.15	--	NSPS[a]	0.01	0.004	0.0001
SO_2	--	--	0.002	AP-42[b]	0.1	0.02	0.001

(a) NSPS 40 CFR Part 60, Subapart IIII Limits

NSPS Limits - 40 CFR Part 60, Subapart IIII, (40 CFR 60 Table 4)

	NOx + VOM	CO	PM
g/kW-hr	4.0	3.5	0.20
g/hp-hr	3.0	2.6	0.15

(b) AP-42 Section 3.3 (10/96)

Emergency Generator

Size	1250.0	KW
	932.1	hp
	241.0	gal/hr
	12.6	MMBtu/hr
Operation	100.0	hours/year

Emergency Generator Stack Parameters

Height (meters)	Temp. (ºC)	Velocity (m/s)	Diameter (meters)	Stack Discharge Type	Fuel
4.9	448.9	52.2	0.4	Vertical	Diesel

	Emission Factors				Emissions		
Pollutant	g/kw-hr	g/hp-hr	lb/hp-hr	Source	g/s	tonnes per year	g/s Equivalent
NO_X	6.4	4.8	--	NSPS[a]	2.2	0.8	0.03
CO	3.5	2.6	--	NSPS[a]	1.2	0.4	--
$PM/PM_{10}/PM_{2.5}$	0.2	0.15	--	NSPS[a]	0.1	0.03	0.001
SO_2	--	--	0.002	AP-42[b]	0.2	0.09	0.003

(a) NSPS 40 CFR Part 60, Subapart IIII Limits

NSPS Limits - 40 CFR Part 60, Subapart IIII, (40 CFR 60.4202(a)(2) and 40 CFR 89.112 - Table 1)

	NOx + VOM	CO	PM
g/kW-hr	6.4	3.5	0.2
g/hp-hr	4.8	2.6	0.15

(b) AP-42 Section 3.3 (10/96)

APPENDIX C – MODELLING FIGURES

Figure C-2: CO 1-Hour Concentration Plot
Worst-Case Operating Load Impacts: Start-up/Shutdown Operation

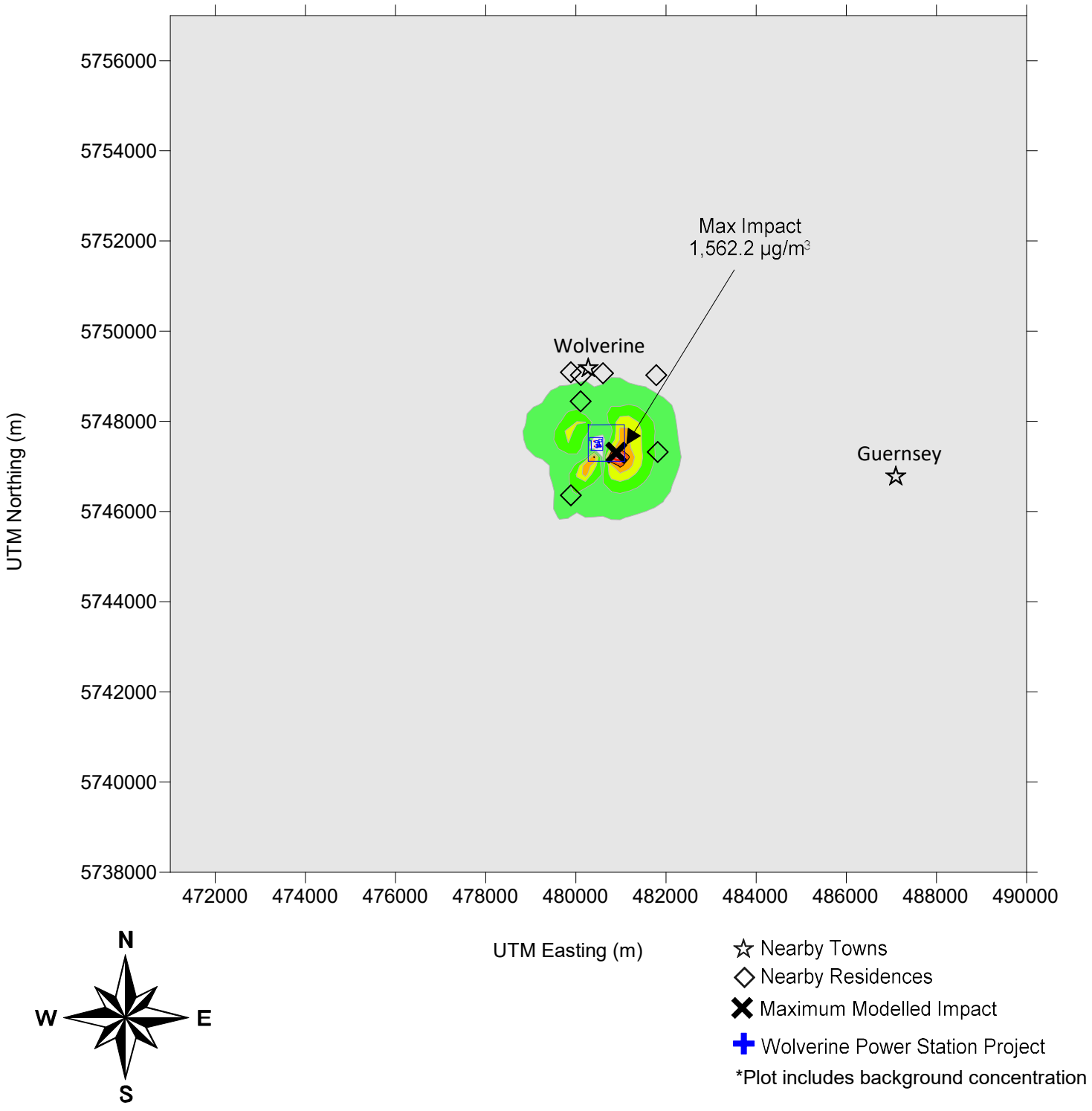

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Figure C-3: CO 8-Hour Concentration Plot
Worst-Case Operating Load Impacts: Start-up/Shutdown Operation

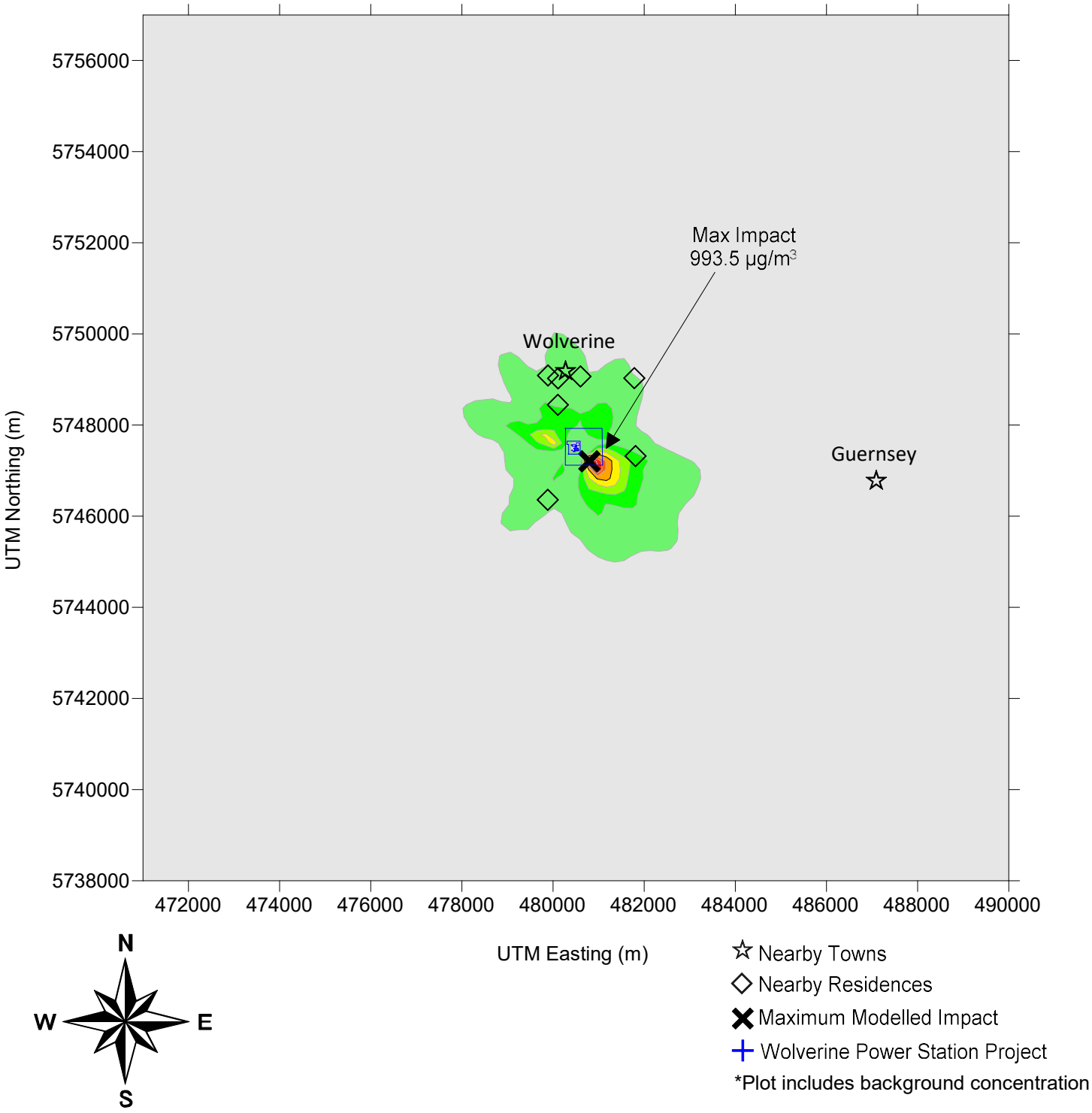

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Figure C-4: NO_2 1-Hour Concentration Plot
Worst-Case Operating Load Impacts: 100% Load Operation

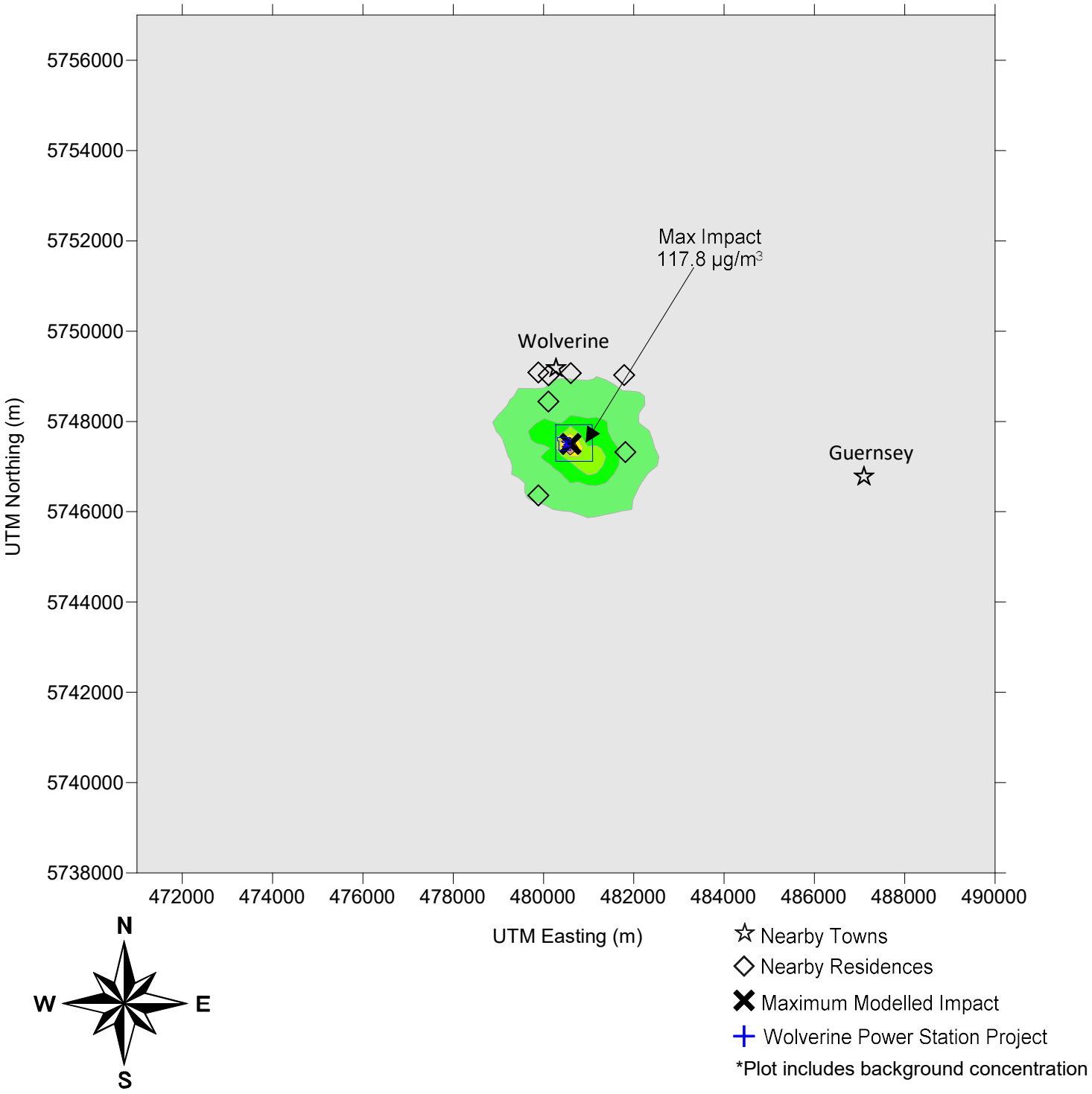

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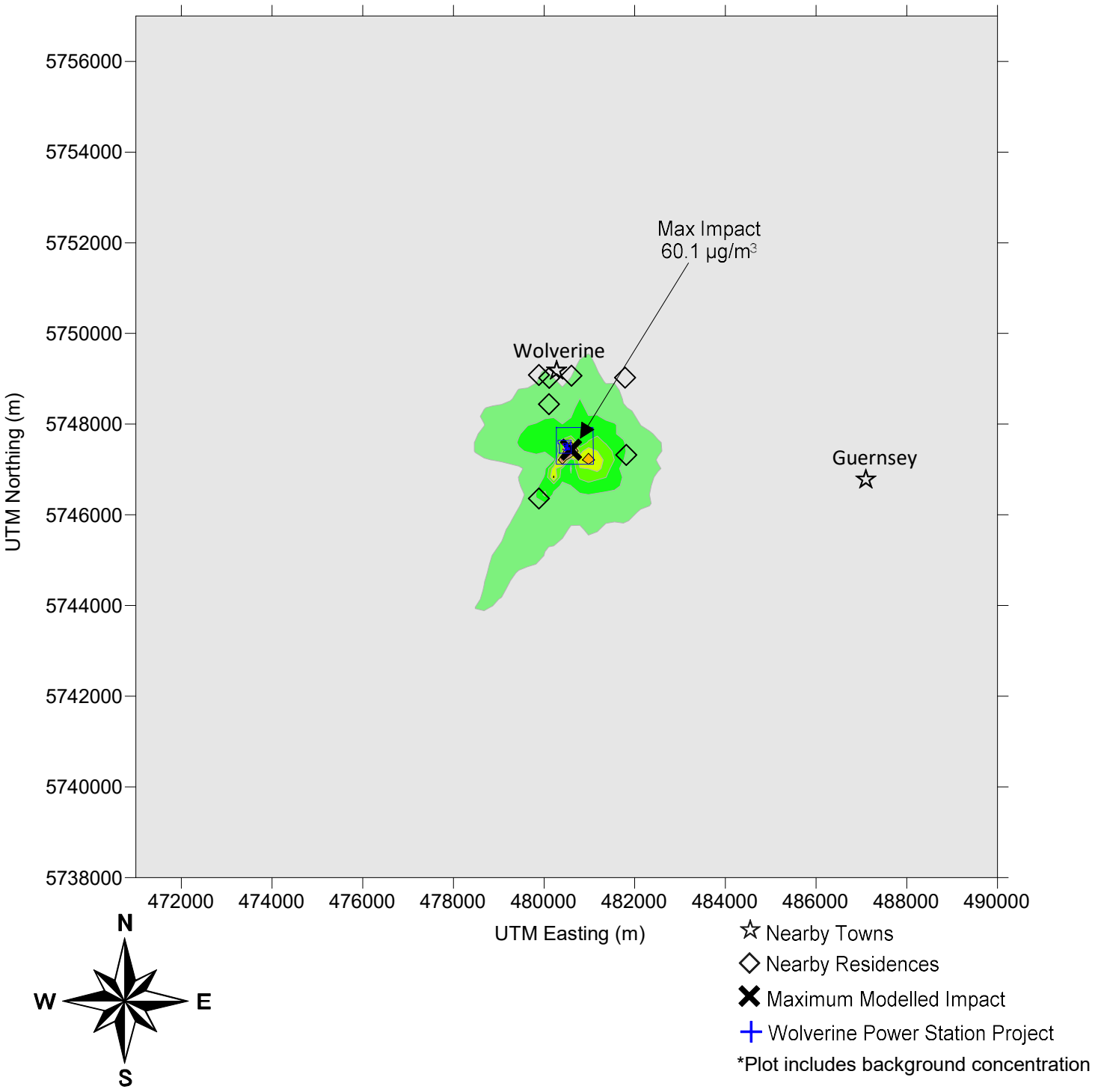
Figure C-5: NO_2 24-Hour Concentration Plot
Worst-Case Operating Load Impacts: Start-up/Shutdown Operation



Modelled Concentrations (µg/m³)

NO_2 24-hour SAAQS Threshold = 200 µg/m³

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Figure C-6: NO_2 Annual Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

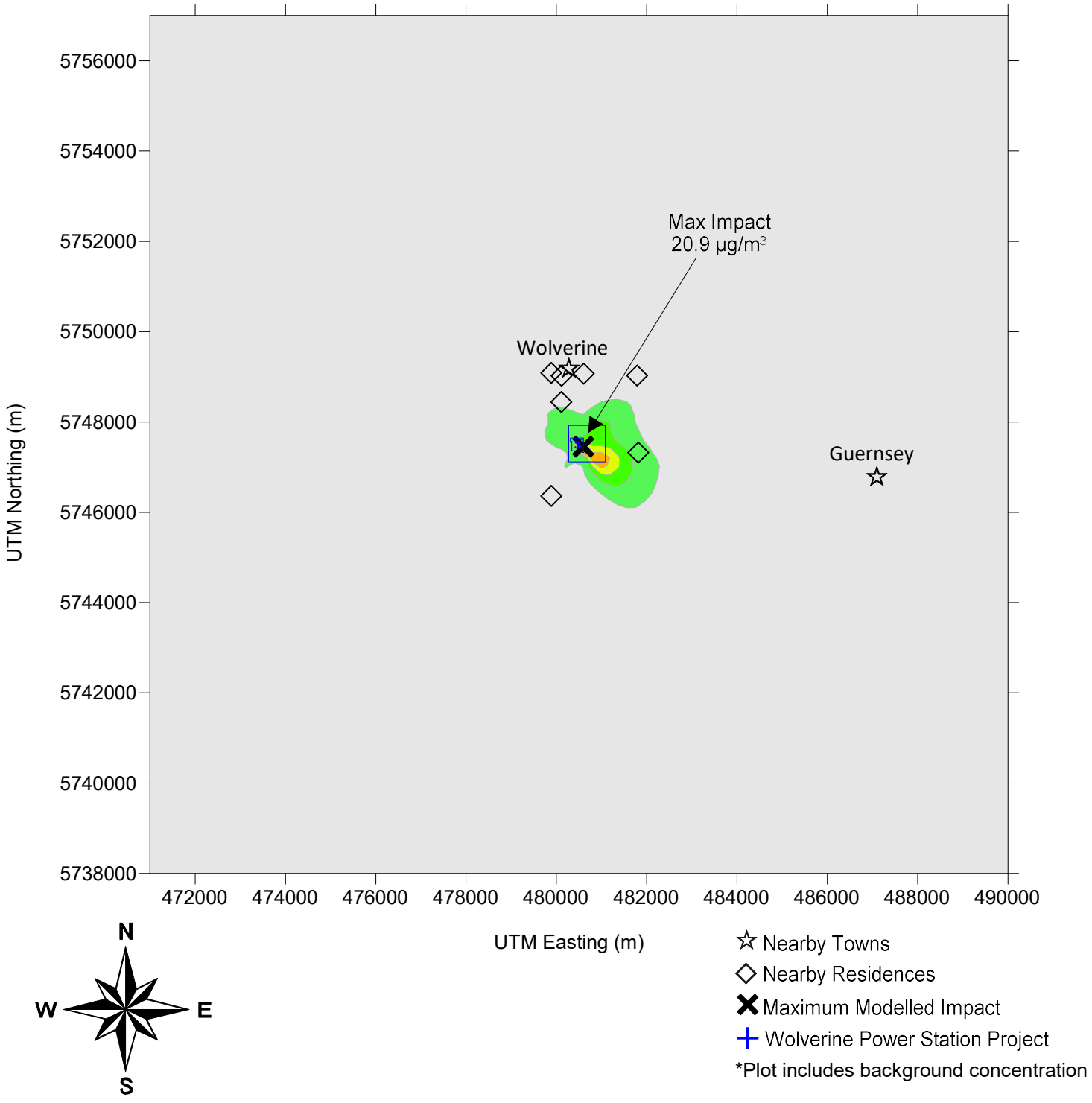

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Figure C-7: SO_2 1-hour Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

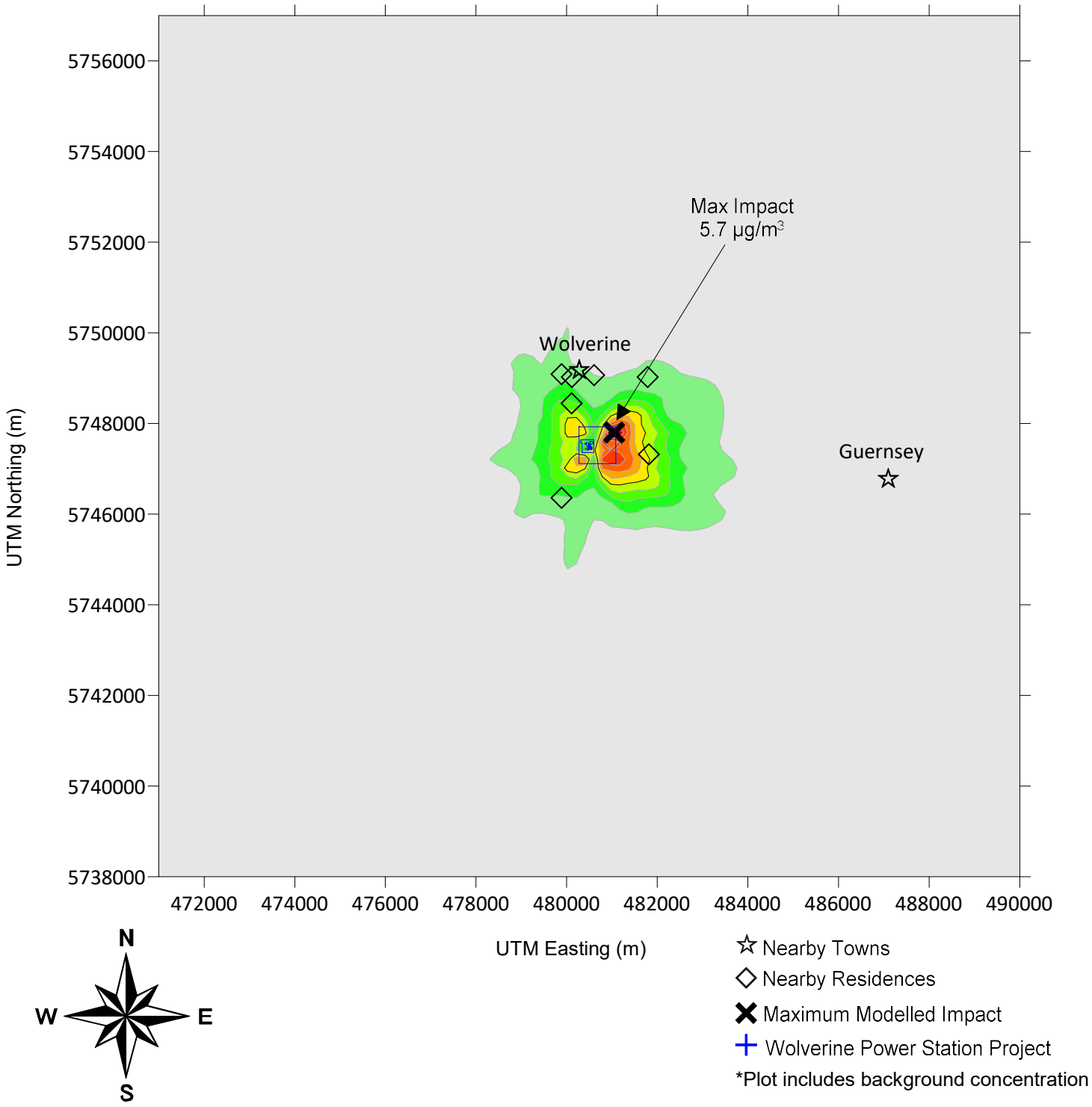

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Figure C-8: SO_2 24-hour Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

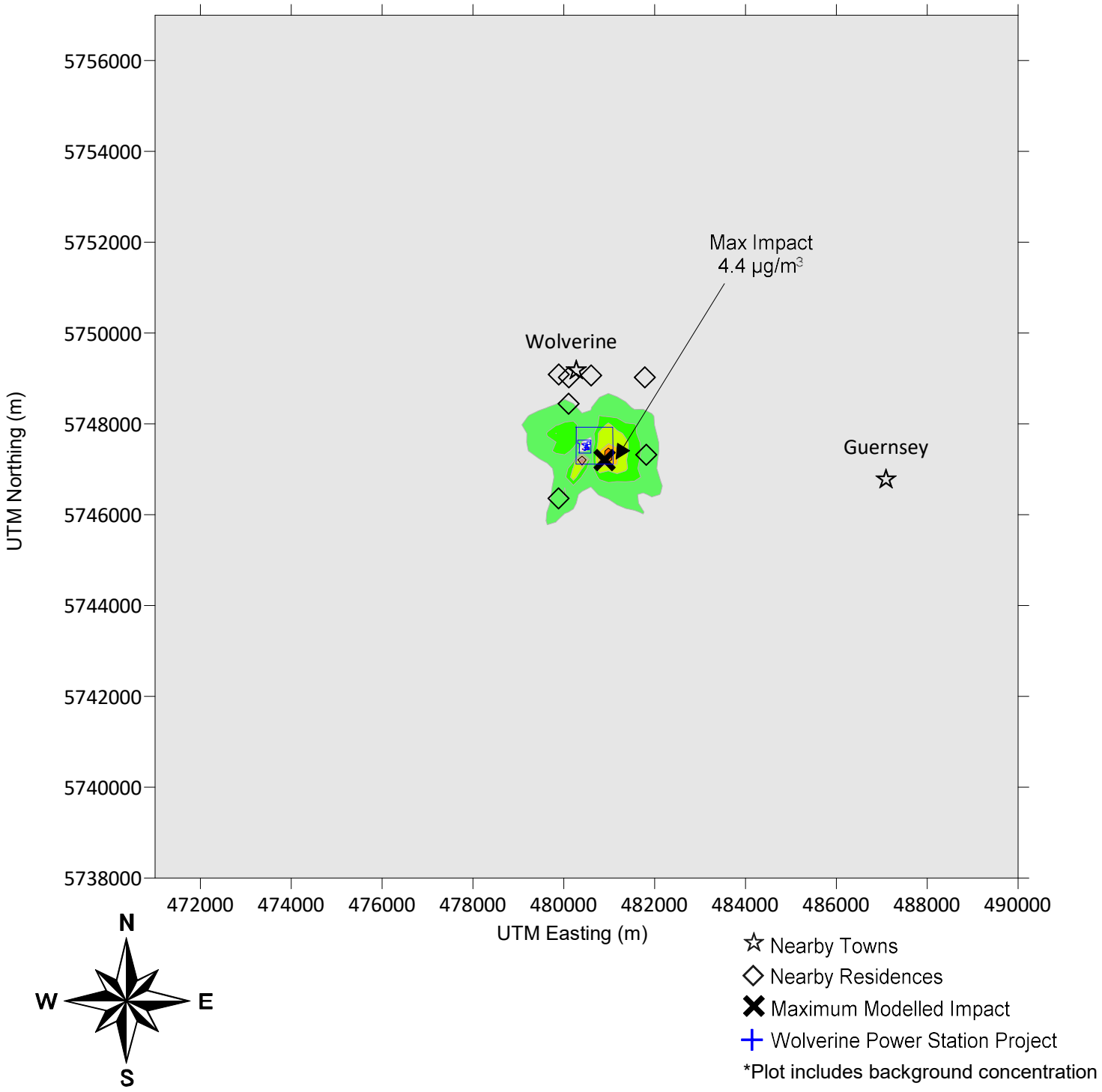

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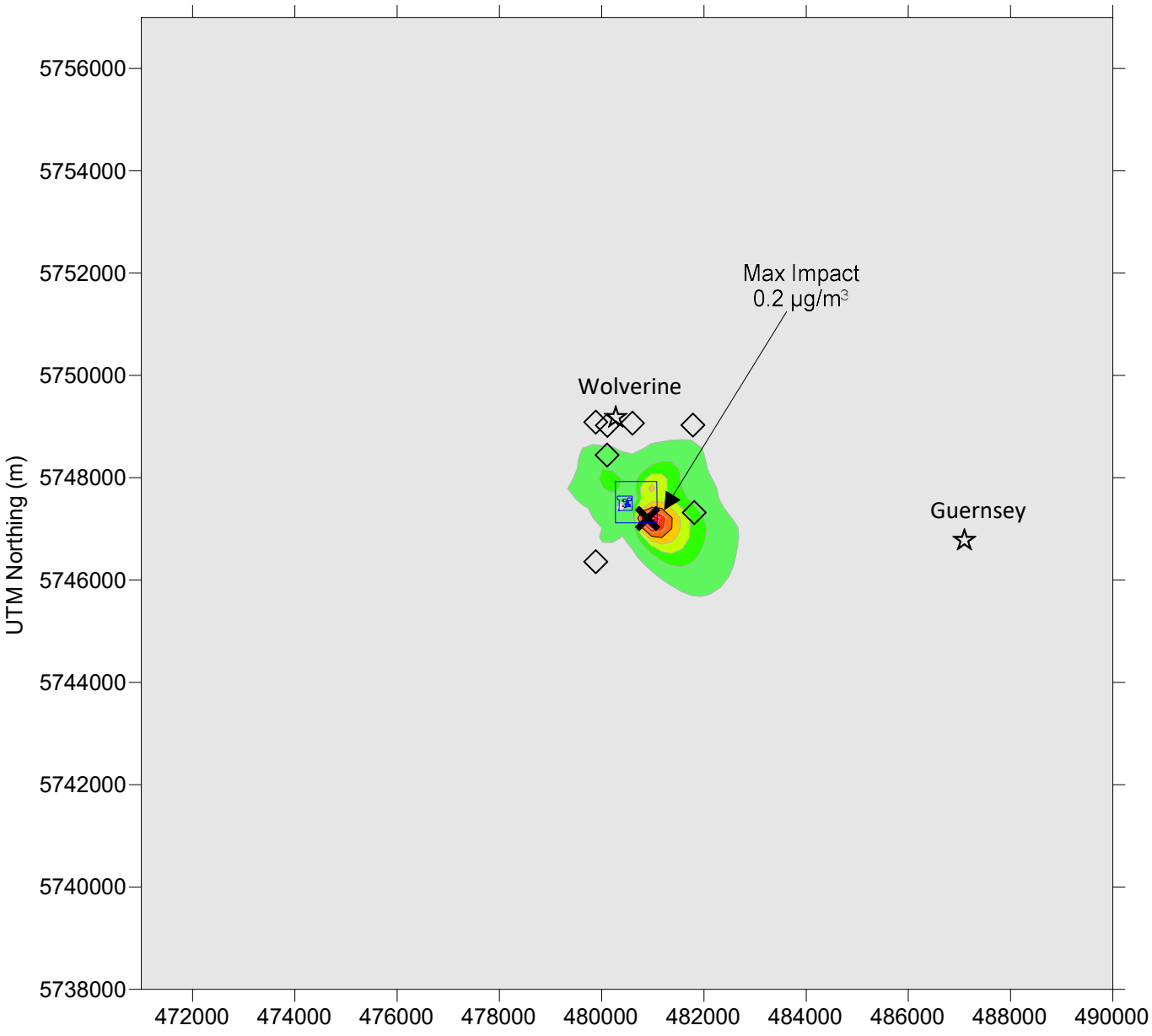
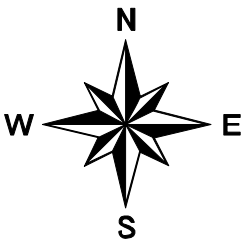
Figure C-9: SO_2 Annual Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

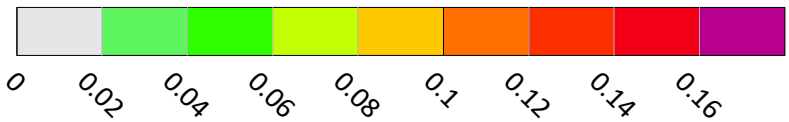




☆ Nearby Towns
◇ Nearby Residences
✖ Maximum Modelled Impact
+ Wolverine Power Station Project

*Plot includes background concentration

Modelled Concentrations (µg/m³)



SO_2 Annual SAAQS Threshold = 20 µg/m³

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Figure C-10: $PM_{2.5}$ 24-hour Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

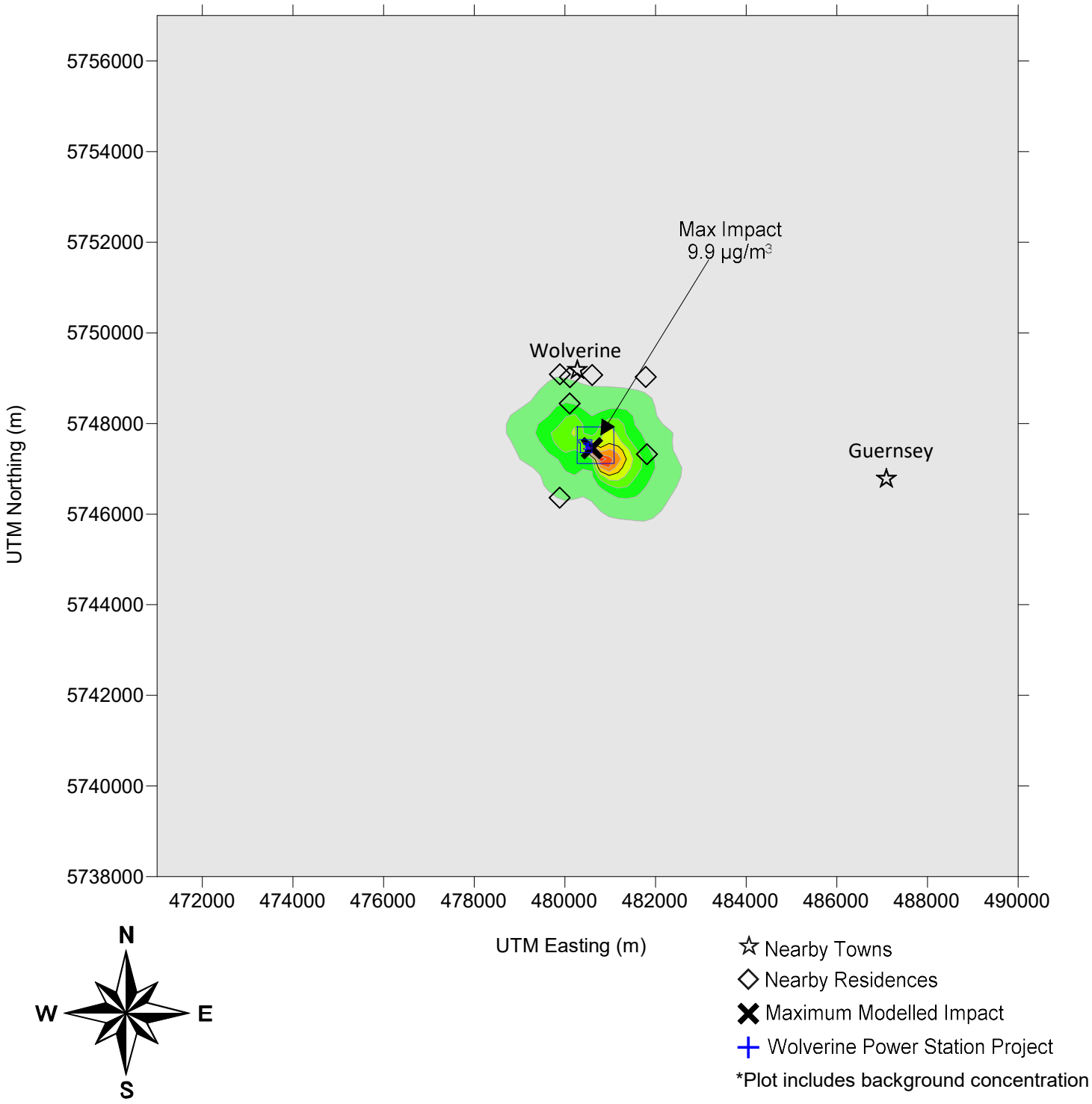

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Figure C-11: $PM_{2.5}$ Annual Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

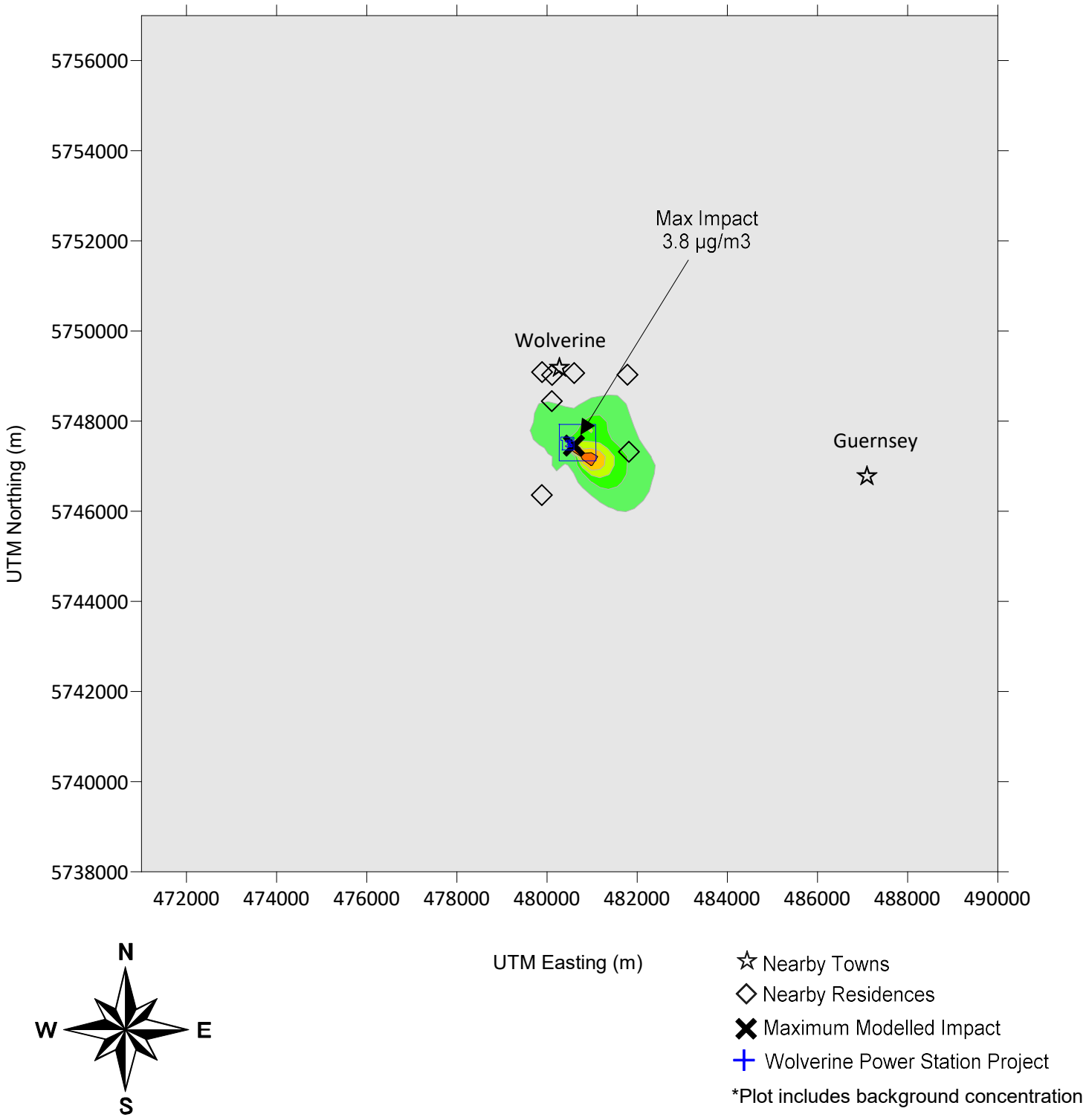

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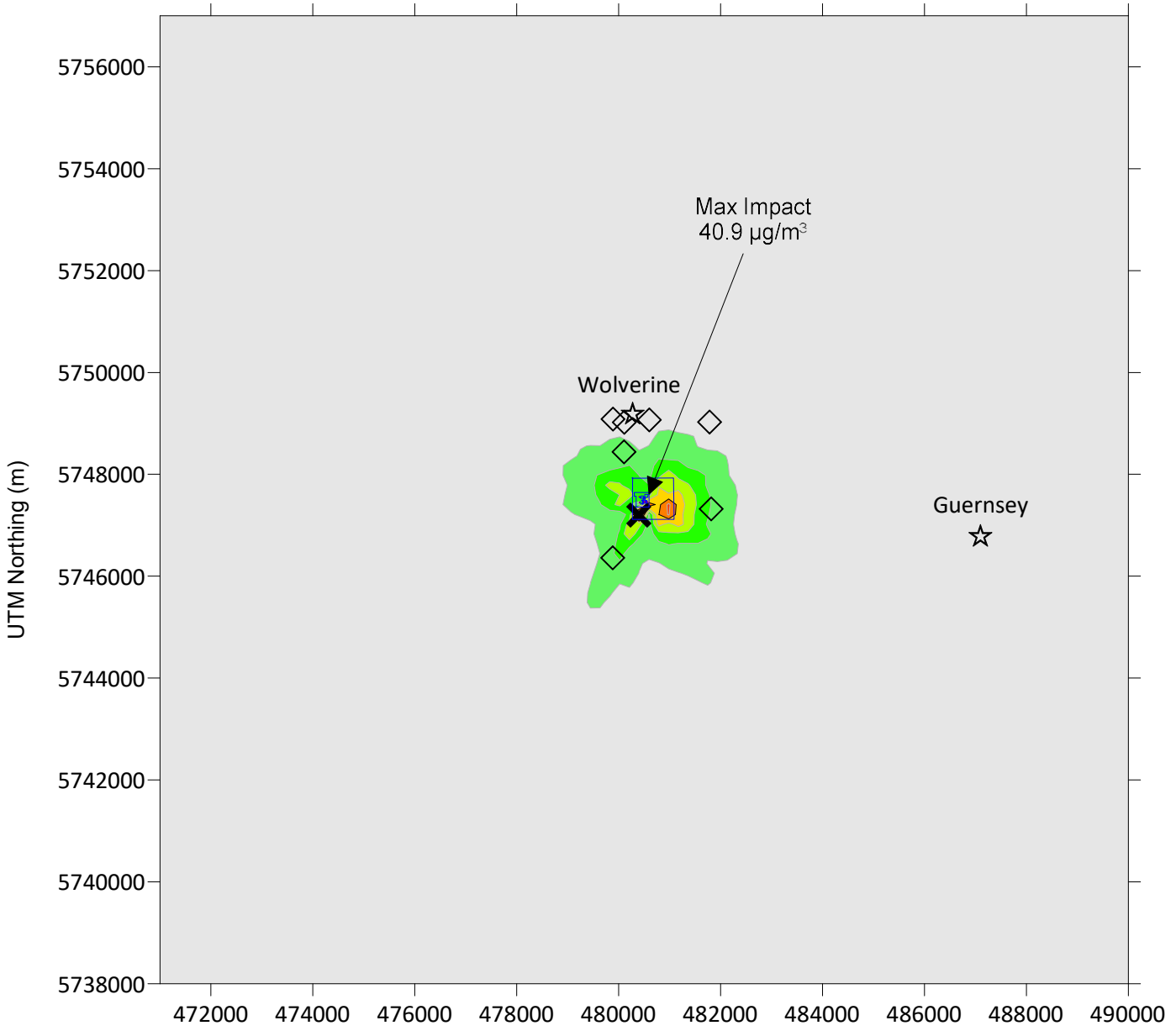
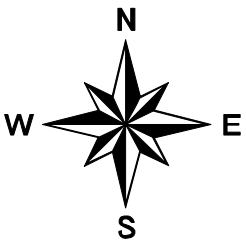
Figure C-12: PM_{10} 24-hour Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation





☆ Nearby Towns
◇ Nearby Residences
✖ Maximum Modelled Impact
\+ Wolverine Power Station Project
*Plot includes background concentration

Modelled Concentrations (µg/m³)

PM_{10} 24-hour SAAQS Threshold = 50 µg/m³

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Figure C-13: PM 24-hour Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation

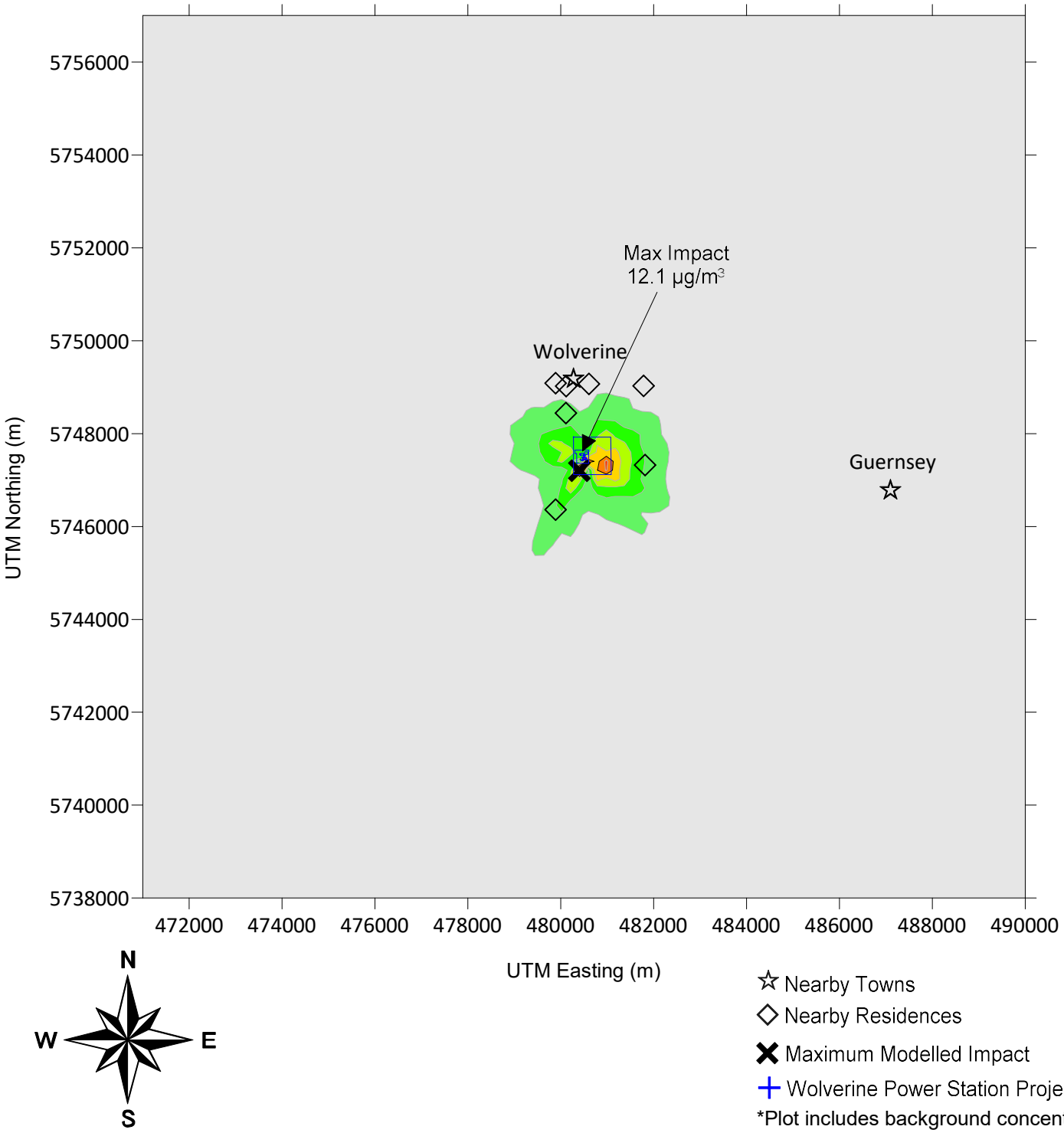

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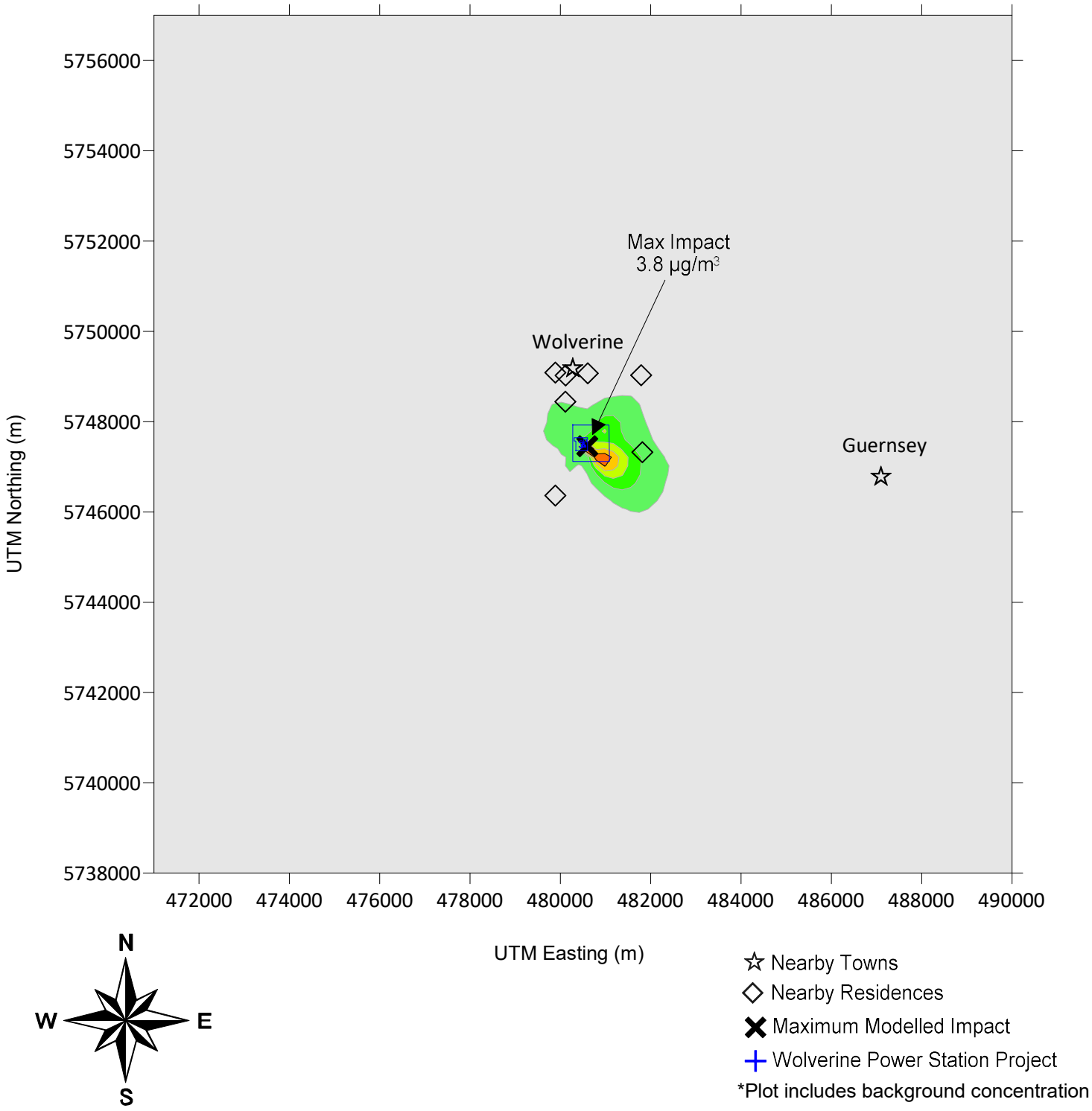
Figure C-14: PM Annual Concentration Plot
Worst-Case Operating Load Impacts: Minimum Emissions Compliant Load Operation



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CREATE AMAZING.

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Appendix H Noise Impact Assessment

H.1 Noise Impact Assessment

Noise Impact Assessment

SaskPower

Wolverine Power Station
Project No. 146929

Revision 0
11/4/2022

Noise Impact Assessment

prepared for

SaskPower
Wolverine Power Station
Wolverine, Saskatchewan

Project No. 146929

Revision 0
11/4/2022

prepared by

Burns & McDonnell
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ACC	air-cooled condenser
AUC	Alberta Utilities Commission
AUC Rule 012	Alberta Utilities Commission Rule 012
BSL	basic sound level
CadnaA	Computer Aided Noise Abatement
CTG	combustion turbine generator
dB	decibels
dBA	decibels A-weighted
dBC	decibels C-weighted
dBC-dBA	difference between dBC and dBA
HRSG	heat recovery steam generator
Hz	Hertz
ISO	International Organization of Standardization
LFN	low-frequency noise
L_{eq}	equivalent sound level
L_p	sound pressure level
L_w	sound power level
NIA	noise impact assessment
Project	Wolverine Power Station
PSL	permissible sound level
Rec	noise-sensitive receiver

Abbreviation	Term/Phrase/Name
STC	sound transmission class
STG	steam turbine generator

1.0 EXECUTIVE SUMMARY

Burns & McDonnell has conducted a noise impact assessment (NIA) for SaskPower's proposed Wolverine Power Station (Project) located near Wolverine, Saskatchewan. Major equipment to be installed at the 1x1 combined-cycle power plant consists of one combustion turbine generator (CTG), one heat recovery steam generator (HRSG), one steam turbine generator (STG) and an air-cooled condenser (ACC). The purpose of this NIA is to determine the design goal and predict the expected sound levels emanating from the Project as measured 15 meters from the most impacted dwelling(s) during normal steady state operations. Upset conditions such as startup, shutdown, and bypass operations are not evaluated within this NIA.

Burns & McDonnell reviewed noise regulations to determine sound level limits applicable to the Project. The Province of Saskatchewan does not have a numerical noise limit applicable to the Project. At the request of the SaskPower, and for consistency with other power-generation projects in Saskatchewan, the Project's sound level design goal is to meet the permissible sound level (PSL) as determined by Alberta Utilities Commission (AUC) Rule 012 (AUC Rule 012).

Burns & McDonnell has not collected ambient sound level data at this time. Therefore, an ambient nighttime sound level of 35 decibels A-weighted (dBA) and daytime sound level of 45 dBA were assumed in this analysis per AUC guidance. The calculated PSLs for the dwellings near the proposed Project are 40 dBA equivalent sound level (L_{eq}) during nighttime hours and 50 dBA L_{eq} during daytime hours. The more restrictive nighttime sound level limit will be used as the design goal for the Project, as the Project is designed to operate during both daytime and nighttime hours.

To quantify the noise emitted by the Project, a noise model was developed based on historical and vendor-supplied sound level data. Sound sources were modeled at noise-sensitive receivers in the surrounding community. Receivers were located a minimum of 15 meters from the dwelling in the direction of the Project.

The cumulative, predicted sound levels (logarithmic sum of Project emitted noise and assumed ambient noise) are expected to be at or below the PSLs at all nearby dwellings, and low-frequency noise is not expected to be an issue.

2.0 ACOUSTIC TERMINOLOGY

The terms “noise level” and “sound level” are often used interchangeably to describe two different sound characteristics called sound power and sound pressure. Every source that produces sound has a sound power level. The sound power level (L_w) is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the environment. The acoustical energy produced by a source propagates through the air as air pressure fluctuations. These pressure fluctuations, also called sound pressure (L_p), are what human ears hear and microphones measure.

Sound energy is physically characterized by amplitude and frequency. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. A 3-dB change in a continuous broadband sound level is generally considered “just barely perceptible” to the average listener. A 6-dB change is generally considered “clearly noticeable,” and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Frequency is measured in Hertz (Hz), which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighted scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighted scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighted scale has been applied is expressed in dBA. Although the A-Weighted scale is used for most applications, the C-Weighted scale (dBC) is also commonly used to estimate peak sound levels and low-frequency noise. For reference, the sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1.

Sound in the environment is constantly fluctuating, for example, when a car drives by, a dog barks, or a plane passes overhead. Although an instantaneous sound level measured in dBA may indicate the level of noise experienced by an observer at that point in time, environmental noise levels vary continuously. Most ambient environmental noise includes a mixture of noise from some identifiable sources plus a relatively steady background noise where no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) is used to describe sound that is constant or changing in level. The L_{eq} is the average sound level for a specific time period.

Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 ft.	--
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft.	--
120	Threshold of feeling	Elevated train	Hard rock band
110	--	Jet flyover at 1,000 ft.	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 ft., auto horn at 10 ft., crowd noise at football game	--
90	--	Propeller plane flyover at 1,000 ft., noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 ft.	Inside auto at high speed, garbage disposal
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 ft., near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Sources:
(1) Adapted from *Architectural Acoustics*, M. David Egan, 1988
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

3.0 APPLICABLE REGULATIONS AND PROJECT DESIGN GOAL

Burns & McDonnell reviewed noise regulations to determine sound level limits applicable to the Project. The Project will be located near Wolverine, Saskatchewan. The province of Saskatchewan does not establish numerical noise limits which would be applicable to the Project. At the request of the SaskPower, and to remain consistent with other power-generation projects within Saskatchewan, the Project's designed goal is to meet the PSLs as determined by AUC Rule 012.

3.1 AUC Rule 012

The purpose of AUC Rule 012 is to provide a procedure to verify that the noise from a facility, measured cumulatively with noise from other energy-related facilities, will not exceed the PSL calculated in accordance with the AUC Rule 012 methodology. The PSL is the maximum daytime or nighttime sound level at a point 15 meters from a dwelling in the direction of a facility. AUC Rule 012 defines a dwelling to be "any permanently or seasonally occupied structure used for habitation for the purpose of human rest; including a nursing home or hospital with the exception of an employee or worker residence, dormitory, or construction camp located within an energy-related industrial plant boundary. Trailer parks and campgrounds may qualify as a dwelling if it can be demonstrated that they are in regular and consistent use."

The cumulative sound level includes the assumed or measured ambient sound level; any existing and approved but not yet constructed energy-related facilities; and the predicted sound level from the applicant's proposed facility.

Ambient sound level measurements may be taken to quantify the existing sound levels in the area and, in conjunction with the basic sound level (BSL), refine the cumulative PSL. This ambient data would include existing transportation, industrial, extraneous sources in the area, and potentially existing energy-related facilities.

There is one existing energy-related facility in the area of the proposed Project (i.e., within 3000 meters). There is an existing substation located approximately 1,700 meters west of the proposed Project. The location of this facility is provided in Figure 3-1.

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Service Layer Credits: World Boundaries and Places: Esri, HERE, Garmin, GeoTechnologies, Inc., NRCan

BURNS McDONNELL

Figure 3-1

SaskPower Wolverine Substation and Receiver Locations

Source: ESRI, Burns & McDonnell

Issued: 11/2/2022

Within the noise measurement section of AUC Rule 012, low-frequency noise is addressed. The rule provides two conditions that must both be exceeded to indicate the presence of problematic low-frequency noise at a dwelling. The first condition is if the difference of the dBC and dBA (dBC-dBA) levels is 20 dB or greater. The second condition requires an analysis of one-third octave bands between 20 and 250 Hz. The data necessary to perform the one-third octave band analysis is not readily available during the design phase of a project.

3.2 Permissible Sound Levels

Per the AUC Rule 012, the PSL at a dwelling is the sum of the BSL, daytime adjustment, Class A adjustments, Class B adjustments, and/or Class C adjustments. Based on desktop review, three nearby dwellings have been identified within 1,500 meters of the proposed Project boundary and will be evaluated within this NIA. The Project location and nearby dwellings, labeled Receiver (Rec) 01 through 03 are shown in Figure 3-1.

3.2.1 Basic Sound Level and Assumed Ambient Sound Levels

Per the AUC Rule 012, the nighttime BSL is determined by the number of dwellings per quarter section of land and the distance from the dwelling to transportation noise sources such as a heavily traveled road, railway, or frequent aircraft flyovers. The BSLs based on these factors are provided in Table 3-1. Assumed ambient nighttime sound levels are 5 dBA less than the basic sound level and assumed ambient daytime levels are 5 dBA greater than the basic sound levels in accordance with the AUC Rule 012 methodology.

Table 3-1: Nighttime Basic Sound Levels (dBA L_{eq})

Proximity to Transportation Noise Source	Dwellings per Quarter Section of Land		
	1 to 8 Dwellings	9 to 160 Dwellings	> 160 Dwellings
Category 1[a]	40	43	46
Category 2[b]	45	48	51
Category 3[c]	50	53	56

a) Category 1 dwellings are located more than 500 meters from transportation noise sources such as heavily traveled roads, railways, and are not subject to regular aircraft overflight.
b) Category 2 dwellings are located more than 30 meters but less than 500 meters from transportation noise sources such as heavily traveled roads, railways, and are not subject to regular aircraft overflight.
c) Category 3 dwellings are located less than 30 meters from transportation noise sources such as heavily traveled roads, railways, or are subject to regular aircraft overflight.

The lowest BSL for the identified receivers is based on a desktop review showing there are between 1 and 8 dwellings per quarter section of land, and the dwellings nearest the proposed Project are more than 500 meters from the heavily traveled roadways, rails, and are not subject to regular aircraft overflight in the

area. As a conservative measure, this BSL is assumed for all receivers in the area. Therefore, the nighttime BSLs for dwellings in proximity to the Project is 40 dBA L_{eq}. Per AUC Rule 012, the assumed ambient daytime and nighttime sound levels are 45 and 35 dBA, respectively.

3.2.2 Daytime Adjustment

Per the AUC Rule 012, the daytime adjustment factor is 10 dBA for the hours of 7:00 A.M to 10:00 P.M.

3.2.3 Class A Adjustments

There are two types of Class A adjustments defined within AUC Rule 012: A1 and A2. An A1 adjustment is a +5-dBA seasonal adjustment for measurements during wintertime conditions. This adjustment is not applicable during the design phase of the Project.

An A2 adjustment is an ambient noise monitoring adjustment, applicable if the measured ambient sound level differs from the assumed ambient sound level. The adjustment can range between -10 to +10 dBA. At this time, ambient noise monitoring has not been completed and the assumed ambient sound levels will be used for this analysis with no further adjustment. Ambient sound level measurements may be taken to quantify the existing sound levels in the area and used to refine the cumulative PSL. This ambient data will include existing transportation, industrial, extraneous sources in the area, and any existing energy-related facilities in the area.

3.2.4 Class B Adjustments

Class B adjustments increase the BSL for temporary noise generating activities. Temporary noise generating activities are those lasting up to 60 days and not expected to occur more than once every 12 months. In order to use this adjustment, the Project must inform the potentially-impacted residence of the duration and character of the temporary noise. This analysis focuses on the normal, steady-state operation of the Project and does not utilize any Class B adjustment for temporary noise activities.

3.2.5 Class C Adjustments

Class C adjustments are specific to wind energy projects and are not applicable to this Project.

3.2.6 Calculated Permissible Sound Levels and Project Design Goal

The PSLs for dwellings near the proposed Project are calculated by taking the sum of the BSL and each of the applicable adjustments. Dwellings Rec01, Rec02, and Rec03 are considered Category 1, as they are more than 500 meters from heavily traveled roads and railways. Dwellings Rec04, Rec05, Rec06, and Rec07 are considered Category 2, as they are each within 500 meters of heavily traveled roads and railways. Category 2 residences are considered to have a nighttime BSL that is 5 dBA higher than

Category 1 (the calculated PSL would also be 5 dBA higher). As a conservative estimate it was assumed all seven dwellings are Category 1. The calculations of the PSLs are provided in Table 3-2.

Table 3-2: Permissible Sound Levels (dBA L_{eq}) at Nearby Dwellings

Time of Day	Basic Sound Level	Sound Level Adjustments					Permissible Sound Level
		Daytime	Class A1	Class A2	Class B	Class C	
Nighttime[a]	40	0	0	0	0	0	40
Daytime[b]	40	10	0	0	0	0	50

a) Nighttime hours are from 10:00 P.M. to 7:00 A.M.
b) Daytime hours are from 7:00 A.M. to 10:00 P.M.

The calculated PSLs for the dwellings near the proposed Project are 40 dBA L_{eq} during nighttime hours and 50 dBA L_{eq} during daytime hours. These values will be used as a design goal for the proposed Project. The receiver names, location, receptor height, distance to the Project and PSL design goal are listed below in Table 3-3. Dwellings that are 1 story have receivers placed at 1.5 meters above ground level and dwellings that are 2 story have receivers placed at 4.5 meters above ground level.

Table 3-3: Nearby Dwellings

Receiver Location	Coordinates (UTM Meters Zone 13)		Receptor Height[a] (m)	Distance to Project (m)	Nighttime Permissible Sound Level (dBA)
	Easting	Northing			
Rec01	480,120	5,748,423	1.5	930	40
Rec02	479,892	5,746,375	1.5	1,180	40
Rec03	481,795	5,747,323	1.5	1,260	40
Rec04	479,901	5,749,075	4.5	1,580	40
Rec05	480,125	5,749,003	4.5	1,440	40
Rec06	480,600	5,749,045	4.5	1,430	40
Rec07	481,784	5,749,005	4.5	1,880	40

a) Single-story homes had receptors set to 1.5 meters and two-story homes had receptors placed at 4.5 meters.

4.0 CUMULATIVE SOUND LEVELS

The sound levels for the existing substation were estimated and added to the assumed ambient sound levels to determine the cumulative sound levels at each critical receiver. To quantify the noise emitted by the Project, a noise model was developed based on historical and vendor-supplied sound-level data. The noise emitted from the existing substation was estimated based on common transformer sound levels, but they are only an estimate as substation sound level data was not available. It is not expected that the existing substation sound levels are a major source of noise at the receivers due to the distance between the substation and respective receivers. However, the potential noise contribution was accounted for.

4.1 Existing Energy-Related Sound Sources

4.1.1 Substation

There is no measured sound level data available for the existing substation. To estimate the sound emitted from the substation, it was conservatively assumed that the large transmission transformer was approximately 85 dBA sound pressure level at three feet, which is a common sound level for transmission substation transformers. The two smaller distribution transformers were set to 80 dBA at 3 feet. The nearest dwelling is located approximately 1790 meters northeast of the substation. The substation-generated sound was modeled at each of the seven receivers analyzed within this report. The distance from the center of the substation to the receiver locations in this study and estimated substation sound levels are provided in Table 4-1. Topography effects on sound propagation resulted in sound levels at Rec02 being the loudest impacts from the substation.

Table 4-1: Estimated Sound Levels for Existing Substation

Receiver Location	Distance to Center of Substation (meters)	Estimated Sound Level (dBA)
Rec01	1,790	22.8
Rec02	1,795	23.3
Rec03	3,290	15.3
Rec04	2,020	21.4
Rec05	2,130	20.8
Rec06	2,530	18.6
Rec07	3,550	14.4

4.2 Proposed Wolverine Power Station

To quantify the noise emitted by the Project, a noise model was developed based on historical and vendor-supplied sound level data.

4.2.1 Sound Modeling Methodology

Sound modeling was performed using industry-accepted sound modeling software Computer Aided Noise Abatement (CadnaA), version 2022. The software is a scaled, three-dimensional program, which accounts for air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise-emitting equipment and predicts sound pressure levels. The model calculates sound propagation based on International Organization of Standardization (ISO) 9613-2:1996, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates sound propagation using omnidirectional, downwind sound propagation and worst-case directivity factors. In other words, the model assumes that each piece of equipment propagates its maximum sound level in all directions at all times. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results are generally considered conservative. The modeled atmospheric conditions were assumed to be calm, and the temperature and relative humidity were left at the program's default values. Reflections and shielding were considered for sound waves encountering physical structures. General modeling parameters used in the model are provided in Table 4-2.

Table 4-2: Sound Model Input Parameters

Model Input	Parameter Value
Ground Absorption - Offsite	G = 0.5
Ground Absorption - Onsite	G = 0.2
Foliage	Not Included
Number of Reflections	2
Receptor Height	1.5 meters above grade
Temperature	50 °F

4.2.2 Sound Sources and Sound Mitigation

To estimate the sound levels emitted by the Project, each major piece of equipment associated with the proposed Project was modeled with its expected sound power levels, L_w. Vendor-provided sound data for

all equipment was not available; therefore, historical data was used when required. The historical data was taken from projects of similar scope and size. Appendix A provides the octave-band sound power level inputs for the model. A site layout of the major equipment is provided in Figure 4-1.

To meet the PSLs at nearby dwellings, some of the equipment will require noise mitigation measures in their design. Actual mitigation will be selected during detailed design of the Project. Typical mitigation measures that can be implemented for the equipment may consist of some combination of the following:

- Silencer,
- Acoustical barriers,
- Enclosures or wraps,
- Relocation of equipment,
- Use of low-noise equipment,
- Acoustical building elements, and/or
- Acoustical louvers or silencers for building ventilation.

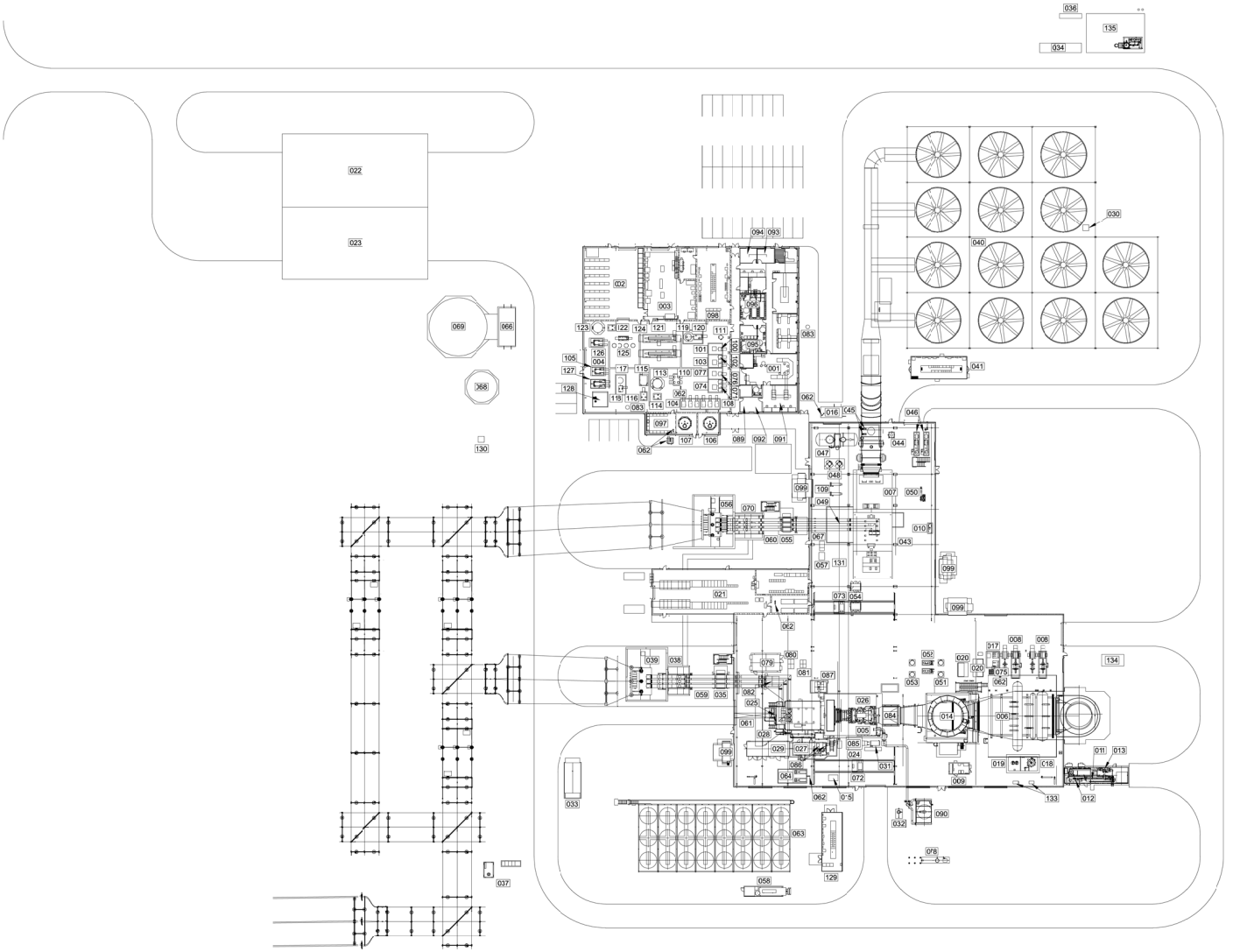
A summary of the major equipment sound levels in either L_w or L_p at distance, are provided in Table 4-3. The required sound transmission class (STC) of the combustion- and steam-turbine buildings are also provided in the table.

Table 4-3: Sound Mitigation for Major Sound Sources and Buildings

Sound Source	Sound Metric[a]	Equipment Sound Level (dBA)[b]	Measurement Location	Typical Form of Mitigation[c]
ACC	L_p	52	400 feet	Low Noise Fans / Fan Deck Barrier
Air-Cooled Heat Exchanger	L_w	51	400 feet	Low Noise Fans
HRSG Stack Exit	L_w (w/o directivity)	97	--	Stack Silencer
Simple-Cycle Stack Exit	L_w (w/o directivity)	108	--	Stack Silencer
CTG Inlet Face	L_w	100	--	Inlet Silencer / Acoustical Hood
GSU Transformers	L_p	80	3 feet	Low Noise Transformer
BOP Equipment	L_p	85	3 feet	Varies
Turbine Hall Walls	STC	39[b]	--	Insulated Wall Assembly
Turbine Hall Roofs	STC	39[b]	--	Steel Roof with Insulation
Turbine Hall Louvers	NR	10[b]	--	6-inch standard louver

a) L_p – sound pressure level, L_w – sound power level, STC – sound transmission class, NR – noise reduction
b) Modeled sound power levels per individual frequency bands are provided for each noise source in Appendix A.
c) Common forms of mitigation provided. Actual mitigation will be selected during detailed design of the Project.

EQUIPMENT IDENTIFICATON AND LOCATION LIST	
DWG REF	DESCRIPTION NEW SITE EQUIPMENT
001	MAIN CONTROL ROOM / ADMINISTRATION ROOMS
002	WAREHOUSE
003	MAINTENANCE SHOP
004	WATER TREATMENT BUILDING
005	GAS TURBINE GENERATOR (GTG)
006	HEAT RECOVERY STEAM GENERATOR (HRSG)
007	STEAM TURBINE GENERATOR (STG)
008	BOILER FEEDWATER PUMP
009	CEMS ENCLOSURE
010	TEMPERING WATER SKID
011	FUEL GAS PERFORMANCE HEATER
012	FUEL GAS KNOCKOUT TANK / DRAINS TANK
013	FUEL GAS FILTER/SEPARATOR
014	BYPASS STACK
015	CLOSED COOLING WATER HEAD TANK
016	STG CHEMICAL FEED ENCLOSURE
017	HRSG CHEMICAL FEED SKID
018	HRSG BLOWDOWN TANK
019	HRSG BLOWDOWN SUMP & PUMPS
020	SAMPLE PANELS
021	MAIN ELECTRICAL ROOM
022	COLD STORAGE BUILDING
023	HEATED STORAGE BUILDING
024	GTG WASH WATER SKID
025	GTG TURNING GEAR
026	GTG TURBINE ENCLOSURE
027	GTG LUBE OIL PACKAGE
028	GTG AIR INLET FILTER
029	GTG ELECTRICAL PACKAGE
030	ACC CLEANING SYSTEM
031	GTG FIRE PROTECTION PACKAGE
032	GTG WASH WATER DRAIN TANK (UNDERGROUND)
033	EMERGENCY DIESEL GENERATOR
034	HIGH PRESSURE FUEL GAS REGULATING SKID
035	GENERATOR CIRCUIT BREAKER (GTG)
036	LOW PRESSURE FUEL GAS REGULATING SKID
037	CONSTRUCTION PCC AND XFMR VAULT
038	GTG AUXILIARY TRANSFORMER
039	GTG GSU TRANSFORMER
040	AIR COOLED CONDENSER (ACC)
041	ACC PCM
042	NOT USED
043	STG FLASH TANK
044	STG ATMOSPHERIC DRAINS TANK
045	DRAIN POT PUMPS
046	VACUUM PUMP SKID
047	CONDENSATE STORAGE TANK
048	CONDENSATE PUMPS
049	STEAM TURBINE CONTROL OIL SKID
050	GLAND STEAM CONDENSER
051	DRY AIR RECEIVERS
052	AIR DRYER SKIDS
053	WET AIR RECEIVERS
054	AIR COMPRESSORS
055	GENERATOR CIRCUIT BREAKER (STG)
056	STG GSU TRANSFORMER
057	STG EXCTATION TRANSFORMER
058	FUEL GAS DEW POINT HEATER
059	GTG ISOPHASE BUS
060	STG ISOPHASE BUS
061	GENERATOR ROTOR PULL
062	SAFETY SHOWER
063	CLOSED COOLING WATER HEAT EXCHANGER
064	CLOSED COOLING WATER PUMPS
065	NOT USED
066	FIRE PUMP ENCLOSURE
067	STG EXCTER
068	DEMINERALIZED WATER STORAGE TANK
069	SERVICE/ FIRE WATER STORAGE TANK
070	STG AUXILIARY TRANSFORMER
071	SODIUM HYDROXIDE DOSING SKID
072	GTG CRANE
073	STG CRANE
074	SODIUM HYDROXIDE TOTE
075	NITROGEN BOTTLE RACK
076	BIOCIDE DOSING SKID
077	BIOCIDE TOTE
078	OIL / WATER SEPARATOR
079	SEE / SFC PACKAGE
080	SFC TRANSFORMER
081	SEE TRANSFORMER
082	VT & SURGE CUBICLE WITH SFC SWITCH
083	SANITARY LIFT STATION
084	EXHAUST TRANSITION DUCT
085	GTG AIR COMPRESSOR
086	GTG LUBE OIL COOLERS
087	GTG CONTROL OIL SKID
088	NOT USED
089	LIBRARY
090	ROTOR AIR COOLER
091	DCS ROOM
092	TELECOM ROOM
093	CONFERENCE ROOM
094	BREAKROOM
095	WOMEN LOCKER ROOM
096	MEN LOCKER ROOM
097	LAB
098	WT ELECTRICAL ROOM
099	AIR HANDLING UNIT
100	ANITSCALANT DOSING SKD
101	ANTISCALANT TOTE
102	SODIUM BISULFITE DOSING SKID
103	SODIUM BISULFITE TOTE
104	SULFURIC ACID DOSING SKIDS
105	WASTE WATER PUMP SKID
106	SODIUM HYPO TANK
107	SULFURIC ACID TANK
108	SODIUM HYPO DOSING SKIDS
109	CONDENSATE FILTERS
110	OILY WATER POLISHING SYSTEM
111	WTB AIR RECEIVER
112	NOT USED
113	UF PERMEATE/BACKWASH TANK
114	RO FEEDPUMPS SKID
115	ULTRAFILTRATION SKID
116	AUTOMATIC BACKWASH STRAINER SKID
117	WASTE WATER TREATMENT SYSTEM TANK
118	WASTE WATER TREATMENT SYSTEM SKID
119	UF/RO CIP TANK
120	UF/RO CIP SKID
121	RO SKID
122	RO TRANSFER PUMP SKID
123	RO PERMEATE TANK
124	MIXED BED FACE PIPING SKID
125	OFF-SITE REGEN MIXED BED
126	DEMINERALIZED WATER PUMP SKID
127	SERVICE WATER SKID
128	RO/UF REJECT SUMP
129	HRSG PCM
130	REGULATOR CONTROL BUILDING
131	STG LUBE OIL SKID
132	NOT USED
133	BLOWDOWN COOLER HEAT EXCHANGER
134	FLAMMABLE MATERIAL ENCLOSURE
135	FUEL GAS YARD



PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
CERTIFICATE No. 27521
PROJECT No. 140929

Figure 4-1

REVISED BY	DATE	AUTHORIZED BY	APPROVED BY	SEALED BY
O				
N				
M				
L				
K				
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G				
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E				
D				
C				
B	C. YODER	C105621		ISSUED FOR REVIEW
A	C. YODER	062322		ISSUED FOR REVIEW

ENGINEERING SEAL

CONTRACT INFORMATION
CONTRACT No.
CONTRACT NAME

DESIGN DEPT.
DESIGNED BY
AUTHORIZED BY
APPROVED BY
SEALED BY
DATE

SaskPower

GENERAL ARRANGEMENT
SITE PLAN

UNIT No. 00
WOLVERINE POWER STATION

DRAFTING DEPT.
DRAWN BY C. YODER
CHECKED BY
APPROVED BY
DATE
SCALE AS SHOWN
DRAWING No.
WYPS
00-R-GA.001
SHEET: 1
REV A

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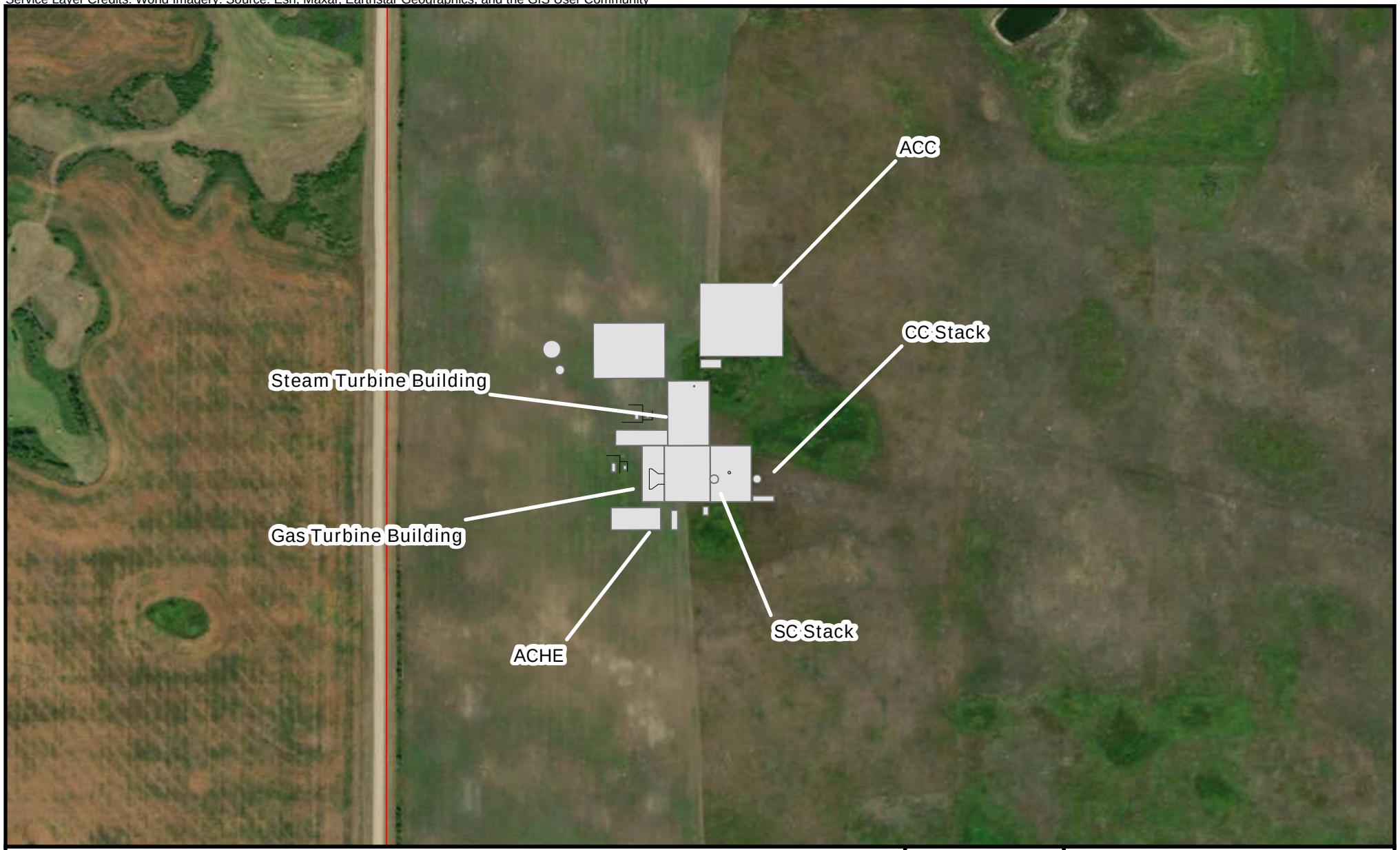

Project Structures
Property line

NORTH
100 50 0 100
Meters

BURNS McDONNELL

Figure 4-2

SaskPower Wolverine
Project Layout

Source: ESRI, Burns & McDonnell

Issued: 10/24/2022

4.3 Ambient Sound Levels

This analysis uses the assumed ambient sound levels of 45 dBA for daytime hours and 35 dBA for nighttime hours provided in AUC Rule 012. Ambient sound levels measurements may be taken to quantify the existing sound levels in the area and be used to refine the cumulative PSL. Burns & McDonnell has not collected ambient data at this time, so the assumed ambient sound levels were used for further analysis.

4.4 Estimated Cumulative Sound Levels

Sound sources were propagated out to the noise-sensitive receivers in the surrounding community, within 1,500 meters. Receivers were located a minimum of 15 meters from the dwelling in the direction of the Project. The predicted sound levels, assumed ambient sound levels, assumed sound level from nearby energy-related facilities, and cumulative sound levels are provided and compared to the nighttime PSL in Table 4-4 and Table 4-5. The cumulative sound levels are the logarithmic sum of the modeled and assumed ambient sound levels. The cumulative sound levels for the Project are expected to be at or below the PSL at all nearby dwellings.

Table 4-4: Estimated Cumulative Combined-Cycle Sound Levels (dBA L_{eq})

Receiver Location	Modeled Project Sound Level	Existing Substation Estimated Sound Level	Assumed Nighttime Ambient Sound Level	Cumulative Nighttime Sound Level	Nighttime Permissible Sound Level
Rec01	38.3	22.8	35	40	40
Rec02	37.3	23.3	35	39	40
Rec03	35.4	15.3	35	38	40
Rec04	33.4	21.4	35	37	40
Rec05	34.9	20.8	35	38	40
Rec06	34.6	18.6	35	38	40
Rec07	31.9	14.4	35	37	40

Table 4-5: Estimated Cumulative Simple-Cycle Sound Levels (dBA L_{eq})

Receiver Location	Modeled Project Sound Level	Existing Substation Estimated Sound Level	Assumed Nighttime Ambient Sound Level	Cumulative Nighttime Sound Level	Nighttime Permissible Sound Level
Rec01	37.8	22.8	35	40	40
Rec02	38.2	23.3	35	40	40
Rec03	35.6	15.3	35	38	40
Rec04	34.1	21.4	35	38	40
Rec05	34.8	20.8	35	38	40
Rec06	33.9	18.6	35	38	40
Rec07	32.6	14.4	35	37	40

The estimated sound levels emitted by the Project can be seen graphically in Figure 4-3 and Figure 4-4. The figures show sound generated from the Project, projected outward to nearby dwellings, represented in 5-dB contours. The contours represent the expected sound levels of the Project only.

Path: G:\Projects\Air-Noise Dept\Project Files\SaskPower\Wolverine ECI\GIS\Sask Wolverine GIS Project\Sask Wolverine GIS Project.aprx gweger 10/24/2022
Service Layer Credits: World Boundaries and Places: Esri, HERE, Garmin, GeoTechnologies, Inc., NRCan

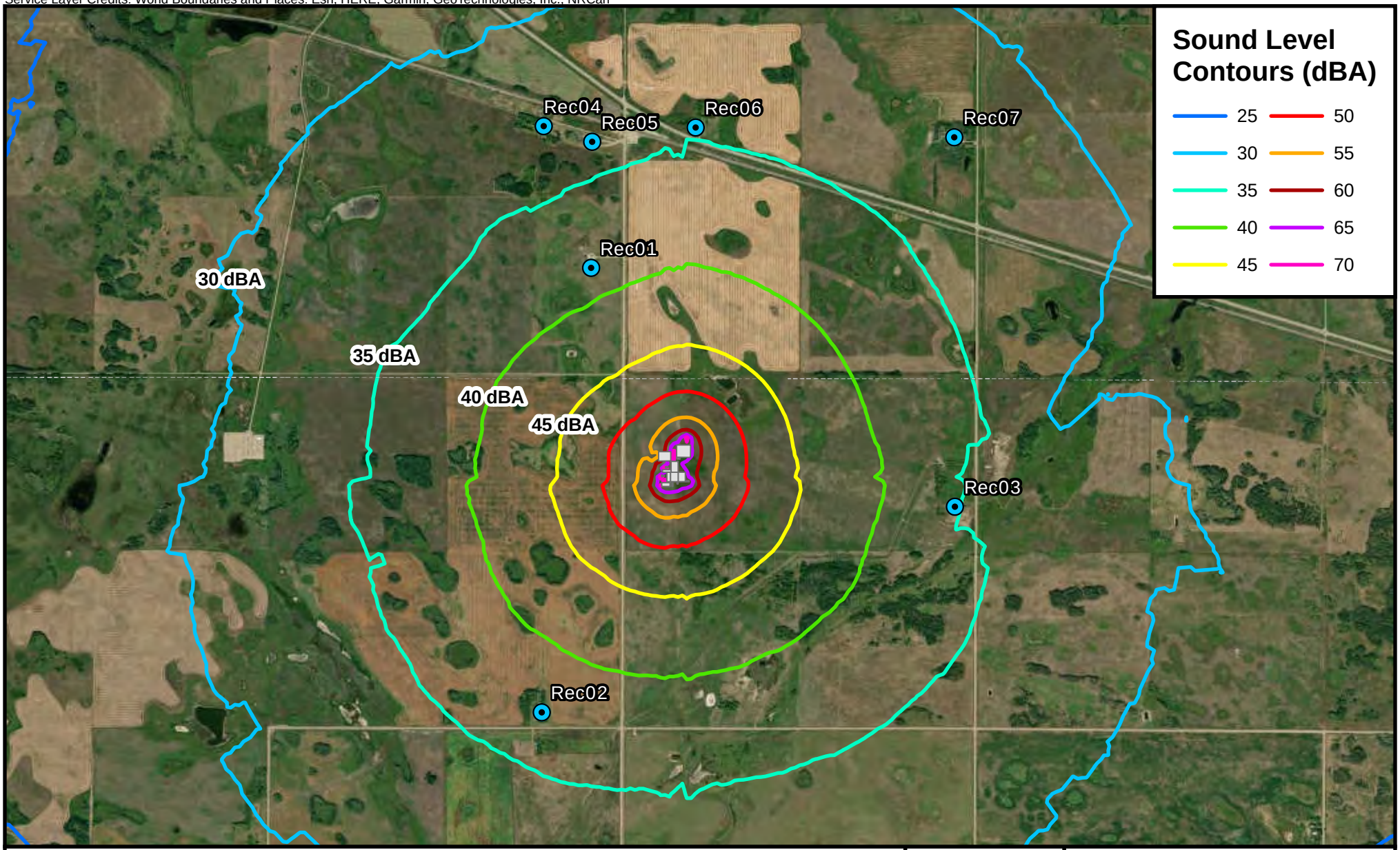

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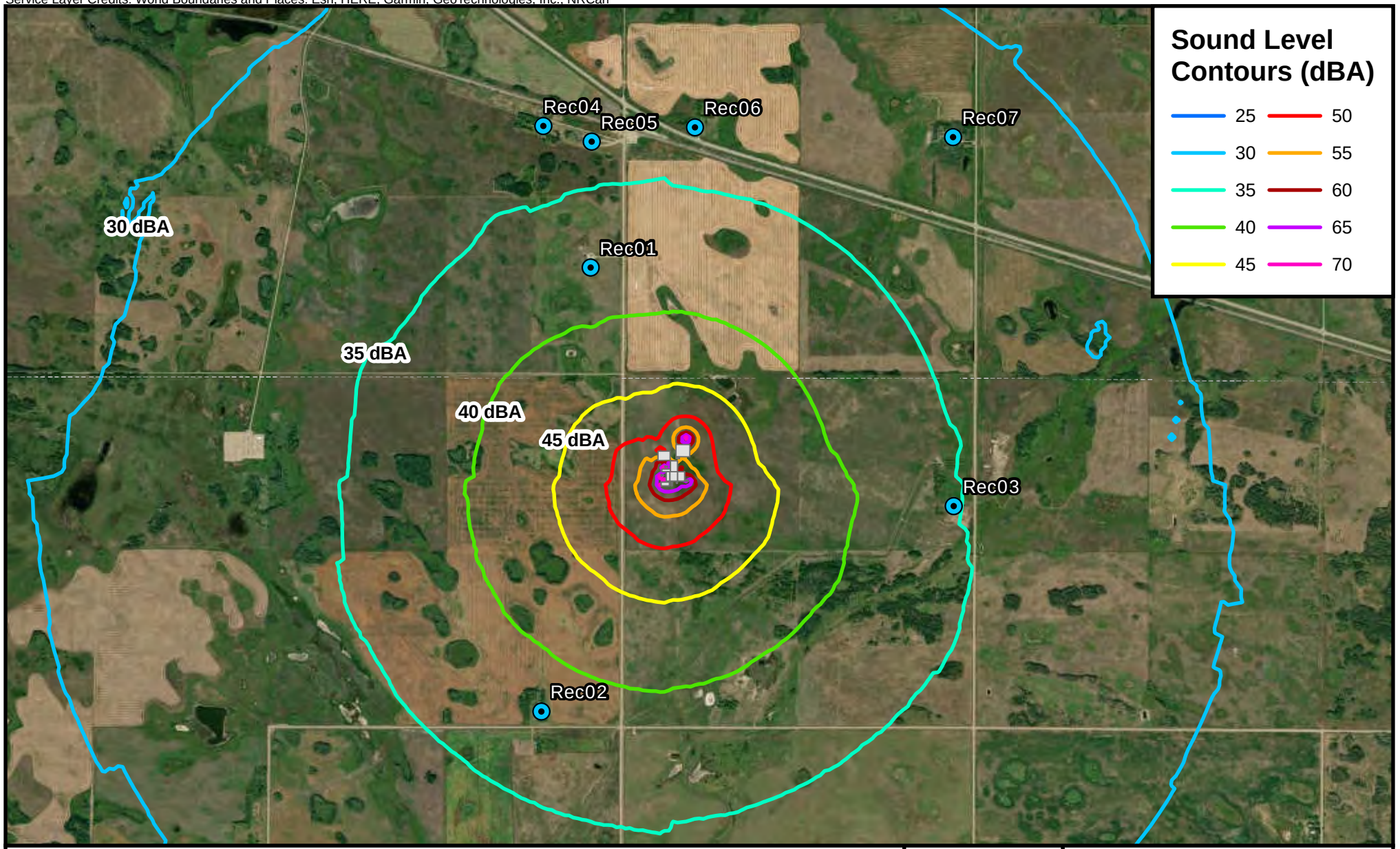
Figure 4-3

SaskPower Wolverine
Sound Level Contours
Combined Cycle

Source: ESRI, Burns & McDonnell

Issued: 10/24/2022

Path: G:\Projects\Air-Noise Dept\Project Files\SaskPower\Wolverine ECI\GIS\Sask Wolverine GIS Project\Sask Wolverine GIS Project.aprx gweger 10/24/2022
Service Layer Credits: World Boundaries and Places: Esri, HERE, Garmin, GeoTechnologies, Inc., NRCan



Receiver

Project Structures

NORTH

500 250 0 500

Meters

BURNS McDONNELL

Figure 4-4

SaskPower Wolverine
Sound Level Contours
Simple Cycle

Source: ESRI, Burns & McDonnell

Issued: 10/24/2022

4.5 Low-Frequency Noise Analysis

As part of the noise impact assessment requirements in AUC Rule 012, the potential for low-frequency noise (LFN) effects from a project should be considered. A-weighting measurements typically discount the lower frequencies. Therefore, when low frequency noise is an issue, the dBA value may not be sufficient to determine if low frequency noise is present. The dBC minus the dBA is to be calculated to identify the potential for low frequency noise impacts.

In AUC Rule 012, a LFN effect is present at a receptor when a clear tone is present at or below 250 Hz and when the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB. The presence of both conditions at a receptor indicates the potential for LFN concerns. The first LFN condition (i.e., clear tone is present at or below 250 Hz) can only be assessed by a post construction noise measurement study. Low frequency tonality information is typically not available from the manufacturer. Based on the Project preliminary sound model estimations, clear tones below 250 Hz are not expected. If there are no clear tones at a frequency below 250 Hz, then low-frequency noise would not be considered a concern, per AUC Rule 012.

The modeled sound levels for each dwelling were analyzed for low-frequency noise by comparing the dBC and dBA sound levels. The dBC, dBA, and the dBC-dBA values are provided and compared to the AUC Rule 012 thresholds in Table 4-6 and Table 4-7.

Table 4-6: Low-Frequency Sound Level Analysis – Combined Cycle

Receiver Location	Modeled Project dBC Sound Level	Modeled Project dBA Sound Level	Modeled dBC-dBA Value	AUC Rule 012 dBC-dBA Threshold
Rec01	59	38	21	20
Rec02	61	37	24	20
Rec03	60	35	25	20
Rec04	55	33	22	20
Rec05	56	35	21	20
Rec06	59	35	24	20
Rec07	57	32	25	20

Table 4-7: Low-Frequency Sound Level Analysis – Simple Cycle

Receiver Location	Modeled Project dBC Sound Level	Modeled Project dBA Sound Level	Modeled dBC-dBA Value	AUC Rule 012 dBC-dBA Threshold
Rec01	61	38	23	20
Rec02	62	38	24	20
Rec03	60	36	24	20
Rec04	58	34	24	20
Rec05	58	35	23	20
Rec06	58	34	24	20
Rec07	57	33	24	20

The dBC minus dBA values are above 20 dB at all of the nearest receptors for the combined- and simple-cycle operation, indicating one of the two conditions for LFN concern is met. It is not anticipated that the Project would emit a clear tone at a frequency below 250 Hz. Since there is not sufficient information to assess the clear tone at low frequency, Health Canada 2016 noise guidance for LFN was also used to assess potential LFN effect at receptors.

Health Canada (Health Canada, 2016) also provides guidance for assessment of LFN based on ANSI 12.9 2005. The guidance suggests that the sum of these three 16 Hz, 31.5 Hz, and 63 Hz octave band sound levels should be less than the rattle criterion of 70 dB. Assessment of the 16 Hz sound pressure level is not possible because no sound power data is available for the proposed equipment and this octave band is outside of the ISO 9613-2 calculation standard. Based on past project experience with sound level measurements of similar turbines, it is assumed that the 16 Hz octave band sound pressure level is the same as the 31.5 Hz octave band. The sum of the assumed 16-Hz, the-31.5 Hz and the 63-Hz octave band sound levels from the Project are below the “rattle criterion” of 70 dB at each of the neighboring receptors, indicating that the Health Canada guidance for LFN concerns are not exceeded.

5.0 CONSTRUCTION NOISE

Project construction will generate noise levels that have the potential to be periodically audible offsite. Construction of the proposed Project is expected to involve site clearing, excavation, placement of concrete, and the use of typical utility construction equipment. The primary sources of construction noise will be associated with equipment operation, use of heavy-duty vehicles, grading, and foundation work activities. Project construction is typically completed in stages, but various construction activities may overlap and with multiple construction crews operating simultaneously.

AUC Rule 012, Section 2.11 – Construction Noise, provides that the impacts of construction noise must be managed to reduce impacts to nearby dwellings. The Section states the following mitigating measures should be used:

1. Conduct construction activity between the hours of 7 a.m. and 10 p.m. to reduce the duration impact from construction noise
2. Advise nearby residents of significant noise-causing activities and schedule these events to reduce disruption to them
3. Ensure that all internal combustion engines are well maintained with muffler systems

Noise from construction equipment will be temporary during construction of the Project. The construction contractor selected is expected to implement, where appropriate, construction methods that limit construction noise levels to the extent practicable. There may also be times that work needs to be accomplished in part outside of typical working hours. Such work generally consists of activities that must occur continuously once begun (e.g., a concrete pour or transformer oil filling). However, significant noise emitting activities, such as pile driving, should be completed during daytime hours.

Noise levels resulting from construction equipment are dependent on several factors, including the number and type of equipment operating, the level of operation, and the distance between sources and receptors. The impacts that various construction-related activities might have will vary considerably based on the proximity to the Project fence line. During a typical day, equipment would not be operated continuously at peak levels. While the average noise levels would represent a noticeable temporary increase over the ambient noise levels near the construction sites, the noise would attenuate with increasing distance, fading into ambient noise background levels at distances over half a mile from the loudest equipment. Generic sound data ranges are available for various types of equipment at certain distances. Table 5-1 lists generic activities and their minimum and maximum instantaneous sound levels at 50 feet as provided in the Federal Highway Administration (FHWA), Highway Construction Noise

handbook and the Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual.

Table 5-1: Range of Typical Construction Equipment Noise Levels[a,b]

Generic Construction Equipment	Minimum Noise at 50 feet (dBA)	Maximum Noise at 50 feet (dBA)
Backhoes	74	92
Compressors	73	86
Concrete Mixers	76	88
Cranes (movable)	70	94
Dozers	65	95
Front Loaders	77	96
Generators	71	83
Graders	72	91
Jack Hammers and Rock Drills	80	98
Pile Driver[b]	96	101
Pumps	69	71
Scrapers	76	95
Trucks	83	96

(a) Values taken from FHWA Highway Construction Noise handbook
(b) Values taken from Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2006

The types of equipment listed in the table above may be used at various times and for various periods of time. Typically, construction equipment has a usage factor ranging between 15 and 50 percent of the day, according to the FHWA roadway construction noise handbook. However, the actual amount of use for each type of equipment would vary day to day. Construction noise mitigation measures that could be implemented include the following actions:

1. Maximize the distance between stationary equipment and noise sensitive receptors to the extent practicable
2. Limit pile driving and impact activities to daytime hours
3. Route construction equipment away from noise sensitive receptors to the extent practicable
4. Turn off idling equipment when not in use
5. Utilize construction equipment with proper mufflers

5.1 Project Commissioning Noise (Steam Blow)

During Project commissioning, steam blows will be utilized to remove any debris which may be left inside the system during construction. Steam blowing is a critical activity during the commissioning of the Project. The steam system feeding the steam turbine must be steam blown to remove debris that could potentially damage the steam turbine blades during operation.

The steam blow piping will be routed outside the building and the noise generated from the steam exiting the discharge piping will be routed through a silencer to reduce noise emissions. Estimated sound power levels from steam blows vary, but the use of silencers can reduce noise emissions down to a level similar to typical construction activities. The number of steam blow vents, pipe diameter, pressure, and mass flow all factor into the noise generated by the steam blow operation.

6.0 CONCLUSION

Burns & McDonnell has conducted a NIA for the proposed Wolverine Power Station located near Wolverine, Saskatchewan. Saskatchewan does not have a numerical noise limit applicable to the Project. At the request of SaskPower, and to remain consistent with other power-generation projects in Saskatchewan, the Project is to be designed to meet the noise limits determined by the methodology defined in AUC Rule 012.

The cumulative sound levels (logarithmic sum of Project emitted noise, existing energy-related facility noises, and assumed ambient noise), are expected to be at or below the PSLs at all nearby dwellings, and low frequency noise is not expected to be an issue.

APPENDIX A - MODELED SOUND POWER LEVELS

Appendix A - Modeled Sound Power Levels

SaskPower

Wolverine

Source	Name	Number of Sources	Sound Power Level (dB)[1] Octave Band Frequency (Hz) 31.5	63.0	125	250	500	1000	2000	4000	8000	Overall (dBA)	Notes
BOP	LP Fuel Gas Skid	1	104	100	89	81	80	86	88	91	89	**96**	85 dBA at 3 feet
	HP Fuel Gas Skid	1	104	100	89	81	80	86	88	91	89	**96**	85 dBA at 3 feet
	Fuel Gas Yard	1	104	100	89	81	80	86	88	91	89	**96**	85 dBA at 3 feet
	Gas Heater Stack	1	119	101	93	88	89	95	93	92	91	**100**	BMCD Estimate
	Gas Turbine Vent	1	89	98	93	93	90	93	98	91	87	**101**	BMCD Estimate
	Make-Up Air Unit	4	96	96	100	95	91	80	70	70	70	**92**	BMCD Estimate
	Fin Fan Cooler	1	110	110	109	106	101	99	93	87	81	**104**	51 dBA at 400 ft
	DP Heater	1	108	100	99	92	88	89	87	84	79	**94**	85 dBA at 3 feet
	Rotor Air Cooler	1	107	109	95	92	98	92	90	88	81	**99**	85 dBA at 3 feet
	GT Transformer	1	98	98	102	102	102	86	81	74	69	**100**	80 dBA at 3 feet
	Auxiliary Transformer	2	89	89	93	93	93	77	72	65	60	**91**	75 dBA at 3 feet
Simple-Cycle Equipment	Turbine Building Roof Vent	8	107	101	98	93	86	82	80	77	74	**90**	BMCD Estimate
	Exhaust Stack Exit[2]	1	133	122	120	112	102	89	80	90	87	**108**	Mitigation Requirement
	Turbine Hall Inlet	1	128	121	110	92	76	64	57	52	49	**99**	Calculated
	Turbine Hall	1	129	122	111	94	79	66	59	54	51	**100**	Calculated
	GT Inlet Face	1	117	116	113	103	89	88	78	88	88	**100**	Mitigation Requirement
	GT Inlet Duct	2	120	119	116	106	92	91	81	91	91	**103**	BMCD Estimate
	Turbine Hall Building Louver[3]	2	77	70	65	59	52	47	45	42	38	**75**	With 10 dB reduction through Louver
Combined-Cycle Equipment	HRSG Roof Vent	6	109	103	100	95	88	84	82	79	76	**92**	BMCD Estimate
	Exhaust Stack Exit[2]	1	117	114	110	100	87	69	52	51	36	**97**	Mitigation Requirement
	HRSG Blowdown Vent	1	81	89	97	101	98	95	91	87	65	**100**	90 dBA at 3 feet
	ACC Steam Line	1	102	108	110	106	102	96	90	85	76	**103**	85 dBA at 3 feet at ST Exit
	STG Building	1	121	119	113	94	78	67	61	60	55	**99**	Calculated
	ST GSU Transformer	1	98	98	102	102	102	86	81	74	69	**100**	80 dBA at 3 feet
	ACC	1	122	115	113	108	104	102	94	90	86	**107**	52 dBA at 400 feet
	HRSG Building	1	133	128	109	94	79	73	69	63	52	**103**	Calculated
	HRSG Building Louver[3]	5	76	71	59	57	52	53	51	48	37	**78**	With 10 dB reduction through Louver
	STG Building Louver[3]	3	72	71	71	63	56	52	51	51	47	**75**	With 10 dB reduction through Louver

Notes:

1. All sound levels are inclusive of modeled attenuation.
2. Exhaust stack operation is either in simple-cycle or combined-cycle, not both.
3. Sound levels provided per square meter

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CREATE AMAZING.

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H.2 Noise Impact Assessment Addendum

CONSTRUCTION NOISE CALCULATIONS

As discussed in Section 5.0 of the noise impact assessment, project construction will generate noise levels that have the potential to be periodically audible offsite. Construction of the proposed project is expected to involve site clearing, excavation, placement of concrete, and the use of typical utility construction equipment. The primary sources of construction noise will be associated with equipment operation, use of heavy-duty vehicles, grading, and foundation work activities.

Project construction is typically completed in stages, but various construction activities may overlap and with multiple construction crews operating simultaneously. As a worst-case assumption, construction noise levels were calculated for all large construction equipment operating during the same day. This is unlikely to happen, but it gives a high-level estimate of the upper end of construction noise that could be expected.

AUC Rule 012, Section 2.7 – Construction Noise, provides that the impacts of construction noise must be managed to reduce impacts to nearby dwellings. The Section states the following mitigating measures should be used:

1. Conduct construction activity between the hours of 7 a.m. and 10 p.m. to reduce the duration impact from construction noise
2. Advise nearby residents of significant noise-causing activities and schedule these events to reduce disruption to them
3. Ensure that all internal combustion engines are well maintained with muffler systems

All construction noise impacts will be temporary and associated with operation of construction equipment during project activities. The increase in noise will only be noticeable within a short distance of the project area. The closest residential receiver is 1,021 meters from the center of construction activities. The anticipated equipment to be used in construction of the project are provided with their associated noise emission level at 50 feet in Table 1. Table 1 also includes the cumulative construction average daily noise levels for all significant construction equipment at 50 feet and 1,021 meters. Impacts to the nearest residential property is anticipated to be approximately 61 dBA during daytime construction activities. This is an average level based on the proximity to construction activities and equipment usage time throughout an typical construction day.

Table 1 - Construction Noise Estimate

Major Construction Equipment	Number of Construction Equipment in Use	Equipment Noise Level at 50 ft (dBA)	Duty Cycle[1]	Composite Noise Level at 50 ft based on Duty Cycle[2] (dBA)	Composite Noise Level at 3,350 ft (1,021 m)[3] (dBA)
Crane	10	85	0.2		
Pickup Truck	9	55	0.4		
Forklift	5	80	0.4		
Concrete Pump Truck	2	84	0.4		
Water Truck	1	84	0.4		
Flatbed Truck	1	84	0.4		
Air Compressor	5	80	0.4		
Man Lift	20	85	0.2		
Generator	5	82	0.5		
Vibratory Compactor	3	80	0.2	97	61
Motor Grader	1	84	0.4		
Dump Truck	3	84	0.4		
Wheel Loader	3	80	0.4		
Dozer	3	85	0.4		
Excavator	5	85	0.4		
Scraper	3	85	0.4		
Pavers	1	85	0.5		
Trencher	2	84	0.4		
Skid Steer	2	80	0.4		

1. Duty cycle based on roadway construction noise manual typical daily usage

2. Composite noise level at 50 feet is the sum of all construciton equipment's daily operating levels

3. Composite noise level calculated at 1,021 meters. Distance from center of construction to nearest residence.

Appendix I Supplemental Wildlife and Vegetation Information

I.1 HABISask Project Screening Reports

Project Screening Report

Notes: SaskPower Aspen

Report Generated
02/10/2023

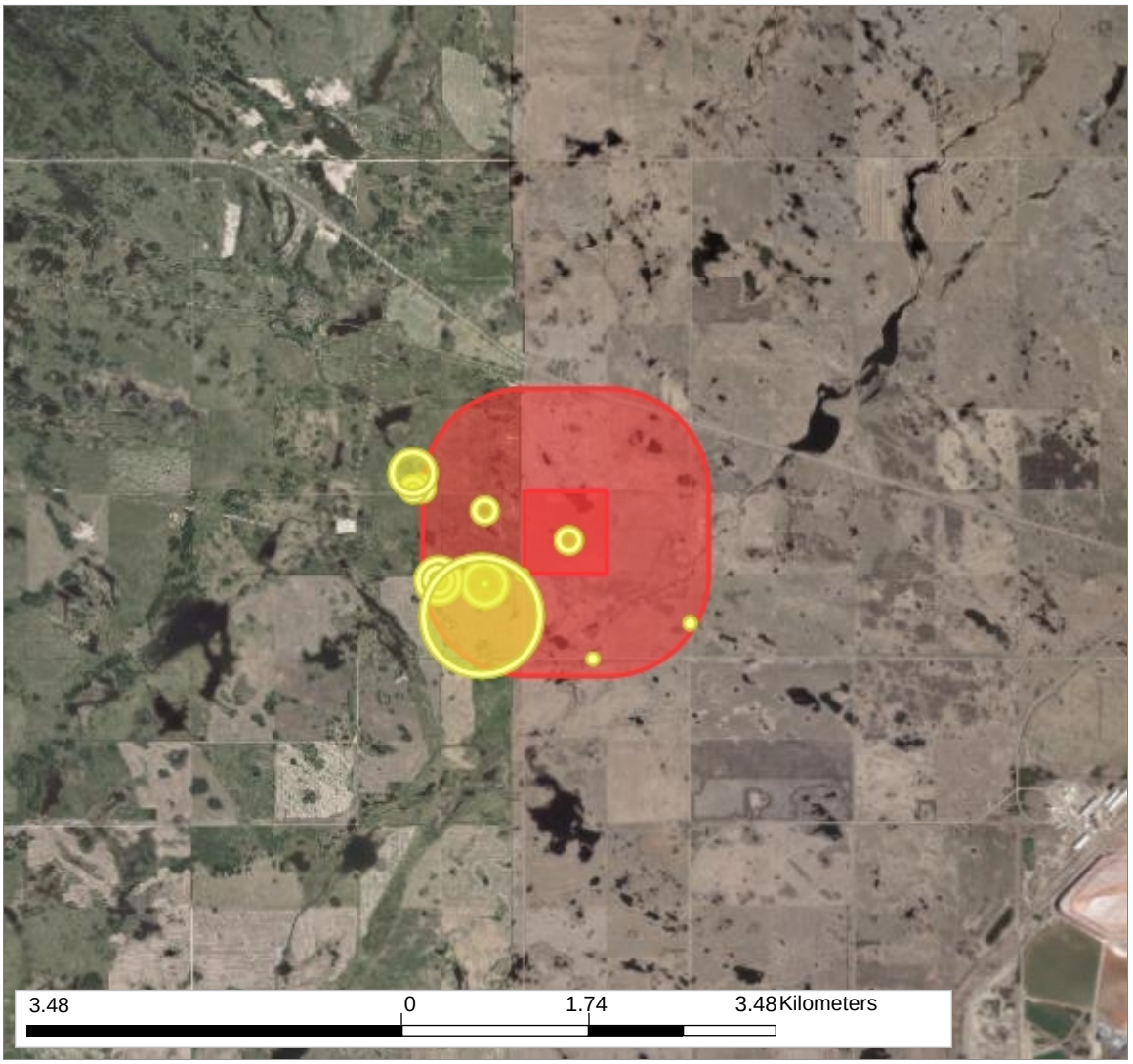
Map Information

Buffer Size:

1 Kilometers

Coordinates:
Lat: 51.87815° N
Lon: -105.28068° W

Area of Interest



Screened Areas:

- Ecological Management Specialist (EMS) District
- Compliance & Field Service Area
- Compliance & Field Service (CFS) Region
- Area Fisheries Ecologists
- Area Wildlife Ecologists
- Rural Municipality
- Indian Reserve
- Rare and Endangered Species
- Fish Species
- Woodland Caribou Range
- Species Predictive Models
- Whooping Crane Corridor
- Federal Critical Habitat
- Emergency Protection Order
- Wind Energy Avoidance Zones
- Important Natural Areas
- Provincial Parks
- Recreation Sites
- Game Preserves
- National Wildlife Areas
- Federal Pastures
- Community Pastures
- Wildlife Habitat Protection Act Lands
- Fish & Wildlife Development Fund Lands
- Migratory Bird Sanctuary
- Wildlife Refuge
- Conservation Easements
- Crown Conservation Easements
- Ecological Reserves
- Ramsar Wetlands
- Reservoir Development Areas
- Representative Areas

Project Screening Report

Species Likely to be Present

Known Species

"Known" species are species that have known occurrences in the area from the Saskatchewan Conservation Data Centre's Rare and Endangered Species map layer. However, absence of species observation records does not preclude the existence of species in the area of interest. Observations may simply not have been recorded for the given area or may not have yet been entered into the ministry data holdings – new observation records are continuously being discovered. Information accessible through HABISask is not intended to be a definitive statement on the presence, absence or status of a species within a given area, nor as a substitute for onsite surveys.

Rare and Endangered Species

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	
Barn Swallow	*Hirundo rustica*	G5	N3N4B, N3N4M	S4B	Special Concern	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Horned Grebe	*Podiceps auritus*	G5	N5B,N5N, N5M	S5B	Special Concern	Special Concern	
Rusty Blackbird	*Euphagus carolinus*	G4	N4B,NUN, N4M	S3B,SUN	Special Concern	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B, N3N4M	S3B	Threatened	Threatened	

Fish Atlas

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations

Expected Species

"Expected" is based on a modelled prediction if a species might occur in areas based upon developed statistical relationships between local and landscape characteristics and species presence. Models utilized by this report have only been created in the prairie ecozone for a selection of species. The boreal plain, boreal shield and taiga shield will not return any expected species results. Models are not a substitute for on the ground surveys to determine species presence.

Species Predictive Models

Category: Invertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Monarch	*Danaus plexippus plexippus*	G4T3	N3B,NNRM	S2B,SNRM	Endangered	Special Concern	

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	
Baird's Sparrow	*Centronyx bairdii*	G4	N4B,N4M	S4B	Special Concern	Special Concern	
Bank Swallow	*Riparia riparia*	G5	N5B,N5M	S4B,S5M	Threatened	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Common Nighthawk	*Chordeiles minor*	G5	N4B,N3M	S4B	Special Concern	Threatened	
Ferruginous Hawk	*Buteo regalis*	G4	N3B,N3N, NUM	S3B	Special Concern	Threatened	
Horned Grebe	*Podiceps auritus*	G5	N5B,N5N, N5M	S5B	Special Concern	Special Concern	
Northern Harrier	*Circus hudsonius*	G5	N5B,N4N	S4B	Not at Risk		
Short-eared Owl	*Asio flammeus*	G5	N4B,N3N, N4M	S3B,S2N	Threatened	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B, N3N4M	S3B	Threatened	Threatened	

Whooping Crane Corridor 95% Core Area

Whooping Crane Corridor 75% Core Area

Woodland Caribou Habitat

Detailed information concerning woodland caribou habitat, administration units and Caribou Habitat Management areas is provided below.

Currently, information on woodland caribou habitat potential is not available in this report, but users are encouraged to view the dataset "Woodland Caribou Habitat Potential" to determine whether your project falls within high, moderate or low caribou habitat potential areas.

Woodland Caribou Conservation Unit(s): Nothing found

Woodland Caribou Administrative Unit(s): Nothing found

Woodland Caribou Habitat Management Area Tier category: Nothing found

Species with Critical Habitat Present

This dataset displays the geographic areas within which federal Critical Habitat for species at risk listed on Schedule 1 of the federal Species at Risk Act (SARA) occurs in Saskatchewan. Please be aware that not all of the area within these boundaries is necessarily Critical Habitat. To determine if a specific area is Critical Habitat and if your activity might be considered "destruction" of Critical Habitat, other information available in each individual species' Recovery documents (http://www.sararegistry.gc.ca) need to be considered, including biophysical attributes and activities likely to result in destruction of Critical Habitat.

Note that recovery documents (and therefore Critical Habitat) may be amended from time to time. Species are added as the data becomes ready, which may occur after the recovery document has been posted on the SAR Public Registry. Although HABISask will try to provide the latest data, the SAR Public Registry should always be considered as the official source for Critical Habitat information.

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
No Critical Habitat found							

Emergency Protection Order

This dataset is comprised of areas under the federal Emergency Order for the Protection of the Greater Sage-Grouse in Canada. The exterior extent polygons are derived from the detailed dataset of the Government of Canada Emergency Order dataset. For specific information regarding the order and the prohibitions set out in the Emergency Order please consult the official documents on the Species at Risk Registry (sararegistry.gc.ca)

Common Name	Scientific Name
No species found	

Important Natural Areas

Important Natural Areas are sites in Saskatchewan that are considered to have conservation significance, but are not necessarily legally protected.

Name	Type
Nothing Found	

Wind Turbine Avoidance Zones Present

The Wind Energy Avoidance Zones were designed to enhance environmental protection and provide more certainty to future wind energy developments. These guidelines clearly identify environmentally sensitive areas that should be avoided for projects that include the siting of wind turbines but can be helpful in siting any development project. The complete report entitled, Wildlife Siting Guidelines for Saskatchewan Wind Energy Projects, can be found on the Government of Saskatchewan website or by selecting the following link: https://publications.saskatchewan.ca/#/categories/78

Land Type
Conservation Easement Lands

Managed Areas

Managed areas are a diverse collection of lands and waters on which the conservation of biodiversity and ecosystem function are among the goals of the land management programs. Each of the unique or sensitive landscapes, within the network of managed areas, have some level of protection or activity restrictions placed on them by legislation, agreement or policy. These lands include provincial and national parks, ecological reserves, wildlife lands, game preserves, conservation easements and other privately held stewardship lands.

Conservation Easement	*Fish & Wildlife Development Fund (FWDF)*	*Migratory Bird Sanctuary*	*Provincial Pasture*
Nothing Found	Nothing Found	Nothing Found	Nothing Found
Crown Conservation Easement	***Former Federal Pasture***	***National Wildlife Area***	***Ramsar Wetland***
Nothing Found	Nothing Found	Nothing Found	Nothing Found
Ecological Reserve	***Game Preserve***	***Provincial Park***	***Recreation Site***
Nothing Found	Nothing Found	Nothing Found	Nothing Found

Representative Area Ecological Reserve

Nothing Found

Reservoir Development Area

Nothing Found

Wildlife Habitat Protection Act (WHPA)

Nothing Found

Wildlife Refuge

Nothing Found

Rare and Endangered Species Occurrences

The absence of information provided by the Saskatchewan Conservation Data Centre (SKCDC) does not categorically mean the absence of sensitive species or features. The quantity and quality for data collected by the SKCDC are dependent on the research and observations of many individuals and organizations. SKCDC reports summarize the existing natural heritage information, known to the SKCDC, at the time of the request.

SKCDC data should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The user therefore acknowledges that the absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Occurrence ID: 999954449 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954455 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999941539 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954466 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954467 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954481 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999981078 **First Observation:** 2009-05-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-22
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981097 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981082 **First Observation:** 2008-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-17
Scientific Name: Euphagus carolinus
Common Name: Rusty Blackbird
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999941275 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions: SW 31-33-23 W2M

Occurrence ID: 999941282 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999941283 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999981077 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981080 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981079 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981081 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 9999115760
Occurrence Class: Vertebrate Animal
Scientific Name: Taxidea taxus taxus
Common Name: American Badger
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

First Observation: 2008-07-09
Last Observation: 2008-07-09

Wild Species Research Permitting

A Research Permit is required to detect or observe plants or wildlife for commercial purposes, such as pre-screening surveys to collect baseline data or other activities, or to conduct academic research. Research Permits are not required if you are doing surveys for personal, recreational, educational or other non-commercial purposes. Revisions were made to Section 21 of The Wildlife Act in 2015 and to Section 6.2 of The Wildlife Regulations in 2016.

See the Government of Saskatchewan Wild Species Research Permitting page for more information.

All forms and related information pertaining to Research Permits can be found in the Publications Centre. Be sure to check out the Conservation Standards Terms and Conditions for Research Permits for general, wildlife and research-specific and information submission conditions that pertain to all research permits.

Subscribe to our Mail-out List Subscriptions for updates regarding Species Detection Permits, SKCDC Lists and Ranks, Legislation and Policy and HABISask.

Species Detection Survey Protocols

The Species Detection Survey Protocols are used to detect rare and sensitive species so Activity Restriction Guidelines can be applied. Their use is required by industry/ environmental consultants for proposed or existing commercial activities.

Activity Restriction Guidelines for Sensitive Species

The Activity Restriction Guidelines for Sensitive Species outline restricted activity periods and distance setbacks for rare and sensitive species to assist proponents in minimizing impacts to rare and sensitive species and habitats.

Administrative Areas

6	Ecological Management Specialist (EMS) District(s)
Humboldt	Compliance and Field Services Area(s)
Saskatoon	Compliance and Field Services Region(s)
Saskatoon	Area Fisheries Ecologist Area(s)
PARKLAND REGION	Area Wildlife Ecologist(s)
340 - WOLVERINE	Rural Municipality
310 - USBORNE	Rural Municipality
Nothing Found	First Nation Reserve

Contact Us

For more information, please contact our Client Service Office:
Email: centre.inquiry@gov.sk.ca
Tel (toll free in North America): 1-800-567-4224
Tel (Regina): 306-787-2584

Project Screening Report

Notes: SaskPower Aspen

Report Generated
07/27/2023

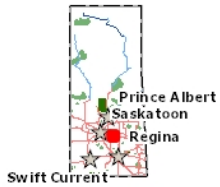
Map Information

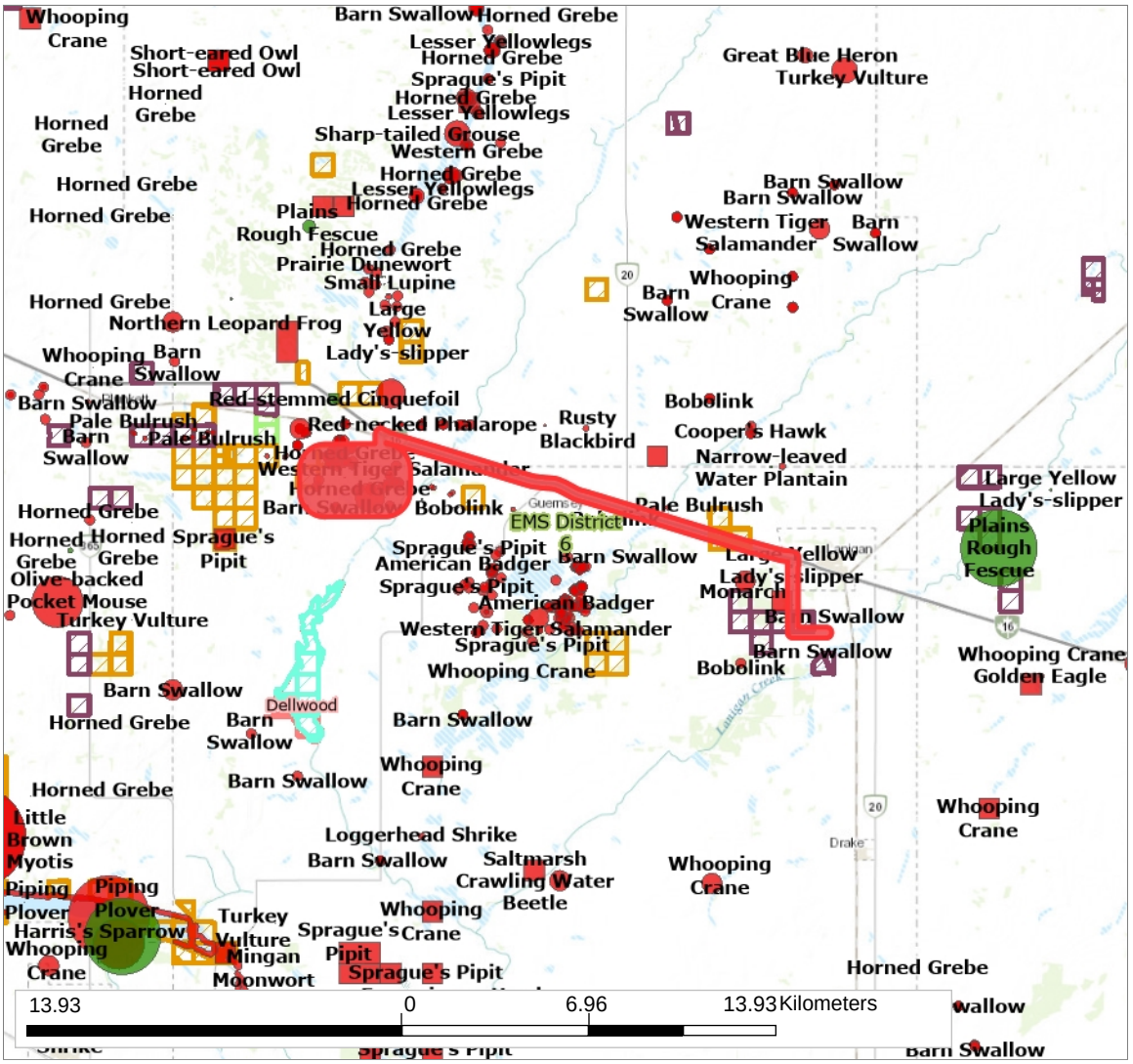
Buffer Size:

30 Meters

Feature Selection
Uploaded Layer

Area of Interest





Screened Areas:

- Ecological Management Specialists (EMS) District
- Compliance & Field Service (CFS) Area
- Compliance & Field Service (CFS) Region
- Area Fisheries Ecologists Area(s)
- Area Wildlife Ecologist(s)
- Rural Municipality
- First Nation Reserve
- AG Crown Land Management Specialist Districts
- Rare and Endangered Species
- Fish Species
- Woodland Caribou Range
- Species Predictive Models
- Whooping Crane Corridor
- Federal Critical Habitat
- Proposed Critical Habitat
- Wind Energy Avoidance Zones
- Important Natural Areas
- Provincial Parks
- Recreation Sites
- Game Preserves
- National Wildlife Areas
- Federal Pastures
- Wildlife Habitat Protection Act Lands
- Fish & Wildlife Development Fund Lands
- Migratory Bird Sanctuary
- Wildlife Refuge
- Conservation Easements
- Crown Conservation Easements
- Ecological Reserves
- Ramsar Wetlands
- Reservoir Development Areas
- Representative Areas

Project Screening Report

Species Likely to be Present

Known Species

"Known" species are species that have known occurrences in the area from the Saskatchewan Conservation Data Centre's Rare and Endangered Species map layer. However, absence of species observation records does not preclude the existence of species in the area of interest. Observations may simply not have been recorded for the given area or may not have yet been entered into the ministry data holdings – new observation records are continuously being discovered. Information accessible through HABISask is not intended to be a definitive statement on the presence, absence or status of a species within a given area, nor as a substitute for onsite surveys.

Rare and Endangered Species

Category: Vascular Plant

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Large Yellow Lady's-slipper	*Cypripedium parviflorum var. pubescens*	G5T5	N5	S2			
Marsh Felwort	*Lomatogonium rotatum var. fontanum*	G5TNR	NNR	S3			
Pale Bulrush	*Scirpus pallidus*	G5	N4	S3			

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	
Baird's Sparrow	*Centronyx bairdii*	G4	N4B,N4M	S4B	Special Concern	Special Concern	
Bank Swallow	*Riparia riparia*	G5	N4N5B, N5M	S4B,S5M	Threatened	Threatened	
Barn Swallow	*Hirundo rustica*	G5	N4N5B	S4B	Special Concern	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Horned Grebe	*Podiceps auritus*	G5	N5B, N4N5N	S5B	Special Concern	Special Concern	
Red-necked Phalarope	*Phalaropus lobatus*	G4G5	N4B, N3N4N	S4B,S3M	Special Concern	Special Concern	
Rusty Blackbird	*Euphagus carolinus*	G4	N4B,NUN	S3B,SUN	Special Concern	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B	S3B	Threatened	Threatened	
Western Tiger Salamander	*Ambystoma mavortium*	G5	N5	S4	Special Concern	Special Concern	

Expected Species

"Expected" is based on a modelled prediction if a species might occur in areas based upon developed statistical relationships between local and landscape characteristics and species presence. Models utilized by this report have only been created in the prairie ecozone for a selection of species. The boreal plain, boreal shield and taiga shield will not return any expected species results. Models are not a substitute for on the ground surveys to determine species presence.

Species Predictive Models

Category: Invertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Monarch	*Danaus plexippus plexippus*	G4T3	N3B,NNRM	S2B,SNRM	Endangered	Special Concern	

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
American Badger	*Taxidea taxus taxus*	G5T5	N4	S3	Special Concern	Special Concern	
Baird's Sparrow	*Centronyx bairdii*	G4	N4B,N4M	S4B	Special Concern	Special Concern	
Bank Swallow	*Riparia riparia*	G5	N5B,N5M	S4B,S5M	Threatened	Threatened	
Bobolink	*Dolichonyx oryzivorus*	G5	N5B, N4N5M	S5B	Special Concern	Threatened	
Common Nighthawk	*Chordeiles minor*	G5	N4B,N3M	S4B	Special Concern	Special Concern	
Ferruginous Hawk	*Buteo regalis*	G4	N3B,N3N, NUM	S3B	Special Concern	Threatened	

Category: Vertebrate Animal

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Horned Grebe	*Podiceps auritus*	G5	N5B,N5N, N5M	S5B	Special Concern	Special Concern	
Northern Harrier	*Circus hudsonius*	G5	N5B,N4N	S4B	Not at Risk		
Northern Leopard Frog	*Lithobates pipiens*	G5	N5	S3	Special Concern	Special Concern	
Piping Plover	*Charadrius melodus circumcinctus*	G3T3	N3B	S3B	Endangered	Endangered	Endangered
Short-eared Owl	*Asio flammeus*	G5	N4B,N3N, N4M	S3B,S2N	Threatened	Special Concern	
Sprague's Pipit	*Anthus spragueii*	G3G4	N3N4B, N3N4M	S3B	Threatened	Threatened	

Fish Species by Watershed

All fish species expected to be in any watershed that intersects the area searched are provided and their presence in the direct project area will depend on habitat.

Watershed: Upper Qu Appelle River

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
Bigmouth Buffalo	*Ictiobus cyprinellus*	G5	N5	S3	Special Concern	Special Concern	
Blacknose Dace	*Rhinichthys obtusus*	G5	N5	S3			
Brook Stickleback	*Culaea inconstans*	G5	N5	S5			
Brook Trout	*Salvelinus fontinalis*	G5	N5B,N5N,	SNA			
Brown Trout	*Salmo trutta*	G5	NNA	SNA			
Burbot	*Lota lota*	G5	N5	S5			
Cisco	*Coregonus artedi*	G5	N5B,N5N,	S5			
Common Carp	*Cyprinus carpio*	G5	NNA	SNA			
Creek Chub	*Semotilus atromaculatus*	G5	N5	S3			
Emerald Shiner	*Notropis atherinoides*	G5	N5	S5			
Fathead Minnow	*Pimephales promelas*	G5	N5	S5			
Iowa Darter	*Etheostoma exile*	G5	N5	S5			
Johnny Darter	*Etheostoma nigrum*	G5	N5	S5			
Lake Whitefish	*Coregonus clupeaformis*	G5	N5B,N5N,	S5	Not at Risk		
Longnose Dace	*Rhinichthys cataractae*	G5	N5	S5			
Ninespine Stickleback	*Pungitius pungitius*	G5	N5B,N5N,	S5			
Northern Pike	*Esox lucius*	G5	N5	S5			
Rainbow Trout	*Oncorhynchus mykiss*	G5	N5B,N5N,	SNA			
River Shiner	*Notropis blennius*	G5	N5	S3			
Shorthead Redhorse	*Moxostoma macrolepidotum*	G5	N5	S4			
Slimy Sculpin	*Cottus cognatus*	G5	N5	S4			
Spoonhead Sculpin	*Cottus ricei*	G5	N5	S5	Not at Risk		
Spottail Shiner	*Notropis hudsonius*	G5	N5	S5			
Trout-perch	*Percopsis omiscomaycus*	G5	N5	S5			
Walleye	*Sander vitreus*	G5	N5	S5			
White Sucker	*Catostomus commersonii*	G5	N5	S4			
Yellow Perch	*Perca flavescens*	G5	N5	S5			

Whooping Crane Corridor 95% Core Area

Whooping Crane Corridor 75% Core Area

Species with Critical Habitat Present

This dataset displays the geographic areas within which federal Critical Habitat for species at risk listed on Schedule 1 of the federal Species at Risk Act (SARA) occurs in Saskatchewan. Please be aware that not all of the area within these boundaries is necessarily Critical Habitat. To determine if a specific area is Critical Habitat and if your activity might be considered "destruction" of Critical Habitat, other information available in each individual species' Recovery documents (http://www.sararegistry.gc.ca) need to be considered, including biophysical attributes and activities likely to result in destruction of Critical Habitat.

Note that recovery documents (and therefore Critical Habitat) may be amended from time to time. Species are added as the data becomes ready, which may occur after the recovery document has been posted on the SAR Public Registry. Although HABISask will try to provide the latest data, the SAR Public Registry should always be considered as the official source for Critical Habitat information.

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
No Critical Habitat found							

Proposed Critical Habitat Present

This section identifies federally proposed critical habitat that is up for consultation as per the information contained within the federal recovery strategies developed under the federal Species at Risk Act (SARA). This information on location of critical habitat is intended for reference by landowners and/or lease holders. Shapefiles or additional maps of critical habitat can be obtained by contacting Environment and Climate Change Canada at ec.leprpn-sarapnr.ec@canada.ca.

Common Name	Scientific Name:	G Rank	N Rank	S Rank	COSEWIC	SARA Status	Wild Species at Risk Regulations
No Critical Habitat found							

Managed Areas

Managed areas are a diverse collection of lands and waters on which the conservation of biodiversity and ecosystem function are among the goals of the land management programs. Each of the unique or sensitive landscapes, within the network of managed areas, have some level of protection or activity restrictions placed on them by legislation, agreement or policy. These lands include provincial and national parks, ecological reserves, wildlife lands, game preserves, conservation easements and other privately held stewardship lands.

Provincial Park

Nothing Found

Ramsar Wetland

Nothing Found

Recreation Site

Nothing Found

Reservoir Development Area

Nothing Found

Game Preserve

Nothing Found

Representative Area Ecological Reserve

Nothing Found

National Wildlife Area

Nothing Found

Pasture Boundary

Nothing Found

Wildlife Habitat Protection Act (WHPA)

Yes

Fish & Wildlife Development Fund (FWDF)

Nothing Found

Migratory Bird Sanctuary

Nothing Found

Wildlife Refuge

Nothing Found

Conservation Easement

Yes

Crown Conservation Easement

Nothing Found

Ecological Reserve

Nothing Found

Project Screening Report

Rare and Endangered Species Occurrences

The absence of information provided by the Saskatchewan Conservation Data Centre (SKCDC) does not categorically mean the absence of sensitive species or features. The quantity and quality for data collected by the SKCDC are dependent on the research and observations of many individuals and organizations. SKCDC reports summarize the existing natural heritage information, known to the SKCDC, at the time of the request.

SKCDC data should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The user therefore acknowledges that the absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Occurrence ID: 999981102 **First Observation:** 2009-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 9999147285 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Centronyx bairdii
Common Name: Baird's Sparrow
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 999940577 **First Observation:** 2012-04-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-04-19
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 pairs observed 2012.
Occurrence Data:
Directions: NE 16-33-22W2M

Occurrence ID: 999981075 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-15
Scientific Name: Phalaropus lobatus
Common Name: Red-necked Phalarope
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981076 **First Observation:** 2009-05-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2009, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981079 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2011, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981081 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-05-13
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981082 **First Observation:** 2008-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-17
Scientific Name: Euphagus carolinus
Common Name: Rusty Blackbird
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981093 **First Observation:** 2008-07-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-07-03
Scientific Name: Centronyx bairdii
Common Name: Baird's Sparrow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981111 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981117 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Podiceps auritus
Common Name: Horned Grebe
Occurrence Rank:
General Description: 5 Unknown Sex/Age; (2008)
Occurrence Data:
Directions:

Occurrence ID: 9999115760 **First Observation:** 2008-07-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-07-09
Scientific Name: Taxidea taxus taxus
Common Name: American Badger
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 9999147286 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Ambystoma mavortium
Common Name: Western Tiger Salamander
Occurrence Rank:
General Description: 1 Adult(s) Unknown Sex; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147278 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Centronyx bairdii
Common Name: Baird's Sparrow
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147287 **First Observation:** 2022-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-28
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 999981123 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981077 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 9999107340 **First Observation:** 2019-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 999941283 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999941281 **First Observation:** 2012-06-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions: NW 35-33-24 W2M

Occurrence ID: 999941282 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999941368 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999941540 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: sighting (2012)
Occurrence Data:
Directions:

Occurrence ID: 999954445 **First Observation:** 2014-06-05
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-05
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954446 **First Observation:** 2014-06-05
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-05
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954449 **First Observation:** 2014-06-06
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-06
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954455 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954463 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954466 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954467 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954475 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954481 **First Observation:** 2014-06-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-06-03
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954483 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999954492 **First Observation:** 2014-05-27
Occurrence Class: Vertebrate Animal **Last Observation:** 2014-05-27
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 individual(s), (2014)
Occurrence Data:
Directions:

Occurrence ID: 999981073 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981074 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981078 **First Observation:** 2009-05-22
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-22
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981080 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-05-29
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981083 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981086 **First Observation:** 2008-06-09
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-18
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981094 **First Observation:** 2008-06-08
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-08
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981095 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981096 **First Observation:** 2010-06-13
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981097 **First Observation:** 2008-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981098 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981099 **First Observation:** 2009-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981100 **First Observation:** 2011-06-07
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981101 **First Observation:** 2008-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-13
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981103 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981104 **First Observation:** 2010-06-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2010, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981105 **First Observation:** 2008-06-08
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981106 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-06-02
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2009)
Occurrence Data:
Directions:

Occurrence ID: 999981107 **First Observation:** 2010-06-13
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-06-13
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981108 **First Observation:** 2008-07-03
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981109 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981110 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981112 **First Observation:** 2011-06-26
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-26
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2011)
Occurrence Data:
Directions:

Occurrence ID: 999981113 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2009-05-22
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008, 2009)
Occurrence Data:
Directions:

Occurrence ID: 999981114 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2011-06-07
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2011)
Occurrence Data:
Directions:

Occurrence ID: 999981115 **First Observation:** 2009-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2009, 2010)
Occurrence Data:
Directions:

Occurrence ID: 999981116 **First Observation:** 2008-06-02
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-16
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2008, 2012)
Occurrence Data:
Directions:

Occurrence ID: 999981118 **First Observation:** 2010-05-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: 2 Unknown Sex/Age; (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981122 **First Observation:** 2008-06-15
Occurrence Class: Vertebrate Animal **Last Observation:** 2008-06-15
Scientific Name: Hirundo rustica
Common Name: Barn Swallow
Occurrence Rank:
General Description: Species detected (2008)
Occurrence Data:
Directions:

Occurrence ID: 999981124 **First Observation:** 2010-05-19
Occurrence Class: Vertebrate Animal **Last Observation:** 2010-05-19
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: Species detected (2010)
Occurrence Data:
Directions:

Occurrence ID: 999981364 **First Observation:** 2012-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2012-06-28
Scientific Name: Riparia riparia
Common Name: Bank Swallow
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2012)
Occurrence Data:
Directions:

Occurrence ID: 9999107338 **First Observation:** 2019-05-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-13
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: Species detected (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999107339 **First Observation:** 2019-05-29
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-05-29
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 9999107350 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 9999107351 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SE-03-34-24-2

Occurrence ID: 9999107352 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 9999107353 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 9999107354 **First Observation:** 2019-06-17
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-17
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; Breeding Bird Status: S; (2019)
Occurrence Data:
Directions: SW-02-34-24-2

Occurrence ID: 9999107365 **First Observation:** 2019-06-20
Occurrence Class: Vertebrate Animal **Last Observation:** 2019-06-20
Scientific Name: Dolichonyx oryzivorus
Common Name: Bobolink
Occurrence Rank:
General Description: 1 Unknown Sex/Age; (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999147276 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147281 **First Observation:** 2022-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-28
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147280 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147284 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147288 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147279 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147277 **First Observation:** 2022-06-10
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-10
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147282 **First Observation:** 2022-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-28
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999147283 **First Observation:** 2022-06-28
Occurrence Class: Vertebrate Animal **Last Observation:** 2022-06-28
Scientific Name: Anthus spragueii
Common Name: Sprague's Pipit
Occurrence Rank:
General Description: 1 Adult Male(s); Breeding Bird Status: S; (2022)
Occurrence Data:
Directions:

Occurrence ID: 9999114715 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 999973002 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-3-34-24 WL1

Occurrence ID: 999973003 **First Observation:** 2013-10-24
Occurrence Class: Vascular Plant **Last Observation:** 2013-10-24
Scientific Name: Scirpus pallidus
Common Name: Pale Bulrush
Occurrence Rank:
General Description: species observed (2013)
Occurrence Data:
Directions: SE-3-34-24 WL2

Occurrence ID: 999973102 **First Observation:** 2013-06-23
Occurrence Class: Vascular Plant **Last Observation:** 2013-06-23
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: species observed (2015)
Occurrence Data:
Directions: Hwy 16-Sask

Occurrence ID: 9999114712 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 6 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114713 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114714 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114716 **First Observation:** 2019-06-20
Occurrence Class: Vascular Plant **Last Observation:** 2019-06-20
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114717 **First Observation:** 2019-08-29
Occurrence Class: Vascular Plant **Last Observation:** 2019-08-29
Scientific Name: Lomatogonium rotatum var. fontanum
Common Name: Marsh Felwort
Occurrence Rank:
General Description: 50 Individual(s); (2019)
Occurrence Data:
Directions:

Occurrence ID: 9999114718 **First Observation:** 2019-08-29
Occurrence Class: Vascular Plant **Last Observation:** 2019-08-29
Scientific Name: Cypripedium parviflorum var. pubescens
Common Name: Large Yellow Lady's-slipper
Occurrence Rank:
General Description: 2 Individual(s); (2019)
Occurrence Data:
Directions:

Project Screening Report

Wild Species Research Permitting

A Research Permit is required to detect or observe plants or wildlife for commercial purposes, such as pre-screening surveys to collect baseline data or other activities, or to conduct academic research. Research Permits are not required if you are doing surveys for personal, recreational, educational or other non-commercial purposes. Revisions were made to Section 21 of The Wildlife Act in 2015 and to Section 6.2 of The Wildlife Regulations in 2016.

See the Government of Saskatchewan Wild Species Research Permitting page for more information.

All forms and related information pertaining to Research Permits can be found in the Publications Centre. Be sure to check out the Conservation Standards Terms and Conditions for Research Permits for general, wildlife and research-specific and information submission conditions that pertain to all research permits.

Subscribe to our Mail-out List Subscriptions for updates regarding Species Detection Permits, SKCDC Lists and Ranks, Legislation and Policy and HABISask.

Species Detection Survey Protocols

The Species Detection Survey Protocols are used to detect rare and sensitive species so Activity Restriction Guidelines can be applied. Their use is required by industry/ environmental consultants for proposed or existing commercial activities.

Activity Restriction Guidelines for Sensitive Species

The Activity Restriction Guidelines for Sensitive Species outline restricted activity periods and distance setbacks for rare and sensitive species to assist proponents in minimizing impacts to rare and sensitive species and habitats.

Administrative Areas

District 6	Ecological Management Specialist (EMS) District(s)
Humboldt	Compliance and Field Services Area(s)
Saskatoon	Compliance and Field Services Region(s)
Saskatoon	Area Fisheries Ecologist Area(s)
PARKLAND REGION	Area Wildlife Ecologist(s)
340 - WOLVERINE	Rural Municipality
310 - USBORNE	Rural Municipality
Nothing Found	First Nation Reserve
District 13	AG Crown Land Management Specialist District

Contact Us

For more information, please contact our Client Service Office:
Email: centre.inquiry@gov.sk.ca
Tel (toll free in North America): 1-800-567-4224
Tel (Regina): 306-787-2584

I.2 Potential Plant SOCC in the Quill Lake Plain Landscape Area

Scientific Name	Common Name	Provincial S Rank	COSEWIC	SARA Schedule 1 Status	SK Wild Species at Risk Regulations	Family
Achnatherum nelsonii ssp. *dorei*	Columbia needlegrass	S3	-	-	-	Poaceae
Alisma gramineum	narrow-leaved Water Plantain	S3	-	-	-	Alismataceae
Amphiscirpus nevadensis	Nevada bulrush	S3	-	-	-	Cyperaceae
Artemisia campestris ssp. *canadensis*	Canada sagewort	S3	-	-	-	Asteraceae
Botrychium campestre	prairie dunewort	S3	-	-	-	Ophioglossaceae
Carex buxbaumii	brown sedge	S3	-	-	-	Cyperaceae
Cirsium drummondii	short-stemmed thistle	S3	-	-	-	Asteraceae
Cladium mariscoides	twig-rush	S1	-	-	-	Cyperaceae
Corallorhiza striata var. *striata*	striped coral-root	S3	-	-	-	Orchidaceae
Cypripedium parviflorum var. *pubescens*	large yellow lady's-slipper	S2	-	-	-	Orchidaceae
Elatine triandra	longstem water-wort	S2	-	-	-	Elatinaceae
Eleocharis coloradoensis	dwarf spike-rush	S2	-	-	-	Cyperaceae
Festuca hallii	plains rough fescue	S3	-	-	-	Poaceae
Hypoxis hirsuta	eastern yellow stargrass	S2	-	-	-	Liliaceae
Lilium philadelphicum var. *andinum f immaculata*	immaculate lily	S1	-	-	-	Liliaceae
Liparis loeselii	yellow twayblade	S3	-	-	-	Orchidaceae
Lomatogonium rotatum var. *fontanum*	marsh felwort	S3	-	-	-	Gentianaceae
Pedicularis parviflora	purple lousewort	S3	-	-	-	Scrophulariaceae
Potentilla hudsonii	Hudson's cinquefoil	S2	-	-	-	Rosaceae
Potentilla lasiodonta	sandhills cinquefoil	S2	-	-	-	Rosaceae
Potentilla rubricaulis	red-stemmed cinquefoil	S3	-	-	-	Rosaceae
Potentilla supina ssp. *paradoxa*	bushy cinquefoil	S3	-	-	-	Rosaceae
Ribes oxyacanthoides var. *setosum*	bristly gooseberry	S2	-	-	-	Grossulariaceae
Ruppia cirrhosa	widgeon-grass	S3	-	-	-	Ruppiaceae

Scientific Name	Common Name	Provincial S Rank	COSEWIC	SARA Schedule 1 Status	SK Wild Species at Risk Regulations	Family
Ruppia maritima	beaked ditch-grass	S3	-	-	-	Ruppiaceae
Salix lucida	shining willow	S3	-	-	-	Salicaceae
Scirpus pallidus	pale bulrush	S3	-	-	-	Cyperaceae
Sisyrinchium septentrionale	northern blue-eyed-grass	S3	-	-	-	Iridaceae
Sporobolus heterolepis	northern dropseed	S3	-	-	-	Poaceae
Teucrium canadense var. *occidentale*	hairy germander	S3	-	-	-	Lamiaceae
Viola pedatifida	crowfoot violet	S3	-	-	-	Violaceae

I.3 Potential Wildlife SOCC to Occur in the Wildlife and Wildlife Habitat LAA

Scientific Name	Common Name	Provincial Rank[1]	Wild Species at Risk Regulations Act[2]	SARA[3]	COSEWIC[3]	HABISask[4]	SKCDC[1]	Birds Canada[5]	Field Survey
Mammals									
Taxidea taxus	American badger	S3	Not Listed	Special Concern	Special Concern	ü	ü	-	-
Lontra canadensis	north American river otter	S3	Not Listed	Not Listed	Not Listed	-	ü	-	-
Birds									
Accipiter cooperii	cooper's hawk	S4B,S2N, S2M	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Aechmophorus occidentalis	western grebe	S3B	Not Listed	Special Concern	Special Concern	-	ü	-	-
Aegolius funereus	boreal owl	S3	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Anthus spragueii	Sprague's pipit	S3B	Not Listed	Threatened	Threatened	ü	ü	ü	ü
Antrostomus vociferus	eastern whip-poor-will	S1B	Not Listed	Threatened	Threatened	-	ü	-	-
Aquila chrysaetos	golden eagle	S3B,S3N, S4M	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Asio flammeus	short-eared owl	S3B, S2N	Not Listed	Special Concern	Threatened	ü	ü	-	-
Buteo platypterus	broad-winged hawk	S4B,S3M	Not Listed	Not Listed	Not Listed	-	ü	-	-
Buteo regalis	ferruginous hawk	S3B	Not Listed	Threatened	Special Concern	ü	ü	-	-
Buteo regalis	ferruginous hawk	S3B	Not Listed	Threatened	Special Concern	-	ü	ü	-
Calamospiza melanocorys	lark bunting	S2B	Not Listed	Threatened	Threatened	-	ü	-	-

Scientific Name	Common Name	Provincial Rank[1]	Wild Species at Risk Regulations Act[2]	SARA[3]	COSEWIC[3]	HABISask[4]	SKCDC[1]	Birds Canada[5]	Field Survey
Calcarius ornatus	chestnut-collared longspur	S3B	Not Listed	Threatened	Endangered	-	ü	ü	-
Calidris canutus	red knot	S2M	Not Listed	Endangered	Endangered	ü	ü	-	-
Cardellina canadensis	Canada warbler	S4B,S3M	Not Listed	Threatened	Special Concern	-	ü	-	-
Cathartes aura	turkey vulture	S3B	Not Listed	Not Listed	Not Listed	-	ü	ü	-
Centronyx bairdii	Baird's sparrow	S4B	Not Listed	Special Concern	Special Concern	ü	ü	ü	ü
Chaetura pelagica	chimney swift	S2B	Not Listed	Threatened	Threatened	-	ü	-	-
Charadrius melodus	piping plover	S3B	Endangered	Endangered	Endangered	ü	ü	-	-
Chordeiles minor	common nighthawk	S4B	Not Listed	Threatened	Special Concern	ü	ü	-	-
Contopus cooperi	olive-sided flycatcher	S4B	Not Listed	Threatened	Special Concern	-	ü	-	-
Coturnicops noveboracensis	yellow rail	S3B	Not Listed	Special Concern	Special Concern	-	ü	-	-
Dolichonyx oryzivorus	bobolink	S5B	Not Listed	Threatened	Special Concern	ü	ü	ü	-
Dryocopus pileatus	pileated woodpecker	S3	Not Listed	Not Listed	Not Listed	-	ü	-	-
Euphagus carolinus	rusty blackbird	S3B, SUN	Not Listed	Special Concern	Special Concern	ü	ü	-	-
Euphagus carolinus	rusty blackbird	S3B,SUN	Not Listed	Special Concern	Special Concern	-	ü	-	-
Grus americana	whooping crane	SXB, S1M	Endangered	Endangered	Endangered	ü	ü	-	-
Hirundo rustica	barn swallow	S4B	Not Listed	Threatened	Special Concern	ü	ü	ü	-

Scientific Name	Common Name	Provincial Rank[1]	Wild Species at Risk Regulations Act[2]	SARA[3]	COSEWIC[3]	HABISask[4]	SKCDC[1]	Birds Canada[5]	Field Survey
Hydroprogne caspia	caspian tern	S2B	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Lanius borealis	northern shrike	S1B,S4N, S4M	Not Listed	Not Listed	Not Listed	-	ü	-	-
Lanius ludovicianus	loggerhead shrike	S3B	Not Listed	Threatened	Threatened	ü	ü	ü	-
Lanius ludovicianus	loggerhead shrike	S3B	Not Listed	Threatened	Threatened	-	ü	-	-
Melanerpes erythrocephalus	red-headed woodpecker	S1B	Not Listed	Endangered	Endangered	-	ü	-	-
Pandion haliaetus	osprey	S3B	Not Listed	Not Listed	Not Listed	-	ü	-	-
Phalaropus lobatus	red-necked phalarope	S4B, S3M	Not Listed	Special Concern	Special Concern	ü	ü	-	-
Pinicola enucleator	pine grosbeak	S2B,S4N	Not Listed	Not Listed	Not Listed	-	ü	-	-
Podiceps auritus	horned grebe	S5B	Not Listed	Special Concern	Special Concern	ü	ü	ü	-
Riparia riparia	bank swallow	S4B, S5B	Not Listed	Threatened	Threatened	ü	ü	ü	-
Sialia sialis	eastern bluebird	S3B	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Strix nebulosa	great grey owl	S3	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Strix varia	barred owl	S3	Not Listed	Not Listed	Not Listed	-	ü	-	-
Surnia ulula	northern hawk owl	S3B,S5N	Not Listed	Not Listed	Not at Risk	-	ü	-	-
Vireo flavifrons	Yellow throated vireo	S3B	Not Listed	Not Listed	Not Listed	-	ü	-	-

Scientific Name	Common Name	Provincial Rank[1]	Wild Species at Risk Regulations Act[2]	SARA[3]	COSEWIC[3]	HABISask[4]	SKCDC[1]	Birds Canada[5]	Field Survey
Amphibians									
Ambystoma mavortium	western tiger salamander	S4	Not Listed	Special Concern	Special Concern	-	ü	-	ü
Lithobates pipiens	northern leopard frog	S3	Not Listed	Special Concern	Special Concern	-	ü	-	-

Notes:

[1] SKCDC 2022, S1 - critically imperiled, S2 – imperiled, S3 – vulnerable, S4 – apparently secure, S5 – secure, B – breeding population, M – migrant population, U – status is uncertain, N – non-breeding population, X – believed to be extinct or extirpated

[2] GOS 1999

[3] GOC 2022c

[4] SK ENV 2022

[5] Birds Canada 2022a, 2022b

I.4 Wildlife Species Observed in the Wildlife and Wildlife Habitat LAA in 2022 and 2023

Wildlife Species Inventory

Scientific Name	Common Name	Provincial Rank[1]
Mammals		
Alces alces	moose	S5
Canis latrans	coyote	S5
Vulpes vulpes	red fox	S5
Birds		
Answer caerulescens	snow goose	S5M
Answer albifrons	greater white-fronted goose	S5M
Branta canadensis	Canada goose	S5B
Spatula discors	blue-winged teal	S5B
Spatula clypeata	northern shoveler	S5B
Mareca strepera	gadwall	S5B
Anas platyrhynchos	mallard	S5B
Anas acuta	northern pintail	S5B
Anas crecca	green-winged teal	S5B
Aythya valisineria	canvasback	S5B
Aythya americana	redhead	S5B
Aythya collaris	ring-necked duck	S5B
Aythya marila	greater scaup	S5M
Bucephala albeola	bufflehead	S5B
Oxyura jamaicensis	ruddy duck	S5B
Podiceps auritus	horned grebe	S5B
Podiceps grisegena	red-necked grebe	S5B
Podiceps nigricollis	eared grebe	S5B
Zenaida macroura	mourning dove	S5B
Porzana carolina	sora	S5B
Fulica americana	American coot	S5B
Recurvirostra americana	American avocet	S4B
Charadrius vociferus	killdeer	S5B
Bartramia longicauda	upland sandpiper	S5B
Gallinago delicata	Wilson’s snipe	S5B
Phalaropus tricolor	Wilson’s phalarope	S5B
Tringa semipalmata	willet	S4B
Larus delawarensis	ring-billed gull	S5B
Chlidonias niger	black tern	S5B
Pelecanus erythrorhynchos	American white pelican	S5B

Scientific Name	Common Name	Provincial Rank[1]
Cathartes aura	turkey vulture	S3B
Circus hudsonius	northern harrier	S4B
Buteo swainsoni	Swainson's hawk	S4B
Buteo jamaicensis	red-tailed hawk	S5B, S1N
Sphyrapicus varius	yellow-bellied sapsucker	S5B
Colaptes auratus	northern flicker	S5B, SUN
Empidonax alnorum	alder flycatcher	S5B
Empidonax minimus	least flycatcher	S5B
Tyrannus tyrannus	eastern kingbird	S5B
Vireo gilvus	warbling vireo	S5B
Vireo olivaceus	red-eyed vireo	S5B
Pica hudsonia	black-billed magpie	S5
Corvus brachyrhynchos	American crow	S5B, S4N
Corvus corax	common raven	S5
Poecile atricapillus	black-capped chickadee	S5
Tachycineta bicolor	tree swallow	S5B
Hirundo rustica	barn swallow	S4B
Petrochelidon pyrrhonota	cliff swallow	S5B
Troglodytes aedon	house wren	S5B
Cistothorus palustris	marsh wren	S5B
Sturnus vulgaris	European starling	SNA
Dumetella carolinensis	gray catbird	S5B
Toxostoma rufum	brown thrasher	S5B
Turdus migratorius	American robin	S5B, SUN
Bombycilla cedrorum	cedar waxwing	S5B
Anthus spragueii	Sprague's pipit	S3B
Spinus tristis	American goldfinch	S5B
Ammodramus savannarum	grasshopper sparrow	S4B
Spizella pallida	clay-colored sparrow	S5B
Zonotrichia querula	Harris's sparrow	SUB, S5M
Pooecetes gramineus	vesper sparrow	S5B
Ammospiza leconteii	LeConte's sparrow	S5B
Ammospiza nelsoni	Nelson's sparrow	S5B
Passerculus sandwichensis	savannah sparrow	S5B
Centronyx bairdii	Baird's sparrow	S4B
Melospiza melodia	song sparrow	S5B
Xanthocephalus xanthocephalus	yellow-headed blackbird	S5B
Dolichonyx oryzivorus	bobolink	S5B
Sturnella neglecta	western meadowlark	S5B

Scientific Name	Common Name	Provincial Rank[1]
Icterus galbula	Baltimore oriole	S5B
Agelaius phoeniceus	red-winged blackbird	S5B, SUN
Molothrus ater	brown-headed cowbird	S5B, SUN
Euphagus cyanocephalus	brewer's blackbird	S5B, SUN
Geothlypis trichas	common yellowthroat	S5B
Setophaga petechia	yellow warbler	S5B
Amphibians		
Anaxyrus hemiophrys	Canadian toad	S4
Pseudacris maculata	boreal chorus frog	S5
Lithobates sylvaticus	wood frog	S5
Ambystoma mavortium	western tiger salamander	S4

Notes:

[1] SKCDC 2022, S3 – vulnerable, S4 – apparently secure, S5 – secure, B – breeding population, M – migrant population, U – status is uncertain, N – non-breeding population

I.5 Bird Counts During Spring Migration Surveys

Species		Survey Visit 1	Survey Visit 2	Total
Scientific Name	**Common Name**			
Waterfowl				
Anser caerulescens	snow goose	460	97	557
Anser albifrons	greater white-fronted goose	-	12	12
Branta canadensis	Canada goose	86	65	151
Spatula clypeata	northern shoveler	10	6	16
Anas platyrhynchos	mallard	10	12	22
Anas acuta	northern pintail	-	2	2
Anas crecca	green-winged teal	6	2	8
Aythya valisineria	canvasback	2	6	8
Aythya americana	redhead	-	12	12
Aythya collaris	ring-necked duck	2	-	2
Aythya marila	greater scaup	-	40	40
Bucephala albeola	bufflehead	2	-	2
Fulica americana	American coot	5	2	7
Waterbirds				
Podiceps auritus	horned grebe	-	3	3
Podiceps nigricollis	eared grebe	-	23	23
Larus delawarensis	ring-billed gull	2	-	2
Shorebirds				
Recurvirostra americana	American avocet	-	2	2

Appendix J SaskPower Diversity and Inclusion Strategy

J.1 SaskPower's Commitment to Diversity and Inclusion

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SASKPOWER'S COMMITMENT TO DIVERSITY AND INCLUSION

We're committed to diversity, inclusion and achieving a workforce representative of the communities we serve. Our vision is to be an employer that values the diversity of its people. That means, engaging and empowering all employees to reach their full potential while bringing their whole selves to work.

Areas of Focus and Priorities

We plan to build on the progress we've made, while pursuing new directions. Focusing on Our People, Our Partnerships and Our Culture will ensure further growth and development of a diverse and inclusive workforce.

Our People

To increase the diversity of our workforce, we actively support employees in growing their careers and reaching their full potential.

Priorities

Advance Women in Trades

Advance Women in leadership

Increase percentage of underrepresented groups

Our Partnerships

To ensure long-term business success, we focus on building strong partnerships both internally and externally.

Within these relationships we promote the value of diversity and ensure our practices are inclusive.

Priorities

Strengthen internal and external partnerships

Our Culture

To leverage the full talents of our workforce, we focus on creating the right environment for people to excel and live up to their full potential.

Priorities

Consistent demonstration of inclusive behaviours and language

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Our Employee Resource Groups

We have six Employee Resource Groups (ERGs). They complement the organization's objectives in creating a culture of growth and inclusion. The groups strive to make meaningful impacts by providing supportive environments.

Indigenous Employees Network (IEN)

The IEN provides a collective voice and a supportive environment for Indigenous employees. These leaders open doors and promote opportunities for Indigenous peoples within the company — playing a key role in building a progressive community.

Pride

This employee resource group raises awareness for the lesbian, gay, bi-sexual, transgender, queer, two-spirited (LGBTQ2S+) community within the company. They also provide support for employees.

Network for Employees with Disabilities (NED)

NED advises on ways to improve the recruitment and retention of those with disabilities. They also improve experiences for those with accessibility issues and promote career development opportunities.

Cultural Diversity Group (CDG)

Serving as an advisory committee, the CDG advocates on cultural diversity concerns. They also support the needs of diverse employees, and educate employees on the benefits and rewards of diverse cultures and backgrounds in employment.

Women's Resource Group (WRG)

WRG encourages the equitable participation of women in under-represented occupations and leadership roles. The group also works to assist women in achieving their full career potential.

PowerGen

PowerGen is a group that aims to shape the next generation of leaders. This means creating opportunities, connecting employees and promoting personal and professional development.

J.2 SaskPower's Diversity and Inclusion Strategy

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SASKPOWER'S DIVERSITY & INCLUSION STRATEGY

I. WHY DIVERSITY & INCLUSION MATTERS

The Business Case

Diversity and inclusion (D&I) are key to healthy business practices in that they have a significant impact on four important areas within organizations:

Source: Catalyst, *Quick Take: Why Diversity and Inclusion Matter* (2020).

Leveraging diversity to source and attract talent and leveraging inclusion to engage and empower people can help organizations increase overall work productivity. When employees believe their employer values diversity and experience inclusion within the workplace, they report feeling valued, trusted, and psychologically safe to express themselves fully.

This, in turn, fosters higher creativity and innovation through the open sharing of diverse perspectives, opinions, and ideas which enables better problem-solving and higher quality decision-making. Likewise, effective business decisions made consistently over time lead to improved corporate financial performance. Finally, stronger financial performance builds better brand value and improved reputation and goodwill in the marketplace.

D&I Best Practices

- **Establish a sense of belonging**. Having a sense of belonging is one of the most important psychological needs for people to feel connected to others and the organization. Employers must work to create the conditions that promote inclusion daily. This speaks directly to the type of organizational culture an employer offers and requires its leaders to take the lead in creating and maintaining a psychologically safe working environment.

- **Educate employees on diversity and inclusion**. For D&I efforts to work in an organization, all employees need to be informed and educated on the benefits and best practices of diversity and inclusion in order to support its initiatives. From senior leaders to front-line employees, every individual must see and understand their role in organizational culture.

- **Enhance recruitment processes**. Organizations that succeed in diversity recruiting and hiring understand that diverse candidates aren't just going to show up on their doorstep; the company must make an extra effort of actively searching for and recruiting from under-represented groups. Moreover, this will ensure equal access to opportunities.

- **Encourage teamwork and collaboration**. The importance of teamwork is essential in today's business world. In every aspect of a business, the diverse skills of teams are needed for reaching success. Teamwork motivates unity in the workplace. It also offers differing perspectives & feedback which not only improve problem-solving but increase innovation.

Common D&I Barriers

- **Unconscious biases**. Unconscious biases are social stereotypes about certain groups of people that individuals form outside their own conscious awareness. Though most people have difficulty accepting or acknowledging it, we all do it. Gender, ethnicity, disability, sexuality, body size, profession etc., all influence the assessments that we make of people and form the basis of our relationship with others, and society at large.

- **Lack of accountability measures**. Accountability in the workplace helps ensure every member is successful and collaborates with others to get the work done. If leaders truly care about leveling the playing field and supporting every employee, they need to be able to measure progress. We've all heard the mantra that what matters gets measured. Without metrics, it's impossible to rally people behind specific goals and determine whether progress is being made.

- **Inaccessibility**. Having systems in place which ensure accessibility allow employees to bring their whole selves to work. Developing an accessible workplace is imperative to help expand workplace diversity, and ultimately improve the recruitment, hiring and retention of employees. Understanding what people need to be truly effective in working at SaskPower is the first step to ensuring that our workplace is inclusive.

II. SASKPOWER'S D&I VISION AND STRATEGIC PRIORITIES

Our Vision

To be an employer that values the diversity of its people and empowers them to bring their whole selves to work.

As a result, we seek to:

- Attract the best people from the entire talent pool and promote leadership diversity;
- Be recognized as an inclusive employer by our employees and prospects;
- Be recognized as an inclusive business partner to our suppliers, customers, and the communities we serve; and
- Leverage diversity and inclusion as a source of business innovation and growth for SaskPower's long-term success.

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At our vision's core, is a focus on three key areas: **People, Partnerships, Culture**.

Our People

- As SaskPower continues to navigate disruption within the utility industry, diversity of thought is critical to driving the innovation and growth required to transform the business successfully.
- To increase the diversity of our workforce, we must not only tap into the full talent pool available to us but also actively support employees in growing their careers at SaskPower and reaching their full potential. This requires leaders and employees to understand how diversity and inclusion benefits everyone and the role each of us has in making a difference.

Our Partnerships

- SaskPower believes in the power of teamwork and collaboration. So much so, that it is both a core competency as well as a corporate value. Working together with our colleagues, partners, stakeholders, and communities enables us to achieve business results far greater than any one talented individual.
- To ensure long-term business success, we must continue our focus on building strong partnerships both internally and externally by promoting the value of diversity and ensuring our business and people practices are inclusionary.

Our Culture

- SaskPower understands the important role culture plays in an organization. Having a workplace culture that is psychologically safe for all employees is critical for inclusion. In a psychologically safe work environment, employees feel free to express themselves fully without feeling any threat of being negatively labelled, blamed, embarrassed or punished is critical for inclusion.
- To leverage the full talents of our workforce, we must continue to focus on shifting our corporate culture. As the corporation continues to face uncertainty, complexity, and interdependence within the business, it is critical for leaders to create the right environment for people to excel and live up to their full potential. And although it's not leaders' responsibility alone, it starts with them.

Our Strategic Priorities

Our aim is to continue building on our progress as well lead in new areas. These strategic priorities will be reviewed periodically to ensure SaskPower capitalizes on opportunities to further grow and develop a diverse and inclusive workforce.

Our People

<u>Advancing Women in Leadership</u>

Much of SaskPower's female representation is at the individual contributor level giving SaskPower a significant opportunity to promote more women into leadership roles. Providing a more targeted approach with better tools and resources will help women feel more supported and advance at a quicker pace.

We will work towards:

- Addressing barriers for women at SaskPower;
- Implementing a women's mentoring program as well as exploring the potential for dedicated women's leadership programming;
- Enhancing our people practices identifying talent and grow potential earlier; and
- Building the pipeline in lower levels to increase the potential for women to advance to the VP level.

Increasing the Percentage of Under-represented Groups

Increasing the percentage of under-represented groups will help create a culture of sustainability, innovation and allow SaskPower to thrive in the future. Diversity of thought and opinion, or being around people who are different to us, makes us more creative, diligent and hard-working. This benefits the organization, every employee and their combined success.

We will work towards:

- Incorporating inclusive design in new builds/renovations at SaskPower owned properties;
- Minimizing the potential for bias in talent attraction, selection, and promotion processes;
- Addressing barriers to accessibility for diverse people; and
- Helping people to better understand the benefits and importance of having a diverse and inclusive workforce.

Our Partnerships

Internal and External Partnerships

Strengthening partnerships both internally and externally will help add value and optimize diversity recruitment and retention strategies. Linking the two efforts together will improve results and optimize resources. It is about demonstrating collaboration and consistency of efforts within SaskPower as well as with external partners.

We will work towards:

- Increasing participation of women in the supply chain;
- Developing and strengthening strategic partnerships and networks with external organizations that support under-represented groups;
- Addressing challenges and enabling growth with the Indigenous communities we serve; and
- Leveraging SaskPower's Employee Resource Groups (ERGs) to supplement efforts to increase awareness, provide education and support, and grow commitment for D&I practices.

Our Culture

Growing and Developing Leaders

Diversity and inclusion are often treated as a single initiative owned exclusively by HR. But for real change to happen, every leader needs to be committed to growing a more diverse workforce and inclusive culture.

We will work towards:

- Increasing leaders' awareness, desire, and knowledge of what D&I means and its important in SaskPower's success;
- Increasing leaders' self-awareness regarding their own biases; and
- Improving leaders' accountability for growing, developing, and supporting D&I efforts.

Adopting Inclusive Behaviours

Hiring goals boost diversity numbers, but this won't automatically create an inclusive culture. To retain and nurture talent, it's critical to look at the end-to-end employee experience and create conditions that promote inclusion daily. When put into action in an environment that supports safe and honest conversations, real change becomes possible.

We will work towards:

- Creating awareness of the importance of psychological safety in the workplace;
- Holding people accountable for demonstrating inclusive key behaviours and ensuring our people practices (i.e. hiring and onboarding practices, rewards and recognition programs, performance management system, etc.) reinforce these behaviours; and
- Using more inclusive language in our corporate communications.

In summary, growing a more diverse workforce and providing an inclusive workplace for employees will take the collective efforts of everyone at SaskPower. Together, we can create a workplace where every individual is valued and respected for who they are and the different talents they bring.

J.3 Indigenous Recruitment and Retention Strategy

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INDIGENOUS RECRUITMENT AND RETENTION STRATEGY

LAND ACKNOWLEDGEMENT

We acknowledge that we live and work on the Treaty and traditional lands of First Nations and Métis people.

We respect and honour the Treaties that were made, acknowledge the harms and mistakes of the past, and are committed to moving forward in partnership with Indigenous Nations in the spirit of reconciliation and collaboration.

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INTRODUCTION

A province-wide action that comes from the 2020-2030 Saskatchewan Growth Plan is to increase Indigenous participation in the economy through the growth of Saskatchewan's natural resource industries and labour market development.

With Indigenous Peoples being the youngest and fastest-growing population segment, Saskatchewan employers have a significant opportunity to grow a more diverse workforce by improving recruitment strategies and building stronger relationships with Indigenous partners and communities.

Aligned with SaskPower's Strategic Direction, a corporate priority is to develop and implement an Indigenous Recruitment and Retention (IRR) Strategy positioning SaskPower as an employer of choice for Saskatchewan's Indigenous Peoples.

BACKGROUND

According to Saskatchewan Human Rights Commission (SHRC), the percentage of self-identified Indigenous people in Saskatchewan is 14%.

The term "Indigenous" refers to First Nations, Métis, and Inuit peoples.

As rights holders, Indigenous Peoples are continually increasing their economic impact and becoming a more influential customer base. Indigenous Peoples have protected rights under Section 35 of Canada's Constitution, and engagement with and building meaningful relationships are essential for current and future power generation and transmission projects.

By honouring Canada's Supreme Court ruling specific to the Duty to Consult and community outreach, SaskPower advances Indigenous engagement and drives Indigenous performance towards becoming sustainable in an environment of rapidly changing demographics and heightened regulatory requirements.

In the spirit of Truth and Reconciliation, SaskPower engages and consults with Indigenous communities before proceeding with economic development projects, celebrates and encourages participation at Indigenous traditional events and cultural ceremonies as one avenue for establishing respectful relationships with Indigenous Peoples.

SaskPower will continue down the path of Economic Reconciliation in collaboration with Indigenous people and communities by responding to the actions identified in the #92 Call to Action of the TRC Calls to Action, by investing in strategies and initiatives that attract Indigenous people to be either directly employed or have their businesses procured by SaskPower.

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IRR STRATEGIC PRIORITIES

By developing an IRR Strategy, SaskPower will employ best practices and lessons learned to identify the barriers and implement initiatives and solutions to advance and continue to improve Indigenous recruitment and retention.

The Strategy will support SaskPower's efforts in becoming an employer of choice for Indigenous people where the importance of Indigenous perspectives within policies, practices and services is recognized. Therefore, the strategy will serve as a broad policy framework that will inform the actions SaskPower aims to achieve.

To improve and sustain Indigenous representation, the collective efforts will align with the three key areas of focus in SaskPower's corporate Diversity and Inclusion Strategy: Our People, Our Partnerships and Our Culture. As such, the IRR strategy will focus on the following:

1. Increasing Indigenous representation largely focused on enhancing sourcing and recruitment strategies
2. Growing strong partnerships with Indigenous organizations and communities focused on building a candidate pipeline; and
3. Retaining Indigenous talent within our workforce focused on fostering an inclusive workplace culture and supporting Indigenous employees in reaching their full potential.

The goals of the Strategy will be realized through the Indigenous Recruitment and Retention Action Plan. To successfully implement the IRR Action Plan, SaskPower will take a collaborative approach that will require the support and participation of all divisions, commencing with executive leadership support. This Action Plan will set out targets & metrics for Indigenous people's attraction and retention as part of the efforts to increase Indigenous employees' representation within SaskPower's workforce.

CURRENT STATE

SaskPower continues to strengthen and explore new initiatives that appeal to and attract Indigenous candidates as well as provide support to existing Indigenous employees.

As well, SaskPower's two unions, Unifor Local 649 and IBEW Local 2067, recognize the need for equity, and support the corporation's efforts to increase diversity in the workforce. Unifor and IBEW are pursuing educational opportunities to acquire knowledge to better support SaskPower's commitment to being recognized as an employer that values innovation, is socially responsible, and provides a healthy and respectful workplace.

UNIFOR LOCAL 649 RECONCILIATION STATEMENT

"In the spirit of **reconciliation** with Indigenous Peoples, Unifor Local 649 **supports** the Reconciliation Action Plan put forward by SaskPower. Unifor 649 **understands** the significance of building **real** meaningful relationships with Indigenous People and their communities. We are **committed** to understanding the history of Canadas' relationship with Indigenous People and **pledge** to **engage** in meaningful collaboration with SaskPower in our **mutual goal** to attract, train and retain union and non-union Indigenous People to SaskPower."

IBEW LOCAL 2067 TRUTH AND RECONCILIATION STATEMENT

"In the **spirit** of reconciliation with Indigenous Peoples IBEW Local 2067 supports SaskPower's Reconciliation Action Plan and **understand** the significance of building **meaningful relationships** with Indigenous people and their communities. As part of IBEW Local 2067 support, we **commit** to understanding the history of Canada's relationship with Indigenous People and will **collaborate** with SaskPower in our mutual goal to attract, train and retain Indigenous people to SaskPower."

RISKS

As the Indigenous population within Saskatchewan continues to grow and Indigenous communities and organizations increasingly become more developed, the economic, rights holders' and political impact will increase. This provides SaskPower with more opportunity to:

- partner with Indigenous communities for future projects, and
- source more products from Indigenous suppliers.

SaskPower's prowess in building and maintaining long-term sustainable relationships is critical in working with the Indigenous communities. Potential corporate risks can increase or decrease depending on the perception, reputation, and relationships we foster with the Indigenous people and communities in Saskatchewan.

As a Saskatchewan-owned Crown corporation, SaskPower has an obligation to operate responsibly – some of the examples include employing environmentally friendly practices, applying targeted recruitment practices in Indigenous communities, and giving back to the community in the form of scholarships, sponsorships, donations, etc.

SUMMARY

Through internal review of current recruitment practices and engagement with various internal stakeholders, SaskPower has identified some key opportunities to improve the attraction and retention of Indigenous employees.

The SaskPower's Indigenous Recruitment and Retention Strategy is intended to leverage these opportunities to support Indigenous Peoples in obtaining employment, growing their careers, and reaching their full potential at SaskPower. In addition to the Strategy, SaskPower has developed a multi-year Action Plan that sets specific objectives and deliverables to improve the successful recruitment and retention of Indigenous Peoples within its workforce.

SaskPower is committed to increasing the representation of Indigenous Peoples within its workforce by building a foundation for stronger partnerships, commitment, and action. Rooted in our corporate values of openness, collaboration, and accountability, SaskPower is paving the way towards becoming an employer of choice for Indigenous Peoples, cultivating a diverse and inclusive workforce representative of the communities we serve.

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APPENDIX A

ROLES AND RESPONSIBILITIES

Implementing the Indigenous Recruitment and Retention Strategy is everyone's responsibility. Every SaskPower employee has a role in and is accountable for the execution of this corporate initiative. The following provides an overview of the roles and responsibilities of all employees at SaskPower:

Executives – President/CEO, Executive Vice-Presidents, and Vice-Presidents

- Lead by example by participating as visible champions of inclusion ensuring SaskPower's Indigenous policies are adhered to
- Ensure the Indigenous Recruitment and Retention Strategy is integrated into division business plans and initiatives
- Promote best practices to support recruitment, retention, and advancement of Indigenous people within SaskPower

Directors/Managers/Supervisors

- Lead by example by participating as visible champions of diversity and inclusion
- Ensure the Indigenous Recruitment and Retention Strategy is integrated into department processes, initiatives, and action plans
- Empower employees to contribute to the division initiatives identified to support recruitment, retention, and advancement of Indigenous people
- Support Indigenous employee participation in the Indigenous Employee Network and its events
- Provide accommodation where needed and remove barriers for employees who require support

Individual Contributors

- Create and maintain a welcoming work environment for Indigenous co-workers, customers, and clients
- Attend training and explore development opportunities to learn about Indigenous culture and Indigenous ways to better support Indigenous coworkers, employees, customers, and clients
- Volunteer at the corporate diversity and Indigenous Employee Network events, develop meaningful relationships and become an ally to indigenous coworkers.

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APPENDIX B

CALLS TO ACTION #92– BUSINESS AND RECONCILIATION

We call upon the corporate sector in Canada to adopt the *United Nations Declaration on the Rights of Indigenous Peoples* as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources. This would include, but not be limited to, the following:

i. Commit to meaningful consultation, building respectful relationships, and obtaining the free, prior, and informed consent of Indigenous peoples before proceeding with economic development projects.

ii. Ensure that Indigenous peoples have equitable access to jobs, training, and education opportunities in the corporate sector, and that Indigenous communities gain long-term sustainable benefits from economic development projects.

iii. Provide education for management and staff on the history of Indigenous peoples, including the history and legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Indigenous rights, Indigenous law, and Indigenous–Crown relations. This will require skills-based training in intercultural competency, conflict resolution, human rights, and anti-racism.

THE WAY FORWARD – TRANSFORMING INTENT INTO ACTION

"The road we travel is equal in importance to the destination we seek. There are no shortcuts. When it comes to truth and reconciliation, we are forced to go the distance."

- Justice Murray Sinclair, Truth and Reconciliation Commission of Canada

Appendix K Heritage Resource Impact Assessment – Overview

Appendix

Heritage Resource Impact Assessment - Overview

Prepared by

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Environmental Assessment

Environment Department
SaskPower

Nov 22nd, 2022

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1. Introduction

1.1 The Heritage Screening Process

As part of the internal project development process, an *Overview* level heritage resource impact assessment (HRIA) was undertaken for the proposed Project. "An *Overview* is a preliminary statement of the archaeological resource potential of an area or region in which a development is proposed. The *Overview* should identify where conflicts between archaeological resources and development are likely to occur and recommend where and perhaps how subsequent investigations should be undertaken" (Ministry of Parks, Culture and Sport, 2010:8)

The first part of this overview HRIA involved overlaying the proposed development study area with a map of all known heritage resources in the province (Figure 1). It also involved predicting (by means of a predictive GIS model built for this purpose, as well relying on the professional judgment of the professional archaeological screener) where any as-of-yet undiscovered heritage resources may be present within the study area.

Using these tools, SaskPower's Archeologist was able to identify where potential conflicts between the proposed project and known heritage resources. SaskPower's Archeologist was also able to make recommendations as to which areas within the study area will require field assessments to determine if any heritage resources are present prior to any development taking place. The field studies will largely be contracted out to a qualified third-party archaeological consultant. This consultant will obtain an Archaeological Research Permit from the provincial regulator (the Saskatchewan Heritage Conservation Branch). Their field studies will consist of a visual inspection of the archaeologically sensitive areas that SaskPower's Archeology group has prescribed. The consultant will also conduct 'shovel testing' in areas were buried archaeological deposits are suspected. SaskPower's Archeologists support the idea of members of the local indigenous community accompanying the consultant field crew and contributing to the discussions about the heritage resources of the area.

The consultant will submit a report to the provincial regulator following the conclusion of their field assessment. This report will make recommendations as to what (if any) further studies or mitigations SaskPower should undertake. SaskPower will have the ability to comment upon the report before and after it is submitted. Once the regulator has approved the report, they will issue us a letter detailing what (if any) further mitigation SaskPower will be required to undertake prior to allowing us to proceed with the development. SaskPower commits to fulfilling the obligations set forth by the provincial regulator.

1.2 Culture History of Saskatchewan.

The information presented in the overview was acquired from the provincial inventory of Saskatchewan archaeological sites. The Heritage Conservation Branch of the Provincial Ministry of Parks, Culture, and Sport maintains a database of all the archaeological sites that have been officially recorded (typically either by professional archaeologists or amateur enthusiasts) within Saskatchewan. Currently, there are approximately 24,000 recorded archaeological sites in the province spanning the last 12,000 years or so

of human history. This is by no means a complete inventory, and on average 200-300 archaeological sites are added to the inventory every year as heritage resource impact assessments get completed within the province.

Archaeologists have divided this history into two main periods: The Pre-Contact Period (everything that happened before indigenous groups encountered Europeans) and the Post-Contact Period (everything that happened after contact was made). The Pre-Contact Period is further subdivided into three broad time periods: The Early Plains Period, the Middle Plains Period, and the Late Plains period. These periods roughly correspond to a shift in material culture and corresponding subsistence strategies. The material culture of the Early Plains Period (From approximately 12,000 to 8,000 years before present) is defined by the presence of large spear points. It is believed that the hunter-gatherers of this time period relied on mammoth and other large megafauna as part of their subsistence. The Middle Plains Period (8,000 to 2,000 years before present) saw the introduction of the innovative atlatl, a javelin-like spear thrower. The projectile points from this period are smaller than the spear points of the previous era. The people of this era hunted bison as their main subsistence strategy. The Late Plains Period (2,000 years ago until the time of contact with Europeans) saw the introduction of the bow and arrow as well as pottery into the material culture. The people of this era practiced communal bison hunting in addition to the hunting practices of past eras.

The material culture of the early, middle and late pre-contact periods can be further subdivided into archaeological cultures based on distinctive stylistic attributes of the projectile points they manufactured. Each style or 'typology' of projectile point can be attributed to a specific age range largely based on sites where these artifacts have been found alongside materials which were then radiocarbon dated. When these diagnostic artifacts are found at an archaeological site, they can be used to effectively determine the age of the site even in the absence of materials that could be radiocarbon dated.

The types of archaeological sites found within Saskatchewan can also be classified into categories. Broadly speaking, they are classified by the number of artifacts found at the site and if there are any archaeological features found on the surface (such as stone rings or cairns). In general, sites with a dense intact layer of artifacts lying undisturbed beneath the ground are considered more significant and worthier of further investigation than sites where the artifacts have been found in an already disturbed context (such as lying on the surface of a cultivated field or recovered form the ploughzone of a cultivated field). All sites with intact archaeological features on the ground surface are assumed to have an intact sub-surface component as well, until it can be proven otherwise. Archaeological sites with multiple intact archaeological components from different eras of history are generally considered more significant than sites with a single component.

Table 1. Culture History of the Saskatchewan

Period	Diagnostic Artifact / Name of Archaeological Material Culture	Date Range (in radiocarbon years before present)
Early Plains Period	Clovis	~12,000 - 10,800
	Folsom	10,900 - 10,200
	Agate Basin	10,500 - 9,600
	Cody Complex	9,600 - 8,600
	Late Paleo- Lanceolate	8,800 – 7,500
Middle Plains Period	Mummy Cave Complex	8,000 - 5,000
	Oxbow	5,000 - 3,000
	McKean Lanceolate	4,200 - 3,200
	McKean - Duncan/Hanna	3,900 - 3,200
	Pelican Lake	3,600 -2,800
Late Plains Period	Besant	2,500 - 1,350
	Avonlea	1,350- 1,100
	Prairie Side-notched	1,100 - 600
	Plains Side-notched	600 - 250
Post -Contact Period	Fur Trade Era	1750 AD - 1875 AD (Calendar Years)
	Early European Settlement	1875 AD – 1914 AD (Calendar Years)
	Modern Era	1914 - Present

1.3 Significant Archaeological Sites and Sites of a Special Nature

The significance of an archaeological site can be measured in a variety of ways:

- **Historical Significance:** Associated with events, places, peoples, organizations or institutions that have made a lasting contribution to the development of Saskatchewan.
- **Cultural/Spiritual Significance**: Sites that contribute to a community's identity or directly connected to a community's traditional way of life
- **Scientific Significance:** Sites that contain or have contributed original material which has furthered (or has the potential to further) our understanding of the past.

When archaeologists refer to a site as being significant, it is often in terms of the *scientific significance* or the site's potential to contribute material which can serve to illuminate past lifeways. Archaeologists often apply the term "significant site" to an archaeological resource when the site represents a sizable and intact collection of information that could potentially further our understanding of past lifeways. Typically, these are large archaeological sites or sites that have been used repeatedly by multiple groups of people over the course of thousands of years. These determinations are typically made by the archaeological practitioner. The indigenous communities and their traditional knowledge keepers may well have their own, equally valid, criteria for determining what makes an archaeological site significant.

In Saskatchewan, there is also the designation of "**Site of a Special Nature (SSN)**" that gets applied to some significant sites where there is evidence of a ceremonial or ritual aspect. These sites include all sites with a "pictograph, petroglyph, human skeletal material, burial object, burial place or mound, boulder effigy, or medicine wheel". This classification is a legal definition as specified under the Saskatchewan *Heritage Property Act (1980)* which affords these types of sites special protections. The provincial regulator has zero appetite to entertain potential impacts to these kinds of sites. All SSNs are considered culturally significant sites, but not all significant sites can be classified as SSN's.

Avoidance of these SSN sites is highly recommended and even approaching the limits of a Site of a Special Nature will trigger the need for a detailed field inspection of the project area surrounding the SSN. Should an SSN be discovered during the field investigation phase of the heritage resource impact assessment, changing the development footprint so that it avoids the site area will be most likely required. Discovering an SSN fortuitously during the construction phase of the project will most likely result in a stop work order being issued while the site is investigated and consultation with the local indigenous groups is conducted.

2.0 Heritage Resource Overview of the Project Area

2.1 Heritage Inventory of the Study Area

The study area was designed to include the proposed CCGT plant site, the Wolverine Station, and all possible sources for the waterline and distribution level power that will feed the plant. Though not defined at the time of the overview, the transmission line between the CCGT plant and Wolverine station, and any potential infrastructure upgrades are assumed to be contained within this study area as well. Please note that the natural gas line which will be evaluated, permitted, and constructed by TransGas is outside of the care and control of SaskPower (though, it too will be within this study area).

There are several heritage resources contained within the study area (Figure 1). The inventory of heritage resources is summarized in Table 2. Few sites within the study area have produced culturally diagnostic materials that could determine the age of the cultural occupation (Table 4).

In addition to the known heritage resources, portions of the study area are considered "archaeologically sensitive", meaning that there is an increased likelihood that additional unrecorded heritage resources are present within these defined areas. In general, these areas are defined by proximity to a significant waterbody or distinct landform feature such as elevated ridges or knolls.

The quarter section (NW ¼ of section 36-33-23-W2M) encompassing the proposed CCGT project plant site does not contain any known archaeological resources and is not considered to be an archaeologically sensitive area. Unlike areas to the northwest and south of the proposed site, the quarter section in question is not adjacent to a significant waterbody, nor does the parcel of land contain any distinct, prominent landforms. There are archaeologically sensitive areas in the land parcels adjacent to the proposed Project. Any incidental development that proposes to intersect these archaeologically sensitive areas adjacent to the project, will trigger a field investigation HRIA by a third-party consultant. This area of archaeological sensitivity is illustrated on the heritage inventory map (Figure 1).

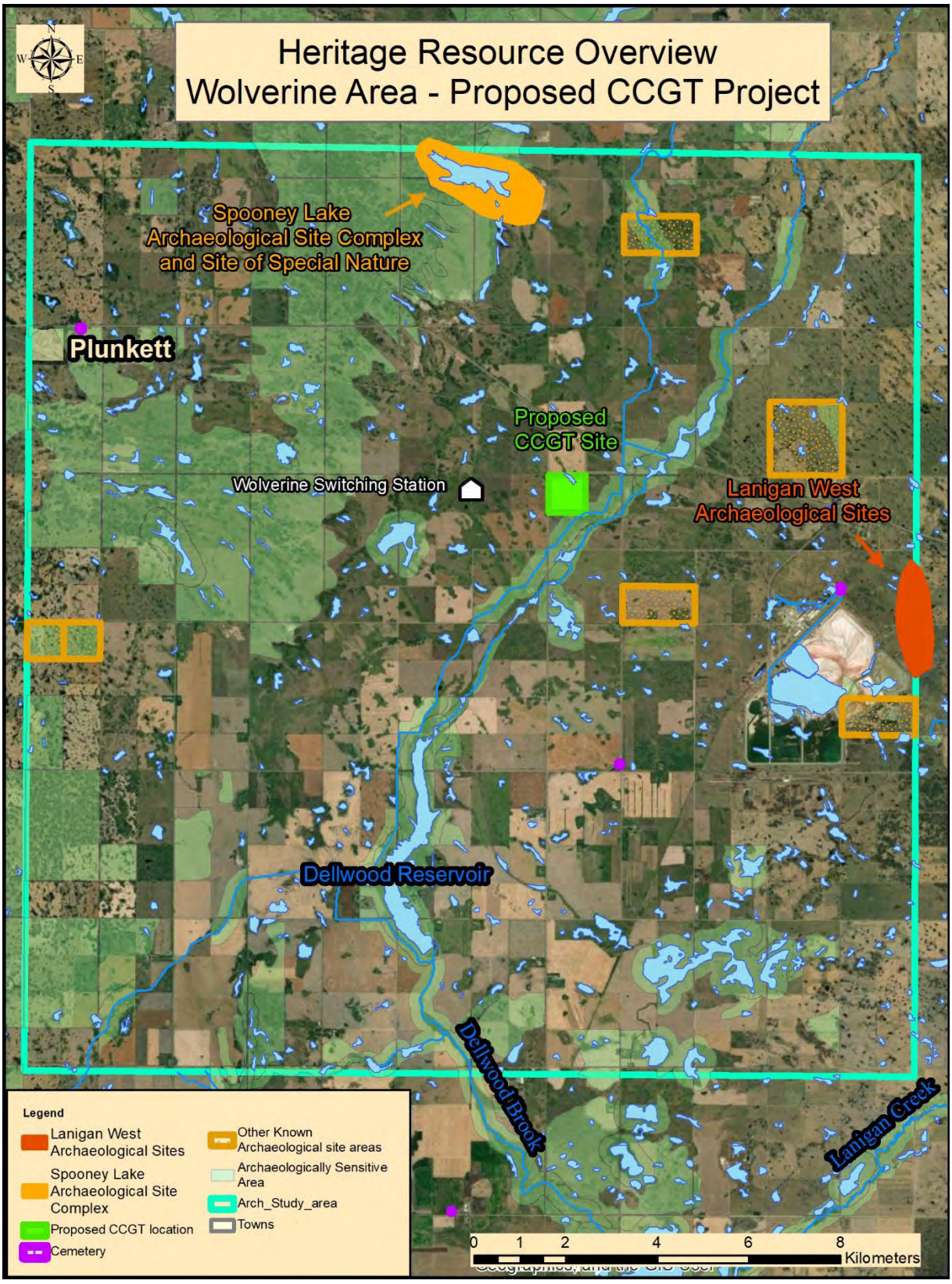

Figure 1: Heritage Resource Inventory of the Study Area

Table 2. Heritage Resources within the Study Area

Resource Type	Number
Site of a Special Nature	1
Archaeological Sites	15
Registered Cemeteries	3

Table 3 Types of archaeological sites within the study area.

Type	Number
Artifact Find (5 or fewer artifacts)	2
Artifact Scatter (6 or more artifacts)	7
Artifact / Feature Combination	1
Single Surface Feature	2
Recurrent Surface Features	2
Stone Alignment / Configuration	1
Medicine Wheel	1

Table 4 Culture History of the Study Area

Period	Diagnostic Artifact (Date Range in RCYBP)	Number of Components at Sites Within study area
Late Plains Period	Plains Side-notched (550 - 200)	1
Post -Contact Period	Early European Settlement (1875 AD - 1914AD)	1

2.1.1 Significant Archaeological Sites and Sites of a Special Nature

There are two clusters of significant archaeological sites within the study area. One cluster (refereed to here as the Spooney Lake Archaeological Site Complex) consists of a series of archaeological sites associated with Spooney Lake on the northern boundary of the study area. The other (Lanigan West Archaeological sites) is a pair of sites on the eastern edge of the study area. Neither of these site areas fall within the proposed development areas of the proposed CCGT plant and its incidental projects.

Spooney Lake Archaeological Site Complex is a cluster of eight archaeological sites in situated on the hilltops and other landforms surrounding Spooney Lake. These eight sites comprise a variety of archaeological features including a series of tipi rings, some uniquely shaped stone cairns, a medicine wheel, and a couple of linear stone features that have been interpreted as drive lines for a bison jump/pound.

The site containing the medicine wheel is considered a Site of a Special Nature under the Heritage Property Act and no development in and around that site is likely to be permitted. Taken as a whole, these eight sites represent evidence of a significant and repeated pre-contact occupation of the area surrounding Spooney Lake. In addition, these have largely been left undisturbed and important cultural materials are presumed to be intact underneath the ground surface

Lanigan West Sites: These sites consist of large scatters of artifacts collected from the cultivated fields by local individuals back in the late 1930's. These sites are noteworthy due to the diverse and plentiful nature of the artifacts recovered from the fields. In addition to the high number of stone tools, a carved atlatl weight was also recovered. These sorts of decorated items are rarely found at archaeological sites and are considered significant cultural artifacts. Unfortunately, subsequent visits to these fields have proved to be unsuccessful in relocating the site, though the area has not been thoroughly investigated through subsurface shovel testing and the possibility of an intact component beneath the ploughzone remains.

2.1.2 Other Archaeological Sites

There are a total of six other archaeological sites within the study area. Unfortunately, these sites were recorded some number of decades ago and the exact location of the finds is imprecise. They each represent a small artifact scatter that was collected by local enthusiasts and eventually reported to the regulator. Very little is know about the nature of these sites and, should a proposed development intersect the site area, an HRIA would be warranted.

2.1.3 Registered Cemeteries

There are three registered cemeteries within the study area (Figure 1.). These sites will be avoided by the proposed plant and its incidental projects. Should one of the incidental projects impact the area immediately adjacent to one of the cemeteries, a field inspection will be conducted to determine the likelihood of burials being present within our proposed impact zone. Further mitigation may be recommended pending the outcome of this assessment.

2.2 Reconnaissance HRIA of NW ¼ of section 36-33-23-W2M

No HRIA was initially planned for 2022, however WLCS identified two cultural features within the quarter section in question at the end of October 2022. Since these features could have regulatory implications at the provincial level as well, SaskPower engaged a third-party archaeological consultant to assess the quarter section for archaeological resources. The goals of this study were threefold: to investigate (through passive, non-invasive means) the cultural features identified by WLCS to determine if they were archaeological in nature, to conduct subsurface testing within the proposed plant site to determine if a cultural component is present beneath the ploughzone, and to evaluate the archaeological potential of the areas within the quarter section but outside the proposed plant footprint.

The reconnaissance HRIA was conducted on Nov 1st, 2022, under archaeological resource investigation permit # 22-149 (on file with the provincial regulator). The final report has not been submitted at the time of this project description submission. A summary of the assessment findings was communicated with SaskPower on Nov 2nd. The investigating archaeologist concluded that the two cultural sites identified by WLCS did not meet the definition of an archaeological site, and thus did not need to be recorded as archaeological resources and reported to the provincial regulator. No further archaeological work was recommended at these two sites.

Similarly, subsurface testing at within the proposed footprint of the plant site did not reveal any buried archaeological deposits. Nor was the area within NW quarter of section 36 outside of the project footprint considered to be archaeologically sensitive.

The remnants of an old homestead established by Mr. Frank Fach and family in 1906 (situated along the northern boundary of the quarter section, outside of the proposed Project footprint) were documented in the field and their historical context was researched at the provincial archives. The archival research did not indicate an association between this site and any significant contribution to the development of Saskatchewan. In addition, the condition of the site is considered poor, as only a few foundations/floors remain visible. As such, the archaeological significance of this site is considered low. Nonetheless, the site will be recorded and registered as an archaeological site with the provincial regulator as a matter of due diligence. The archaeological consultant did not recommend any further archaeological investigations at the homestead site.

In short, the investigating archaeologists are not recommending further work within this quarter section. It is worth noting that the provincial regulator has not yet reviewed the findings of their report. In addition, having no regulatory requirements for additional archaeological work at the gas plant site does not preclude us from conducting additional archaeological surveys in conjunction with WLCS or other interested indigenous rights-holders.

2.3 Next Steps

2.2.1 The CCGT plant site:

At this time there are no plans for additional archaeological investigations at the plant site or within the NW 36 quarter section. The reconnaissance HRIA is considered a thorough archaeological investigation and the likelihood of undiscovered archaeological sites being present within this quarter is extremely low. No further work is being recommended by the archaeological consultant, though additional studies may be undertaken in conjunction with indigenous rights-holders to address any concerns they have.

The former homestead site just to the north of the plant site was recorded as an archaeological site, based on the few architectural features still present on the ground and the archival research. No further archaeological investigations are being recommended for the homestead site, though it is possible the provincial regulator may impose some conditions on working in proximity to the homestead.

2.2.2 The Proposed CCGT – Wolverine Switching Station 230kV interconnection

The proposed route for the transmission line between the plant site and the Wolverine Switching Station was not known at the time of this overview. SaskPower's Archeologist is working on the assumption that the transmission line will follow a fairly direct route between the two facilities. There are no known heritage resources within the area between the two facilities and the potential for the area to contain archaeological sites is considered to be low. However, an HRIA may be required should the proposed route intersect an area of undisturbed native parkland. SaskPower will strive to include the participation of indigenous rights-holders in any archaeological investigations.

2.2.3 Incidental Distribution Power Line

The route for the distribution (25kV or less) power line required for the operation of the CCGT plant is not known at this time. However, it is possible that the route may intersect one or more of the site areas for the poorly defined/recorded archaeological sites (described in section 2.1.2) present within the study area. If the route of the distribution power line intersects one of these site areas, an HRIA will be conducted to evaluate if the resource is at risk of being impacted. SaskPower will strive to include the participation of indigenous rights-holders in any archaeological investigations.

2.2.4 Other Incidental projects (Road, fibre, Distribution line)

SaskPower's Archaeologist is working with Project team to understand the final plans for these additional incidental projects (roads, fibre and waterline). As a guideline, should the footprint for any of these projects approach any of the recorded locations of heritage resources in the study area, then an inventory HRIA will be conducted to evaluate if the resource is at risk of being impacted. Similarly, should the incidental projects infringe upon any of the archaeologically sensitive areas, then they will likewise be subjected to an inventory HRIA. SaskPower's archeologist will conduct a full overview of all incidental projects to determine next steps, once their locations are known.

References Cited

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