

The Chinook Power Station Project

# Project Summary

Submitted to:

**The Canadian Environmental Assessment Agency**

Submitted by:

**Saskatchewan Power Corporation (SaskPower)**

October 2016

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## General Information and Contacts

### 1.0 GENERAL INFORMATION AND CONTACTS

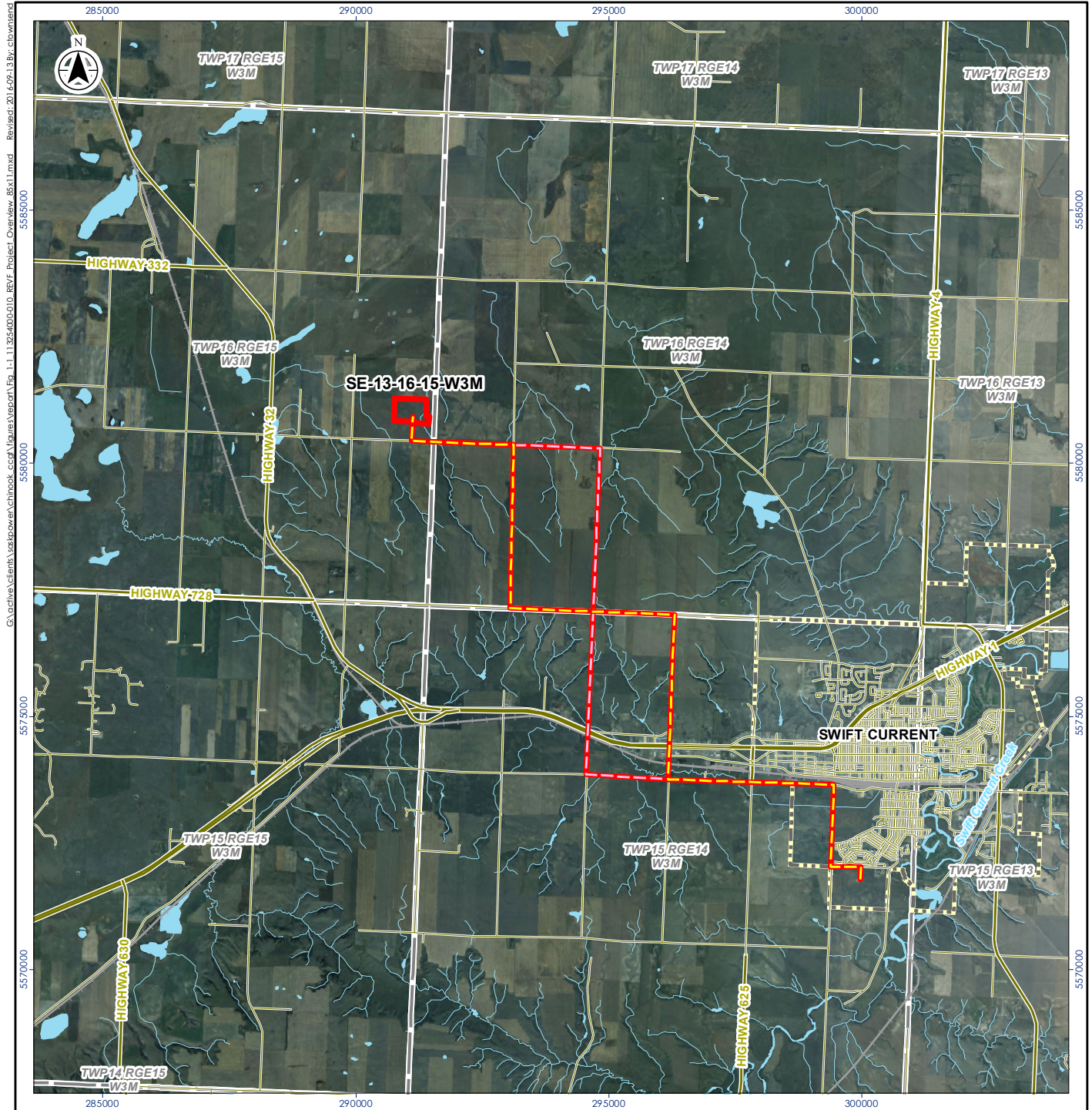
#### 1.1 PROJECT'S NAME, NATURE AND PROPOSED LOCATION

The proposed Chinook Power Station project (the Project) is a nominal 350 megawatt (MW) combined cycle natural gas facility.

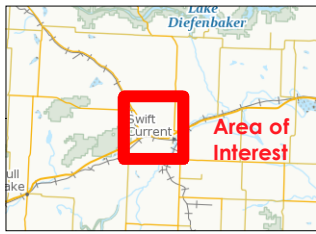
The Project facility is located approximately 11 km northwest of Swift Current, Saskatchewan on private land that is owned by SaskPower. The Project facility is located entirely within one quarter section of land at SE 13-16-15 W3M. The quarter section is located within the Rural Municipality (RM) of Swift Current No. 137 and is zoned as Agricultural/Resource.

The Project also includes a new underground water pipeline from the South Hill Reservoir located within the city limits of Swift Current. There are currently two preliminary water pipeline route options being considered for the Project. Pipeline routing is still under discussion and the final pipeline route is dependent on results of regulatory consultation, engagement activities and preliminary routing studies. The water pipeline will be routed within existing developed road allowances (i.e., ditches), where possible, that are owned by the Province of Saskatchewan (Her Majesty the Queen in Right of Saskatchewan). Regardless of the water pipeline route that is chosen, the start and end points will be the same. A Project overview figure is presented in Figure 1.1.

SaskPower has prepared a Project Description that complies with the *Prescribed Information for the Description of a Designated Project*, and the *Guide to Preparing a Description under the Canadian Environmental Assessment Act, 2012*. This Project Description Summary is prepared to assist in the Canadian Environmental Assessment Agency's (CEA Agency) determination on the requirement of a federal environmental assessment of the Project.



C:\active\clients\waterpower\chinook\_craft\images\mapart\Fig\_1.1\_113254000\_010\_REV1\_P\Project\_Overview\_8.5x11.mxd  
 Revised: 2016-09-13 by: elbowland  
 5570000  
 5575000  
 5580000  
 5585000



- Project Facility Footprint
- Water Pipeline Route Alternative 1
- Water Pipeline Route Alternative 2
- Major Road
- Minor Road
- Railway
- Town/City
- Watercourse
- Waterbody
- Township

0 1 2  
 Kilometers  
 1:115,000 (at original document size of 8.5x11)



Project Location: Near Swift Current, SK  
 113254000-010 REV1  
 Prepared by: clowensend on 2016-09-13  
 Technical Review by: jhennig on 2016-09-13

Client/Project:  
 SaskPower  
 Chinook Power Station Project

Figure No.  
**1.1**  
 Title

**Project Overview**

**Notes**  
 1. Coordinate System: NAD 1983 CSRS UTM, Zone 13N  
 2. Base features produced under license from the Government of Saskatchewan  
 3. Orthomogery: © SGIC 2008 - 2011  
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### 1.2 PROPONENT'S NAME AND CONTACT INFORMATION

The Project name and proponent contact information are provided below:

<b>Name of the designated project:</b>	Chinook Power Station Project
<b>Name of the proponent:</b>	Saskatchewan Power Corporation (SaskPower)
<b>Address of the proponent:</b>	2025 Victoria Avenue Regina, Saskatchewan S4P 0S1
<b>Chief Executive Officer:</b>	Mike Marsh President and Chief Executive Officer SaskPower Phone: 306-566-3271 <a href="mailto:MMarsh@saskpower.com">MMarsh@saskpower.com</a>
<b>Principal contact person:</b>	Yan Wang Project Manager SaskPower Phone: 306-566-6719 <a href="mailto:YWang@saskpower.com">YWang@saskpower.com</a>

### 1.3 RESULTS OF ANY CONSULTATIONS UNDERTAKEN WITH ANY JURISDICTIONS AND OTHER PARTIES INCLUDING ABORIGINAL PEOPLES AND THE PUBLIC

SaskPower conducted an extensive consultation process between 2012 and 2015 during the site selection process. The consultation process provided information about the need for new generation, characteristics, design and schedule of the Project and provided opportunities for elected officials and landowners to learn about the Project and provide feedback. Consultations included in-person meetings with elected officials and landowners as well as, public open houses and mail-outs to nearby landowners. Landowners were generally accepting of the need for the generation project. The main concern expressed was the amount of water required for the Project as landowners do not want the local water supply to be impacted. Landowners also expressed concern about air quality, noise levels, light pollution, increased construction traffic and property values.

The Project team undertook preliminary engagement activities starting in February 2016 to provide opportunities for elected officials and landowners to learn about the Project and provide feedback to the Project team. Activities included in-person and conference call discussions with municipal, provincial and federal government officials. In addition, letters were sent to all landowners within 5 km of the Project facility site as well as other potentially interested stakeholders to introduce the Project (75 in total). The letter included a questionnaire and

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postage-paid return envelope to offer the opportunity to provide feedback. The engagement process included information about the Project need, scope, benefits and schedule.

From the letters that were sent to the landowners within a 5 km radius of the Project site and interested stakeholders, 19 questionnaires (26%) were returned. The responses received indicated that employment opportunities, water use, noise levels and air quality were viewed as the top priorities for development of this Project. Additional concerns identified by landowners included increased traffic during construction, garbage, access to water supply, and effects on farming and land values. Table 1 summarizes the feedback received from local landowners that filled out the questionnaire.

**Table 1 Summary of Feedback Received from Local Landowners Regarding Priorities for Development**

<b>What are your top three priorities for development of this project?</b>	
<b>Options to choose from:</b>	<b>Number of respondents that chose this as a priority</b>
Employment opportunities	10
Noise levels	9
Air quality	8
Water use	8
Land use	6
Cost of project	5
Other	5
Supply of clean, reliable power	4

SaskPower believes that the majority of stakeholders in the study area are generally supportive of the Project as they understand the need for new generation to meet current and future demand in the area and that the Project will provide socioeconomic benefits for their community.

Meetings are being scheduled with the City of Swift Current and the RM of Swift Current to continue discussions regarding the water supply pipeline and related infrastructure. Communication between SaskPower, the RM and the City will continue throughout the phases of the Project. SaskPower commits to ongoing engagement with stakeholders to share information about the Project and ensure questions and concerns are understood and addressed.

Stakeholders will be contacted directly and invited to attend a public open house information session to be held in the fall of 2016 at a local community hall. Information on the design of the facility, proposed noise mitigation techniques and results of air dispersion modelling will be provided and stakeholders will have an opportunity to have their questions and concerns addressed directly by the Project team. Further ongoing engagement activities will be designed

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based on ongoing feedback received from stakeholders. As the Project progresses, information letters will be distributed to stakeholders informing them of the Project status.

The Project team is also planning an economic opportunities forum in the fall of 2016. The forum will be a procurement event where vendors learn about the Project and the Project team can connect with suppliers and service providers.

Based on discussions with CEAA, the Project team identified the seven Aboriginal communities and organizations listed in Table 2 as having a potential interest and/or concern with the Project. A summary of engagement with Aboriginal communities is presented in Table 3.

Letters introducing the Project were sent to the Aboriginal communities identified in Table 2. The letter included a questionnaire and postage-paid return envelope to offer the opportunity to provide feedback. To date, no concerns regarding potential effects have been raised through engagement with Aboriginal communities; however, SaskPower will continue to engage with the Aboriginal communities and organizations to address any concerns.

**Table 2 Aboriginal Communities with a Potential Interest in the Project**

Aboriginal Community	Approximate Distance from Project Area	Address
Nekaneet First Nation	113 km An Urban Reserve is located approximately 3 km from the Project area.	P.O. Box 548, Maple Creek, SK S0N 1N0
Wood Mountain First Nation	138 km	P.O. Box 1792, Assiniboia, SK S0H 0B0
Carry The Kettle Nakoda First Nation	66 km	P.O. Box 57, Sintaluta, SK S0G 4N0
File Hills Qu'Appelle Tribal Council	289 km (to Fort Qu'Appelle)	Room 222-740 Sioux Avenue, P.O. Box 985, Fort Qu'Appelle, SK, S0G 1S0
Prairie Dog Métis Local #123	2 km (to Swift Current address)	780-8th Avenue NE, Swift Current, SK S9H 2R5
Métis Nation –Saskatchewan	220 km (to Saskatoon address)	406 Jessop Ave, Saskatoon, SK S7N 2S5
Métis Nation -Saskatchewan Western Region III	The Project is located within Métis Nation -Saskatchewan Western Region III	3220 Dewdney Ave E. Regina, SK S4N 5E4



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**Table 3 Summary of Engagement with Aboriginal Communities**

<b>Aboriginal Community</b>	<b>Date</b>	<b>Means of Engagement</b>
Nekaneet First Nation	February 1, 2016	Phone call, email
Nekaneet First Nation	February 8, 2016	Email
Nekaneet First Nation	February 10, 2016	Notification letter and survey sent by mail
Nekaneet First Nation	February 10, 2016	Phone call
Nekaneet First Nation	February 11, 2016	In person meeting
Nekaneet First Nation	March 22, 2016	Proposal letter received
Carry the Kettle Nakoda First Nation	May 6, 2016	Notification letter and survey sent by mail
Wood Mountain First Nation	May 6, 2016	Notification letter and survey sent by mail
File Hills Qu'Appelle Tribal Council	May 6, 2016	Notification letter and survey sent by mail
Prairie Dog Métis Local #123	May 6, 2016	Notification letter and survey sent by mail
Métis Nation – Saskatchewan	May 6, 2016	Notification letter and survey sent by mail
Métis Nation - Saskatchewan Western Region III	May 6, 2016	Notification letter and survey sent by mail
Métis Nation – Saskatchewan	May 17, 2016	Notification letter and survey sent by mail returned to SaskPower; mailed to an alternate address
Nekaneet First Nation	May 20, 2016	In person meeting
Nekaneet First Nation	August 18, 2016	In person meeting to discuss next steps in relationship building now that SaskPower has been awarded the opportunity to build the Project.
Carry the Kettle Nakoda First Nation	September 13, 2016	Phone call with the Land Manager to discuss whether there were any concerns with the Project. Emailed the notification letter that was originally mailed in May so that a follow-up conversation to discuss possible concerns could take place in a few days.
Prairie Dog Métis Local #123	September 13, 2016	Phone call with the President of the Prairie Dog Métis Local #123 about the Project. The President did raise expectations of work for some of the members. A commitment was made to keep her and the Prairie Dog Métis Local #123 updated about the Project.
Wood Mountain First Nation	September 15, 2016	Phone call with the Chief to discuss Wood Mountain's interest in the Project. The Chief did not express any concerns from an Aboriginal lands and resources perspective but referred SaskPower to File Hills Qu'Appelle Development Corporation for economic participation in the Project.

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Aboriginal Community	Date	Means of Engagement
Carry the Kettle Nakoda First Nation	September 15, 2016	Follow-up phone call with the Land Manager to see if she had any comments or concerns with the Project. She did not have any comments regarding Carry the Kettle Nakoda First Nation's use of the lands in the Project area.
Carry the Kettle Nakoda First Nation	September 16, 2016	Phone call with the Economic Development Officer. Invitation extended to attend a supplier information session for the Project in Regina on September 21, 2016.
Nekaneet First Nation	September 16, 2016	Phone call to extend invitation to the Supplier Information event in Regina on September 21, 2016. Meeting with a Nekaneet representative where the signed Project Support Agreement was received.
Carry the Kettle Nakoda First Nation	September 20, 2016	Phone call to make arrangements for attendance at the Supplier Information event in Regina on September 21, 2016.
File Hills Qu'Appelle (FHQ) Development Corporation	September 20, 2016	Phone call with the CEO, File Hills Qu'Appelle Development Corporation to discuss the Project and the Supplier information event in Regina on September 21, 2016.
Carry the Kettle Nakoda First Nation	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
Wood Mountain First Nation	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
Prairie Dog Métis Local #123	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
Nekaneet First Nation	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
File Hills Qu'Appelle Tribal Council	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
Métis Nation – Saskatchewan	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.
Métis Nation – Saskatchewan Western Region III	September 22, 2016	Project update letter including information on the proposed water line and a map of the water line study area sent by mail.

In the spirit of collaboration and reconciliation, the Project team has identified the Nekaneet First Nation as the main Aboriginal community in the Project area. The Nekaneet First Nation is a member of the File Hills Qu'Appelle Tribal Council, located approximately 113 kilometers from

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the Project area and also has a commercially developed Urban Reserve located in Swift Current. The Project team has opted to follow a protocol that recognizes the Nekaneet First Nation as the leading Aboriginal community in the overall Project area and SaskPower is currently working with the Nekaneet First Nation on cultural activities that will open the way and lay the groundwork for a successful Project.

SaskPower has signed a Project Support Agreement with the Nekaneet First Nation that includes Nekaneet providing ceremonial support for the Project. SaskPower is working with Nekaneet to design a training program that will be inclusive for community members. Given that Nekaneet is a prominent First Nation in the Swift Current region, SaskPower is working with Nekaneet to ensure that SaskPower is engaging all of the Aboriginal groups that need to be informed about the Project.

Aboriginal engagement is conducted with respect for stakeholder's culture and values and recognition that their input is an integral component to the success of the Project. SaskPower is committed to continue engaging with the Nekaneet First Nation, Carry the Kettle Nakoda First Nation, the Prairie Dog Métis Local #123 and the Wood Mountain First Nation about the Project. As is a recognized best practice, SaskPower is now taking direction from these Aboriginal communities on how and when they would like to be engaged.

Due to the Project being built on private land in an industrial setting in proximity to an urban centre and within developed road allowances owned by the Province of Saskatchewan, there are no obvious impacts to Aboriginal and Treaty rights. There is no unoccupied Crown land in the Project area to allow Aboriginal people the right of access to carry out their Aboriginal or Treaty Rights. SaskPower is therefore of the opinion that a formal Aboriginal consultation plan is not necessary for this Project; however, SaskPower will continue to engage with the Aboriginal groups to address any concerns with the Project.

## 1.4 ENVIRONMENTAL ASSESSMENT AND REGULATORY REQUIREMENTS OF OTHER JURISDICTIONS

### 1.4.1 Provincial Jurisdiction

In addition to federal jurisdiction, the Project may also constitute a "development" for the purposes of *The Saskatchewan Environmental Assessment Act (SKEAA)*, as the term is defined by Section 2(d) of the Act.

Developments that are likely to have significant environmental implications must be granted approval from the Saskatchewan Ministry of Environment (SK MOE) - Environmental Assessment Branch (EAB) before proceeding with a project. The full Project Description document will be submitted to the Saskatchewan MOE-EAB to inform their decisions regarding the acceptability of potential environmental effects from the Project. Following the review, the EA Commissioner will determine if the Project is deemed a development and the submission of an Environmental Impact Statement (EIS) is required.

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Through the submission of an EIS, if required, the EA process is intended to provide a detailed review of the biophysical, socio-economic and cultural issues associated with a proposed project. It allows for the public, potential stakeholders, and appropriate government agencies to be made aware of and comment on the potential environmental effects associated with a proposed project.

#### 1.4.2 Federal-Provincial Jurisdictional Interaction

Based on SaskPower's current understanding of the Project and regulatory processes, the intent of the Project Description is to meet the needs of both federal and provincial regulators in order to screen the Project and make a determination on whether the Project is subject to an EA. If the Project is subject to an EA both federally and provincially, it is anticipated that Canada and Saskatchewan will coordinate and cooperate in the exercise of their respective powers and performance of their respective duties in a timely, efficient and defensible manner.

#### 1.4.3 Legislative and Regulatory Requirements

The Project will be subject to several legislative and regulatory requirements including permits, licences and authorizations. Project planning is at the early stages and consequently, all of the requirements for permits, licences, and authorizations are not currently known. A list of municipal, provincial and federal legislation; regulatory requirements; and permits, licences and authorizations that may be applicable to the Project is provided in Table 4. This list will be updated and refined as Project details are confirmed.

**Table 4 Summary of Potential Legislative and Regulatory Requirements for the Project**

Legislation/Regulations	Overseeing Agency	Relevance to Project
<b>Municipal Authority</b>		
<i>Planning and Development Act</i>	Rural Municipality of Swift Current No. 137	SaskPower may be required to apply for a zoning amendment prior to development. SaskPower will require a Development Permit from the RM. Given the Project is likely classified as a "design build project", three separate permit stages will be required for foundation, above grade structural and final design.
<b>Provincial Authorities</b>		
<i>The Environmental Assessment Act</i>	Saskatchewan MOE	Developments that are likely to have significant environmental implications must be granted approval from the Saskatchewan MOE-EAB before proceeding with a project. This document will be submitted to the Saskatchewan MOE-EAB to inform their decisions regarding the acceptability of potential environmental effects from the Project. Following the review, the EA Commissioner will determine if the Project is deemed a development. If the Project is deemed a development, an EA is required.

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Legislation/Regulations	Overseeing Agency	Relevance to Project
<i>Environmental Management and Protection Act</i>	Saskatchewan MOE	<p>Air quality is regulated by the Saskatchewan MOE under the <i>Environmental Management and Protection Act</i> which regulates potentially harmful activities and substances to protect the air, land and water resources of the province. SaskPower will be required to meet the requirements of Chapter E.1.2, of the Saskatchewan Environmental Code, adopted pursuant to the <i>Environmental Management and Protection Act</i>.</p> <p>The Project will also require industrial works construction and operation approvals including approval to construct and store hazardous substances and/or waste dangerous goods from the Environmental Protection Branch.</p>
<i>Water Security Agency Act</i>	Saskatchewan MOE – Landscape Stewardship Branch, Water Security Agency (WSA)	<p>A permit was required from WSA prior to groundwater investigations taking place.</p> <p>The Project may require a water rights licence and approval to construct and operate works as well as an approval to construct and operate drainage works from WSA. In addition, an Aquatic Habitat Protection Permit may be required prior to beginning construction. Types of activities associated with the Project that may require an Aquatic Habitat Protection Permit include:</p> <p>Road development activities including, culvert installation, maintenance and removal, and temporary crossings; water pipeline construction; and riparian and aquatic vegetation removal.</p>
<i>Wildlife Act</i>	Saskatchewan MOE – Fish and Wildlife Branch	<p>Plant and animal species at risk as defined in the <i>Wildlife Act</i>, are protected from being disturbed, collected, harvested, captured, killed, sold or exported without a permit.</p> <p>Field permits were obtained from the SK MOE Fish and Wildlife Branch for field surveys conducted for the Project. Mitigation or avoidance may be required if species at risk are identified within the Project area.</p>
<i>Public Health Act, 1994</i>	Ministry of Health - Cypress Health Region	<p>The Project may require a permit from the local public health region to construct a sewage works given liquid domestic waste produced from the plant will be less than 18 cubic metres/day of non-industrial effluent.</p>
<i>Highways and Transportation Act, S.S. 1987, H-3.01</i>	Ministry of Highways and Infrastructure (MHI)	<p>The Project may require permits for the movement of oversized and overweight vehicles on provincial highways. Permits may also be required for on premise and off-premise identification signs.</p> <p>SaskPower will work with the Saskatchewan MHI to obtain necessary agreements or permits for work within existing road allowances and roadway crossings prior to water pipeline construction.</p>

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Legislation/Regulations	Overseeing Agency	Relevance to Project
<i>Heritage Properties Act</i>	Ministry of Parks, Culture and Sport – Heritage Conservation Branch	The Heritage Conservation Branch (HCB) has designated each quarter section parcel within the southern half of the Province 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 Chinook Power Station Project is within a non-sensitive parcel (SE 13-16-15 W3M). However, the associated water pipeline intersects some “sensitive” parcels. Based upon an agreed process with the HCB, SaskPower’s in-house archaeologists have reviewed the Project and have determined that, depending on which side of the developed road allowance the pipeline is to be installed on, there is a potential risk of impacting a heritage resource (in the form of a known archaeological site). As such, the Project may require a heritage resource impact assessment (HRIA) to be conducted depending on the final routing of the water pipeline. The results of the HRIA, if required, will be provided to the HCB who will issue a letter granting clearance for the Project under the <i>Heritage Properties Act</i> .
<i>The Occupational Health and Safety Act, 1993</i>		The water pipeline trench will be designed and constructed in accordance with <i>The Occupational Health and Safety Regulations, 1996; Part XVII Excavations, Trenches, Tunnels and Excavated Shafts</i> .
<b>Federal Authorities</b>		
<i>The Canadian Environmental Assessment Act, 2012 (CEAA 2012)</i>	CEA Agency	The Project is a “designated project” and requires a screening under Sections 8 to 12 of the Act. The Agency may require an EA under CEAA 2012.
<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	The <i>Fisheries Act</i> defines requirements by which commercial, recreational and Aboriginal (CRA) fisheries are protected, including the prevention of “serious harm to fish” including fish habitats and to fish that support a CRA fishery. A review of available information indicates that no fish bearing waterbodies are expected to be affected by the Project.
<i>Species at Risk Act</i>	Environment and Climate Change Canada	The <i>Species at Risk Act (SARA)</i> lists species in Canada that are classified as being extirpated, endangered, threatened, or of special concern. These species are granted special measures to protect them.  Federally listed species at risk may occur in the Project area. However, information review and field surveys to date indicate that no critical habitat for these species is expected to be affected by the Project.

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<b>Legislation/Regulations</b>	<b>Overseeing Agency</b>	<b>Relevance to Project</b>
<i>Migratory Bird Convention Act</i>	Environment and Climate Change Canada	The Migratory Birds Regulations and Migratory Birds Sanctuary Regulations define provisions which are meant to protect native species of migratory birds, nests, and eggs. The Project may interact with migratory birds and this document describes appropriate mitigation to avoid potential significant residual adverse environmental effects.
<i>Aeronautics Act, Canadian Aviation Regulations, Standard 621</i>	Transport Canada	SaskPower may be required to submit an Aeronautical Assessment Form for Obstruction Marking and Lighting for Transport Canada to determine the need for the application of marking and lighting of objects that may pose a hazard to aviation.
<i>Aeronautics Act</i>	NAV Canada	SaskPower may be required to submit a Land Use Submission Form to NAV Canada prior to Construction.

# CHINOOK POWER STATION PROJECT

Project Information

## 2.0 PROJECT INFORMATION

### 2.1 PROJECT'S CONTEXT AND OBJECTIVES

To meet the growing demand for power in the province of Saskatchewan, provide replacement power for the retirement and/or refurbishment of conventional coal-fired generating units and allow for the integration of intermittent renewables, there is a need to build a new large-scale power plant in Saskatchewan that can generate electricity by 2019. The proposed Project is a nominal 350 megawatt (MW) combined cycle natural gas power station to be located near Swift Current, Saskatchewan.

SaskPower is investing approximately \$1 billion annually for at least the next decade to upgrade and modernize the province's electricity system. This includes finding cleaner sources of power generation in order to comply with existing regulations, which mandate the phase-out of conventional coal-fired generation as well as new emission standards and emerging regulations. SaskPower has a number of initiatives underway to meet current anticipated supply needs including carbon capture technology, additional natural gas projects, life extensions to existing hydro (non-greenhouse gas (GHG) emitting) facilities, additional wind and hydro projects, utility scale solar projects, importation of clean hydro power from Manitoba and evaluating the potential for geothermal and biomass. These initiatives, combined with the development of more demand-side management and energy efficiency programs, will ensure SaskPower can continue to provide reliable, sustainable, cost-effective electricity to the people of Saskatchewan well into the future.

SaskPower is targeting a 40% reduction in GHG emissions from 2005 levels by 2030, exceeding the national target of a 30% reduction. To achieve this target, SaskPower will transition its conventional coal-fired generation facilities to lower GHG emitting supply options including carbon capture and sequestration, natural gas, and renewables. SaskPower recently announced plans to double its renewable generation capacity from 25% today to up to 50% by 2030. Included in these plans is an increase in wind capacity (target of 30% capacity by 2030) and solar. In order to integrate these renewable supply options that are intermittent by nature, a back-up generation source is required to match electricity generation with electricity demand. Natural gas generation is an ideal candidate as it can quickly ramp up or down as the renewable generation output fluctuates. For Saskatchewan, it is the only practical and economic option for integration of renewables in order to reach SaskPower's 40% emission reduction target by 2030, as other intermittent support options such as hydro are not currently available.

The Project, as proposed, is the most cost-effective solution to meet increasing electricity demand as well as replace existing conventional coal-fired generation within the timelines required. It will also result in an overall reduction of GHG and other air emissions. As SaskPower phases out conventional coal-fired generation, deploys carbon capture and storage



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technology, and adds natural gas and renewables into its system, GHG emission levels will significantly improve.

## 2.2 THE PROVISIONS IN THE SCHEDULE TO THE REGULATIONS DESIGNATING PHYSICAL ACTIVITIES

Paragraph 2(a) of the *Regulations Designating Physical Activities* (Government of Canada 2014) states that a review needs to occur through the Minister of Environment under the CEEA 2012 for the construction, operation, decommissioning and abandonment of a new fossil fuel-fired electrical generating facility with a production capacity of 200 MW or more. The proposed Project is 350 MW in size and is therefore subject to a Screening by the CEA Agency under requirements of Section 10 of CEEA 2012, to determine if an EA is required.

The Project is not a component of a larger Project that is not listed in the *Regulations Designating Physical Activities* (Government of Canada 2014). This is a new project and neither the Project nor any its components are an expansion under CEEA 2012. The project location has not been part of a regional environmental study under Section 74 of CEEA 2012.

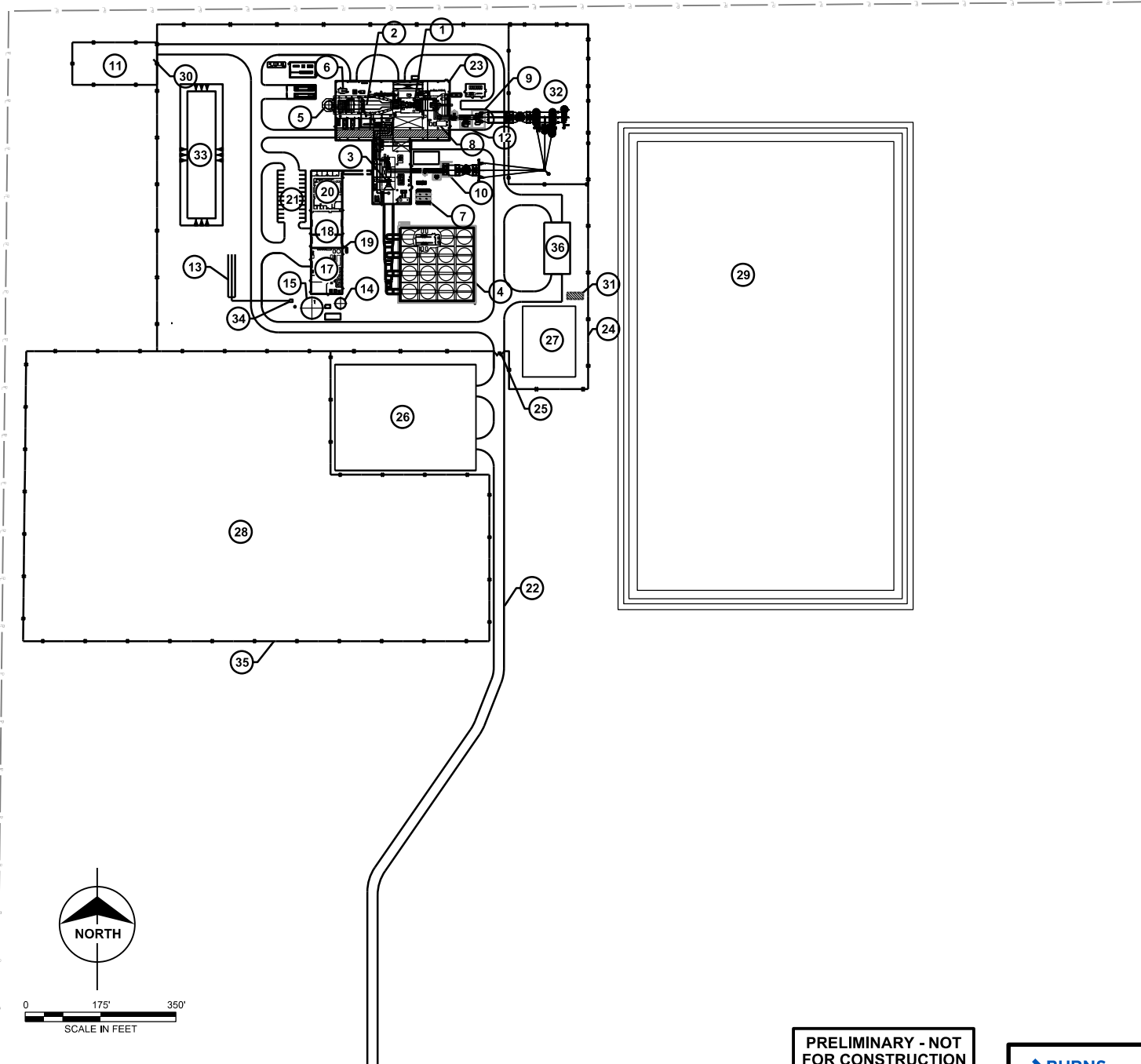
## 2.3 DESCRIPTION OF PHYSICAL WORKS AND STRUCTURES

The Project will be a power generation facility which uses natural gas combined cycle generation turbine (CCGT) technology to generate a nominal 350 MW of electricity. Project components will include the power generation facility, a switchyard to interconnect to the 230 kilovolt (kV) transmission system, an 18 km long potable water pipeline from the City of Swift Current, and a TransGas gas yard. With the exception of the water pipeline, all structures and equipment will be located at SE 13-16-15-W3M, which is owned by SaskPower. The quarter section is currently a greenfield site with no existing structures. The site layout illustrates the proposed locations of the physical structures to be erected on the Project facility (Figure 2.1 and Table 5).

The facility will consist of the powerhouse building, a multi-purpose building with main control/administration room, warehouse, workshop, and water treatment building, air-cooled condenser (ACC), and switchyard. The total disturbance footprint for the facility, including temporarily disturbed areas during construction, will be approximately 650 m by 450 m (29.2 hectares). The total disturbance footprint for the potable water pipeline is approximately 18 km long by 12 m wide (21 ha). The total footprint of the Project will be approximately 50.2 ha.

**KEY NOTES:**

- ① GAS TURBINE GENERATOR (GTG)
- ② HEAT RECOVERY STEAM GENERATOR (HRSG)
- ③ STEAM TURBINE GENERATOR (STG)
- ④ AIR COOLED CONDENSER (ACC)
- ⑤ HRSG STACK
- ⑥ CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS) BUILDING
- ⑦ FIN FAN COOLER
- ⑧ AUXILIARY TRANSFORMER
- ⑨ GTG GENERATOR STEP-UP UNIT TRANSFORMER
- ⑩ STG GENERATOR STEP-UP UNIT TRANSFORMER
- ⑪ FUEL GAS YARD
- ⑫ OIL WATER SEPARATOR
- ⑬ LEACH FIELD
- ⑭ DEMIN WATER STORAGE TANK
- ⑮ SERVICE WATER STORAGE TANK
- ⑯ WASTEWATER STORAGE TANK
- ⑰ WATER TREATMENT BUILDING
- ⑱ WAREHOUSE
- ⑲ MAINTENANCE SHOP
- ⑳ ADMINISTRATION BUILDING
- ㉑ ADMINISTRATION PARKING
- ㉒ PLANT ACCESS ROAD
- ㉓ POWERHOUSE BUILDING
- ㉔ SITE SECURITY FENCE
- ㉕ SITE SECURITY FENCE DOUBLE SWING GATE
- ㉖ CONSTRUCTION PARKING
- ㉗ CONSTRUCTION TRAILERS
- ㉘ CONSTRUCTION LAYDOWN
- ㉙ EVAPORATION POND
- ㉚ TRANSGAS TIE-IN LOCATION
- ㉛ CONSTRUCTION POWER TRANSFORMER
- ㉜ 230 kV SUBSTATION
- ㉝ STORMWATER POND
- ㉞ SEPTIC TANK
- ㉟ TEMPORARY LAYDOWN FENCE
- ㊱ COLD STORAGE BUILDING



PRELIMINARY - NOT FOR CONSTRUCTION



FIGURE 2.1

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**Table 5 Description of Physical Works**

Physical Work	Description
Permanent Facilities and Infrastructure	
<b>Power House</b>	Building to enclose the Gas Turbine Generator (GTG), Steam Turbine Generator (STG), Heat Recovery Steam Generator (HRSG) and other balance of plant (BOP) electrical and mechanical equipment. The footprint of the building will be approximately 4,400 square m. The exhaust stack is anticipated to be 43 m tall.
<b>Multipurpose Building</b>	A multi-purpose building will be constructed to house the operating and maintenance staff. The multi-purpose building will include an administration/control room, warehouse, maintenance shop, and water treatment area. A permanent parking lot will be located on the west side of the multipurpose building.
<b>Fuel Gas Building</b>	A 10 m by 20 m pre-engineered fuel gas building will be located in the northwest corner of the Project site. 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.
<b>Water/glycol loop and fin-fan heat exchanger</b>	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. The fin-fan heat exchanger measures approximately 9 m by 9 m
<b>Air Cooled Condenser</b>	The air cooled condenser (ACC) is a heat exchanger which condenses steam from the steam turbine to condensate. The ACC will be located south of the main power plant facility with an overall dimension of approximately 52 m by 52 m with a height of approximately 30 m.
<b>Underground Wash Water Drain Tank</b>	An underground wash water drain tank will be located to the north of the GTG building. The 3 m by 5 m tank will collect water from the compressor wash and will be hauled off site periodically for disposal at an approved facility.
<b>Fire/Service Water and Demineralized Water Tanks.</b>	The fire/service water tank will have a capacity of approximately 500,000 gallons (1,892,706 litres) whereas the demineralized tank is estimated to have a capacity of 100,000 gallons (378,541 litres). The water storage tanks serve to improve operational reliability of the unit in the event of interruption of service from the City, or equipment malfunction in producing demineralized water.
<b>Oil/Water Separators</b>	Oil/water separators used to separate oil from the water that will be collected from the facility drains. It will be designed to store 1000 gallons (3,785 litres) of oil.
<b>Permanent Small Buildings</b>	The project will include several other permanent small buildings or enclosures of varying sizes including the fire water pump building, emergency diesel generator, and three electrical equipment modules.

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Physical Work	Description
<b>Evaporation Pond/ Stormwater Pond</b>	<p>An evaporation pond will be constructed for the facility to contain any water that cannot be recycled through the plant system. The evaporation pond is estimated to be approximately 15 acres (19 acres including the surrounding berm) with a depth of approximately 2 metres. Given the evaporation pond depth is designed to account for the maximum operational storage plus additional depth for salt storage, allowance for a 100-year rainfall event, freeboard for wave run-up and average annual lake evaporation, it is not intended for the evaporation pond to drain.</p> <p>The stormwater pond will be designed to collect surface water runoff only and will be designed for a 25-year storm event and preliminary design anticipates the pond will be approximately 2,800 square meters and approximately 2 meters deep. There will be an overflow structure as part of the design in the event of a larger storm event. 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. Stormwater discharge at a delayed rate will be done in accordance with a Drainage approval from the Water Security Agency. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected. Drainage from the stormwater pond will not affect fish or fish habitat.</p>
<b>Water Pipeline</b>	<p>Water for the plant will be obtained from the City of Swift Current via a new underground water pipeline from the South Hill Reservoir, an existing enclosed water containment structure that stores treated city water. Initial design calculations have indicated that a new booster pump station will be required at the South Hill Reservoir adjacent to existing facilities. The water pipeline is expected to be approximately 18 km long with a capability of transporting water at a maximum of 100 Gallons Per Minute (United States) (GPM (US)) with a pressure not to exceed 200 pounds per square inch (psi). Pipeline routing is still under discussion and the final pipeline route is dependent on results of regulatory consultation, engagement activities and preliminary routing studies. The water pipeline will be routed within existing developed road allowances (i.e., ditches), where possible, that are owned by the Province of Saskatchewan (Her Majesty the Queen in Right of Saskatchewan).</p>
<b>Site Access Road</b>	<p>The site access road that will be built on the Project quarter section will be approximately 500 m in length and 8 m wide. The access road will be an all-weather crushed rock road and will be sited to avoid wetland areas on the quarter section.</p>
Utilities and Infrastructure	
<b>Electrical Power</b>	<p>SaskPower will provide two overhead powerlines to the Project. A 25 kilovolt (kV) overhead distribution powerline will be constructed on the east side of the property and will connect to a two mega-volt ampere (MVA) transformer for construction. A 230 kV overhead powerline approximately 5 km in length will be constructed on the northeast corner of the site to interconnect the Project to the provincial electrical grid. A team within SaskPower, outside of the Project team will be responsible for routing, stakeholder engagement and regulatory approvals/permits and construction and operation for both components and are therefore outside of the care and control of the Project team. It is expected that both lines will be subject to a self-assessment under SKEAA.</p>

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Physical Work	Description
<b>Fibre</b>	Telecommunications will be required for operation of the Project. The primary method of communication with the plant will be through a Wide Area Network whose central medium for communication is fibre optics. A team within SaskPower, outside of the Project team will be responsible for the fibre optic routing, regulatory approvals/permits, construction and operation and is therefore outside of the care and control of the Project team. It is expected that the fibre optic line will be subject to a self-assessment under SKEAA.
<b>Natural Gas Infrastructure</b>	<p><b>Gas Supply</b></p> <p>The Project requires a natural gas supply of high pressure service to supply the gas turbine and low pressure service to supply the building heaters. TransGas will be responsible for routing, constructing and operating the pipeline to provide the natural gas supply infrastructure and is therefore outside of the care and control of the Project team. SaskPower will enter into a construction agreement with TransGas, a wholly owned subsidiary of SaskEnergy, for the pipeline construction and interconnection facilities. Once construction is complete, as per the TransGas tariff, SaskPower will enter into a service agreement with TransGas to transport the natural gas to the facility. As per The SaskEnergy Act, TransGas has the exclusive right to transport gas within Saskatchewan. It is anticipated that the pipeline will be regulated under the <i>Pipelines Act</i> administered by the Government of Saskatchewan, Ministry of Economy and subject to a self-assessment under SKEAA.</p> <p><b>Plant Gas System</b></p> <p>The plant natural gas system will begin at the downstream side of the fuel gas metering yard. An emergency stop valve, manually controlled from the control room, will be provided downstream of the metering yard to provide emergency shutoff capabilities in the event of an on-site gas system leak or major plant fire.</p>

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### 2.4 PRODUCTION CAPACITY

The Project has been designed to generate a net output of 350 MW which is greater than the 200 MW threshold established for new fossil fuel-fired electrical generating facilities under the *Regulations Designating Physical Activities* (Government of Canada 2014).

Output and heat rate for combined cycle technologies have improved incrementally over the years, primarily due to the advancement in the design of the gas turbine. For an intermediate to base load combined cycle facility, a combined cycle using G, H, and J class gas turbines would have better efficiency. However, output of a combined cycle facility using these technologies would be higher than the 350 MW required by SaskPower. A plant using these larger gas turbine technologies could require derate of the plant to stay under the 350 MW, which in turn decreases the efficiency resulting in a higher heat rate.

The 1x1 F-class turbine configuration chosen for the Project is best suited to meet the 350 MW output. Since carbon capture technology is not used for combined cycle units, higher efficiency (lower heat rate) means that less carbon dioxide (CO<sub>2</sub>) is generated for every kilowatt of electricity generated.

### 2.5 PROCESSING

The basic principle of a CCGT plant is to combust natural gas to produce power in a gas turbine which can be converted to electrical power by a coupled generator. The hot exhaust gases from the gas turbine are then used to produce steam in a heat recovery steam generator (HRSG). This steam is supplied to the steam turbine generator to produce additional power. As a result, combined cycle facilities are one of the most efficient and reliable generation technologies available.

Pipeline quality natural gas will be used as the only fuel for the unit. Prior to entering the gas turbine, the natural gas will be heated in accordance to Original Equipment Manufacturer (OEM) guidelines using the intermediate pressure feedwater. Increasing the temperature of the natural gas increases the cycle efficiency. The heated natural gas is then combusted in the gas turbine to drive the turbine to generate electricity. Electricity generated by the gas turbine generator will be stepped up to 230 kV using the generator step up transformer before interconnecting to the SaskPower transmission system. For this Project, an advanced F-class gas turbine has been selected for the facility. The advanced F-class gas turbine utilizes state-of-the-art technology to improve efficiency and boost output. The gas turbine is equipped with Ultra Low NO<sub>x</sub> (ULN) burners which optimizes the ratio of combustion air to fuel as well as combustion temperature to control NO<sub>x</sub> emissions from the natural gas combustion process.

Temperature of the exhaust gas from the gas turbine ranges from 590°C to 630°C at the outlet of the gas turbine exhaust. The hot exhaust gas is ducted to the HRSG via the GT exhaust transition piece to generate steam.

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The HRSG is a waste heat boiler which produces high pressure, intermediate pressure and low pressure steam. The HRSG also provides a cooling medium to the kettle boiler for the gas turbine compressor air. High temperature air from the compressor is extracted and piped to the kettle boiler. The cooled rotor air is returned to the combustion turbine. The kettle boilers capture the waste heat from the rotor air to heat up low pressure and intermediate pressure feedwater thereby increasing the overall plant output. Amine, phosphate and ammonia are injected into the steam cycle along with continuous and intermittent boiler blowdown to maintain desired cycle chemistry to minimize corrosion and prevent scale formation.

Exhaust gas exits the HRSG via the stack. The stack is estimated to be approximately 43 m high based on findings from the air dispersion modelling performed specifically for the Project to meet the Saskatchewan and Canadian Ambient Air Quality Standards.

Steam generated in the HRSG is used to drive a steam turbine and generator to produce electricity. Electricity generated by the steam turbine generator (STG) will be stepped up to 230 kV using the generator step up transformer before interconnecting to the SaskPower transmission system. Steam from the low pressure part of the turbine exhausts into the air cooled condenser (ACC). Ambient air drawn from the surroundings by fans of the ACC condenses the exhaust steam and the condensate collects in the condensate tank. Condensate is then pumped by condensate pumps and boiler feedwater pumps to the HRSG and the steam cycle repeats.

The HRSG boiler blowdown system collects continuous and intermittent blowdown from the HRSG and steam drains local to the HRSG. Drains are routed from the collection points to the boiler blowdown tank where the steam expands and cools and is recycled back to the service water tank for reuse, reducing the overall water consumption of the facility. The boiler blowdown drain, HRSG stack drain, and feedwater pressure relief valves (PRVs) are routed to the plant drains system where the collected drains will be pumped back to the Service/Fire Water Tank for reuse.

By adopting the process design above, the efficiency of the plant is almost 58% on an annual average ambient condition on a low heating value (LHV) basis. As a result, the CO<sub>2</sub> emissions of the facility are expected to be well below 420 kg/MWh across all ambient conditions when the gas turbine generator (GTG) is operating at full load. CO<sub>2</sub> emissions are estimated to range between 370 kg/MWh to 400 kg/MWh when the GTG operates at 100% load. As the plant ages, the unit will experience degradation which decreases the plant efficiency thereby increasing CO<sub>2</sub> emissions per MWh. Future degradation will be mitigated by implementing a long term service agreement with the gas turbine supplier with contractual remedies on performance to ensure the facility will not exceed emission limits of 420 kg/MWh over the life of the facility.

The use of ACC saves water consumption by more than 90% compared to a wet cooled unit. However, the use of an ACC does impact the efficiency of the cycle, increasing the CO<sub>2</sub> emissions in kg/MWh. Due to the temperate climate at Swift Current, impact on heat rate using an ACC is much less than a location with a hot climate such as Phoenix, Arizona. A Continuous Emissions Monitoring System (CEMS) will be installed at the facility to measure and report emission

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data per the requirements of the annexed New Source Emission Guidelines for Thermal Electricity Generation, Paragraph 11 (Emissions Monitoring) (ECCC 2010), 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.

## 2.6 DESCRIPTION OF ACTIVITIES

### 2.6.1 Pre-construction

The Project site pre-construction activities are anticipated to start in the fall of 2016. 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. A site procedure manual will also be developed and will include a site emergency response plan, an environmental management plan and site safety procedures.

### 2.6.2 Construction

Construction of the Project will include:

- **Site preparation and grading** - Site preparation activities will be performed at the main facility site prior to any other construction work. Site preparation construction is expected to take approximately 4-5 months to complete. The general sequence of the site preparation will be to begin work in the main plant area and in the construction management trailer area/parking lot area. Following the initial work, the balance of the site preparation scope will be performed, which includes installing the site fence, preparing the switchyard area, installing the evaporation pond, and installing the main construction roads on the site.
- **Foundation Excavation and Construction** – Includes excavation, piling construction, and foundation/substructures construction. Ductbank and grounding grid construction and underground piping installation work will be completed during the construction of the foundations in the same areas.
- **Building and Equipment Installation** - Building construction will begin following completion of foundation construction. Building construction also includes mechanical, electrical and switchyard construction.
- **Water Infrastructure** - The Project requires a pipeline and pump station to supply water to site. SaskPower will utilize a subcontractor to design and construct the water pipeline and pump station. The water pipeline will be installed where possible, within existing developed road allowances (i.e., ditches) from the South Hill Reservoir to the Project site. Conventional open trenching technology will be used to construct the majority of the water pipeline other than at crossings (e.g., highway, railway, utilities, etc.) and



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environmentally sensitive areas where horizontal directional drilling will be used. A pump station with intake structure will be installed adjacent to existing facilities at the South Hill Reservoir to connect the pipeline. As per initial discussions with the City of Swift Current, a dedicated pumping system to supply water to the Project will be installed at the reservoir including a new intake well, process piping, pumps, valves, electrical interconnection, controls, monitoring building foundation and structure. The booster pump station will be a pre-engineered building approximately 5 metres by 8 metres in size and will be constructed on City owned property in close proximity to the existing pump station to allow for tie-in to the City's infrastructure.

- **Commissioning and Testing** The principal activities provided during this stage include, Project start-up planning and preparation, start-up and commissioning process, start-up and commissioning management, operator training management, and performance testing.

### 2.6.3 Operation

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 20 people. Additional support staff will be available from the other natural gas plants in the SaskPower fleet.

Major maintenance and inspection work will be provided by the turbine and generator manufacturer. During operation of the Project, the ongoing operation and maintenance of the water pipeline and associated equipment will be the responsibility of the City of Swift Current.

### 2.6.4 Decommissioning and Reclamation

Cleanup activities will be ongoing throughout construction. Upon completion of the construction work, SaskPower and contractor personnel will ensure that any remaining construction materials and other debris are removed. Upon completion of the water pipeline construction, the subcontractor will confirm that any remaining construction materials or other debris are removed and any surface disturbance is reclaimed, where applicable (i.e., recontouring and application of seed and/or sod).

The new gas turbines are expected to operate until at least 2049. Precise timing for the decommissioning of the facility 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 Decommissioning and Reclamation Plan will be developed for the Project outlining the decommissioning and reclamation objectives.

Given that once construction of the water pipeline is complete, care and control of the pipeline during the operation phase will be transferred to the City of Swift Current, any decommissioning and reclamation activities of the water pipeline post-Project will be the sole responsibility of the City.

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## 2.7 WASTES AND WASTE MANAGEMENT

### 2.7.1 Atmospheric Emissions

#### 2.7.1.1 Construction Emissions

Air emissions generated during construction of the facility will result from several sources and activities. Particulate matter (PM) is the term used to refer to solid particles and liquid droplets found in the air. Particulate matter is reported according to the diameter of the particle size; PM<sub>10</sub> refers to coarse dust particles 2.5 to 10 microns in diameter and typically includes crushing and grinding operations and dust from vehicles on roads. PM<sub>2.5</sub> refers to fine particles 2.5 microns or less in diameter and can only be seen with an electron microscope. Fine particles are produced from all types of combustion and some industrial processes. For conservativeness, it was assumed that all PM, PM<sub>10</sub>, and PM<sub>2.5</sub> combustion emissions from the Chinook Power Station are equivalent to each other for the air emissions calculations.

Fugitive dust and fine particulate emissions will be generated from land clearing, site preparation, earth moving and material handling, and vehicles creating dust by traveling on land. In addition, off-road construction equipment (dozers, compressors, etc.) will release combustion by-products such as nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs) when they operate by combusting fuel. Fugitive dust emissions (particulate matter (PM/PM<sub>10</sub>/PM<sub>2.5</sub>)) will be higher during land clearing and site preparation and during active construction periods when there is increased vehicle traffic on the site from mobile equipment.

Construction equipment will also emit greenhouse gas emissions. To estimate potential carbon dioxide equivalent (CO<sub>2</sub>e) emissions from the construction equipment, emission factors for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxides (N<sub>2</sub>O) were obtained from the US Environmental Protection Agency (EPA) Mandatory Greenhouse Gas Reporting Rule (40 CFR Part 98) and ratioed with their appropriate Global Warming Potentials (GWP). The potential emissions are summarized in Table 6.

**Table 6 Estimated Maximum Potential Annual Greenhouse Gas Emission Rates of the Project During Construction**

Pollutant	Construction Year 1 (tonnes per year)	Construction Year 2 (tonnes per year)	Construction Year 3 (tonnes per year)	Total Construction Emissions Over 3 Years (tonnes)
CO <sub>2</sub>	44,130	59,062	10,735	113,927
CH <sub>4</sub>	1.8	2.4	0.4	4.6
N <sub>2</sub> O	0.4	0.5	0.1	1
CO <sub>2</sub> e	44,282	59,266	10,772	114,320

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### 2.7.1.2 Control Measures

Multiple control measures will be implemented during construction to minimize air emissions and potential impacts. After grading, the untraveled or lightly traveled locations will be watered, mulched, overlain with a crushed stone layer, or vegetated to minimize fugitive PM emissions. Activities that potentially generate fugitive PM emissions will be monitored visually by construction personnel. If fugitive emissions become visible, water will be sprayed on the affected areas.

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. The maximum effects due to construction are expected to occur in areas within the immediate vicinity of the site. Many of the site preparation and construction operations 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.

### 2.7.1.3 Operation Emissions

Emission of air contaminants during operation of the Project will result from the combustion of natural gas in the proposed combined-cycle combustion turbine. There will also be emissions of air contaminants generated from other equipment (i.e., 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, including start-up and shut down emissions for the turbine and auxiliary equipment emissions can be found in Table 7.

**Table 7 Estimated Maximum Potential Air Emissions Associated With the Project During Operation**

Pollutant	Potential Air Emissions (tonnes per year)
NO <sub>x</sub>	450.1
CO	462.7
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	26.8
SO <sub>2</sub>	28.7
CO <sub>2</sub>	1,263,467

The above CO<sub>2</sub> estimate is based on a plant operating scenario of 100% load for 100% of the year which is not a realistic operating scenario. Given the plant is designed to be dispatched, under an operating scenario that represents a normal operating year (assuming 85% capacity of the gas turbine at 100% load), the CO<sub>2</sub> emissions would be approximately 1,037,437 tonnes/year.

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Natural gas power stations using combined cycle technology emit 40% as much carbon dioxide as conventional coal-fired generation in Saskatchewan. The two coal units at SaskPower's Boundary Dam Power Station that are scheduled for retirement or retrofitting by the end of 2019 emit approximately 2.3 million tonnes of CO<sub>2</sub> annually to generate 280 MW. The Project will result in a greater generation output of 350 MW with a lower GHG footprint as indicated in Table 8. As SaskPower phases out conventional coal-fired generation and adds natural gas and renewable generation to the system, the GHG emissions will continue to improve (i.e., diminish).

**Table 8 Estimated Maximum Potential Annual Greenhouse Gas Emissions Associated with the Project During Operation**

Pollutant	Combined-Cycle Combustion Turbine <sup>a</sup> (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)
CO <sub>2</sub>	1,035,610	1,735.1	17.9	73.4	1,037,437
CH <sub>4</sub>	18.7	0.03	0.001	0.003	18.7
N <sub>2</sub> O	1.9	0.003	0.0001	0.001	1.9
CO <sub>2</sub> e	1,036,634	1,737	18	74	<b>1,038,463</b>

<sup>a</sup> Represents 100% annual average ambient unfired scenario

The F-Class GTG will have the most up-to-date technology which includes several technologies to keep emissions low. NO<sub>x</sub> emissions will be controlled by the use of Ultra Low NO<sub>x</sub> (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 controlled through the use of good combustion controls on the design of the combustion turbine. Further, natural gas has the lowest SO<sub>2</sub> emissions of any fuels. The Project is being designed with the best available control technology to achieve ground level impacts that will meet the Saskatchewan and Canadian Ambient Air Quality Standards.

### 2.7.2 Liquid Discharges

#### 2.7.2.1 Construction Liquid Discharges

The main sources of possible liquid discharges during the construction phase include sanitary waste, rain water, 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 litres and will be pumped and removed from site by licensed contractors and disposed of in accordance with federal, provincial, and municipal regulations.

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Rain water and snowmelt will need to be monitored and controlled during construction. The developed Project site, including the construction laydown, parking and trailer areas, will be graded to drain site water to temporary ditches or the stormwater pond. The stormwater pond will be designed for a 25-year storm event and preliminary design anticipates the pond will be approximately 2,800 square meters and approximately 2 meters deep. There will be an overflow structure as part of the design in the event of a larger storm event. 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. Stormwater discharge at a delayed rate will be done in accordance with a Drainage approval from the Water Security Agency. The release of stormwater will be designed to maintain existing drainage patterns so adjacent properties are not affected. Drainage from the stormwater pond will not affect fish or fish habitat. During execution, a detailed Stormwater Pollution Prevention Plan will be developed and implemented during construction. After construction is finished, the stormwater pond will be left open for permanent stormwater drainage.

Machinery will be kept in proper working order during construction to avoid spills of machinery fluids such as oils, fuels and coolants. The site procedures manual will identify proper spill handling techniques and spill reporting criteria for the Project.

#### **2.7.2.2 Operation Liquid Discharges**

The Project will contain various sources of possible liquid discharges that must be controlled during operation (See Table 9).

The Project will utilize an air cooled condenser which significantly reduces the water consumption and associated discharges. The estimated process wastewater that will be discharged during normal operation will range between 32 litres/minute and 35 litres/minute (46-50 cubic metres per day ( $\text{m}^3/\text{day}$ )) across various ambient conditions. The waste water generated from the facility will be discharged to an onsite evaporation pond. The evaporation pond will be effectively sized to receive approximately 16,035 cubic metres ( $\text{m}^3$ ) per year of wastewater, as well as to account for annual rainfall at the site conditions. The evaporation pond will be designed to have a high-density polyethylene (HDPE) or clay liner to prevent seepage into the soil. The evaporation pond will contain effluent water from the water treatment process and it is not expected to contain contaminants in concentrations that would negatively impact migrating birds or wildlife.

During operation of the Project, sanitary waste will be collected and pumped to a new on-site septic system and absorption field. Given sanitary waste water generated during operation will be less than 18  $\text{m}^3$  per day, the waste system will be regulated by The Plumbing and Drainage Regulations. The design of the absorption field will be in accordance with the Saskatchewan Onsite Wastewater Disposal Guide (Government of Saskatchewan, 2009) and will be permitted through the Cypress Health Region and comply with the requirements of the *Public Health Act*, 1994.

# CHINOOK POWER STATION PROJECT

## Project Information

In addition to the liquid discharges during operation, there are also other liquid waste discharges associated with maintenance work. These discharges are usually intermittent such as gas turbine compressor wash, ACC wash, lube oil, etc. (Table 9).

**Table 9 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 LP 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 plant sump and vapor is sent to an atmospheric vent.	3.2 m <sup>3</sup> /hour	15.9 m <sup>3</sup> /hour	Oil/Water Separator	Recycled back to service water storage tank and filtered in plant demineralizer	None
Waste effluent from demineralized water treatment plant	Water treatment plant discharge waste stream	2.1 m <sup>3</sup> /hour	4.2 m <sup>3</sup> /hour	Evaporation Pond	Effluent will be pumped to an evaporation pond	None; pond will be designed and permitted in accordance with the Saskatchewan Stormwater Guidelines EPB 322 produced by the Water Security Agency.
Sampling discharge	Sample panel drains	0.9 m <sup>3</sup> /hour	0.9 m <sup>3</sup> /hour	Oil/Water Separator	Recycled back to service water storage tank and filtered in plant demineralizer	None
Drainage within powerhouse building	Miscellaneous floor drains and equipment drains	2.3 m <sup>3</sup> /hour	2.3 m <sup>3</sup> /hour	Oil/Water Separator	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 <sup>3</sup> /hour	7.9 m <sup>3</sup> /hour	Water Wash Drains Tank	Will be treated as hazardous waste and trucked offsite.	None
Air cooled condenser water wash	Air cooled condenser fin wash to remove dust accumulation on the outside of the ACC fins	200 m <sup>3</sup> per wash (wash quantity dependent on weather cycles, est. 2 washes per year)	N/A	N/A	Plant storm water system	None; clean plant water is used in the pressure washer.
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 <sup>3</sup> /day	N/A	N/A	Absorption field	None; absorption field will be designed in accordance with the Saskatchewan Onsite Wastewater Disposal Guide and will be permitted through the Cypress Health Region.

**Notes:**

1. Information in this table is preliminary and values will be updated as required during permit application process.

## CHINOOK POWER STATION PROJECT

### Project Information

#### 2.7.3 Types of Waste and Plans for Disposal

Solid wastes that will be generated during construction 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 collected in large waste containers, and hauled off and disposed of by licensed waste contractors in accordance with federal, provincial, and municipal regulations. Waste disposal will occur only at either locally or regionally approved facilities.

Solid wastes generated during the operation phase of the Project will be typical of activities associated with 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 operations will be disposed of by licensed waste contractors in accordance with federal, provincial and municipal regulations using approved facilities. Table 10 provides the estimated quantity of solid wastes that will be generated during operation of the Project.

**Table 10 Estimated Quantity of Solid Wastes Generated From the Project during Operation**

Waste Material	Disposal Method	Estimated Annual Quantity (tonnes)
Waste oil/filters/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 and office waste	Municipal Landfill	3
Paper/cardboard/tin/plastic	Approved recycling facility	8-15
Scrap metal	Approved recycling facility	15

## CHINOOK POWER STATION PROJECT

Project Information

### 2.8 PROJECT PHASES AND SCHEDULE

The following project schedule assumes that no federal or provincial environmental assessment (EA) will be required. In the event that an EA is required, the Project milestones will be shifted accordingly based on the time required to conduct the EA. The proposed Project schedule is provided in Table 11.

**Table 11 Project Schedule**

<b>Project Task</b>	<b>Approximate Schedule</b>
Land and Geotechnical Surveys	September 2016
Permit Applications and Approval	October 2016 to January 2016
Site Clearing & Grubbing	November 2016 to March 2017
Site Preparation/Levelling	December 2016 to June 2017
Piling Installation	January 2017 to July 2017
Foundation and Underground Installation	January 2017 to December 2017
Building Erection	July 2017 to July 2018
Water Pipeline Construction	July 2017 to February 2018
Equipment Installation	October 2017 to February 2019
Commissioning & Start-up	February to October 2019
Decommissioning (after estimated 30 year Project life)	2049 to 2051



## CHINOOK POWER STATION PROJECT

Project Location

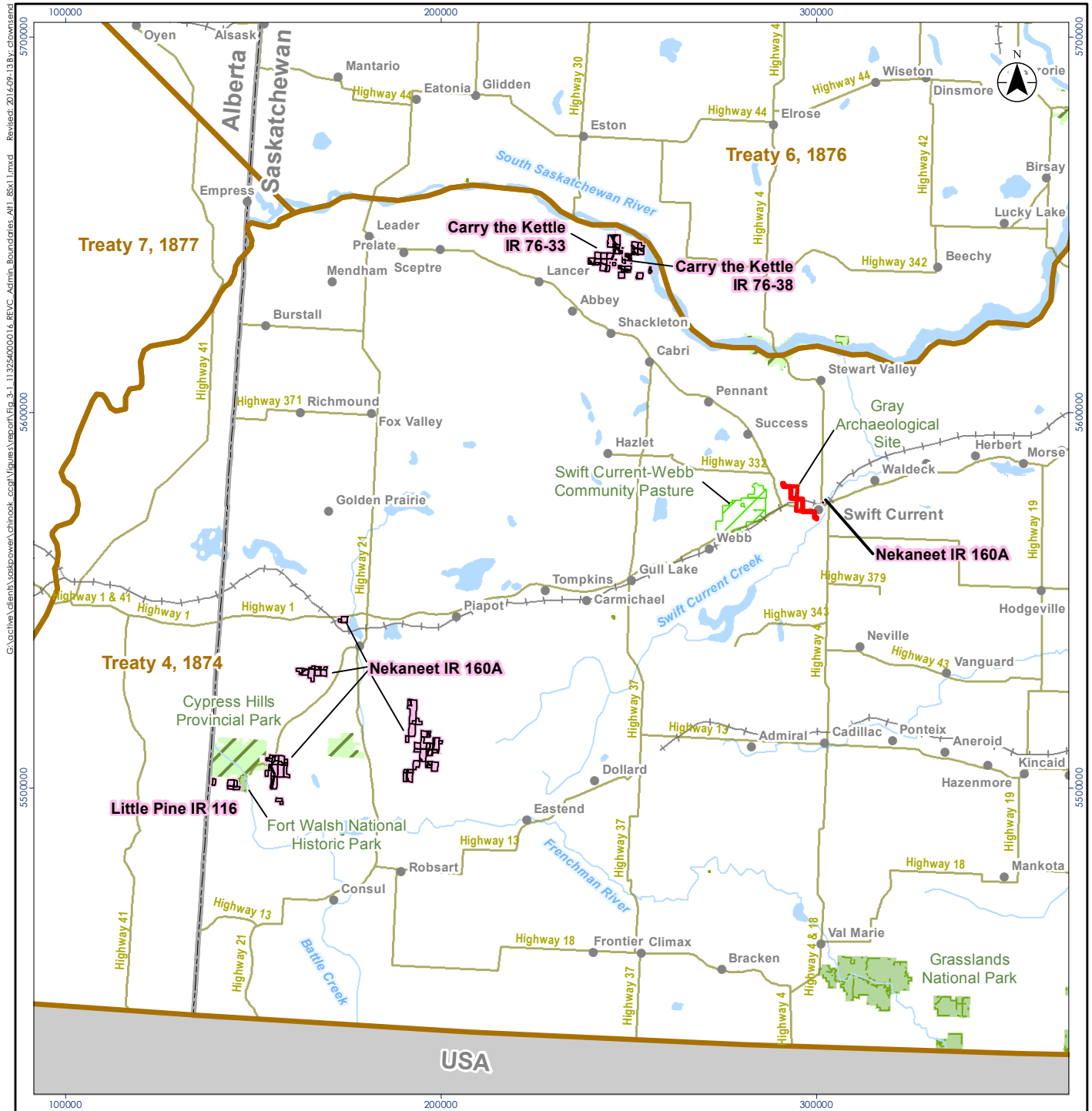
### 3.0 PROJECT LOCATION

The Project facility is located approximately 11 km northwest of Swift Current, Saskatchewan on private land that is owned by SaskPower. The Project facility is located entirely within one quarter section of land at SE 13-16-15 W3M. The quarter section is located within the Rural Municipality (RM) of Swift Current No. 137 and is zoned as Agricultural/Resource. The centre point of the facility is located at approximately 50° 20' 34.278", 107° 55' 55.185", subject to final siting and design. A subsurface rights holder, Prairiesky Royalty Ltd., holds the petroleum and natural gas rights within SE-13-16-15-W3M.

The Project also includes a new underground water pipeline from the South Hill Reservoir located within the city limits of Swift Current. There are currently two preliminary water pipeline route options being considered for the Project. Pipeline routing is still under discussion and the final pipeline route is dependent on results of regulatory consultation, engagement activities and preliminary routing studies. Regardless of the water pipeline route that is chosen, the start and end points will be the same. The start and end points of the water pipeline are located at approximately 50° 15' 51.48", 107° 48' 25.20", and 50° 20' 35.288", 107° 56' 9.60", respectively.

The water pipeline will be routed within existing developed road allowances (i.e., ditches), where possible, that are owned by the Province of Saskatchewan (Her Majesty the Queen in Right of Saskatchewan). The road allowances in the Project area are operated by the Saskatchewan Ministry of Highways and Infrastructure, the RM of Swift Current or the City of Swift Current, depending on the location along the route. The road allowances along both water pipeline preliminary route options are adjacent to privately owned land zoned primarily for agricultural purposes and in many areas the cultivation extends into the road allowance. SaskPower will obtain written approval from the RM of Swift Current or the City of Swift Current prior to obtaining easements to build the pipeline within the developed road allowances.

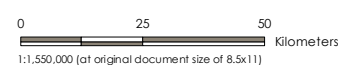
A figure showing the Project location and administrative boundaries in the Project area is presented in Figure 3.1.



G:\projects\clients\stapower\chinnook\csp\MapArea\SaskPower\_Ep\_3.1\_1132540001\_6\_REV\_C\_Admin\_Boundaries\_A11\_85x11.mxd    Revised: 2016-09-13 by: ctownsend



- Project Development Area
- Indian Reserve
- First Nations Treaty Boundary
- City/Town
- Provincial Boundary
- Major Road
- Railway
- Watercourse
- Waterbody
- Swift Current-Webb Community Pasture
- National Park
- Provincial Park
- Protected Area (Other)



Project Location: Near Swift Current, SK    113254000-016 REV C  
 Prepared by: ctownsend on 2016-09-13  
 Technical Review by: jhennig on 2016-09-13

Client/Project: SaskPower  
 Chinook Power Station Project

Figure No.: **3.1**  
 Title:

**Administrative Boundaries for The Project Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 13N  
 2. Base features produced under license from the Government of Saskatchewan

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## CHINOOK POWER STATION PROJECT

Federal Financial Support, Lands, and Legislative or Regulatory Requirements

### 4.0 FEDERAL FINANCIAL SUPPORT, LANDS, AND LEGISLATIVE OR REGULATORY REQUIREMENTS

There is no proposed or anticipated federal financial support that federal authorities will be providing to support the Project.

No federal lands will be used during the development or operation of the Project or any of its components. The Gray Burial Site (EcNx-1x), designated a Provincial and National Historic site, is located approximately 3.5 km east of the Project facility footprint, 1.8 km from preliminary water pipeline route alternative one and 0.5 km from preliminary water pipeline route alternative two. The Swift Current-Webb Community Pasture, which is currently federal land managed by Agriculture and Agri-Food Canada and expected to be transferred to provincial control between 2017 and 2018, is located approximately 4.2 km west of the Project.

SaskPower may be required to submit an Aeronautical Assessment Form for Obstruction Marking and Lighting for Transport Canada to determine the need for the application of marking and lighting of objects that may pose a hazard to aviation. Additionally, SaskPower may be required to submit a Land Use Submission Form to NAV Canada prior to Construction. There are no additional known federal permits, licences or other authorizations that are required for the development or operation of the Project.

## CHINOOK POWER STATION PROJECT

Physical and Biological Setting and Environmental Effects

### 5.0 PHYSICAL AND BIOLOGICAL SETTING AND ENVIRONMENTAL EFFECTS

#### 5.1 PHYSICAL AND BIOLOGICAL SETTING

The Project area is situated within the Mixed Grassland ecoregion and extends into parts of the Gull Lake, Antelope Creek and Swift Current Plateau landscape areas. The Mixed Grassland ecoregion has a variable landscape with level to gently undulating plains, frequently interrupted by hilly uplands, sand dunes, and numerous creeks and valleys. Brown chernozems are the dominant soil type within this ecoregion. The landscape in the Project area consists predominantly of brown loam soils within the three landscape areas (Acton et al. 1998).

The Project is located within the South Saskatchewan River major drainage basin and watershed which cover areas of 49,286 km<sup>2</sup> and 39,397 km<sup>2</sup>, respectively. Swift Current Creek, located 1.1 km from the preliminary water pipeline route is the only watercourse in close proximity to the Project with other ephemeral drainages occurring in ditches and across the landscape.

Aquifers are abundant within the ecoregion and consist of bedrock aquifers, glacial inter-till aquifers and surficial aquifers. These different types of aquifers significantly influence surface water quality in the region. Deep aquifers feed saline lakes and wetlands and shallow lakes fed by shallower aquifers typically contain fresher water (Acton et al. 1998). Generally, water quality in the region is expected to be similar to other wetlands and shallow waterbodies in the Prairie Pothole Region with low pH and variable salinity.

The majority of the Project area is cultivated. Native prairie is typically limited to gullies, coulees and valleys (Acton et al. 1998). The areas of native mixed-grass prairie within the Project area support diverse plant communities. Within the Mixed Grassland ecoregion, native vegetation is typically comprised of mid-grasses (i.e., wheatgrasses and speargrasses) and short grasses (e.g., blue grama grass) on loamy soils, while sandy areas have a unique community of grasses and shrubs (Acton et al. 1998).

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects



**Photo 5-1 Native Vegetation in a Coulee Bottom Adjacent to Preliminary Water Pipeline Route Alternative 2**

The Project lies within the Prairie Pothole Region which is characterized by numerous depressional wetlands that contribute substantially to the regional biodiversity. These wetlands provide important breeding and staging habitat to a wide variety of waterbirds (e.g., waterfowl, gulls, terns, shorebirds), raptors and wetland-associated migratory bird species (EC 2013).

The Mixed Grassland ecoregion supports a wide variety of wildlife species including birds, amphibians and reptiles. Within the Project area, areas of native prairie, tame pasture and wetlands provide important breeding and staging habitats for a diverse number of wildlife species.



**Photo 5-2 Class IV Wetland adjacent to Project Area in SE 13-16-15-W3M**

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

Swift Current Creek, located approximately 1.1 km from the proposed water line, is the closest known fish bearing water feature to the Project. Swift Current Creek contains a variety of sportfish species including yellow perch (*Perca flavescens*), northern pike (*Esox Lucius*) and walleye (*Stizostedion vitreum vitreum*), as well as a variety of minnow and sucker species.

## 5.2 ENVIRONMENTAL EFFECTS

SaskPower is ISO 14001 environmental management system certified and is guided by existing commitments to environmental sustainability and best practice. SaskPower is committed to incorporating environmental management approaches and strategies into Project planning and execution so that not only is the Project compliant with regulatory requirements, but that it also enhances positive effects. SaskPower has consulted with provincial and federal regulators and will consult the public, to better understand the issues that are of most concern to them, as well as to understand requirements for the preparation of this document.

SaskPower has experience developing, operating and maintaining power generation facilities in Saskatchewan. This experience will be used for the development of environmental management tools prior to Project construction to support the proactive management of potential environmental effects.

The incorporation of environmental management tools into Project planning has occurred in several ways, including in the design and selection of Project components and activities. Environmental management tools will be used to avoid or mitigate potential effects on natural features, (e.g., wetlands), and will include use of site selection criteria, conducting biophysical field surveys, and developing an Environmental Management Plan, to name a few. By integrating this environmental management framework into Project planning, several potential environmental effects can be avoided or appropriately managed prior to Project execution.

Potential environmental effects resulting from the Project on environmental components are presented in the sections below.

### 5.2.1 Atmospheric Environment

Air emissions associated with Project construction are expected to be minor and occur only for short intervals. During operation, maximum predicted concentrations of the substances of interest are below the relevant regulatory objectives (SAAQS and CAAQS) for all averaging periods. Maximum predicted concentrations are expected to occur in close proximity to the Project, and decrease with increasing distance from the Project. The dispersion modelling indicates that the operation of the Project will not cause or contribute to a significant degradation of ambient air quality.

The Project noise effects will affect the existing acoustic environment. The severity of the noise effect decreases with increasing distance from the noise sources. At further distance, the Project noise effect will diminish to a level below the baseline sound level. Based on the predicted

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

Project noise emissions and with the inclusion of mitigation strategies, the modelling results indicate the Project will comply with AUC Rule 12.

#### 5.2.2 Terrain and Soil

Project activities have the potential to cause qualitative changes in terrain integrity and soil quality and quantity through processes such as loss of topsoil, admixing, erosion, compaction, and rutting. However, changes to terrain integrity and soil quality and quantity can be addressed through the implementation of mitigation measures and no residual environmental effects are expected.

#### 5.2.3 Hydrology and Hydrogeology

Groundwater use activities (i.e., water well use) occur throughout the region. No domestic use wells are located within 200 m of the Project. Due to the relatively shallow installation depth of the water supply pipeline, groundwater quality and quantity are not expected to be affected during Project construction activities. SaskPower will either directionally drill under wetlands or construct during dry or frozen periods. All ground disturbance will be limited to the extent feasible. Planning and standard mitigation measures will limit potential effects and existing drainage patterns will be maintained, to the extent possible. Changes in localized flows and drainage patterns or areas are not expected.

#### 5.2.4 Vegetation and Wetlands

Subsequent to mitigation, some effects to vegetation and wetlands are expected to occur as a result of the Project. Tame pasture, modified native vegetation and wetlands located within the Project area are potential habitat for plant species of management concern (SOMC). Project construction will result in the loss of tame pasture and a small portion of modified native vegetation during site clearing activities for the Project facility site (Table 12). No wetlands were observed within the Project facility site; however, wetlands of varying sizes and classes occur along the two preliminary water pipeline route alternatives. Wetlands within the pipeline ROW will be avoided through the use of horizontal directional drilling methods or temporarily affected by constructing during dry or frozen conditions. Through the implementation of the above mitigation measures, permanent loss or alteration/destruction of wetlands along the pipeline ROW is not expected. It is expected that mitigation measures implemented pre-construction, during construction and throughout operation and maintenance will mitigate Project effects due to the loss of tame pasture, modified native vegetation and wetlands.

## CHINOOK POWER STATION PROJECT

Physical and Biological Setting and Environmental Effects

**Table 12 Land cover classes within the PDA**

Land Cover Type	Land Cover within the Project Facility PDA (ha)	Land Cover within Preliminary Water Pipeline Route Option 1 (ha)*	Land Cover within Preliminary Water Pipeline Route Option 2 (ha)*
Cultivated	-	4.6 - 5.2	1.1 – 2.7
Tame Pasture	27.0	10.0 – 11.2	13.6 -14.4
Hay	-	0.0 - 1.4	0.5 – 1.5
Treed	-	0.0 - 0.2	0.0 - 0.2
Wetland	-	3.8 – 4.7	4.0 – 4.1
Modified Native Prairie	2.2	-	-
<b>Total</b>	<b>29.2</b>	<b>20.3 – 21.0</b>	<b>21.0</b>

\*Range is dependent on the side of the road that the water pipeline is routed on.



**Photo 5-3 Tame Pasture within the Project Facility Footprint in SE 13-16-15-W3M**



## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

#### 5.2.5 Wildlife and Wildlife Habitat

The Project facility footprint will remain disturbed for the life of the Project; as such, habitat loss in that area is considered permanent. Construction of the Project will result in a permanent loss of tame pasture and a small portion of modified native vegetation. SOMC and migratory birds could potentially be affected by the direct loss of wildlife habitat. Tame pasture is available within the Project area and can provide suitable habitat for mobile and tame pasture-dependent species (i.e., sharp-tailed grouse) that may be displaced during construction.

The preliminary water pipeline routes occur within existing developed road allowances, which typically have low wildlife and migratory bird habitat potential. Changes in wildlife habitat related to the construction of the water pipeline are expected to be limited and any habitat that is disturbed will return to pre-construction conditions following reclamation.

Wildlife surveys were completed in the Project area in 2015 and 2016. During field surveys, a sharp-tailed grouse lek was detected in the Project facility footprint. The Project team explored potential options to minimize effects to the lek including redesigning the Project components as well as establishing an exclusion buffer around the lek during construction. However, based on discussions with the SK MOE, taking into account the proximity of the lek in relation to the project components and the sensory disturbance that will occur during construction and operation activities, direct effects to the lek are anticipated. SaskPower will continue to work with SK MOE to develop an acceptable plan to address the effects to this lek.

During wildlife surveys one northern leopard frog was detected at a Class IV wetland associated with a dugout located in the Project area. Given the location of the wetland in relation to the Project infrastructure, the Project team is currently investigating opportunities to avoid or minimize effects to the northern leopard frog including consideration of potential redesign of project components (e.g., relocating the access road). The Project team has initiated discussions with the SK MOE and will continue to work with the SK MOE to develop acceptable mitigation plans, to address how best to proceed with construction while limiting the potential effects to the northern leopard frog.

In addition to these mitigation plans, additional measures will be applied during the construction and operation of the Project to reduce the potential of mortality risk to SOMC and migratory birds, including timing vegetation clearing activities prior to the migratory bird nesting period and ongoing monitoring during construction to identify SOMC occurrences. Reduced speed limits on and off the Project site and installation of signage where specific wildlife concerns have been identified are also expected to reduce mortality risk.

#### 5.2.6 Migratory Birds, as Defined in the Migratory Birds Convention Act

Project construction has the potential to result in an increased mortality risk for migratory birds. In particular, construction activities (e.g., vegetation clearing, vehicle traffic, trenching for the water pipeline) during the breeding season can result in the destruction of migratory bird nests

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

and young. Ground-nesting birds (e.g., Sprague's pipit, bobolink) are particularly vulnerable during construction in open fields throughout the breeding season. Wildlife mortality of young may also occur if active nests have been abandoned due to sensory disturbance and the young may not be able to escape the area. Nesting migratory birds are also more susceptible to mortality if individuals are unable to escape construction activities.

There is also an increased mortality risk for migratory birds due to potential vehicle collisions at the Project site, along the access road and roads in the Project area that will be used to bring in equipment and materials to the Project site and during water pipeline installation activities along the developed road allowances. The primary strategy to mitigate wildlife mortality during construction includes timing clearing outside of the migratory bird nesting period, outlined by Environment and Climate Change Canada (April 26 to August 15; EC 2016) to avoid mortality of ground-nesting or slow-moving wildlife during this sensitive period (i.e., nesting and rearing). However, given construction of a natural gas plant takes a minimum of 32 months to construct and there is a need for the Project to be operational by the fall of 2019, construction will need to occur at the Project facility site year round. As such, it will not be possible to avoid construction activities at the Project facility site during the migratory bird nesting period.

The proposed plan to mitigate potential effects to migratory birds at the Project facility site will be to conduct site clearing activities prior to the migratory bird nesting period to develop the area and remove the habitat in order to discourage migratory birds from establishing nests within the Project facility footprint. The noise and activity that will be occurring at the Project facility site prior to, and during, the migratory bird nesting period will likely discourage birds with a low tolerance for disturbance from inhabiting the area around the Project facility. Birds that are less susceptible to disturbance may choose to inhabit the areas within the quarter section adjacent to the Project facility footprint. Construction equipment will be confined to travelling within the established site boundary and access road.

Regular inspections of the Project facility site and surrounding area within the quarter section will be conducted by the contractor and the environmental monitor, a qualified wildlife biologist, during construction activities that occur during the migratory bird nesting period to monitor for active nests and/or their sign (i.e., individuals displaying nesting behavior). If an active nest is encountered, a species appropriate buffer will be applied and work in that area will temporarily shut down until the young have naturally left the vicinity of the nest (i.e., fledged) and/or an acceptable mitigation plan is approved by the Saskatchewan Ministry of Environment (SK MOE) in consultation with Environment and Climate Change Canada.

Wildlife mortality will also be mitigated by maintaining speed limits on and off the Project site and along the water pipeline route to limit the risk of vehicle collisions with wildlife. Speed limits will be reduced in areas where species wildlife concerns or movement corridors have been identified. Collisions with wildlife will be reported to provincial regulators.

Construction of the water pipeline near migratory bird habitat (e.g., native prairie, tame pasture, wetlands) is scheduled to occur outside of the migratory bird nesting period, where possible.

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

Construction is scheduled to begin in August 2017 and will continue into the winter of 2017/2018. The sensory disturbance associated with the water pipeline installation will be of short duration (4-5 months) and outside of the migratory bird nesting period.

The Project facility footprint (approximately 29.2 hectares) will remain disturbed for the life of the Project. Construction of the Project facility will result in a permanent loss of tame pasture and the loss of a small section of modified native vegetation (2.2 hectares). Given the careful siting of the Project facility, the wetlands located within the quarter section will remain undisturbed, thereby providing potential habitat for migratory birds during operation. Tame pasture is available within the Project area and can provide suitable habitat for migratory birds that may be displaced during construction and operation. Construction of a stormwater pond and evaporation pond with similar water quality as other natural habitats will create habitat for wetland associated wildlife species including migratory birds. With wetland loss continuing throughout prairie Canada (Government of Canada 1991), this created habitat will benefit wetland associated wildlife species and migratory bird species.

Construction of the water pipeline will predominantly affect previously disturbed road allowances (i.e., ditches). Previously disturbed road allowances are typically less suitable habitat for migratory birds given the existing disturbance that occurs within, along and adjacent to the road allowances (e.g., vehicle traffic, maintenance activities such as grading and mowing, agricultural operations, etc.); however, some migratory bird habitat does occur along the water pipeline route alternatives (e.g., wetlands, natural drainage areas, etc.). The water pipeline will be installed underground and where a wetland or drainage area is encountered, either horizontal directional drilling methods will be used to install the pipeline under the wetland to avoid altering the wetland; or construction will occur during dry or frozen conditions to ensure minimal effects to the wetland. An Aquatic Habitat Protection Permit (AHPP) that outlines specific mitigation measures will be obtained from SK MOE prior to construction occurring near wetlands and SaskPower will follow any permit conditions issued to ensure minimal effects to the bed, bank and boundary of wetlands. The water pipeline right-of-way will be reclaimed after construction and it is expected that areas of suitable habitat (i.e., wetlands) will return to pre-construction levels during operation.

Direct habitat loss for migratory birds is not expected to occur during the operation and maintenance phases for the Project. Sensory disturbance during operation and maintenance may continue to result in indirect habitat loss by altering migratory bird habitat availability. The increase in noise levels near the facility during operation and maintenance may result in the displacement of migratory birds; however, some species may return after a period of acclimatization. No specific noise mitigation measures other than those proposed in the Noise Assessment in order to meet AUC Rule 012 – Noise Control are currently proposed.

Project-specific mitigation measures, along with standard industry practices and avoidance measures will be implemented during construction and operation and maintenance to reduce potential effects on migratory birds.

## **CHINOOK POWER STATION PROJECT**

Physical and Biological Setting and Environmental Effects

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

A review of available information indicates that the closest fish-bearing water feature is Swift Current Creek, located greater than 1 km away from the Project and therefore, no fish bearing water features are expected to be affected by the Project.

### **5.2.8 Land Use**

The Project facility site is currently zoned as an Agricultural and Resource District and the Project is not expected to conflict with the current zoning. The Project facility site is located on land used for grazing operations. Historical activities throughout the quarter section include haying operations, excavations activities and disposal of asphalt. The construction, operation and decommissioning and reclamation will limit the use of the land for future grazing operations within the Project area for the duration of the Project.

The two preliminary water pipeline route alternatives are located within existing road allowances and a permanent change in land use is not anticipated. The road allowances are owned by Her Majesty the Queen in Right of Saskatchewan and operated by the Saskatchewan Ministry of Highways and Infrastructure. Public road allowances are not typically zoned and therefore, changes to zoning as a result of the water pipeline installation are not expected. Mitigation measures will be followed to avoid or reduce the potential change to land use activities during construction, operation and decommissioning and reclamation of the Project.

Twenty-three rural residences and one outbuilding were confirmed to be located within 5 km of the Project facility footprint. The nearest residence is located 2.3 km northeast of the Project facility footprint.

### **5.2.9 Regional Employment and Economy**

Potential effects on employment will occur as a result of direct employment and Project expenditures during construction. The Project will also generate indirect employment as a result of capital expenditures on goods and services generated during the construction and decommissioning and reclamation period. Direct and indirect employment generated by the Project will be temporary and will be most prevalent during the construction and decommissioning and reclamation phase, and less during operation and maintenance.

### **5.2.10 Existing Infrastructure**

During construction, an increase in traffic is expected as a result of material and equipment deliveries and commuting by Project personnel. The increase in traffic would be minimal considering the existing highway capacity and existing traffic levels.

The Project also has the potential to affect infrastructure as a result of disposal requirements for solid waste generated by construction and decommissioning and reclamation activities. Solid

## CHINOOK POWER STATION PROJECT

### Physical and Biological Setting and Environmental Effects

waste would consist of construction waste, recyclable materials and some hazardous waste. During the construction phase, sewage generated onsite will be disposed of at an approved off-site sewage disposal facility.

It is anticipated that the Project will have no effect on the private aerodrome located southwest of the Project.

#### 5.2.11 Heritage Resources

The location of the Project facility footprint (SE 13-16-15-W3) has been identified as “Not Heritage Sensitive” by the Heritage Conservation Branch (HCB) of the Saskatchewan Ministry of Parks, Culture and Sport. As such, the likelihood of impacting a heritage resource is considered to be very low and the Project facility site will not need to be reviewed by the HCB.

The two proposed water pipeline route alternatives run adjacent to a number of land parcels that are considered to be heritage “sensitive”. Based on an approved process with the HCB, SaskPower's own in-house archaeologists have reviewed the Project to determine if an HRIA is warranted. The in-house review process determined that an HRIA may be warranted, depending on which side of the developed road allowance the water pipeline will be constructed on. The results of the HRIA, if required, will be provided to The Saskatchewan Ministry of Parks, Culture and Sport who will issue a letter granting clearance for the Project under the *Heritage Properties Act*. It is expected that siting the final water pipeline route on the opposite sides of the road allowances from archaeologically sensitive areas where known heritage resources are located will mitigate potential effects to these resources.

There are no concerns with the remainder of the two preliminary route alternatives, provided they remain within the developed portion of the road allowances.

#### 5.2.12 Aboriginal Land and Resource Use

The Project site is located within Treaty No. 4 lands and Métis Nation – Saskatchewan Western Region III; however, there are no unoccupied Crown lands that grant a right of access to carry out Aboriginal or Treaty Rights in the Project area. The Project facility is located on a quarter section that has been privately owned since at least 1919 and is currently owned by SaskPower and the water pipeline will be installed within developed road allowances owned by the Province of Saskatchewan. The road allowances along both water pipeline preliminary route options are adjacent to privately owned land zoned primarily for agricultural purposes and in many areas the cultivation extends into the road allowance. Given the narrow width of the road allowance, 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 therefore unlikely that the quarter section and road allowances used for the Project are currently in use for traditional purposes. Development of the Project is not expected to affect the health of Aboriginal peoples. To date, no concerns regarding potential effects have been raised through engagement with Aboriginal communities; however,

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SaskPower will continue to engage with the Aboriginal communities and organizations to address any concerns.

#### 5.2.13 Environmental Effects to Components under Federal Jurisdiction

The Project has the potential to affect changes on the environment, some of which may affect migratory birds, which fall under federal jurisdiction. Other environmental components that fall under federal jurisdiction, fish and fish habitat or marine plants, as defined in the *Fisheries Act*, and listed aquatic species will not be affected by the Project.

The Project is not anticipated to cause any changes in the environment that would adversely affect federal lands or lands outside of Saskatchewan. The Project is a component of, and will contribute to, SaskPower's overall plan to reduce greenhouse gas and other air emissions.

#### 5.2.14 Changes that may be caused by the Project to Aboriginal Peoples Resulting from Changes to the Environment

Carrying out the Project is not expected to change the environment such that it would affect Aboriginal peoples, including impacts to Treaty Rights, health or socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance. Additional detail is provided below.

- The Project facility is located on a quarter section that is owned by SaskPower. The water pipeline will be installed within developed road allowances owned by the Province of Saskatchewan. The road allowances along both water pipeline preliminary route options are adjacent to privately owned land zoned primarily for agricultural purposes and in many areas the cultivation extends into the road allowance. As such, the Project will not affect the ability of Aboriginal people to exercise Treaty Rights, or use, access or develop lands and resources currently used for traditional uses by Aboriginal peoples.
- 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 dispersion modelling indicates that the operation of the Project will not cause or contribute to a significant degradation of ambient air quality and that the predicted concentrations of Project related emissions will decrease with distance from the Project. The nearest Aboriginal home community is located approximately 120 km from the Project facility and therefore, adverse health effects to Aboriginal groups are not anticipated.
- Given that the Project will comply with AUC Rule 012 – Noise Control and that the nearest Aboriginal home community is located approximately 120 km from the Project facility, adverse noise effects on Aboriginal peoples are not expected.

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- Swift Current Creek, located approximately 1.1 km from the proposed water line, is the closest known fish bearing water feature to the Project. Swift Current Creek will not be affected by the Project and therefore, adverse effects to fish and fish habitat and water are not anticipated.
- For water quality, the predicted aquatic concentrations of released elements to the evaporation pond were compared to the water quality guideline values for the protection of freshwater aquatic life (CCME 2008). All applicable parameters that had a screening level listed in the guidelines were below the ecological screening levels for freshwater aquatic life except for iron. However, the predicted iron concentration in the evaporation pond falls within the natural range of concentrations in prairie wetlands. Adverse effects to water quality or wildlife that may temporarily use the evaporation ponds are not expected.
- The Project facility site is within a parcel (SE 13-16-15 W3M) that has been designated as "non-sensitive" for heritage resources. As such, the likelihood of impacting a heritage resource at the Project facility site is considered to be very low. Two areas of concern were identified along the two preliminary water pipeline route options. An HRIA may be required if the water pipeline is proposed to be installed at either of these locations. If an HRIA is required and determines that one of these known archaeological sites (or a previously unrecorded archaeological site) is in conflict with the waterline development, mitigation options will be explored with the input of the HCB. There are no concerns with the remainder of either of the two proposed route alternatives, provided they remain within the developed portion of the road allowances. No other structures, sites or things that are of historical archaeological, paleontological, or architectural significance are currently known to exist within the Project facility or proposed water pipeline route options.

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### References

## 6.0 REFERENCES

- Acton, D.F., G.A. Padbury and C.T. Stushnoff. 1998. The Ecoregions of Saskatchewan. Regina, SK: Saskatchewan Environment and Resource Management and the Canadian Plains Research Centre.
- Canadian Council of Ministers of the Environment (CCME). 2008. Canadian Water Quality Guidelines. Available at: [http://www.ccme.ca/files/Resources/supporting\\_scientific\\_documents/cwqg\\_pn\\_1040.pdf](http://www.ccme.ca/files/Resources/supporting_scientific_documents/cwqg_pn_1040.pdf) Accessed: August 10, 2016
- Canadian Environmental Assessment Act (CEAA). 2012. Canadian Environmental Assessment Act, 2012. S.C. 2012, c. 19, s. 52. Last amended on December 31, 2014. Available at: <http://laws-lois.justice.gc.ca/eng/acts/c-15.21/index.html>
- Canadian Environmental Assessment Agency. 2015. Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act*, 2012. Available at: <http://ceaa.gc.ca/default.asp?lang=en&n=3CA9CEE5-1>
- Environment Canada. 2016. General Nesting Periods of Migratory Birds in Canada. Government of Canada, Environment Canada. Available at: <https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1>. Accessed: May 2016.
- Environment and Climate Change Canada. 2010. New source emission guidelines for thermal electricity generation. Available at: <https://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=8FCC2CCB-1#a8>. Accessed June 2016.
- Government of Canada. 1991. The federal policy on wetland conservation. Available at: <http://publications.gc.ca/collections/Collection/CW66-116-1991E.pdf>. Accessed August 10, 2016.
- Government of Canada. 1994. *Migratory Birds Convention Act*, 1994. Available at: <http://laws.justice.gc.ca/eng/acts/M-7.01/>
- Government of Canada. 2002. Species at Risk Act (S.C. 2002, c.29). Last amended on 2015-05-15. Government of Canada, Environment Canada. Available at: <http://laws-lois.justice.gc.ca/eng/acts/S-15.3/>. Accessed: May 2016.
- Government of Canada. 2014. Regulations Designating Physical Activities. Last Amended on 2014-12-31. Available at: <http://laws-lois.justice.gc.ca/PDF/SOR-2012-147.pdf>. Accessed August 2016.



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### References

Government of Saskatchewan. 1980. *The Environmental Assessment Act*. Last Amended in 2013.

Available at: <http://www.qp.gov.sk.ca/documents/English/Statutes/Statutes/E10-1.pdf>.

Accessed: August 2016.

Saskatchewan Ministry of Environment (SK MOE). 2012. Saskatchewan Air Modelling Guideline.

Available at:

<http://www.environment.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=55efb669-d96a-4722-b0bc-bd3173208616&MediaID=c8a3dcd8-c42c-4445-ad91-9d6800edb26a&Filename=Saskatchewan+Air+Quality+Modelling+Guideline.pdf&I=English>.

Accessed; May 2016.

Saskatchewan Ministry of Environment. 2016. Table 20: Saskatchewan Ambient Air Quality

Standards. Available at: <https://envrbrportal.crm.saskatchewan.ca/Pages/SEQS/Table20-SEQS-SAAQS.pdf>. Accessed; June 2016.