REPORT

SaskPower

BLACK LAKE DENESULINE FIRST NATION

December 2012

PROJECT DESCRIPTION - EXECUTIVE SUMMARY

Elizabeth Falls Hydroelectric Project

Report **Number:** 10-1365-0004/DCN-051

Golder Associates

EXECUTIVE SUMMARY

1.0 INTRODUCTION

1.1 Project overview

The proposed Elizabeth Falls Hydroelectric Power Project (Project) will be a 42 to 50 megawatt (MW) water diversion type electrical generating station. The Project is centred approximately 7 kilometres (km) from the community of Black Lake, within the Chicken Indian Reserve No. 224, adjacent to the Fond du Lac River between Black Lake and Middle Lake (Latitude: 59° 10' 48" N, Longitude: 105° 32' 12" W) (Figure 1.1-1). The hamlet of Stony Rapids is located about 25 km northwest of the Project site.

The objective of this Project is to develop additional power generation capacity in northern Saskatchewan to assist with accommodating the growing energy requirements of northern Saskatchewan communities, and to support continued northern economic development.

1.2 Project Proponent

The Proponent for the Project is the Black Lake First Nation (BLFN) together with Saskatchewan Power Corporation (SaskPower), a Crown corporation incorporated under *The Power Corporation Act* of Saskatchewan (SaskPower). Black Lake First Nation's interest in the Project is being held through their development arm, Elizabeth Falls Hydro Limited Partnership (EFHLP).

Elizabeth Falls Hydro Limited Partnership (EFHLP) and SaskPower will be negotiating various agreements to establish the terms and conditions for the Project structure, and development of the Project. These agreements must be concluded prior to the start of construction.

1.2.1 Proponent Contact Information

On behalf of the EFHLP, the principal contact for environmental assessment of the Project is:

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Business Development
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The contacts for the Project who are representatives of EFHLP and SaskPower are:

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CEO, Elizabeth Falls Hydro Development Corporation
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Prince Albert, Saskatchewan
S6V 5R8
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Fax: 306-922-5075
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Project Manager
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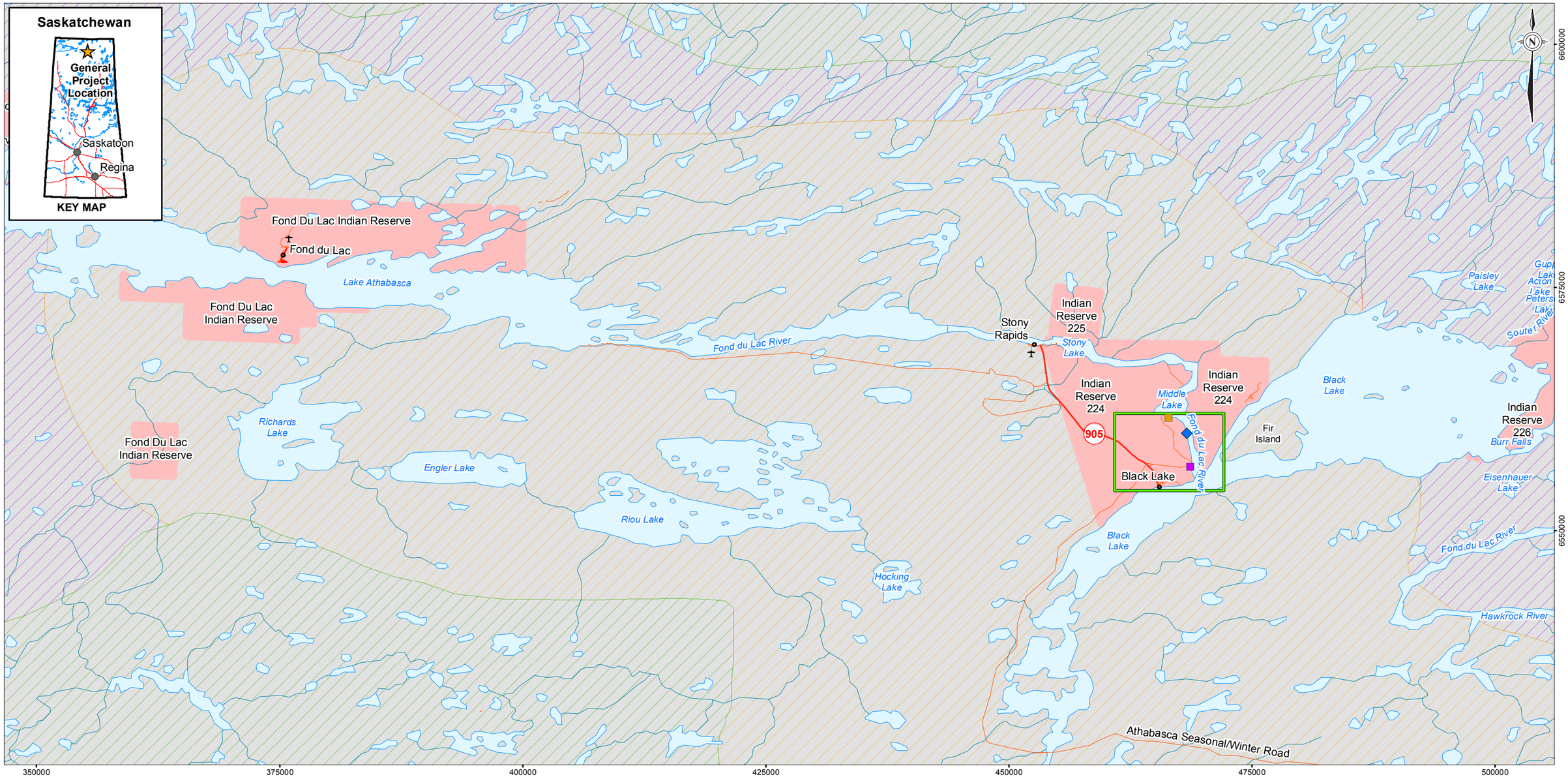
E-mail: mpeters@saskpower.com

1.3 Public Engagement

Over the past three years, prior to SaskPower considering involvement in the Project as a Proponent with the BLFN, EFHLP and the BLFN undertook several community engagement initiatives with respect to the Project. The Proponent is committed to keeping Project stakeholders informed about the project, and to fostering good relations with communities located near the Project, the general public and relevant regulatory agencies. Accordingly, the Proponent has developed a public involvement program to provide information to stakeholders and engage with First Nations and Métis communities, the public, and regulatory agencies. A list of the stakeholders identified as potentially having an interest in the Project has been provided below. This list is not meant to be exhaustive; it is anticipated that additional stakeholders may be identified as the project proceeds through the planning and development phases.

First Nations and Métis Communities and Groups:

- Chief and Council Black Lake First Nation;
- Chief and Council Fond du Lac First Nation;
- Prince Albert Grand Council – Athabasca Region; and
- Metis Local Northern Region 1.



LEGEND

- INDIAN RESERVE
- WATERBODY
- RIVER
- HIGHWAY
- ROAD
- VILLAGE
- RUNWAY
- GENERAL PROJECT LOCATION
- NORTHERN ADMINISTRATION DISTRICT
- ATHABASCA LAND USE PLAN - STAGE 1
- ATHABASCA LAND USE PLAN - STAGE 2
- ATHABASCA LAND USE PLAN - STAGE 3
- ELIZABETH FALLS
- CAMP GRAYLING
- RESIDENCE

REFERENCE

DMTI Highways and Roads
NTS Mapsheet 74I, 74J, 74O, 74P
DATUM: NAD 83 PROJECTION: UTM ZONE 13

10 0 10
SCALE 1:400,000 KILOMETRES

PROJECT
SaskPower
ELIZABETH FALLS HYDROELECTRIC POWER PROJECT

TITLE
GENERAL PROJECT LOCATION

Golder Associates
Saskatoon, Saskatchewan

PROJECT	10-1365-0004.22000		FILE No.	
DESIGN			SCALE AS SHOWN	REV. 1
GIS	JRC	12/12/12		
CHECK	MT	12/12/12	FIGURE: 1.1-1	
REVIEW	BC	12/12/12		

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Public Stakeholders and Stakeholder Groups:

- Mayor and Council Northern Hamlet of Stony Rapids;
- Athabasca Land Use Planning;
- Athabasca Health Authority;
- New North;
- Northern Labour Market Committee (NLMC);
- Athabasca Basin Development - Board of Directors;
- Athabasca Keepers of the Water;
- Canadian Parks and Wilderness Society, Saskatchewan (CPAWS);
- Saskatchewan Environmental Society (SES);
- local outfitters and resource users;
- regional suppliers;
- uranium industry;
- regional educations and training institutes; and
- relevant government departments and ministries.

1.4 Regulatory Framework

Both federal and provincial environmental assessment legislation may apply to this Project. The federal requirements are detailed within the *Canadian Environmental Assessment Act* (*CEAA*) (Government of Canada 2012). Provincial requirements are specified under the *Environmental Assessment Act* (*EAA*) (Government of Saskatchewan 2010).

1.4.1 Federal

Under Section 8 of the *CEAA, 2012*, a Project Description is required to initiate the screening process through which the Canadian Environmental Assessment Agency (the Agency) will determine if a federal environmental assessment is required for all designated projects. Designated projects are defined under the Regulations Designating Physical Activities (2012). The information requirements for a Project Description are provided in the Prescribed Information for the Description of a Designated Project Regulations and summarized in the Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act*, 2012 (CEAA-July 2012).

1.4.2 Provincial

Similar to the federal process, the provincial environmental assessment process begins with the submission of a Technical Proposal to the Environmental Assessment Branch (EAB) of the Ministry of Environment (MOE) to determine if the Project is considered a ‘development’.

The information requirements for a Technical Proposal are provided in the Technical Proposal Guidelines – A Guide to Assessing Projects and Preparing Proposals Under the *Environmental Assessment Act*, 2010 (MOE 2012).

1.4.3 Regulatory Permitting

Regulatory permitting (i.e., licensing) occurs after environmental assessment approval and includes the submission of specific applications and supporting design and project management documentation seeking specific construction and operating approvals. A number of federal and provincial permits, licences, approvals and authorizations may also be required depending on the specifics of the Project (Table 1.4-1).

Table 1.4-1: Federal and Provincial Acts and Regulations Relevant to the Project

Jurisdiction	Related Regulations	Permits Required
Federal Acts		
Canadian Emission Reduction Incentives Agency Act, S.C., 2005, c. 30	■ n/a	■ n/a
Canadian Environmental Assessment Act, 2012, S.C., 2012, c.19, s.52	■ Regulations Designating Physical Activities, SOR/2012-147 ■ Prescribed Information for the Description of a Designated Project Regulations, SOR/2012-148 ■ Cost Recovery Regulations, SOR/2012-146	■ Environmental Assessment Approval
Canadian Environmental Protection Act, 1999, C-15.1	■ Environmental Emergency Regulations, SOR/2003-307 ■ Federal Above Ground Storage Tank Technical Guidelines, P.C. 1996-1233 ■ Federal Halocarbon Regulations, 2003 SOR/2003-289 ■ Federal Underground Storage Tank Guidelines ■ Inter-provincial Movement and Hazardous Waste Regulations, SOR/2002-301 ■ National Pollutant Release Inventory and Municipal Wastewater Services May 2003 ■ Ozone-depleting Substances Regulations, 1998 SOR/99-7	■ n/a
Canadian Water Act, R.S.C., 1985, c. C-11	■ Guidelines for Canadian Drinking Water Quality	■ n/a
Canadian Wildlife Act, R.S.C., 1985, c. W-9	■ Wildlife Area Regulation, C.R.C., c. 1609	■ n/a
The Fisheries Act, R.S.C., 1985, c. F-14 (amended 2012)	■ *n/a*	■ Authorization For Harmful Alteration or Disruption, or the Destruction of fish habitat (Section 35) ■ As well as requirements under other sections of the act (may include Sections 20, 30, 32, and 36 as final 2012 changes come into force)

Table 1.4-1: Federal and Provincial Acts and Regulations Relevant to the Project (continued)

Jurisdiction	Related Regulations	Permits Required
Federal Acts		
Indian Act R.S.C. 1985, c.I-5	■ Indian Reserve Waste Disposal Regulations, C.R.C., c.960 ■ Indian Timber Regulations C.R.C., c.961	■ Permit to use land in a reserve for the disposal or storage of waste, or to burn waste on any land in a reserve ■ Licence to cut timber on surrendered lands or on reserve land ■ Lease of Land (Section 53) ■ Access Permit (Section 20)
Migratory Birds Convention Act, S.C., 1994, c. 22	■ *Migratory Bird Regulations, 2010 C.R.C., c. 1035*	■ n/a
*Navigable Waters Protection Act, R.S., 1985, C. N-22**	■ *n/a*	■ Work Approval
Species at Risk Act, S.C. 2002, c. 29	■ n/a	■ n/a
Transportation of Dangerous Goods Act, 1992, C.34	■ Transportation of Dangerous Goods Regulations, SOR/2001-286	■ n/a
Provincial Acts		
The Clean Air Act, S.S. 1986-87-88, C-12.1	■ The Clean Air Regulations, R.R.S c. C-12.1 Reg 1	■ Permit to Construct ■ Permit to Operate
The Environmental Assessment Act, S.S. 1979-80, E-10.1	■ n/a	■ Environmental Assessment Approval
Environmental Management and Protection Act, R.R.S. 2010, c. E-10.22	■ The Environmental Spill Control Regulations, R.R.S c.D-14 Reg 1 ■ The Hazardous Substances and Waste Dangerous Goods Regulations, R.R.S., c. E-10.2, Reg 3 ■ The Water Regulations, 2002, R.R.S. c. E-10.21 Reg 1 ■ Halocarbon Control Regulations, c. E-10.21 Reg 2 ■ Used Oil Collection Regulations, R.R.S., c. E-10.2 Reg 8	■ Hazardous Substances and Waste Dangerous Goods Permit to Construct (Section 10) ■ Hazardous Substances and Wastes Dangerous Goods Permit to Operate (Approval to Store - Section 9) ■ Approval to Construct - Water Works ■ Approval to Operate – Water Works ■ Permit to Construct - Aquatics Habitat Protection Permit
Forest Resources Management Act, 1996, F-19.1	■ The Forest Resources Management Regulations, 1999, F-19.1 Reg 1	■ Forest Product Permit
Fire Prevention Act, S.S. 1992, F-15.001	■ The Saskatchewan Fire Code Regulations, F-15.001 Reg 1 ■ The Fire Insurance Fees and Reporting Regulations, F-15.001 Reg 2	■ n/a
Fisheries Act (Saskatchewan), S.S. 1994, F-16.1	■ The Fisheries Regulations, 1994, F-16.1	■ n/a

Table 1.4-1: Federal and Provincial Acts and Regulations Relevant to the Project (continued)

Jurisdiction	Related Regulations	Permits Required
Provincial Acts		
The Heritage Property Act, S.S. 1979-80, H-2.2	■ The Heritage Property Regulations, Sask. Reg 279-80	■ n/a
Highways and Transportation Act, S.S. 1987, H-3.01	■ The Controlled Access Highways Regulations, H-3 Reg 7 ■ The Highways and Transportation Regulations, H-3.01 Reg 1 ■ The Erection of Signs Adjacent to Provincial Highways Regulations, 1986	■ Approach Permit ■ Oversize / Overweight permits ■ Roadside Permit ■ Off-premise Sign Application ■ On-premise Sign Application
The Northern Municipalities Act, 2012, N-5.2	■ The Northern Municipalities Regulations, 2011, N-5.2 Reg 1	■ Road Maintenance Agreement
Occupational Health and Safety Act, S.S. 1993, O-1.1	■ Occupational Health and Safety Regulations, 1996, R.R.S., c. O-1 Reg 1	■ n/a
Provincial Lands Act, S.S. 1978, P-31	■ Saskatchewan Wetland Conservation Corporation Land Regulations, 1993, P-31, Reg 14 ■ Crown Resource Land Regulations, P-31, Reg 17 ■ Provincial Lands Regulations, SR145/68	■ n/a
Saskatchewan Watershed Authority Act, S.S. 2005, c. S-35.03	■ Saskatchewan Watershed Authority Regulations, R.R.S., c. S-35.03 Reg1	■ Approval to Construct - Industrial Wastewater Works ■ Water Rights Licence & Approval to Construct and Operate Works ■ Water Rights Licence
Weed Control Act, 2010, S.S. W-11.1	■ Weed Control Regulations, W-11.1, Reg 1	■ n/a
Wildlife Act, S.S. 1998, c. W-13.12	■ Wildlife Regulations, W-13.1, Reg 1 ■ Wildlife Management Zones and Special Areas Boundaries Regulations, 1990, W-13.1 Reg 45 ■ Wildlife-Landowner Assistance Regulations, 1981, W-13.1, Reg 48 ■ Wild Species at Risk Regulations, W-13.1 Reg 1	■ n/a

*Act is currently being revised. Changes to the Act had not come into force at the time this table was generated. Changes to the Act will have to be reviewed in context of the Project once additional information is available.
n/a = not applicable

1.5 Environmental Studies within the Proposed Project Area

A number of environmental studies have been undertaken by the Proponent in the general Project area specific to baseline data collection and feasibility planning for the Project. The Proponent is not aware of any federal regional environmental studies, as described in Section 73-77 of *CEAA, 2012* that are taking place, or have previously taken place, in the region.

The Project is located within the Stage I planning area of the Draft Athabasca Land Use Plan (ALUP) for the Athabasca region. The draft land use plan was released in March 2006. As part of this plan, land use zoning is used as a planning tool to guide management and development within the Stage I planning area

(ALUP 2006). The Project is located in the community and infrastructure area. The planning focus for this area is on maintaining existing community and public infrastructure uses, and allows for future improvements to access and infrastructure (ALUP 2006).

2.0 PROJECT INFORMATION

2.1 Project Components

The Project will be a 42 to 50 MW water diversion type electrical generating station. The gross head of the Project will be approximately 36 metres (m), capitalising on the long term annual average river flow of 305 cubic metres per second (m^3/s). No impoundment of Black Lake will be required. When completed, the principal components of the proposed Project will consist of:

- an approximately 8.5 km long connecting gravel access road to the proposed Project site from the all-season road between Stony Rapids and Black Lake communities;
- a bridge over the Fond du Lac River;
- a powerhouse and associated infrastructure;
- an approximately 2.65 km tunnel from Black Lake to the powerhouse, using a portion of the water that would typically flow down the Fond du Lac River from Black Lake to Middle Lake;
- an approximately 1,100 m long tailrace channel between the powerhouse and its re-entry into the Fond du Lac River upstream of Middle Lake;
- a submerged weir in the Fond du Lac River at the outlet of Black Lake, to maintain water levels and fish habitat in Black Lake; and
- an approximately 20 km transmission line and switching station to connect the energy produced into the northern Saskatchewan electrical grid.

2.2 Designated Activity

Under the *CEAA 2012*, an environmental assessment may be required for "designated projects". A designated project is one that includes one or more physical activities that are set out in the Regulations Designating Physical Activities (2012). Pursuant to Section 7 of the Schedule to the federal Regulations Designating Physical Activities (2012), a project involving the construction, operation, decommissioning, and abandonment of a structure for the diversion of 10,000,000 cubic metres per year (m^3/y) or more of water from a natural water body into another natural water body is a designated project. The Project, as currently proposed, will require the construction of a structure that will divert up to approximately 5,000,000,000 (5.0 billion) to 5,900,000,000 (5.9 billion) m^3/y depending on the generating capacity of the powerhouse selected, and on the frequency and extent of planned and unplanned outages. As the Project will exceed the criteria listed in the regulations, it is considered a designated project and, therefore, will be subject to the provisions of the *CEAA, 2012*.

2.3 Project Footprint

The arrangement of proposed structures for the Project was influenced by BLFN's requirements that the Project minimize the environmental impact to Black Lake and the Fond du Lac River. To take full advantage of the gradient in this section of the Fond du Lac River, water from Black Lake will be conveyed from an intake structure via a power tunnel excavated through rock to the powerhouse, and finally will be returned to the Fond du Lac River upstream of Middle Lake via a tailrace.

The results of the site investigations and development of the design concept considering cost and potential environmental effects determined the final proposed structure locations. Because the Project design has not yet been finalized, minor refinements are expected (e.g., changes to component locations to accommodate site conditions) during the final design phase (start early 2013), pursuant to final engineering design and input from the general contractor.

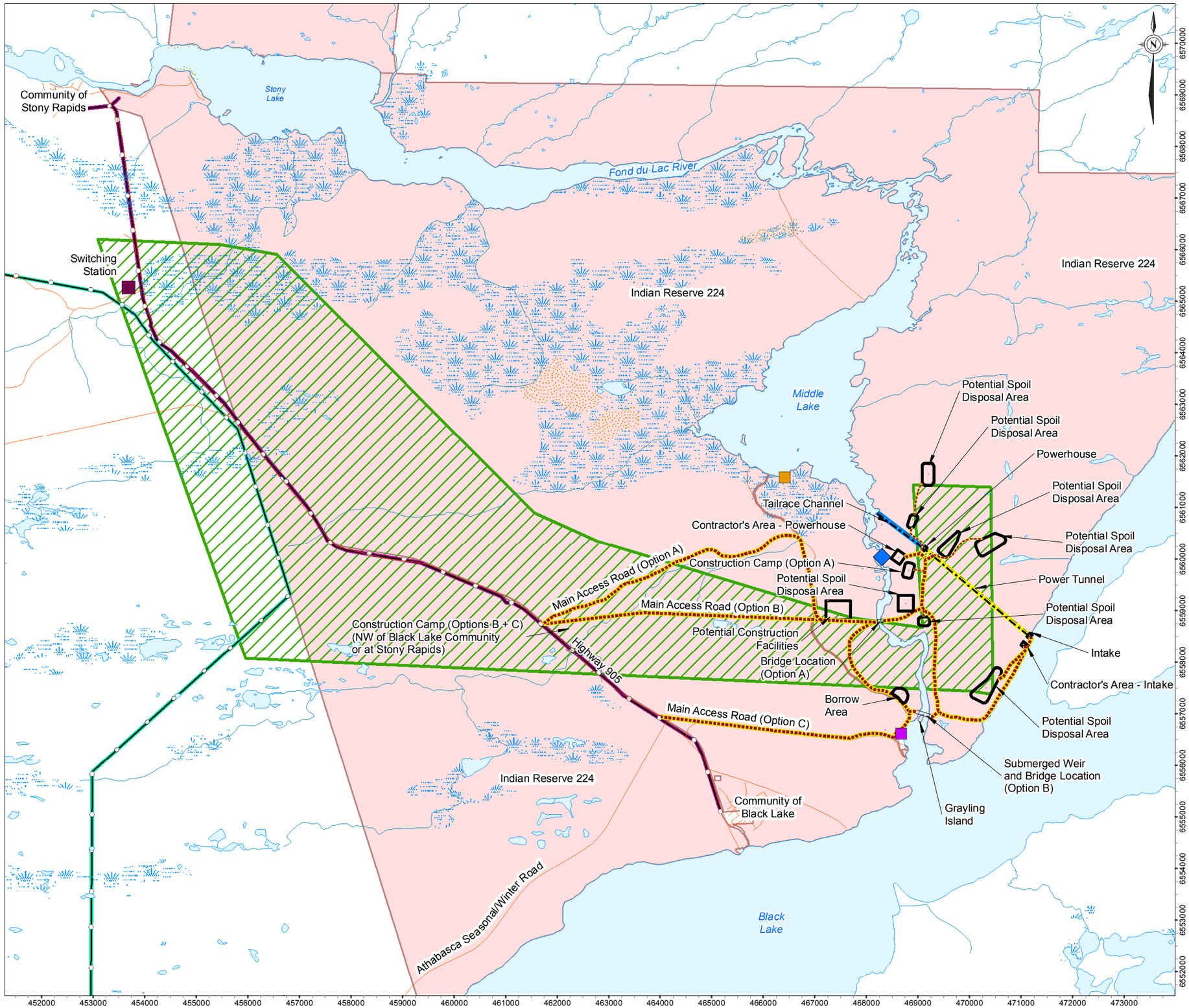
The footprint of the proposed Project will include the area between Black Lake and Middle Lake that extends approximately 2 to 3 km on either side of the Fond du Lac River (Figure 2.3-1). The proposed location of the powerhouse coordinates are 59° 10' 48" N and 105° 32' 12" W. Within this area, footprint impacts will be localized to the immediate vicinity of Project components (e.g., bridge, water intake, powerhouse, tailrace and outfall, submerged weir, access roads, staging/material storage areas, construction camp, transmission lines and waste rock disposal areas).

The majority of Project activities will take place on Chicken Indian Reserve No. 224. Portions of the Project proposed at this time that may be partially located off of Reserve land include segments of the main access road, transmission line corridor, and an area of Camp Grayling. In addition to the communities of Black Lake and Stony Rapids, there is one known residence on Middle Lake.

3.0 PROJECT DESCRIPTION

The proposed Project is comprised of a water intake located on Black Lake, a 2.65 km power tunnel excavated through rock to a powerhouse containing electricity generating turbines, and a tailrace extending for approximately one kilometre from the powerhouse to the Fond du Lac River. The tailrace will discharge into the Fond du Lac River approximately 600 m downstream of Elizabeth Falls, which consists of a series of rapids over a 600 m long section of the river. Several smaller rapid sections are located on the river upstream of Elizabeth Falls towards Black Lake. The difference in elevation between Black Lake and Middle Lake is approximately 36 m, which is considered to be the gross head of the development.

Other components of the proposed Project include an electrical switchyard located immediately adjacent to the powerhouse, and an interconnecting transmission line, together with the associated access roads and a bridge across the Fond du Lac River connecting the Project site to Highway 905 and the communities of Black Lake and Stony Rapids. The proposed Project will also include a construction work camp, waste rock disposal areas, and a submerged weir near the outlet of Black Lake (Figure 2.3-1). Some aspects of the project design may be modified subject to final engineering and design.



LEGEND

- INDIAN RESERVE
- WATERBODY
- WETLAND
- RIVER
- ROAD
- 138 KV TRANSMISSION LINE
- 25 KV DISTRIBUTION LINE
- INTERCONNECTION STUDY AREA
- ELIZABETH FALLS
- SWITCHING STATION
- CAMP GRAYLING
- RESIDENCE

NOTE: LOCATIONS OF POTENTIAL OR OPTIONAL FACILITIES ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. FINAL LOCATIONS WILL BE DETERMINED DURING FINAL ENGINEERING AND DESIGN, TAKING INTO CONSIDERATION STAKEHOLDER INPUT.

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
SITE PLAN PROVIDED BY HATCH ENGINEERING

2 0 2
SCALE 1:75,000 KILOMETRES

PROJECT
SaskPower
ELIZABETH FALLS HYDROELECTRIC POWER PROJECT

TITLE
CONCEPTUAL SITE LAYOUT

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1365-0004	FILE No.	
DESIGN			SCALE AS SHOWN	REV. 2
GIS	JRC	12/12/12	**FIGURE: 2.3-1**	
CHECK	MT	12/12/12		
REVIEW	BC	12/12/12		

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3.1 Construction

The key components of the Project, which will comprise the majority of site construction activities, require the construction of the proposed water intake, tunnel, powerhouse, switchyard and tailrace. The powerhouse will require the installation of turbines and generators as well as other electrical and mechanical systems.

3.1.1 Access Roads and Bridge

The main access road will provide all-season permanent access to the Project areas during construction and operations (Figure 2.3-1). The location of the main site access road from Highway 905 to the proposed bridge over the Fond du Lac River will be selected following local First Nations and public engagement. Currently, three possible alignments are being presented for community discussion; two alignments follow existing vehicle trails while the third alignment crosses undisturbed terrain. Beyond the Fond du Lac River bridge, the main access road will turn north and travel along the right bank of the Fond du Lac River passing near the proposed location of the contractor's work area and ending at the location of the powerhouse. The approximate length of the proposed main access road alignment from Highway 905 to the powerhouse is about 8.5 km.

Various other roads will be required in addition to the main access road (Figure 2.3-1). The east access road will branch off of the main access road just east of the proposed bridge location, and will provide access to the water intake area located at Black Lake. The length of the proposed east access road is approximately 2.7 km. If the construction camp is located at the Project site, a third road will be constructed from the main access road to the construction camp.

Temporary roads will be required to access waste rock and overburden disposal areas, and other areas that require access during construction. Temporary roads will not be built to provide all-season access. The number of temporary roads will be kept to a minimum to reduce impact on the local environment and the possibility of encroachment onto previously unknown heritage sites. After Project construction is completed temporary roads will be removed and the terrain returned, as near as possible, to its original preconstruction condition. As the locations of the waste rock and overburden disposal areas will not be finalized until the final design phase, the route of temporary access roads is uncertain at this stage. However, all significant components of the final Project design will be determined prior to submitting the Environmental Impact Statement (EIS) for the Project.

Two alternate access bridge locations across the Fond du Lac River are proposed. One site is located approximately 1.8 km downstream of Grayling Island at a point where the width of the river is narrowest. A second location would be parallel to the axis of the proposed submerged weir at the downstream end of Grayling Island. In addition to engineering and cost considerations, public consultation on the location of the access bridge will be used to determine the preferred bridge location.

3.1.2 Powerhouse

An optimization study is currently underway to determine the specific generating capacity of the proposed Project (i.e., between 42 MW and 50 MW). The Project will operate as a water diversion type plant using approximately 36 m of gross head between Black Lake and Middle Lake, at discharge rates between 160 m^3/s (42 MW facility) and 190 m^3/s (50 MW facility).

While the number of generating units has not yet been finalized, it is estimated that up to four units could be used. A multiple unit generating plant was selected because of its flexibility of operation and more easily managed scheduling of maintenance outages compared to a single unit power plant.

The type of turbine units selected for the Project will be determined in the design process and will be described in more detail in the EIS. Turbine specific characteristics such as fixed versus variable pitch blades, runner diameter, synchronous speed, number of units, and individual unit output will be determined subsequent to a formal solicitation for equipment proposals from turbine manufacturers. An example of a typical turbine and generator installation layout is provided in Figure 3.1-1.

3.1.2.1 Flow Bypass

In order to maintain downstream flows and water levels during a sudden change in turbine load such as a load rejection, the station will be equipped with features to ensure that the change in operation does not negatively affect downstream flows or water levels.

3.1.3 Water Intake

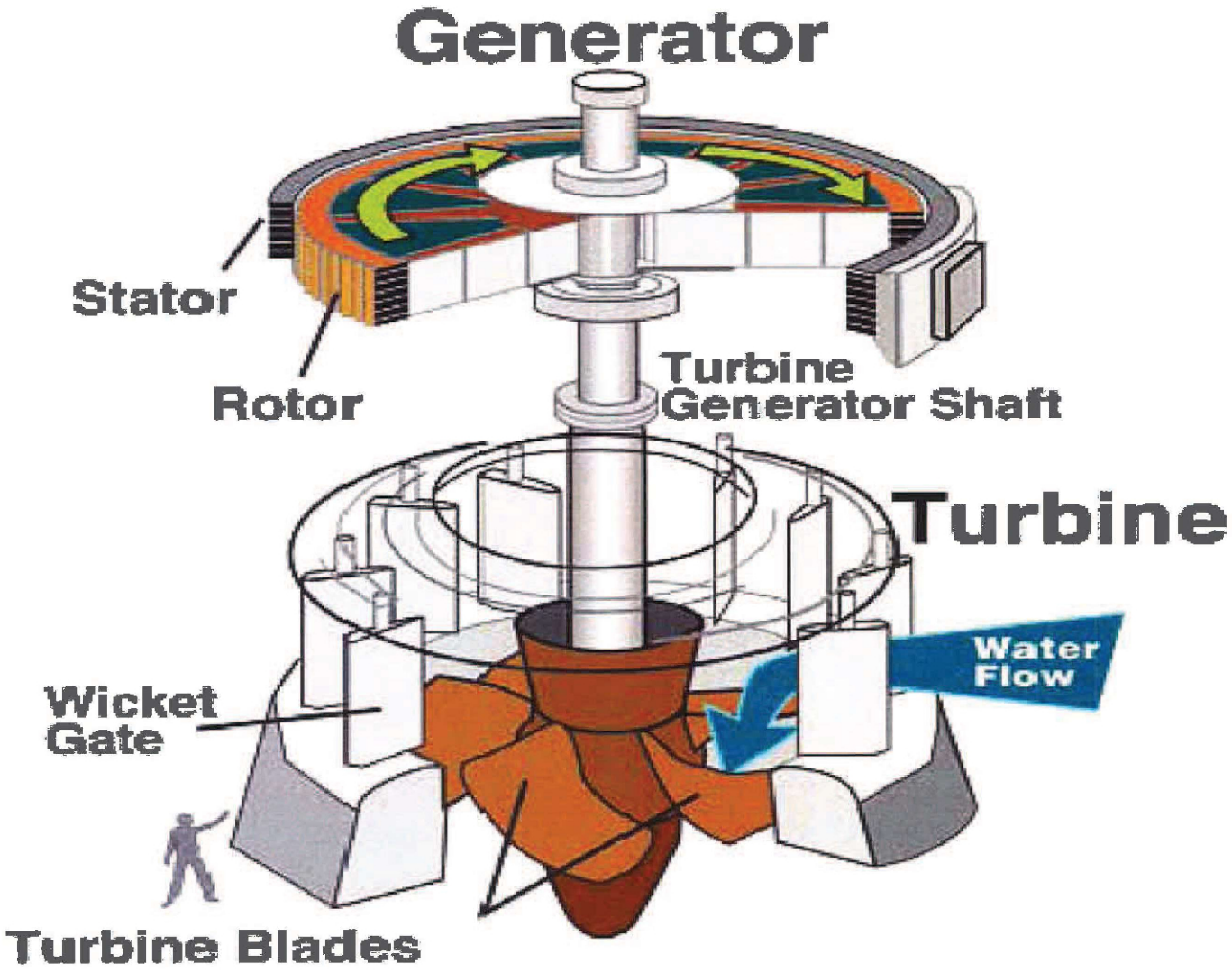
The purpose of the proposed water intake is to direct water into the power tunnel from Black Lake under controlled conditions. It establishes the transition between the free water surface of the lake and the closed conduit flow within the power tunnel. The water intake structure will be designed and located to divert water from well below the surface of the lake (i.e., greater than 2 to 5 m below the lake surface). The water intake will be constructed of reinforced concrete with provisions for steel stoplogs and trashracks. The trashracks are intended to prevent debris and ice from entering the water passages of the plant and potentially damaging the turbine generating equipment. To minimize entrance hydraulic losses, the intake water passage will be streamlined to direct the flow from Black Lake into the power tunnel. The intake channel and structure will be designed to draw the required power plant design discharge from Black Lake over the full range of anticipated lake levels.

The proposed water intake will be sized to deliver the full plant discharge capacity of 160 m^3/s (42 MW facility) or 190 m^3/s (50 MW facility) into the power tunnel. The size and shape of the intake water passage will be designed to minimize hydraulic losses, to ensure the formation of a competent ice cover at the intake channel entrance during winter operation, and to ensure compliance with industry and regulatory standards.

3.1.3.1 Cofferdam for Water Intake in Black Lake

Construction of the water intake structure will require construction of a coffer dam to prevent water flowing into the active work area. Natural features will be used where appropriate to aid with the coffer dam design. The proposed water intake structure will be located adjacent to a rock outcrop approximately 90 m from the shore of Black Lake. There is a plateau between the rock outcrop and the shoreline of the lake that is underlain by up to 20 m of sand, gravel, boulders and cobbles (Hatch 2002, 2012).

A steel sheet pile cut-off wall will be installed to control seepage through this sand layer during construction of the water intake. This option involves driving sheet piles to form a low permeability barrier. The sheet pile wall will be about 250 m long and extend 17 m below grade. A sand plug between the sheet pile and the excavation will be left to ensure stability of the sheet pile wall. Water seepage through and beneath the sheet pile wall will be managed with dewatering wells or sumps. The sheet piles will be removed prior to excavation of the sand plug, but after completion of the water intake and power tunnel construction activities.



PROJECT

SaskPower

ELIZABETH FALLS HYDROELECTRIC POWER PROJECT

TITLE

GENERATOR PROCESS DIAGRAM

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1365-0004	FILE No.	
DESIGN			SCALE AS SHOWN	REV. 0
GIS	JRC	12/12/12	**FIGURE: 3.1-1**	
CHECK	MT	12/12/12		
REVIEW	BC	12/12/12		

REFERENCE

PROCESS DIAGRAMS PROVIDED BY SASKPOWER

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3.1.4 Tunnel

The current preferred power tunnel arrangement consists of a 2.65 km long tunnel with a 9.1 m wide horseshoe shaped (∩) cross-section. The tunnel is expected to be constructed using the drill-and-blast method. Approximately 315,000 cubic metres (m^3) of waste rock is expected to be created by the tunnel excavation, assuming an overbreak of 0.5 m along the entire length of the tunnel.

Due to the geology of the area, the drill-and-blast method is expected to be the preferred method of construction. Tunnelling will be done from a single active work face. It is assumed that initially about 150 m length of the tunnel will be excavated from the powerhouse end, with the remaining length (approximately 2,500 m) of the tunnel being excavated from the water intake side. This sequencing of tunnelling allows for construction of the tunnel to steel penstock transition at the powerhouse to proceed independent of the remainder of tunnel construction. The access for installation of the steel penstocks will be via the tunnel end that enters the upstream wall of the powerhouse excavation. The access to the tunnel for mucking and general traffic during construction from the Black Lake water intake end will be via the intake excavation.

3.1.5 Tailrace

Downstream of the powerhouse, the water from the turbine discharge enters the tailrace channel. The tailrace channel is located within a broad flat valley sloping gently to the northwest. The proposed tailrace channel (approximately 1,100 m long) will be excavated in rock with varying depths of overburden. After the water from Black Lake is used to generate power, the tailrace returns the water back to the Fond du Lac River at a location upstream of Middle Lake.

As the power plant is expected to operate at full discharge capacity approximately 90 percent (%) of the time, the design of the tailrace channel has been based on the full plant discharge. For an installed capacity of 42 MW and full plant discharge of 160 m^3/s, the optimum tailrace channel cross-section was determined to have a width of 25 m and a flow depth of 5.5 m resulting in an average flow velocity of 1.1 metres per second (m/s). The resultant hydraulic loss in the tailrace channel due to friction was estimated to be 0.27 m at the full plant discharge.

3.1.5.1 Cofferdam for Tailrace Outlet into Fond du Lac River

To keep water out of the active work area and permit working in the dry during tailrace channel excavation, a rock and overburden plug will be left at the downstream end of the tailrace channel until the excavation is complete. The cofferdam would be constructed by placing the two rockfill sections first, then depositing semi-impervious material between them to minimize the release of fines into the river. The cofferdams would be removed following completion of the tailrace exit excavation for hydraulic improvements at the river. Turbidity curtains will be used during construction to minimize the amount of silt entering the river.

3.1.6 Black Lake Outlet (Grayling Island) Water Control Structure

To maintain historic water levels in Black Lake following construction of the generating station, the flow through the natural outlet of Black Lake will need to be restricted by constructing a submerged rockfill weir spanning the Fond du Lac River. The proposed weir will be constructed across the Fond du Lac River at the outlet of Black Lake at the location indicated in Figure 2.3-1. The Fond du Lac River is approximately 200 m wide at the location of the proposed weir, including the 35 m wide Grayling Island, which the weir will intersect. The length of weir to the west of Grayling Island will be approximately 85 m, while the length of weir to the east of the island is approximately 80 m. The final weir configuration will be designed to facilitate fish passage at all lake levels and discharges.

3.1.7 Transmission Line

A transmission line will be required to connect the Project to the existing northern Saskatchewan electrical grid through the existing Stony Rapids Switching Station, or potentially a new station in the area. The general corridor, through which potential transmission line rights-of-way will be identified, is shown in Figure 2.3-1. The transmission line connecting the powerhouse to the Stony Rapids Switching Station is still in the design phase and an exact location has not yet been determined. SaskPower, separate from the Project Proponent, will build, own, operate, and maintain the transmission line. SaskPower plans to discuss the transmission line right-of-way location with Black Lake and Stony Rapids community members prior to finalizing a route.

3.2 Operation

Operational planning for the Project is in the early design stages; adjustments to the description provided herein may be made after further evaluation, including consulting with local community members and regulators.

3.2.1 Powerhouse

The proposed powerhouse and service bay complex will be located in a rock excavation to the east of Elizabeth Falls as shown in Figure 2.3-1. Adjacent to the powerhouse will be the parking/vehicle manoeuvring area and the switchyard.

It is anticipated that the powerhouse structure will house two to four generating units, for a total rated plant capacity of between 42 and 50 MW. A multi-unit plant was selected because of its flexibility of operation and scheduling of outages compared to a single unit plant. While a single unit plant may cost less, a multi-unit powerhouse will result in less lost generation of energy due to forced and planned outages. Equipment components will also be smaller and easier to handle.

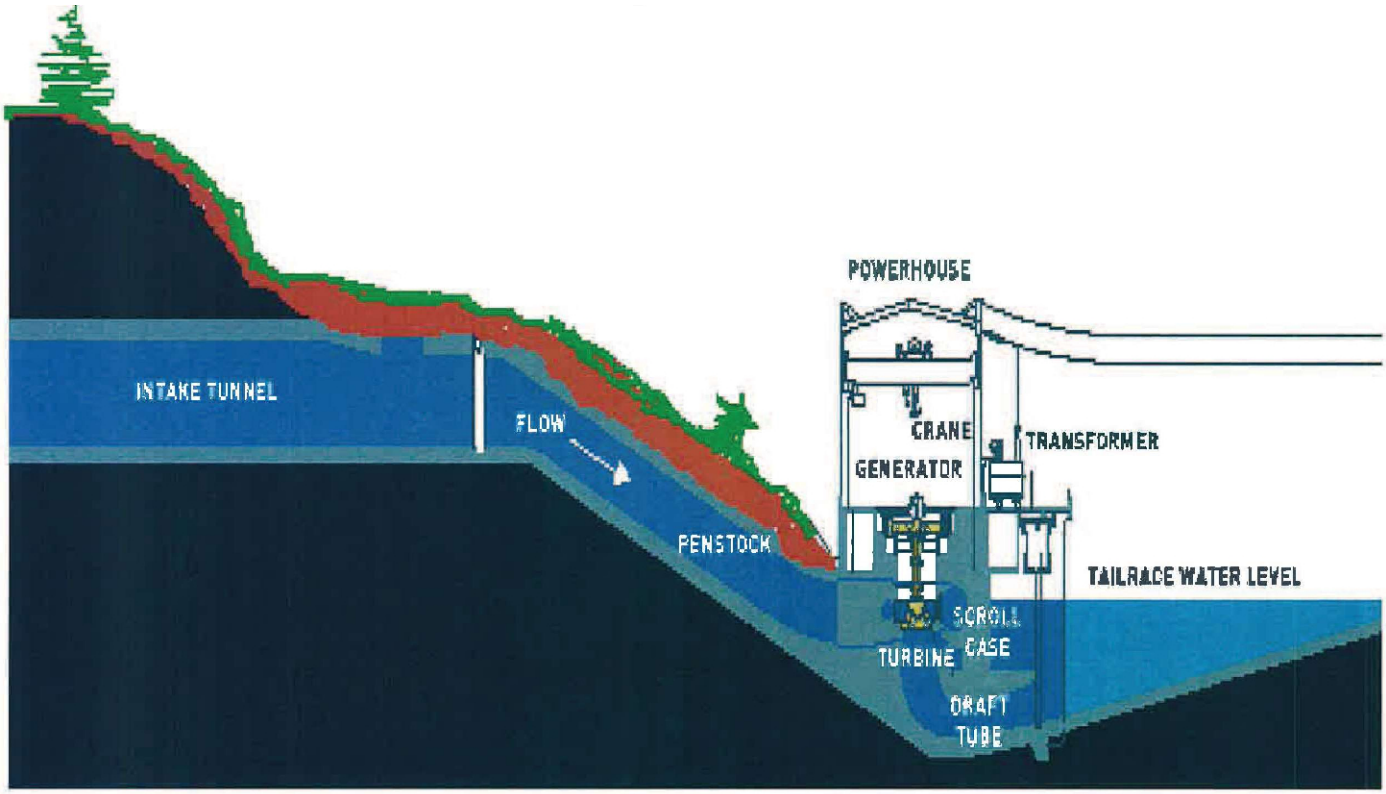
3.2.2 Powerhouse Complex

Design of the powerhouse complex is conceptual at this time. The design characteristics proposed are based on what would typically be expected for a facility of this nature. Final design characteristics will be determined by mid-2013. A conceptual drawing of what the powerhouse complex may look like is provided in Figure 3.2-1.

3.2.3 Water Intake Structure

The proposed intake will consist of a reinforced concrete structure with provision for steel stoplogs and trashracks, and a streamlined water passage to direct the flow to an excavated tunnel. The intake channel and structure will be designed to withdraw the required plant discharge from Black Lake over the full range of anticipated lake levels.

The size of the intake will be sufficient to ensure the formation of a stable ice cover in Black Lake in the vicinity of the water intake during winter operation. The soffit (ceiling) of the water passage will be set low enough to prevent entrainment of air into the tunnel. The level of the intake deck will be set so that sufficient rock thickness remains above the tunnel soffit to maintain the integrity of the rock.



PROJECT

SaskPower

ELIZABETH FALLS HYDROELECTRIC POWER PROJECT

TITLE

EXAMPLE POWERHOUSE PROCESS DIAGRAM

Golder Associates
Saskatoon, Saskatchewan

PROJECT		10-1365-0004	FILE No.	
DESIGN			SCALE AS SHOWN	REV. 0
GIS	JRC	12/12/12	FIGURE: 3.2-1	
CHECK	MT	12/12/12		
REVIEW	BC	12/12/12		

REFERENCE

PROCESS DIAGRAMS PROVIDED BY SASKPOWER

G:\CLIENTS\SASKPOWER\Elizabeth Falls Power Project\Figures\10-1365-0004 SaskPower Elizabeth Falls EA\22000 Project Description\10-1365-0004 Process Diagram A.mxd

3.2.3.1 Black Lake Water Levels with Project Operation

Using 40 years of recorded flows and Black Lake water levels, a model was developed to simulate water levels in Black Lake under natural conditions, and with the power generating station in operation. Water levels were estimated in the model using the stage discharge relationship developed from flow records obtained from the Water Survey of Canada Gauging Station near the outlet of Black Lake.

Black Lake water levels are controlled by a natural rock outcrop at the lake outlet where the Fond du Lac River resumes its course. From the results of the simulation of natural conditions over the period of record, the analysis indicated that Black Lake water levels typically fluctuate approximately 0.7 m over the course of an average year. Over the 40 year period of record, the maximum annual water level fluctuation was determined to be approximately 1.6 m.

As previously stated, with the added flow capacity in the power tunnel, a submerged rockfill overflow weir will be installed at the outlet of Black Lake to restrict the flow, and maintain lake levels within their historic range. The model that was used for the natural conditions was modified to simulate the operation of the power plant over the same historical period of record.

The post-Project Fond du Lac River discharge downstream of the Black Lake outlet will vary throughout the year. However, depending on the time of year, a minimum riparian flow varying between 50 and 100 m^3/s will be maintained through the natural river reach to retain existing fisheries habitat and natural river regimes as much as possible. Most of the time however, these minimum flows will be exceeded.

3.3 Supporting Infrastructure

3.3.1 Construction Camp

It is anticipated that a construction camp will be required to accommodate 100 to 150 workers. Features of a construction camp of this nature would typically include: dormitories with washroom and laundry facilities, kitchen and dining facility, office space, recreational and commissary complex, water and sewage storage units, parking spaces and electrical generator units. Three alternative locations are currently being considered (Figure 2.3-1).

3.3.2 Contractors Work Areas

Contractors' work areas will be used to store materials, maintain and assemble equipment and administer work on the Project. It is expected that two such areas will be required, one near the powerhouse and one near the water intake. At this stage of design the exact size and details of the contractors' work areas are not known. However, two potential locations have been selected as shown on Figure 2.3-1.

3.3.3 Construction Facilities Area

At this time it is anticipated that only one construction facilities area will be required. This area will be used for contractor's laydown areas, work areas, storage areas, services areas, and garages. One potential location has been identified on the southwest side of the Fond du Lac River (Figure 2.3-1). The final location(s) will be determined during final design.

3.3.4 Water Supply and Fire Protection Water Services

During construction and operations, potable water will be provided at various locations throughout the contractors' work areas. It is expected that treated water will be hauled from an existing water treatment facility to site via water trucks from either BLFN or Stony Rapids. Untreated water will be pumped directly from Black Lake or the Fond du Lac River for use in fire protection. Pump intakes will be screened to

prevent entrainment of fish in accordance with Fisheries and Oceans Canada's (DFO's) "Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995).

3.3.5 Power

Construction power will be supplied to the site from the SaskPower grid using temporary 25 kilovolt (kV) distribution lines to the contractor's work area, certain construction facilities, and the construction camp during construction of the principal structures. A temporary pole line will distribute power throughout the Project site and will provide mounting for exterior lighting, cable television and telephone line distribution as required. It is expected that the power requirements of the Project during operations can be accommodated through the 25 kV distribution line put in place for construction, with diesel powered generators for backup.

3.3.6 Telecommunications

A telecommunication system will be required for construction of the Project, as well as for the eventual management and integration of the energy produced by the Project into the SaskPower grid system. Given the remote location of the proposed Project, telecommunications is one of the key aspects of the Project. At this time, the optimal telecommunications technology has not yet been determined. Options include satellite and fibre optic network technologies.

3.3.7 Waste Rock Disposal Areas

The location of potential disposal areas for the waste rock and overburden materials excavated from the water intake, power tunnel, powerhouse, and tailrace channel is currently under consideration (refer to Figure 2.3-1 for options being considered). Factors being considered for determining their location include proximity to the main access roads, potential ability to accommodate disposal of a significant amount of excavated materials, and suitable topographical features.

At this time it is estimated that the total potential disposal volume after excavation will be approximately 3,000,000 m^3. This represents a post-excavated volume for disposal consisting of approximately 1,860,000 m^3 of rock and 1,120,000 m^3 of overburden. A relatively small volume of the excavated rock may be used as road topping, riprap to armour the walls of the portion of tailrace channel excavated in overburden, and to construct the submerged weir across the Fond du Lac River at Grayling Island. Similarly, portions of the overburden, comprised of sand and gravel, may be used as aggregate for the production of concrete if suitable.

Some portion of the waste rock excavated from the power tunnel could be potentially acid generating, high in various metals or contain uranium mineralization, particularly waste rock from the section of tunnel within, or in close proximity to, the Black Lake Shear Zone. As such, a waste rock chemical management plan will be prepared. This plan will outline the methods to visually identify and classify the waste rock, including the rock type, the waste unit designation, and the acid rock drainage (ARD) and uranium potential. This plan will also include the preparation of standard operating procedures and a site geological manual to direct on-site characterization.

It is expected that a designated spoil area would be set aside to isolate materials deemed to be potentially ARD generating or that may contain uranium. In addition, drainage from the areas used to dispose of the different waste units will be monitored to confirm that water quality is acceptable for discharge to the environment, and also to provide information for use in reclamation planning. Water samples will be collected regularly and analyzed for general water quality parameters and total metals.

3.4 Decommissioning and Reclamation

The construction phase of the Project is expected to be relatively short (i.e., 4 years) compared to the operational life of the Project which may extend up to 100 years or more. A conceptual Decommissioning and Reclamation (D&R) Plan for the construction phase will be written as a component of the environmental assessment process associated with the Project.

The operational life of the Project is expected to extend up to 100 years or more. The exact life expectancy of the Project cannot be determined at this time as hydroelectric projects of this type can operate almost indefinitely with ongoing equipment maintenance and upgrades. It is currently anticipated that decommissioning and reclamation of the Project will take approximately one year following cessation of power production operations. A conceptual D&R Plan will be written as a component of the environmental assessment process associated with the Project.

Decommissioning, when it occurs, would be done in compliance with all federal and provincial acts, regulations and standards applicable at the time, and in consultation with the BLFN. Abandoned properties will be left in a condition that meets or exceeds regulatory requirements. In general, it is anticipated that equipment and material that would no longer be viable would be removed from the site and/or disposed of in an approved manner. It is anticipated at this time that usable materials and equipment will be removed from the site and returned to central stores and/or used at other power generation facilities. Alternatively, some reusable material and equipment may be made available for acquisition by the local communities.

3.5 Project Schedule

The Project schedule has been defined by major Project phases. If the Project is given regulatory approval, the major Project phases and their estimated timelines are as follows:

- construction: September 2014 to December 2017;
- operations: January 2018 to approximately January 2118; and
- D&R: duration of approximately one year following cessation of operations.

4.0 EMISSIONS, DISCHARGES AND WASTE

The emissions, discharges and waste that have that may be generated by the Project along with proposed mitigation for each are provided in Table 4.0-1.

Table 4.0-1: Emissions, Discharges and Waste Generated by the Project

Emission, Discharge or Waste		Mitigation Plan
Emission	Operation of motorized equipment (e.g., engine exhaust)	▪ Efforts will be made to minimize build-up of harmful airborne pollutants in the power tunnel. ▪ Vehicles and equipment will be inspected regularly and properly maintained to reduce emissions.
	Increased dust from increased use of access roads	▪ Dust abatement measures will be put in place as necessary.
	Increased noise levels	▪ Air compressors will be housed in insulated enclosures to act as effective sound barriers. ▪ Tunnel ventilation fans will be equipped with silencers.

Table 4.0-1: Emissions, Discharges and Waste Generated by the Project (continued)

Emission, Discharge or Waste		Mitigation Plan
Discharge	Hazardous and non-hazardous substances	▪ Fuel storage and re-fuelling will occur at a designated location in the work camp. ▪ Appropriate secondary containment will be in place. ▪ The compressors used for tunnel ventilation will be oil free rotary screw compressors. ▪ Non-petroleum based oils and greases will be used wherever practical. ▪ Backup generators and their associated diesel fuel tanks will we set upon concrete foundations equipped with catch sumps to prevent any accidental oil spills getting to the soil surface. ▪ Site drainage with a potential for containing oil will be directed to an oil interceptor/separator system.
	Hazardous and non-hazardous substances spills	▪ Spill response procedures will be in place. ▪ Double walled heat exchangers will be used for the turbine and generator cooling systems to reduce the risk that cooling coil failure will discharge oil into the water.
	Groundwater seepage into power tunnel during construction	▪ Water will be collected in sumps and pumped out of the tunnel. ▪ Tunnel seepage water will be discharged into a sediment pond to allow suspended solids to settle out before water is released to the environment.
Discharge	Site drainage/Surface runoff	▪ Road construction will incorporate erosion control methods (e.g., ditch blocks, silt fences) to ensure overland flow does not direct sediment-laden water into natural watercourses. ▪ A network of swales, culverts, and ditches within and around the Project will be put in place. ▪ Ditches will be sized to accommodate extreme daily rainfall events. ▪ Surface runoff will be directed into natural drainage courses via the drainage network put in place for the site.
	Increased erosion and scouring from site drainage	▪ Water flow volumes and velocities will be kept low. ▪ Riprap energy dissipaters and ditch lining will be installed in areas where runoff velocities may be high.
Waste	Sanitary	▪ Contractors will provide portable toilet facilities and holding tanks for the construction camp. ▪ Sewage will be collected regularly and hauled to an existing sewage treatment facility (e.g., Stony Rapids or Black Lake) for treatment and final disposal.
	Domestic	▪ During construction and operations, domestic waste (e.g., food refuse, construction materials) will be collected and hauled to an existing permitted waste disposal site. ▪ Only the burning of scrap wood and paper products, and the burial of scrap metal will take place at the construction site.
	Industrial	▪ Options for disposal are still being evaluated. ▪ Locations for disposal of waste rock and overburden are still being evaluated.

5.0 PROJECT LOCATION AND EXISTING ENVIRONMENTAL SETTING

5.1 Project Location

The proposed Project site is located approximately 7 km from the community of Black Lake (Figure 1.1-1), within the Chicken Indian Reserve No. 224 (AANDC 2011). The hamlet of Stony Rapids is located about 25 km northwest of the Project site. All-season road access in the area is limited to the length of Highway 905 between Black Lake and Stony Rapids communities. Transportation to southern Saskatchewan involves the use of the Athabasca Seasonal/Winter Road (i.e., Highway 905), or flights from the airport in Stony Rapids. A recreational sport fishing camp (i.e., Camp Grayling) is located at the outlet of Black Lake in close proximity to the Project. Both the surface and subsurface of the Reserve are set aside for the use and benefit of the BLFN members. Black Lake, Fond du Lac River and Middle Lake are the major waterbodies and watercourses in the vicinity of the Project. Elizabeth Falls, a well-known area of cataracts and rapids is located on the Fond du Lac River between Black Lake and Middle Lake. Figure 5.1-1 shows the environmental and heritage sensitivities identified in the Project area to date.

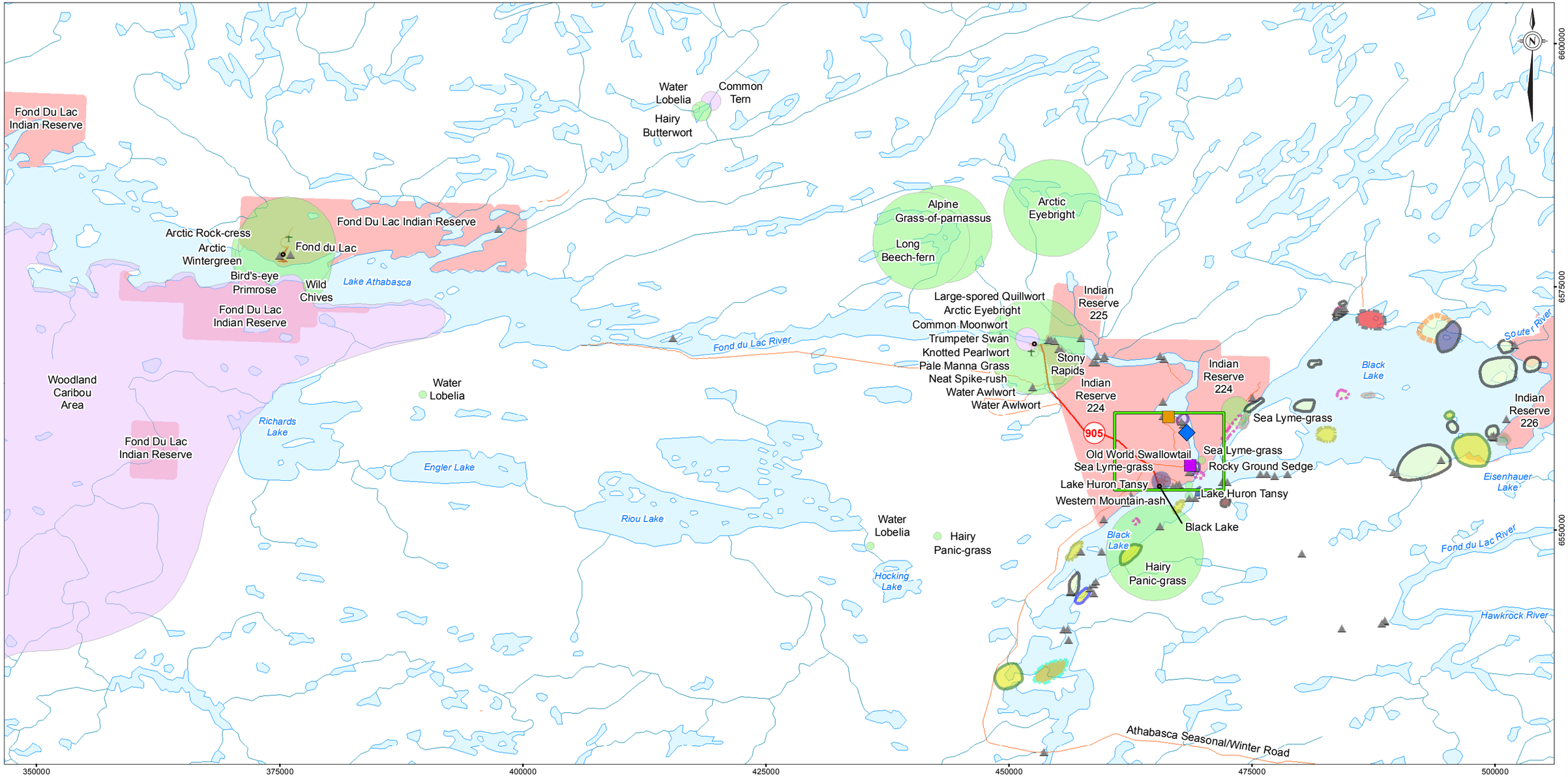
The legal description of the land where the Project is located is Chicken Indian Reserve No.224 as designated under the *Indian Act* (Government of Canada, 1985). Project components located outside of the Chicken Indian Reserve No.224 are located on land administered by the Northern Administration District in accordance with the *Northern Municipalities Act* (2012) (Figure 1.1-1).

5.2 Existing Environment

5.2.1 Climate, Atmospheric and Acoustic Environment

The Project area has a subarctic continental climate with long, very cold winters, and short cool summers. The Project area is located in the Northern Saskatchewan airshed. Regional background air contaminant concentrations are monitored at the MOE station located at La Loche, 370 km to the southwest. Air contaminants measured at La Loche include carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulate matter smaller than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), and particulate matter smaller than 10.0 micrometers in aerodynamic diameter (PM_{10}). Potential Project-related effects to the atmospheric environment are being assessed with a desktop study of these monitoring data.

As a remote location far from any urban/industrial sources of noise, the acoustic environment in the study area can likely be classified as a quiet rural location. Potential Project related effects to the acoustic environment are being assessed using an acoustic baseline study, including noise monitoring in the Project study area.



LEGEND

- INDIAN RESERVE
- WATERBODY
- RIVER
- HIGHWAY
- ROAD
- VILLAGE
- RUNWAY
- GENERAL PROJECT LOCATION
- ARGR - ARCTIC GRAYLING
- LKTR - LAKE TROUT
- LKTR - LAKE TROUT FALL SPAWNING
- LKTR* - LAKE TROUT (CAMP GRAYLING)
- LKWH - LAKE WHITEFISH
- NRPK* - NORTHERN PIKE (CAMP GRAYLING)
- NRPK/WALL - NORTHERN PIKE AND WALLEYE
- NET FISHING
- WALL - WALLEYE
- WALL* - WALLEYE (CAMP GRAYLING)
- WALL*/WHSC - WALLEYE AND WHITE SUCKER SPAWNING
- WALL/LKTR - WALLEYE AND LAKE TROUT
- WHSC - WHITE SUCKER
- HISTORICAL FISHING SPOT - WINTER
- HISTORICAL SUCKER FISHING
- LISTED WILDLIFE LOCATION
- LISTED INVERTEBRATE LOCATION
- LISTED PLANT LOCATION
- KNOWN HERITAGE RESOURCE
- ELIZABETH FALLS
- CAMP GRAYLING
- RESIDENCE

10 0 10
SCALE 1:400,000 KILOMETRES

REFERENCE

DMTI Highways and Roads
NTS Mapsheet 74I, 74J, 74O, 74P
DATUM: NAD 83 PROJECTION: UTM ZONE 13

PROJECT
SaskPower
ELIZABETH FALLS HYDROELECTRIC POWER PROJECT

TITLE
ENVIRONMENTAL AND HERITAGE SENSITIVITIES

Golder Associates
Saskatoon, Saskatchewan

PROJECT	10-1365-0004.22000		FILE No.	
DESIGN			SCALE AS SHOWN	REV. 2
GIS	JRC/LR	12/12/12		
CHECK	MT	12/12/12		
REVIEW	BC	12/12/12		

FIGURE: 5.1-1

G:\CLIENTS\SASKPOWER\Elizabeth Falls Power Project\Figures\10-1365-0004 SaskPower Elizabeth Falls EA\22000 Project Description\10-1365-0004 Environmental and Heritage Sensitivities.mxd Date: 12/12/2012 2:21:01 PM

5.2.2 Geology

The topography surrounding Elizabeth Falls is primarily bedrock controlled with low to moderate relief. The area forms part of the Lake Athabasca drainage basin. Prominent landforms in the study area are a result of glacial action.

The bedrock in the Project area consists of Precambrian age crystalline gneiss complex and the Athabasca Formation (conglomerates and sandstones) to the east and west of the Fond du Lac River, respectively. Structural features within the area include foliation (most prominent), shear zones (Black Lake Shear Zone), faulting and jointing. The Black Lake Shear Zone is comprised of mylonitic and cataclastic amphibole gneiss and felsic gneiss. The zone strikes northeast parallel to the shore of Black Lake. This zone is the result of faulting cataclysmic milling that produced re-healed rock mass with deformed and stretched mineral grains.

5.2.2.1 Mineralization

It is estimated at this time that over 1.3 million m^3 of rock and 860,000 m^3 of consolidated overburden will be excavated during the construction of the proposed tunnel, powerhouse site, tailrace channel, and water intake. The total disposal volume of the unconsolidated deposits after removal will be larger, as identified in Section 3.3.7. One of the potential environmental concerns with projects that involve the excavation of large quantities of bedrock and overburden materials is that the excavated materials could have potential for metal leaching and acid rock drainage as a result of precipitation falling on the excavated material. Given that there are several known uranium deposits within five to ten km of the Project area, an assessment of the potential for exposure of uranium mineralization during the tunnel and surface excavations is on-going.

The bedrock cores from boreholes drilled during the 2012 geotechnical investigation program located within, or in close proximity to, the Black Lake Shear Zone, were scanned using a scintillometer to obtain an indication of the background radiation levels to provide an indication as to whether the core contained uranium. The Black Lake Shear zone hosts known uranium deposits in the area. The radiation levels obtained were generally less than 150 counts per second (cps), typical of ordinary background levels, and well below the 100,000 cps previously documented for known uranium showings in the general area (Hatch 2012). No evidence of uranium mineralization was visually observed in the drill core or in the core sampled for petrographic analyses. Nonetheless, given the proximity of known uranium deposits in the Project area, additional testing of the drill core has been undertaken. Should this testing indicate that uranium mineralization is present, a risk analysis will be carried out and appropriate management plan developed for inclusion in the EIS.

5.2.3 Surface Water Environment

The Project is located on the Fond du Lac River in the Athabasca River basin of Northern Saskatchewan, between upstream Black Lake and downstream Middle Lake. The Fond du Lac River originates at the outflow of Wollaston Lake, and flows approximately 275 km northwestward before reaching Lake Athabasca approximately 50 km downstream of the Project. At the outlet of Black Lake, the Fond du Lac River has an upstream drainage area of 50,700 square kilometres (km^2).

5.2.3.1 Water Quality

Water and sediment quality samples and limnology profiles or *in situ* surface measurements were collected from Black Lake, Fond du Lac River, and Middle Lake in different seasons throughout 2010 and 2011. Sediment chemistry samples were collected during spring and summer at two locations each in Middle Lake and Black Lake. Limnology profiles were recorded at two locations on the Fond du Lac River

during the fall season, at four locations in Middle Lake during all four seasons, and at three locations in Black Lake during all four seasons.

The objectives of the water and sediment quality baseline programs were to collect site-specific information to document baseline conditions within the study area, and to evaluate potential spatial and temporal trends. Water chemistry samples were analyzed for physical parameters, major ions, nutrients, total metals, and radionuclides. Sediment quality samples were analyzed for nutrients, total metals, and radionuclides.

5.2.3.2 Fish and Fish Habitat

Fish and fish habitat surveys were completed in Black Lake, Fond du Lac River (between Black Lake and Middle Lake), and Middle Lake. Fish sampling was completed several times between June 2010 and July 2012. Objectives of fish sampling included obtaining seasonal estimates of fish species composition and relative abundance, and to identify important habitat (e.g., shallow water spawning habitat).

In 2011, DFO requested that a radio-tagging study be carried out to monitor Arctic grayling movement patterns within the Fond du Lac River between Black Lake and Middle Lake. This study began in October 2011 and ran for a full year until October 2012.

Fish habitat assessments in Black Lake and Middle Lake consisted of bathymetric surveys, shoreline habitat assessments, and tributary assessments. The Fond du Lac River was separated into reaches based on the dominant channel type. Detailed habitat measurements describing spawning habitat were collected in association with Arctic grayling egg searches. Fish collection methods included gill nets, boat electrofishing, backpack electrofishing, trap-nets, and angling. Table 5.2-1 provides a list of fish species identified in Black Lake, Middle Lake, and the Fond du Lac River.

Table 5.2-1: Fish Species Identified in Black Lake, Middle Lake and the Fond du Lac River

Common Name	Scientific Name
Arctic grayling	*Thymallus arcticus*
burbot	*Lota lota*
cisco	*Coregonus artedi*
lake chub	*Couesius plumbeus*
lake trout	*Salvelinus namaycush*
lake whitefish	*Coregonus clupeaformis*
longnose sucker	*Catostomus catostomus*
ninespine stickleback	*Pungitius pungitius*
northern pike	*Esox lucius*
round whitefish	*Prosopium cylindraceum*
slimy sculpin	*Cottus cognatus*
spottail shiner	*Notropsis hudsonius*
trout-perch	*Percopsis omiscomaycus*
walleye	*Sander vitreus*
white sucker	*Catostomus commersonii*
yellow perch	*Perca flavescens*

5.2.4 Terrain and soils

Glaciofluvial deposits varying from homogeneous deposits of fine sand to heterogeneous deposits of sand and cobble were observed on the west side of the Fond du Lac River. Typically, Brunisolic soils (i.e., forest soils with brownish coloured B horizons) were found on these glaciofluvial deposits. Gleyed Brunisolic soils, Gleysolic soils (i.e., water saturated mineral soils), and Organic soils (i.e., peat soils) were found in low-lying and poorly-drained areas.

Steep bedrock outcrops characterize the terrain on the east side of the Fond du Lac River. When present, mineral and Folisols (i.e., upland organic soils) generally occurred on nearly level undulating bedrock surfaces and in mid to lower slope positions of gently inclined bedrock faces. Folisols were observed on boulder glacial till and bedrock. Brunisolic soils were observed on thin deposits of sand and boulder glacial till and were underlain by bedrock. Gleysolic soils and Organic soils were found in low lying and poorly drained areas.

5.2.5 Vegetation

Regionally, vegetation communities classified as burn and regenerating burn vegetation are common and tend to be dominated by jack pine (*Pinus banksiana*) in both upland and wetland sites. Vegetation communities in the regional study area (RSA) areas are slow to regenerate after fire. One reason for the dominance of jack pine is that cones of mature jack pine trees are serotinous, which means the cones are covered with a resin that must be melted for the cone to open and release seeds. They require an environmental trigger to open for seed dispersal; in this case fire is the mechanism.

In the RSA, upland forests are dominated by mixed stands of trembling aspen and birch, with black spruce occurring on the slopes in transitional areas. Bedrock outcrops are common in the area and are typically sparsely vegetated, with jack pine or jack pine-black spruce communities. Wetland communities in the poorly-drained lowland areas between bedrock outcrops include shrubby and graminoid bogs. In lowland areas with better drainage, treed and shrubby swamp communities dominate.

Federally and provincially tracked plant species with the potential to occur in the RSA and local study area (LSA) were identified through searches of previously listed sources prior to field programs. Of the species listed, 16 have been historically documented within the RSA. One provincial tracked plant species, Alaskan clubmoss (*Lycopodium sitchese*), was encountered twice during early season surveys; however these locations are not within the Project footprint. This species is not listed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the *Species at Risk Act* (*SARA)*, or the *Wildlife Act*. Additional provincially tracked species were collected during the early season field program, however the identification of these species is pending. If any of the samples are positively identified as tracked species, they will be identified in the final baseline report and EIS.

5.2.6 Wildlife

Baseline wildlife data were collected in 2012. Winter track counts, ungulate and waterbird aerial surveys, and upland breeding bird, raptor stick nest, and amphibian surveys were completed. Table 5.2-2 lists the species observed during the 2012 wildlife surveys.

Prior to carrying out baseline wildlife surveys, a list was compiled of federal (COSEWIC 2012; SARA 2012) and provincial (SKCDC 2012a) species at risk that have the potential to occur in the RSA. Of these potential species, two were identified during the baseline wildlife surveys, Wolverine (*Gulo gulo*), and Olive-sided flycatcher (*Contopus cooperi*).

Table 5.2-2: Wildlife Species Observed During 2012 Surveys

Common Name	Scientific Name	Common Name	Scientific Name
Mammals			
American marten	*Martes americana*	Muskrat	*Ondatra zibethicus*
Beaver	*Castor canadensis*	Ptarmigan species	*Lagopus muta or L. lagopus*
Black bear	*Ursus americanus*	Red fox	*Vulpes vulpes*
Canada lynx	*Lynx canadensis)*	Red squirrel	*Tamiasciurus hudsonicus*
Fisher	*Martes pennanti*	River otter	*Lontra canadensis*
Grey wolf	*Canis lupus*	Snowshoe hare	*Lepus americanus*
Grouse species	*Bonasa umbellus,Tympanuchus phaisianellus, or Falcipennis canadensis*	Vole species	*Microtus spp.*
Mink	*Neovison vison*	Weasel species	*Mustela spp.*
Moose	*Alces alces*	Wolverine	*Gulo gulo*
Mouse species	*Peromyscus spp.*	-	-
Upland Breeding Birds			
Alder flycatcher	*Empidonax alnorum*	Northern flicker	*Colaptes auritus*
American crow	*Corvus brachyrhynchos*	Northern waterthrush	*Seiurus noveboracensis*
American redstart	*Setophaga ruticilla*	Olive-sided flycatcher	*Contopus cooperi*
American robin	*Turdus migratorius*	Orange-crowned warbler	*Vermivora celata*
Bay-breasted warbler	*Dendroica castanea*	Palm warbler	*Dendroica palmarum*
Black-backed woodpecker	*Picoides arcticus*	Pine siskin	*Carduelis pinus*
Black-capped chickadee	*Poecile atricapilla*	Red crossbill	*Loxia curvirostra*
Blackpoll warbler	*Dendroica striata*	Red-eyed vireo	*Vireo olivaceus*
Blue-headed vireo	*Vireo solitarius*	Ruby-crowned kinglet	*Regulus calendula*
Boreal chickadee	*Poecile hudsonica*	Savannah sparrow	*Passerculus sandwichensis*
Cape May warbler	*Dendroica tigrina*	Song sparrow	*Melospiza melodia*
Cedar waxwing	*Bombycilla cedorum*	Swainson's thrush	*Catharus ustulatus*
Chipping sparrow	*Spizella passerina*	Swamp sparrow	*Melospiza georgiana*
Common redpoll	*Carduelis flammea*	Tennessee warbler	*Vermivora peregrina*
Dark-eyed junco	*Junco hyemalis*	Tree swallow	*Tachycineta bicolor*
Fox sparrow	*Passerella iliaca*	Vesper sparrow	*Pooecetes gramineus*
Gray jay	*Perisoreus canadensis*	White-throated sparrow	*Zonotrichia albicollis*
Hairy woodpecker	*Picoides villosus*	Wilson's warbler	*Wilsonia pusilla*
Hermit thrush	*Catharus guttatus*	Winter wren	*Troglodytes troglodytes*

Table 5.2-2: Wildlife Species Observed During 2012 Surveys (continued)

Common Name	Scientific Name	Common Name	Scientific Name
Least flycatcher	*Empidonax minimus*	Yellow warbler	*Dendroica petechia*
Lincoln's sparrow	*Melospiza lincolnii*	Yellow-bellied sapsucker	*Sphyrapicus varius*
Magnolia warbler	*Dendroica magnolia*	Yellow-rumped warbler	*Dendroica coronata*
Nashville warbler	*Vermivora ruficapilla*	-	-
Waterbird Species			
American widgeon	*Anas americana*	Mallard	*Anas platyrhynchos*
Belted kingfisher	*Megaceryle alcyon*	Merganser species	*Mergus merganser* or *M. serrator*
Blue-winged teal	*Anas discors*	Northern pintail	*Anas acuta*
Bonaparte's gull	*Larus philadelphia*	Northern shoveler	*Anas clypeata*
Bufflehead	*Bucephala albeola*	Sandhill crane	*Grus canadensis*
Canada goose	*Branta canadensis*	Surf scoter	*Melanitta perspicillata*
Common goldeneye	*Bucephala clangula*	Swan species	*Cygnus buccinator or C. columbianus*
Common tern	*Sterna hirundo*	White-winged scoter	*Melanitta fusca*
Gull species	*Larus canus*, *L. delawarensis*, *L. californicus*, or *L. argentatus*	-	-
Raptors			
Bald eagle	*Haliaeetus leucocephalus*	Osprey	*Pandion haliaetus*
Merlin	*Falco columbarius*	Red-tailed hawk	*Buteo jamaicensis*
Northern harrier	*Circus cyaneus*	Sharp-shinned hawk	*Accipiter striatus*
Amphibians			
Boreal chorus frog	*Pseudacris maculata*	Wood frog	*Rana sylvatica*

5.2.7 Traditional Land and Resource Use

The Project area has been used traditionally by the Aboriginal people of the region for generations. Traditional land and resource use information and Aboriginal traditional knowledge (ATK) were collected in discussion with community members and resource users within the Black Lake First Nation. Information was collected through interviews and mapping exercises undertaken with individual resource users and Elders in the community of Black Lake, in addition to review of other ATK-related materials held by the community. Eleven interviews were conducted in the community of Black Lake regarding resource use in the Elizabeth Falls area. As the Project is located within the Chicken Indian Reserve No. 224, the focus of traditional land and resource use and ATK information gathered to date has been with members of this community.

Traditional resource use by the people of this area is a defining feature of their culture and identity. While barren-ground caribou is considered a very important species hunted by residents of the region, moose, black bear, and waterfowl, such as ducks and geese, also are hunted. Woodland caribou are not a food source used by the people of this area as the species has not been observed in recent memory of the

area residents. The effects of successive forest fires over the last few decades have limited hunting and other resource uses in the area around Middle Lake and Elizabeth Falls. However, these burned areas produce berries that are gathered by community members for domestic use. Fish have been a vital part of traditional life in the region and continue to be an important food source for members of the local community.

5.2.8 Non-traditional Land and Resource Use

Activities such as trapping, commercial fishing, and gathering and using forest products create approximately 4,000 seasonal jobs and generate important seasonal income to residents of northern Saskatchewan. Income from resource harvesting remained fairly stable between the 1980s and early 2000s, at about $6 to $7 million annually (Northlands College et al. 2004). No mining activities are taking place in the area around Elizabeth Falls. However, numerous mineral deposits have been identified in the area, including uranium, gold, base metals, and other minerals. Twenty-six outfitting lodges operate in the Athabasca region, with three lodges and outfitters offering sport fishing and hunting services within a 50 km radius of the proposed Project site around Black Lake and Stony Rapids communities.

5.2.9 Socio-Economic Environment

Two communities have been the focus of the socio-economic characterization near the Project, Black Lake First Nation, (the community of Black Lake) and the northern hamlet of Stony Rapids (Stony Rapids). Black Lake First Nation is a Dene First Nation with members residing throughout Saskatchewan and in other locations. Black Lake First Nation has three registered reserve locations: Chicken Indian Reserve No. 224 (25,819 hectares [ha]; populated); Chicken Indian Reserve No. 225 (2,193 ha; no resident population); and Chicken Indian Reserve No. 226 (4,217 ha; no resident population; Aboriginal Affairs and Northern Development Canada [AANDC] 2012). According to Saskatchewan Health, the community of Black Lake had a population of 1,417 residents in 2011. Aboriginal Affairs and Northern Development Canada (AANDC) placed the total First Nation membership, including members who live off-reserve, at 2,028 in 2011. In comparison, according to Saskatchewan Health, Stony Rapids had a population of 158 residents in 2011.

Residents of the communities of Black Lake and Stony Rapids have access to the Athabasca Health Authority (AHA) health facility located outside of Stony Rapids on Black Lake reserve land. The Dene name for this facility is Yutthe Dene Nakohoki, which means “a place to heal northern people”. The AHA health facility is unique because it is a joint provincial-federal initiative. Patients requiring emergency services that are unavailable at the AHA health facility typically are flown to La Ronge, Prince Albert, or Saskatoon, depending on their needs.

The communities of Black Lake and Stony Rapids each have schools. The school in the community of Black Lake is federally funded and the school in Stony Rapids is provincially funded. Father Porte School in the community of Black Lake is a First Nation operated facility covering Pre-Kindergarten to Grade 12. There are no post-secondary institutions in the Athabasca region, although Northlands College offers training and adult education programs throughout northern Saskatchewan (Cameco 2011).

The communities of Black Lake and Stony Rapids have a variety of community-based businesses (e.g., taxi services and local contractors) (Keewatin Career Development Corporation 2012). Additionally, both communities actively seek to build capacity and expand their business holdings. While average income in the Athabasca Basin communities, including Black Lake and Stony Rapids, is generally lower than the provincial average income, many of the everyday costs of living in northern Saskatchewan (e.g., prices of groceries and fuel) are higher than in Saskatchewan as a whole (Public Health Nutritionists of Saskatchewan 2010).

6.0 FEDERAL INVOLVEMENT

6.1 Financial Support

The Proponent is not aware of any federal funding available to construct and operate the Project, and as a result will not be making an application to the federal government for purposes of enabling the physical activities of the Elizabeth Falls Hydroelectric Project to proceed. If a source of funding becomes available in the future to assist EFHLP/BLFN for their equity participation in the project, then EFHLP/BLFN would pursue that option.

EFHLP/BLFN has in the past received, and currently receives, a small amount of funding (less than $100,000 per year) from AANDC for project development work under the Communities Economic Opportunities Program (CEOP) initiative. Assuming partnership discussions between SaskPower and EFHLP/BLFN are successful, then additional funding under CEOP will not be available in the future.

6.2 Federal Lands

The proposed Project site is located approximately 7 km from the community of Black Lake (Figure 2.3-1), within the Chicken Indian Reserve No. 224 (AANDC 2011). Both the surface and subsurface resources of the Reserve are set aside for the use and benefit of the BLFN members. In 2009, an Order in Council (P.C.2009-305) was approved by the Governor General in Council, pursuant to paragraph 39(1)(c), and Section 40 of the *Indian Act* (Government of Canada, 1985), designating portions of the Chicken Indian Reserve No. 224, 225, and 226 for exploration and development of minerals, development of a hydroelectric facility, and commercial leasing purposes.

6.3 Federal Legislative or Regulatory Requirements

Under Section 5 of the CEAA 2012, effects or changes that may be caused to the following as a result of the Project must be considered:

- fish and fish habitat, as defined in the *Fisheries Act*;
- aquatic species, as defined in the SARA;
- migratory birds, as defined in the *Migratory Birds Convention Act*, 1994;
- effects to Aboriginal peoples that may result in effects to health and 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.

This Project is a designated project under the Regulations Designating Physical Activates, 2012, and therefore, the Agency would be considered the federal responsible authority for the Project. However, other federal agencies such as DFO, Transport Canada (TC), and Health Canada may have a regulatory interest in this project. Potential permits, licences, approvals or authorizations that may be required from a federal agency have been identified in Table 1.4-1.

7.0 ENVIRONMENTAL EFFECTS

The greatest amount of environmental disturbance associated with the Project is expected to occur during the construction phase in terms of the Project's overall development footprint and the workforce on-site. However, construction activities will occur over a relatively short period of time.

A preliminary site screening process was completed to identify anticipated potential effects from the interaction of the proposed Project with the various components of the biophysical and socio-economic environment. Because the Project is a designated project, the environmental effects the Project may have on components of the environment listed in paragraph 5(1)(a) of CEAA, 2012 must be assessed. These components include fish and fish habitat, aquatic species and migratory birds. However, the Project is located on, and therefore will have an effect on, federal lands administered by AANDC under the *Indian Act*. As a result, all potential effects resulting from a project located on federal land must be assessed subject to paragraph 5(1)(b) of the CEAA, 2012, A matrix of anticipated Project-environment interactions for the biophysical and socio-economic environments is provided in Table 7.1-1.

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment							Socio-economic Environment						
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional Land and Resource Use*	Non-Traditional Land and Resource Use	Economy*	Infrastructure and Community Services	Population and Health*
■ Infrastructure Footprints ▪ Temporary infrastructure – work camp area – overburden and waste rock piles – construction area and materials laydown area ▪ Operational infrastructure – power generation station – water intake structure – power tunnel – tailrace channel – weir – bridge – transmission line – water diversion structures around the Project footprint – potable water and wastewater intake and discharge structures – site access roads (including source material)	Construction	■ Loss or alteration of permafrost can change terrain and affect soil, vegetation, wildlife habitat, and human activities.						•	•	•		•	•			
	Construction	■ Direct loss or alteration of local soil and vegetation from the Project footprint can affect vegetation and human activities.						•	•			•	•			
	Construction	■ Direct loss and fragmentation of wildlife habitat from the Project footprint can affect wildlife and human activities.								■		■	■			
	Construction	■ Site clearing, contouring, and excavation can cause admixing, compaction, and erosion to soils, and change soil quality.						•								
	Construction	■ Soil salvage, stockpiling and transport can change physical, biological, and/or chemical properties of soils, and increase erosion potential.						•								
	Construction	■ Site clearing, contouring, and excavation can cause soil erosion, which can change surface water quality and affect fish habitat, vegetation, wildlife habitat, and human activities.				•	•	•	•	•		•	•			
	Construction	■ Ground disturbance can alter or destroy heritage resources.									•					
■ General Construction and Operation of Project	Construction, Operations, and Decommissioning and Reclamation	■ Introduction of weed species can affect plant community composition, and listed and traditional use plant species.							•							
	Construction, Operations, Decommissioning and Reclamation, and Post-Decommissioning and Reclamation	■ Physical hazards (e.g., blasting activities, tailrace channel, buildings, wasterock piles) from the Project can cause injury or mortality to wildlife and affect wildlife populations and human activities.								•		•	•			

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional and Non-Traditional Land and Resource	Non-Traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ General Construction and Operation of Project (continued)	Construction, Operations, Decommissioning and Reclamation, and Post-Decommissioning and Reclamation	■ Site infrastructure (e.g., tailrace) may restrict wildlife movement and increase risk of mortality from predation or hunting, which can affect wildlife and human activities.								•		•	•			
	Construction, and Operations, and Decommissioning and Reclamation	■ Collisions with Project vehicles can cause injury or mortality to wildlife and affect wildlife populations and human activities.								■		■	■			
	Construction	■ Construction of site infrastructure can affect local and regional economies, employment levels, and quality of life for people.												♦		♦
	Operations	■ Operation of the Project can affect local and regional economies, employment levels, education and training of people, and quality of life for people.												♦		♦
	Construction, Operations, Decommissioning and Reclamation, and Post-Decommissioning and Reclamation	■ Construction of site roads and bridge can change traffic levels and access to areas on the east side of the Fond du Lac River, which can affect wildlife and human activities.					•		•	■		■	■	■	•	
	Construction and Operations	■ Attraction of birds to Project infrastructure for roosting and nesting sites can affect bird populations and human activities.								•		•	•			
	Construction, Operations, and Decommissioning and Reclamation	■ Sensory effects (e.g., presence of buildings, lights, smells, noise, blasting activity, and vehicles) can wildlife, human activities, and quality of life for people.	•							■		•	•			■
	Construction, Operations, and Decommissioning and Reclamation	■ Change in energetic costs from disturbance or displacement can affect wildlife and human activities	•							■		■	■			
	Construction	■ Destruction of migratory bird nests can affect wildlife populations and human activities								■		■	■			

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional and Non-Traditional Land and Resource	Non-Traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ Construction of In-water Works ▪ power tunnel ▪ water intake structure ▪ tailrace ▪ weir structure ▪ bridge	Construction	■ Construction of the power tunnel and intake structure may disturb sediment, which can change surface water quality, and affect fish and fish habitat.				•	•					•	•			
	Construction and Operations	■ Direct loss or alteration of fish habitat from the Project footprint can affect fish and human activities.					■					■	■			
	Construction	■ Use of explosives near fish-bearing water can cause injury or mortality to fish, which can affect fish populations and human activities.					■					■	■			
	Construction	■ Use of explosives near surface waterbodies can change surface water quality and affect soils, vegetation, wildlife habitat, fish habitat, and human activities.	•			■	•	•	•	•		■	■			
▪ Air Emissions and Noise Levels ▪ emission of dust from blasting activities and hauling waste rock to storage piles. ▪ emission of standard pollutants from vehicles and heavy equipment operation	Construction, Operations, and Decommissioning and Reclamation	■ Air emissions from site can change the chemical properties of surface water and soil, which can affect vegetation, fish habitat, wildlife habitat, and human activities.	•			•	•	•	•	•		•	•			•
	Construction, Operations, and Decommissioning and Reclamation	■ Air emissions from site can change the chemical properties of surface water and soil, which can affect the health of vegetation, fish, wildlife, and people.	•			•	•	•	•	•		•	•			•
	Construction, Operations, and Decommissioning and Reclamation	■ Dust deposition from Project vehicles and blasting activities can change the chemical properties of surface water, soil, and vegetation, which can affect fish habitat, wildlife habitat, and human activities.	•			•	•	•	•	•		•	•			•
	Construction, Operations, and Decommissioning and Reclamation	■ Dust deposition from Project vehicles and blasting activities, may cover aquatic substrates, soils, and vegetation, which can affect the fish, fish habitat, wildlife habitat, and human activities.	•			•	•	•	•	•		•	•			•
	Construction, Operations, and Decommissioning and Reclamation	■ Dust deposition from Project vehicles and blasting activities can change the chemical properties of surface water and soil, which can affect the health of vegetation, wildlife, fish, and people.	•			•	•	•	•	•		•	•			•

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional Land and Resource Use*	Non-Traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ Power Generation Activities ▪ water withdrawal for power generation ▪ diversion of water through the power tunnel to the powerhouse ▪ discharge of tailrace flows	Operations	■ Water withdrawal from Black Lake may cause injury, impinge, or entrain fish and affect fish populations and human activities.					■					■	■			
	Operations	■ Withdrawal, diversion, and discharge of water for power generation may change hydrology, which can affect fish habitat, soils, vegetation, wildlife habitat, and human activities.			■		■	•	•	•		■	■			
	Operations	■ Withdrawal and discharge for power generation may change the temperature of the water which can affect fish habitat, wildlife habitat, and human activities.				■	•			•		■	■			
	Operations	■ Withdrawal and discharge for power generation may change the temperature of the water and therefore ice safety in Black Lake and Middle Lake, which can affect wildlife and human activities.			•					•		•	•			
	Operations	■ Withdrawal, diversion, and discharge of water for power generation may change groundwater, surface water, and soil quality, and affect the health of vegetation, fish, wildlife, and people.				■	•	•	•	•		■	■			•
	Operations	■ Diversion of water through the power tunnel may change groundwater quantity, which can change hydrology, and affect soils, terrain, vegetation, fish habitat, wildlife habitat, and human activities.		•	•	•	•	•	•	•		•	•			
■ Waste Management	Construction, Operations, and Decommissioning and Reclamation	■ Consumption of waste materials (e.g., food waste, oil products) may affect wildlife health and, therefore, human health.								■						■
	Construction, Operations, and Decommissioning and Reclamation	■ Attraction to the Project (e.g., food waste, oil products) may increase human-wildlife interactions and mortality risk to individual animals, which can affect wildlife populations and human activities.								■		■	■			
	Construction, Operations, and Decommissioning and Reclamation	■ Attraction to the Project (e.g., food waste, oil products) may increase predator numbers and predation risk, which can affect prey populations and human activities.								■		■	■			

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional Land and Resource Use*	Non-Traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ Site Water Management ▪ collection and treatment of surface runoff within the project footprint ▪ withdrawal of potable and industrial water ▪ discharge of wastewater ▪ collection and treatment of groundwater in the tunnel	Construction and Operations	■ Water withdrawal for domestic (e.g., potable water) and industrial (e.g., dust suppression) purposes can change hydrology which can affect soils, vegetation, wildlife, fish and fish habitat and, therefore, human activities.			•		•	•	•	•		•	•			
	Construction and Operations	■ The interception and collection of direct precipitation and surface runoff within the Project footprint may change hydrology which can affect soils, vegetation, wildlife habitat, fish, fish habitat, and human activities.			•		•	•	•	•		•	•			
	Construction and Operations	■ The interception and collection of direct precipitation and surface runoff within the Project footprint may drawdown the local groundwater table and change hydrology and soils which can affect vegetation, wildlife habitat, fish, fish habitat, and human activities.		•	•		•	•	•	•		•	•			
	Construction and Operations	■ Surface water diversions (e.g., berms, ditches, waste rock piles) around the Project footprint can change drainage areas, runoff characteristics, and local and downstream hydrology, which can affect soils, vegetation, wildlife habitat, fish habitat, fish, and human activities.			•		•	•	•	•		•	•			
	Construction and Operations	■ Discharge of wastewater can change hydrology and surface water quality, which can affect soils, vegetation, wildlife habitat, fish habitat, and human activities.			•		•	•	•	•		•	•			
	Construction and Operations	■ Discharge of wastewater can affect surface water quality, which can affect the health of vegetation, wildlife, fish, and people.				■	•		•	•						■
	Construction, Operations, and Decommissioning and Reclamation	■ Seepage from waste rock piles can change surface water, groundwater, and soil quality, and affect vegetation, wildlife habitat, fish habitat, and human activities.		•		•	•	•	•	•		•	•			
	Construction, Operations, and Decommissioning and Reclamation	■ Seepage from waste rock piles can change surface water, groundwater, and soil quality and affect vegetation, wildlife, fish, and human health.		•		■	•	•	•	•		•	•			■

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional Land and Resource Use*	Non-traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ Decommissioning and Reclamation of Temporary Infrastructure ▪ site grading, contouring, reclamation, and re-establishment of natural drainage characteristics ▪ waste rock management ▪ cessation of potable water withdrawal and wastewater discharge	Construction	■ Long-term contaminant transport from waste rock and the diversion tunnel can change surface water, groundwater, and soil quality, and affect vegetation, wildlife habitat, fish habitat, and human activities.		•		•	•	•	•	•		•	•			
	Construction	■ Long-term contaminant transport from waste rock and the diversion tunnel can change surface water, groundwater, and soil quality, and affect the health of vegetation, wildlife, fish, and people.		•		•	•	•	•	•						•
	Construction and Operations	■ The waste rock piles will alter terrain and may affect wildlife, human activities, and quality of life for people (i.e., visual aesthetics).						•		•		•	•	•		
■ Decommissioning and Reclamation of Power Production Infrastructure ▪ site grading, contouring, reclamation, and re-establishment of natural drainage characteristics ▪ waste rock management ▪ cessation of potable water withdrawal and wastewater discharge ▪ cessation of power generation activities including the withdrawal, diversion, and discharge of water ▪ weir	Decommissioning and Reclamation and Post-Decommissioning and Reclamation	■ Cessation of power generation activities, including the withdrawal, diversion, and discharge of water, can change hydrology and surface water quality, which can affect soils, vegetation, fish, fish habitat, wildlife, wildlife habitat, and human activities.			■		■	•	•	•		■	■			
	Post- Decommissioning and Reclamation	■ Direct loss or alteration of local soil and vegetation from residual ground disturbance from portions of the site facilities can cause permanent loss and alterations to soil and vegetation, and affect human activities.						•	•			•	•			
	Post- Decommissioning and Reclamation	■ Direct loss and fragmentation of wildlife habitat from residual ground disturbance from portions of the site facilities can affect wildlife and human activities.								■	•	■	■			
	Post- Decommissioning and Reclamation	■ Residual ground disturbance from portions of the site facilities can cause permanent alterations to hydrology and surface water quality, which can affect soils, vegetation, fish habitat, wildlife habitat, and human activities.			•		•	•	•	•		•	•			
	Decommissioning and Reclamation	■ Redistribution of material in the waste rock piles for use in the decommissioning and reclamation of power production infrastructure can change air and surface water quality, which can affect soils, vegetation, fish habitat, fish, wildlife habitat, and human activities.	•			•	•	•	•	•		•	•			
	Decommissioning and Reclamation	■ Alteration or destruction of heritage resources if areas outside original footprint are disturbed during reclamation process (e.g., new borrow source).									•					
	Decommissioning and Reclamation and Post-Decommissioning and Reclamation	■ Cessation of power generation activities can affect local and regional economies, employment levels, and quality of life for people.												•	•	•

Table 7.1-1: Potential Interactions between the Project and the Biophysical and Socio-economic Environments (continued)

Project Component/Activity	Expected Project Phase for Project Component/Activity	Potential Effects to Environmental Components	Biophysical Environment								Socio-economic Environment					
			Atmospheric Environment	Groundwater	Hydrology	Surface Water Quality*	Fish and Fish Habitat*	Soils and Terrain	Vegetation	Wildlife and Wildlife Habitat*	Heritage Resources*	Traditional Land and Resource Use*	Non-traditional Land and Resource Use	Economy *	Infrastructure and Community Services	Population and Health*
■ Accidents and Malfunctions ▪ emergency shutdowns of power turbines ▪ hazardous materials spills	Operations	■ Emergency shutdown of power generation activities can change surface hydrology, which can affect soils, vegetation, wildlife, wildlife habitat, fish, fish habitat, and human activities.			■		■	•	•	•		■	■			
	Construction, Operations, and Decommissioning and Reclamation	■ Release or spills of hazardous substances (e.g., fuel, oil) can change surface water and soil quality, which can affect vegetation, fish habitat, wildlife habitat, and human activities.				•	•	•	•	•		•	•			
	Construction, Operations, and Decommissioning and Reclamation	■ Release or spills of hazardous materials (e.g., fuel, oil) can change surface water and soil quality, which can affect the health of vegetation, fish, wildlife, and people.				•	•	•	•	•		•	•			•

■ Key Adverse Interaction
• Potential Adverse Interaction
♦ Key Positive Interaction
Blank cell – no Interaction anticipated
*Represents a biophysical or socio-economic component identified under Section 5 of the CEAA, 2012.
-Surface Water Quality, and Fish and Fish Habitat: includes fish and fish habitat, as defined in the *Fisheries Ac*t, and aquatic species, as defined in the SARA.
-Wildlife and Wildlife Habitat: includes migratory birds, as defined in the *Migratory Birds Convention Act*, 1994.
-Heritage Resources, Traditional and Non-traditional Land use, Quality of Life, and Economy, Employment, and Training: includes effects that may be caused on the environment that may effect aboriginal health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

8.0 ABORIGINAL, PUBLIC, AND REGULATORY ENGAGEMENT

As the majority of the Project is located on the Chicken Indian Reserve No. 224, engagement with stakeholders, especially Aboriginal engagement, is particularly important for the Project. The EFHLP has been taking the lead on the Project's Public Involvement Plan (PIP). The plan is being used to conduct engagement activities with stakeholders in the area. The purpose of the PIP is to inform stakeholders about the Project, and to provide an opportunity for these stakeholders to ask questions and share their concerns about the Project and the environmental assessment and review process. SaskPower has also been engaging with various regulatory agencies that may have an interested in the Project. All engagement activities are being tracked using Staketracker, a software system designed for engagement data storage.

The PIP is currently being modified for activities in 2013 and beyond. Specific dates for public engagement activities have not been scheduled, however they likely will correspond with the following Project milestones:

- submission of Project Description;
- prior to submission of the EIS; and
- following the receipt of technical review comments from regulatory reviewers.

8.1 Aboriginal

In terms of Aboriginal engagement, BLFN has been the main target and focus of engagement for the Project to date. Documentation of engagement with BLFN for the purpose of the environmental assessment began in 2010. Three formal meetings were held on the BLFN, including one Community Information Session held in 2010.

A list of the stakeholders identified as potentially having an interest in the Project has been provided below.

- Chief and Council Black Lake First Nation;
- Chief and Council Fond du Lac First Nation;
- Prince Albert Grand Council – Athabasca Region; and
- Metis Local Northern Region 1.

8.2 Public

In terms of public engagement to date, Stony Rapids and Black Lake communities have been the main target and focus of engagement for the Project. Documentation of engagement with Stony Rapids for the purpose of the environmental assessment began in 2010. Two formal meetings were held in Stony Rapids, including one Community Information Session held in 2010.

A list of the stakeholders identified as potentially having an interest in the Project has been provided below.

- Mayor and Council Northern Hamlet of Stony Rapids;
- Athabasca Land Use Planning;

- Athabasca Health Authority;
- New North;
- Northern Labour Market Committee (NLMC);
- Athabasca Basin Development - Board of Directors;
- Athabasca Keepers of the Water;
- Canadian Parks and Wilderness Society, Saskatchewan (CPAWS);
- Saskatchewan Environmental Society (SES);
- local outfitters and resource users;
- regional suppliers;
- uranium industry;
- regional educations and training institutes; and
- relevant government departments and ministries.

8.3 Regulatory Engagement

Engagement with regulatory authorities is an important aspect of the Project's overall engagement approach. The Proponent will keep regulatory agencies (identified as having a regulatory or permitting interest in the Project) informed of the status of the Project. Engagement with regulatory authorities will provide an opportunity to seek a deeper understanding from the environmental assessment and regulatory community about potential concerns and requirements for the Project.

9.0 REFERENCES

Athabasca Land Use Plan (ALUP) – Stage I DRAFT. March 2006. Athabasca Interim Advisory Panel. Available from:http://www.environment.gov.sk.ca/adx/aspx/adxGetMedia.aspx?DocID=691,683,621,247,94,88,Documents&MediaID=299&Filename=Athabasca+LUP+stage+1.pdf&l=English

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