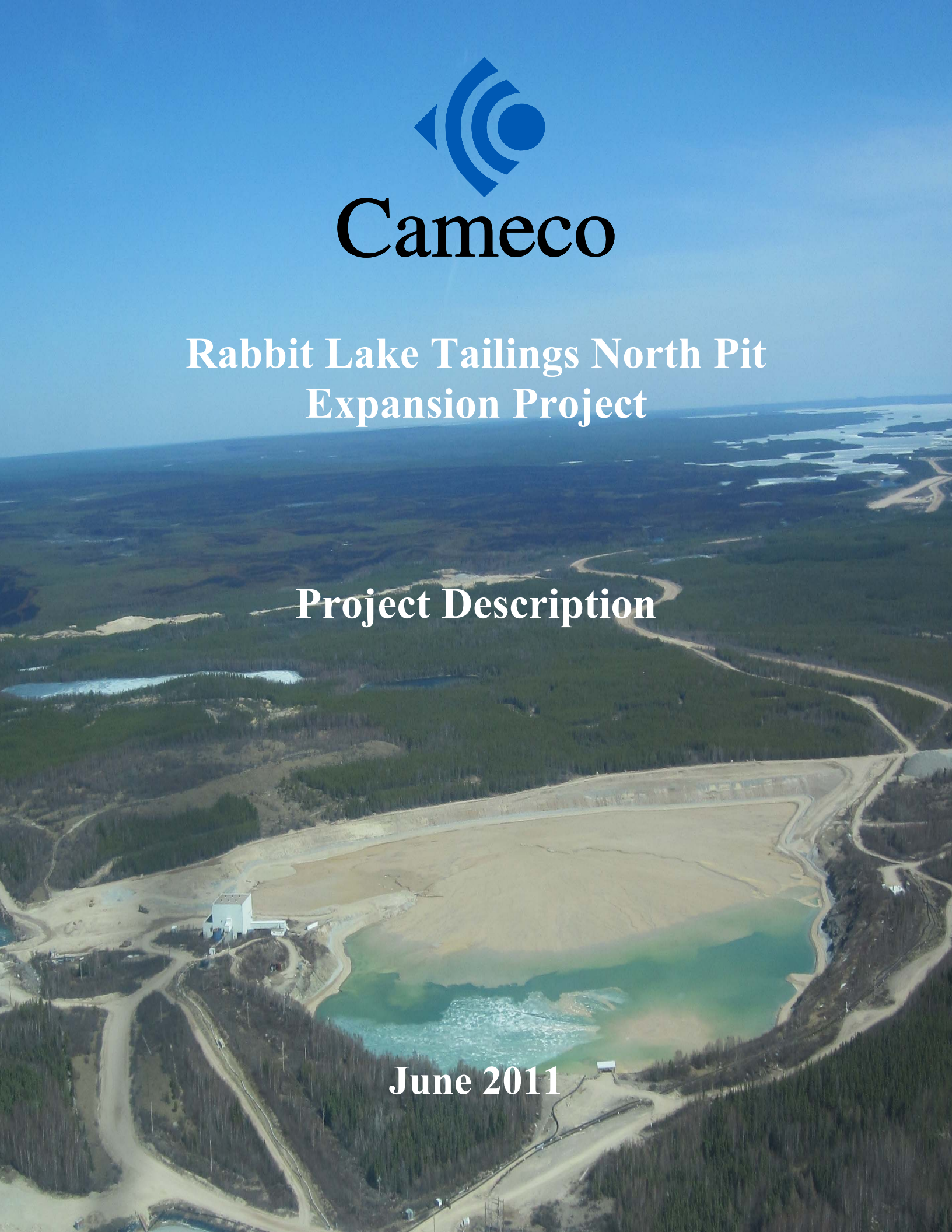

Cameco

Rabbit Lake Tailings North Pit Expansion Project

Project Description

June 2011

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

GENERAL INFORMATION

Cameco is proposing to extend the life of the Rabbit Lake Operation with an expansion of tailings capacity at the site (the Project or the North Pit Expansion).

Cameco expects to have sufficient tailings capacity to support milling of Eagle Point ore and a portion of the Cigar Lake uranium rich solution (URS) until approximately 2017. Additional tailings capacity is required to support the extension of Rabbit Lake's mine life, accommodate tailings from processing Cigar Lake URS and provide a modest amount of additional tailings capacity for future processing opportunities. Cameco estimates that it will require a licence to construct the expansion by the fourth quarter of 2014 to ensure continued operation.

Cameco's vision for the future of the Rabbit Lake Operation is continued safe, clean and reliable production, with flexibility to adapt to emerging mining and milling opportunities in the region, while limiting the environmental footprint of the operation on the land and drainage systems affected by the operation. This vision is consistent with the recommendations 1997 *Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan*.

Previously approved activities have been implemented or are being developed at the Rabbit Lake Operation that enhance environmental performance or renew production facilities. In order to fully achieve Cameco's vision for the future of the operation, Cameco is seeking approval for a range of necessary and potential activities related to continued production. One of these key activities is the Project.

Implementation of the Project will require approval by the Canadian Nuclear Safety Commission (CNSC) pursuant to the Rabbit Lake Uranium Mine Operating Licence (UMOL-MINEMILL-RABBIT.00/2013).

PROJECT INFORMATION

The Project consists of a number of modifications to existing facility components and processes and licensed activities at the Rabbit Lake Operation to allow the milling of a range of Eagle Point-type ores, other ores on and off the Rabbit Lake surface lease, waste rock and Cigar Lake URS. Several of the modifications required for co-milling of Eagle Point ore and Cigar Lake URS were assessed in the previously approved 2008 Rabbit Lake solution processing project environmental assessment (2008 URS EIS).

Increased tailings management capacity is the essential aspect of the Project and is to be achieved through an expansion that increases the approved capacity of the existing Rabbit Lake Tailings Management Facility (RLTMF) from the current 9 million cubic meters (Mm^3) to 12 Mm^3. With the proposed expansion of the existing RLTMF, Cameco will achieve an additional 3 Mm^3 of tailings capacity sufficient to accommodate tailings from ores of various sources and within a range of geotechnical and geochemical properties. It is anticipated that the additional tailings capacity may extend the life of the Rabbit Lake

Operation to approximately 2028 or longer. Studies will be conducted as part of the environmental assessment (EA) of the Project to determine environmental effects that may result from this extension.

The work and activities under consideration for the Project include:

- Excavation of an additional pit to the north of the existing RLTMF;
- Piping additions to support the Project that are still subject to a feasibility study;
- Installation and/or modification of infrastructure to accommodate the Project;
- Changes to the amount of water requiring treatment in accordance with the predictions in the 2008 URS EIS; and
- Changes to waste rock management facilities and overburden piles resulting from excavation required for the Project.

The following activities are not considered part of the Project as they have been previously approved or are the subject of a separate approval:

- Development of appropriate water treatment at Eagle Point (subject to a separate EA);
- Planning for appropriate water treatment at the mill (approved in the 2008 URS EIS); and
- Other reclamation activities associated with the site.

While the amount of water requiring treatment at the Rabbit Lake Operation will change from predictions in the 2008 URS EIS, the Project is not expected to require significant changes to the water management system. The expected increase in water flow from the RLTMF will largely be offset by a reduction in the volume of mine water pumped from Eagle Point to the mill for recycle or treatment. Cameco anticipates that the Project and other modifications planned at the Rabbit Lake Operation would not significantly alter the present approach and objectives of the Rabbit Lake Reclamation Plan (2009).

EXISTING ENVIRONMENT

The Rabbit Lake Operation lies within the Athabasca Plain ecoregion and the Boreal Shield ecozone in northern Saskatchewan. The landscape is characterized by flat-lying sandstone bedrock and a nearly continuous cover of sandy glacial deposits. The environment surrounding the Rabbit Lake Operation is well understood as a result of extensive studies conducted over the last 35 years. Baseline studies were conducted in 1976 and 1977 and the original EA was completed in 1980. Since then, numerous environmental monitoring programs and specific scientific investigations have been conducted, including work recently completed in support of an environmental impact statement prepared for the processing of Cigar Lake URS at the Rabbit Lake Operation in 2008 (the 2008 URS EIS).

POTENTIAL EFFECTS

A screening-level assessment of potential environmental effects of the Project has been conducted to assist in EA process decision making. The assessment considered the potential effects of all components and activities proposed under the Project, including

both incremental and total (existing effects plus incremental) residual effects. Of course, the environmental impact statement will more fully address the biophysical and socioeconomic effects of the Project.

The Project is expected to have potential incremental and total effects in Horseshoe Creek and/or Link Lakes watersheds as follows:

- During construction – potential incremental effects associated with the development of the north pit expansion on surface water hydrology and quality in Link Lakes watershed are expected to be low in magnitude. Much of the surface runoff in the development area is currently collected for treatment. As well, effects of material handling activities on turbidity levels in runoff will be controlled through the application of appropriate practices. Construction activities are not expected to have any effect on Horseshoe Creek;
- During operations – potential incremental and total effects will mainly be related to the discharge of treated effluent to the Horseshoe Creek watershed. Overall effects on the aquatic and terrestrial ecosystems in Horseshoe Creek are expected to be similar to the effects predicted in the 2008 URS EIS, as a result of measures being contemplated to minimize any increase in the total flow through the effluent treatment system. The extent of these effects will be assessed in detail once effluent flows related to this Project are more precisely defined. Effects on the downstream Link Lakes watershed during the operating phase are not expected to change from current conditions; and
- Post-decommissioning – once natural groundwater and surface water flows have been re-established in the Link Lakes watershed, the long-term load of constituents of potential concern from the Project facility are expected to result in an incremental increase in the total effects of the RLTMF. The design of the proposed North Pit Expansion is based on minimizing constituent loads in the long-term. The extent of these effects will be assessed in detail once design concepts are firmed up and detailed hydrogeological modelling is undertaken.

Effects of the Project on other components of the biophysical environment are expected to be low.

Project activities are not expected to provide a measurable contribution to cumulative effects associated with other projects in the region. Measurable effects on wildlife movement and behaviour are also not anticipated.

PUBLIC PARTICIPATION: ENGAGING FIRST NATIONS, METIS AND OTHER INTERESTED PARTIES

Cameco engages interested parties (or potentially interested parties) through a variety of specific engagement methods. Several recent events have involved dialogue between Cameco and potentially interested parties on the general topic of tailings and tailings management at Cameco operating sites in northern Saskatchewan, including the Rabbit Lake Operation. Based on the ongoing input received from interested parties during these engagement activities, Cameco will continually refine and implement the public participation program for the Project for the duration of the EA.

In general, Cameco public participation programs are designed to:

- Provide opportunities for interested parties to provide feedback;
- Identify relevant concerns in relation to proposed projects;
- Obtain feedback and/or concerns relevant to the EA process;
- Where appropriate, develop mitigation strategies that respond to feedback from the public participation programs; and
- Inform interested parties throughout the Project as to the manner in which their feedback and/or concerns are being addressed.

A public participation program is being developed specific to the Project.

CONCLUSIONS

The Project is intended to expand tailings capacity at the existing RLTMF from the existing 9 Mm^3 to 12 Mm^3. This project will:

- Support the continued operation of Rabbit Lake Operation;
- Occur within the surface lease of the existing Rabbit Lake Operation;
- Add additional capacity with reliable and established tailings management methods;
- Extend as well as provide new employment opportunities to residents of Saskatchewan North (RSNs) and northern contractors;
- Maintain operational flexibility;
- Be incorporated into the CNSC uranium Mine Operating Licence and the provincial operating permit;
- Not result in an increase in uranium production capacity of more than 35% and
- Use existing processes for milling of uranium and tailings management that are authorized under the current licence.

Cameco believes that the Project is the best alternative for expanding tailings capacity at the Rabbit Lake Operation because it meets the criteria of acceptable long-term performance while taking into consideration those aspects that are important local stakeholders.

The receiving environment has been studied extensively at both local and regional levels. A screening level assessment of potential environmental effects indicates that the Project could result in a small incremental increase in the level of effects that has resulted from, or are expected to result from the current Rabbit Lake Operation. Incremental and total effects will be studied through the EA of the Project.

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AECB	Atomic Energy Control Board
AGTMF	Above-Ground Tailings Management Facility
AWG	Athabasca Working Group
BCI	Benthic Community Index
BEM	Biological Effects Monitoring
Bq	Becquerel
^{o}C	Degrees Celsius
CCD	Counter-Current Decantation
CCME	Canadian Council of Ministers of the Environment
CEAA	*Canadian Environmental Assessment Act*
CEM	Cumulative Effects Monitoring
CEQG	Canadian Environmental Quality Guidelines
CLMC	Cigar Lake Mining Corporation
CNSC	Canadian Nuclear Safety Commission
CO_2	Carbon Dioxide
COPC	Constituent of Potential Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CVMP	Community Vitality Monitoring Partnership
DCS	Distributed Control System
drm^3	Dry Reference Cubic Metre
dw	Dry Weight
EA	Environmental Assessment
EC	Environment Canada
EEM	Environmental Effects Monitoring
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Plan
EQC	Environmental Quality Committee
ET	Effluent Treatment System
FAQ	Frequently Asked Questions
FAs	Federal Authorities
GHG	Greenhouse Gas
H_2SO_4	Sulphuric Acid
ha	Hectares
HDPE	High-Density Polyethylene
HRDA	Human Resource Development Agreement
HRDP	Human Resource Development Plan
IMA	Impact Management Agreement
ISQG	Interim Sediment Quality Guideline
km	Kilometres
km^2	Square kilometres
kV	Kilovolt
kW	Kilowatt
LLRD	Long-Lived Radioactive Dust
LSA	Local Study Area
m	Metres
m/s	Metres per second

List of Acronyms	
masl	Metres Above Sea Level
MDL	Method Detection Limit
MMER	Metal Mining and Effluent Regulations
MNS	Métis Nation of Saskatchewan
MOU	Memorandum of Understanding
NCQ	Northern Career Quest
NGO	Non-Governmental Organization
NLMC	Northern Labour Market Committee
NO_x	Nitrogen Oxides
NSEQC	Northern Saskatchewan Environmental Quality Committee
OSLD	Optically Stimulated Luminescence Dosimeter
PAGC	Prince Albert Grand Council
PDP	Preliminary Decommissioning Plan
PMP	Probable Maximum Precipitation
ppm	Parts Per Million
RLITMF	Rabbit Lake In-Pit Tailings Management Facility, referring to the original in-pit tailings facility, or Phase 1)
existing RLTMF	Rabbit Lake Tailings Management Facility, referring to the expanded RLITMF as it currently exists, consisting of the Phase 1 RLITMF and Phase 2 Pit Crest Expansion
RLTMF	Rabbit Lake Tailings Management Facility, referring to the existing RLTMF with the addition of the proposed Phase 3 North Pit Expansion
RO	Reverse Osmosis
RSA	Regional Study Area
RSNs	Residents of Saskatchewan's North
SEAA	The *Environmental Assessment Act* (Saskatchewan)
SKCDC	Saskatchewan Conservation Data Centre
SMOE	Saskatchewan Ministry of Environment
SO_2	Sulphur Dioxide
SO_3	Sulphur Trioxide
SO_x	Sulphur Oxides
SSA	Site Study Area
SSWQO	Saskatchewan Surface Water Quality Objectives
TEC	Track-etch Cup
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
$\mu g/m^3$	Micrograms per cubic metre
U.S. EPA	United States Environmental Protection Agency
URS	Uranium Rich Solution
VEC	Valued Ecosystem Component
VSEC	Valued Socioeconomic Component

SECTION 1

GENERAL INFORMATION

1.0 GENERAL INFORMATION

1.1 Summary

The Rabbit Lake Operation continues to be an important fuel supplier for the global nuclear industry. In 1975, the Rabbit Lake mill began processing ore from the Rabbit Lake open-pit mine, which continued until 1984. Mining of additional ore bodies followed, all of which were located within the current lease boundary along the northern extent of the Harrison Peninsula. Open pit mining of the B Zone ore body was conducted from 1984 to 1991, D Zone from 1995 to 1996 and A Zone from 1996 to 1997. Development of the Eagle Point underground mine, located approximately 16 kilometres (km) northeast of the mill, began in 1991 with full operation commencing in 1994. Except for two market induced production breaks, the Eagle Point mine has operated continuously since 1994 and represents the only current mining operation supplying ore to the Rabbit Lake mill. By the end of 2010, the Rabbit Lake mill had produced more than 180 million pounds of uranium sourced entirely from ore supplied on site by these five ore sources. After 35 years of production, Cameco is seeking to extend the life of the Rabbit Lake Operation as described within this proposal.

Cameco's vision for the future of the Rabbit Lake Operation is continued safe, clean, economic and reliable production, with flexibility to adapt to emerging mining and milling opportunities in the region, while limiting the environmental footprint of the operation on the land and drainage systems affected by the operation. This vision is consistent with the 1997 *Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan.* Specifically, the panel encouraged that, in order to limit the footprint of environmental effects from the uranium industry, a milling facility be used to process ores from several mines rather than establishing additional facilities at a series of new mines.

The purpose of the proposed North Pit Expansion is to increase tailings capacity at the Rabbit Lake Operation. The discovery of additional ore at Eagle Point has necessitated additional tailings capacity. The Rabbit Lake Operation presently deposits tailings within the existing RLTMF and is seeking to expand the capacity of this facility from the current 9 Mm^3 to 12 Mm^3. Based on current projections, the expanded facility will need a Licence to Construct by the fourth quarter of 2014 to allow construction to be completed before the facility reaches the current maximum permitted deposition height. The proposed expansion and its timeline will permit the uninterrupted milling and tailings deposition of Eagle Point ores, other ores on and off the Rabbit Lake surface lease, waste rock and Cigar Lake URS.

Previously approved activities have been implemented or are being developed at the Rabbit Lake Operation that enhance environmental performance or renew production facilities. Such improvements include the commissioning of low and high pH clarifiers, current upgrades to the acid plant, as well as planning for appropriate water treatment at the Rabbit Lake mill.

In order to fully achieve Cameco's vision for the future of the operation, Cameco is seeking approval for a range of necessary and potential activities related to continued production. One of these key activities is securing the required expansion of the approved capacity of the existing RLTMF to ensure the continued life of the operation.

1.2 Alternatives to the Project

In 2006, Cameco began to examine options to increase tailings storage capacity at the Rabbit Lake Operation. Cameco developed a set of criteria with stakeholder input, including Athabasca community representatives that were then used to narrow down the range of alternatives. The key criteria included acceptable long-term performance, distance to the mill, and economic feasibility as well as potential impact to the environment and nearby communities.

Initial scoping studies considered 17 alternative locations for development of a new in-pit tailings management facility. In 2007, field drilling was conducted in those areas considered to be best suited for either an expansion of the existing tailings management facility or development of a new tailings management facility.

Ultimately, Cameco concluded that the operational timeline and economic conditions for a new tailings management facility would not best meet the needs of the current Rabbit Lake Operation. Subsequently, from 2009 to 2010, Cameco completed a prefeasibility study examining five different expansion options for the area in the immediate vicinity of the existing RLTMF.

A further alternative to a new tailings management facility would be to establish uranium milling, waste management and supporting infrastructure at a new location. Cameco is of the view that this approach would not be consistent with the 1997 *Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan* that encouraged the practice of using one mill for several mines.

Project Contact Information

Cameco is the owner, operator and licensee of the Rabbit Lake Operation. The business address is:

Project Operator	Cameco Corporation 2121 – 11th Street West Saskatoon, SK S7M 1J3
Project Contacts	
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Assessment Point of Contact	Kyle Wivcharuk Environmental Assessment Coordinator Kyle_Wivcharuk@cameco.com 306-956-8042

1.3 Regulatory Authorizations

1.3.1 Rabbit Lake Site and Assessment History

Exploration activity for uranium ore began in the Rabbit Lake area in 1965. During exploration several radiometric anomalies were detected in the vicinity of Rabbit Lake. Subsequent exploration drilling was conducted and a total of five different ore bodies with mineable potential in the Rabbit Lake project area were identified, including: Rabbit Lake ore body (1968); Collins Bay A Zone ore body (1971); Collins Bay B Zone ore body (1977); Collins Bay D Zone ore body (1979); and Eagle Point ore body (1980). The Rabbit Lake and Collins Bay ore bodies were suitable for mining by open pit excavation methods whereas the Eagle Point deposit required the use of underground mining methods.

Construction of a camp and mill began in 1972. In 1975, processing of ore from the Rabbit Lake deposit through the mill began. Mining of this ore body was completed in 1984. Tailings from this ore body were deposited in the Rabbit Lake above-ground tailings management facility (AGTMF), which was constructed to the southeast of the mill in the headwaters of the Horseshoe Creek drainage.

In 1980, an EIS was completed and submitted to the province for the development of the Collins Bay B Zone deposit (*Gulf Minerals 1980*). Following the public review process, regulatory approvals were issued in late 1982 for mining and milling of the B Zone ore body and development of a new tailings facility within the Rabbit Lake pit to accommodate B Zone tailings - the Rabbit Lake In-Pit Tailings Management facility (RLITMF) which now part of the existing RLTMF. Stripping of the B Zone overburden

began in mid 1984 and milling commenced in late 1985 once the last of the Rabbit Lake ore was processed. In 1991, mining of the B Zone ore body was completed.

In June 1987, an EA was submitted for the Collins Bay A Zone, D Zone and Eagle Point Development to Saskatchewan Environment and Public Safety (now Saskatchewan Ministry of the Environment (SMOE)) and to the Atomic Energy Control Board (AECB) (now the CNSC). In January 1988, the Saskatchewan government issued an approval, followed by a conditional licence approval from the AECB in April 1988 for the Eagle Point test mine and the mining of A Zone and D Zone, subject to the submission of construction drawings. In 1991, the AECB re-examined the approvals granted to Cameco and referred the production mining of Eagle Point and development of A Zone and D Zone mines to the Minister of Environment for a review by the Federal Environment Assessment Review Office Panel. Subsequently, a revised and updated EIS was completed and submitted to the regulatory agencies in 1992 (*Cameco and Uranerz 1992*). Cameco participated in public hearings in 1992, which were conducted to review the acceptability to federal authorities of proceeding with the development of Eagle Point and the Collins Bay A Zone and D Zone mines (*Cameco 1993a; 1993b*). In 1994, approval was granted to develop the three deposits subject to conditions specified within the approval.

Construction of an Eagle Point underground test mine began in 1991 and full operation of the mine commenced in 1994. The Eagle Point mine remains in full operation and is currently the source of ore processed in Rabbit Lake mill production.

In 1995 work commenced on the Collins Bay D Zone pit with the construction of the cofferdam, followed by the commencement of stripping later in the year. D Zone mining was completed in 1996, at which time a pond was created through backfilling of the pit and flooding with water from Collins Bay. Reclamation of the pond was completed during the summer of 2010 with removal of the cofferdam thereby connecting the D Zone pond with Wollaston Lake.

A Zone stripping was initiated in 1996 and mining was completed in 1997. Similar to D Zone, the pit was backfilled and flooded to create a contained pond upon completion of mining activities. Over the summers of 2005 and 2006, pond reclamation activities were conducted and the cofferdam removed thereby connecting the A Zone pond with Wollaston Lake. A Zone approaches were hydro-seeded in 2010 and reclamation activities completed.

The 2008 URS EIS addressed the development of key infrastructure and processes required for the transport and milling of URS at Rabbit Lake as produced from processing Cigar Lake ore in the McClean Lake mill, operated by AREVA Resources Canada Inc. This project was approved and URS transportation is anticipated to commence in 2015.

The Rabbit Lake Operation is licensed to operate under the following licences or approvals:

- CNSC Uranium Mine Operating Licence UMOL-MINEMILL-RABBIT.00/2013 (expires October 31, 2013);

- SMOE Approval to Operate a Pollutant Control Facility IO-240 (expires October 31, 2013); and
- SMOE *Permit to Operate Waterworks # 00053518-01-00* (expires March 31, 2015) and *Permit to Operate Waterworks # 00053518-01-00H* (expires March 31, 2015).

1.3.2 The *Canadian Environmental Assessment Act* (CEAA)

The proposed Project, as outlined in this document, is an undertaking in relation to a physical work and as such, satisfies the definition of a project set out in Section 2(1)(a) of CEAA.

Further, there are no identified exclusions for the Project pursuant to either Section 7 of CEAA or the *Exclusion List Regulations, 2007*.

Implementation of the Project will require approval by the CNSC pursuant to the Rabbit Lake uranium mill operating licence (UMOL-MINEMILL-RABBIT.00/2013). The CNSC has previously taken the position that the required approval would be a "trigger" under the *Law List Regulations* enacted pursuant to CEAA.

Storage of explosives will be required as part of the Project and will utilize the existing magazine at Rabbit Lake Operation. Therefore, the Project will not be seeking additional approvals from Natural Resources Canada in accordance with the *Explosives Act*

There are no activities proposed as part of the Project that require approvals from Transport Canada pursuant to the *Navigable Waters Protection Act*.

There are no activities proposed as part of the Project that require approvals pursuant to the federal *Fisheries Act*.

In accordance with CEAA's *Regulations Respecting the Co-ordination by Federal Authorities of Environmental Assessment Procedures and Requirements*, other federal departments/agencies with an interest related to their mandate may participate in the review of this Project as federal authorities (FAs).

In the federal context, Cameco believes that a screening level environmental assessment is required for this project. The project, as designed, is an expansion of the existing RLTMF that will not result in an increase in production capacity of more than 35 per cent. Further, the project will take place within the existing boundaries of the licensed Rabbit Lake Operation and will utilize waste (and tailings) management processes that are authorized under the existing licence.

1.3.3 *The Environmental Assessment Act* (Saskatchewan) (SEAA)

The Project is likely to satisfy one or more of the SEAA definitions of a "development". In accordance with Section 9 of this legislation, Cameco, as the proponent of the development, will therefore conduct, prepare and submit an EIS to the provincial Minister of Environment. Ultimately, the Project will then require the issuance of a Ministerial Approval pursuant to Section 15 of SEAA before proceeding.

SECTION 2

DETAILED PROJECT INFORMATION

2.0 DETAILED PROJECT INFORMATION

The Rabbit Lake Operation is located approximately 350 km north of La Ronge, Saskatchewan along the west shore of Wollaston Lake, as shown on Figure 2.0-1.

Under the Rabbit Lake Surface Lease Agreement, the province of Saskatchewan has leased 2001.28 ha of land to Cameco located at approximate UTM Grid Zone 13V 6450800N, 575500E. The leased surface area is described in the Rabbit Lake Operation's *Plan of Survey Surface Lease Maps*, as approved by the Controller of Surveys as MG929 and MG957. A plan view drawing indicating the general boundaries of the surface lease and the major infrastructure located within the lease is provided in Figure 2.0-2.

The Project will occur within the surface lease boundary of the Rabbit Lake Operation.

The scope of work for this project is found in Section 2.1, a brief description of the Rabbit Lake Operation is found in Section 2.2 and the proposed changes to the existing operation (facility components and processes), which represent the scope of the Project, are found in Section 2.3.

2.1 Scope of the Proposed Project

Increased tailings management capacity is the essential aspect of the proposed Project and is to be achieved through an expansion of the approved capacity of the existing RLTMF. Cameco expects to have sufficient tailings capacity to support milling of Eagle Point ore and a portion of the Cigar Lake uranium rich solution (URS) until approximately the end of 2016. Additional tailings capacity is required to support the extension of Rabbit Lake's mine life, accommodate tailings from processing Cigar Lake URS and provide a modest amount of additional tailings capacity for future processing opportunities. With the proposed expansion of the existing RLTMF, it is anticipated that the additional tailings capacity may allow operation of the Rabbit Lake facilities to continue until approximately 2028 or longer.

The Project consists of a number of modifications to existing facility components and processes and licensed activities to extend the life of the operation, to allow the milling of a range of Eagle Point ores, other ores on and off the Rabbit Lake surface lease, waste rock and Cigar Lake URS and to enhance operational flexibility and reliability of the Rabbit Lake Operation.

The assumptions and justification of the tailings management expansion are summarized in the table following:

SCOPE DESCRIPTION:

Item	Assumption	Justification
Location of Additional Tailings Capacity	• Immediately north of the existing RLTMF (the existing RLTMF includes the Phase 1 - RLITMF and Phase 2 - Pit Crest Expansion)	• On current lease • Maintains same receiving environments (Upper Link Lakes and Horseshoe Creek) • The Phase 3 North Pit Expansion of the existing RLTMF will permit existing infrastructure to be utilized where appropriate as well as existing approved processes
Ore Source	• Eagle Point ores, other ores on and off the Rabbit Lake surface lease, waste rock and Cigar Lake URS	• The intention is to blend URS tailings with Eagle Point ores, other ores on and off the Rabbit Lake surface lease and/or waste rock • Blending should significantly improve the consolidation characteristics of the tailings and decrease the estimated consolidation time over utilizing URS tailings alone
Size	• Approximately 3 Mm^3	• Facility sized to accommodate previously approved tailings volume expected from milling Cigar Lake URS as well as the estimated ore types and volumes expected from future mining predictions

2.2 Existing Rabbit Lake Operation

The following subsections provide a brief description of the existing and approved facility components and processes that form the Rabbit Lake Operation, including expected changes that will be in place prior to processing URS shipments from McClean Lake. Further details can be found in the Rabbit Lake Mining Facility Licensing Manual and supporting documentation, which also contain information on the operating policies and principles, facility management and programs. Decommissioning and reclamation activities are also briefly summarized because these activities are an essential feature of the operation.

2.2.1 Mine Facilities

Mining at the Rabbit Lake Operation has included both open pit and underground mining. Of the five deposits mined to date, four were open pit operations. Mining at all four open pits has been completed (i.e. the Rabbit Lake, B Zone, D Zone and A Zone pits). Only the Eagle Point underground mine (Figure 2.0-2) is currently active, with mining of this deposit projected to continue through 2019.

Ore extracted during mining at Eagle Point is moved to an ore storage pad near the mine portal prior to being hauled to the ore pad at the mill or to the B Zone ore stockpile pad. “Special waste” (i.e. mine rock that has non-economic uranium content) is also transported from Eagle Point to the ore pad at B Zone where it is sorted for processing through the mill or for disposal in a secure manner. Waste rock that cannot be used readily underground for backfill purposes is moved to the surface and placed on the waste rock storage pad at Eagle Point. Eagle Point waste rock currently stored on surface that has not been used for other purposes (i.e. road development) will be used underground as backfill or reclaimed in situ.

Mine water from the underground Eagle Point mine is pumped to a sedimentation pond on the surface prior to being pumped, along with water from other mining areas, to the Rabbit Lake mill for treatment. At present, Cameco is developing a second discharge point at Eagle Point that has secured provincial Ministerial approval, but is undergoing a separate federal EA. This activity is outside of the scope of this submission.

2.2.2 Mill Facilities

Ten primary circuits are used to produce yellowcake at the Rabbit Lake mill. Figures 2.2.2-1 and 2.2.2-2 illustrate both the mill process flow circuit that currently exists and the mill process flow circuit once Cigar Lake URS from McClean Lake is received at Rabbit Lake. The circuits include:

- receiving;
- grinding;
- leaching;
- counter-current decantation;

- solvent extraction;
- gypsum precipitation;
- uranium precipitation;
- product drying and packaging; and
- neutralization circuit.

These mill process circuits remain unaffected by the project and no further detail is provided in this Project Description.

Treatment of waste streams takes place in the neutralization circuit. This aspect is discussed in subsequent sections of the Project Description (Sections 2.2.3, 2.2.4, 2.2.5, 2.2.6 and 2.2.7).

2.2.3 Site Infrastructure

Various components make up the Rabbit Lake Operation site infrastructure, including the following:

- An airstrip for the transportation of personnel and air freight to and from the Rabbit Lake Operation;
- A 280 person permanent camp, which is expandable as required through the use of temporary construction camps, to house and feed all personnel who work at the Rabbit Lake Operation;
- Industrial and potable water supplies;
- Insulated and covered utilidors for potable water and sewage that connect the mill complex to the camp and laboratory;
- Site electrical supply and emergency generators;
- Air ventilation and emission control systems;
- Acid plant for production of sulphuric acid used in the mill;
- Process control systems;
- Facilities to prevent the release of constituents of potential concern (COPCs) to the environment, such as ore/special waste storage areas;
- Contaminated water collection, management and treatment systems;
- Tailings management facilities;
- Domestic and contaminated waste landfills;
- A road network that connects all of the above infrastructure and facilities; and
- Security controlled access to Provincial Highway 905 that connects the Rabbit Lake site to the provincial road network.

A brief discussion on several of the key features is provided below.

2.2.3.1 Industrial and Potable Water Supplies

Most of the site's industrial water sources originate from the mine water surge pond (which is fed from the Eagle Point mine and B Zone area) and the existing RLTMF raise water.

2.2.3.2 Process Control System

The Rabbit Lake mill uses a distributed control system (DCS), located centrally in the mill control room and is monitored by mill personnel continuously. The system monitors and controls various points in the mill process and treatment circuits and displays a continuous read-out, with audible and visual alarms for operator notification upon detected deviations from prescribed limits. Various field instrument signals are communicated to the DCS via hard wire and radio signals. The mill maintenance group conducts routine maintenance of this system as per the preventative maintenance schedule. There may be some new controls for equipment (i.e. pumps and motors) as a result of the Project.

2.2.3.3 Site Electricity Supply and Emergency Power

Overhead transmission lines supply power to the Rabbit Lake Operation from SaskPower's Island Falls and Uranium City generation stations. Power is received by the main substation at 115 kilovolt (kV) and is transformed to 35 kV for distribution to various secondary substations around the site via overhead lines.

In the event that the SaskPower service is interrupted, three diesel generators can provide 6,600 kilowatt (kW) of power, which is sufficient to support all critical operations. These generators are maintained in standby mode in the Rabbit Lake powerhouse. In the event of a power loss to isolated areas of the site, portable generators can be moved into location and temporarily connected.

There may be some new electrical equipment (i.e. transformers, starters, poles) as a result of the Project.

2.2.3.4 Ventilation Systems

Ventilation systems in buildings and confined areas (i.e. new raise pumphouse) will be assessed as part of this project to ensure protection of workers.

2.2.3.5 Stockpile Runoff Control Methods

Rabbit Lake ore and special wastes are stored on lined pads that are approved under federal and provincial approvals to operate. Specifically, mill feed ore is stored on a bentonite lined pad on the south side of the mill building and residual ore and special waste are stored on the high-density polyethylene (HDPE) plastic lined B Zone ore pad. Eagle Point ore and special waste is transferred from underground operations to a bentonite-lined pad prior to surface haulage to the mill ore pad or the B Zone ore pad.

2.2.3.6 Stockpile Drainage/Leachate Control Systems

Ore and special waste stockpiles are lined with leachate control systems in place to contain contaminated water; they include the Eagle Point ore pad, B Zone ore pad and the mill feed ore pad. The contained water is collected and pumped to the mill for use as industrial make up water or treatment.

Typically clean waste rock piles do not have leachate control systems; however, the B Zone waste rock pile has unlined ditches from which leachate or runoff can be collected and pumped to the mill for treatment. Similarly, surface waters from the Rabbit Lake west and north waste rock piles are collected in a holding pond and diverted into the existing RLTMF. Subsurface flows from beneath these piles are also captured in the existing RLTMF raise sump. All water entering the existing RLTMF is collected and pumped via the raise water pumping system to the mill for mill process use or treatment. A network of piezometers is used to monitor for fugitive leachate from these areas.

2.2.3.7 Surface Water Control

Clean surface water is diverted, where possible, away from contaminated water collection systems or potential COPC sources. The mine water pipelines (i.e. 4 and 6 mile lines) are used to transfer contaminated water from Eagle Point and B Zone to the mill for treatment. The treated effluent pipelines are used to transfer water from the mill to the effluent treatment ponds near the AGTMF. Both water lines are contained within ditches from which water from a pipe failure can be collected and pumped to the mill for treatment.

Surface water handling and control is important during spring melt runoff period, as frequently, the water handling systems operates near capacity. Operations balance between maintaining surface water runoff; camp/mill wastewater streams; contaminated water from the Eagle Point mine; the B Zone ore pad, waste rock pile and pond; existing RLTMF raise water level; and collected leachate from the drainage control systems.

2.2.4 Tailings Management

Management of the tailings is an essential activity related to ore processing at the Rabbit Lake Operation. Tailings properties are controlled according to specific procedures designed to enhance their long-term geochemical stability (i.e. metal solubility) and physical performance (i.e. settlement, consolidation). Tailings are safely stored on-site within tailings management facilities. These facilities are designed to:

- Collect seepage and contain tailings solids during operations (i.e. safe containment);
- Minimize long-term environmental impact, following closure, by restricting the flux of COPCs from the facility; and
- Ensure long-term physical containment (i.e. cover integrity).

Presently, there are two tailings management facilities at the Rabbit Lake Operation:

- the AGTMF; and

  the existing RLTMF.

The locations of these facilities are shown on Figure 2.0-2.

2.2.4.1 Above Ground Tailings Management Facility

The AGTMF contains approximately 6.5 million tonnes of tailings that were deposited between 1975 and 1985 during milling of ore from the original Rabbit Lake mine. These tailings are confined between bedrock ridges to the east and west and earth filled dams to the north and south.

The AGTMF remains an important component in the overall waste management system as a portion of the facility is designated as a waste disposal area for contaminated solid waste, other than tailings. Reclamation of the AGTMF is underway as part of the Rabbit Lake Reclamation Plan.

2.2.4.2 Existing Tailings Management Facility

The existing RLTMF consists of the following two phases:

- Phase 1 - the original RLITMF that lies within the mined out Rabbit Lake pit and that has been operational since 1984; and
- Phase 2 - the Pit Crest Expansion to the RLITMF that has been operational since 2009.

Tailings from these two phases have now merged to become one large pit.

The total capacity of the existing RLTMF is estimated to be 9 Mm^3. The volume of tailings deposited up to the end of 2010 was approximately 7.5 Mm^3, leaving an estimated 1.5 Mm^3 of remaining capacity.

A fundamental component of the existing RLTMF design is the highly permeable zone of crushed rock and filter sand surrounding the tailings. This ‘pervious surround’ provides a means to drain and collect tailings supernatant and pore water during tailings placement, which allows the dissipation of excess porewater pressure and promotes consolidation of the tailings. It also permits groundwater to be collected from the surrounding geologic formation via a raise well, creating an ‘inward’ groundwater gradient that ensures containment of tailings seepage water. Specifically, the bottom drain of the pervious surround consists of a 4 metre (m) thick select rock fill layer, a 1.5 m thick intermediate rock layer and a 1.5 m thick filter sand layer (7 m total thickness). The pervious surround side-drain consists of a 1.0 m thick layer of coarse (permeable) rock placed against the pit walls over the full perimeter of the pit. The pervious surround is protected with a sand filter to prevent migration of tailings fines into the coarse rock. The minimum thickness of the filter zone is 1m (over horizontal benches), while the minimum thickness on vertical bench faces is 2 m. For practical reasons (i.e. width of equipment and creation of a road), the filter zone width is maintained at 3.5 to 4.5 m. The pervious surround and filter are constructed intermittently to maintain a minimum freeboard for the filter sand of 0.6 m (2 feet) above the tailings surface.

Tailings are transported from the mill to the existing RLTMF in slurry form via pipeline at a density of approximately 35% solids. Within the existing RLTMF, tailings are placed using one of three currently approved placement methods:

- subaerial discharge;
- submerged discharge; and
- injection.

The overall performance of the existing RLTMF is monitored on a regular basis to validate predictions and to seek ways to improve tailings management at Rabbit Lake. The routine monitoring and sampling programs, which are reported annually, target key tailings performance indicators enabling operations to respond to changes.

2.2.5 Waste Rock Management Facilities

Waste rock, generated from mining operations, is stockpiled in designated locations around the Rabbit Lake Operation and is categorized as either:

- Waste rock – non-mineralized materials that have been excavated to gain access to uranium ore, such as sand and till soils, sandstone and basement rock; or
- Mineralized waste – material with some uranium as well as elevated sulphide and arsenide mineral content.

During development of the Rabbit Lake open pit mine (1974-1984), waste rock was placed in several locations. Figure 2.2.5-1 identifies the different pile locations, including: West #5, North #5 (overburden) and East #5 waste rock piles as well as mineralized waste piles #2, #3, #9 and #36. Mineralized waste pile #36 was placed on top of the West #5 waste rock pile. Waste rock from the East #5 pile has been used as an aggregate source in both the construction of the pervious surround in the existing RLTMF and in road construction. Mineralized waste from pile #9 has been processed through the mill.

The steel dykes separating the A Zone and D Zone pits from Collins Bay have been removed thus allowing free exchange of water between Collins Bay and the former mining area.

Waste generated from ongoing mining at Eagle Point will continue to be stockpiled on the Eagle Point waste rock pad and will be consumed during backfilling of the Eagle Point mine or reclaimed in-situ.

Drainage/seepage from the West #5 and North #5 waste rock piles and from mineralized waste pile #36 is captured by the drainage system of the existing RLTMF. This water is pumped to the mill for treatment. A small portion of the seepage and runoff from these piles collects in a pond to the east of West #5 and is conveyed from the pond in a pipe to the existing RLTMF. Finally, surface drainage and subsurface flow from mineralized waste piles #2, #3 and the mill yard area generally move in a northward direction towards the existing RLTMF where they are intercepted and pumped via the raise water system to the mill for treatment.

Following closure of the RLTMF, the pervious surround will allow groundwater to flow around or above the tailings mass, resulting in only a small flow of water through the tailings. The net effect is that COPC transport from tailings is greatly reduced.

2.2.6 Water Management Facilities

The Rabbit Lake Operation water management facilities are designed to minimize the amount of water contaminated by site activities and where required, capture and treat contaminated water to acceptable levels before being discharged to the environment. This section describes water handling at the Rabbit Lake Operation for industrial and contaminated water, including surface water drainage or diversion systems and collection or storage works.

2.2.6.1 Water Feed Sources

Eagle Point Mine

Water from the Eagle Point mine and the Eagle Point ore and waste stockpile pad sumps goes to the Eagle Point sedimentation pond, which is used for surge capacity and for settling a portion of the solids that are present in the water. The decant water is pumped from the pond along the transfer line (i.e. 4-mile line) to the B Zone sedimentation pond (Figure 2.2.6.1-1).

B Zone Area

Contaminated water collected at the B Zone pond, waste rock pile, emergency dump pond, ore storage pad and the B Zone shop/office complex are collected and pumped to the B Zone sedimentation pond. From this pond, decant water is pumped through a transfer line (the 6-Mile Line) to the Rabbit Lake mine water surge pond (referred to as mine pond on Figure 2.2.6.1-1).

Mine water Surge Pond (Mine Pond)

Water collected in the mine pond is pumped to the mill for use in the mill process and any mine pond water not required for the mill process is treated directly in the solution neutralization circuit prior to release into the environment (Section 2.2.6.2).

Raise Water

At the existing RLTMF (Section 2.2.4), water filtered through the pervious surround drains to the raise water sump from which it is pumped to the mill via the raise pump house. A majority of the raise water is used as mill process water or is diverted to the mill process water tank. Raise water is also used as cooling water for the strip makeup and organic cooling heat exchangers in the solvent extraction circuit, the mill air compressors and the clarified pregnant strip cooler. As is the case with water from the mine pond, any remaining raise water not required for mill processes reports to the solution neutralization circuit for treatment (Section 2.2.6.2).

Collins Creek – Industrial Water

As previously stated (Section 2.2.3.1), the Collins Creek pump house supplies fresh water to the potable water system and additionally services steam boilers and the mill raw water tank. The lower section of the mill raw water tank is a reserve for the fire suppression water system and water drawn from the upper section is used as cooling water for the acid plant (Section 2.2.3.2), as makeup water for the strip solution and as fresh water for the scrubbers in the yellowcake package area. Water from the acid coolers is known as "hot sump" water and is used for the following purposes:

- reagent makeup in the mill;
- cell feed water for solvent extraction wash;
- seal water tank supply; CCD collection box; and
- various other purposes within the mill.

Since it is not contaminated, hot sump water not required for mill process purposes may be sent to mine water tank #3 or to the process water tank.

2.2.6.2 Contaminated Water

The feed streams described above all report to the Rabbit Lake Operation's effluent treatment system either directly or through the mill uranium extraction process. Typical of the treatment systems used throughout the uranium milling industry, the Rabbit Lake effluent treatment system includes solution neutralization, pH adjustment and radium removal processes to remove various COPCs prior to the release of effluent into the environment. Effluent treatment at Rabbit Lake is carried out in three separate solids/liquid separation stages:

- Low pH adjustment in the mill;
- High pH adjustment and neutralization; and
- Final treatment in the effluent treatment area south of the AGTMF.

Individual treatment stages that are part of this process are described below and shown in Figures 2.2.2-1 and 2.2.2-2.

Solution Neutralization

The solution neutralization phase of the contaminated water treatment process involves the use of lime to increase the solution pH to cause the precipitation of contaminants. Liquid waste streams from the mill process circuits (raffinate, clarified barren strip and scrub aqueous), the existing RLTMF raise water and mine water feed make up the contaminated water stream treated with lime and other reagents to enhance the removal of metals. From here it is sent to the two stage pH controlled neutralization circuit and then piped to the effluent treatment area for final treatment prior to release.

Residue Neutralization

Both the mill process residue underflow slurry from the last CCD thickener and the underflow from the CCD cyclones are pumped to a set of three residue neutralization pachucas. Here they are mixed with the low and high pH underflows and slaked lime is added to raise the slurry's pH to neutralize acidity and precipitate any dissolved metals. The tailings slurry resulting from this process is then pumped from the mill to the existing RLTMF for disposal. (Section 2.2.4).

Final pH Treatment

Overflow from the high pH circuit is pumped to the final pH treatment area where reagents are added to precipitate remaining metals and to provide final pH balance prior to release to the effluent treatment area.

Effluent Treatment

Clarified water from the first pond is treated with barium chloride in a second settling pond where any remaining suspended solids are removed. The overflow from this pond is then pumped to a sand filtration system from which the filtrate flows into a third pond. This final effluent is released to the environment through Weir #3 which is the final control point and the effluent compliance monitoring point. The contingency process for effluent malfunctions and accidents is identified in the Mill Program Manual (LIC-002), which references specific duties and responsibilities.

2.2.7 Air Emissions Management

Atmospheric emissions at the Rabbit Lake Operation originate from both stationary and mobile sources. The stationary sources are at the Eagle Point mine, the existing RLTMF and the Rabbit Lake mill complex, including the acid plant. Other sources include the waste rock piles, ore storage pads, AGTMF, the camp, haul roads and airstrip. The mobile sources are the mining equipment and vehicles used to move people, supplies and ore around the site.

At Eagle Point, total suspended particulate (TSP) and radon-222 are the main air quality constituents of concern. The main source of these constituents is the mine ventilation exhaust. Mine ventilation ensures acceptable quality of air for miners working at various locations underground. Monitoring of TSP and radon-222 is carried out at Eagle Point to measure the effects of the exhaust on local air quality.

At the existing RLTMF, fresh tailings are placed by subaerial discharge, subaqueous discharge or injection. All three methods essentially eliminate TSP emissions and reduce radon gas emissions. Raise water drawn from the bottom of the partially filled pit is pumped to a valve chamber where radon gas is released prior to pumping the water to the mill for use in processing ore.

Emissions from the Rabbit Lake mill complex and associated out-buildings are controlled with exhaust fans and heated makeup air. Specifically dust emissions are managed through equipment skirting or closure and ventilation to the atmosphere; appropriate

vessels are maintained at a negative pressure; vent fan failure is alarmed to the central control room DCS. Radon-222 and its progeny are controlled within the mill complex through all the methods mentioned. This provides an effective mechanism to capture radon gas and allow it to be released to the atmosphere in a controlled fashion.

Exhaust air from the acid plant is treated in an absorption tower equipped with a mist eliminator and exhausted to the atmosphere through a 30.5 m high stack. Sulphur dioxide emissions from the sulphuric acid plant are monitored in the stack on a daily basis (with the exception of shut down periods) and ambient sulphur dioxide (SO_2) concentrations in the vicinity of the mill are monitored continuously.

In the yellowcake drying and processing area, exhaust air is passed through venturi scrubbers to minimize emission of uranium bearing particulate. These scrubbers operate by forcing the exhaust gas through water in a venturi section, a wetted elbow and a wet tower assembly. Any solids that are captured by the water and collected in a pump tank are returned to the uranium precipitation circuit thickeners. Finally, air is drawn from the loading and the lid stations, keeping the packaging stations and dryer area at a negative pressure relative to the surrounding area.

2.2.8 Other Types of Waste

2.2.8.1 Domestic Waste

The Rabbit Lake domestic waste landfill is located adjacent to the northeast side of the West #5 waste rock pile, west of the existing RLTMF. This landfill receives non-contaminated domestic waste, which includes both burnable and non-burnable materials: wood and paper waste can be placed separately and burned under provincial permit. Waste rock and sand are used to cover and compact waste in lifts.

2.2.8.2 Contaminated Waste

The Rabbit Lake contaminated waste landfill is located on the surface of the AGTMF and receives radiologically contaminated waste from the entire operation in accordance with the current federal and provincial licences and permits. Waste material is pushed and covered with sand for truck access and to prevent debris from becoming windblown on the AGTMF.

2.2.8.3 Hazardous Waste

In accordance with the Saskatchewan *Hazardous Substance and Waste Dangerous Goods Regulations*, the Rabbit Lake Operation has approved storage facilities. The hazardous substance waste dangerous goods storage facilities inventory is licensed under Appendix E of the current provincial operating approval, PO11-005.

2.2.8.4 Sewage Waste

Sewage from the mill and camp are collected and enter the mill through the neutralization circuit. Sewage from B Zone office and dry area is collected in the six-mile line to the mine water pond and is processed through the mill neutralization circuit. At Eagle Point,

security and other temporary office/trailer setup sewage is collected with a vacuum truck and dumped into the mill neutralization circuit for processing. After processing, the remaining solids are sent to the existing RLTMF via the residue pachucas.

2.2.9 Site Decommissioning and Reclamation

Cameco maintains a preliminary decommissioning plan (PDP) and a financial assurance bond for the Rabbit Lake Operation as part of the federal and provincial regulatory licensing and permitting processes. The PDP was last updated in 2008 and identifies the activities and costs that would be required to decommission the Rabbit Lake Operation while the financial assurance bond (last updated in 2008) provides funding for decommissioning the Rabbit Lake Operation for post-closure assurance. In addition to the PDP, Cameco prepares a one and five year decommissioning and reclamation plan annually for Rabbit Lake Operation, in accordance with requirements of the current permit from the Saskatchewan Ministry of Environment and, since 2009, a Site-wide Reclamation Plan has also been updated annually as required by CNSC licensing.

The objective of the Rabbit Lake Operation decommissioning plan is to generally reclaim the site to a stable condition to meet environmental, radiological and conventional safety criteria (under reasonable occupancy periods) and to support the development of self-sustaining vegetation that is similar to pre-development flora, in terms of cover density, diversity, productivity and ability to host wildlife.

Decommissioning and reclamation activities, where possible, should be undertaken during the operating life of the facility. This progressive reclamation has already been applied at the Collins Bay facilities with breaching of the cofferdams that separate the A Zone and D Zone ponds from Collins Bay and numerous borrow pits and access roads. Commencement of reclamation activities are planned in the near future for the B Zone waste rock pile and planning is advancing for reclamation of the AGTMF.

2.3 Project Related Changes

As noted in Section 2.1, the proposed Project consists of a proposed North Pit Expansion to the existing RLTMF. The purpose of these modifications is to allow the milling of Eagle Point ores, other ores on and off the Rabbit Lake surface lease, waste rock and Cigar Lake URS. Of the various changes proposed herein, the increased tailings capacity is the essential aspect of the Project.

2.3.1 Changes to the Milling Facilities and Mill Utilities

The Rabbit Lake milling facilities will require some piping changes to support the Project; this is the only modification considered to be within the scope of the Project. Piping changes are subject to feasibility study for the Project and may include:

- New piping and ingress for raise water to the Rabbit Lake mill;
- New piping and egress for tailings distribution from the Rabbit Lake mill;
- New piping and egress for a redundant line from the Rabbit Lake mill; and
- Tailings pump and valve upgrades as required in the mill to support the new piping.

2.3.2 Changes to Site Infrastructure

The Rabbit Lake Operation has a mature infrastructure that has evolved with operational needs over the years since operation began in 1975. Components of the site infrastructure that may be needed to support the proposed Project include the airport, materials receiving/forwarding facility, camp facilities, access roads and tie-ins to existing pipelines. No physical changes to the airport are expected to accommodate the Project; the same is expected of the materials receiving/forwarding facility.

Existing camp facilities at the Rabbit Lake Operation are sufficient to house workers for the Project. A temporary construction camp may be established at the during the construction phase.

During the feasibility engineering stage of the Project, there may be proposed changes to existing service roads and recommendations for new piping and tie-in connections to existing piping, access to a new raise pump house and a new tailings distribution valve house.

A concept drawing of new access roads and modifications to the existing access roads is provided as Figure 2.3.2-1. The final location of the new access road may vary slightly from the drawing depending upon information gathered during the detailed design process.

2.3.3 Changes to Tailings Management

Cameco proposes to expand the tailings management capacity by the construction of a 3 Mm^3 North Pit Expansion which will include a new pit, raise, piping and valve houses. Changes will be required to the existing infrastructure to support the North Pit Expansion (Section 2.3.2), and assorted processes will be employed that are authorized under the existing CNSC licence. A concept drawing of the size and location of the pit and waste rock stock piles is provided in Figure 2.3.2-1.

Cameco is proposing to continue with the placement of tailings in the expanded facility below the water table to a consolidated height of approximately 426 metres above sea level (masl) for the purposes of this EA. The final consolidated tailings elevation will be decided on the basis of practical operational considerations, such as maintaining appropriate water cover thickness and hydraulic containment, as well as acceptability of the predicted long-term environmental performance of the North Pit Expansion and adjacent waste rock stockpiles.

There are ongoing improvements and adaptive management initiatives under way that relate to tailings management within the scope of the existing licensed activities. These are excluded from the scope of the Project (e.g. tailings optimization).

2.3.4 Changes to Waste Rock Management

Proposed changes to waste rock management at Rabbit Lake relates to the management of additional clean waste rock and overburden piles, which will be created as a result of the expansion excavation, but will not involve new processes. A priority will be to utilize the overburden material for reclamation projects (i.e. cover material for the B Zone

Waste Rock Pile and the AGTMF) and as construction material for civil projects, such as road building. Portions of the waste rock piles will be used as an aggregate source for the pervious surround and other civil projects, such as road building. It is not anticipated that any of the piles will contain mineralized rock. The waste rock piles will be placed to facilitate final reclamation. If mineralized rock is encountered during excavation, then it will be moved to an area on site already approved for storage of mineralized rock (i.e. B Zone ore pad).

2.3.5 Changes to Water Management

Consistent with approved site practices, groundwater and surface water from the North Pit Expansion will be collected from the surrounding area via its pervious surround. Through experience gained from operating the existing pit, improvements will be undertaken to minimize the formation of frozen tailings layers. This may include, but not be limited to, measures such as injecting tailings at depth and/or operating with a water cover

A diversionary line allowing drainage of the water in the 6-Mile line (conveying Eagle Point mine water to the mill) will be part of the facility as is the case with the current D1 diversion line into the existing RLTMF.

The proposed infrastructure required to accommodate the water from the North Pit Expansion may include the following:

- A corridor along a permanent access road;
- A water cover barge pump and piping;
- New tailings discharge piping;
- New raise returns piping;
- In-pit tailings sub-aqueous distribution piping;
- The 6-Mile line (Eagle Point mine water) in the vicinity of the North Pit Expansion;
- Associated tailings management facilities (pump house, valve house, barge pump, etc.);
- Electrical power supply; and
- Instrumentation.

The amount of water requiring treatment will change from predictions in the 2008 URS EIS due to:

- An increase in the volume of mill effluent due to continued mining at the Eagle Point mine;
- An increase related to additional regional groundwater being captured within the pervious surround of the North Pit Expansion;
- An increase related to the additional treatment of raise water from the proposed North Pit Expansion;
- An increase related to incorporating the AGTMF into the overall site water balance;
- A decrease from reclamation activities for B Zone pond, B Zone Waste Rock Pile; and

- A decrease in Eagle Point mine water with appropriate treatment and discharge.

Improvements to the Rabbit Lake Operation's current water management practices are typically evaluated as part of the operation's approach to continual improvement and adaptive management.

Cameco does not anticipate that additional water treatment capacity will be required with additional appropriate water treatment at Eagle Point and at the mill. Should additional water treatment capacity be required as a result of this Project, it will be established based upon strategies and technologies suitable for the quantity and quality of water requiring treatment.

2.3.6 Changes to Air Emissions

2.3.6.1 Continued Production

There will be impacts to air emissions due to continued mill operation and discharge of tailings to the existing RLTMF for the continued mining of Eagle Point as described in Section 2.3.3. The air emission impacts from the mill will be mitigated by upgrades in 2010 and 2011 to the acid plant to reduce sulphur oxides (SO_x) and nitrogen oxides (NO_x). Through Cameco's Environmental Leadership initiative, there has been a focus on the reduction of propane usage by optimizing the processes in the mill and reducing the temperature in the mine which will result in a reduction of carbon dioxide (CO_2) emissions. It is envisaged practice will continue to be employed for the life of the facility.

2.3.6.2 Construction Phase

During the construction phase of the North Pit Expansion, the excavation process and the operation of heavy equipment will temporarily increase air emissions of dust particulate and the burning of fuel. These impacts will be mitigated by the use of dust control methods and by ensuring construction vehicles are maintained on a regular basis and are in good working condition.

2.3.7 Changes to the Management of Other Types of Wastes

The Rabbit Lake Operation is committed to handle and dispose of wastes generated by the operation in such a manner as to avoid, reduce or control pollution. Management of wastes should include:

- Managing and disposal of wastes in compliance with applicable laws and regulations and in accordance with generally accepted industry practices in a manner which minimizes potential adverse impacts to human health and the environment;
- Tracking the quantities of wastes produced, reduced, reused, recycled, recovered, stored and disposed of and the locations used for waste storage and disposal;
- Continuing to enhance the existing 4Rs program (reduce, reuse, recycle and recover);
- Operating facilities in a manner that reduces the volume and toxicity of wastes generated; and

- Storing wastes only when 4Rs are not possible and, where storage is necessary, utilize appropriate management and/or engineering control systems and provide for their eventual disposal.

All waste management planning and activities should be undertaken in conformance with Cameco's Integrated Safety, Health, Environment and Quality Management System.

Over the next several years, the amount of domestic and industrial waste should be minimized through the implementation of the 4Rs program. Specific to the Project, there will be additional wastes from:

- Continued mining of the Eagle Point mine with the additional ore identified through exploration activities;
- Renewing or replacing current facilities or equipment; and
- Engaging in other mining projects.

Plans have been made at site to extend the life of the existing facilities to accommodate the additional volume.

2.3.8 Changes to the Preliminary Decommissioning Plan

It is anticipated that the proposed tailings expansion and other modifications planned at the Rabbit Lake Operation over the next twenty years would not significantly alter the present approach and objectives of the Rabbit Lake Site Wide Reclamation Plan (2009). This plan will be reviewed as part of the EIS so that long-term environmental effects from the proposed activities from this Project can be meaningfully assessed and appropriate mitigation measures can be considered in the design.

2.4 Project Phases and Scheduling

As summarized in Section 2.1, the Project consists of modifications to existing facility components and processes and licensed activities. Schedules have been developed for each portion of the Project, along with an overall Project schedule that is maintained on a weekly basis. The estimated project timeline with key milestones is listed below in Table 2.4-1.

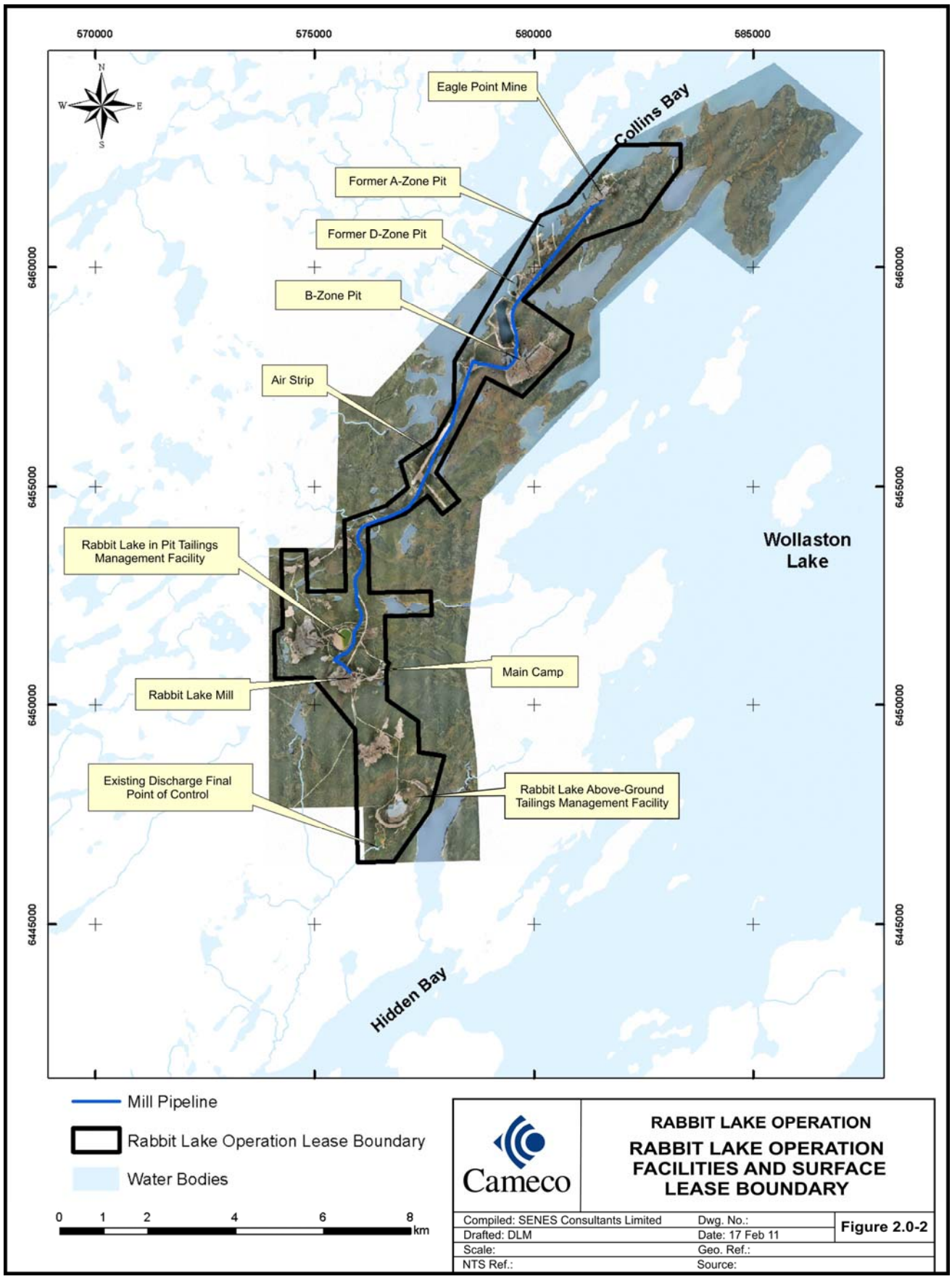
Table 2.4-1
Milestone Timeline

Q1 2014	Submission of EIS
Q4 2014	Construction License Approval Required for RL Tailings North Pit Expansion
Q1 2015	Construction Start
Q4 2016	Current RLTMF expected to be at capacity
Q4 2016	New Pit Construction complete and operational

FIGURES

FIGURES


Camsell Portage
Uranium City
Fond-du-Lac
Lake Athabasca
Stony Rapids
Black Lake
Wollaston Lake
Athabasca Basin
Cluff Lake
McClean Lake
Rabbit Lake
Cigar Lake
Hatchet Lake
McArthur River
Wollaston Lake
Key Lake
Reindeer Lake
955
905
914
SASKATCHEWAN
LEGEND
Active Uranium Mining Operation
Decommissioned Uranium Mining Operation
Athabasca Basin Region Community
Cameco
RABBIT LAKE OPERATION
SITE LOCATION AND REGIONAL STUDY AREA
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Adapted from Cameco & AREVA 2008, Fig 1.1-1
Figure 2.0-1


570000
575000
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N
W
E
S
Eagle Point Mine
Collins Bay
Former A-Zone Pit
Former D-Zone Pit
B-Zone Pit
Air Strip
Rabbit Lake in Pit Tailings Management Facility
Wollaston Lake
Main Camp
Rabbit Lake Mill
Existing Discharge Final Point of Control
Rabbit Lake Above-Ground Tailings Management Facility
Hidden Bay
Mill Pipeline
Rabbit Lake Operation Lease Boundary
Water Bodies
0 1 2 4 6 8 km
Cameco
RABBIT LAKE OPERATION
RABBIT LAKE OPERATION FACILITIES AND SURFACE LEASE BOUNDARY
Compiled: SENES Consultants Limited
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Scale:
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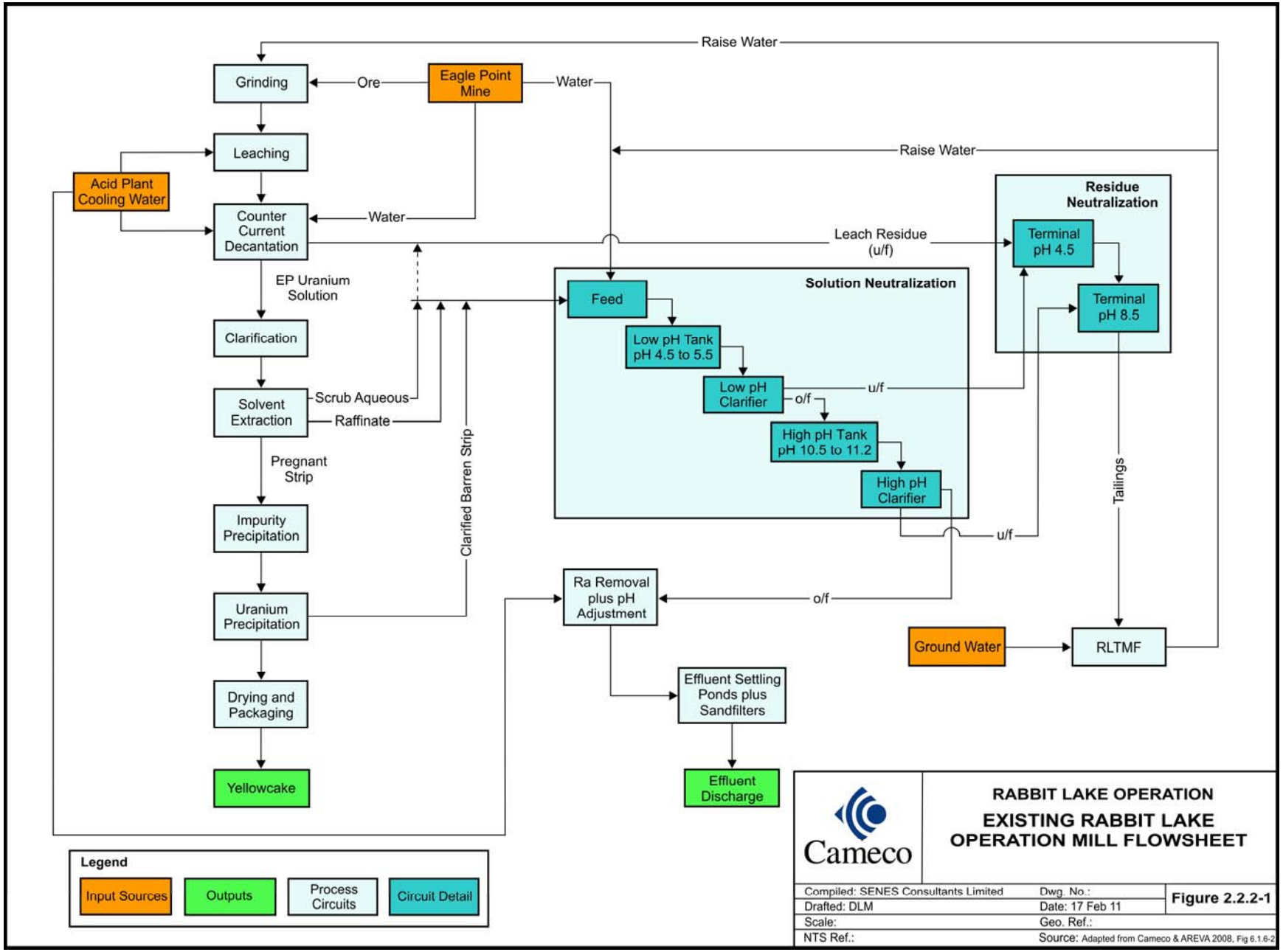
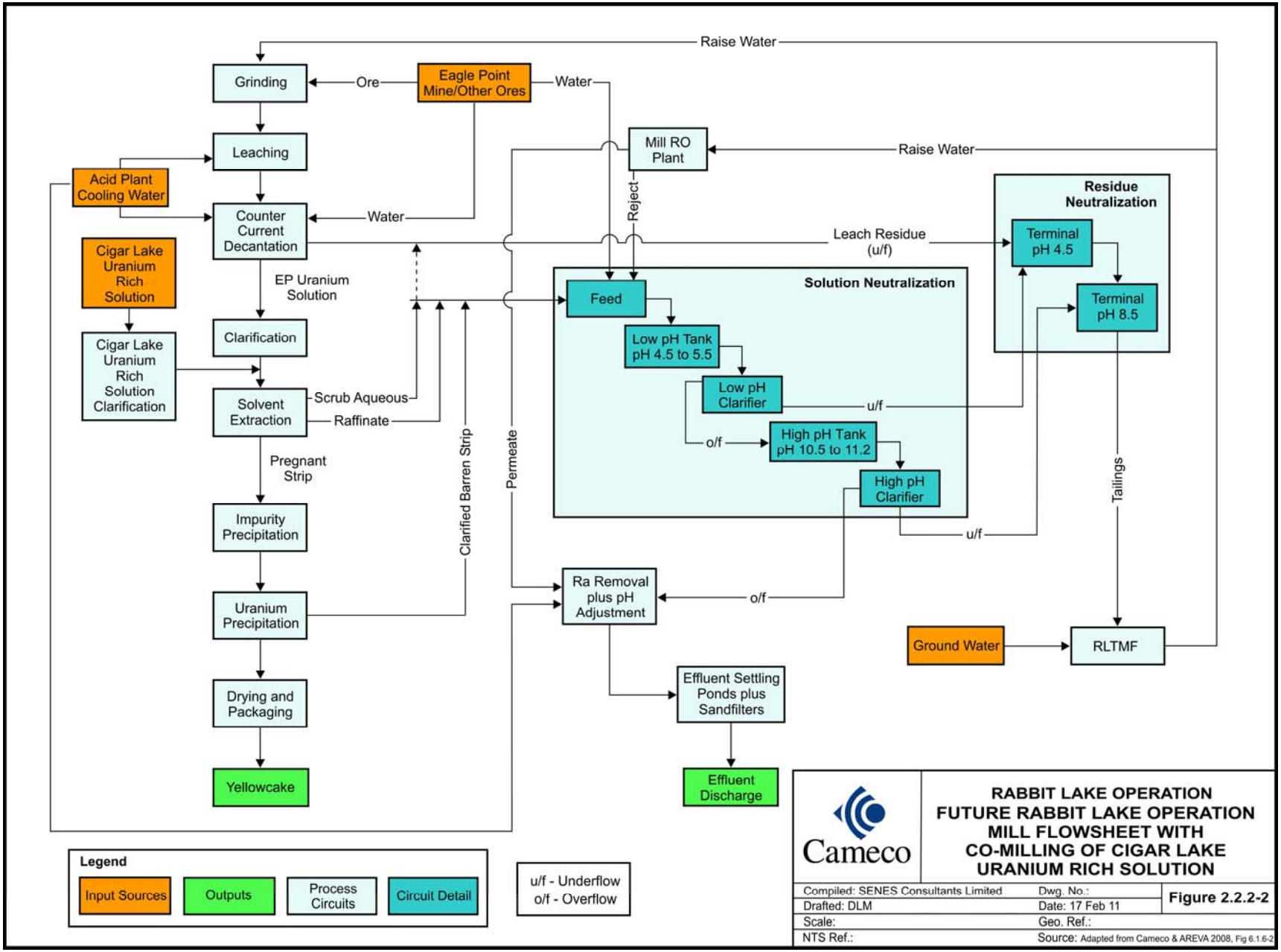
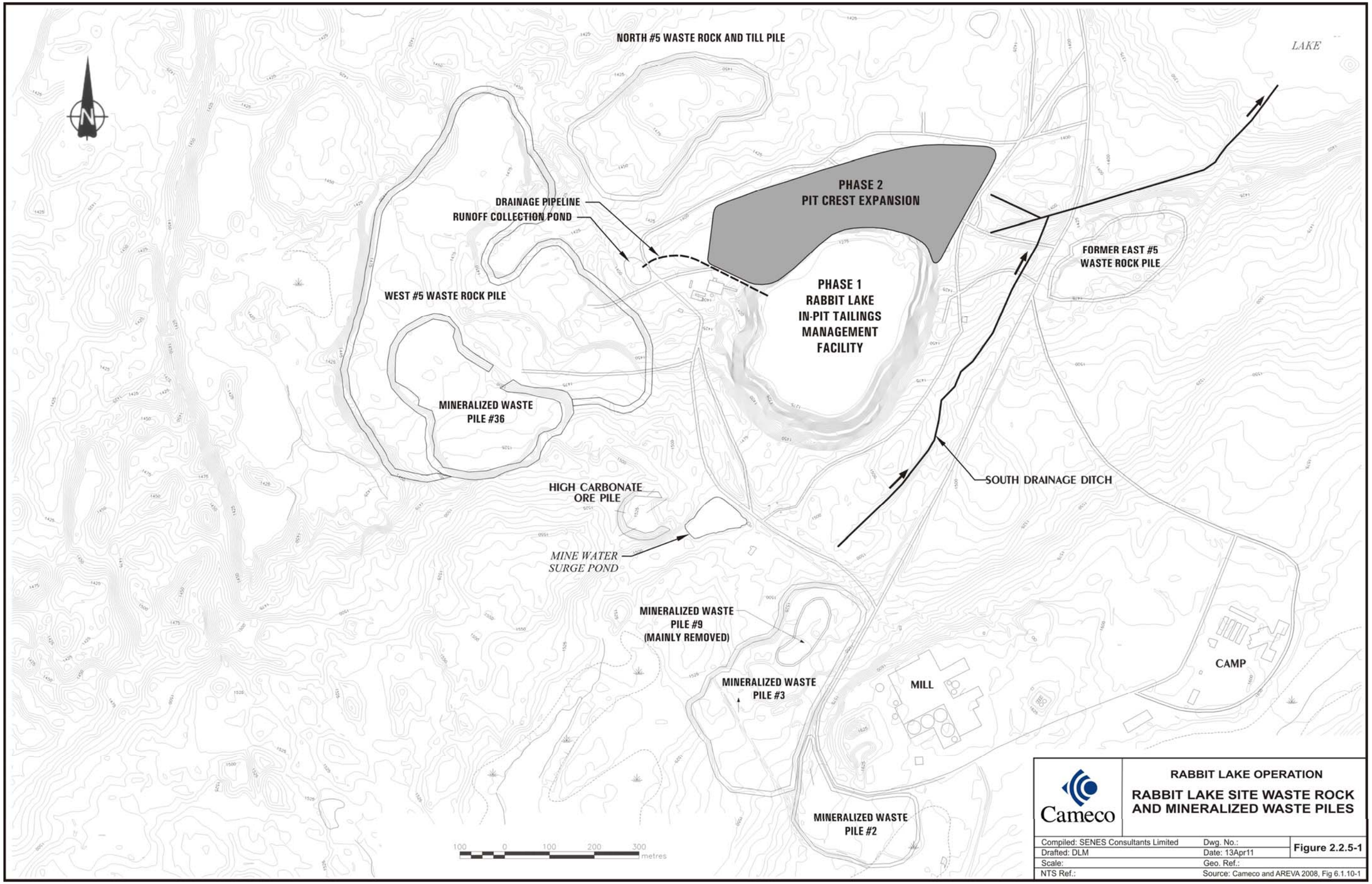
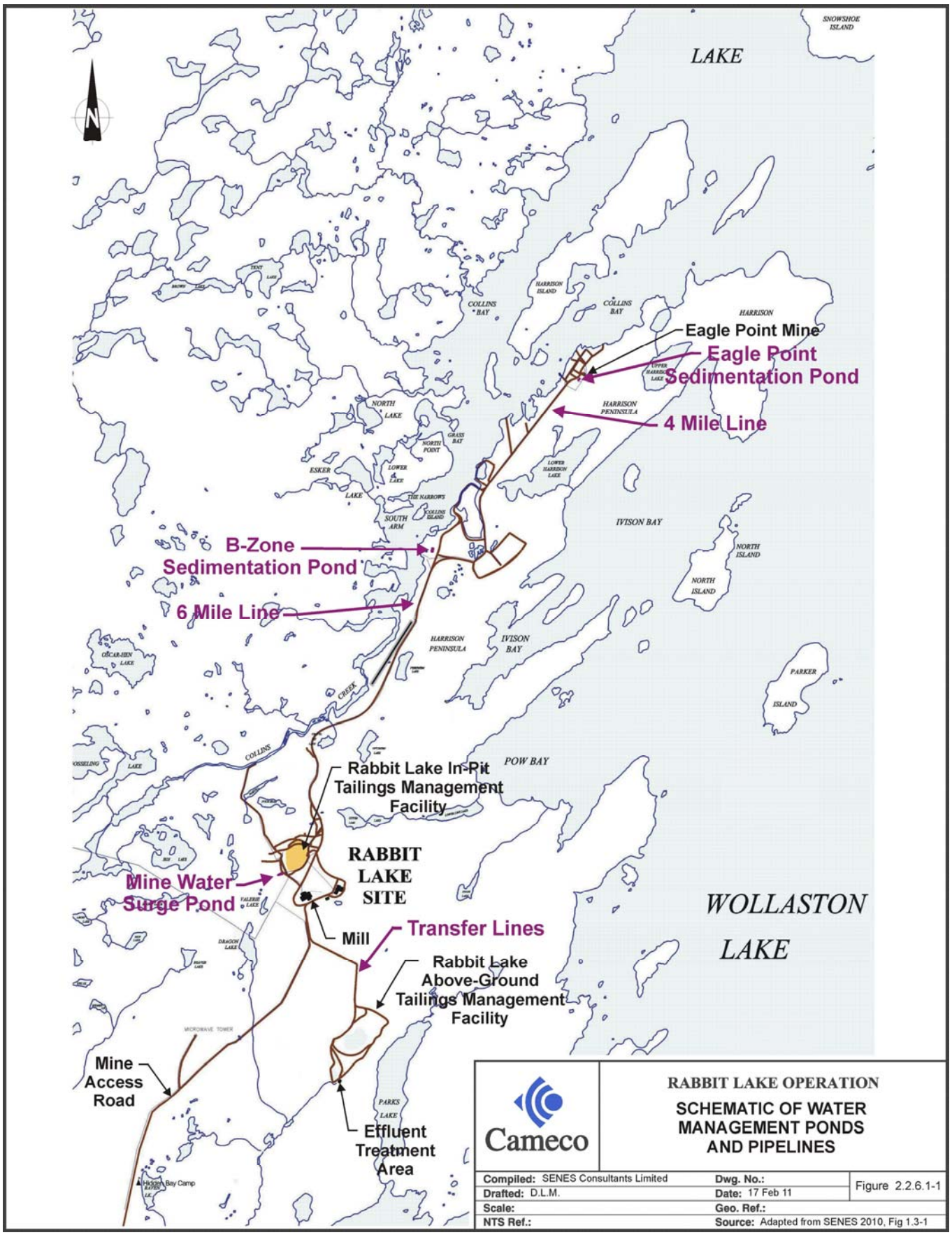
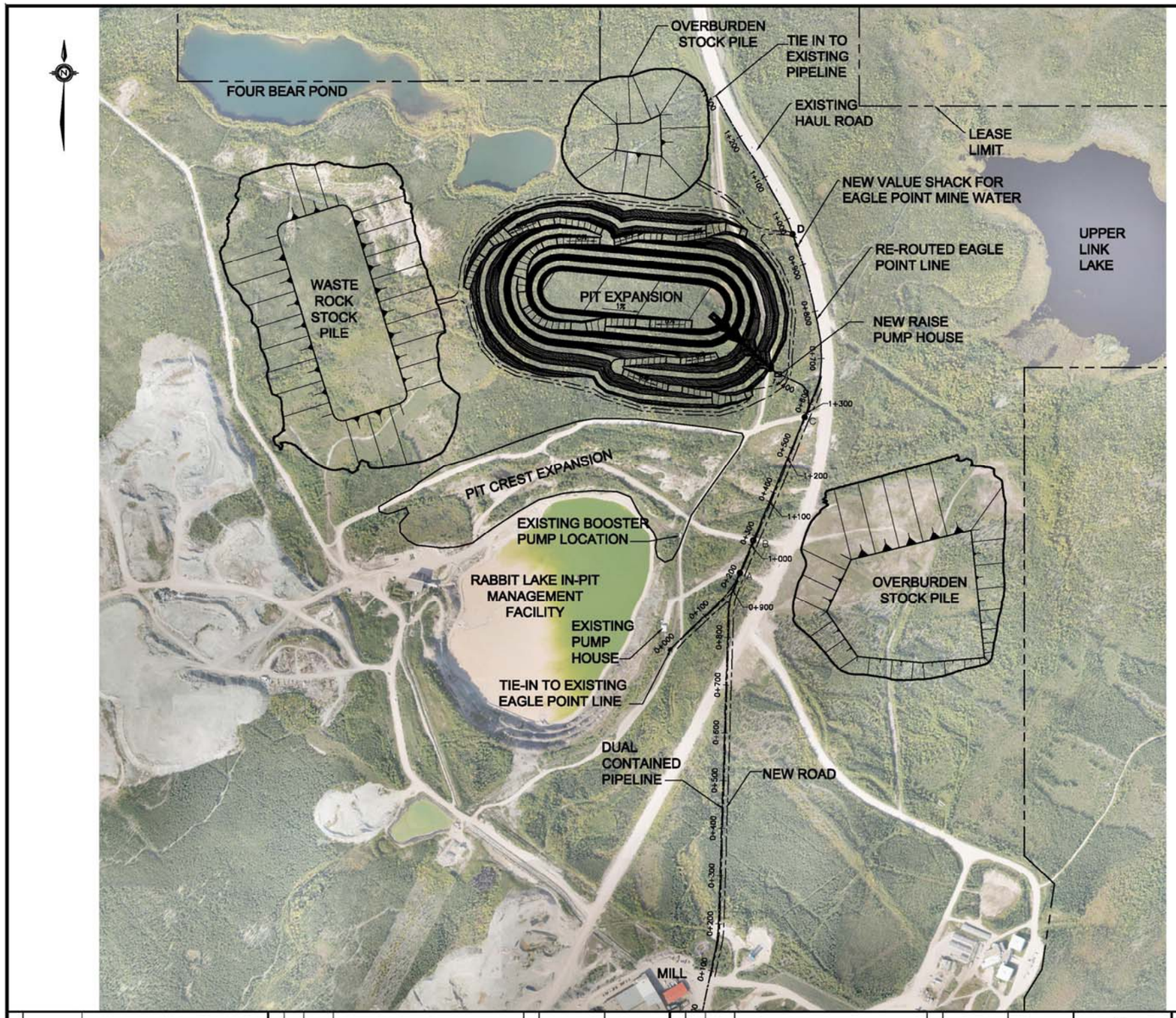
Date: 17 Feb 11
Geo. Ref.:
Source:
Figure 2.0-2


Raise Water
Grinding
Ore
Eagle Point Mine
Water
Leaching
Raise Water
Acid Plant Cooling Water
Residue Neutralization
Counter Current Decantation
Water
Leach Residue (u/f)
Terminal pH 4.5
EP Uranium Solution
Solution Neutralization
Feed
Terminal pH 8.5
Clarification
Low pH Tank pH 4.5 to 5.5
Low pH Clarifier
u/f
Solvent Extraction
Scrub Aqueous
o/f
Raffinate
High pH Tank pH 10.5 to 11.2
Pregnant Strip
High pH Clarifier
Clarified Barren Strip
Tailings
Impurity Precipitation
u/f
Ra Removal plus pH Adjustment
o/f
Uranium Precipitation
Ground Water
RLTMF
Effluent Settling Ponds plus Sandfilters
Drying and Packaging
Yellowcake
Effluent Discharge
Legend
Input Sources
Outputs
Process Circuits
Circuit Detail
Cameco
RABBIT LAKE OPERATION
EXISTING RABBIT LAKE OPERATION MILL FLOWSHEET
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Adapted from Cameco & AREVA 2008, Fig 6.1.6-2
Figure 2.2.2-1


Raise Water
Grinding
Ore
Eagle Point Mine/Other Ores
Water
Leaching
Mill RO Plant
Raise Water
Acid Plant Cooling Water
Counter Current Decantation
Water
Reject
Residue Neutralization
Terminal pH 4.5
Leach Residue (u/f)
Cigar Lake Uranium Rich Solution
EP Uranium Solution
Solution Neutralization
Feed
Terminal pH 8.5
Low pH Tank pH 4.5 to 5.5
Clarification
Cigar Lake Uranium Rich Solution Clarification
Low pH Clarifier
u/f
Solvent Extraction
Scrub Aqueous
Raffinate
o/f
High pH Tank pH 10.5 to 11.2
Pregnant Strip
High pH Clarifier
Tailings
Clarified Barren Strip
Permeate
u/f
Impurity Precipitation
Ra Removal plus pH Adjustment
o/f
Uranium Precipitation
Ground Water
RLTMF
Effluent Settling Ponds plus Sandfilters
Drying and Packaging
Yellowcake
Effluent Discharge
Legend
Input Sources
Outputs
Process Circuits
Circuit Detail
u/f - Underflow
o/f - Overflow
Cameco
RABBIT LAKE OPERATION
FUTURE RABBIT LAKE OPERATION
MILL FLOWSHEET WITH
CO-MILLING OF CIGAR LAKE
URANIUM RICH SOLUTION
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Adapted from Cameco & AREVA 2008, Fig 6.1.6-2
Figure 2.2.2-2


NORTH #5 WASTE ROCK AND TILL PILE
LAKE
PHASE 2
PIT CREST EXPANSION
DRAINAGE PIPELINE
RUNOFF COLLECTION POND
FORMER EAST #5
WASTE ROCK PILE
WEST #5 WASTE ROCK PILE
PHASE 1
RABBIT LAKE
IN-PIT TAILINGS
MANAGEMENT
FACILITY
MINERALIZED WASTE
PILE #36
HIGH CARBONATE
ORE PILE
SOUTH DRAINAGE DITCH
MINE WATER
SURGE POND
MINERALIZED WASTE
PILE #9
(MAINLY REMOVED)
CAMP
MILL
MINERALIZED WASTE
PILE #3
MINERALIZED WASTE
PILE #2
100 0 100 200 300
metres
Cameco
RABBIT LAKE OPERATION
RABBIT LAKE SITE WASTE ROCK
AND MINERALIZED WASTE PILES
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 13Apr11
Geo. Ref.:
Source: Cameco and AREVA 2008, Fig 6.1.10-1
Figure 2.2.5-1


LAKE
Eagle Point Mine
Eagle Point Sedimentation Pond
4 Mile Line
B-Zone Sedimentation Pond
6 Mile Line
Rabbit Lake In-Pit Tailings Management Facility
RABBIT LAKE SITE
Mine Water Surge Pond
Mill
Transfer Lines
Rabbit Lake Above-Ground Tailings Management Facility
Mine Access Road
Effluent Treatment Area
WOLLASTON LAKE
IVISON BAY
POW BAY
HARRISON PENINSULA
COLLINS BAY
RABBIT LAKE OPERATION
SCHEMATIC OF WATER MANAGEMENT PONDS AND PIPELINES
Cameco
Compiled: SENES Consultants Limited
Drafted: D.L.M.
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Adapted from SENES 2010, Fig 1.3-1
Figure 2.2.6.1-1



GENERAL NOTES:

1. THE GRID SYSTEM SHOWN IS RABBIT LAKE MINE GRID.
2. ALL COORDINATES ARE SHOWN IN METERS AND DECIMALS THEREOF.

REFERENCE		
	DWG No.	DESCRIPTION

REVISIONS						
No.	DATE	DESCRIPTION	BY	DES. LEAD APPL.	DES. AUTH. APPL.
C	05/17/11	ISSUED FOR REVIEW	G.Y.		
B	05/10/11	ISSUED FOR REVIEW	G.Y.		
A	04/04/11	PRELIMINARY	G.Y.		

REVISIONS					
No.	DATE	DESCRIPTION	BY	DES. LEAD APPL.	DES. AUTH. APPL.

Cameco
MANAGEMENT RELEASE:

SCALE (A1):		DATE
DESIGNED:	C.D./ A.Z. / A.G.	02/23/11
DRAWN:	G.Y.	02/23/11
CHECKED:		
DESIGN LEAD APPROVAL:		
DESIGN AUTH. APPROVAL:		

PRELIMINARY DRAWING
NOT TO BE USED FOR CONSTRUCTION

PEOPLE, PASSION, PERFORMANCE. TRUSTED GLOBALLY
ATTENTION COMPANY
REFERENCE No. 1019538200-DWG-P0001-C

LOC. RABBIT LAKE
AREA TAILINGS POND AND EFFLUENT TREATMENT

FIGURE 2.3.2-1
PROPOSED PIPELINES, ROAD PIT AND WASTE ROCK STOCKPILES PLAN

DWG. No. RAM3400-P-001 REV C

SECTION 3

EXISTING ENVIRONMENT

3.0 EXISTING ENVIRONMENT

This section describes the existing environment as it is understood from monitoring programs and special investigations conducted at the Rabbit Lake Operation. An abundance of environmental data has been collected in the vicinity of the Project since operations began at the site in the 1970s. The information provided in this section has largely been extracted from the *Rabbit Lake Operation Integrated Environmental Risk Assessment and State of the Environment Report* (*SENES 2010,* also described as the 2010 SOE Report) and the 2008 URS EIS. A more in-depth summary of available data will be provided in the EIS.

3.1 Atmospheric Environment

3.1.1 Climate and Meteorology

The Rabbit Lake Operation is located in the continental sub-arctic region of northern Saskatchewan on the west side of Wollaston Lake. The climate is characterized by short, cool summers and a frost-free period of less than 90 days. Winter months see extremely cold temperatures with occasional outbreaks of Arctic air alternating with milder intrusions of Pacific air. Two meteorological stations at Collins Bay currently collect data: Station 61629 (Environment Canada operated) that collects hourly temperature and wind readings as well as daily precipitation; and Station 61632 (Cameco-operated), which collects daily temperature and precipitation measurements.

3.1.1.1 Temperature

Data collected between 2005 and 2009 at both stations (61629 and 61632), showed similarities: the daily mean maximum temperature at Station 61629 ranged from 20.8 degrees Celsius (^{o}C) in July to –17.4 ^{o}C in January and from 20.4 ^{o}C in July to –17.1 ^{o}C in January at Station 61632; and the daily mean minimum temperature ranged from 11.2 ^{o}C in August to –25.8 ^{o}C in February at Station 61629 and from 9.8 ^{o}C in July to –27.3 ^{o}C in February at Station 61632. This is comparable to Environment Canada's thirty-year temperature normals for the period 1971 to 2000 where the daily mean maximum temperature ranged from a high of 19.9 ° C in July to a low of -20.1 ° C in January and the daily mean minimum temperature ranged from a high of 10.1 ^{o}C in July to a low of -28.7 ^{o}C in January.

3.1.1.2 Precipitation

Between 2005 and 2009, approximately 69% of the total annual precipitation fell as rain, while approximately 54% occurred during the months of June through September, as recorded at Station 61629. Comparable numbers were reported at Station 61632. Environment Canada precipitation normals showed similar results with approximately 62% of the total annual precipitation occurring between 1971 and 2000 falling as rain and approximately 56% occurring during the months of June through September.

3.1.1.3 Surface Winds

Between 2005 and 2009, the prevailing annual wind directions (recorded at Station 61629) were from the south, occurring 12.3% of the time at an average wind speed of 3.9 metres per second (m/s) and from the west, occurring 9.5% of the time at an average wind speed of 3.1 m/s.

3.1.2 Air Quality

3.1.2.1 Radon

Ambient radon-222 monitoring at the Rabbit Lake Operation is currently conducted at 23 track-etch cup (TEC) sites through three separate programs: Wollaston Lake (eighteen sites); B Zone (three sites); and Eagle Point (three sites). Figure 3.1.2.1-1 shows the location of both active and inactive monitoring stations. A fourth monitoring program was carried out in the area of the AGTMF between 1986 and 2004, but was discontinued after it was determined that the radon-222 levels were low and further monitoring was not warranted. In addition to the stations shown on Figure 3.1.2.1-1, a third monitoring station was established at Eagle Point in 2008.

Trends in radon-222 levels were identified in the 2010 SOE Report (*SENES 2010*). In comparison to the mean radon-222 concentrations measured at Wollaston Lake stations between 2000 and 2005, concentrations measured at most stations over the 2005 to 2009 period were lower: radon-222 concentrations at Wollaston Lake stations averaged 18 Bq/m^3 over the 2000 to 2005 period compared to 10 Bq/m^3 over the 2005 to 2009 period. The data from both periods demonstrates that the Rabbit Lake Operation has little effect on regional radon-222 levels. For context, the current Health Canada standard is 200 Bq/m^3 in homes.

3.1.2.2 Total Suspended Particulate

Monitoring of total suspended particulate (TSP) and particulate metals and radionuclides has been conducted at a number of relevant locations around the Rabbit Lake Operation since 1975. Since 1991, three stations have been active, Station 1 located approximately 335 m southeast of the mill, Station 9 located approximately 35 m southeast of the B Zone stockpile and Station EP located approximately 100 m east of the portal at Eagle Point (Figure 3.1.2.2-1). A 24-hour sample is collected once every six days for TSP at each monitoring location. Monthly composites are submitted for metal analysis and semi-annual composites for radionuclide analysis.

Between 2005 and 2009 the mean annual TSP concentrations at all three monitoring stations were consistently below the provincial mean annual limit of 70 micrograms per cubic metre ($\mu g/m^3$) for ambient air. There were few individual sampling days where concentrations were above the provincial 24-hour TSP limit of 120 $\mu g/m^3$ for ambient air at Station EP, with no exceedances reported for Stations 1 and 9. The 24-hour TSP standard was only exceeded on 5 out of 300 occasions (<2% of the time) at Station EP, with no exceedances occurring in 2008 and 2009 when mean TSP concentrations were lower and closer to the baseline level than in previous years.

3.1.2.3 Sulphur Dioxide

The acid plant is the primary source of sulphur emissions at the Rabbit Lake Operation. Ambient SO_2 concentrations have been monitored continuously in the vicinity of the Rabbit Lake mill since the plant was opened in 1975. The ambient SO_2 monitor is located approximately 335 m southeast of the acid plant stack, next to TSP Station 1 (Figure 3.1.2.2-1). A comparison of the SO_2 monitoring results (collected between 2005 and 2009) to Saskatchewan's ambient air quality standards indicates that there were no exceedances of the annual standard of 0.01 parts per million (ppm), only one exceedance of the daily standard of 0.06 ppm and nine exceedances (out of approximately 38,900 measurements) of the hourly standard of 0.17 ppm. Typically, exceedance of the hourly standard has been found to occur with start up of the acid plant. Replacement of the acid plant converter was completed in early September of 2010 and this action resulted in a large decrease (approximately 70%) in SO_2 emissions from the plant and is therefore anticipated to result in the ambient air quality standards being consistently met at the ambient monitoring location.

3.1.2.4 Mill Exhaust Stack Emissions

To fulfill three-year mill stack emission requirement of the Rabbit Lake Operation environmental monitoring program (EMP), the Rabbit Lake mill exhaust stacks were sampled by Saskatchewan Research Council in 2007. The three stacks sampled included the dryer scrubber, dust collector in the dryer area and the yellowcake packaging scrubber. The monitoring requirements included analysis of arsenic, copper, lead, molybdenum, nickel, uranium, zinc, lead-210, radium-226 and thorium-230. Further information pertaining to stack emissions will be provided in the EIS.

3.1.2.5 Lichen Sampling

Since 1986, lichen has been sampled every three years using *Cladina stellaris* as the indicator species. Collected samples are analyzed for radionuclides (generally lead-210, radium-226 and thorium-230) and selected metals (arsenic, nickel and uranium). Since 1995, thirteen stations have been sampled consistently for uranium, which coincide with several radon TEC sites of the Wollaston Lake Program (Figure 3.1.2.1-1 for station locations).

Uranium concentrations peaked at most near-field stations (EM-7, EM-10, EM-11, EM-20, EM-23 and EM-24) in 1998 during the height of mining activities at the A Zone and D Zone areas and Eagle Point (*Cameco 2001; 2004*). In this case a near-field station is defined as a station within approximately 2 km of A Zone, D Zone or Eagle Point mine. Uranium concentrations at these stations decreased to much lower levels in 2001 and 2004, while concentrations at far-field stations (EM-9, EM-15 and EM-26) remained relatively unaffected by the mining activities. A far-field station is defined as a station 2 km or greater from A Zone, D Zone or Eagle Point mine. A temporal trend similar to that for uranium was not apparent for the radionuclides. Lead-210, radium-226 and thorium-230 concentrations at Stations EM-1, EM-2 and EM-12 have remained fairly consistent over time. Lead-210 is strongly influenced by natural atmospheric conditions (i.e. precipitation, temperature) and this may explain the observed increase in 2004.

3.1.3 Noise Quality

Noise sources at the Rabbit Lake Operation are typical of industrial sites. Noise levels are monitored within facilities that have the potential for noise constraints on humans. Buildings and locations with noise levels measured above acceptable limits are posted with signage requiring hearing protection.

Ambient noise levels in the surrounding environment are not monitored.

3.2 Geology, Hydrogeology and Groundwater Quality

3.2.1 Geology

The Rabbit Lake Operation lies within the eastern border of the Athabasca Basin, in the Churchill Province of the Canadian Shield (Figure 3.2.1-1). The present-day landscape is dominated by landforms from the last episode of continental glaciation, which moved in a north/north-east direction. The geology of the proposed Project area is comprised of three major components: surficial deposits, Athabasca sandstone and basement rock. In the vicinity of the Project, the combined thickness of surficial sediments (deposited during the Quaternary period) ranges from approximately five to 20 m with boulder lag seen throughout much of the area where surficial till has been eroded and finer-grained silty sands typically deposited in the lower lying areas. Sandstone in the area belongs to the lower Manitou Falls Formation of the Middle Proterozoic Athabasca Group. The sandstone unconformably overlies the crystalline basement rocks. The uranium in the former Rabbit Lake deposit was hosted immediately above and below the unconformity. The thickness of the sandstone typically increases in a northwesterly direction from the proposed location of the Project, ranging from five to 20 m within the immediate vicinity, to 150 m within a distance of 10 to 15 km northeast of the Project's location. Finally, the basement rock, which underlies the sandstone unit, consists of Archean granites of the Pre-Wollaston Group overlain by Early Proterozoic (Aphebian) paragneissic rocks of the Wollaston Group. The basement rock forms part of the Canadian Shield, which is a tectonically stable continental plate with low risk of seismic activity.

3.2.2 Hydrogeology

In the area of the Rabbit Lake Operation, the groundwater flow system is controlled by the presence of discontinuous deposits of eskerine sands and gravels situated within an overall low permeability till, sandstone and bedrock environment. Fracture flow in the bedrock is the main control on regional groundwater flow with primary locations for regional discharge being Collins Creek and Wollaston Lake. The local groundwater pattern in the immediate vicinity of the Project is significantly influenced by the on-going dewatering of the existing RLTMF nearby. Dewatering of the existing RLTMF is accomplished by pumping groundwater from the raise pump house located to the south of the existing RLTMF.

The drawdown cone around the existing RLTMF is steep and therefore, limited to a distance of about 1,000 m around the facility (Figure 3.2.2-1). While groundwater elevations in the existing RLTMF (raise pump) are maintained at approximately 310 masl

(120 m below the original water level in Rabbit Lake), the drawdown in groundwater elevations and lake levels surrounding the pit is limited in areal extent. The low groundwater inflow to the existing RLTMF and the minimal effect of dewatering activities on water levels in nearby lakes, indicate that the Project is situated in a low permeability environment. Furthermore, hydrogeological evidence suggests that the more permeable eskerine deposits to the west of the existing RLTMF are not continuous below the water table and are not connected to the Project's location.

Estimates of hydraulic conductivities from a recent drill program in the immediate vicinity of the Project's location indicate hydraulic conductivities for the basement rock and regolith ranging from $1.8x10^{-9}$ to $5.2x10^{-7}$ m/s (*SRK 2011*).

3.2.3 Groundwater Quality

Groundwater quality monitoring in the area of the existing RLTMF was not carried out prior to the commencement of mining in 1975. From 1987 to 1993, three multi-level piezometers were used to monitor groundwater quality under normal groundwater flow conditions in bedrock associated with the Rabbit Lake fault at sites located down gradient of the existing RLTMF. The data collected during this period indicated that groundwater quality was similar at all three sampling horizons and had a different chemical signature when compared with the facility's raise-water quality. In 1992 and 1993, a series of shallow (RP series) peizometers were installed in the overburden, overburden/bedrock interface and the upper portion of the bedrock in vicinity of the existing RLTMF. The locations of the piezometers are shown on Figure 3.2.3-1. Most recently, shallow piezometers were installed in the vicinity of the proposed location of the Project (HIG series - Figure 3.2.3-1). Results from all piezometers will be provided in the EIS.

3.3 Aquatic Environment

3.3.1 Regional, Local and Rabbit Lake Site Drainage

3.3.1.1 Regional Drainage

Regionally, the Rabbit Lake Operation is situated on a major continental drainage divide which includes the Mackenzie River drainage system to the north and the Churchill River drainage system to the south. Local streams from both drainage systems discharge to Wollaston Lake. Wollaston Lake drains naturally in two directions (*Geomatics Canada 1995*). The Fond du Lac River flows northwest from the northwest corner of Wollaston Lake into Lake Athabasca and the Mackenzie River system. The Cochrane River initially flows northeast from the northeast end of Wollaston Lake, but eventually courses south, to Reindeer Lake, which in turn drains to the Churchill River and ultimately to Hudson Bay. About 85 to 90% (percent) of the water from Wollaston Lake is discharged through the Cochrane River and the remainder through the Fond du Lac River (*Environment Canada 1970; Mackenzie River Basin Committee 1981*).

3.3.1.2 Local Drainage

The majority of land to the west and south of the Rabbit Lake Operation lies within the Collins Creek and Umpherville River watersheds that both flow into Wollaston Lake. The average longitudinal slopes within the watersheds vary between 0.006% and 0.288%. These low hydrographic gradients and the large number of lakes within each of the watersheds, result in high surface water storage and long lag time between precipitation and outflow events (*Cameco and AREVA 2008*). Collins Creek flows approximately 62 km from its headwaters to the outlet at Collins Bay on Wollaston Lake. Collins Creek drains an area of approximately 685 square kilometers (km^2); 16% (109 km^2) of this area drained is occupied by lakes. The Umpherville River watershed drains an area of approximately 850 km^2 southwest of the Rabbit Lake Operation and discharges to Hidden Bay on Wollaston Lake.

3.3.1.3 Site Drainage

Due to the Rabbit Lake Operation having facilities spread across a larger distance, surface water drainage occurs in a number of small sub-basins that flow either north to Collins Bay or south to Ivison, Pow or Hidden bays. There are three site-specific drainages associated with this Project, Horseshoe Creek/Hidden Bay, Link Lakes/Pow Bay and Four Bear Pond/Collins Bay watersheds.

Horseshoe Creek (Figure 3.3.1.3-1) drains south through Horseshoe Pond and eventually discharges into Hidden Bay on Wollaston Lake. Contaminated and process water generated at the Rabbit Lake Operation (i.e. drainage from waste rock piles, mineralized waste and ore stockpiles, mine water from Eagle Point, raise water from the existing RLTMF, surface runoff and some seepage flows from the AGTMF, mill process water) is treated in the effluent treatment system and discharged to the headwaters of Horseshoe Creek. Station 2.3.3 (Figure 3.3.1.3-1) has been designated as the final point of operational control for the treated effluent.

The Link Lakes watershed (Figure 3.3.1.3-2) consists of Upper Link Lake, which drains into Lower Link Lake through a wetland area and then into Pow Bay on Wollaston Lake. Between 1975 and 1977, untreated mine water from the Rabbit Lake pit was discharged through a drainage ditch and into Upper Link Lake. A sedimentation dam was constructed at the outlet of Upper Link Lake to minimize sediment transport downstream. Runoff from the waste rock and ore stockpiles around the mill and the mill complex were later routed through a south drainage ditch and into the main drainage ditch, which fed into Upper Link Lake. This practice was discontinued in the early 1980s with the construction of the mine water surge pond. Mine water and site runoff that collects in the pond is now pumped to the mill for re-use or treated through the effluent treatment process and discharged to the Horseshoe Creek watershed. The north drainage ditch, which receives runoff from the north and west waste rock piles, also drained into the main drainage ditch, but the flow was diverted in late 1997 to the existing RLTMF from where it is pumped to the mill for treatment. In 1999, recycling of cooling water from the mill for use as process water commenced, reducing the amount of water discharged to the

south drainage ditch. Discharge of cooling water to the south drainage ditch continued intermittently until 2003 when the discharge was essentially eliminated (*SENES 2010*).

Four Bear Pond, (Figure 3.3.1.3-2), is situated adjacent to the north boundary of the Link Lakes watershed, approximately 500 m north of the existing RLTMF. It is an isolated water body with a drainage area of only 0.4 km^2. There is no defined outflow from the pond. The pond is comprised of two distinct basins separated by a wetland complex and small channel.

3.3.1.4 Flow Data

Regionally, long-term flow data are available for a number of streams that drain the eastern Athabasca Basin region (*Cameco and AREVA 2008*). Locally, flow has been measured since 1979 in Collins Creek below McClean Lake, but has not been regularly monitored within the Umpherville River watershed. Flow within Horseshoe Creek is highly dependent on the effluent discharge from Rabbit Lake because there is little natural runoff several months of the year. Flow is continuously monitored and logged at the final point of effluent discharge (Station 2.3.3). Daily flow measurements at two stations within the Link Lakes watershed capture flow data. Station 1.2.5, which is positioned at the main drainage ditch adjacent to the haul road upstream from Upper Link Lake and Station 1.4, which is located at the sedimentation dam outlet of Upper Link Lake. For reasons described in the previous subsection, flow at these stations is intermittent with no flow occurring for most of the year.

3.3.2 Surface Water and Sediment Quality

3.3.2.1 Surface Water Quality

Water quality has been monitored extensively at the Rabbit Lake Operation since 1974. In addition to the specific monitoring requirements of the regulatory agencies, Cameco conducts voluntary monitoring to further assess the performance of the operation. Water monitoring stations are shown on Figure 3.3.2.1-1. The number of constituents monitored and the length and frequency of monitoring varies widely between stations depending on the regulatory requirements and specific conditions for each station.

Horseshoe Creek and Hidden Bay Watershed

Contaminated water from the Rabbit Lake Operation (including the existing RLTMF raise water, Eagle Point mine water, mill process effluent, contaminated site drainage, sewage and seepage from the AGTMF) is treated in the neutralization circuit in the mill and the effluent treatment system before being released to Horseshoe Creek at Station 2.3.3, which has been designated by the regulatory agencies as the final point of control. The treatment process involves several steps for adjustment of pH, precipitation of metals and removal of radium as described in Section 2.2.6.2. Station 2.3.3 is sampled weekly with constituents measured on a weekly, monthly, quarterly or semi-annual basis. Monitoring of water quality in the receiving environment is carried out at several stations in Horseshoe Creek and Hidden Bay. The monitoring locations are shown in Figure 3.3.2.1-1 and include Station 3.1 (Horseshoe Pond), 3.2 (Horseshoe Creek near Hidden

Bay), 3.2.2 (Hidden Bay near Horseshoe Creek outflow) and 3.4 (Hidden Bay). Environmental effects monitoring is also carried out on Horseshoe Pond (Station 3.1), Hidden Bay shallow (Station 3.2.2) and Hidden Bay deep (Station 3.4).

Mean constituent concentrations measured at Station 2.3.3 over the 2005 to 2009 period were consistently below the effluent limits for all of the regulated metals and radionuclides. On three occasions (1% of measurements), the pH value measured in the field was below the lower limit of 6.0; however, none of the pH values reported in the laboratory were found to fall outside the desired range of 6.0 to 9.5. Water quality at Station 2.3.3 was found to have improved for several constituents since the previous State of the Environment (SOE) report for the 2000 to 2005 period (*SENES 2007*), with statistically significant decreasing trends observed for almost all metal and radionuclide constituents. Constituent concentrations measured at Station 2.3.3 and other stations in Horseshoe Creek and Hidden Bay will be reported in the EIS.

Link Lakes and Pow Bay Watershed

Water quality is measured at four stations within the Link Lakes watershed. Station 1.2.5 is located along the main drainage ditch at the main Haul Road and discharges to Upper Link Lake. With diversion of contaminated waters to the existing RLTMF, the main drainage ditch now carries flow from only a small portion of the original Rabbit Lake drainage basin and flow occurs at infrequent intervals, such as during spring snowmelt or after a major rainfall event. As such, sampling at Station 1.2.5 has occurred only once or twice each year. The other stations that characterize the Link Lakes system include the outflow from Upper Link Lake (Station 1.4), the outlet of Lower Link Lake (Station 1.4.5) and Pow Bay on Wollaston Lake (Station 1.5). Station locations are shown on Figure 3.3.2.1-1. Historically, water quality in Upper Link Lake was also monitored at Station W9 at the inflow and Station 1.4.1 in the middle of the lake.

Although the mean concentrations of many constituents, including arsenic, copper, lead and uranium were above applicable water quality criteria (SSWQO) at Station 1.2.5, concentrations decreased progressively downstream through Upper and Lower Link Lakes and in most cases were diluted to non-detectable or background levels in Pow Bay. In addition, statistically significant decreasing trends in constituent concentrations relative to the previous SOE period (2000 to 2005) were noted for many of the metals (i.e. arsenic, molybdenum and uranium) and radium-226 at several stations within the Link Lakes system. A detailed summary of the results and findings of the monitoring data will be provided in the EIS.

Four Bear Pond

As part of efforts outside of the environmental monitoring program, baseline composite water samples were collected from Four Bear Pond in September 2009 (*CanNorth 2011*). The pond, shown in Figure 3.3.1.3-2, contained low nutrient concentrations and was classified as oligotrophic. Baseline levels of metals, trace elements and radionuclides in the water were generally low, with the majority of values falling close to or below the method detection limits. The data reported from this investigation will be included in the EIS.

3.3.2.2 Sediment Quality

Sediment sampling at the Rabbit Lake Operation was initiated in 1975 with samples collected annually from 1979 to 1987, except in 1976. Over this time sediment locations, station names, sampling and analytical methods and requirements varied. These changes are discussed in SOE reports (*TAEM and SENES 1996; CanNorth and SENES 2001*). In 1990, a new sediment monitoring program was established, requiring sediment sampling to be conducted every three years (1990 through 2000). This new monitoring program established three permanent monitoring stations in Hidden Bay (S4), Pow Bay (S2) and Horseshoe Pond (S3) with five replicate sampling sites at each station. Since 2002, sediment sampling for the Rabbit Lake EMP has been completed during the *Metal Mining and Effluent Regulations* (MMER) and CNSC environmental effects monitoring (EEM) programs (as of March 2011 the CNSC EEM program has changed to a biological effects monitoring (BEM) program as per LIC-003), which are also conducted every three years, in order to increase sampling efficiency, avoid redundancy, minimize pressure on aquatic systems and reduce costs. Between 2005 and 2009, sediment sampling was completed in 2005 and 2008 by Golder and CanNorth, respectively (*Golder 2005; CanNorth 2009a*). Stations where sediment was sampled during these programs are shown on Figure 3.3.2.2-1.

In addition to the required sediment monitoring, multiple special investigations were completed between 2005 and 2009 which focused on or incorporated sediment studies (*CanNorth 2007; 2009b,c; 2010a,b; and Golder 2009*). Baseline samples were collected from Four Bear pond in 2009 as part of a special investigation (*CanNorth 2011*). A summary of the data reported from these various investigations will be presented in the EIS.

3.3.3 Aquatic Resources

With the exception of Wollaston Lake, most lakes within the vicinity of Rabbit Lake Operation are relatively shallow and predominantly composed of sand substrate. The lakes in the area are characteristic of northern Saskatchewan, that is, they are typically nutrient poor and with pH ranging between marginally alkaline to marginally acidic depending on the influence of surrounding bogs and fens.

Extensive environmental monitoring of the Rabbit Lake Operation has been required throughout its operational period in order to meet regulatory requirements. Both Environment Canada (EC) *MMER* and CNSC have required Cameco to conduct approved EEM programs to evaluate the effects of mine effluent on fish and fish habitat by analyzing fish population and benthic invertebrate community data. The EC EEM is conducted on the Horseshoe Creek watershed, and up until 2010 the CNSC EEM was conducted on both the Horseshoe Creek and Link Lakes watersheds. In 2010, the CNSC agreed that future monitoring on Link Lakes would change over to a BEM program. All monitoring stations associated with the EEM programs are shown on Figure 3.3.3-1. The SMOE Approval to Operate Pollution Control Facilities also requires Cameco to conduct an EMP. The Rabbit Lake Operation EMP is conducted site-wide (Horseshoe Creek and Link Lakes watersheds as well as Collins Bay) and beyond. The aquatic biota component

includes fish population and benthic invertebrate community surveys and supporting data (water chemistry and sediment particle size), large-bodied fish tissue chemistry and acute toxicity testing (at an annual frequency) of the final effluent.

In 2010, a comprehensive aquatic investigation (including benthic invertebrate and fish community surveys) was completed by CanNorth (*2011*) to establish baseline conditions in the Four Bear Pond study area. Sampling of Four Bear Pond yielded no fish despite multiple sampling methods. This finding indicates that Four Bear Pond is not a fish bearing water body.

The results and findings of these various investigations will be provided as part of the EIS.

3.4 Terrestrial Resources

The Rabbit Lake Operation lies within the Athabasca Plain ecoregion and the Boreal Shield ecozone in northern Saskatchewan (Saskatchewan Conservation Data Centre *(SKCDC) 2002*). The landscape is characterized by flat-lying sandstone bedrock and a nearly continuous cover of sandy glacial deposits (*Fung 1999*). The topography of the Project study area is typical of the Precambrian Shield, with extensive areas of rock forming broad, smooth uplands and lowlands. Prominent eskers are common in this area, but essentially this area is a drumlinoid moraine that is extensively covered in undulating glaciofluvial outwash deposits. Brunisolic soils dominate the well-drained slope positions in some of the landscapes, with Gleysols and organics and local Cryosols in the numerous small, poorly drained swales and flats (*Acton et al. 1998*). Lakes, fens and bogs fill the valleys and depressions between the ridges, hills and knolls found on the landscape.

Routine monitoring of the terrestrial environment at the Rabbit Lake Operation is undertaken through lichen sampling, which is conducted as part of the air quality monitoring program (Section 3.1.2). In addition, a number of focused terrestrial baseline studies, including soil, vegetation and wildlife components, have been conducted at various times throughout the operational history of the mine. A brief summary of terrestrial information relevant to the Project is presented in the following sub-sections.

3.4.1 Soil

Monitoring of soil quality has been performed on occasion as a component of comprehensive terrestrial investigations. Soil samples were collected during July and August 2008 as part of a study in the Optimism Pond area of the Rabbit Lake Operation (*CanNorth 2010*). This area is located immediately adjacent to the Four Bear Pond area. Samples were collected from ten sites in the Optimism Pond study area and from two reference sites outside the study area (station 6 and 7) at the locations in Figure 3.4.1-1. CanNorth (*2010*) reported that in general, soil samples showed little variability in the concentrations of most constituents between stations and that the concentrations and activities of all constituents, for which soil quality guidelines have been developed, were below guideline values (*CCME 2011*). A full summary of the study findings will be presented in the EIS.

3.4.2 Vegetation

Harms (*1977*) completed a baseline survey of terrestrial vegetation within a five-mile radius of the Rabbit Lake mine site in 1976. The common vegetation types, as identified by Harms (*1977*) included Jack Pine (*Pinus banksiana*);,Jack Pine/Black Spruce (*Picea mariana*), Black Spruce; Regeneration, Treed and Open Bogs and Sedge Fen. Plant species diversity (*Harms 1977*) and floristic diversity (*GMCL 1980*) were reported as low in the Rabbit Lake Operation area. Gulf Minerals Canada Limited (*1980*) explained low floristic diversity as being a factor of an adverse climate, shallow rooting depths, thin soils and high fire frequency.

Between 2005 and 2010, four separate terrestrial baseline ecological inventories were completed: in the Four Bear Pond study area (*CanNorth 2011*); in the area of Optimism Pond immediately north of the Project area (*CanNorth 2010*); in the area of the Tamarack deposit located to the west of the Rabbit Lake Operation (*CanNorth 2009*); and, in the area of the Midwest Project located to the west of the Rabbit Lake Operation (*CanNorth 2006*). The data gathered in these inventories were combined to produce a regional database and mapping product. A total of 22 Ecosite phases were classified and mapped in the baseline study area shown in Figure 3.4.2-1, which encompasses an area of 69.7 km^2. The dominant phases are the black spruce forest – closed canopy (28.3% of the total area), regeneration – tree or tall shrub dominated (20.1%), recent burn (12.6%), lake/pond (7.2%) and disturbed lands – non-vegetated (5.7%). Vegetation and wildlife habitat sampling was also completed for the Four Bear Pond baseline study area with similar programs on other projects in the regional study area to describe and quantify the structural and botanical conditions within recurring mapped Ecosite phase types. A summary description of Ecosite phase conditions in the study area will be presented in the Project's EIS.

In the immediate Four Bear Pond study area, vegetation studies carried out in August 2009 focused on rare species and community composition (*CanNorth 2011*). Rare plant occurrences in the 3.58 km^2 study area are indicated on Figure 3.4.2-2. Three rare plant species were observed, few-flowered sedge (*Carex pauciflora*) at eight locations, Alaskan clubmoss (*Lycopodium sitchense*) at one location and American scheuchzeria (*Scheuchzeria palustris var. americana*) at two locations, over a total of nine locations. None of the rare plant species observed in the Four Bear Pond study area are provincially or federally listed species.

Labrador tea samples were collected for analyses of metals and radionuclides, close to Four Bear Pond, as part of the Optimism Pond area vegetation survey CanNorth (*2010*). Vegetation samples were collected from ten sites in the Rabbit Lake Operation area and from two reference sites outside the study area during July/August 2008. The locations of the sampling plots were the same as those shown for the soil sampling locations on Figure 3.4.1-1. Chemical analysis of common Labrador tea (*Ledum groenlandicum*) samples indicated that in general, there was little variability in the concentrations and activities of most constituents between stations and that the concentrations of most constituents were below MDL values in vegetation samples.

3.4.3 Wildlife

3.4.3.1 Wildlife Populations

Two studies conducted by Willard and Boden in 1976 (*Willard and Boden 1976a, b*) and one study conducted by Gulf Minerals Canada Limited in 1979 (*GMCL 1980*) provide baseline data on wildlife populations occurring within the vicinity of the Rabbit Lake Operation. Small mammal and general wildlife surveys conducted by Golder Associates provide additional baseline wildlife data for the study area (*Golder 1994; 2003*). More recently, wildlife data have been provided through special investigations undertaken by URSUS and CanNorth (*2008*) and CanNorth (*2010*) covering designated areas within the Rabbit Lake Operation lease boundary. In addition, an avian study is currently being undertaken. Data gathered in these investigations will be used to characterize baseline conditions in the Project study area.

Amphibians and Reptiles

One baseline study examined the abundance of amphibians and reptiles in the study area. Between June and September 1979, GMCL (*1980*) found one species of amphibian, the wood frog (*Rana sylvatica*) and reported boreal chorus frog (*Pseudacris triseriata*) vocalizations. Two more studies within the Project vicinity also reported incidental sightings of wood frogs (Golder 2003) and hearing unidentified frog vocalizations (*Golder 2004*).

More recently, an amphibian and reptile survey was one component of the Four Bear Pond study area terrestrial investigation (*CanNorth 2011*). A total of 54 sites were surveyed between June 6 and 15, 2010. Two amphibian species were detected - boreal chorus frog (*Pseudacris maculata*) and wood frog (*Rana sylvatica*). Boreal chorus frogs were recorded at 41 of 54 (76%) sites and wood frogs were recorded at 3 of 54 (6%) sites. No listed amphibian species, including Canadian toads (*Bufo hemiophrys*) or northern leopard frogs (*Rana pipiens*) were detected. Comparison of the results of this survey to those of four other studies across northern Saskatchewan indicated that boreal chorus frogs were detected in all studies.

Birds

Waterfowl surveys were conducted in 1979 by GMCL (*1980*) in conjunction with the proposed development of the B Zone mine. Approximately 50 mergansers (*Mergus merganser*) and 25 mallards (*Anas platyrhynchos*) were found on Collins Bay; and breeding pairs of loons (*Gavia immer*) and scoters (*Melanitta perspicillata*) were seen on Collins Bay and Harrison Lake, respectively. GMCL (*1980*) also conducted raptor surveys in 1979 that identified bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) presence within the area, mainly concentrated along Collins Creek. Collins Creek was identified as a valuable source of food for raptors. GMCL (*1980*) and Golder (*1995a*) both reported low raptor nest density with poor nesting habitat (small size of trees), which was hypothesized as the population limiting factor for raptors in the study area (*GMCL 1980*).

A study conducted by URSUS and CanNorth (*2008*) reported that numerous waterfowl were found to use Horseshoe Creek and Link Lakes drainages. A female mallard was identified incubating eight eggs in Horseshoe Creek south and a loon nest was observed in Lower Link Lake with two eggs successfully hatched. Incidental sightings of ruffed grouse (*Bonasa umbellus*), common raven (*Corvus corax*), gray jays (*Perisoreus canadensis*), Canada geese (*Branta canadensis*) and willow ptarmigans (*Lagopus lagopus*) have also been reported (*Cameco and AREVA 2008*).

A baseline inventory of breeding bird and songbird in the terrestrial and baseline study areas (Figure 3.4.2-1 for area boundaries) was conducted in June 2010 (*CanNorth 2011*). A total of 233 indicated pairs of 36 bird species were detected and 2 species (Canada warbler; *Wilsonia canadensis* and the olive-sided flycatcher; *Contopus cooperi*) were ranked as federally threatened but provincially listed as common to very common. The 3 most abundant species in descending order were dark-eyed junco (*Junco hyemalis*), chipping sparrow (*Spizella passerina*) and yellow-rumped warbler (*Dendroica coronata*).

Furbearers and Small Mammals

Multiple studies have addressed furbearer and small mammal abundance in the Rabbit Lake Operation area. Habitat quality has been identified as a population limiting factor for some species. For example, the habitat lacks deciduous trees and shrubs, which are essential in maintaining large beaver populations (*Willard and Boden 1976b*).

Two muskrat studies were completed in 2006 and 2007 (*URSUS and CanNorth 2008*). The studies confirmed the presence of muskrat in the Horseshoe Creek and Link Lakes drainages, indicated a sustained presence of muskrat in both exposure and reference areas near the Rabbit Lake Operation and confirmed that muskrats are breeding successfully in both exposure and reference areas.

Two other wildlife surveys (small mammal and semi-aquatic furbearer) in the Optimism Pond area were completed to document species composition, abundance and habitat use (*CanNorth 2010*). The most abundant small mammal species captured was red-backed vole (*Clethrionomys gapperi*), which corresponds to previous data collected by Golder (*1994*) that identified red-backed vole as one of two most abundant species in the study area (the other being meadow vole (*Microtus pennsylvanicus*)). Other small mammal captures reported by CanNorth (*2010*) included meadow vole, western jumping mouse (*Zapus hudsonicus*), dusky shrew (*Sorex monticolus*) and masked shrew (*Sorex cinereus*).

Ungulates

Two baseline studies conducted by Willard and Boden (*1976a*) and GMCL (*1980*) addressed ungulate abundance in the Rabbit Lake Operation area. Barren-ground caribou (*Rangifer tarandus groenlandicus*), elk (*Cervus elaphus*) and deer (*Odocoileus* spp.) were very uncommon or absent in the region and moose (*Alces alces*) were reported to have a density of 0.02 moose/km^2 (Willard and Boden 1976a). The moose density corresponds to data collected by Golder (*1995b*) who reported that 0.06 and 0.02 moose/km^2 resided in the area during early and late winter surveys, respectively and a later study by Golder (*2003*) that reported a moose density of 0.07 moose/km^2 within the Project area. TAEM

(*1995*) confirmed that northern Saskatchewan supports few moose by documenting a mean moose density of 0.04 moose/km^2 from 22 northern Saskatchewan studies (*Cameco and AREVA 2008*).

In early 2010, an aerial survey for ungulates was completed by CanNorth (*2011*) in the Four Bear Pond study area. A total of 26 moose (0.07 moose/km^2) were identified with a high ratio of bulls to cows and cows to calves, indicating low hunting pressure and high reproductive success. Individual woodland caribou (*Rangifer tarandus caribou*) were not observed in the study area, however, a single woodland caribou pellet group in the Four Bear Pond study area was identified during an ungulate pellet/browse survey conducted between June 6 and June 8, 2010. This finding suggests that woodland caribou may occasionally use the area.

3.4.3.2 Rare and Endangered Species

The following rare or endangered species have either been spotted in, or identified as having the potential to frequent, the Project area:

- Barren-ground Caribou: during the winter of 2004, barren-ground caribou were reported to be migrating through the Rabbit Lake Operation area. Barren-ground caribou are ranked as rare to uncommon (S3) in Saskatchewan by SKCDC (*2005*).
- Woodland Caribou (*Rangifer tarandus caribou*): during aerial wildlife surveys Golder (*1995*) reported a few woodland caribou in the vicinity of the Rabbit Lake Operation and CanNorth (*2011*) reported woodland caribou feeding craters within the Four Bear Pond terrestrial study area and a single pellet group in the Four Bear Pond baseline study area (Figure 3.4.2-1 for study areas). Woodland caribou are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (*2005*) as being threatened and as being rare to uncommon (S3) by SKCDC (*2005*).
- Wolverine (*Gulo gulo*): no wolverine animals or signs have been observed in the Rabbit Lake Operation area; however, they have been observed in the region. Given the large home range of individual wolverines, they are likely to be present within the local study area (*Cameco and AREVA 2008*). Wolverines are listed by COSEWIC (*2005*) as a species of special concern and by SKCDC (*2005*) as rare to uncommon (S3).
- Canada Warbler: in 2010 during a breeding bird and songbird call survey conducted by CanNorth (*2011*), Canada warbler was detected within the Four Bear Pond study area. Canada warbler is currently classified by COSEWIC as threatened under COSEWIC (*2011*) but listed provincially as very common (S5) (*SKCDC 2011*).
- Olive-sided Flycatcher: in 2010 during a breeding bird and songbird call survey conducted by CanNorth (*2011*), the olive-sided flycatcher was detected within the Four Bear Pond study area. Olive-sided flycatcher is currently classified as threatened by COSEWIC (*2011*) but listed provincially as common (S4) (*SKCDC 2011*).

3.5 Socioeconomic Environment

This section provides an overview of the socioeconomic environment for the Project. The scope of the socioeconomic environment is identified by considering the potential

pathways of effect from the proposed project to people. It sets out the topics that will be used to characterize the socioeconomic environment, including the following:

- Infrastructure and Services;
- Economy;
- Land and Resource Use; and
- Community Health.

Conventional sources of data including published and unpublished data from secondary sources (i.e. Statistics Canada, Indian and Northern Affairs Canada, Government of Saskatchewan), socioeconomic monitoring data (i.e. employment and business participation in uranium mining to date), research undertaken by the Community Vitality Monitoring Partnership Process (i.e. study of effects of the commuter rotation system) will be used to frame the understanding of the socioeconomic environment. This will be supplemented by a focused key person interview program to provide local perspectives on the characterization of the socioeconomic environment.

The anticipated project-environment interactions, including socioeconomic effects, are discussed in Section 4, Potential Effects. One of the primary pathways from the Project to the socioeconomic environment is through the employment and business opportunities provided by the Project, as defined in the Human Resource Development Agreement (HRDA) for Rabbit Lake and the Human Resource Development Plan (HRDP) for Northern Saskatchewan Mine Operations (*2010*). In addition, pathways of effects stemming from changes to the physical and biophysical environment are considered in terms of land and resource use and associated effects.

The Rabbit Lake Operation is currently operated with the intent of maximizing employment and business participation for residents of Saskatchewan's north (RSN). The framework for this commitment is set out in the 1999 Impact Management Agreement (IMA) signed by AREVA, Cigar Lake Mining Corporation (CLMC) and Cameco, along with six of seven communities in the Athabasca basin. Commitments towards the direct employment and economic benefits for RSNs are reiterated in the Surface Lease Agreement signed between the Government of Saskatchewan and Cameco (*2004*).

The regional socioeconomic study area will be defined as a part of the EIS.

3.5.1 Economy

Information about the economy will be described for the regional study area (RSA). This component will include:

- Labour force characteristics (i.e. potential and actual labour force and participation rates by gender);
- Education and training (i.e. high school, post-secondary, designated trades, other skills relevant to construction and operation jobs);
- Employment and income (i.e. employment and unemployment levels, seasonality, type);

- Business capacity (i.e. type and nature of businesses relevant to the Project);
- Cost of living; and
- Role of uranium mining in the northern Saskatchewan economy (i.e. training, employment and business participation).

Saskatchewan operations for Cameco strive to create opportunities for northern and Aboriginal residents, with a target of 67% of its workforce being RSNs. In 2010, approximately 51% of the permanent Cameco workforce was RSNs (*Cameco 2011*). Of these employees, more than 40% are of Aboriginal ancestry.

In addition to local employment, Cameco is committed to helping develop local business in northern communities of Saskatchewan. In particular, Cameco has a Northern Preferred Suppliers program. Northern Preferred Suppliers work at all Saskatchewan Cameco operations, working in underground mining, drilling, construction, trucking, aviation, catering/janitorial, security, environmental and geophysics.

Currently, entry-level and trainee positions at northern Saskatchewan uranium mining operations are targeted to be filled by RSNs (this commitment is formalized in Cameco's HRDPs that are submitted to the province annually). In order for northern workers to be recruited in higher numbers and for higher-skill level positions, education requirements must be met. As such, there are multiple programs in place to assist in the training of northerners for mining-related employment. Cameco, in partnership with others, has contributed to numerous initiatives to promote education and training for northerners. These initiatives include, among others, the following:

- Multi-Party Training Plan;
- Northern Summer Student Program;
- Northern Scholarship Program;
- CREDENDA Virtual High school;
- Athabasca Education Awards; and
- Educational School/Community Tours of Northern Operation.

3.5.2 Infrastructure and Services

Information about infrastructure and services will be described for the RSA. This component will include:

- Transportation infrastructure (i.e. roads, traffic levels and accidents);
- Public infrastructure (i.e. sewer, water, roads, electrical) in communities; and
- Public facilities and services (i.e. health care, education, recreation) in communities.

3.5.3 Land and Resource Use

Information about land and resource use will be described for the local study area (LSA), site study area (SSA) and RSA. Although the focus of this will be specific to the Rabbit

Lake Operation, where relevant, the context of regional land and resource uses will be included.

Land and resource use will describe traditional and domestic resource use by Aboriginal people and commercial and recreational land use.

Information about land and resource use for traditional and domestic purposes by Aboriginal people will consider:

- Sites of traditional or cultural importance to Aboriginal people;
- Domestic hunting, fishing, trapping and gathering by Aboriginal people; and
- Location of reserve lands, Métis settlements and traditional territories identified by Aboriginal groups.

Residents have expressed protection of lands and waters in the Athabasca Basin as being important when considering potential developments. In addition to wage employment, resources harvesting, (i.e. trapping, fishing, guiding and hunting) from the lands and water in the region provides important seasonal cash income and income in-kind for many residents of the region.

Commercial and recreation land uses will consider:

- Trapping (i.e. trap lines, number of trappers, level of activity);
- Commercial fishing (i.e. commercial fishing lakes, number of fishermen, level of commercial fishing activity);
- Tourism, outfitting and lodges (i.e. lodges and out camps, areas allocated to outfitters);
- Recreational hunting and fishing (i.e. sport hunting and fishing activity);
- Other outdoor recreation uses (i.e. snowmobile trails); and
- Mining (i.e. claims, exploration).

3.5.4 Community Health

Information about population and community health will be described for the RSA, in addition to facilities/health services at the Rabbit Lake Operation.

This component will include:

- Population;
- Community health indicators; and
- On-site health facilities/services.

3.5.5 Protected Areas

There are no existing protected areas within or in the vicinity of the SSA and LSA.

3.5.6 Heritage Resources

Comprehensive heritage resources baseline surveys have been conducted at the Rabbit Lake Operation on three separate occasions in recent years. The surveys were undertaken for the following primary purposes:

- Locate and document the presence of heritage resources;
- Determine the content, structure and integrity of the heritage resource;
- Establish the significance of the heritage resource; and
- Provide recommendations for any archaeological mitigation that may be required for a development to proceed.

In 2007, a natural heritage resources investigation was undertaken in the area of Optimism Pond and the ridge east of the mill at the Rabbit Lake Operation as part of a larger baseline environmental study investigating five locations for a new tailings disposal site (*CanNorth 2007*). This investigation included a database review and field survey. The database review indicated that as of September 2007, 22 archaeological sites were registered in the Saskatchewan archaeological database for map sheet 64 L/4. No sites involving cultural features were located in the Optimism Pond study area. During the 2007 field survey, no surface cultural features were evident, nor were any archaeological sites discovered within the Optimism Pond or mill study areas.

A provincial archaeological database search was conducted again in 2008 (*CanNorth 2010*) that revealed 38 previously recorded heritage sites in the regional study area compared to the 22 identified in 2007. Another field survey was then completed specifically in the Optimism Pond study area and no existing or new archaeological sites were identified.

In 2009, heritage studies were conducted in the Four Bear Pond project area and involved both desktop and field components (*CanNorth 2011*). The field program aimed at providing information on existing disturbed and intact sites by determining archaeological site types, site nature and association, site context and potential site values. A search of the provincial archaeological site inventory revealed no known sites in the immediate vicinity of the Four Bear Pond study area. The field survey conducted in 2009 targeted areas that would be potentially affected by the Project and included single and multiple pedestrian transects spaced 5 metres (m) to 10 m apart. No archaeological artifacts or features were found at any of the locations surveyed (*CanNorth 2011*).

3.5.7 Worker Health and Safety

The conventional safety concerns at the Rabbit Lake Operation are in effect the same as those encountered at other gold or base metal mining and milling operations. Conventional safety concerns include such things as the use of heavy mobile equipment, other industrial and mining equipment and machinery and chemicals used in the various mining, milling and support functions including their exhaust and other emissions. The occupational health and safety performance has been consistently above the industry average (i.e. Cameco has been recognized for the safety performance of the Rabbit Lake

Operation, receiving the Mary Jean Mitchell Green Award in 1990, 1996 and 2003, a John T. Ryan national award in 2001 and a John T. Ryan regional award in 2003).

While Cameco is proud of these achievements, the corporation continues to strive for improvement in the overall safety program. Leading indicators of compliance to the safety program consist of a combination of three key elements which include job task observations, safety meetings and a planned inspection program.

Radiological exposure is managed through an extensive radiological monitoring and reporting system. Radiological dosimetry at Rabbit Lake is performed for gamma radiation, radon gas, radon progeny and long-lived radioactive dust (LLRD). Dosimetry is assessed through use of licensed services or on site area sampling.

On a quarterly basis the dosimetry results reported to regulators, Health Canada's National Dose Registry and to employees through personal radiation exposure reports. Currently, exposures are well within regulatory limits and no appreciable changes to exposures are expected as a result of this Project. The Rabbit Lake Operation's Radiation Protection Program Manual is the top-level document describing the radiation protection measures on site.

3.6 Regional Study Area

The cumulative effects monitoring (CEM) and Athabasca Working Group (AWG) environmental monitoring programs have monitored the regional aquatic, atmospheric and terrestrial environments within the Athabasca Basin. The CEM program is a SMOE initiative and was completed annually with rotating site locations while the AWG is a community-based program with sampling completed annually.

Between 1994 and 2008, the province's CEM program annually monitored the environment in northern Saskatchewan for possible cumulative effects arising from uranium mining activity. In 2007, the program underwent restructuring and new sampling locations were selected. Prior to 2007, the CEM program spatially overlapped with other programs, such as the EEM program and the AWG program, as described below. Starting in 2007, cumulative effects were monitored in further far-field waterbodies where information was generally not being gathered by other programs. Four locations were monitored in 2007 and 2008 (Figure 3.6-1) including: the Geikie River near the inlet to Wollaston Lake; Collins Bay on Wollaston Lake; the Waterfound River near the inflow to Waterbury Lake; and the Fond-du-Lac River downstream of the Waterford River. The 2007 and 2008 CEM programs included collection of limnology data, as well as water, sediment and fish samples for chemical analyses at these locations (*CanNorth 2010*).

The AWG program provides representatives from communities located in the Athabasca basin with the opportunity to test the environment near their communities for constituents associated with uranium mining and milling operations. The AWG program monitors locally important receptors in regards to air quality, water quality, sediment quality, vegetation, fish and wildlife at six study areas located in close proximity to the participating communities (Wollaston Lake, Hatchet Lake Denesuline First Nation, Black Lake Denesuline First Nation, Stony Rapids, Fond-du-Lac Denesuline First Nation,

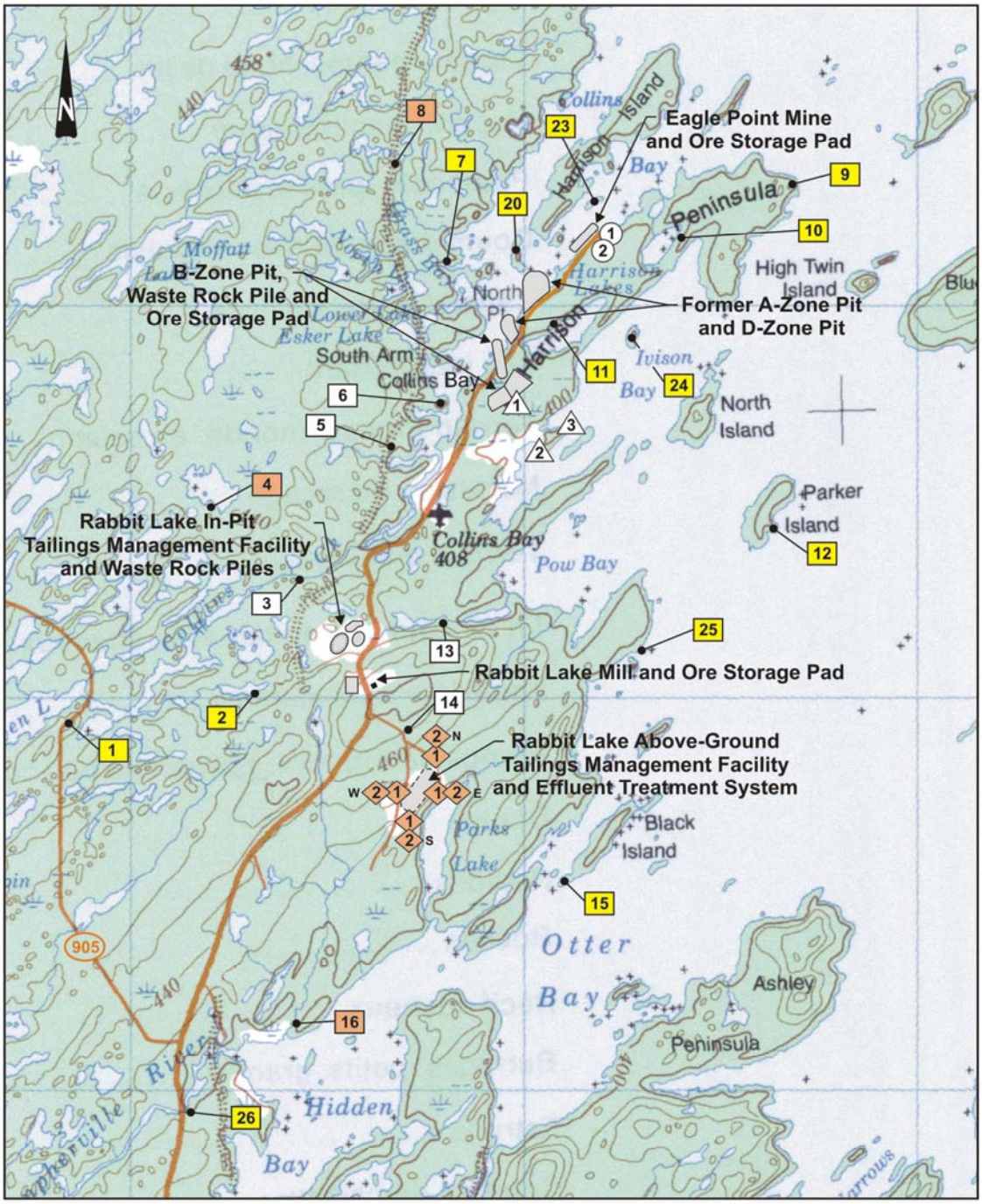
Uranium City and Camsell Portage). Monitoring is carried out by, or with the help of, members of these communities. Cameco Corporation and AREVA Resources Canada Inc. provide funding support for the program, but overall management of the program is undertaken by Canada North Environmental Services Limited Partnership (CanNorth), a First Nation-owned environmental services company.

The closest communities to the Rabbit Lake Operation are the Wollaston Lake and Hatchet Lake Denesuline First Nation communities that are located adjacent to each other on the east shoreline of Wollaston Lake. The AWG program has monitoring of water, sediment and fish in both exposure areas (i.e. Collins Bay and Hidden Bay), a reference area (Fiddler Bay) and near the communities (Welcome Bay). Samples collected at these locations (shown on Figure 3.6-2) are analyzed for COPCs; namely arsenic, copper, lead, nickel, molybdenum, radium-226, selenium, uranium and zinc. While data collected over the 2000 to 2007 period, showed differences between monitoring locations, CanNorth (*2008*) concluded there are no obvious environmental or human health concerns. Data collected on wildlife samples (caribou and moose) were found to be characteristic of COPC levels in species collected elsewhere. Likewise, concentrations of the key constituents in vegetation samples (blueberries, Labrador tea and bog cranberries) were found to be fairly consistent over time and to be similar to levels measured in plants collected near other northern communities. Finally, radon levels measured at two locations near the Wollaston Lake communities remained low but varied naturally from season-to-season.

The data collected in each of these programs will be discussed in greater depth in the EIS.

FIGURES

FIGURES



RADON

- Tailings Plan Program (Radon & Dustfall)
- Eagle Point Program
- B-Zone Program

RADON & LICHEN

- Wollaston Lake Program (Radon)
- Wollaston Lake Program (Radon and Lichen)

NOTE:

- Inactive Site

Cameco

RABBIT LAKE OPERATION

RADON MONITORING LOCATIONS AT RABBIT LAKE OPERATION

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Drafted: DLM	Date: 17 Feb 11	
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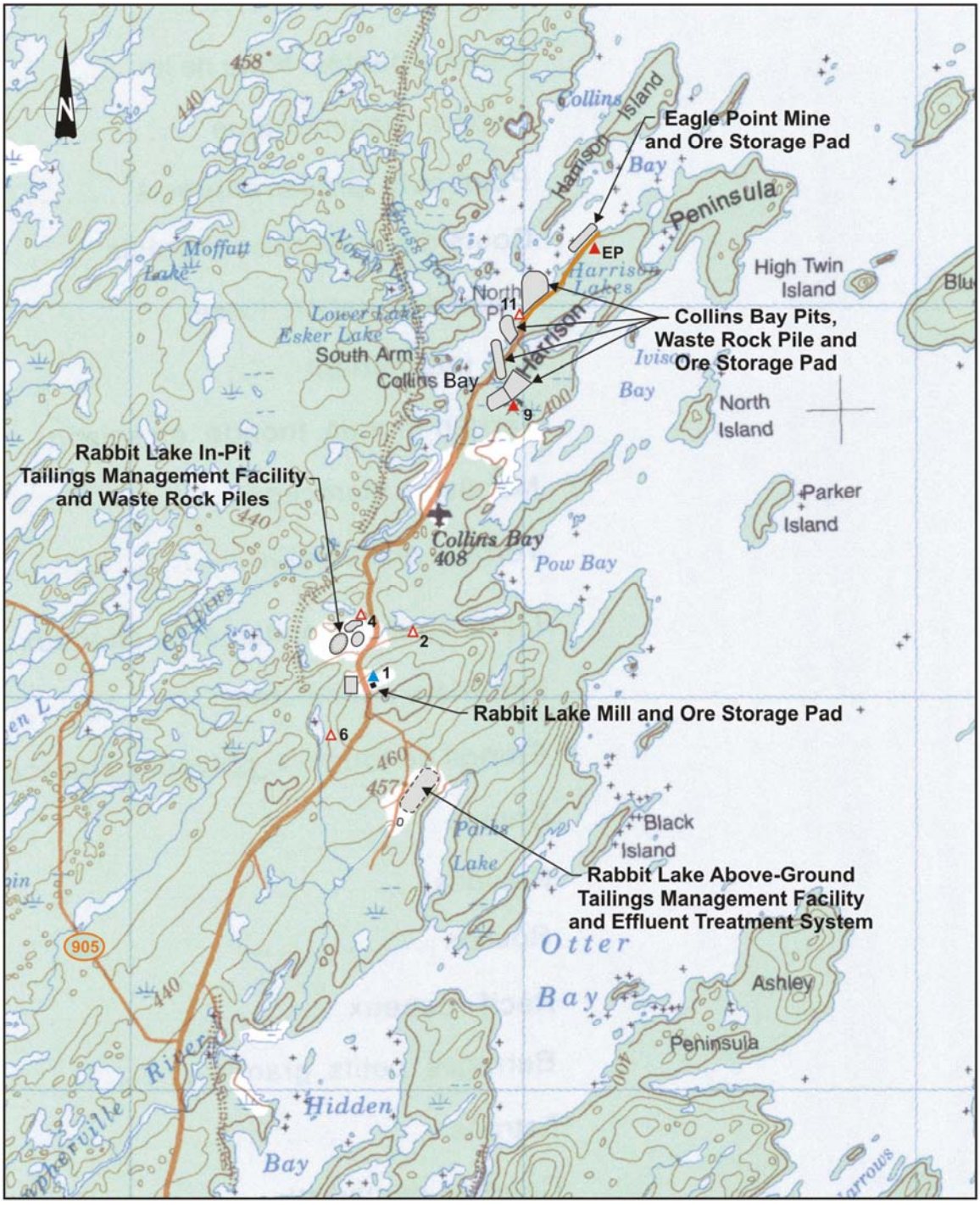
N
Eagle Point Mine
and Ore Storage Pad
Collins Bay Pits,
Waste Rock Pile and
Ore Storage Pad
Rabbit Lake In-Pit
Tailings Management Facility
and Waste Rock Piles
Rabbit Lake Mill and Ore Storage Pad
Rabbit Lake Above-Ground
Tailings Management Facility
and Effluent Treatment System
EP
Collins Bay
Harrison Bay
Peninsula
High Twin Island
North Island
Parker Island
Black Island
Ashley Peninsula
Moffatt Lake
Lower Lake
Esker Lake
South Arm
Pow Bay
Otter Bay
Hidden Bay
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Cameco
RABBIT LAKE OPERATION
AIR QUALITY
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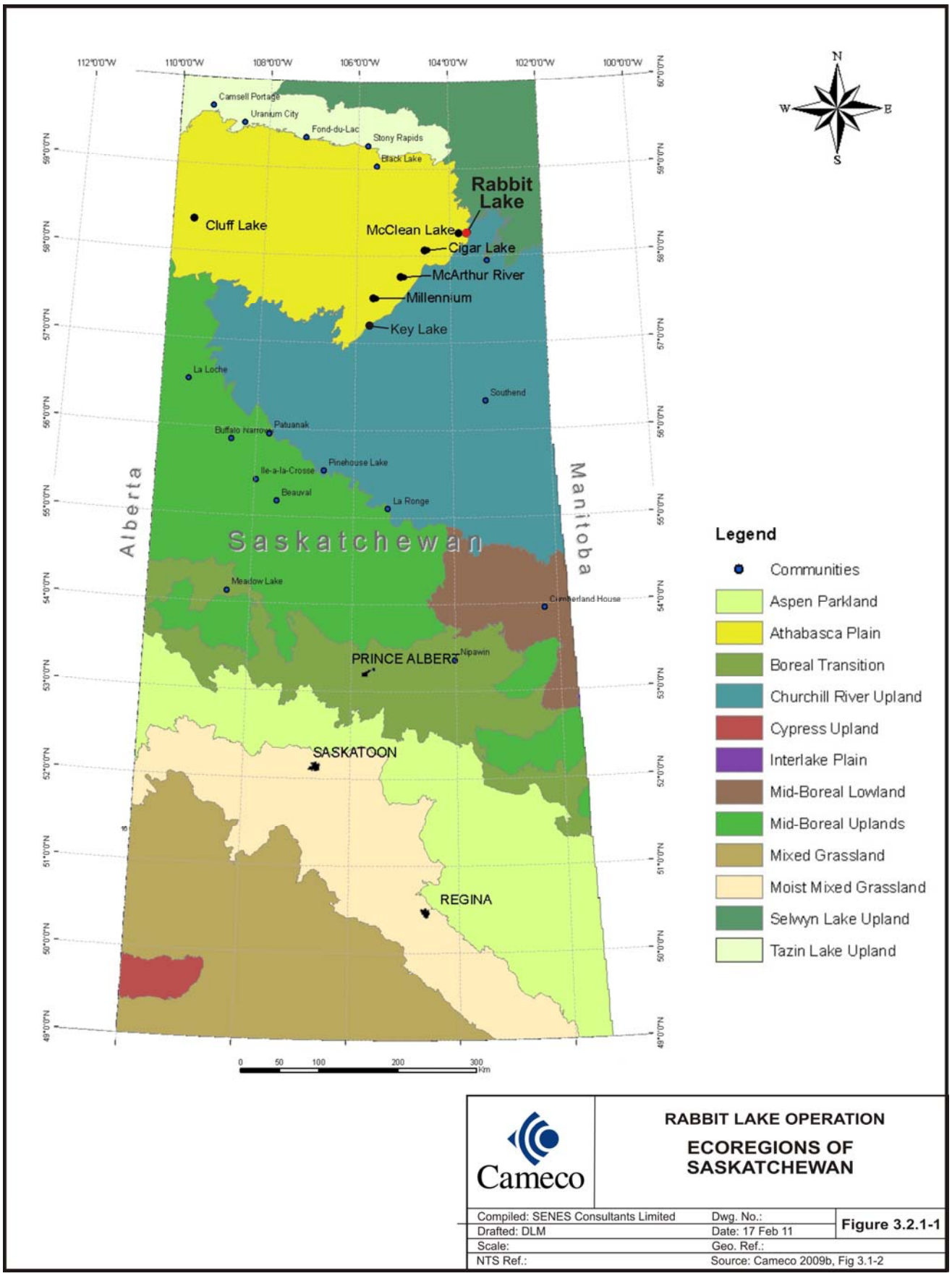
Camsell Portage
Uranium City
Fond-du-Lac
Stony Rapids
Black Lake
Rabbit Lake
Cluff Lake
McClean Lake
Cigar Lake
McArthur River
Millennium
Key Lake
La Loche
Southend
Buffalo Narrows
Patuanak
Pinehouse Lake
Ile-a-la-Crosse
Beauval
La Ronge
Alberta
Saskatchewan
Manitoba
Meadow Lake
Cumberland House
Nipawin
PRINCE ALBERT
SASKATOON
REGINA
N
W
E
S
Legend
Communities
Aspen Parkland
Athabasca Plain
Boreal Transition
Churchill River Upland
Cypress Upland
Interlake Plain
Mid-Boreal Lowland
Mid-Boreal Uplands
Mixed Grassland
Moist Mixed Grassland
Selwyn Lake Upland
Tazin Lake Upland
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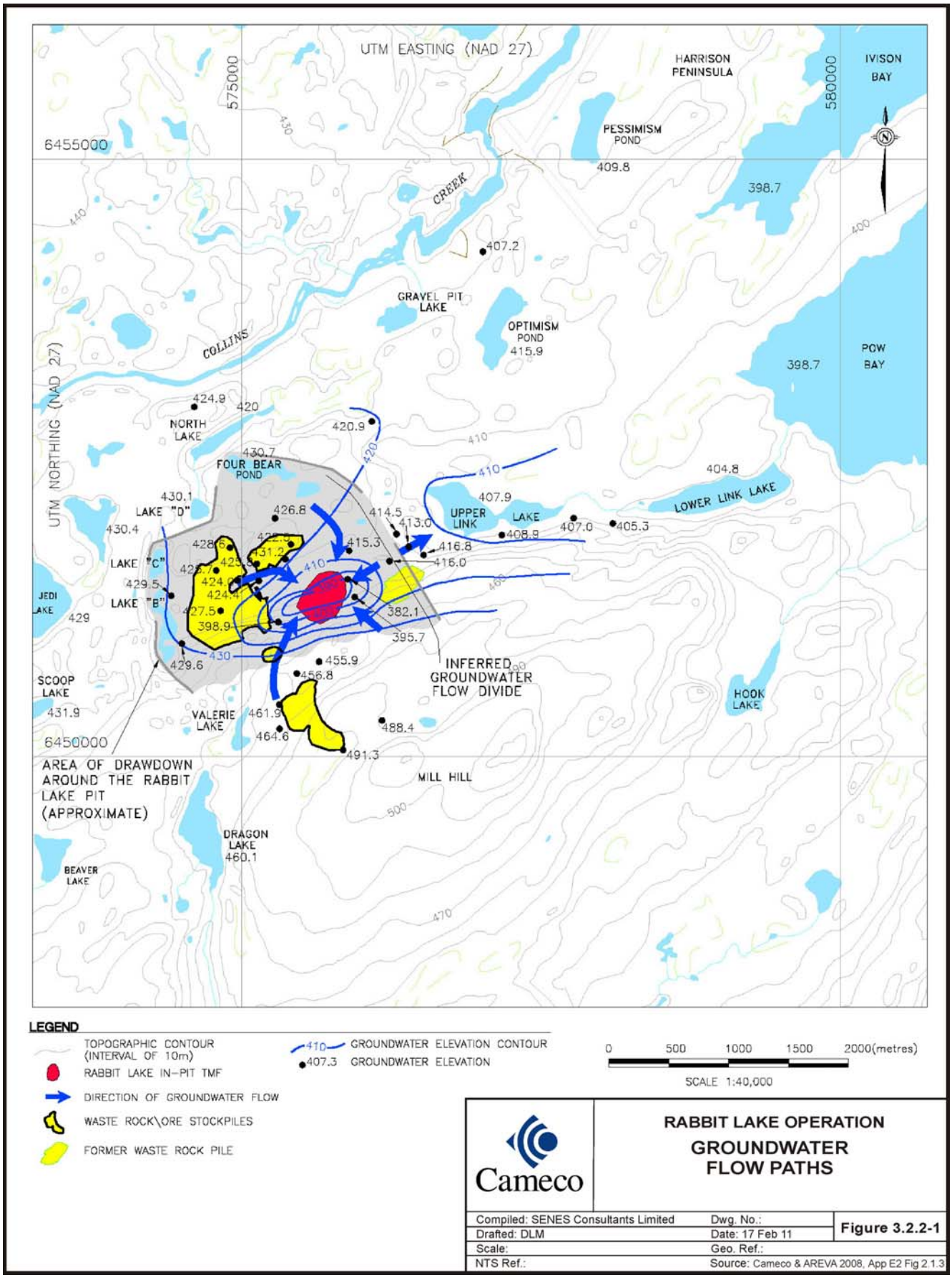
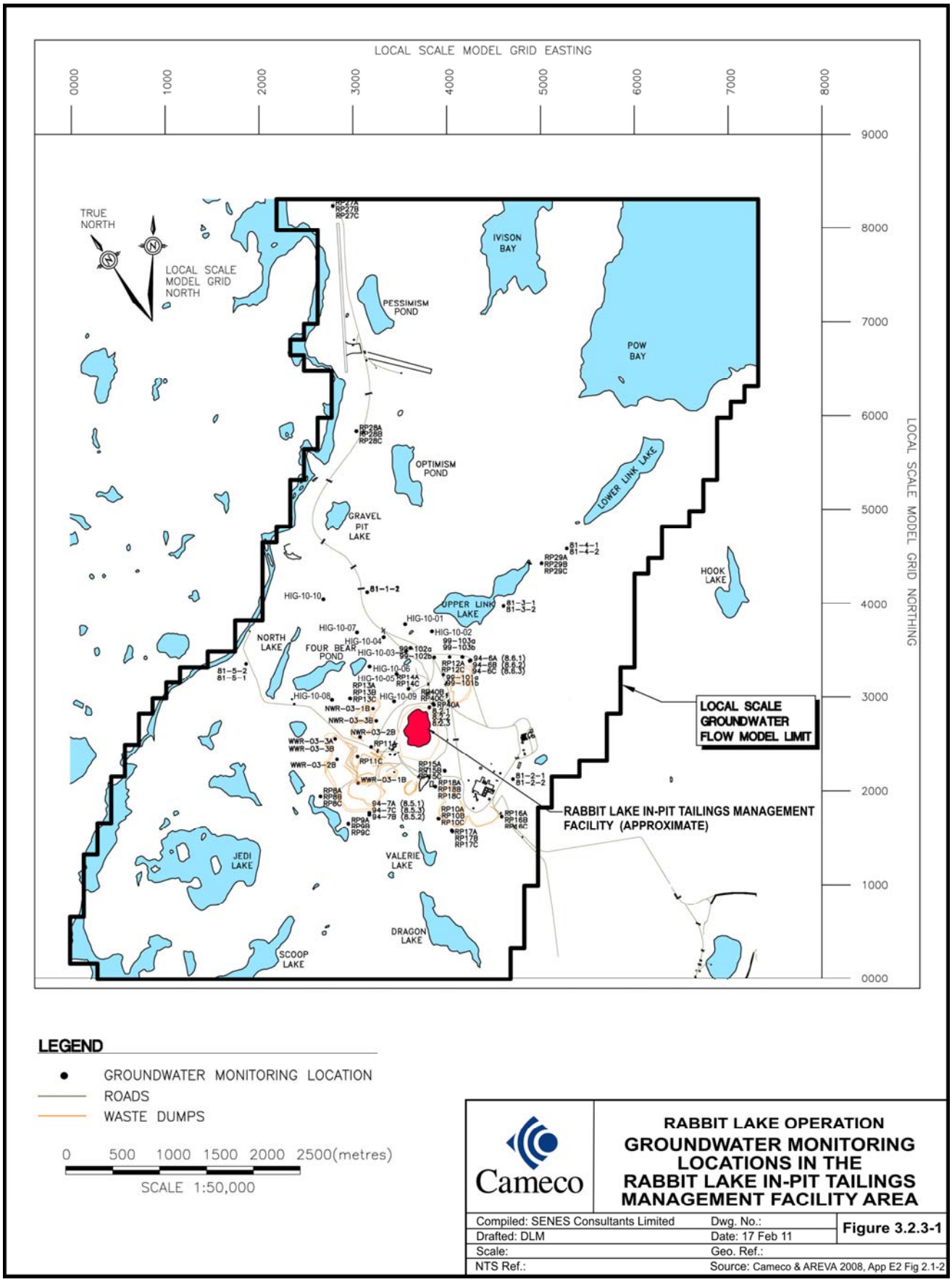
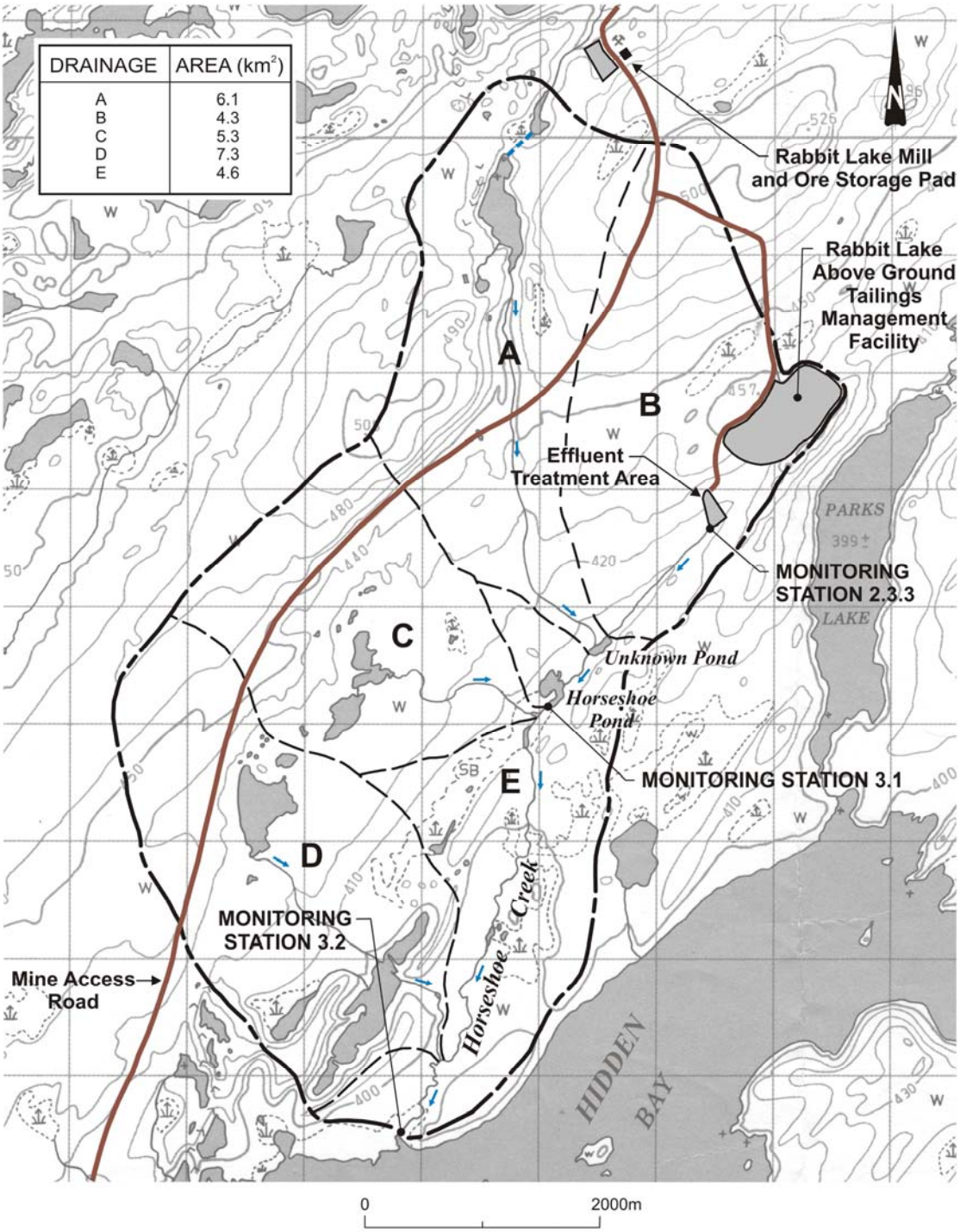
Cameco
RABBIT LAKE OPERATION
ECOREGIONS OF SASKATCHEWAN
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Cameco 2009b, Fig 3.1-2
Figure 3.2.1-1


UTM EASTING (NAD 27)
575000
580000
6455000
6450000
UTM NORTHING (NAD 27)
HARRISON PENINSULA
IVISON BAY
POW BAY
PESSIMISM POND
409.8
398.7
CREEK
407.2
GRAVEL PIT LAKE
OPTIMISM POND
415.9
COLLINS
NORTH LAKE
424.9
420.9
FOUR BEAR POND
430.7
LAKE "D"
430.1
430.4
426.8
414.5
413.0
UPPER LINK LAKE
407.9
408.9
407.0
405.3
LOWER LINK LAKE
404.8
LAKE "C"
LAKE "B"
JEDI LAKE
429
429.5
427.5
398.9
424.4
431.2
415.3
416.8
416.0
382.1
395.7
429.6
455.9
456.8
INFERRED GROUNDWATER FLOW DIVIDE
SCOOP LAKE
431.9
VALERIE LAKE
461.9
464.6
488.4
491.3
HOOK LAKE
AREA OF DRAWDOWN AROUND THE RABBIT LAKE PIT (APPROXIMATE)
MILL HILL
DRAGON LAKE
460.1
BEAVER LAKE
LEGEND
TOPOGRAPHIC CONTOUR (INTERVAL OF 10m)
RABBIT LAKE IN-PIT TMF
DIRECTION OF GROUNDWATER FLOW
WASTE ROCK\ORE STOCKPILES
FORMER WASTE ROCK PILE
410 GROUNDWATER ELEVATION CONTOUR
407.3 GROUNDWATER ELEVATION
0 500 1000 1500 2000(metres)
SCALE 1:40,000
Cameco
RABBIT LAKE OPERATION
GROUNDWATER FLOW PATHS
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Cameco & AREVA 2008, App E2 Fig 2.1.3
Figure 3.2.2-1


LOCAL SCALE MODEL GRID EASTING
0000
1000
2000
3000
4000
5000
6000
7000
8000
9000
LOCAL SCALE MODEL GRID NORTHING
TRUE NORTH
LOCAL SCALE MODEL GRID NORTH
IVISON BAY
POW BAY
PESSIMISM POND
OPTIMISM POND
GRAVEL PIT LAKE
LOWER LINK LAKE
UPPER LINK LAKE
HOOK LAKE
NORTH LAKE
FOUR BEAR POND
JEDI LAKE
VALERIE LAKE
DRAGON LAKE
SCOOP LAKE
LOCAL SCALE GROUNDWATER FLOW MODEL LIMIT
RABBIT LAKE IN-PIT TAILINGS MANAGEMENT FACILITY (APPROXIMATE)
LEGEND
GROUNDWATER MONITORING LOCATION
ROADS
WASTE DUMPS
0 500 1000 1500 2000 2500(metres)
SCALE 1:50,000
Cameco
RABBIT LAKE OPERATION
GROUNDWATER MONITORING LOCATIONS IN THE RABBIT LAKE IN-PIT TAILINGS MANAGEMENT FACILITY AREA
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Cameco & AREVA 2008, App E2 Fig 2.1-2
Figure 3.2.3-1

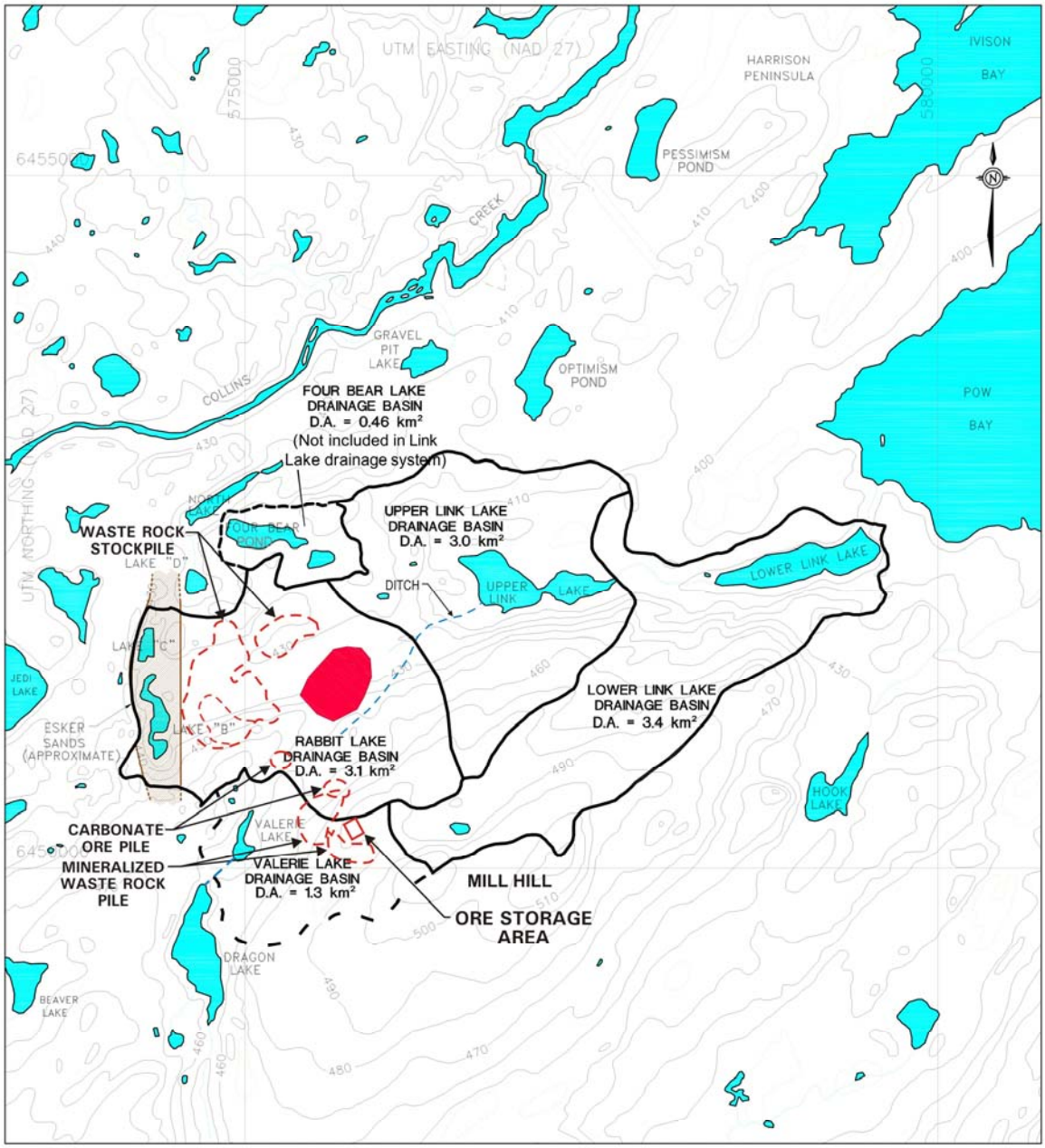


Cameco

RABBIT LAKE OPERATION

HORSESHOE CREEK WATERSHED AND SURFACE WATER QUALITY MONITORING STATIONS

Compiled: SENES Consultants Limited	Dwg. No.:	Figure 3.3.1.3-1
Drafted: D.L.M.	Date: 17 Feb 2011	
Scale: As Shown	Geo. Ref.:	
NTS Ref.:	Source: SENES 2010, Fig 2.2-1	

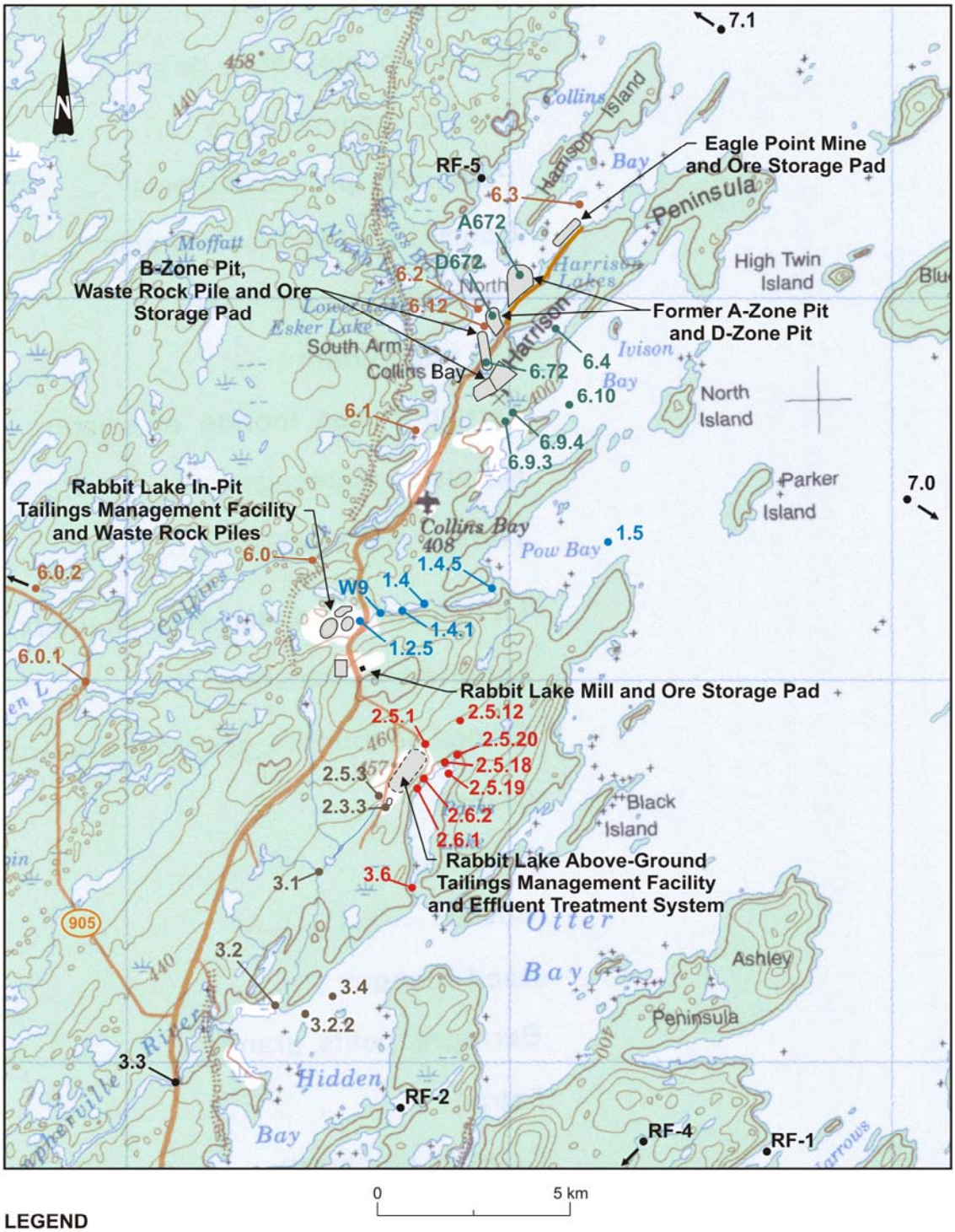


Cameco

RABBIT LAKE OPERATION

RABBIT LAKE/LINK LAKES WATERSHED AND SURFACE WATER QUALITY MONITORING STATIONS

Compiled: SENES Consultants Limited	**Dwg. No.:**	Figure 3.3.1.3-2
Drafted: D.L.M.	**Date:** 17 Feb 2011	
Scale: As Shown	**Geo. Ref.:**	
NTS Ref.:	**Source:** SENES 2010, Fig 2.3-1	



LEGEND

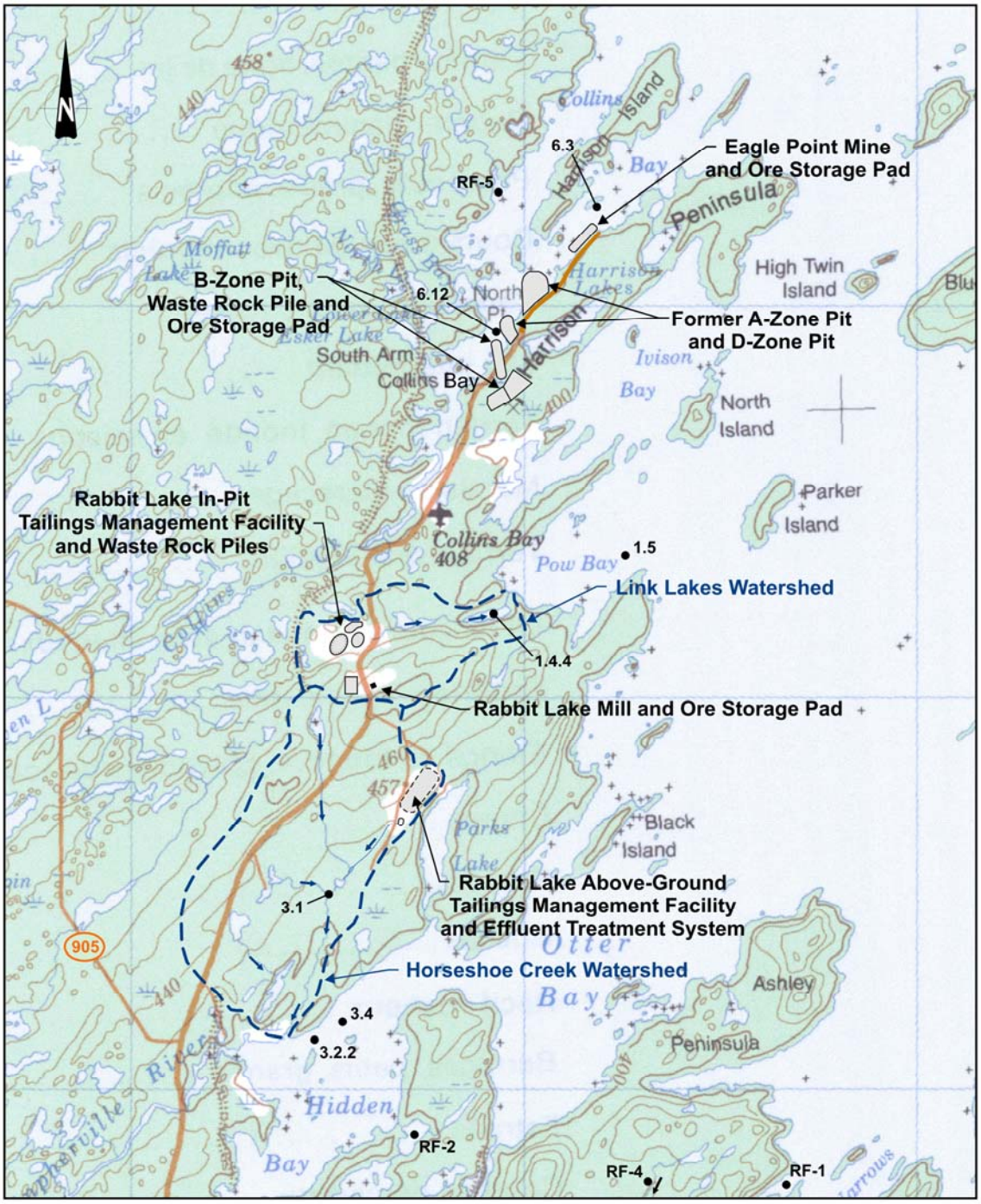
- Collins Creek Watershed Monitoring Station
- Horseshoe Creek Watershed Monitoring Station
- Link Lake Watershed Monitoring Station
- Parks Lake Watershed Monitoring Station
- Harrison Peninsula Monitoring Station
- Additional Monitoring Station

Cameco

RABBIT LAKE OPERATION

SURFACE WATER MONITORING STATIONS AT RABBIT LAKE OPERATION

Compiled: SENES Consultants Limited	**Dwg. No.:**	Figure 3.3.2.1-1
Drafted: D.L.M.	**Date:** 17 Feb 2011	
Scale: As Shown	**Geo. Ref.:**	
NTS Ref.:	**Source:** SENES 2010, Fig 3.1.2-1	

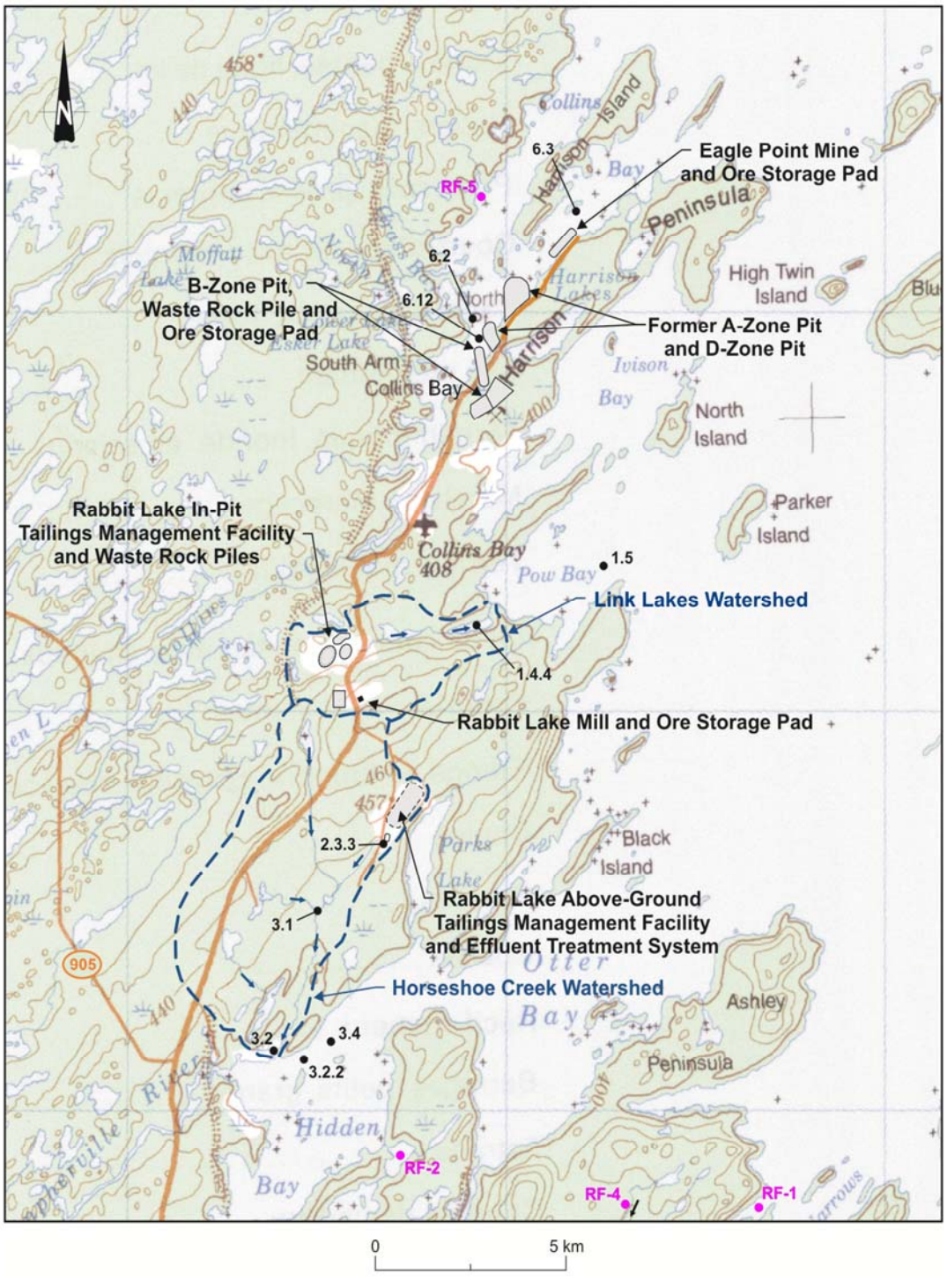


Cameco

RABBIT LAKE OPERATION

SEDIMENT MONITORING STATIONS AT RABBIT LAKE OPERATION

Compiled: SENES Consultants Limited	Dwg. No.:	Figure 3.3.2.2-1
Drafted: D.L.M.	Date: 17 Feb 2011	
Scale: As Shown	Geo. Ref.:	
NTS Ref.:	Source: SENES 2010, Fig 3.1.3-1	



LEGEND

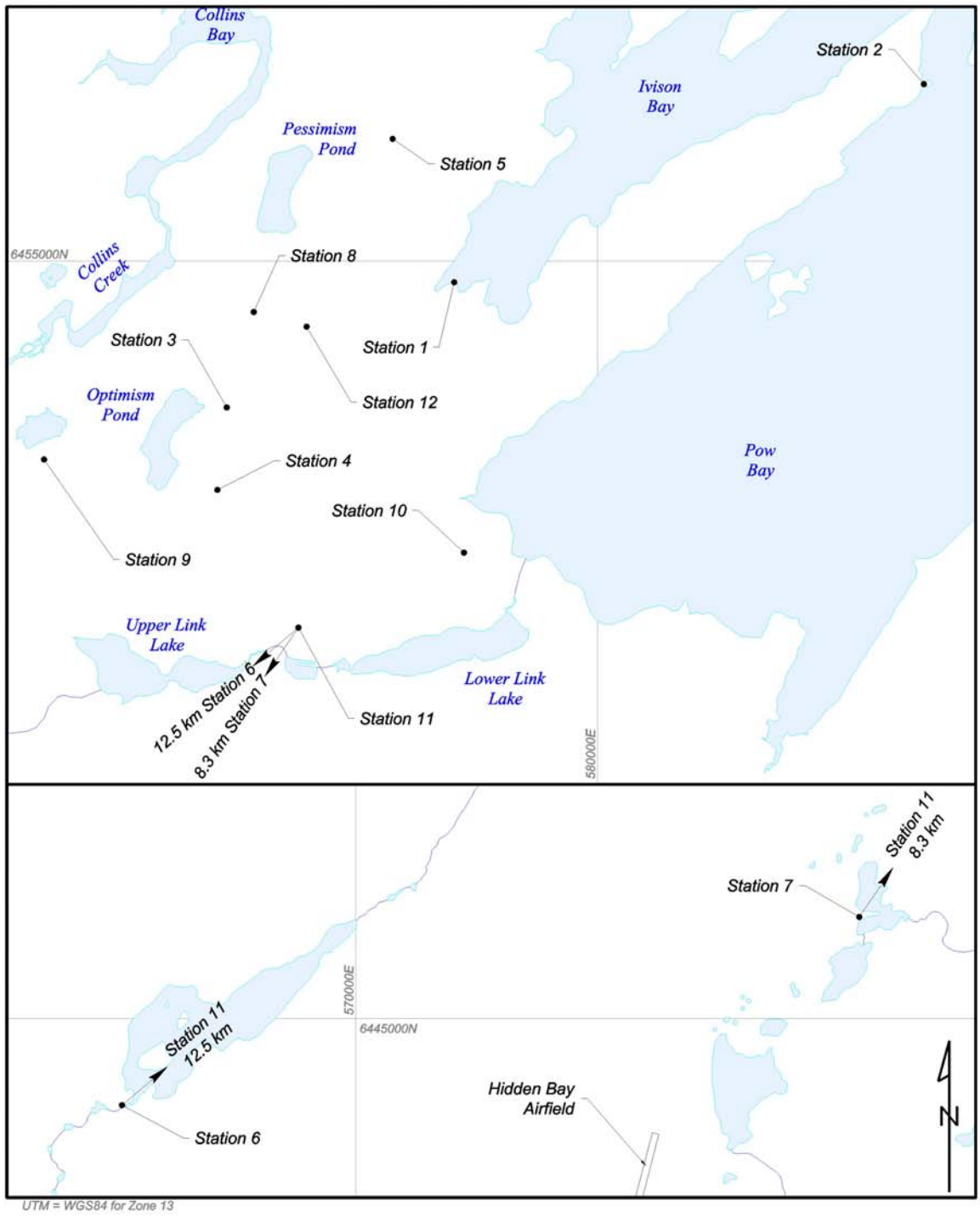
RF - Reference Station

Cameco

RABBIT LAKE OPERATION

EEM AND EMP MONITORING STATIONS AT RABBIT LAKE OPERATION

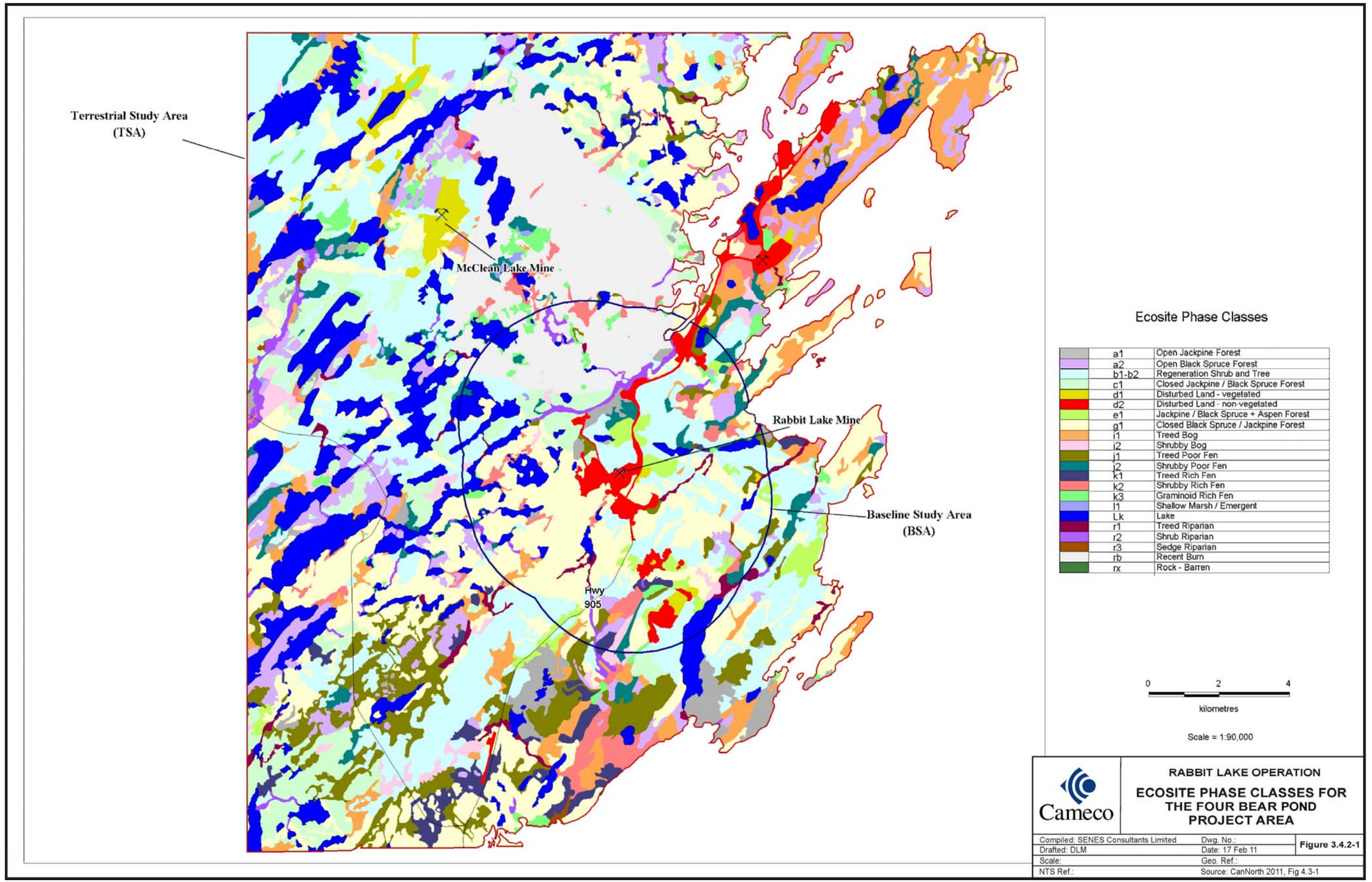
Compiled: SENES Consultants Limited	Dwg. No.:	**Figure 3.3.3-1**
Drafted: DLM	Date: 17 Feb 11	
Scale:	Geo. Ref.:	
NTS Ref.:	Source: Adapted from SENES 2010, Fig 3.1.3-1	

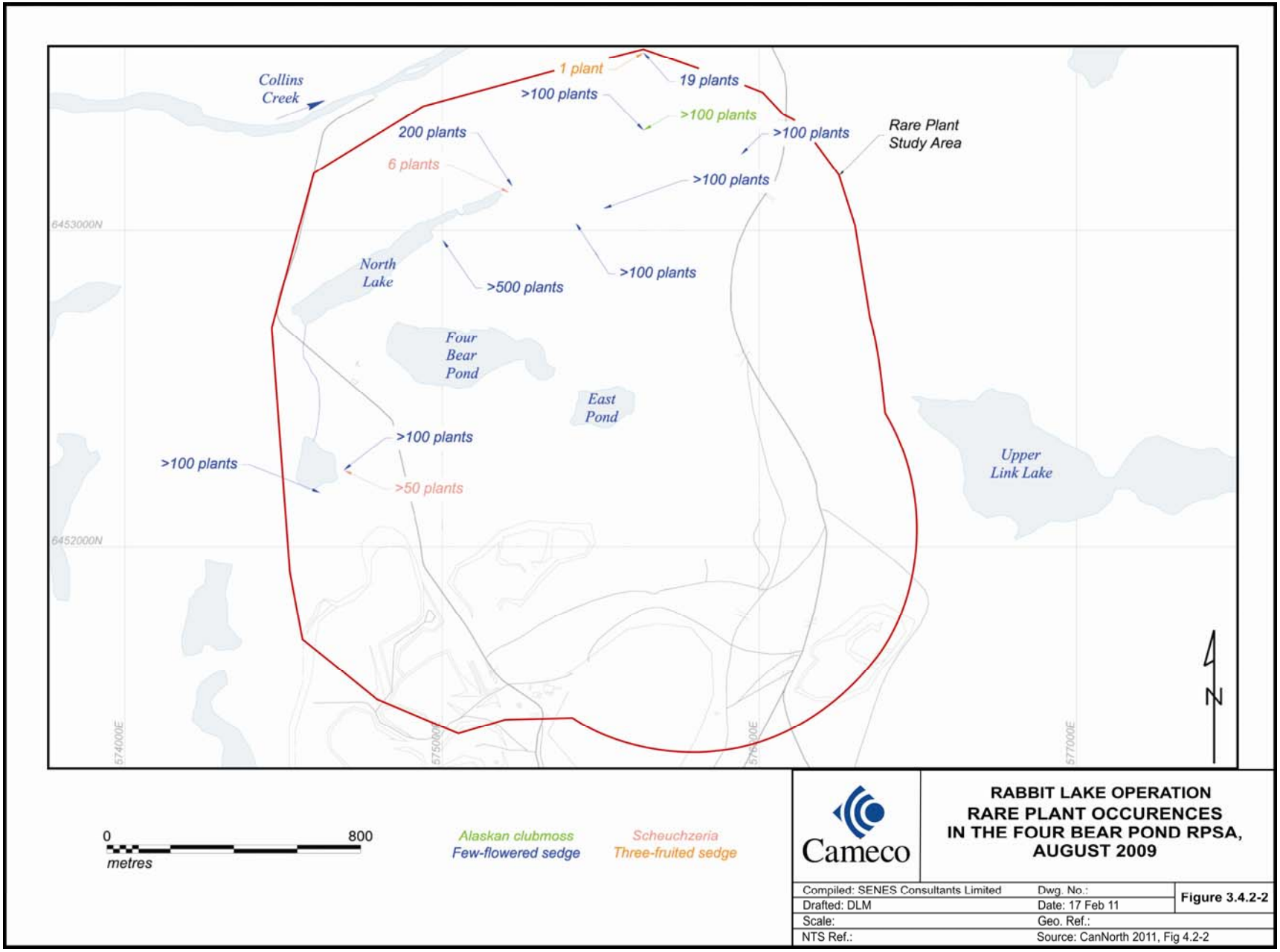


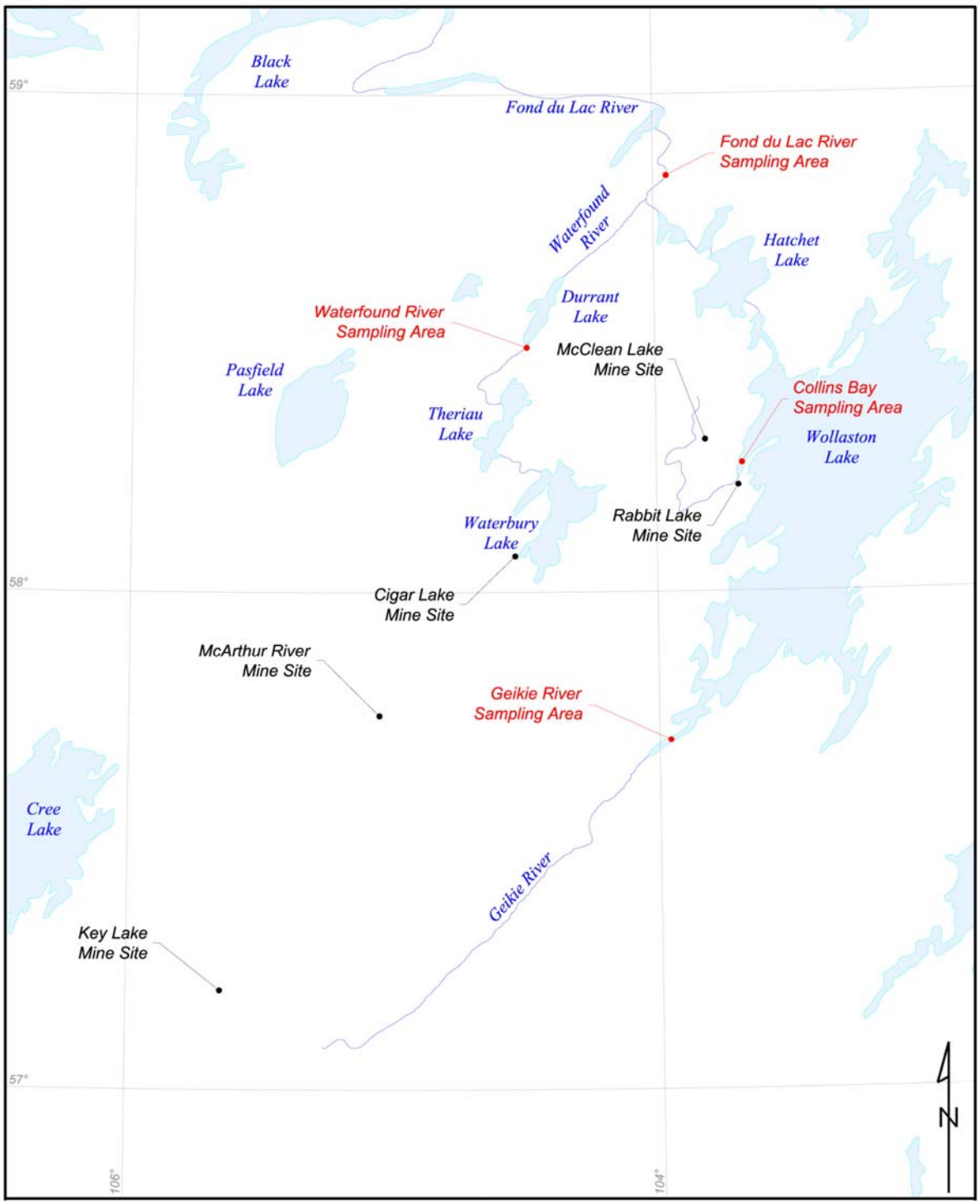
Cameco

RABBIT LAKE OPERATION
LOCATIONS OF SOIL AND VEGETATION CHEMISTRY SAMPLING STATIONS, 2008 SURVEY

Compiled: SENES Consultants Limited	Dwg. No.:	Figure 3.4.1-1
Drafted: DLM	Date: 17 Feb 11	
Scale:	Geo. Ref.:	
NTS Ref.:	Source: CanNorth 2010, Fig 3-3	


Terrestrial Study Area
(TSA)
McClean Lake Mine
Rabbit Lake Mine
Baseline Study Area
(BSA)
Hwy
905
Ecosite Phase Classes
a1 Open Jackpine Forest
a2 Open Black Spruce Forest
b1-b2 Regeneration Shrub and Tree
c1 Closed Jackpine / Black Spruce Forest
d1 Disturbed Land - vegetated
d2 Disturbed Land - non-vegetated
e1 Jackpine / Black Spruce + Aspen Forest
g1 Closed Black Spruce / Jackpine Forest
i1 Treed Bog
i2 Shrubby Bog
j1 Treed Poor Fen
j2 Shrubby Poor Fen
k1 Treed Rich Fen
k2 Shrubby Rich Fen
k3 Graminoid Rich Fen
l1 Shallow Marsh / Emergent
Lk Lake
r1 Treed Riparian
r2 Shrub Riparian
r3 Sedge Riparian
rb Recent Burn
rx Rock - Barren
0 2 4
kilometres
Scale = 1:90,000
Cameco
RABBIT LAKE OPERATION
ECOSITE PHASE CLASSES FOR THE FOUR BEAR POND PROJECT AREA
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: CanNorth 2011, Fig 4.3-1
Figure 3.4.2-1


Collins Creek
1 plant
19 plants
>100 plants
>100 plants
200 plants
>100 plants
Rare Plant Study Area
6 plants
>100 plants
6453000N
North Lake
>500 plants
>100 plants
Four Bear Pond
East Pond
>100 plants
>100 plants
>50 plants
Upper Link Lake
6452000N
574000E
575000E
576000E
577000E
N
0
800
metres
Alaskan clubmoss
Few-flowered sedge
Scheuchzeria
Three-fruited sedge
Cameco
RABBIT LAKE OPERATION
RARE PLANT OCCURENCES
IN THE FOUR BEAR POND RPSA,
AUGUST 2009
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: CanNorth 2011, Fig 4.2-2
Figure 3.4.2-2

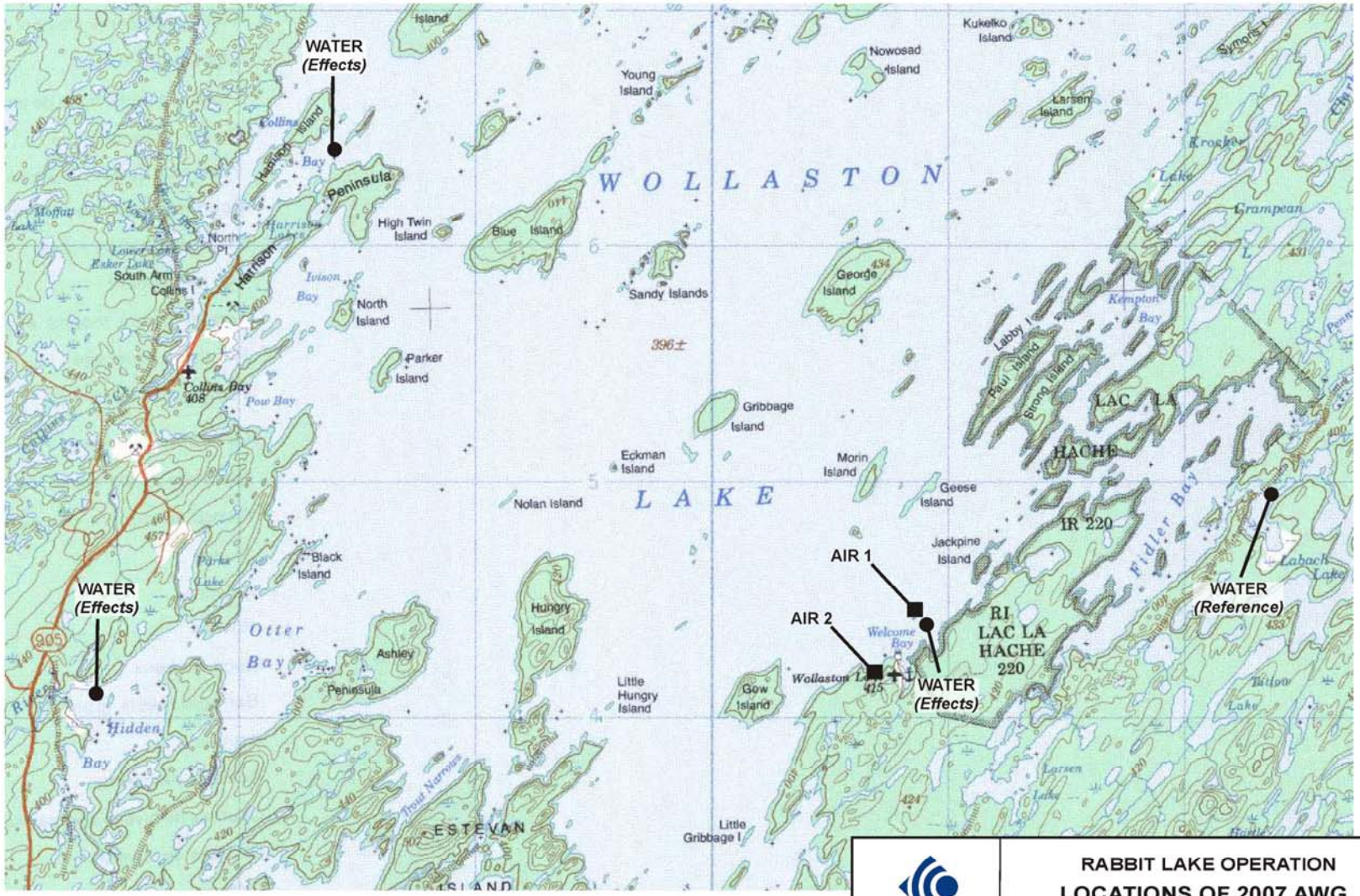


Cameco

RABBIT LAKE OPERATION

LOCATIONS OF THE 2008 CEM PROGRAM SAMPLING SITES

Compiled: SENES Consultants Limited	Dwg. No.:	**Figure 3.6-1**
Drafted: DLM	Date: 17 Feb 11	
Scale:	Geo. Ref.:	
NTS Ref.:	Source: CanNorth 2010, Fig 2	



LEGEND

- ■ *Air Quality Station*
- ● *Water and Sediment Sampling Station*

Cameco

RABBIT LAKE OPERATION

LOCATIONS OF 2007 AWG PROGRAM SAMPLING SITES

Compiled: SENES Consultants Limited	Dwg. No.:	**Figure 3.6-2**
Drafted: DLM	Date: 17 Feb 11	
Scale:	Geo. Ref.:	
NTS Ref.:	Source: Adapted from CanNorth 2008	

SECTION 4

POTENTIAL EFFECTS

4.0 POTENTIAL EFFECTS

The objective of this section is to present a preliminary review of the potential environmental effects of the Project for purposes of:

- Determining the required federal assessment process;
- Facilitating the development of project-specific assessment guidelines for the Project; and
- Aiding in the development of EIS work plans to meet the guideline requirements.

The Project is closely interrelated with the existing and approved Rabbit Lake Operation therefore Project related effects must be considered in combination with effects from the existing operation.

The preliminary review focuses on both the incremental effects of the Project, as well as a discussion of the Project effects in combination with effects from the currently approved Rabbit Lake Operation. Although some aspects of the Project are subject to the results of yet-to-be completed feasibility studies, this preliminary review of effects has assumed that all proposed project components will prove feasible and that these components or activities will proceed as described in Section 2.

Mitigation measures are based on current operational plans or pre-feasibility level planning that may change as a result of feasibility and detailed design level changes. Although this approach results in uncertainties associated with the present preliminary review, Cameco believes this information will assist with the objectives mentioned above. A more refined, better-informed assessment of biophysical and socioeconomic effects will be presented in the EIS.

This section begins by establishing spatial and temporal boundaries for the Project. Within this context, the potential interactions between the Project and the environment (biophysical and socioeconomic) are identified and likely residual environmental effects (i.e. measurable effects after mitigation) are identified and then characterized.

This section also discusses the potential adverse effects due to unplanned events associated with the Project, as well as the potential for cumulative effects in combination with other existing developments.

4.1 Spatial and Temporal Boundaries

To facilitate the assessment of project-environment interactions, relevant spatial and temporal boundaries must be established within which potential effects of a project are evaluated. The boundaries adopted for this screening level assessment are described below.

4.1.1 Spatial Boundaries

Spatial (or geographic) boundaries are considered at three scales which are within site boundaries, at a local scale and at a regional scale. Local and regional spatial boundaries

vary amongst the environmental components being assessed; for example, the air assessment boundary is independent of the aquatic assessment boundary. While overlap between the assessment boundaries may occur, the overall definition of a boundary is specific to each environmental component.

- The **site study area** (SSA) is defined by the boundaries containing all infrastructure required for the Project (Section 4.1.1.1).
- The **local study area** (LSA) is defined as the area beyond the site study area within which measurable changes to the environment directly resulting from the proposed activities are anticipated (Section 4.1.1.2).
- The **regional study area** (RSA) is defined as the area within which there is the potential for direct or indirect cumulative biophysical and socio-economic effects (Section 4.1.1.3). Cumulative effects on the biophysical environment may be assessed in a larger area as dictated by the location of developments that may contribute to cumulative effects in combination with a project.

4.1.1.1 Site Study Area

The SSA and activities related to the Project have been defined to occur within the Rabbit Lake Operation surface lease boundary area north of the Rabbit Lake mill as shown on Figure 4.1.1-1; inside of the area also described as the Link Lakes watershed area.

4.1.1.2 Local Study Area

Where atmospheric, aquatic and terrestrial components are affected differently by Project activities, the LSA is unique for each component (Figure 4.1.2-1). The LSA for the atmospheric environmental component is defined by a 10 km radius circle around the Rabbit Lake mill. This boundary is selected on the basis of air-dispersion modeling and monitoring results that show that effects on air quality are typically limited to areas close to sources of atmospheric emissions. The aquatic environment LSA includes both Link Lakes (including Pow Bay) and Horseshoe Creek (including Hidden Bay) watersheds. These drainage systems have been incorporated into the monitoring and risk assessment programs for the current operation. The LSA for the terrestrial environment encompasses the LSA for assessing atmospheric effects, as well as the LSA for assessing aquatic effects (i.e. the Link Lakes and Horseshoe Creek watersheds).

4.1.1.3 Regional Study Area

The RSA for assessing effects of the Project on the biophysical environment is defined as the Wollaston Lake drainage basin (Figure 2.0-1). Drainage from the Rabbit Lake Operation reports to Wollaston Lake where drainages from other operations and developments in the region also flow.

The spatial boundaries for the assessment of socioeconomic effects differ from the boundaries defined above for the effects assessment of terrestrial, aquatic and atmospheric environmental components. The spatial boundary for socioeconomic effects stemming from changes to the biophysical environment (i.e. land and resource use), encompasses the people and communities who live in and make use of the area

potentially affected by the biophysical changes. The nearest community is Wollaston Lake, located approximately 32 km southeast of the Rabbit Lake mill. For effects related to business and employment, the socioeconomic spatial boundary will be defined more broadly by the northern Saskatchewan designations (Athabasca, western, central and eastern regions) and the communities identified in the Project HRDA and HRDP.

For the assessment of effects of the Project on the socioeconomic environment, the RSA encompasses the seven communities in the Athabasca Basin (Figure 2.0-1), including

- First Nation Communities: Fond du Lac Denesuline First Nation, Black Lake Denesuline First Nation and Hatchet Lake Denesuline First Nation (located at Wollaston Lake);
- Northern Settlements: Camsell Portage, Uranium City and Wollaston Lake; and
- Northern Hamlet: Stony Rapids.

Both the biophysical and socioeconomic effect assessment boundaries remain the same as those already in place for the Rabbit Lake Operation.

4.1.2 Temporal Boundaries

The temporal boundaries are defined by the duration of the construction, operating and decommissioning phases of a project. The timeframe for the assessment also encompasses a post-decommissioning period, in which the effects of a project, where appropriate, continue to be monitored. Operation of the North Pit Expansion as part of the RLTMF is expected to continue until approximately 2028, after which reclamation would begin. Timelines pertaining to this Project are under development and will be included in the EIS.

4.2 Potential Project-Environment Interactions

The initial step in the assessment of environmental effects involves identifying the key project activities that may interact with the biophysical and socio-economic environments. Project-environment interactions are considered during the construction, operation, decommissioning and post-decommissioning phases of a project and include accidents and malfunctions. Each of the identified project activities are considered individually to determine whether there is a plausible pathway to interact with the environment. For a project-environment interaction to occur there needs to be:

- A source (i.e. project activity, such as treated effluent release);
- A receptor within the environment that could be affected (i.e. valued ecosystem components (VECs) and valued socioeconomic components (VSECs)); and
- A valid connection (i.e. a pathway to an environmental effect) from the source to the receptor in the environment.

Potential interactions between a project and the environment are identified in a matrix format. Potential interactions between the Project and the environment are presented by an “X” on Tables 4.2-1 and 4.2-2 for biophysical and socioeconomic components, respectively. Blank cells indicate project-environment interactions were considered but

no interaction is expected. Those project-environment interactions identified with an "X" are considered further in subsequent sections.

Table 4.2-1
Project Environment Interaction Matrix - Biophysical Effects

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants. Animals and birds)
Construction Phase – Link Lakes Watershed																
	1. Construction of lay down area and runoff sediment controls on lease in the vicinity of the pit expansion area and mobilization of equipment	X	X	X	X	X	X			X			X	X	X	
	2. Clearing of area for North Pit Expansion (approx 30 ha) and construction of surface water diversion trenches and/or berms	X	X	X	X	X	X			X	X		X	X	X	X
	3. Development of clean rock and overburden piles (separate areas to be constructed near the pit on the lease to minimize haul distances). No liners required	X	X	X	X	X	X			X	X	X	X	X	X	X
	4. Excavation of overburden and bedrock to create pit expansion, including blasting of bedrock	X	X	X	X	X	X	X		X	X	X	X	X	X	X
	5. Construction of pit underdrain, raise, tunnel and pervious surround	X	X	X	X	X	X			X	X	X	X		X	
	6. Construction of access and perimeter roads including the re-alignment of existing roads, including sourcing of road bed material	X	X	X	X	X	X			X			X	X	X	X
	7. Construction of ancillary facilities: pipelines, valve house, pumphouse, electrical power line and master control centre	X	X	X	X	X	X						X	X	X	

Table 4.2-1
Project Environment Interaction Matrix – Biophysical Effects (continued)

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants. Animals and birds)
	8. Collection and treatment of surface runoff and pit waters during construction to remove TSS with discharge to Upper Link Lake				X	X	X	X	X							
Operating Phase – Link Lakes Watershed																
	9. Permanent placement of tailings in the RLTMF	X	X							X	X	X				X
	10. Collection, pumping and venting of raise water (including contaminated site runoff, groundwater and tailings slurry water) to the mill for reuse or treatment	X	X		X	X	X	X	X	X	X	X			X	X
Operating Phase – Horseshoe Creek Watershed																
	11. Continued discharge of treated effluent				X	X	X	X	X			X	X	X	X	X
Operating Phase – Local Airshed																
	12. Extended operation of the mill and ancillary facilities	X	X	X		X	X	X	X			X	X	X	X	X
Decommissioning Phase – Link Lakes Watershed																
	13. Reclamation of North Pit Expansion, including placement of cover material	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 4.2-1
Project Environment Interaction Matrix – Biophysical Effects (continued)

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants. Animals and birds)
Decommissioning Phase – Horseshoe Creek																
	14. Continued treatment of contaminated waters from the North Pit Expansion until tailings are sufficiently consolidated with discharge to Horseshoe Creek				X	X	X	X	X	X	X	X	X	X	X	X
Post-Decommissioning Phase – Link Lakes Watershed																
	15. Re-establishment of surface water and groundwater flow systems				X	X	X	X	X	X	X	X	X	X	X	X
Post-Decommissioning Phase – Horseshoe Creek Watershed																
	16. Discontinuation of treated water discharge to Horseshoe Creek				X	X	X	X	X		X	X	X	X	X	X
Accidents & Malfunctions – Local Study Area																
	17. Accidental spill of tailings or untreated raise water during transfer via pipeline				X	X	X	X	X		X	X	X	X	X	X
	18. Accidental spill of fuel				X	X	X	X	X			X	X	X	X	X
	19. Failure of pervious surround or pit wall slopes during operation				X	X	X	X	X	X	X	X	X	X	X	X
	20. Safety incidents (injuries and equipment damage)															

*Note – "X" indicates that a potential project-environment has been identified and will be carried forward in the assessment process.
A blank cell indicates that a project-environment interaction has been considered but no interaction is expected.

Table 4.2-2
Project Environment Interaction Matrix – Socioeconomic Effects

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Construction Phase – Link Lakes Watershed											
	1. Construction of lay down area and runoff sediment controls on lease in the vicinity of the pit expansion area and mobilization of equipment	X	X	X	X	X	X	X	X	X	X
	2. Clearing of area for North Pit Expansion (approx. 30 hectares (ha)) and construction of surface water diversion trenches and/or berms	X	X	X	X	X	X	X	X	X	X
	3. Development of clean rock and overburden piles (separate areas to be constructed near the pit on the lease to minimize haul distances). No liners required	X	X	X	X	X	X	X	X	X	
	4. Excavation of overburden and bedrock to create pit including blasting of bedrock	X	X	X	X	X	X	X	X	X	
	5. Construction of pit underdrain, raise, tunnel and pervious surround	X	X	X	X	X	X	X	X	X	
	6. Construction of access and perimeter roads including the re-alignment of existing roads, including sourcing of road bed material	X	X	X	X	X	X	X	X	X	X
	7. Construction of ancillary facilities: pipelines, valve house, pumphouse, electrical power line and master control centre	X	X	X	X	X	X	X	X	X	X
	8. Collection and treatment of surface runoff and pit waters during construction to remove TSS with discharge to Upper Link Lake				X	X	X		X	X	

Table 4.2-2
Project Environment Interaction Matrix – Socioeconomic Effects (continued)

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Operating Phase – Link Lakes Watershed											
	9. Permanent placement of tailings in RLTMF	X	X	X	X	X	X	X	X	X	
	10. Collection, pumping and venting of raise water (including contaminated site runoff, groundwater and tailings slurry water) to the mill for reuse or treatment		X		X	X		X	X	X	
Operating Phase – Horseshoe Creek Watershed											
	11. Continued discharge of treated effluent to Horseshoe Creek	X	X		X			X	X	X	
Operating Phase – Local Airshed											
	12. Extended operation of the mill and ancillary facilities	X	X			X	X	X	X	X	
Decommissioning Phase – Link Lakes Watershed											
	13. Progressive reclamation of North Pit Expansion, including placement of cover material	X	X	X	X	X	X	X	X	X	
Decommissioning Phase – Horseshoe Creek Watershed											
	14. Continued treatment of contaminated waters from North Pit Expansion until tailings are sufficiently consolidated with discharge to Horseshoe Creek	X	X		X			X	X	X	

Table 4.2-2
Project Environment Interaction Matrix – Socioeconomic Effects (continued)

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Post-Decommissioning Phase – Link Lakes Watershed											
	15. Re-establishment of surface water and groundwater flow systems	X						X	X	X	
Post-Decommissioning Phase – Horseshoe Creek Watershed											
	16. Discontinuation of treated water discharge to Horseshoe Creek	X						X	X	X	
Accidents & Malfunctions – Local Study Area											
	17. Spill of tailings or untreated raise water during transfer via pipeline	X	X			X		X	X	X	
	18. Spill of fuel	X	X			X		X	X	X	
	19. Failure of pervious surround or pit wall slopes during operation	X	X	X	X			X	X	X	
	20. Safety incidents (injuries and equipment damage)			X	X						

*Note – "X" indicates that a potential project-environment has been identified and will be carried forward in the assessment process.
A blank cell indicates that a project-environment interaction has been considered but no interaction is expected.

4.3 Potential Effects on the Environment

A summary of the screening-level assessment undertaken for the potential project-environment interactions identified in Section 4.2 (Tables 4.2-1 and 4.2-2) is presented here.

Tables 4.3.1-1, 4.3.2-1, 4.3.3-1, 4.3.4-1, 4.3.5-1, 4.3.6-1 and 4.3.6-2 describe the assessment completed for each individual environmental component (i.e. atmospheric, aquatic, hydrogeologic and geologic, terrestrial, human, economy and land and resource use). The assessment tables reveal the linkages between project activity, potential project-environment interaction (as identified with an "X" on Tables 4.2-1 and 4.2-2), the associated potential effect and proposed mitigation. The assessment has been completed by characterizing likely residual effects using criteria listed in Table 4.3-1. For the purpose of the Project Description, emphasis has been placed on three of the primary criteria (magnitude, spatial extent and duration), except where the economic assessment is concerned, in which case a direction (i.e. positive or negative) was used to characterize likely residual effects. Where available, results of environmental investigations and previous EIS reports completed for Rabbit Lake Operation (e.g. 2008 URS EIS) were considered in the classification. The characterization of likely residual effects also includes the distinction between project-related effects (incremental) and total residual effects (defined as the combination of existing effects plus the Project-related effects), where applicable. Uncertainties pertaining to the characterization of residual effects are identified and included in the assessment tables.

For ease of comparison, total residual effects are also presented in the original project-environment interaction matrix format (Tables 4.2-1 and 4.2-2). This allows the reader to easily identify how potential interactions have been characterized (see Tables 4.3-2 and 4.3-3). The following legend applies to the likely residual effects matrices (after the implementation of mitigation measures):

- An open circle indicates that the total residual effect is likely negligible (i.e. low or low to moderate in magnitude);
- A solid circle indicates that the total residual effect could be moderate or moderate to high in magnitude; and
- A positive or a negative symbol indicates how the activity is generally expected to impact the socioeconomic environment.

Summaries for each environmental component are provided below. A full assessment of effects, including the determination of the significance of likely residual effects and appropriate mitigation measures will be presented in the EIS.

Table 4.3-1
Criteria for the Characterization of Likely Residual Effects

	Effect Criteria	Effect Levels and Parameters		
Primary Considerations	Direction	**Negative:** Effect is adverse.		**Positive:** Effect is beneficial.
	Magnitude	**Low:** Effect exceeds baseline conditions, but is below reference criteria or guideline values.	**Medium:** Effect will likely exceed reference criteria or guideline values but has limited effect on function.	**High:** Effect will likely exceed reference criteria or guideline values and may cause a loss of function.
	Spatial Extent	**Site:** Effect limited to SSA.	**Local:** Effect limited to LSA.	**Regional:** Effect extends into the RSA.
	Duration	**Short-term:** Effect is limited to short-term events during construction or operation phases.	**Medium-term:** Effect is limited to operational and decommissioning phases.	**Long-term:** Effect extends beyond the decommissioning phase.
Other Considerations	Likelihood	**Unlikely:** Effect is not likely to occur during the assessment period.	**Possible:** Effect may occur during the assessment period.	**Likely:** Effect will likely occur during the assessment period.
	Frequency	**Isolated**: Effect, confined to discrete period.	**Periodic**: Effect occurs intermittently, but repeatedly over the assessment period.	**Continuous:** Effect occurs continuously over the assessment period.
	Reversibility	**Reversible – short term:** Effect ceases once source/stressor is removed.	**Reversible – long term:** Effect persists for some time after source/stressor is removed.	**Irreversible:** Effect is not readily reversible.
	Ecological Importance	**Low:** The attribute being affected is common and abundant within the RSA.	**Medium:** The attribute being affected is less common and of limited abundance within the RSA.	**High:** The attribute being affected is recognized as being a threatened or a rare or endangered species.
	Societal Value	**Low:** The attribute being affected plays a limited role in maintaining the economic base, social structure, community stability or the well-being of people in the study area.	**Medium:** The attribute being affected plays an important role in maintaining the economic base, social structure, community stability and the well-being of people in the study area.	**High:** The attribute being affected plays a highly important role in maintaining the economic base, social structure, community stability and the well-being of people in the study area.

Table 4.3-2
Likely Residual Effects Matrix – Biophysical Effects

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants, Animals and birds)
Construction Phase – Link Lakes Watershed																
	1. Construction of lay down area and runoff sediment controls on lease in the vicinity of the pit expansion area and mobilization of equipment	O	O	O	•	•	•			O			O	•	•	
	2. Clearing of area for North Pit Expansion (approx 30 ha) and construction of surface water diversion trenches and/or berms	O	O	O	•	•	•			O	•		•	•	•	O
	3. Development of clean rock and overburden piles (separate areas to be constructed near the pit on the lease to minimize haul distances). No liners required	O	O	O	•	•	•			O	•	O	O	•	•	O
	4. Excavation of overburden and bedrock to create pit including blasting of bedrock	O	O	O	•	•	•	O		O	•	O	•	•	•	O
	5. Construction of pit underdrain, raise, tunnel and pervious surround	O	O	O	•	•	•			O	•	O	O		•	
	6. Construction of access and perimeter roads including the re-alignment of existing roads, including sourcing of road bed material	O	O	O	•	•	•			O			•	•	•	O
	7. Construction of ancillary facilities: pipelines, valve house, pumphouse, electrical power line and master control centre	O	O	O	•	•	•						•	•	•	

Table 4.3-2
Likely Residual Effects Matrix – Biophysical Effects (continued)

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants, Animals and birds)
	8. Collection and treatment of surface runoff and pit waters during construction to remove TSS with discharge to Upper Link Lake				•	•	•	O	O							
Operating Phase – Link Lakes Watershed																
	9. Permanent placement of tailings in RLTMF	O	O							O	•	O				•
	10. Collection, pumping and venting of raise water (including contaminated site runoff, groundwater and tailings slurry water) to the mill for reuse or treatment	O	O		•	O	O	O	O	O	•	O			•	•
Operating Phase – Horseshoe Creek Watershed																
	11. Continued discharge of treated effluent				•	•	•	•	•			O	O	O	O	•
Operating Phase – Local Airshed																
	12. Extended operation of the mill and ancillary facilities	O	O	O		O	O	O	O			O	O	O	O	O
Decommissioning Phase – Link Lakes Watershed																
	13. Progressive reclamation of RLTMF, including placement of cover material	O	O	O	•	O	O	•	O	O	•	O	O	•	•	O

Table 4.3-2
Likely Residual Effects Matrix – Biophysical Effects (continued)

Phase Key	Activity	Atmospheric Environment			Aquatic Environment					Hydrogeologic/Geologic Environment			Terrestrial Environment			
		Air Quality (including dust)	Noise Levels and Vibration	Climate Change (greenhouse gas emissions)	Surface Water Hydrology (including flow and lake levels)	Surface Water Quality	Sediment Quality	Aquatic Biota and Habitat Disturbance	Aquatic Biota Exposure to COPCs	Geotechnical/Geomorphologic Considerations	Groundwater Flow or Elevation Change	Groundwater Quality	Soil Disturbance and Quality	Vegetation Disturbance (communities/species/listed plants)	Wildlife and Habitat Disturbance (animals and birds)	Terrestrial Biota Exposure to COPCs (plants, Animals and birds)
Decommissioning Phase – Horseshoe Creek																
	14. Continued treatment of contaminated waters from the RLTMF until tailings are sufficiently consolidated with discharge to Horseshoe Creek				●	O	O	●	●	O	O	O	O	O	O	●
Post-Decommissioning Phase – Link Lakes Watershed																
	15. Re-establishment of surface water and groundwater flow systems				●	●	●	●	O	O	●	●	O	●	●	●
Post-Decommissioning Phase – Horseshoe Creek Watershed																
	16. Discontinuation of treated water discharge to Horseshoe Creek				●	O	O	●	O		O	O	O	O	O	O
Accidents & Malfunctions – Local Study Area																
	17. Accidental spill of tailings or untreated raise water during transfer via pipeline				O	O	O	O	O		O	O	●	O	O	O
	18. Accidental spill of fuel				O	O	O	O	O			O	●	O	O	O
	19. Failure of pervious surround or pit wall slopes during operation				O	O	O	O	O	O	●	O	O	O	O	O
	20. Safety incidents (injuries and equipment damage)															

*Note – An open circle indicates that the total residual effect is expected to be negligible (i.e. low or low to moderate in magnitude)
A solid circle indicates that the total residual effect could be moderate or moderate to high in magnitude

Table 4.3-3
Likely Residual Effects Matrix – Socioeconomic Effects

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Construction Phase – Link Lakes Watershed											
	1. Construction of lay down area and runoff sediment controls on lease in the vicinity of the pit expansion area and mobilization of equipment	O	O	O	O	+	+	O	O	O	O
	2. Clearing of area for North Pit Expansion (approx 30 ha) and construction of surface water diversion trenches and/or berms	O	O	O	O	+	+	O	O	O	O
	3. Development of clean rock and overburden piles (separate areas to be constructed near the pit on the lease to minimize haul distances). No liners required	O	O	O	O	+	+	O	O	O	
	4. Excavation of overburden and bedrock to create pit including blasting of bedrock	O	O	O	O	+	+	O	O	O	
	5. Construction of pit underdrain, raise, tunnel and pervious surround	O	O	O	O	+	+	O	O	O	
	6. Construction of access and perimeter roads including the re-alignment of existing roads, including sourcing of road bed material	O	O	O	O	+	+	O	O	O	
	7. Construction of ancillary facilities: pipelines, valve house, pumphouse, electrical power line and master control centre	O	O	O	O	+	+	O	O	O	O
	8. Collection and treatment of surface runoff and pit waters during construction to remove TSS with discharge to Upper Link Lake				O	+	+		O	O	

Table 4.3-3
Likely Residual Effects Matrix – Socioeconomic Effects (continued)

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Operating Phase – Link Lakes Watershed											
	9. Permanent placement of tailings in RLTMF	O	O	O	O	+	+	O	O	O	
	10. Collection, pumping and venting of raise water (including contaminated site runoff, groundwater and tailings slurry water) to the mill for reuse or treatment		O		O	+		O	O	O	
Operating Phase – Horseshoe Creek Watershed											
	11. Continued discharge of treated effluent to Horseshoe Creek	O	O		O			O	O	O	
Operating Phase – Local Airshed											
	12. Extended operation of the mill and ancillary facilities	O	O			+	+	O	O	O	
Decommissioning Phase – Link Lakes Watershed											
	13. Progressive reclamation of RLTMF including placement of cover material	O	O	O	O	+	+	O	O	O	
Decommissioning Phase – Horseshoe Creek Watershed											
	14. Continued treatment of contaminated waters from RLTMF until tailings are sufficiently consolidated with discharge to Horseshoe Creek	O	O		O			O	O	O	

Table 4.3-3
Likely Residual Effects Matrix – Socioeconomic Effects (continued)

Phase Key	Activity	Human Health				Economy		Land and Resource Use			
		Public Exposure to Radioactive and Non-radioactive COPCs	Worker Exposure to Radioactive and Non-radioactive COPCs	Public Exposure to Conventional Health & Safety (physical hazards)	Worker Exposure to Conventional Health & Safety (physical hazards)	Employment	Business and Economic Development	Land and Resource Use for Traditional and Domestic Purposes by Aboriginal people	Hunting, Trapping and Fishing Use	Tourism, Outfitting and Lodges	Heritage Resources
Post-Decommissioning Phase - Link Lakes Watershed											
	15. Re-establishment of surface water and groundwater flow systems	O						O	O	O	
Post-Decommissioning Phase - Horseshoe Creek Watershed											
	16. Discontinuation of treated water discharge to Horseshoe Creek	O						O	O	O	
Accidents & Malfunctions - Local Study Area											
	17. Accidental spill of tailings or untreated raise water during transfer via pipeline	O	O			+		O	O	O	
	18. Accidental spill of fuel	O	O			+		O	O	O	
	19. Failure of pervious surround or pit wall slopes during operation	O	O	O	O			O	O	O	
	20. Safety incidents (injuries and equipment damage)			O	O						

*Note - An open circle indicates that the total residual effect is expected to be negligible (i.e. low or low to moderate in magnitude)
A "+" indicates that the total residual effect is expected to be positive

4.3.1 Summary of Atmospheric Environment

Potential effects on the atmospheric environment have been assessed through the investigation of Project activities and their interaction with three atmospheric sub-components (i.e. air quality, noise and greenhouse gas (GHG) emissions). Tables 4.2-1 and 4.3-2 present the Project-atmospheric environment interactions and likely residual effects, respectively, while Table 4.3.1-1 offers the complete screening level assessment of the atmospheric environment undertaken for the Project Description. Accidents and malfunctions related to the Project are not expected to effect the atmospheric environment and therefore are not discussed.

4.3.1.1 Air Quality

Project activities likely to result in residual effects on air quality during construction and decommissioning phases include site clearing, construction and excavation activities and the use of vehicles and heavy equipment during all phases. These activities will result in small incremental increases of TSP, CO_2, NO_x and SO_2 levels in the LSA. To mitigate these potential effects, service vehicles will be maintained in good operating order, dust suppression measures will be in place and traffic will be limited to necessary activities.

The extended operation of the mill will result in an incremental increase of radon, TSP, uranium and other elements, SO_2 and NO_x levels in the local airshed. The permanent placement of tailings in the proposed North Pit Expansion and the venting of raise water will also result in small incremental increases to radon levels in the LSA. To mitigate these potential effects, dust and emission control measures will continue to be in place at the mill during its extended operation and currently approved tailings deposition methods will minimize dust and limit radon gas emanations during tailings deposition.

Both incremental and total effects on air quality are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the environmental impact assessment.

4.3.1.2 Noise Levels and Vibrations

Project activities likely to result in residual effects on ambient noise and vibration levels in the SSA during the construction phase include blasting of bedrock and the loading and dumping of waste materials. Similarly, grading and handling of cover material during decommissioning will result in the same effect. During the operating phase the placement of tailings into the proposed North Pit Expansion and the collection, pumping and venting of raise water also generate noise. However, many of these operating phase activities are housed, which effectively reduces ambient noise levels. All other activities associated with noise are a result of vehicle and heavy equipment use.

To mitigate incremental increases to noise and vibration levels during the construction phase, blasting activities will be scheduled (when possible) to minimize potential noise and vibration effects to human and terrestrial receptors. Both incremental and total effects of noise and vibration are expected to be low in magnitude, local in geographic extent,

medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

4.3.1.3 Climate Change

The extended operation of the mill will result in small incremental increases to GHG emissions in the LSA during the operating phase. Specifically, heating systems for the maintenance of the mill process and building temperatures may contribute to climate change by way of fossil fuel combustion. Additionally, the continued use of vehicles and heavy equipment which emit CO_2 and NO_x during all phases will result in the same effect.

To mitigate incremental increases to GHG emissions during the operating phase, environmental initiatives will continue to play an important role in emissions reduction. During all phases, construction and service vehicles and heavy equipment will be maintained in good operating order and traffic will be limited to necessary activities to minimize emissions. All incremental and total effects of GHG emissions on climate change are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible.

Table 4.3.1-1
Atmospheric Environment

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Air Quality (including dust) – Local Airshed	<u>Construction and Decommissioning Phases</u> • Construction of lay down area and runoff sediment controls. • Clearing of area for the North Pit and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and the realignment of an existing road, including sourcing of road bed material. • Excavation and handling of overburden and bedrock to construct the North Pit Expansion including blasting of bedrock and development of waste rock and overburden piles. • Construction of ancillary facilities (pipelines, valve house, pumphouse, electrical power line). • Preparation and placement of pit underdrain, raise, tunnel and pervious surround in North Pit Expansion. • Progressive reclamation, including excavation, haulage, placement and grading of cover materials during reclamation of waste piles and the North Pit Expansion.	<u>Construction and Decommissioning Phases</u> • Emissions of dust during site development and clearing activities and during construction of access roads, the North Pit Expansion and ancillary facilities (from blasting, excavation, loading, hauling, dumping and grading). • Emissions from crushing and screening of rock for permeable surround and placement of same. • Emissions of dust during decommissioning from shaping of piles and disturbed areas and from excavation, haulage and placement of cover materials.	• Increase in dust (TSP) in local airshed.	<u>All Phases</u> • Dust suppression measures will be in place to limit dust levels during unfavourable weather conditions – such as road wetting when necessary. • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize gaseous and TSP emissions. • Traffic will be limited to necessary activities such as routine pipeline integrity checks and regular service maintenance.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects of TSP, CO_2, NO_x and SO_2 emissions on air quality are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. <u>Uncertainties</u> • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Quantities and types of fuel required during, construction, operation and decommissioning.	The EIS will include a full assessment of potential effects – air quality will be included in the assessment. Uncertainties will be addressed in the assessment.
	<u>All Phases</u> • Use of vehicles and heavy equipment.	<u>All Phases</u> • Emissions of TSP and standard pollutants (CO_2, NO_x, SO_2, TSP) from construction equipment and light vehicles.	• Increase in TSP, CO_2, NO_x and SO_2 levels in local airshed.			

Table 4.3.1-1
Atmospheric Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Air Quality (including dust) – Local Airshed (Cont'd)	Operating Phase • Extended operation of the mill and ancillary facilities. • Permanent placement of tailings into the North Pit Expansion. • Venting (degassing) of raise water.	Operating Phase • The mill emits SO_2 through the acid plant as well as TSP and associated metals and radionuclides and radon gas from mill processes and standard pollutants from combustion of heating fuels. • Tailings slurry water contains radon gas some of which will be emitted to the atmosphere from the surface water cover layer in the North Pit Expansion and during venting of raise water.	• Increase in radon, TSP, uranium and other elements, SO_2 and NO_x levels in the local airshed around mill. • Increase in radon levels in local airshed during tailings deposition, venting and pumping of raise water to mill and mill operation.	Operating Phase • Currently approved tailings deposition methods will prevent dust and limit radon gas emanations at the North Pit Expansion. • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and acid plant.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of radon and other emissions on air quality are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Composition/physical properties of tailings.	The EIS will include a full assessment of potential effects – air quality will be included in the assessment. Uncertainties will be addressed in the assessment.
Noise Levels and Vibrations – Local Airshed	Construction and Decommissioning Phases • Blasting of bedrock. • Preparation and placement of pit underdrain, raise, tunnel and pervious surround in the North Pit Expansion. • Progressive reclamation of the North Pit Expansion including placement of cover material. • Operation of heavy equipment. Operating Phase • Permanent placement of tailings into the North Pit Expansion. • Collection, pumping and venting of raise water. All Phases • Use of light vehicles.	Construction and Decommissioning Phases • Blasting of bedrock will produce noise and vibrations. • Crushing and screening of rock for permeable surround and placement of same produces noise. • Grading of waste piles and handling of cover materials for reclamation of waste piles, the North Pit Expansion and roads will produce noise. • Noise and vibrations produced by the operation of equipment and handling of construction and waste material. Operating Phase • Operation of the North Pit Expansion and ancillary facilities (i.e. activities such as the placement of tailings and the use of pumps to move raise water) produces noise. All Phases • Vehicles produce noise and vibrations.	• Increase of ambient noise and vibration levels (disturbance to people and wildlife).	Construction and Decommissioning Phases • To the extent possible, blasting activities will be scheduled to minimize potential noise and vibration effects to human and terrestrial receptors. Operating Phase • Many components of the North Pit Expansion and ancillary facilities are housed (i.e. valve house, pumphouse etc.) which effectively reduces ambient noise levels. All Phases • Traffic will be limited to necessary activities such as routine pipeline integrity checks and regular service maintenance.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of noise and vibration are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Extent of blasting that will be required to develop the pit. • Number of and type of vehicles/equipment to be used during construction and decommissioning phases.	The EIS will include a full assessment of potential effects – noise and vibration levels will be included in the assessment. Uncertainties will be addressed in the assessment.

Table 4.3.1-1
Atmospheric Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Noise Levels and Vibrations – Local Airshed (Cont'd)	Operating Phase • Extended operation of the mill and ancillary facilities.	Operating Phase • Mill process equipment generates noise.	• Extended duration of noise and vibration levels.	Operating Phase • Most mill process and ancillary equipment are housed which effectively reduces ambient noise levels around the complex.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of noise resulting from an extended operation of the mill are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Little change expected from existing conditions.	The EIS will include a full assessment of potential effects – noise and vibration levels will be included in the assessment.
Climate Change (GHG emissions) – Local Airshed	Operating Phase • Extended operation of heating systems for maintenance of mill process and building temperatures. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Facility and process heating requires combustion of fossil fuels which emit CO_2 and NO_x. All Phases • Vehicles and heavy equipment emit CO_2 and NO_x.	• Increase in GHG emissions from Rabbit Lake Operation.	Operating Phase • Environmental leadership initiatives such as turning down the temperature in the mill will continue to have an important role in emission reduction during the extended operation of the mill. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions. • Traffic will be limited to necessary activities such as routine pipeline integrity checks and regular service maintenance.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of GHG emissions are expected to be low in magnitude and medium-term in duration. Uncertainties • Quantities of fuel required for heating purposes and for operation of mobile equipment.	The EIS will include an assessment of potential effects – GHG emission levels will be included in the assessment. Uncertainties will be addressed in the assessment.

4.3.2 Summary of Aquatic Environment

Potential effects on the aquatic environment have been assessed through the investigation of Project activities and their interaction with four sub-components (i.e. surface water hydrology, surface water and sediment quality, aquatic biota and habitat disturbance and aquatic biota exposure to COPCs). Accidents and malfunctions are assessed for all aquatic environment sub-components in Section 4.3.2.5. Tables 4.2-1 and 4.3-2 present Project-environment interactions and the likely residual effects, respectively, while Table 4.3.2-1 explains Project-environment interactions, potential effects and mitigation specific to the aquatic environment.

4.3.2.1 Surface Water Hydrology

Potential effects on surface water hydrology have been identified in both Link Lakes and Horseshoe Creek watersheds.

Link Lakes Watershed

During construction of the North Pit Expansion and ancillary facilities, site work will involve the removal of vegetative cover and soil, the diversion of clean runoff and the collection of potentially contaminated surface water. These activities will result in changes to local surface water flow patterns and runoff quantities to the Lower Link Lake drainage system. To mitigate the potential effect of construction phase activities, where feasible, existing cleared areas will be used and new infrastructure will tie into existing facilities to limit disturbance to hydrology. Vegetation and soil removal will also be minimized where possible and standard construction practices will be employed to reduce soil erosion. Finally, measures will be employed to minimize sediment loading from runoff from waste rock and overburden to the Link Lakes drainage system.

Similarly to construction phase activities, the collection of raise water during operating and decommissioning phases will change local surface water flow patterns; surface runoff in the area of the North Pit Expansion will be reduced as a result of drawdown of the groundwater table and interception of direct precipitation (i.e. until pumping and treatment of raise water is no longer required). Drawdown will likely lower the water level of Four Bear Pond. Surface runoff is currently directed into the existing RLTMF from much of the drainage area on the north side of the existing pit therefore no substantial change to surface runoff flow is expected as a result of the North Pit Expansion during operating and decommissioning phases.

With the discontinuation of raise water pumping, there will be an increase in surface water flow quantities as natural patterns are re-established. To mitigate increased flow, disturbed areas will be reclaimed with natural shaped landforms and indigenous vegetation to integrate the North Pit Expansion site back into the local hydrological system.

Incremental effects to local surface water hydrology during the construction, operating and decommissioning phases are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental effects related specifically to

the drawdown of Four Bear Pond water levels are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible while incremental effects of increases to local surface water hydrology resulting from re-naturalization during post-decommissioning are expected to be moderate in magnitude, local in geographic extent and long-term in duration. It is noted that there are no fish present in Four Bear Pond and that it is not hydraulically connected to any other water body; hence, any potential effect on the water level in the pond would have minor consequences.

Total effects of all facilities in the Link Lakes drainage basin on local surface water hydrology are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek

During operating and decommissioning phases raise water from the North Pit Expansion will be collected and treated in the Rabbit Lake effluent treatment system (ET) and discharged to Horseshoe Creek. These activities will result in an increase of flow to Horseshoe Creek due to incremental increase in total flow treated through the ET. However, the volume of treated effluent discharged to Horseshoe Creek will not change substantially due to appropriate water management strategies being added to the Rabbit Lake Operation. The discontinuation of raise water pumping once tailings are sufficiently consolidated during the post-decommissioning phase will reduce flow in Horseshoe Creek. No mitigation is anticipated as flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions.

Incremental effects on local surface water hydrology during operating and decommissioning phases are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Total effects on local surface water hydrology of the combined discharge from the ET are expected to be high in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects of the discontinuation of the discharge of treated effluent is expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.2.2 Surface Water and Sediment Quality

Potential effects on surface water and sediment quality have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

During the construction phase, there is the potential for increased turbidity in local surface water as a result of vegetation and soil removal, site runoff and surface runoff from barren waste rock and overburden piles. To mitigate this potential effect, standard construction practices will be employed to limit soil erosion and offsite transport of

suspended solids. Sediment control measures will be used to reduce total suspended solids from runoff from the waste and overburden piles.

During operating and decommissioning phases, the collection of surface runoff and site reclamation are expected to have no measurable effect on the Link Lakes system water or sediment quality. Surface water is collected, treated and then discharged to Horseshoe Creek during these phases and the placement of cover material over the tailings surface at closure will isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings.

The discontinuation of raise water pumping during post-decommissioning will increase COPC load input to Link Lakes watershed. Natural groundwater and surface water flow patterns will be re-established at this point and water passing through and around the decommissioned North Pit Expansion and associated waste rock pile is expected to contain residual COPC levels that will be transported downstream to Upper and Lower Link Lakes. To mitigate this potential effect, the ET will continue to be utilized until the consolidation of the tailings is sufficiently complete to the satisfaction of regulatory requirements; the pervious surround will minimize groundwater flow through the tailings over the long-term thus reducing COPC loads transported downstream; and mineralized waste rock will be handled and disposed of in a secure manner to prevent contamination of surface runoff.

Incremental effects on COPC levels in surface water and sediment in the downstream Link Lakes watershed are expected to be low to moderate in magnitude, local in geographic extent and long-term in duration. Total effects on COPC levels in surface runoff to Link Lakes watershed are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek

During the operating phase, the collection and treatment of raise water will result in an increase in the COPC loads in the discharge to Horseshoe Creek watershed and hence increase in the COPC concentrations in Horseshoe Creek and Hidden Bay water and sediments. This is also true for decommissioning though at a reduced rate. During both phases, all water entering the RLTMF will be captured through the pervious surround systems, pumped to the mill for recycle or treatment in the ET prior to release into Horseshoe Creek. Effluent discharge will be monitored and will conform to discharge limits before release.

During the post-decommissioning phase, the discontinuation of effluent discharge to Horseshoe Creek will decrease the COPC loads entering Horseshoe Creek. Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as sufficient recovery of the system is verified.

During the operating phase, incremental effects on COPC levels in surface water and sediment in the Horseshoe Creek watershed are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Total

effects on COPC levels in surface water and sediment in Horseshoe Creek watershed during the operating phase are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. During the decommissioning phase, both incremental and total effects on COPC levels in Horseshoe Creek watershed are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. During post-decommissioning, the recovery of water and sediment quality is expected to occur slowly over time. These residual effects will be assessed more definitively in the EIS.

Local Airshed

Mill emissions of TSP and associated metals and radionuclides will continue for a longer timeframe as a result of the extended operation of the mill and the use of vehicles and heavy equipment will result in emissions of standard pollutants and cause dust suspension. These emissions may have a potential effect on surface water and sediment quality in the local airshed. During the operating phase, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and during all phases, construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.

Incremental and total effects on surface water and sediment quality resulting from dust deposition and emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. There are no uncertainties as monitoring of small lakes close to the Rabbit Lake Operation has demonstrated that atmospheric emissions have little effect on surface water and sediment quality.

4.3.2.3 Aquatic Biota and Habitat Disturbance

Potential effects on aquatic biota and habitat disturbance have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

During the construction phase, the blasting of bedrock and the collection of surface runoff may disturb aquatic biota or habitat. Blasting causes over pressure and particle velocity changes that could potentially affect fish and/or fish habitat depending on the distance from the closest water body and the size of the explosive charge while the collection of surface runoff may result in a temporary increase in turbidity levels in runoff waters from disturbed areas. Specifically, blasting may cause a change in fish health, including potential for mortality to egg, young and adult fish life stages as a result of over pressure or particle velocity changes; a change in fish behaviour; or a change to fish habitat quality due to pressure and vibration. Collection of surface water may cause a change in aquatic biota behaviour and habitat quality due to a potential increase in the turbidity level and sediment deposition in the Link Lakes system.

During the operating phase, the collection and treatment of raise water will remove contaminated water from the Link Lakes watershed; therefore, minimal change in aquatic habitat is expected. All water entering the RLTMF during operation will be captured

through the pervious surround systems, pumped to the mill for recycle or treatment in the ET prior to release into Horseshoe Creek.

Starting during decommissioning with the placement of cover material over the tailings and continuing through post-decommissioning with the discontinuation of raise water pumping, the increase in surface runoff to Link Lakes in the long-term will potentially affect habitat quality and quantity. Mitigation for this potential effect includes disturbed areas being reclaimed with natural shaped landforms and indigenous vegetation to integrate these areas back into the local hydrological regime.

Incremental effects resulting from blasting and increased turbidity levels during the construction phase are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible. The incremental and total effect on aquatic habitat biota during the operating phase is expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects on aquatic biota due to flow changes in Link Lakes in the long-term during post-decommissioning are expected to be moderate in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek

The collection and treatment of raise water during the operating and decommissioning phases with discharge to Horseshoe Creek may result in a change in aquatic biota habitat quantity and quality due to an incremental increase in the flow rate in Horseshoe Creek. The discontinuation of raise water pumping and discharge to Horseshoe Creek during the post-decommissioning phase may also result in a change to habitat quantity and quality from a decrease in flow rate to Horseshoe Creek in the long-term. Mitigation during operating and decommissioning phases includes the addition of appropriate water treatment to the Rabbit Lake Operation and the monitoring of effluent discharge to ensure conformance to discharge limits before release. The volume of treated effluent discharged to Horseshoe Creek will not change substantially during the operating phase due to other water management strategies being implemented at Eagle Point; however, during decommissioning, substantially lower volumes will be experienced, but with a base flow remaining in the system. No mitigation is anticipated during post-decommissioning as flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions.

Incremental effects on aquatic biota due to habitat quantity and quality changes resulting from flow rate changes in Horseshoe Creek are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects on aquatic biota in the Horseshoe Creek watershed due to continued discharge are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects on aquatic biota due to flow changes in Horseshoe Creek in the long term (post decommissioning) are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Local Airshed

As a result of mill emissions of TSP and associated metals and radionuclides over a longer time frame and the use of vehicles and heavy equipment that will result in emissions of standard pollutants and dust suspension, a decrease in the quality of aquatic habitat in the local airshed may occur. To mitigate this potential effect, during the operating phase, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation and, during all phases, construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.

Incremental and total effects on aquatic habitat resulting from dust deposition and emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible.

4.3.2.4 Aquatic Biota Exposure to COPCs

Potential effects of aquatic biota exposure to COPCs have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

During the construction, operating and decommissioning phases, there will be minimal exposure of aquatic biota to COPCs in the Link Lakes watershed because all water entering the RLTMF will be captured through the pervious surround systems, pumped to the mill for recycle or treatment in the ET prior to release into Horseshoe Creek.

Once raise water pumping ceases during the post-decommissioning phase, natural surface water flow patterns will be re-established and surface water passing over the decommissioned RLTMF and associated waste rock pile will result in the transport of COPCs to the downstream Link Lakes watershed. Mitigation measures for this potential effect include the placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings and the continued operation of the ET until consolidation of the tailings is sufficiently complete to the satisfaction of regulatory requirements..

Incremental and total effects on aquatic biota due to increase in COPC levels in the downstream Link Lakes system during construction, operation and decommissioning are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration, and reversible. Incremental and total effects on aquatic biota in Link Lakes watershed during post-decommissioning are expected to be low to moderate in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed in more detail more definitively in the EIS.

Horseshoe Creek

The collection and treatment of raise water during both the operating and decommissioning phases, with discharge to Horseshoe Creek, may affect the health of aquatic biota from exposure to COPCs. To mitigate this potential effect, all water

entering the RLTMF during operation will be captured through the pervious surround systems, pumped to the mill for recycle or treatment in the ET prior to release into Horseshoe Creek. This includes continued pumping and treatment of raise water until consolidation of the tailings is sufficiently complete (no excess pore pressures) to the satisfaction of regulatory requirements. The addition of appropriate water treatment to the Rabbit Lake Operation is planned to reduce COPC loads and effluent discharge will be monitored to ensure conformance with discharge limits before release.

During post-decommissioning, raise water pumping will be discontinued and discharge to Horseshoe Creek through the ET will cease. This will decrease aquatic biota exposure to COPCs. Monitoring of water, sediments and aquatic biota in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system meets regulatory requirements.

Incremental effects on aquatic biota health as a result of exposure to COPCs in the Horseshoe Creek watershed are expected to be moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Total effects on aquatic biota in the Horseshoe Creek watershed are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Recovery of water and sediment quality is expected to occur slowly over time - thus reducing exposure to COPCs in the post-decommissioning phase. These residual effects will be assessed more definitively in the EIS.

Local Airshed

As a result of mill emissions of TSP and associated metals and radionuclides over a longer time frame and the use of vehicles and heavy equipment that will result in emissions of standard pollutants and dust suspension, aquatic biota may be exposed to COPCs in the local airshed. To mitigate this potential effect during the operating phase, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and during all phases of construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.

Incremental and total effects on aquatic biota resulting from exposure to COPCs derived from mill and vehicle emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible.

4.3.2.5 Accidents and Malfunctions for all Aquatic Environment Sub-Components

The transfer of tailings slurry or raise water to and from the mill poses a risk of accidental spill as a result of pipeline failure or human error. An accident may result in an increase in the COPC loads in water and sediment in the Link Lakes drainage system. Similarly, the transportation of fuel to the construction site and the fuelling of construction equipment poses a risk of spillage. A spill may result in hydrocarbon compound contamination of surface water and sediment in the area of the accident, potentially exposing aquatic biota to hydrocarbons. An accidental spill of tailings slurry, raise water or fuel may also result in a change to aquatic biota behaviour and habitat quality in the

Link Lakes system. To mitigate these potential effects, pipelines associated with the North Pit Expansion will be dual contained, thus reducing risk of pipeline failure and an emergency response plan is in place at Rabbit Lake Operation, including trained personnel who can be dispatched to control and contain a spill in a timely manner.

Failure of the pervious surround or pit walls during operation could result in the loss of tailings storage capacity, the interruption of operations and/or the loss of contaminated groundwater containment. To mitigate these potential effects to the side slopes of the North Pit Expansion it is anticipated that the pit will be excavated to an average slope angle of 2 horizontal : 1 vertical to reduce the potential of side slope failure during filling of the North Pit Expansion.

Incremental effects of an accidental release or spill on the exposure of all aquatic environment sub-components are expected to be low to moderate in magnitude, short-term in duration, site-specific in geographic extent and reversible. These residual effects will be assessed more definitively in the EIS.

Table 4.3.2-1
Aquatic Environment

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Surface Water Hydrology – Link Lakes Watershed	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for the North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of an existing road, including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct the North Pit Expansion including blasting of bedrock and development of waste rock and overburden piles. • Construction of pit underdrain, raise, tunnel and pervious surround. • Construction of ancillary facilities (pipelines, valve house, pumphouse, electrical power line). • Collection and treatment of surface runoff with discharge to Link Lakes watershed. Operating and Decommissioning Phases • Collection and pumping of raise water (including contaminated site runoff, groundwater and tailings slurry) to the mill for recycle or treatment.	Construction Phase • Site work including removal of vegetative cover and soil will require the diversion of clean runoff and collection of potentially contaminated surface water during construction of the North Pit Expansion, site infrastructure and development of pads for the overburden and waste rock piles. Operating and Decommissioning Phases • Surface runoff in the area of the North Pit Expansion will be reduced as a result of drawdown of the groundwater table during the operating phase and interception of direct precipitation (i.e. until pumping and treatment of raise water is no longer required). • As a result of drawdown of the groundwater table, the water level of Four Bear Pond will likely be lowered.	• Changes to local surface water flow patterns and runoff quantities to the Lower Link Lake drainage system.	Construction Phase • Existing cleared areas will be used and new infrastructure will tie into existing infrastructure where feasible to limit the disturbance to local hydrology. • Vegetation and soil removal will be minimized where possible. • Standard construction practices will be employed to limit soil erosion and offsite transport of suspended solids. • Runoff from the waste rock and overburden piles will be mitigated though sediment controls prior to release to the Lower Link Lake drainage system. Where required, contaminated runoff will be pumped to the ET for removal of metals or radiological COPCs. Operating and Decommissioning Phases • Surface runoff is presently directed into the existing RLTMF from much of the drainage area on the north side of the pit – no substantial change to surface runoff flow is expected as a result of the North Pit Expansion during operating and decommissioning phases.	Project-Related Effects: • Incremental effects to local surface water hydrology during the construction, operating and decommissioning phases are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. • Incremental effects of drawdown on Four Bear Pond are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Total Rabbit Lake Operation Effects: • Total effects of all facilities in the Link Lakes drainage basin on local surface water hydrology are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Extent of change in local drainage patterns has yet to be defined.	The EIS will include a full assessment of potential effects on surface water hydrology. Uncertainties will be addressed in the assessment.
	Decommissioning and Post-Decommissioning Phases • Reclamation activities including the re-establishment of surface water and groundwater flow systems and placement of cover material on the North Pit Expansion upon decommissioning.	Decommissioning and Post-Decommissioning Phases • Change in drainage patterns as a result of site re-naturalization upon decommissioning.	• Increase in surface water flow quantities once pumping of raise water from the North Pit Expansion is no longer required and flow patterns are re-established following re-contouring of the disturbed area.	Decommissioning and Post-Decommissioning Phases • Once tailings are sufficiently consolidated, the collection and treatment of contaminated raise water will cease and natural surface water flow will be re-established with site runoff draining towards Upper Link Lake. • Disturbed areas will be reclaimed with natural shaped landforms and indigenous vegetation to integrate the North Pit Expansion site back into the local hydrological system.	Project-Related Effects: • Incremental effects of increases to local surface water hydrology resulting from re-naturalization are expected to be moderate in magnitude, local in geographic extent and long-term in duration. Total Rabbit Lake Operation Effects: • Total effects on surface water hydrology following reclamation of all facilities in the Link Lakes drainage are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration.	

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Surface Water Hydrology – Link Lakes Watershed (Cont'd)					Uncertainties • Extent of change in local drainage patterns has yet to be defined.	
Surface Water Hydrology – Horseshoe Creek Watershed	Operating and Decommissioning Phase • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET.	Operating and Decommissioning Phases • Discharge of treated effluent to Horseshoe Creek as currently practiced.	• Increase of flow to Horseshoe Creek due to incremental increase in total flow treated through the ET.	Operating and Decommissioning Phases • All water entering the North Pit Expansion during operation will be captured through the pervious surround systems, pumped to the mill for recycle or treatment and then sent to the ET prior to release into Horseshoe Creek. This includes continued pumping and treatment of raise water until consolidation of the tailings is sufficiently complete (no excess pore pressures). • Volume of treated effluent discharged to Horseshoe Creek will not change substantially due to appropriate water treatment additions for the Rabbit Lake Operation.	Project-Related Effects: • Incremental effects on local surface water hydrology during operating and decommissioning phases are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Total Rabbit Lake Operation Effects: • Total effects on local surface water hydrology of the combined discharge from the ET are expected to be high in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Estimated effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized.	The EIS will include a full assessment of potential effects on surface water hydrology. Uncertainties will be addressed in the assessment.
	Post-Decommissioning Phase • Discontinuation of pumping of raise water for treatment once tailings consolidation is complete.	Post-Decommissioning Phase • Cessation of the discharge of treated effluent to Horseshoe Creek.	• Reduction in flow in Horseshoe Creek.	Post-Decommissioning Phase • None. Flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of discontinuation of the discharge of treated effluent is expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. Uncertainties • Natural flow conditions in small watersheds in the local study area are not well known.	

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Surface Water and Sediment Quality – Link Lakes Watershed	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of an existing road, including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct the North Pit Expansion including blasting of bedrock and development of waste rock and overburden piles. • Construction of pit underdrain, raise, tunnel and pervious surround. • Construction of ancillary facilities (pipelines, valve house, pumphouse, electrical power line). • Collection and treatment of surface runoff with discharge to Link Lakes watershed.	Construction Phase • Site work including removal of vegetative cover and soil will require the diversion of clean runoff and collection of potentially contaminated surface water during construction of the North Pit Expansion and site infrastructure and development of pads for the overburden and waste rock piles. • Surface runoff from barren waste rock and overburden piles will require collection and treatment to reduce the sediment load and control other COPCs.	• Increased turbidity in local surface water in the Link Lakes system during construction.	Construction Phase • Standard construction practices will be employed to limit soil erosion and offsite transport of suspended solids. • Sediment control measures will be used to reduce total suspended solids from runoff from the waste and overburden piles. Where required, contaminated runoff will be pumped to the ET for removal of metals or radiological COPCs.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on surface water and sediment quality of all facilities in Link Lakes system LSA are expected to be moderate to high in magnitude, local in geographic extent and short-term in duration.	The EIS will include a full assessment of potential effects on surface water and sediment quality. Uncertainties will be addressed in the assessment.
	Operating and Decommissioning Phases • Collection of contaminated surface water and pumping to the mill for reuse or treatment. • Reclamation of the surface of the North Pit Expansion to isolate it from direct contact with surface runoff.	Operating and Decommissioning Phases • Prevention of contaminated water from reaching the downstream Link Lakes drainage system. • Discharge of treated effluent to the Horseshoe Creek watershed.	• No measurable effect on Link Lakes system water and sediment quality.	Operating and Decommissioning Phases • Collection of potentially contaminated surface runoff and groundwater in the North Pit Expansion raise water pumping system prevents contaminated waters from moving offsite thus providing positive protection of the downstream receiving environment. • Placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects of facilities in the Link Lakes system are expected to be low in magnitude, local in geographic extent and medium-term in duration. Uncertainties • Related to development of appropriate surface water management plans and assessment of capacity of raise water pumping systems.	

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Surface Water and Sediment Quality – Link Lakes Watershed (Cont'd)	Post-Decommissioning Phase • Discontinuation of raise water pumping activities and re-establishment of surface water and groundwater flow systems.	Post-Decommissioning Phase • Once raise water pumping ceases natural groundwater and surface water flow patterns will be re-established. Water passing through and around the decommissioned North Pit Expansion and associated waste rock pile is expected to contain residual COPC levels that will be transported downstream to Upper and Lower Link Lakes.	• Increase in COPC load input to Link Lakes watershed.	Post-Decommissioning Phase • ET will continue to be operated until consolidation of the tailings is sufficiently complete (no excess pore pressures). • The conceptual design for the North Pit Expansion provides for the construction of a pervious surround to minimize groundwater flow through the tailings in the long-term and thus minimizes the COPC loads that will be transported to Upper Link Lake once the natural groundwater flow system re-establishes itself. • Waste rock removed during development of the pit will be separated into clean rock and mineralized waste and the latter waste will be handled and disposed of in a secure manner to prevent contamination of surface runoff during operating and post-operating periods.	Project-Related Effects: • Incremental effects on COPC levels in surface water and sediment in the downstream Link Lakes watershed are expected to be low to moderate in magnitude, local in geographic extent and long-term in duration. Total Rabbit Lake Operation Effects: • Total effects on COPC levels in surface runoff to Link Lakes watershed are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. Uncertainties • Quality of excess water that infiltrates the clean waste rock pile and moves downward into the groundwater system. • Long-term load estimates for the groundwater flow system from the RLTMF and waste rock piles in the drainage basin.	The EIS will include a full assessment of potential effects on surface water and sediment quality. Uncertainties will be addressed in the assessment.
Surface Water and Sediment Quality – Horseshoe Creek Watershed	Operating Phase • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET in conjunction with other contaminated site waters.	Operating Phase • Discharge of treated effluent containing residual amounts of COPCs into Horseshoe Creek.	• Increase in the COPC loads in the discharge to Horseshoe Creek watershed and hence increase in the COPC concentrations in Horseshoe Creek and Hidden Bay water and sediments.	Operating Phase • All water entering the North Pit Expansion during operation will be captured through the pervious surround systems, pumped to the mill for recycle or treatment and then sent to the ET prior to release into Horseshoe Creek. • Effluent discharge will be monitored and will conform to discharge limits before release.	Project-Related Effects: • Incremental effects on COPC levels in surface water and sediment in Horseshoe Creek watershed are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Total Rabbit Lake Operation Effects: • Total effects on COPC levels in surface water and sediment in Horseshoe Creek watershed are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible.	The EIS will include a full assessment of potential effects on surface water and sediment quality. Uncertainties will be addressed in the assessment.

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Surface Water and Sediment Quality – Horseshoe Creek Watershed (Cont'd)	Decommissioning Phase • Continued treatment of contaminated raise waters until tailings are sufficiently consolidated.	Decommissioning Phase • Treated effluent containing residual amounts of COPCs will be discharged into Horseshoe Creek through the existing Rabbit Lake ET.	• Continued discharge of treated effluent to Horseshoe Creek but at reduced rate and hence, reduced COPC loads during decommissioning.	Decommissioning Phase • All water entering the decommissioned North Pit Expansion will be captured through the pervious surround systems, pumped to the mill for treatment and then sent to the ET prior to release into Horseshoe Creek. • Effluent discharge will be monitored and will conform to discharge limits before release.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on COPC levels in Horseshoe Creek watershed are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible.	
	Post-Decommissioning Phase • Discontinuation of the North Pit Expansion raise water and other contaminated surface waters, pumping activities.	Post-Decommissioning Phase • Discontinuation of effluent discharge to Horseshoe Creek.	• Decrease in the COPC loads to Horseshoe Creek.	Post-Decommissioning Phase • Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.	Project-Related and Total Rabbit Lake Operation Effects: • Recovery of water and sediment quality is expected to occur slowly over time. Uncertainties • Time line for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF.	
Surface Water and Sediment Quality – Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Mill emissions of TSP and associated metals and radionuclides will continue for a longer time frame. All Phases • Vehicles and heavy equipment operation will result in emissions of standard pollutants and cause dust suspension.	• Mill emissions (dust deposition and air emissions) may have an effect on surface water and sediment quality in the local airshed. • Vehicle emissions (dust deposition and air emissions) may have an effect on local surface water and sediment quality.	Operating Phase • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on surface water and sediment quality resulting from dust deposition and emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • None. Monitoring of small lakes close to the Rabbit Lake Operation has demonstrated that atmospheric emissions have little effect on surface water and sediment quality.	This aspect will not be addressed further in the EIS.

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Aquatic Biota & Habitat Disturbance – Link Lakes Watershed	Construction Phase • Blasting of bedrock. • Collection and treatment of surface water runoff with discharge to Link Lakes watershed.	Construction Phase • Blasting activity causes both over pressure and particle velocity changes that have the potential to negatively affect fish and fish habitat, depending on distance and the size of the explosive charge. • Potential for temporary increase in turbidity levels in runoff water from disturbed areas during construction activities (i.e. grading, pipeline trenching and placement of cover material).	• Change to fish health, including potential for mortality to egg, young and adult fish life stages as a result of over pressure or particle velocity changes. • Changes in fish behaviour (i.e. avoidance of areas influenced by blasting). • Changes in fish habitat quality due to pressure and vibration. • Change in aquatic biota behaviour and habitat quality due to a potential increase in the turbidity level and sediment deposition in the Link Lakes system.	Construction Phase • Fisheries and Oceans Canada guidance on blasting in proximity to fish habitat will be followed. • Management of runoff from disturbed areas through sediment control measures will serve to both modulate flow rates and reduce the turbidity in runoff prior to release to the Link Lakes watershed. • Standard construction practices will be employed to limit soil erosion and offsite transport of suspended solids.	Project-Related Effects: • Incremental effects on aquatic biota of blasting activity in Link Lakes watershed are expected to be low in magnitude, local in geographic extent, long-term in duration and reversible. • Incremental effects on aquatic biota from turbidity increases are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible. Uncertainties Extent of blasting that will be required to develop the pit.	The EIS will include a full assessment of potential effects on aquatic biota and habitat disturbance. Uncertainties will be addressed in the assessment.
	Operating Phase • Collection and pumping of raise water to the mill for reuse or treatment.	Operating Phase • Removal of contaminated water from the Link Lakes watershed.	• Minimal change in aquatic habitat over the operating phase.	Operating Phase • All water entering the North Pit Expansion during operation will be captured through the pervious surround systems, pumped to the mill for recycle or treatment and then sent to the ET prior to release into Horseshoe Creek.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effect on aquatic habitat and aquatic species is expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Extent of freshwater diversion from upstream watershed is not fully understood at the current level of design.	

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Aquatic Biota & Habitat Disturbance – Link Lakes Watershed (Cont'd)	Decommissioning and Post-Decommissioning Phases • Reclamation activities including the re-establishment of surface water and groundwater flow systems and covering of the North Pit Expansion upon decommissioning.	Decommissioning and Post-Decommissioning Phases • Upon cessation of raise water treatment, water will follow natural flow systems into Link Lakes watershed.	• Increase in surface runoff to Link Lakes in the long-term will potentially affect habitat quality and quantity.	Decommissioning and Post-Decommissioning Phases • Disturbed areas will be reclaimed with natural shaped landforms and indigenous vegetation to integrate these areas back into the local hydrological regime.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic biota due to flow changes in Link Lakes in the long term are expected to be moderate in magnitude, local in geographic extent, long-term in duration and reversible. Uncertainties • Surface runoff patterns in the upstream watershed are not fully understood at the current level of design.	
Aquatic Biota & Habitat Disturbance – Horseshoe Creek Watershed	Operating Phase • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET with discharge to Horseshoe Creek. Decommissioning Phase • Continued treatment of contaminated raise waters until tailings are sufficiently consolidated. Post-Decommissioning Phase • Discontinuation of raise water pumping activities at the North Pit Expansion and re-establishment of groundwater and surface water flow systems.	Operating and Decommissioning Phases • Treatment of raise water from the North Pit Expansion with treated effluent discharged to Horseshoe Creek. Post-Decommissioning Phase • Discontinuation of treated effluent discharge to Horseshoe Creek will decrease the system's flow rate, thus allowing the watershed to return to natural ephemeral conditions.	• Change in aquatic biota habitat quantity and quality due to increase in the flow rate in Horseshoe Creek. • Decrease in flow rate to Horseshoe Creek in the long-term will potentially affect habitat quantity and quality.	Operating Phase • Effluent discharge will be monitored and will conform to discharge limits before release. • Volume of treated effluent discharged to Horseshoe Creek will not change substantially due to other water management strategies being implemented at Eagle Point. Decommissioning Phase • Effluent discharge will be monitored and will conform to discharge limits before release. • Volume of treated effluent discharged to Horseshoe Creek will be substantially lower than during the operating phase but would maintain a base flow in the system. Post-Decommissioning Phase • None. Flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions.	Project-Related Effects: • Incremental effects on aquatic biota due to habitat quantity and quality changes resulting from flow rate changes in Horseshoe Creek are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic biota in the Horseshoe Creek watershed due to continued discharge are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. • Incremental and total effects on aquatic biota due to flow changes in Horseshoe Creek in the long term are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. Uncertainties • Estimated effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized. • Natural flow conditions in small watersheds in the local study area are not well known.	The EIS will include a full assessment of potential effects on aquatic biota and habitat disturbance. Uncertainties will be addressed in the assessment.

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Aquatic Biota & Habitat Disturbance – Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Mill emissions of TSP and associated metals and radionuclides will continue for a longer time frame. All Phases • Vehicles and heavy equipment operation will result in emissions of standard pollutants and cause dust suspension.	• Decreased quality of aquatic habitat resulting from mill emissions (dust deposition and air emissions) that may have an effect on surface water and sediment quality in the local airshed. • Decreased quality of aquatic habitat resulting from vehicle emissions (dust deposition and air emissions) that may have an effect on local surface water and sediment quality.	Operating Phase • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic habitat resulting from dust deposition and emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities.	This aspect will not be addressed further in the EIS as monitoring data has shown that the Rabbit Lake Operation has little effect on water and sediment quality in small lakes close to the mill facilities.
Aquatic Biota Exposure to COPCs – Link Lakes Watershed	Construction Phase • Collection and treatment of surface runoff with discharge to Link Lakes watershed. Operating and Decommissioning Phases • Collection and pumping of raise water to the mill for reuse or treatment.	Construction Phase • Discharge of clarified runoff to Link Lakes watershed. Operating and Decommissioning Phases Removal of contaminated water from the Link Lakes watershed.	• Minimal exposure of aquatic biota to COPCs over the construction, operating and decommissioning phase.	Operating and Decommissioning Phases • All water entering the North Pit Expansion during the operating and decommissioning phases will be captured through the pervious surround systems, pumped to the mill for recycle or treatment and then sent to the ET prior to release into Horseshoe Creek.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic biota due to increase in COPC levels in the downstream Link Lakes system are expected to be low to moderate in magnitude, local in geographic extent and medium-term in duration. Uncertainties • Related to the development of a surface water management strategy.	The EIS will include a full assessment of potential effects on aquatic biota exposure to COPCs. Uncertainties will be addressed in the assessment.

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Aquatic Biota Exposure to COPCs – Link Lakes Watershed (Cont'd)	Post-Decommissioning Phase • Re-establishment of surface water flow system.	Post-Decommissioning Phase • Once raise water pumping ceases natural surface water flow patterns will be re-established and surface water passing over the decommissioned North Pit Expansion and associated waste rock pile will result in the transport of COPCs to the downstream Link Lakes watershed.	• Health of aquatic biota from exposure to COPCs in the long term in Link Lakes watershed once surface and groundwater flow systems are re-established.	Decommissioning Phase • Placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings. Post-Decommissioning Phase • ET will continue to be operated until consolidation of the tailings is sufficiently complete.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic biota in Link Lakes watershed are expected to be low to moderate in magnitude, local in geographic extent and long-term in duration. Uncertainties • Quality of excess water that infiltrates the clean waste rock pile and moves downward into the groundwater system. • Long term load estimates for the groundwater flow system from the RLTMF and waste rock piles in the drainage basin.	The EIS will include a full assessment of potential effects on aquatic biota exposure to COPCs. Uncertainties will be addressed in the assessment.
Aquatic Biota Exposure to COPCs – Horseshoe Creek Watershed	Operating Phase • Collection and treatment of the North Pit Expansion raise water in the Rabbit Lake ET in conjunction with other contaminated waters with discharge to Horseshoe Creek. Decommissioning Phase • Continued treatment of contaminated raise waters until tailings are sufficiently consolidated. Post-Decommissioning Phase • Discontinuation of the North Pit Expansion raise water and other contaminated surface waters, pumping activities.	Operating and Decommissioning Phases • Discharge of treated effluent containing residual amounts of COPCs into Horseshoe Creek through the existing Rabbit Lake ET. Post-Decommissioning Phase • Discontinuation of effluent discharge to Horseshoe Creek resulting in reduced exposure of aquatic biota to COPC loads.	• Health of aquatic biota from exposure to COPCs in Horseshoe Creek watershed. • Decreased exposure of aquatic biota to COPCs during post-decommissioning.	Operating and Decommissioning Phases • All water entering the North Pit Expansion during operation will be captured through the pervious surround systems, pumped to the mill for recycle or treatment and then sent to the ET prior to release into Horseshoe Creek. This includes continued pumping and treatment of raise water until consolidation of the tailings is sufficiently complete (no excess pore pressures). • Addition of appropriate treatment to the Rabbit Lake Operation is planned to reduce the COPC loads. • Effluent discharge will be monitored and will conform to discharge limits before release. Post-Decommissioning Phase • Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.	Project-Related Effects: • Incremental effects on aquatic biota in the Horseshoe Creek watershed are expected to be moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Total Rabbit Lake Operation Effects: • Total effects on aquatic biota in the Horseshoe Creek watershed are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. • Recovery of water and sediment quality is expected to occur slowly over time thus reducing exposure to COPCs in the pots-decommissioning phase. Uncertainties • Timeline for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF.	The EIS will include a full assessment of potential effects on aquatic biota exposure to COPCs. Uncertainties will be addressed in the assessment.

Table 4.3.2-1
Aquatic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Aquatic Biota Exposure to COPCs – Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Mill emissions of TSP and associated metals and radionuclides will continue for a longer time frame. All Phases • Vehicles and heavy equipment operation will result in emissions of standard pollutants and cause dust suspension.	• Exposure of aquatic biota to COPCs resulting from mill emissions in the local airshed. • Exposure of aquatic biota to COPCs resulting from vehicle emissions in the local airshed.	Operating Phase • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on aquatic biota resulting from exposure to COPCs derived from mill and vehicle emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities.	This aspect will not be addressed further in the EIS as monitoring data has shown that the Rabbit Lake Operation has little effect on water and sediment quality in small lakes close to the mill facilities.
All Aquatic Environment Sub-components – Link Lakes Watershed	Accidents and Malfunctions • Transfer of tailings slurry to the North Pit Expansion from the mill via pipeline. • Transfer of raise water (i.e. contaminated water collected in the North Pit Expansion) to the mill for recycle or treatment. • Transportation of fuel to construction site and fuelling of construction equipment. • Failure of pervious surround or pit walls during operation or failure of North Pit Expansion cover after decommissioning.	Accidents and Malfunctions • Accidental releases or spills of tailings or untreated raise water as a result of pipeline failure, or human error. • Fuel spillage during transfer from fuel farm to construction site or during fuelling of construction equipment. • Interruption of the tailings disposal and/or raise water pumping activities.	• Increase in the COPC loads in water and sediment in Link Lakes drainage system due to accidental and exposure of aquatic biota. • Hydrocarbon compound contamination of surface water and sediment in area of spill and exposure of aquatic biota to hydrocarbons. • Change in aquatic biota behaviour and habitat quality as a result of accidental releases or spills in Link Lakes system. • Loss of tailings storage capacity, interruption of operations and loss of contaminated groundwater containment.	Accidents and Malfunctions • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing risk of pipeline failure. • An emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to control and contain any possible spill in a timely manner. • Side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle to reduce the potential of side slope failure during filling of the pit.	Project-Related Effects: • Incremental effects of an accidental release or spill on the exposure of all aquatic environment sub-components are expected to be low to moderate in magnitude, short-term in duration, site-specific in geographic extent and reversible. Uncertainties • Likelihood and quantity of a spill of tailings slurry, raise water or fuel. • Quantities and types of fuel required during construction, operation and decommissioning. • Timeline required to respond to failure of pervious surround.	The EIS will include a full assessment of potential accidents and malfunctions. Uncertainties will be addressed in the assessment.

4.3.3 Summary of Hydrogeologic/Geologic Environment

Potential effects on the hydrogeologic/geologic environment have been assessed through the investigation of Project activities and their interaction with geotechnical/geomorphological considerations, groundwater flow and groundwater quality. Accidents and malfunctions are assessed for all hydrogeologic/geologic sub-components in Section 4.3.3.3. Tables 4.2-1 and 4.3-2 show Project-environment interactions and the likely total residual effects, respectively, while Table 4.3.3-1 explains Project-environment interactions, potential effects and mitigation specific to the hydrogeologic/geologic environment.

4.3.3.1 Geotechnical and Geomorphological Considerations

Potential effects on geotechnical and geomorphological considerations have been identified in the Link Lakes watershed. Project activities that will potentially affect geotechnical and geomorphological considerations during the construction phase include site clearing, construction and excavation activities. These activities will physically disturb geologic material, resulting in an altered geologic landscape. To mitigate these potential effects existing cleared areas will be used to the extent possible, waste rock/side slopes will be graded to improve stability and achieve conformance with natural landscapes and the North Pit Expansion will be covered and re-vegetated at closure to blend into the landscape.

During the operating phase, the sub-aqueous or sub-aerial placement of tailings into the North Pit Expansion may create geotechnical concerns in pit walls as it fills with water. If this occurs, there could be a loss of capacity or a cessation of tailings disposal. These potential effects will be mitigated by maintaining the pit slopes in a dewatered condition while creating a perched pond on the tailings surface and by excavating side slopes of the North Pit Expansion to approximately a 2:1 slope angle.

Activities occurring during the decommissioning and post-decommissioning phases that may affect geotechnical and/or geomorphological considerations include the placement of a waste rock equalization layer, drainage layer and cover material on the North Pit Expansion and the re-establishment of the groundwater flow system. The equalization layer will consist of a thick layer of waste rock designed to ensure consolidation of the entire tailings mass. Following placement of the equalization layer, the surface will be graded according to the closure design prior to installation of the drainage layer and final cover. To account for the potential effects of minor settlement of the drainage layer post-closure, a thick drainage layer will be constructed. All of these activities will alter the local geographic landscape through the removal, relocation and/or addition of geologic material. Mitigation measures include the use of overburden for surface reclamation of new or previously disturbed areas and, the establishment of a vegetative cover of indigenous species to achieve a natural appearance.

All incremental and total residual effects on geotechnical and geomorphological considerations are expected to be low in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.3.2 Groundwater Flow or Elevation Change and Quality

Potential effects on groundwater flow or elevation change and quality have been identified in both Link Lakes and Horseshoe Creek watersheds. Atmospheric emissions from the mill are expected to have little effect on groundwater quality in the local airshed and are not discussed further.

Link Lakes Watershed

During construction, the excavation of the North Pit Expansion will require that groundwater seeping into the North Pit Expansion be removed by pumping from a sump within the pit; dewatering will continue during operation and decommissioning phases by pumping water from the bottom drain system to the mill for reuse or treatment. Additionally, small site-specific boggy areas may need to be backfilled to support construction activities. The incremental effect of these activities will be the drawdown of Four Bear Pond water level and lowered groundwater levels in the vicinity of the North Pit Expansion. To reduce the volume of water to be pumped from the North Pit Expansion, consideration will be given to pumping water from Four Bear Pond as a pre-emptive measure.

The pumping of water from the bottom of the North Pit Expansion will cease once the tailings are verified as being sufficiently consolidated (to the satisfaction of regulatory requirements) at the end of the decommissioning phase, this will allow the groundwater system in the vicinity of the North Pit Expansion to recover to near its pre-development elevation. Likewise, the water level in Four Bear Pond would recover gradually over time.

Project activities that may affect groundwater quality during the construction phase include: excavation, handling and placement of bedrock; and the development of waste rock and overburden piles. Waste rock removed during excavation will be placed in designated areas; however, the downward movement of leachate from the waste rock pile could increase COPCs in local groundwater. To mitigate this potential effect, waste rock will be managed through detailed geochemical characterization to identify potentially mineralized rock. Non-mineralized rock will be stored separately from potentially mineralized rock that is stored on lined pads prior to being processed through the mill, used in construction of the pervious surround or otherwise disposed of to minimize long-term leaching of COPCs.

During the operating and decommissioning phases, groundwater will be drawn toward the base of the pit due to the continuous pumping of water from the drainage system (bottom drain and pervious surround). Decant and consolidation water from the tailings will enter the bottom drain and mix with groundwater. The presence of a groundwater gradient toward the pit bottom ensures that contaminated water is contained. This contaminated water is pumped to the mill for processing through the ET. The ET will continue to be operated through decommissioning until consolidation of the tailings is sufficiently complete to the satisfaction of regulatory requirements.

Once pumping is stopped, near the end of the decommissioning phase, the natural groundwater flow will be re-established with the exception that groundwater will tend to flow through the pervious surround rather than the tailings body. A small amount of water will pass through the tailings resulting in some transport of COPCs to the downstream Link Lakes watershed. In addition, water flowing around the tailings in the pervious surround will be subject to COPC loading by diffusive transport from the tailings, this will result in some transport of COPCs to the downstream Link Lakes watershed. The resulting incremental effect will be an increase in COPC load input to Link Lakes watershed.

Incremental and total effects on the groundwater table in the vicinity of the North Pit Expansion are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects on groundwater flow once the natural flow system is re-established are expected to be low in magnitude, local in geographic extent and long-term in duration. Incremental and total effects on groundwater quality during construction, operating and decommissioning phases are expected to be low in magnitude, local in geographic extent and short-term in duration. Incremental and total effects on groundwater quality during post-decommissioning are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

During the operating and decommissioning phases, groundwater in the vicinity of the North Pit Expansion will be collected, treated and discharged into Horseshoe Creek. Infiltration of treated effluent into the shallow groundwater system in the Horseshoe Creek watershed is expected to be very limited because the creek is bordered throughout most of its length by a wet fen type community ranging in width up to 100 m (*TAEM 1994*), which suggests that groundwater discharges to the creek. Therefore, the Project is not expected to have a negative effect on groundwater flow or elevation in the Horseshoe Creek system. Treated water discharged to Horseshoe Creek during operating and decommissioning phases has the potential to intermix with groundwater in the Horseshoe Creek watershed. As was noted above, the creek flow is predominantly through a wet fen, which suggests that groundwater flow is upwards into the creek over most its length.

Therefore, incremental and total effects on groundwater flow or elevation change and quality in Horseshoe Creek watershed therefore are expected to be low in magnitude, local in geographic extent, medium term in duration and reversible. Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as the recovery of the system is verified.

4.3.3.3 Accidents and Malfunctions for all Hydrogeologic/Geologic Environment Sub-Components

The transfer of tailings slurry or North Pit Expansion raise water via pipeline during operation poses risks of an accidental release or spill of tailings or untreated raise water. Failure of the pervious surround or pit walls could result in the loss of tailings storage capacity, an interruption of operations, or the loss of contaminated groundwater

containment. During all phases, the transportation of fuel to the construction site and the fuelling of construction equipment poses a risk of fuel spillage and could result in hydrocarbon contamination of groundwater.

The accidental spill of tailings slurry or raise water and the accidental spill of fuel are not expected to have a measurable effect on the groundwater system. Mitigation measures for accidental spills include the use of dual contained pipelines and having an emergency response plan to control and contain any possible spill in a timely manner. Further, also mitigating of spills in the vicinity of the RLTMF is the existence of a groundwater gradient toward the bottom of the pit. To reduce the risk of pit wall failure, side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle and the groundwater level around the pit will be drawn down to reduce the potential of side slope failure during filling of the pit. Incremental and total effects on groundwater quality are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Table 4.3.3-1
Hydrogeologic / Geologic Environment

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Geotechnical / Geomorphologic Considerations – Link Lakes Watershed	<u>Construction Phase</u> • Construction of lay down area and runoff sediment controls. • Clearing of area for the North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of an existing road, including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct the North Pit Expansion, including blasting of bedrock and development of waste rock and overburden piles. • Construction of pit underdrain, raise, tunnel and pervious surround. <u>Operating Phase</u> • Permanent placement of tailings into the North Pit Expansion via currently approved tailings deposition methods. <u>Decommissioning and Post-Decommissioning Phases</u> • Reclamation activities including re-establishment of groundwater flow system and the placement of an equalization layer, drainage layer and cover material on the North Pit Expansion.	<u>Construction Phase</u> • Physical disturbance through the removal, relocation and/or addition of geologic material. <u>Operating Phase</u> • Disposal of tailings under a water cover and the gradual filling of the pit may create geotechnical concerns in pit walls. <u>Decommissioning and Post-Decommissioning Phases</u> • Physical disturbance through the removal, relocation and/or addition of geologic material.	• Altered local geological landscape including creation of pit for tailings disposal and waste rock and overburden piles and the decommissioning of the pit including placement of equalization layer, drainage layer and cover material.	<u>Construction Phase</u> • Existing cleared areas will be used where feasible to limit geologic disturbance. • Waste rock piles side slopes will be graded during construction to improve their stability and to achieve conformance with the natural landscape as construction proceeds. <u>Operating Phase</u> • Pit slopes will be maintained in a dewatered condition while creating a perched pond on the tailings surface. • Side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle to reduce the potential of side slope failure during filling of the pit. <u>Decommissioning and Post-Decommissioning Phases</u> • Overburden will be used for reclamation of the surfaces of new or previously disturbed areas and the reclaimed surfaces will be vegetated with indigenous species to achieve a natural appearance.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the geomorphologic and geotechnical environment are expected to be low in magnitude, local in geographic extent and long-term in duration. <u>Uncertainties</u> • Details of construction plan / design of the North Pit Expansion and waste rock / overburden piles are not finalized. • Extent of blasting that will be required to develop the pit. • Conceptual decommissioning options are under development.	The EIS will include a full assessment of potential effects on geotechnical and geomorphologic considerations. Uncertainties will be addressed in the assessment.

Table 4.3.3-1
Hydrogeologic / Geologic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Groundwater Flow, Quality and Elevation Change – Link Lakes Watershed	<u>Construction Phase</u> • Clearing of area for the North Pit Expansion. • Excavation and handling of overburden and bedrock to construct the North Pit Expansion, including blasting of bedrock and development of waste rock and overburden piles. • Construction of pit underdrain, raise, tunnel and pervious surround. <u>Operating Phase</u> • Permanent placement of tailings into the North Pit Expansion. • Pumping of raise water to the mill for recycle or treatment and discharge to the environment during the period when tailings are placed in the pit. <u>Decommissioning Phase</u> • Progressive reclamation of the North Pit Expansion. • Continued pumping of raise water for treatment until tailings are fully consolidated.	<u>Construction Phase</u> • Site proposed for the North Pit Expansion contains boggy areas (that may contribute to groundwater recharge), which may need to be backfilled to support vehicular activity. • Excavation of pit and construction of pervious surround will require pumping of groundwater that flows into the North Pit Expansion. • Waste rock removed during excavation of the North Pit Expansion will be placed in designated areas in the vicinity of the pit – COPCs could leach from rock and seep into groundwater. <u>Operating and Decommissioning Phases</u> • Groundwater that flows into the pervious surround will combine with tailings slurry water and be pumped to the mill for reuse or treatment and discharged to the environment.	• Lowering of the groundwater table in the area surrounding the North Pit Expansion. • Decreased groundwater flow in the vicinity of the North Pit Expansion once the groundwater table has been drawn down. • Draw down of water level in Four Bear Pond and lowered groundwater levels in the vicinity of the North Pit Expansion. • Full containment of groundwater and tailings slurry water due to drawdown of groundwater table in the vicinity of the North Pit Expansion. • Increase of COPCs in local groundwater from downward movement of leachate from the waste rock pile.	<u>Construction Phase</u> • Waste rock will be managed through detailed geochemical characterization of the material to identify potentially problematic rock which will be stored separately on lined pads. • Potentially problematic waste rock will be processed through the mill, used in construction of the pervious surround, or otherwise disposed of to minimize long-term leaching of COPCs. • Non-problematic rock will be placed on a separate unlined pad and used for reclamation purposes where appropriate. Waste rock will be placed in a landform that will be stable over the long term. • Water pumped from the pit during development will be suitably managed to prevent the discharge of high turbidity water to the environment. <u>Operating and Decommissioning Phase</u> • To reduce the volume of water to be pumped from the North Pit Expansion consideration will be given to pumping water from Four Bear Pond as a pre-emptive measure. • The pervious surround maintains a minimum hydraulic gradient across the operating and decommissioned North Pit Expansion thus minimizing the loss of COPCs to the groundwater system in the long-term.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the groundwater table are expected to be high in magnitude, local in geographic extent, medium-term in duration and reversible. • Incremental and total effects on groundwater quality during construction, operating and decommissioning phases are expected to be low in magnitude, local in geographic extent and short-term in duration. <u>Uncertainties</u> • Contribution of site-specific boggy areas to groundwater recharge.	The EIS will include a full assessment of potential effects on groundwater flow, quality and elevation change. .

Table 4.3.3-1
Hydrogeologic / Geologic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Groundwater Flow, Quality and Elevation Change – Link Lakes Watershed (Cont'd)	Post-Decommissioning Phases • Discontinuation of raise water pumping at the North Pit Expansion.	Post-Decommissioning Phase • Once raise water pumping ceases and natural groundwater flow is re-established, a small amount of groundwater will pass through the tailings of the decommissioned North Pit Expansion that will result in some transport of COPCs to the downstream Link Lakes watershed.	• Recovery of groundwater table in affected area once pumping of raise water is discontinued. • Increased groundwater flow in the vicinity of the North Pit Expansion. • Contamination of groundwater that passes through tailings or pervious surround and transport of COPC load to Link Lakes watershed. • Recovery of water level in Four Bear Pond as the groundwater table rebounds.	Post-Decommissioning Phase • As part of the decommissioning plan, natural groundwater flows will be re-established upon closure.	Project Related Effects: • Incremental effects on groundwater flow and quality once the natural flow system is re-established are expected to be low in magnitude, local in geographic extent and long-term in duration. Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on groundwater flow and quality once the natural flow system is re-established are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. Uncertainties • Composition/physical properties of tailings. • Conceptual decommissioning options are under development	The EIS will include a full assessment of potential effects on groundwater flow, quality and elevation change. Uncertainties will be addressed in the assessment.
Groundwater Flow, Quality and Elevation Change – Horseshoe Creek Watershed	Operating and Decommissioning Phases • Collection and pumping of raise water from the North Pit Expansion to the mill during the operating phase for reuse or treatment. • Continued treatment of contaminated waters from the North Pit Expansion during the decommissioning phase.	Operating and Decommissioning Phases • Groundwater collected at the North Pit Expansion is treated and discharged into Horseshoe Creek – water discharged into the Horseshoe Creek watershed could infiltrate the shallow groundwater system in that area and contribute to changes in the groundwater flow rate, quality or elevation.	• Increased groundwater flow in the Horseshoe Creek watershed area during the operating and decommissioning phases. • Decreased quality of groundwater in the Horseshoe Creek watershed area during the operating and decommissioning phases. • Recovery of groundwater quality in the Horseshoe Creek watershed in the post-decommissioning phase.	Operating and Decommissioning Phases • Effluent discharge will be monitored and will conform to discharge limits before release. • Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified. Post-Decommissioning Phase • None. Flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions upon post-decommissioning.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on changes to groundwater flow and quality in the Horseshoe Creek watershed are expected to be low in magnitude, local in geographic extent and medium term in duration. Uncertainties Influence of Rabbit Lake Operation or the proposed Project on the groundwater level and quality in Horseshoe Creek	The EIS will more fully address potential effects on groundwater flow, quality and elevation change.

Table 4.3.3-1
Hydrogeologic / Geologic Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Groundwater Flow, Quality and Elevation Change – Horseshoe Creek Watershed (Cont'd)	Decommissioning Phase • Progressive reclamation of the North Pit Expansion. Post-Decommissioning Phase • Discontinuation of raise water pumping at the North Pit Expansion.	Decommissioning Phase • While the North Pit Expansion is undergoing progressive reclamation gradual decreases to Horseshoe Creek discharges will occur thus decreasing potential for the discharge to contribute to change in the groundwater flow rate and quality in the Horseshoe Creek Watershed. Post-Decommissioning Phase Re-establishment of natural groundwater system at closure.			• Time line for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF.	
All Hydrogeologic / Geologic Environment Sub-components – Link Lakes Watershed	Accidents and Malfunctions • Transfer of tailings slurry to the North Pit Expansion from the mill via pipeline. • Transfer of raise water (i.e. contaminated water collected in the North Pit Expansion) to the mill for recycle or treatment. • Failure of pervious surround or pit walls during operation. • Transportation of fuel to construction site and fuelling of construction equipment.	Accidents and Malfunctions • Accidental releases or spills of tailings or untreated raise water as a result of pipeline, pervious surround or pit wall failure or human error. • Fuel spillage during transfer from fuel farm to construction site or during fuelling of construction equipment.	• Loss of tailings storage capacity, interruption of operations and loss of contaminated groundwater containment. • Loss of capacity or cessation of disposal in the North Pit Expansion due to pit wall failure. • Spillage of fuel could result in hydrocarbon contamination of groundwater.	Accidents and Malfunctions • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing the risk of pipeline failure. • Side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle and the groundwater level around the pit will be drawn down to reduce the potential of side slope failure during filling of the pit. • Spills in the vicinity of the North Pit Expansion will be influenced by the groundwater gradient toward the bottom of the pit. • An emergency response plan is in place at Rabbit Lake Operation, including trained personnel who can be dispatched to control and contain any possible spill in a timely manner.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on groundwater quality are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible. Uncertainties • Likelihood and quantity of a spill of tailings slurry, raise water or fuel. • Quantities and types of fuel required during construction, operation and decommissioning.	The EIS will include a full assessment of potential effects of accidents and malfunctions.

4.3.4 Summary of Terrestrial Environment

Potential effects on the terrestrial environment have been assessed through the investigation of Project activities and their interaction with three sub-components (i.e. soil and vegetation disturbance and quality, wildlife and habitat disturbance and terrestrial biota exposure to COPCs). Accidents and malfunctions are assessed for all terrestrial environment sub-components in Section 4.3.4.4. Tables 4.2-1 and 4.3-2 present Project-environment interactions and the likely residual effects, respectively, while Table 4.3.4-1 explains Project-environment interactions, potential effects and mitigation specific to the terrestrial environment. As defined in Section 4.1.2, the LSA for the assessment of the terrestrial environment encompasses the LSA for assessing atmospheric potential effects as well as the LSA for assessing aquatic potential effects (i.e. the Link Lakes and Horseshoe Creek watersheds). While overall the terrestrial component has been reviewed at the LSA level, for the purposes of this discussion, potential effects and likely residual effects have been organized by watershed and airshed. This format allows for potential effects to be directly associated with the area in which they may have the most influence.

4.3.4.1 Soil and Vegetation Disturbance and Quality

Potential effects on soil and vegetation have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

The removal and relocation of soil and vegetation is required to prepare the site for the North Pit Expansion, site access roads, road realignment and associated infrastructure during construction. Soil and vegetation disturbance will also occur during decommissioning and reclamation. These activities may result in the loss of soil and vegetation cover in areas affected by construction, compaction of soil in traffic areas and increased erosion in disturbed areas. To mitigate these potential effects, a variety of measures will be implemented, such as the use of existing cleared areas where feasible, the removal and storage of topsoil for use during reclamation and the routing of site access and perimeter roads and pipelines to avoid, when possible, rare plants that have been identified. Reclamation will either be completed progressively or upon decommissioning and will include the tilling of compacted areas to promote the re-vegetation of indigenous plant species.

Initially, newly reclaimed areas may be susceptible to erosion during the post-decommissioning phase when the surface water flow is re-established. Also during this phase, vegetation types may vary based on both surface water flow patterns and on the vegetation mixture used during the hydro-seeding of reclaimed areas. As susceptibility to erosion is expected to occur only initially, no mitigation is anticipated during the post-decommissioning phase; vegetation applied during decommissioning is expected to be sufficient to prevent erosion.

Incremental effects on soil and vegetation are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

During operating and decommissioning phases the collection and treatment of raise water with discharge to Horseshoe Creek could affect soil and vegetation through bank erosion due to an increase in flow. During operating and decommissioning phases the volume of treated effluent discharged to Horseshoe Creek will not change substantially as a result of the North Pit Expansion because other water management strategies are being implemented at Eagle Point. The discontinuation of treated water discharge to Horseshoe Creek during post-decommissioning will eliminate soil and vegetation disturbance resulting from bank erosion while also reducing riparian vegetation. No mitigation is anticipated as flow in the Horseshoe Creek system will be allowed to return to natural ephemeral conditions once treatment of tailings raise water ceases, thus reducing peak flow events.

Local Airshed

Mill emissions of TSP and associated metals and radionuclides, as along with emissions of standard pollutants and dust suspension as a result of vehicle and heavy equipment use, may affect soil and vegetation quality in the local airshed. To mitigate this potential effect, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and access roads will be appropriately maintained and watered as needed to suppress dust. Construction and service vehicles and heavy equipment will also be maintained in good operating order to minimize emissions.

Incremental and total effects on soil and vegetation quality as a result of emissions and dust deposition are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible.

4.3.4.2 Wildlife and Habitat Disturbance

Potential effects on wildlife and habitat have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

As a result of the construction, operation and decommissioning of the North Pit Expansion, there is potential for the loss and/or fragmentation of wildlife habitat. To mitigate this potential effect during the construction phase, physical disturbance will remain within the lease boundary and existing cleared areas will be used, where feasible, to limit wildlife and habitat disturbance. During decommissioning, pipelines will be removed to minimize fragmentation and cover material will be placed over the North Pit Expansion to isolate the tailings and promote re-vegetation. Also, overburden will be used for reclamation of the surfaces of new or previously disturbed areas and the

reclaimed surfaces will be vegetated with indigenous species to achieve a natural appearance and provide natural habitat.

Sensory disturbance as a result of construction activities (including blasting and rock crushing) and vehicular activity during all phases is expected to change the quality of habitat and alter wildlife behaviour. To the extent possible, blasting activities will be scheduled to minimize potential noise effects to terrestrial receptors. In addition, the mine rock crushing plant will be located in an area where potential effects on wildlife are minimized. Traffic will be limited to necessary activities, such as routine pipeline integrity checks and regular service maintenance.

During operating and decommissioning phases when raise water is being actively pumped, the drawdown of the groundwater table will likely influence water levels in Four Bear Pond. Decreased water levels in Four Bear Pond may reduce the availability of habitat for certain terrestrial species (i.e. frogs). As Four Bear Pond is not connected to other water bodies and does not support fish populations, it has limited capacity to support wildlife species. During post-decommissioning, when vegetation growth and surface water flow patterns have been re-established the physical landscape will be more characteristic of natural habitat in the local study area. No mitigation is anticipated during the post-decommissioning phase as flow in the Link Lakes system will be allowed to return to natural ephemeral conditions.

Incremental effects of habitat loss and potential effects on wildlife movement and behaviour are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental effects of habitat loss related to drawdown of Four Bear Pond are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects related to sensory disturbance in the Link Lakes watershed are expected to be low in magnitude, local in geographic extent, short to medium term in duration and reversible. Total effects of all facilities in the Link Lakes watershed resulting in disturbance to wildlife or habitat are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

During operating and decommissioning phases, the collection and treatment of raise water with discharge to Horseshoe Creek could affect wildlife habitat through bank erosion due to higher than normal flows. During operating and decommissioning phases, the volume of treated effluent discharged to Horseshoe Creek will not change substantially as a result of the North Pit Expansion as other water management strategies are being implemented at Eagle Point to reduce the volume of mine water pumped to the mill for treatment. The discontinuation of treated water discharge to Horseshoe Creek during post-decommissioning will eliminate habitat disturbance resulting from bank erosion and may reduce riparian habitat. No mitigation is anticipated as flow in the Horseshoe Creek system will be allowed to return to natural ephemeral conditions once treatment of tailings raise water ceases, thus reducing peak flow events.

Incremental and total effects on wildlife and habitat resulting from bank erosion (and related soil and vegetation disturbance) are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Local Airshed

Mill emissions of TSP and associated metals and radionuclides, as well as emissions of standard pollutants and dust suspension as a result of vehicle and heavy equipment use, may affect habitat quality by affecting soil and vegetation quality in the local airshed. To limit this potential effect, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and access roads will be appropriately maintained and watered as needed to suppress dust. Additionally, construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.

Incremental and total effects on wildlife habitat in the local airshed resulting from mill and vehicle emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible.

4.3.4.3 Terrestrial Biota Exposure to COPCs

Potential effects related to terrestrial biota exposure to COPCs have been identified in both Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed

During construction and decommissioning phases, dust will be emitted during site clearing and development as a result of activities, such as blasting, crushing excavation, hauling, dumping and grading. Construction equipment and light vehicles also emit TSP and standard pollutants. These activities may affect the health of wildlife through exposure to TSP and standard pollutants within the area affected by construction activity. To mitigate this potential effect, dust suppression measures will be in place to limit dust levels during unfavourable weather conditions, such as road wetting, when necessary and construction equipment will be maintained in good operating order to limit air emissions, thus reducing wildlife exposure to standard pollutants.

Once raise water pumping ceases during post-decommissioning, natural surface and groundwater flow patterns will be re-established and water passing over or through the North Pit Expansion and associated waste rock pile will result in the transportation of COPCs to the downstream Link Lakes watershed. This may affect the health of wildlife from exposure to COPCs in the aquatic environment in the Link Lakes watershed over the long-term. To mitigate this potential effect, the pervious surround system maintains a minimum hydraulic gradient across the decommissioned North Pit Expansion thus minimizing the loss of COPCs to the groundwater system in the long-term.

Incremental effects on terrestrial biota resulting from construction activity are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible.

Incremental and total effects on terrestrial biota in the Link Lakes watershed as a result of exposure to COPCs during post-decommissioning are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

The collection and treatment of raise water during the operating phase will increase the total load of COPCs discharged to Horseshoe Creek, resulting in increased exposure of terrestrial biota (with aquatic-based diets) to radiological and non-radiological COPCs. The same is true during the decommissioning as discharge continues though at a reduced rate and hence, reduced exposure to COPCs. The addition of appropriate water treatment to the Rabbit Lake Operation is planned to reduce the COPC loads and effluent discharge will be monitored and will conform to discharge limits before release.

During post-decommissioning the discontinuation of effluent discharge to Horseshoe Creek will decrease the total load of COPCs discharged to Horseshoe Creek resulting in reduced exposure of terrestrial biota (with aquatic-based diets) to radiological and non-radiological COPCs. Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified as satisfactory by regulatory requirements.

Incremental and total effects on terrestrial biota in the Horseshoe Creek watershed are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. These residual effects will be assessed more definitively in the EIS.

Local Airshed

Mill emissions of TSP and associated metals and radionuclides, as well as emissions of standard pollutants and dust suspension as a result of vehicle and heavy equipment use, may increase exposure of terrestrial biota to COPCs in the local airshed. To mitigate this potential effect, dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill and access roads will be appropriately maintained and watered as needed to suppress dust. Additionally, construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions and reduce terrestrial biota exposure to COPC.

Tailings slurry water contains radon gas; during the operating phase some radon gas will be emitted to the atmosphere from the surface water cover layer in the North Pit Expansion and during venting of raise water. To mitigate this, sub-aqueous or sub-aerial tailings deposition will be one means of mitigating radon gas emanation at the North Pit Expansion during the operating phase. During the decommissioning phase, radon emissions will be further reduced by the cover layer placed over the tailings. Likewise, gamma radiation from the tailings will be reduced by the cover layer at decommissioning.

Incremental and total effects on terrestrial biota in the local airshed as a result of exposure to COPCs through mill emissions and vehicular activity are expected to be low

in magnitude, local in geographic extent, medium-term in duration and reversible. Incremental and total effects on terrestrial biota in the local airshed as a result of radon or radon decay product exposure are expected to be low in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.4.4 Accidents and Malfunctions for all Terrestrial Environment Sub-Components

The accidental release of tailings, untreated raise water, or fuel as a result of either pipeline failure (tailings or raise water only) or human error would contaminate soil or vegetation and wildlife habitat, with COPCs or hydrocarbons. Mitigation includes the use of dual-contained pipelines to reduce risk of failure. In addition, Cameco has an emergency response plan in place and trained personnel at Rabbit Lake Operation to contain releases in a timely manner. In the event of a release, contaminated soil and/or vegetation will be removed and disposed of in an environmentally responsible manner.

The failure of the pervious surround or pit wall during operation could change topographic features or cause a loss of habitat in the area affected by a failure. Specific potential effects associated with these failures include the creation of unstable ground conditions, loss of cover on an area affected by slope failure and the disturbance of habitat. In the event of such a failure, unstable slopes or ground conditions would be remediated, stabilized and vegetated to prevent further risk of failure. To mitigate against pit wall failure, pit slopes will be maintained in a dewatered condition while creating a perched pond on the tailings surface and the walls of North Pit Expansion will be constructed at approximately a 2:1 slope.

With the exception of soil (which has the potential to be moderate to high in magnitude) all incremental effects associated with accidents and malfunctions are expected to be low in magnitude, short-term in duration, site-specific in geographic extent and reversible. These residual effects will be assessed more definitively in the EIS.

Table 4.3.4-1
Terrestrial Environment

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Soil and Vegetation Disturbance & Quality – Link Lakes Watershed	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct North Pit Expansion, including blasting of bedrock and development of waste rock and overburden piles. • Construction of pit underdrain, raise, tunnel and pervious surround. • Construction of ancillary facilities (pipelines, valve house, pumphouse, electrical power line). Decommissioning Phase • Reclamation activities including placement of cover material on North Pit Expansion and other disturbed areas and re-vegetation of reclaimed surfaces. Post-Decommissioning Phase • Re-establishment of surface water flow system.	Construction and Decommissioning Phases • Removal and relocation of soil and vegetation is required to prepare site for North Pit Expansion, access and perimeter roads, road realignment and associated infrastructure during construction and then again for reclamation during decommissioning. Post Decommissioning Phase • Newly reclaimed areas will be susceptible to erosion, initially, as surface water passes across re-surfaced areas. • Once surface water flow systems are re-established vegetation types may vary based on surface water flow patterns and on vegetation mixture used during hydro-seeding of reclaimed areas.	• Loss of soil cover and vegetation in affected areas during construction and operating phases. Soil and vegetation cover re-established during site reclamation. • Roads and other traffic areas will experience soil compaction. • Disturbed areas will be susceptible to erosion during construction and/or operating phases and newly reclaimed areas will be susceptible to erosion after natural surface water flow patterns have been re-established. • Changes to vegetation type.	Construction Phase • Existing cleared areas will be used where feasible to limit disturbance to soil and vegetation. • Control measures will be in place during construction to minimize erosion and transport of soil off-site. • Topsoil (if present) will be removed and stored for use during reclamation activities. • Routing of access and perimeter roads and pipelines will avoid areas where rare plants have been identified, when possible. Decommissioning Phases • Compacted areas will be tilled during the reclamation process to promote re-vegetation. • Disturbed areas will be reclaimed either progressively during construction or upon decommissioning. • Areas will be re-vegetated using indigenous species either progressively during construction or upon decommissioning. Post-Decommissioning Phase • None. Vegetation applied to disturbed areas during decommissioning is expected to be sufficient to prevent erosion.	Project-Related Effects: • Incremental effects on soil and vegetation are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Details of construction plan / design of Rabbit Lake Tailings North Pit Expansion Project and waste rock / overburden piles have not been finalized. • Conceptual decommissioning options are under development • Natural flow patterns of surface water in local study area at post-decommissioning are not well known.	The EIS will include a full assessment of potential effects on soil and vegetation disturbance and quality. Uncertainties will be addressed in the assessment.

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Soil and Vegetation Disturbance & Quality – Horseshoe Creek Watershed	Operating and Decommissioning Phases • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET in conjunction with other contaminated site waters. • Continued treatment of contaminated waters until tailings are sufficiently consolidated. Post-Decommissioning Phase • Discontinuation of treated water discharge to Horseshoe Creek.	Operating and Decommissioning Phases • Discharge to Horseshoe Creek during operation and to a lesser extent during decommissioning, could affect soil and vegetation through bank erosion resulting from flow into the system. Post-Decommissioning Phase • The discontinuation of treated water discharge to Horseshoe Creek will eliminate soil and vegetation disturbance resulting from soil/bank erosion and may reduce riparian vegetation.	• Increased soil/bank erosion as a result of discharge of treated effluent to Horseshoe Creek. • Vegetation loss as a result of bank erosion due to discharge of treated effluent to Horseshoe Creek. • Decreased soil/bank erosion once discharge to Horseshoe Creek ceases. • Loss of riparian vegetation.	Operating and Decommissioning Phases • Volume of treated effluent discharged to Horseshoe Creek will not change substantially due to appropriate water treatment additions to the Rabbit Lake Operation. Post-Decommissioning Phase • None. Flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions thus reducing peak flow events.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on soil during operating and decommissioning phases resulting from flow of treated water into Horseshoe Creek are expected to be low to moderate in magnitude, local in geographic extent and short to medium-term in duration. • Incremental and total effects on vegetation during operating and decommissioning phases resulting from flow of treated water into Horseshoe Creek are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Estimated effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized.	The EIS will include an assessment of potential effects on soil and vegetation disturbance and quality. Uncertainties will be addressed in the assessment.
Soil and Vegetation Disturbance & Quality – Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Emissions of TSP and associated metals and radionuclides will continue for a longer time frame due to extended period of mill operation. All Phases • Vehicles and heavy equipment operation will result in emissions of standard pollutants and cause dust suspension.	• Mill emissions (dust deposition and air emissions) may have an effect on soil and vegetation quality in the local airshed. • Vehicle emissions (dust deposition and air emissions) may have an effect on soil and vegetation quality in the local airshed.	Operating Phase • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. • Access roads will be appropriately maintained and watered as needed to suppress dust. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.	Project Related and Total Rabbit Lake Effects: • Incremental and total effects on soil and vegetation quality as a result of emissions and dust deposition are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities.	The EIS will include a full assessment of potential effects on soil and vegetation quality. Uncertainties will be addressed in the assessment.

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Wildlife & Habitat Disturbance - Link Lakes Watershed	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for the North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road, including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct North Pit Expansion, including blasting of bedrock and development of waste rock and overburden piles. • Crushing of mine rock to produce construction materials. • Construction of pit underdrain, raise, tunnel and pervious surround. • Construction of ancillary facilities (pipelines, valve house, pumphouse and electrical power line). Operating Phase • Operation of North Pit Expansion, including transport of facility operators and maintenance staff to the site and routine inspection of facilities. • Collection and pumping of raise water to mill for reuse or treatment. Decommissioning Phase • Continued treatment of contaminated waters from the North Pit Expansion. • Reclamation activities including placement of cover material on North Pit Expansion and other disturbed areas and re-vegetation of reclaimed surfaces.	Construction and Decommissioning Phases • Site work requires altering the existing local landscape to create space for the North Pit Expansion, access and perimeter roads, road realignment and associated infrastructure and upon closure site work will require construction activities to re-naturalize the site. • Blasting of bedrock and crushing of mine rock will increase noise levels in the immediate vicinity of the North Pit Expansion. Operating and Decommissioning Phases • As a result of drawdown of the groundwater table during pumping of raise water, water levels of Four Bear Pond may decrease thus influencing the availability of habitat for certain terrestrial species (i.e. frogs and other amphibians). Post Decommissioning Phase • Once vegetation growth and surface water flow patterns have been re-established the physical landscape will be more characteristic of natural habitat in the local study area.	• Loss and fragmentation of wildlife habitat from disturbed areas over duration of the construction, operating and decommissioning phases. • Loss of wildlife habitat if the water level in Four Bear Pond is drawn down. • Sensory disturbance from construction activities (including blasting) is expected to change the quality of wildlife habitat and alter wildlife behaviour. • Sensory disturbance from operation of light duty vehicles and heavy equipment. • Creation of new wildlife habitat in post-decommissioning phase.	Construction Phase • Physical disturbance will remain within the lease boundary. • Existing cleared areas will be used where feasible to limit wildlife and habitat disturbance. • To the extent possible, blasting activities will be scheduled to minimize potential noise effects to terrestrial receptors. • The mine rock crushing plant will be located in an area where effects on wildlife will be minimized. Decommissioning Phase • Pipelines will be removed upon decommissioning to minimize continued habitat fragmentation. • Placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover. The elevation of the tailings surface will be below the natural groundwater surface. The elevation of the reclaimed surface layer may also be below the natural ground surface at closure, depending on the final reclamation plan. • Overburden will be used for reclamation of the surfaces of new or previously disturbed areas and the reclaimed surfaces will be vegetated with indigenous species to achieve a natural appearance and provide natural habitat. Post Decommissioning Phase • None. Flow in the Link Lakes system would be allowed to return to natural ephemeral conditions and soil and vegetation would be allowed to adapt to the natural conditions. All Phases • Traffic will be limited to necessary activities such as routine pipeline integrity checks and regular service maintenance.	Project-Related Effects: • Incremental effects of habitat loss and effects on wildlife movement and behaviour are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. • Incremental effects of habitat loss related to drawdown of Four Bear Pond are expected to be low to moderate in magnitude, local in geographic extent, medium-term in duration and reversible. • Incremental effects of increased noise levels resulting in wildlife disturbance are expected to be low in magnitude, local in geographic extent and short-term in duration. • Incremental sensory effects from operation of light duty vehicles and heavy construction equipment are expected to be low in magnitude, local in geographic extent and short-term in duration. Total Rabbit Lake Operation Effects: • Total effects of all facilities in the Link Lakes watershed resulting in disturbance to wildlife or habitat are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Details of construction plan / design of Rabbit Lake Tailings North Pit Expansion Project and waste rock / overburden piles have not been finalized.	The EIS will include a full assessment of potential effects on wildlife and habitat disturbance. Uncertainties will be addressed in the assessment.

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Wildlife & Habitat Disturbance - Link Lakes Watershed (Cont'd)	<u>All Phases</u> • Use of vehicles and heavy equipment. <u>Post-Decommissioning Phase</u> • Re-establishment of surface water flow system.	<u>All Phases</u> • Vehicles and heavy equipment produce noise and vibrations.			• Extent of change in local drainage patterns, including drawdown of Four Bear Pond has yet to be defined. • Extent of blasting that will be required to develop the pit. • Volume of minerals that needs to be crushed for construction purpose. • Number and type of vehicles/equipment used during construction, operation and reclamation activities and the expected duration of these activities. • Conceptual decommissioning options are under development	The EIS will include a full assessment of potential effects on wildlife and habitat disturbance. Uncertainties will be addressed in the assessment.
Wildlife and Habitat Disturbance – Horseshoe Creek Watershed	<u>Operating and Decommissioning Phases</u> • Collection and treatment of raise water from the North Pit Expansion in the ET in conjunction with other contaminated site waters. • Continued treatment of contaminated waters until tailings are sufficiently consolidated. <u>Post-Decommissioning Phase</u> • Discontinuation of treated water discharge to Horseshoe Creek.	<u>Operating and Decommissioning Phases</u> • Discharge to Horseshoe Creek during operation and to a lesser extent during decommissioning, could affect wildlife habitat by way of bank erosion resulting from flow into the system. <u>Post-Decommissioning Phase</u> • The discontinuation of treated water discharge to Horseshoe Creek will eliminate disturbance to wildlife habitat. It may also reduce riparian habitat.	• Loss or disturbance to wildlife habitat as a result of soil or vegetation disturbance from bank erosion due to discharge of treated effluent to Horseshoe Creek or as a result of the cessation of discharge.	<u>Operating and Decommissioning Phases</u> Volume of treated effluent discharged to Horseshoe Creek will not change substantially due to appropriate water treatment additions to the Rabbit Lake Operation. <u>Post-Decommissioning Phase</u> • None. Flow in the Horseshoe Creek system would be allowed to return to natural ephemeral conditions and habitat would be allowed to adapt to the natural conditions.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on wildlife and habitat resulting from soil or vegetation disturbance are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. <u>Uncertainties</u> • Estimated effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized.	The EIS will include an overview assessment of potential effects on wildlife and habitat disturbance. Uncertainties will be addressed in the assessment.
Wildlife & Habitat Disturbance – Local Airshed	<u>Operating Phase</u> • Extended operation of the mill and ancillary facilities. <u>All Phases</u> • Use of vehicles and heavy equipment.	<u>Operating Phase</u> • Mill emissions of TSP and associated metals and radionuclides will continue for a longer time frame. <u>All Phases</u> • Vehicles and heavy equipment operation will result in emissions of standard pollutants and dust.	• Mill emissions (dust deposition and air emissions) may have an effect on wildlife habitat by affecting local soil and vegetation quality in the local airshed. • Vehicle emissions (dust deposition and air emissions) may have an effect on wildlife habitat by affecting local soil and vegetation quality.	<u>Operating Phase</u> • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. • Access roads will be appropriately maintained and watered as needed to suppress dust. <u>All Phases</u> • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize gaseous, TSP and noise emissions.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on wildlife habitat in the local airshed resulting from mill and vehicle emissions are expected to be low in magnitude, local in geographic extent, medium-term in duration and reversible. <u>Uncertainties</u> • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities.	The EIS will include an overview assessment of potential effects on wildlife and habitat. Uncertainties will be addressed in the assessment.

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Terrestrial Biota (Wildlife) Exposure to COPCs – Link Lakes Watershed	Construction Phase • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct North Pit Expansion, including blasting of bedrock and development of waste rock and overburden piles. Operating Phase • Collection and treatment of raise water from the North Pit Expansion raise water in Rabbit Lake ET in conjunction with other contaminated site waters. Decommissioning Phase • Reclamation activities including placement of cover material on the North Pit Expansion and other disturbed areas and re-vegetation of reclaimed surfaces.	Construction Phase • Emissions of dust during site clearing activities and during construction of access roads and North Pit Expansion (from blasting, excavation, loading, hauling, dumping and grading). Construction and Decommissioning Phases • Emissions of TSP and standard pollutants from construction equipment and light vehicles. Operating Phase Treated raise water will be discharged to Horseshoe Creek via the mill and ET.	• Health of wildlife from exposure to standard pollutants within the local area affected by construction activity. • Contaminated waters will be removed from the Link Lakes watershed thus eliminating this exposure pathway for wildlife.	Construction and Decommissioning Phases • Dust suppression measures will be in place to limit dust levels during unfavourable weather conditions, such as road wetting, when necessary. • Construction equipment will be maintained in good operating order to limit air emissions and thus reduce exposure to standard pollutants.	Project-Related Effects: • Incremental effects on terrestrial biota resulting from construction and decommissioning activities are expected to be low in magnitude, local in geographic extent, short-term in duration and reversible. Uncertainties • Details of construction plan / design of Rabbit Lake Tailings North Pit Expansion Project and waste rock / overburden piles have not been finalized. • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Conceptual decommissioning options are under development	The EIS will include a full assessment of potential effects on terrestrial biota from exposure to COPCs. Uncertainties will be addressed in the assessment.
	Post-Decommissioning Phase • Re-establishment of surface water and groundwater flow systems.	Post-Decommissioning Phase • Once raise water pumping ceases natural surface and groundwater flow patterns will be re-established and water passing over or through the decommissioned the North Pit Expansion and associated waste rock pile will result in the transportation of COPCs to the downstream Link Lakes watershed.	• Health of wildlife from exposure to COPCs in the aquatic environment in the Link Lakes watershed in the long term once surface water and groundwater systems are re-established.	Post-Decommissioning Phase • Pervious surround ensures minimum hydraulic gradient across the decommissioned North Pit Expansion thus minimizing the loss of COPCs to the groundwater system in the long-term.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on terrestrial biota in the Link Lakes watershed as a result of exposure to COPCs during post-decommissioning are expected to be moderate to high in magnitude, local in geographic extent and long-term in duration. Uncertainties • Conceptual decommissioning options are under development • Extent of change in local drainage patterns has yet to be defined.	

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Terrestrial Biota (Wildlife) Exposure to COPCs – Horseshoe Creek Watershed	Operating Phase • Collection, treatment and discharge of North Pit Expansion raise water in ET in conjunction with other contaminated site waters and discharge to Horseshoe Creek.	Operating Phase • Treated raise water will be discharged to Horseshoe Creek via the mill and ET.	• Increase in the total load of the COPCs discharged to Horseshoe Creek resulting in increased exposure of terrestrial biota with aquatic based diets to radiological and non-radiological COPCs.	Operating Phase • Addition of appropriate treatment to the Rabbit Lake Operation is planned to reduce the COPC loads. • Effluent discharge will be monitored and will conform to discharge limits before release.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on terrestrial biota in the Horseshoe Creek watershed are expected to be moderate to high in magnitude, local in geographic extent, medium-term in duration and reversible. Uncertainties • Estimated effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized.	The EIS will include a full assessment of potential effects on terrestrial biota from exposure to COPCs. Uncertainties will be addressed in the assessment.
	Decommissioning Phase • Continued discharge of treated effluent to Horseshoe Creek.	Decommissioning Phase • Treated effluent containing residual amounts of COPCs will be discharged into Horseshoe Creek through the existing ET, until tailings are sufficiently consolidated.	• Continued discharge of treated effluent to Horseshoe Creek but at reduced rate and hence, reduced COPC loads during decommissioning.	Decommissioning Phase • ET will continue to be operated until consolidation of the tailings is sufficiently complete. • Effluent discharge will be monitored for conformance to discharge limits.		
	Post-Decommissioning Phase • Discontinuation of North Pit Expansion raise water pumping activities and re-establishment of groundwater and surface water flow systems.	Post Decommissioning Phase • Discontinuation of effluent discharge to Horseshoe Creek.	• Decrease in the total load of the COPCs discharged to Horseshoe Creek resulting in reduced exposure of terrestrial biota with aquatic based diets to radiological and non-radiological COPCs.	Post-Decommissioning Phase • Monitoring of water quality in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.	Project-Related and Total Rabbit Lake Operation Effects: • Recovery of water and sediment quality is expected to occur slowly over time. Uncertainties • Timeline for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF. • Post-decommissioning natural flow conditions in small watersheds in the study area are not well known.	

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Terrestrial Biota (Wildlife) Exposure to COPCs – Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities. • Permanent placement of tailings into the North Pit Expansion. • Venting (degassing) of raise water. All Phases • Use of vehicles and heavy equipment.	Operating Phase • Mill emissions of TSP and associated metals and radionuclides will continue for a longer time frame. • Tailings slurry water contains radon gas some of which will be emitted to the atmosphere from the surface water cover layer in the North Pit Expansion and during venting of raise water. All Phases • Vehicles and heavy equipment operation will result in emissions of standard pollutants and cause dust suspension.	• Mill emissions (dust deposition and air emissions) may increase terrestrial biota exposure to COPCs by depositing on soil and vegetation in the local airshed. • Increase in radon levels in local airshed during tailings deposition is expected to result in increased exposure of wildlife to radon decay products (lead-210 and polonium-210) during the operating phase. • Vehicle emissions (dust deposition and air emissions) may increase terrestrial biota exposure to COPCs by depositing on soil and vegetation in the local airshed.	Operating Phase • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. • When used, currently approved tailings deposition methods will limit radon gas emanations at the North Pit Expansion during the operating phase. • During the decommissioning phase radon emissions will be further reduced by the cover layer placed over the tailings. • Placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings and direct exposure of wildlife to tailings. All Phases • Construction and service vehicles and heavy equipment will be maintained in good operating order to minimize emissions.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on terrestrial biota in the local airshed as a result of exposure to COPCs through mill emissions are expected to be low in magnitude, local in geographic extent and medium-term in duration. • Incremental and total effects on terrestrial biota in the local airshed as a result of radon or radon decay product exposure are expected to low in magnitude, local in geographic extent and long-term in duration. Uncertainties • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities.	The EIS will include a full assessment of potential effects on terrestrial biota exposure to COPCs. Uncertainties will be addressed in the assessment.
All Terrestrial Environment Sub-Components – Link Lakes Watershed	Accidents and Malfunctions • Transfer of tailings slurry to the North Pit Expansion from the mill via pipeline. • Transfer of raise water (i.e. contaminated water collected in the North Pit Expansion) to the mill for recycle or treatment. • Transportation of fuel to construction site and fuelling of construction equipment.	Accidents and Malfunctions • Accidental releases or spills of tailings or untreated raise water as a result of pipeline or human error. • Fuel spillage during transfer from fuel farm to construction site or during fuelling of construction equipment. • Loss of habitat in area affected by failure of pervious surround or pit wall.	• Contamination of soil or vegetation by COPCs resulting from accidental release or spill of tailings or untreated raise water or as a result of cover failure during decommissioning. • Spillage of fuel would result in hydrocarbon contamination of soil and/or vegetation in area of spill. • Disturbance of habitat as a result of a spill or during remediation of affected spill area.	Accidents and Malfunctions • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing the risk of pipeline failure. • An emergency response plan is in place at Rabbit Lake Operation, including trained personnel who can be dispatched to control and contain any possible spill in a timely manner.	Project-Related Effects: • Incremental effects of an accidental release or spill on soil are expected to be moderate to high in magnitude, short term in duration, site-specific in geographic extent and reversible. • Incremental effects of an accidental spill on vegetation and wildlife habitat are expected to be low in magnitude, site-specific in geographic extent, short-term in duration and reversible.	The EIS will include an assessment of the effects of accidents and malfunctions on terrestrial biota and habitat. Uncertainties will be addressed in the assessment.

Table 4.3.4-1
Terrestrial Environment (continued)

Environmental Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
All Terrestrial Environment Sub-Components – Link Lakes Watershed (Cont'd)	• Failure of pervious surround or pit walls during operation of the North Pit Expansion.		• Contamination and/or destruction of habitat in area affected by spillage of fuel. • Exposure of terrestrial biota to COPCs in area affected by spill or North Pit Expansion cover failure. • Exposure of terrestrial biota to hydrocarbon compound contamination. • Creation of unstable ground conditions. • Loss of cover on area affected by slope failure.	• Any contaminated soil and/or vegetation will be removed and disposed of in an environmentally responsible manner. • Pit slopes will be maintained in a dewatered condition while creating a perched pond on the tailings surface. • Side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle to reduce the potential of side slope failure during filling of the pit. • Unstable slopes or ground conditions would be remediated, stabilized and vegetated to prevent further risk of failure.	• Incremental effects of slope failure are expected to be low in magnitude, site-specific in geographic extent, short-term in duration and reversible. • Incremental effects of terrestrial exposure to COPCs resulting from an accidental spill are expected to be low in magnitude, short-term in duration and site-specific in geographic extent. <u>Uncertainties</u> • Likelihood and quantity of a spill of tailings slurry, raise water or fuel. • Quantities and types of fuel required during construction, operation and decommissioning. • Risk of slope failure is unknown.	The EIS will include an assessment of the effects of accidents and malfunctions on terrestrial biota and habitat. Uncertainties will be addressed in the assessment.

4.3.5 Summary of Human Health Environment

Potential effects on the human health environment have been assessed through the investigation of Project activities and their interaction with four sub-components (i.e. public exposure to conventional health and safety hazards, public exposure to radioactive and non-radioactive COPCs, worker exposure to conventional health and safety hazards and worker exposure to radioactive and non-radioactive COPCs). Tables 4.2-2 and 4.3-3 present project-environment interactions and the likely residual effects, respectively, while Table 4.3.5-1 explains Project-environment interactions, potential effects and mitigation specific to the human health environment.

4.3.5.1 Public Exposure to Conventional Health and Safety Hazards

It is important to note that the public has very limited access to the lease area, and the closest community is located outside of the local airshed and watershed at a considerable distance away from the Rabbit Lake Operation. Potential effects involving public exposure to conventional health and safety hazards, related to accidents and malfunctions, have been identified and include injury or fatality as a result of side slope failure (i.e. if a member of the public was in the vicinity of the pit during a side slope failure they could fall in) or injury or fatality resulting from a vehicular accident. Access to the Rabbit Lake site via road is controlled thus there is low risk of injury to members of the public due to side slope failure or accidents involving construction or mining equipment. However, during decommissioning, reclamation of the North Pit Expansion and associated waste rock pile will include the stabilization of side slopes to minimize the chance of side slope failure in the post-decommissioning phase when members of the public may gain access to the site. Overall, changes to conventional health and safety at the Rabbit Lake Operation as a result of the North Pit Expansion are expected to be minor.

Incremental and total effects on the health and safety of members of the public are expected to be low in magnitude, local in geographic extent and medium-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.5.2 Public Exposure to Radioactive and Non-Radioactive COPCs

Potential effects involving public exposure to radioactive and non-radioactive COPCs have been identified in Link Lakes and Horseshoe Creek watersheds and the local airshed.

Link Lakes Watershed and Local Airshed

During the operating phase the following activities may result in public exposure to COPCs due to the extended operation of the mill (i.e. emissions of radon-222, SO_2, TSP and associated metals and radionuclides will continue for a longer duration), the placement of tailings into the North Pit Expansion (i.e. radon gas will be released from both the surface layer of tailings slurry in the North Pit Expansion and during degassing of raise water) and the transfer of tailings and raise water (also during decommissioning)

via pipeline. These activities will increase the risk of members of the public to COPCs from mill operation, increase risk of public exposure to radon decay products (lead-210 and polonium-210) and potentially result in indirect exposure of members of the public to COPCs in the area of a release if there was a pipeline failure, respectively.

To mitigate these operating phase-related potential effects, dust and other emission control measures will continue to be in place at the mill to reduce emissions during the extended operation. The placement of tailings below the natural groundwater table ensures that the tailings remain saturated in the long term which will limit radon gas emanations at the North Pit Expansion. Regarding pipeline failure, any new pipelines constructed as a result of the North Pit Expansion will meet current environmental standards which may include dual-contained pipe systems. An emergency response plan is in place at Rabbit Lake Operation, including trained personnel who can be dispatched to control and contain a release in a timely manner.

Progressive reclamation during decommissioning includes the placement of cover material over the North Pit Expansion. This activity will essentially eliminate radon gas emissions and substantially reduce gamma radiation levels at the surface of the reclaimed TMF, thus decreasing exposure of the public to radon gas emissions. Finally, during all phases, the use of vehicles and heavy equipment may result in public exposure to TSP and standard pollutants. Service vehicles and heavy equipment will be maintained in good operating order to minimize emissions and thus reduce public exposure to standard pollutants.

Incremental and total effects on the health of the public as a result of exposure to COPCs in the Link Lakes watershed and local airshed are expected to be low in magnitude, local in geographic extent and long-term in duration. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

During operating and decommissioning phases, the collection and treatment of raise water with discharge to Horseshoe Creek will result in direct and indirect exposure of members of the public to COPCs (reduced exposure during the decommissioning phase). Mitigation measures include the addition of appropriate treatment to the Rabbit Lake Operation to reduce COPC loads, undertaking discharge monitoring to ensure conformance to discharge limits and the continuation of the ET through decommissioning until consolidation of the tailings is sufficiently complete (to the satisfaction of regulatory requirements).

The discontinuation of effluent discharge to Horseshoe Creek during post-decommissioning will result in the progressive improvement of COPC levels in this watershed. The progressive recovery of the Horseshoe Creek and Hidden Bay ecosystems will in turn result in reduced direct and indirect exposure of members of the public to COPCs, including exposure via drinking water and fish and wildlife ingestion. Aquatic biota, water and sediments in Horseshoe Creek and Hidden Bay will continue to be monitored until such time as recovery of the system is verified as satisfactory by regulatory requirements.

As previously stated, the public has very limited access to the lease area and the closest community is located a considerable distance from the Rabbit Lake Operation. Incremental and total effects on the health of the public as a result of exposure to COPCs in Horseshoe Creek watershed are expected to be low in magnitude, local in geographic extent and medium-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.5.3 Worker Exposure to Conventional Health and Safety Hazards

Potential effects involving worker exposure to conventional health and safety hazards (related to accidents and malfunctions) have been identified and include: injury or fatality as a result of accidentally falling into the North Pit Expansion; injury or fatality as a result of a side slope failure at the expansion or associated waste rock or overburden piles; workplace injuries from mechanical or electrical causes; direct exposure to hazardous chemicals; and injury or fatality from vehicular accident. To mitigate potential effects related specifically to side slope failure, slopes of the North Pit Expansion will be excavated to approximately a 2:1 angle to reduce the potential for failure during the filling of the pit and side slopes of the waste rock pile will be graded at decommissioning to reduce the risk of slope failure and rock falls. Overall, the Project will be completed following Cameco's conventional health and safety standards, including routine performance meetings and an emergency response plan that is in place at the Rabbit Lake Operation. Changes to conventional health and safety at the Rabbit Lake Operation as a result of the North Pit Expansion are expected to be minor.

Incremental and total effects on the health and safety of workers are expected to be low in magnitude, local in geographic extent and short-term in duration. These residual effects will be assessed more definitively in the EIS.

4.3.5.4 Worker Exposure to Radioactive and Non-Radioactive COPCs

Potential effects involving worker exposure to radioactive and non-radioactive COPCs have been identified in the Link Lakes watershed and the local airshed.

Link Lakes Watershed and Local Airshed

During the operating phase, worker exposure to COPCs in the local airshed may result from the extended operation of the mill (i.e. emissions of radon-222, SO_2, TSP and associated metals and radionuclides will continue for a longer duration) and from the placement of tailings into the North Pit Expansion (i.e. radon gas will be released from the surface layer of tailings slurry in the North Pit Expansion). Operating phase mitigation measures include continuing to have dust and emission control measures in place at the mill to reduce emissions during the extended operation of the mill and undertaking as appropriate currently approved tailings deposition methods to limit radon gas emanations at the North Pit Expansion.

During operating and decommissioning phases, the operation and maintenance of the tailings disposal system at the North Pit Expansion (including the venting of raise water), the release of tailings and raise water due to pipeline failure or human error and the

potential of fuel spillage during refueling could directly expose workers to COPCs and/or hydrocarbon contamination. To mitigate these potential effects, the venting of off-gases from the raise water pump station to the atmosphere will be undertaken to limit exposure of workers to radon gas in the pump station and pipelines associated with the North Pit Expansion will be dual contained to reduce the risk of pipeline failure. Worker radiation exposure at Rabbit Lake Operation is monitored and recorded routinely to ensure that exposure levels stay below prescribed limits; this will continue for the North Pit Expansion and in the event of a release an emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to control and a release in a timely manner.

Finally, during all phases the use of vehicles and heavy equipment may result in worker exposure to TSP and standard pollutants. Service vehicles and heavy equipment will be maintained in good operating order to minimize emissions and thus reduce worker exposure to standard pollutants. Incremental and total effects on the health of workers from exposure to radioactive and non-radioactive COPCs are expected to be low in magnitude, short to medium term in duration and comparable to levels measured historically at the Rabbit Lake Operation. These residual effects will be assessed more definitively in the EIS.

Horseshoe Creek Watershed

During operating and decommissioning phases the collection and treatment of raise water with discharge of treated effluent containing residual amounts of COPCs into Horseshoe Creek may result in direct or indirect exposure of workers to COPCs (i.e. through consumption of fish obtained from Hidden Bay). Mitigation for these potential effects include the planned addition of appropriate treatment to the Rabbit Lake Operation and effluent discharge monitoring to ensure conformance to discharge limits before release. Environmental monitoring will be carried out in accordance with the currently approved plans on Horseshoe Creek and Hidden Bay water, sediment and aquatic biota (including fish).

The discontinuation of effluent discharge to Horseshoe Creek during the post-decommissioning phase will result in progressive improvement in COPC levels in this watershed. This will result in reduced direct and indirect exposure of workers to COPCs. Monitoring of aquatic biota, water and sediments in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.

Incremental and total effects on the health of workers as a result of exposure to COPCs in Horseshoe Creek watershed and Hidden Bay are expected to be low in magnitude, local in geographic extent and medium-term in duration. These residual effects will be assessed more definitively in the environmental impact assessment.

Table 4.3.5-1
Human Health

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Public Exposure to Conventional Health and Safety Hazards (related to Accidents and Malfunctions)	<u>Construction and Decommissioning Phases</u> • Construction of the North Pit Expansion, waste rock and overburden piles and ancillary facilities. • Progressive reclamation of the North Pit Expansion including placement of cover material, reshaping of waste rock pile and reclamation of other disturbed areas. <u>All Phases</u> • Use of vehicles and heavy equipment.	<u>Construction, Operating and Decommissioning Phases</u> • The North Pit Expansion poses a hazard to the public if they were to fall into the pit. • Failure of slope of pit, waste rock or overburden piles or the North Pit Expansion pit walls pose a hazard to individuals if in the vicinity of these facilities. <u>All Phases</u> • Operation of light and heavy equipment poses risks of accidents due to equipment failure or human error.	• Risk of injury or fatality from falling into the North Pit Expansion, or as a result of side slope failure. • Injury or fatality from vehicular accidents.	<u>Construction, Operating and Decommissioning Phases</u> • Access to the Rabbit Lake site via road is controlled thus there is low risk of injury to members of the public due to side slope failure or accidents involving construction or mining equipment. <u>Decommissioning Phase</u> • Reclamation of the waste rock pile and the North Pit Expansion will include stabilization of side slopes to minimize the chance of side slope failure in the post-decommissioning phase when members of the public could access the site. • Reclamation activities will also include remove of all facilities on surface and remediation of the affected areas occupied by these facilities (i.e. pipelines, pump station, etc.)	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health and safety of members of the public are expected to be low in magnitude, local in geographic extent and medium-term in duration. • Changes to conventional health and safety at the Rabbit Lake Operation as a result of the North Pit Expansion are expected to be minor. <u>Uncertainties</u> • Number and type of vehicles/equipment used during all phases. • Conceptual decommissioning options are under development • .Detailed pit slope design is currently not available.	The EIS will include a full discussion of the potential health and safety risks to the public. Uncertainties will be addressed in the assessment.
Public Exposure to Radioactive and Non-radioactive COPCs – Link Lakes Watershed and Local Airshed	<u>Operation Phase</u> • Extended operation of the mill and ancillary facilities. • Placement of tailings into the North Pit Expansion. • Transfer of raise water from the North Pit Expansion for reuse or treatment. • Transfer of tailings slurry via pipeline from the mill to the North Pit Expansion.	<u>Operating Phase</u> • Mill emissions of radon-222, SO_2, TSP and associated metals and radionuclides will continue for a longer time frame. • Tailings slurry water contains radon gas; some of which will be released (emitted) to the atmosphere from the surface layer in the North Pit Expansion. • Raise water will be degassed on surface near the North Pit Expansion prior to transfer to the mill.	• Exposure of members of the public to COPCs from mill operation air emissions (radon, TSP, SO_2 and radioactive and non-radioactive emissions). • Increase in radon levels in local airshed during tailings deposition would potentially result in increased risk of exposure of members of the public to radon decay products (lead-210 and polonium-210) during the operating phase.	<u>Operating Phase</u> • Dust and other emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. • Currently approved tailings deposition methods will limit radon gas emanations at the North Pit Expansion during the operating phase.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health of members of the public as a result of exposure to emissions are expected to be low in magnitude, local in geographic extent and short to medium term in duration.	The EIS will include a full assessment of potential risks to the public from exposure to radioactive and non-radioactive COPCs.

Table 4.3.5-1
Human Health (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Public Exposure to Radioactive and Non-radioactive COPCs – Link Lakes Watershed and Local Airshed (Cont'd)	<u>Decommissioning Phase</u> • Progressive reclamation of the North Pit Expansion including placement of cover material. • Continued treatment of contaminated raise waters until tailings are sufficiently consolidated. <u>All Phases</u> • Use of vehicles and heavy equipment.	<u>Decommissioning Phase</u> • Placement of cover material over the North Pit Expansion will essentially eliminate radon gas emissions and substantially reduce gamma radiation levels at the surface of the reclaimed TMF. <u>Operating and Decommissioning Phases</u> • Accidental release of tailings or untreated raise water as a result of pipeline failure or human error poses a risk of release of COPCs to the environment and indirect exposure of a member of the public through water, vegetation or wildlife. <u>All Phases</u> • Emissions of TSP and standard pollutants from construction equipment and light vehicles.	• Decreased exposure of the public to radon gas emissions as a result of progressive reclamation. • Indirect exposure of members of the public to COPCs in the area of the spill. • Exposure of members of the public to standard pollutants within the area affected by vehicular activity.	<u>Operating and Decommissioning Phases</u> • The public has very limited access to the lease area and the closest community is located outside of the local airshed at a considerable distance away from the Rabbit Lake Operation. • Placement of tailings below the natural groundwater table to ensure that the tailings remain saturated in the long term and placement of cover material over the tailings surface at closure to isolate the tailings and reduce emissions. • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing the risk of pipeline failure. • An emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to control and contain any possible spill in a timely manner. • Service vehicles and heavy equipment will be maintained in good operating order to minimize emissions and thus reduce public exposure to standard pollutants.	<u>Uncertainties</u> • Composition/physical properties of tailings. • Conceptual decommissioning options are under development • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Quantities and types of fuel required during, construction, operation and decommissioning.	The EIS will include a full assessment of potential risks to the public from exposure to radioactive and non-radioactive COPCs. Uncertainties will be addressed in the assessment.
	<u>Post-Decommissioning Phase</u> • Re-establishment of surface water and groundwater flow systems.	<u>Post-Decommissioning Phase</u> • Once raise water pumping ceases natural surface and groundwater flow patterns will be re-established and water passing over or through the decommissioned North Pit Expansion and associated waste rock pile will result in the transport of COPCs to the downstream Link Lakes watershed.	• Direct and indirect exposure of members of the public to COPCs in the Link Lakes watershed. • Risk of exposure to above background gamma levels to individuals who come in contact with tailings.	<u>Post-Decommissioning Phase</u> • Pervious surround ensures minimum hydraulic gradient across the decommissioned North Pit Expansion thus minimizing the rate of COPCs transported to the groundwater system in the long-term. • The cover that would be placed on the tailings will include a drainage layer to minimize the opportunity for groundwater to come in contact with tailings and a thick overburden layer to prevent tailings from migrating to the surface and to support vegetative growth, which will serve to minimize erosion losses. These measures will limit the risk of individuals unknowingly coming in contact with tailings. • Upon regulatory approval, the public will be allowed free access to the Link Lakes system.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health of members of the public as a result of exposure to COPCs in the Link Lakes watershed are expected to be low in magnitude, local in geographic extent and long-term in duration. <u>Uncertainties</u> • Conceptual decommissioning options are under development	

Table 4.3.5-1
Human Health (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Public Exposure to Radioactive and Non-radioactive COPCs – Horseshoe Creek Watershed	<u>Operating and Decommissioning Phases</u> • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET in conjunction with other contaminated site waters.	<u>Operating and Decommissioning Phases</u> • Discharge of treated effluent containing residual amounts of COPCs into Horseshoe Creek.	• Direct and indirect exposure of members of the public to COPCs discharged to Horseshoe Creek and Hidden Bay including exposure via drinking water and fish and wildlife ingestion.	<u>Operating and Decommissioning Phases</u> • Addition of appropriate treatment to the Rabbit Lake Operation is planned to reduce the COPC loads. • ET will continue to be operated until consolidation of the tailings is sufficiently complete (no excess pore pressures). • Effluent discharge will be monitored and will conform to discharge limits before release. • Environmental monitoring will be carried out in accordance with the currently approved plans on Horseshoe Creek and Hidden Bay water, sediment and aquatic biota (including fish). • Public access to the lease area will be limited and the closest community is located at a considerable distance from the Rabbit Lake Operation. The Hidden Bay lodge, which is used seasonally, is the closest public facility.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health of members of the public as a result of exposure to COPCs in Horseshoe Creek watershed and Hidden Bay are expected to be low in magnitude, local in geographic extent and medium-term in duration.	The EIS will include a quantitative assessment of potential effects on public exposure to radioactive and non-radioactive COPCs. Uncertainties will be addressed in the assessment.
	<u>Post-Decommissioning Phase</u> • Discontinuation of pumping and treatment of raise water from the North Pit Expansion.	<u>Post-Decommissioning Phase</u> • Discontinuation of effluent discharge to Horseshoe Creek will result in progressive improvement in COPC levels in this watershed.	• Progressive recovery of the Horseshoe Creek and Hidden Bay ecosystems will result in reduced direct and indirect exposure of members of the public to COPCs including exposure via drinking water and fish and wildlife ingestion.	<u>Post-Decommissioning Phase</u> • Monitoring of aquatic biota, water and sediments in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.	• Recovery of water and sediment quality is expected to occur slowly over time thus reducing exposure to COPCs. <u>Uncertainties</u> • Timeline for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF.	
Worker Exposure to Conventional Health and Safety Hazards (related to Accidents and Malfunctions)	<u>Construction and Decommissioning Phases</u> • Construction of the North Pit Expansion, waste rock and overburden piles and ancillary facilities. • Progressive reclamation of the North Pit Expansion including placement of cover material and reshaping of waste rock pile.	<u>Construction, Operating and Decommissioning Phases</u> • The North Pit Expansion poses risk of worker from falling into the pit or from side slope failure. • Construction of waste rock and overburden piles pose risks due to slide slope failure.	• Injury or fatality as a result of falling into the North Pit Expansion. • Injury or fatality as a result of side slope failure at the North Pit Expansion or at the waste rock or overburden piles.	<u>All Phases</u> • The Project will be completed following Cameco conventional health and safety standards including routine performance meetings. • Side slopes of the North Pit Expansion will be excavated to approximately a 2:1 slope angle to reduce the potential of side slope failure during filling of the pit.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health and safety of workers are expected to be low in magnitude, local in geographic extent and short-term in duration.	The EIS will include a full assessment of potential conventional worker health and safety concerns and preventative programs that are in place to minimize risks.

Table 4.3.5-1
Human Health (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Worker Exposure to Conventional Health and Safety Hazards (related to Accidents and Malfunctions) (Cont'd)	Operating Phase • Transfer of tailings slurry via pipeline from the mill to the North Pit Expansion and associated operation of tailings disposal equipment. Operating and Decommissioning Phases • Transfer of raise water from the North Pit Expansion for reuse or treatment. • Operation and maintenance of pipelines, pumping systems and ET components including handling of conventional process chemicals and treatment plant sludge. All Phases • Use of vehicles and heavy equipment. • Transportation of goods or personnel around the site.	• Handling of hazardous chemicals and operation and maintenance of mechanical equipment all pose conventional health and safety risks • Operation of light and heavy equipment poses risks of accidents due to equipment failure or human error.	• Work place injuries from mechanical or electrical causes. • Direct exposure to hazardous chemicals. • Injury or fatality from vehicular accidents.	• Side slopes of the waste rock pile will be graded at decommissioning to reduce the risk of slope failure and rock falls. • An emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to in a timely manner.	• Changes to conventional health and safety at the Rabbit Lake Operation as a result of the North Pit Expansion are expected to be minor. Uncertainties • Conceptual decommissioning options are under development • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Detailed pit slope design is currently not available.	The EIS will include a full assessment of potential conventional worker health and safety concerns and preventative programs that are in place to minimize risks. Uncertainties will be addressed in the assessment.
Worker Exposure to Radioactive and Non-radioactive COPCs – Link Lakes Watershed and Local Airshed	Operating Phase • Extended operation of the mill and ancillary facilities (i.e. the ET). • Placement of tailings into the North Pit Expansion. Operating and Decommissioning Phases • Operation and maintenance of tailings disposal system at the North Pit Expansion including the collection, pumping and venting of raise water. • Pumping of raise water to the mill from the North Pit Expansion for reuse or treatment in the ET. • Operation and maintenance of ET until tailings are consolidated. • Spill to the environment of tailings slurry or raise water as a result of a break in the tailings or raise water pipelines. • Spill of fuel on the ground during refuelling of equipment or an accident involving the fuel truck.	Operating Phase • Mill emissions of radon-222, SO_2, TSP and associated metals and radionuclides will continue for a longer time frame. • Tailings slurry water contains radon gas; some of which will be released (emitted) to the atmosphere from the surface layer in the North Pit Expansion. Operating and Decommissioning Phases • Clean-up area affected by spilled tailings, raise water or fuel. All Phases Emissions of TSP and standard pollutants from construction equipment and light vehicles.	• Exposure of workers to COPCs from mill operation air emissions (radon, TSP, SO_2 and radioactive and non-radioactive emissions) and to radon decay products (lead-210 and polonium-210) during venting of raise water. • Direct exposure of workers to COPCs during operation and maintenance of equipment associated with the North Pit Expansion, raise water pumping system and Effluent Treatment System. • Direct exposure by workers to COPCs during remediation of spilled tailings or contaminated soils.	Operating Phase • Currently approved deposition methods will limit radon gas emanations at the North Pit Expansion during the operating phase. • Venting of off-gases from the raise water pump station to the atmosphere will limit exposure of workers to radon gas in the pump station. • Dust and emission control measures will continue to be in place at the mill to reduce emissions during the extended operation of the mill. Operating and Decommissioning Phases • Worker radiation exposure is monitored and recorded routinely to ensure that exposure levels stay below prescribed limits. • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing the risk of pipeline failure. • An emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to control and contain any possible spill in a timely manner.	Project-Related and Total Rabbit Lake Operation Effects: • Incremental and total effects on the health of workers from exposure to radioactive and non-radioactive COPCs are expected to be low in magnitude and to be comparable to levels measured historically at the Rabbit Lake Operation. Uncertainties • Composition/physical properties of tailings. • Likelihood and quantity of a spill of tailings slurry, raise water and fuel. • Quantities and types of fuel required during construction, operation and decommissioning.	The EIS will include a full assessment of potential effects – worker exposure to radioactive and non-radioactive COPCs will be considered in the assessment. Uncertainties will be addressed in the assessment.

Table 4.3.5-1
Human Health (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Worker Exposure to Radioactive and Non-radioactive COPCs – Link Lakes Watershed and Local Airshed (Cont'd)	<u>All Phases</u> • Use of vehicles and heavy equipment.		• Direct exposure to hydrocarbon constituents during clean-up of affected area. • Exposure of members of workers to standard pollutants within the area affected by vehicular activity.	<u>All Phases</u> • Service vehicles and heavy equipment will be maintained in good operating order to minimize emissions and thus reduce worker exposure to standard pollutants.		
Worker Exposure to Radioactive and Non-radioactive COPCs – Horseshoe Creek Watershed	<u>Operating and Decommissioning Phases</u> • Collection and treatment of raise water from the North Pit Expansion in the Rabbit Lake ET in conjunction with other contaminated site waters.	<u>Operating and Decommissioning Phases</u> • Discharge of treated effluent containing residual amounts of COPCs into Horseshoe Creek.	• Direct and indirect exposure of workers to COPCs discharged to Horseshoe Creek and Hidden Bay including exposure via consumption of fish obtained from Hidden Bay.	<u>Operating and Decommissioning Phases</u> • Addition of appropriate treatment to the Rabbit Lake Operation is planned to reduce the COPC loads. • Effluent discharge will be monitored and will conform to discharge limits before release. • Environmental monitoring will be carried out in accordance with the currently approved plans on Horseshoe Creek and Hidden Bay water, sediment and aquatic biota (including fish).	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on the health of workers as a result of exposure to COPCs in Horseshoe Creek watershed and Hidden Bay are expected to be low in magnitude, local in geographic extent and medium-term in duration.	The EIS will include an assessment of potential effects on worker exposure to radioactive and non-radioactive COPCs. Uncertainties will be addressed in the assessment.
	<u>Post-Decommissioning Phase</u> • Discontinuation of pumping and treatment of raise water from the North Pit Expansion.	<u>Post-Decommissioning Phase</u> • Discontinuation of effluent discharge to Horseshoe Creek will result in progressive improvement in COPC levels in this watershed.	• Progressive recovery of the Horseshoe Creek and Hidden Bay ecosystems will result in reduced direct and indirect exposure of workers to COPCs including exposure via consumption of fish obtained from Hidden Bay.	<u>Post-Decommissioning Phase</u> • Monitoring of aquatic biota, water and sediments in Horseshoe Creek and Hidden Bay will continue until such time as recovery of the system is verified.	• Recovery of water and sediment quality is expected to occur slowly over time thus reducing exposure to COPCs. <u>Uncertainties</u> • Timeline for recovery is uncertain as there will be residual COPC input to the watershed from the AGTMF.	

4.3.6 Summary of the Socioeconomic Environment

Potential effects on the socioeconomic environment have been assessed through the investigation of project activities and their interaction with four sub-components (i.e. employment and business opportunities, land and resource use, heritage resources and community health). Tables 4.2-2 and 4.3-3 present project-environment interactions and the likely residual effects, respectively, while Tables 4.3.6-1 and 4.3.6-2 explains project-environment interactions, potential effects and mitigation specific to the socioeconomic environment.

4.3.6.1 Employment and Business Opportunities

Project construction would offer employment and business opportunities. Northern employment would be enhanced through hiring preferences and northern business participation would be enhanced through contract and purchase preferences. Employment and business opportunities would also be associated with the operations and decommissioning phases of the Project. Continued mill production is anticipated to prolong the availability of employment at the milling operation, resulting in an overall increase and extension in access to employment and business opportunities for RSNs.

An Impact Management Agreement exists between Cameco, AREVA, the Cigar Lake Mining Corporation and six of the seven Athabasca communities, which has provisions related to recruitment, retention and training. In addition, formal arrangements that Cameco has in place with the province, including the Surface Lease Agreement and the Human Resources Development Agreement, establish commitments towards the maximization of recruitment, retention and training opportunities for RSNs; as well as northern business opportunities. Hiring preferences for jobs associated with this Project will be consistent with those arrangements and will prioritize the participation of RSNs. Cameco also gives preference to northern businesses for contract and purchase opportunities through the Northern Preferred Supplier Program.

Table 4.3.6-1
Employment and Business Opportunities

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Employment	Construction and Decommissioning Phases • Development and reclamation of the North Pit Expansion and associated infrastructure.	Construction and Decommissioning Phases • During development and closure of the North Pit Expansion, construction crews and catering staff will be required.	• Increased employment among residents of northern Saskatchewan during construction, decommissioning and post-decommissioning phases. • Increased/continued economic and social viability of northern communities.	Construction, Operating and Decommissioning Phases • An Impact Management Agreement exists between Cameco and six of the seven Athabasca communities which has provisions related to recruitment, retention and training. • Formal arrangements that Cameco has in place with the province, including the Surface Lease Agreement and the Human Resources Development Agreement, establish commitments towards the maximization of recruitment, retention and training opportunities for RSNs); as well as northern business opportunities. • Transportation for northern residents will continue to be provided by flights in/out for regional communities.	Project-Related and Total Rabbit Lake Operation Effect: • Incremental and total effects on employment opportunities for residents of northern Saskatchewan are expected to be positive in terms of both the number of positions as well as the duration of future employment opportunities.	The EIS will include a full assessment of potential effects – employment will be considered in the assessment.
	Operating Phase • Operation of the North Pit Expansion and the resulting extended operation of the mill. Accidents and Malfunctions • Transfer of tailings slurry to the North Pit Expansion from the mill via pipeline. • Transfer of raise water (i.e. contaminated water collected in the North Pit Expansion to the mill for recycle or treatment.	Operating Phase • Development of the North Pit Expansion will increase tailings capacity at the Rabbit Lake Operation, allowing for extended mining and milling functions. Accidents and Malfunctions • In the event of an accidental release or spill a clean up crew may be required.	• Prolonged availability of employment at the Rabbit Lake Operation.			
Business and Economic Development	Construction and Decommissioning Phases • Development and reclamation of the North Pit Expansion and associated infrastructure.	Construction and Decommissioning Phases • Development of the North Pit Expansion and associated infrastructure will present business opportunities during the construction and reclamation phases.	• Increased business capacity in northern Saskatchewan as a result of Project expenditures and associated job and business opportunities.	Construction, Operating and Decommissioning Phases • Formal arrangements that Cameco has in place with the province, including the Surface Lease Agreement and the Human Resources Development Agreement, establish commitments towards the maximization of recruitment, retention and training opportunities for RSNs; as well as northern business opportunities. • Preference is given to northern businesses for contract and purchase opportunities through Cameco's Northern Preferred Supplier Program	Project-Related and Total Rabbit Lake Operation Effect: • Incremental and total effects on business opportunities for northern companies are expected to be positive.	The EIS will include a full assessment of potential effects – business and economic development will be considered in the assessment.
	Operating Phase • Operation of the North Pit Expansion and the resulting extended operation of the mill.	Operating Phase • Development of the North Pit Expansion will increase tailings capacity at the Rabbit Lake Operation, allowing for extended mining and milling functions.	• Continuation of business opportunities over the life of the Rabbit Lake facility.			

Table 4.3.6-2
Land and Resource Use

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Land and Resource Use for Traditional and Domestic Purposes by Aboriginal People – Local Study Area	<u>Construction Phase</u> • Construction of lay down area and runoff sediment controls. • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct North Pit Expansion including blasting of bedrock and development of waste rock and overburden piles. • Construction of ancillary facilities. <u>Operating Phase</u> • Extended operation of the mill and ancillary facilities. • Operation of North Pit Expansion including transport of facility operators and maintenance staff to the site and routine inspection of facilities. • Collection, pumping and treatment of North Pit Expansion raise waters. <u>Decommissioning. Phase</u> • Continued treatment of contaminated waters from the North Pit Expansion. • Reclamation activities including grading of piles and other disturbed areas, placement of cover material on North Pit Expansion and other disturbed areas and re-vegetation of reclaimed surfaces. <u>Post-Decommissioning Phase</u> • Re-establishment of surface and groundwater flow systems. • Discontinuation of treated water discharge to Horseshoe Creek watershed. <u>All Phases</u> • Use of vehicles and heavy equipment.	<u>Construction Phase</u> • Preparation of the site for the North Pit Expansion will require physical disturbance including removal of vegetation and soil. <u>Operating Phase</u> • Extended operation of the facility will result in continued levels of noise in proximity to site and continued emission of standard pollutants to the local airshed. <u>Operating and Decommissioning Phases</u> • Treated effluent containing residual amounts of COPCs will be discharged into Horseshoe Creek through the existing Rabbit Lake ET. <u>Post-Decommissioning Phase</u> • Once raise water pumping ceases natural surface water flow patterns will be re-established both in Link Lakes and Horseshoe Creek watersheds. Surface water passing over the decommissioned North Pit Expansion and associated waste rock pile will result in the transport of COPCs to the downstream Link Lakes watershed. <u>All Phases</u> • Use of vehicles and heavy equipment will increase ambient noise levels in the site area.	• Changes to land and resource use as a result of the construction, operation and decommissioning of the North Pit Expansion, due to direct and indirect effects to the biophysical environment resulting in reduced opportunity for Aboriginal resource harvesting. • Changes to the terrestrial and aquatic environment may result in a loss or a perception of reduction in the quality of available resources to meet the needs of resource users (i.e. for harvest).	<u>All Phases</u> • A mitigation arrangement is in place between Cameco and a specific local trapper covering the general area of the Rabbit Lake Operation. This arrangement has been in place for many years and is periodically reviewed and adjusted in coordination with the trapper and the applicable First Nation political leadership • The North Pit Expansion and associated facilities are located in an isolated area that the public has limited access to thus there will be limited effect on resource use. • Cameco will continue to communicate results of the Project to the local trapper, as well as to communities as part of on-going community engagement activities associated with Rabbit Lake Operation.	<u>Project-Related and Total Rabbit Lake Operation Effects</u>: • Incremental and total effects on land and resource use are expected to be low in magnitude, local in geographic extent and medium-term in duration. <u>Uncertainties</u> • Details of construction plan / design of Rabbit Lake Tailings North Pit Expansion Project and waste rock / overburden piles are not finalized. • Extent of blasting that will be required to develop the pit. • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized. • Conceptual decommissioning plans are under development. • Long-term load estimates for the groundwater flow system from the North Pit Expansion and waste rock piles in the drainage basin.	The EIS will include a full assessment of potential effects – land and resource use will be considered in the assessment. Uncertainties will be addressed in the assessment.

Table 4.3.6-2
Land and Resource Use (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Tourism, Outfitting and Lodges –Local Study Area	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road including sourcing of road bed material. • Excavation, handling and placement of overburden and bedrock to construct North Pit Expansion including blasting of bedrock and development of waste rock and overburden piles. • Construction of ancillary facilities. • Collection and treatment of surface runoff. Operating Phase • Collection, treatment and discharge of North Pit Expansion raise water in Rabbit Lake ET with discharge to Horseshoe Creek. Decommissioning Phase • Continued treatment of contaminated raise waters until tailings are sufficiently consolidated. • Reclamation of site study area including grading, placement of cover material and re-vegetation of North Pit Expansion. Post-Decommissioning Phase • Re-establishment of surface and groundwater flow systems. • Discontinuation of treated effluent discharge to Horseshoe Creek All Phases • Use of vehicles and heavy equipment.	Construction Phase • Altering the local landscape to accommodate the North Pit Expansion and associated infrastructure is required. • Surface runoff from barren waste rock and overburden piles will require collection and treatment to reduce the sediment load and control other COPCs. • Noise and vibrations will be produced during bedrock blasting. Operating and Decommissioning Phases • Treated effluent containing residual amounts of COPCs will be discharged into Horseshoe Creek through the existing Rabbit Lake ET. Post-Decommissioning Phase • Once collection and treatment of raise water is suspended, natural surface and groundwater flows will be re-established in Link Lakes watershed and flow in Horseshoe Creek will be permitted to return to natural ephemeral conditions. All Phases • Noise will be produced by vehicles and heavy equipment during construction, operation, closure and accidental spills clean-up.	• Decreased aesthetic value of the region may prevent outfitters from bringing tourists to areas in proximity to the site. • Changes to aquatic environment (i.e. water quality, health of aquatic biota and habitat and wildlife disturbance) resulting in decreased local tourism. • Changes to ambient noise levels resulting in decreased tourism.	Construction Phase • Existing cleared areas will be used where feasible to limit disturbance to aesthetic value. • Physical disturbance will remain within the lease boundary. • Sediment control measures will be used to reduce total suspended solids from runoff from the waste and overburden piles. Where required, contaminated runoff will be pumped to the ET for removal of metals or radiological COPCs. • To the extent possible, blasting activity will be scheduled to minimize potential noise and vibration effects to local tourism. The nearest lodge to the Project area is located several kilometres to the south of the Link Lakes watershed. Operating and Decommissioning Phases • Effluent Treatment System will continue to be operated until consolidation is sufficiently complete (no excess pore pressures). • Cameco will continue to communicate results of project to the local trapper, as well as to communities as part of on-going community engagement activities associated with Rabbit Lake Operation. Decommissioning Phase • Disturbed areas will be reclaimed upon decommissioning and vegetated with indigenous species to achieve a natural appearance. • Waste rock piles side slopes will be graded during reclamation to improve their stability and to achieve conformance with the natural landscape. • Placement of cover material over the tailings surface at closure to isolate the tailings and allow establishment of vegetative cover to prevent surface water contact with tailings. • To the extent possible, remediation activities will be scheduled to minimize potential noise effects to local tourism. Post-Decommissioning Phase • ET will continue to be operated until consolidation of the tailings is sufficiently complete (no excess pore pressures).	Project-Related and Total Rabbit Lake Operation Effects: • No anticipated effects on lodges, tourism and outfitting as none occur within the Rabbit Lake Operation surface lease area. Uncertainties • Details of construction plan / design of Rabbit Lake Tailings North Pit Expansion Project and waste rock / overburden piles are not finalized • Extent of blasting that will be required to develop the pit. • Number and type of vehicles/equipment used during construction and reclamation activities and the expected duration of these activities. • Effluent flow rates over the duration of the operating and decommissioning phases have yet to be finalized. • Conceptual decommissioning options are under development • Long-term load estimates for the groundwater flow system from the North Pit Expansion and waste rock piles in the drainage basin.	The EIS will include a full assessment of potential effects – tourism, outfitting and lodges will be considered in the assessment. Uncertainties will be addressed in the assessment.

Table 4.3.6-2
Land and Resource Use (continued)

Sub-component	Key Activity /Group of Activities	Description of Interaction	Potential Effects	Mitigation	Likely Residual Effects	Further Action
Tourism, Outfitting and Lodges –Local Study Area (Cont'd)				• Pervious surround ensures minimum hydraulic gradient across the decommissioned North Pit Expansion thus minimizing the loss of COPCs to the groundwater system in the long term. All Phases • Traffic will be limited to necessary activities such as routine pipeline integrity checks and regular service maintenance		The EIS will include a full assessment of potential effects – tourism, outfitting and lodges will be considered in the assessment.
Heritage Resources – Site-Specific Study Area	Construction Phase • Construction of lay down area and runoff sediment controls. • Clearing of area for North Pit Expansion and site infrastructure and for development of overburden and waste rock piles. • Construction of site access roads and realignment of existing road including sourcing of road bed material. • Construction of ancillary facilities.	Construction Phase • Land clearing and construction activities could unearth artifacts.	• Disturbance or discovery of heritage resources during the construction phase.	Construction Phase • A survey of areas where construction activities are contemplated has been completed as one component of the baseline characterization work for the site study area. No artifacts were found during the survey. • In the event that traditional artifacts are discovered construction activities will cease in the vicinity of the discovery until the Provincial Heritage Resources Branch has been contacted and a response plan is developed and activated. Recovery and preservation of any discovered heritage resources will be conducted in accordance with relevant legislation.	Project-Related and Total Rabbit Lake Operation Effects: • Effects on heritage resources are not expected.	The EIS will include a full assessment of potential effects – heritage resources will be considered in the assessment.
All Land and Resource Sub-Components – Link Lakes Watershed	Accidents and Malfunctions • Transfer of tailings slurry to the North Pit Expansion from the mill via pipeline. • Transfer of raise water (i.e. contaminated water collected in the North Pit Expansion) to the mill for recycle or treatment. • Transportation of fuel to construction site and fuelling of construction equipment. • Failure of pervious surround or pit walls during operation.	Accidents and Malfunctions • Accidental release of tailings or untreated raise water due to pipeline failure or human error poses a risk of release of COPCs to local aquatic and terrestrial environments. • Fuel spillage during transfer from fuel farm to construction site or during fuelling of construction equipment. • Change in topographic features due to failure of pervious surround or pit wall.	• Changes to the aquatic and terrestrial environments.	Accidents and Malfunctions • Pipelines associated with the North Pit Expansion will be dual contained, thus reducing the risk of pipeline failure. • An emergency response plan is in place at Rabbit Lake Operation including trained personnel who can be dispatched to control and contain any possible spill in a timely manner. • Any contaminated soil or vegetation will be removed and disposed of in an environmentally responsible manner. • Unstable slopes or ground conditions would be remediated to prevent further risk of failure.	Project-Related Effects: • Incremental effects of an accidental spill on land and resource use are expected to be low in magnitude, short-term in duration and site-specific in geographic extent. Uncertainties • Likelihood and quantity of a spill of tailings slurry, raise water or fuel. • Quantities and types of fuel required during construction, operation and decommissioning.	The EIS will include a full assessment of potential effects resulting from accidents and malfunctions. Uncertainties will be addressed in the assessment.

4.3.6.2 Land and Resource Use

There is the potential for effects on land and resource use including hunting, trapping and fishing, tourism, outfitting and lodges during the continued mill production operations, decommissioning and post-decommissioning phases. During construction activities, noise and the presence of a construction workforce on site may disrupt local wildlife movement and potentially the location of resource harvesting, as well as hunting, trapping and fishing for commercial or recreational purposes. Some disruption of these activities is also anticipated during the operations, decommissioning and post-decommissioning phases of the tailings management facility expansion.

Within the SSA and LSA, potential additional effects of the proposed Project will be mitigated by using existing disturbed areas where reasonable. Current operations have had no measurable effect on fish species or water quality in Wollaston Lake. On Wollaston Lake, no potential effect to domestic use of fish species is anticipated as a result of the Project; seasonal and periodic use of fish resources are expected to remain as they have in the past.

Mitigation arrangements are in place between Cameco and applicable local resource user(s) in northern Saskatchewan. These agreements have been in place for many years. Specifically pertaining to the Rabbit Lake Operation, there is one such agreement in place with a trapper from the Hatchet Lake First Nation. Communication would be undertaken with this resource user about timing and location of construction activity.

Cameco has implemented policies and procedures limiting hunting and fishing within the SSA associated with the Rabbit Lake Operation. Hunting and firearms are prohibited for on-site staff and all other individuals, including local land users. The discharge of firearms is prohibited on the surface lease, except for the purposes of wildlife control. Cameco holds standing wildlife permits to address any issues with nuisance wildlife and will coordinate the removal of such wildlife with the local conservation officer as necessary. Staff must adhere to both provincial sports fishing policies and to conservation limits on fish. The area is classified as CR1 by Saskatchewan Environment, in which there are catch limits based on fish species within the lease area. Trapping is not permitted within the Rabbit Lake surface lease area although a local trapper is regularly granted access to the site in order to pursue resource harvesting in adjacent areas.

4.3.6.3 Heritage Resources

Construction activities associated with the proposed project have the potential to unearth heritage resources. However, a survey of areas where construction is contemplated has been completed as part of the baseline work for the site study area. No artifacts were found during the survey and none are expected to be unearthed.

In the event that archaeological artifacts are discovered during the construction activities, all construction work will cease in the vicinity of the discovery until Heritage Resources Branch of the Ministry of Tourism, Parks, Culture and Sport has been contacted and a

response plan is developed and implemented. Recovery and preservation of any discovered heritage resources will be conducted in accordance with relevant legislation.

4.3.6.4 Community Health

People in communities around the Rabbit Lake Operation may be directly and/or indirectly exposed to radioactive and non-radioactive COPCs, in the local study area, by drinking water and consuming fish or wildlife. To minimize potential effects associated with COPC exposure, mitigation measures will include limiting access to the Rabbit Lake lease area, project-design features to minimize the discharge of COPCs into the environment and monitoring.

Potential exposures due to accidents and malfunctions will be minimized through existing emergency response plans at the Rabbit Lake Operation.

4.4 Potential Effects of the Environment on the Project

Potential effects of the Project on the environment have been discussed in previous sections; potential effects of the environment on the Project are described here, including geologic and climatic events and natural hazards.

4.4.1 Geologic Events

Seismic activity is not considered to be an issue for the Rabbit Lake Operation and surrounding areas due to the low probability of significant seismic activity in the region. Development of the proposed North Pit Expansion for the placement of tailings below the surrounding ground surface will ensure full containment of the tailings even in the event of seismic activity. This design feature, combined with the low probability of seismic activity, minimizes the potential significance of risk from seismic events.

4.4.2 Climatic Events

4.4.2.1 Extended Drought

An extended drought period at the Rabbit Lake Operation would create a loss of natural runoff in the Horseshoe Creek watershed. Horseshoe Creek is very small and in the absence of treated effluent discharge experiences seasonal flows and would otherwise not support permanent aquatic communities. Since effluent flow is the only flow present in Horseshoe Creek a persistent drought condition would simply result in conditions already experienced.

4.4.2.2 Major Precipitation

Presently, contaminated runoff in the site-specific area is collected in the existing RLTMF and in the mine water surge pond. Once developed, runoff will also flow into the proposed North Pit Expansion. There is a large capacity in both the existing RLTMF and in the design of the expansion to handle major precipitation events. Regarding the storage ponds at the AGTMF, a flood event would result in a bypass of partially treated water directly to Horseshoe Creek. The design of the storage ponds at the AGTMF provides for

protection of dams on the AGTMF area and the containment structures in the treatment ponds. While only partially processed water would be discharged during such an event, the bypass flow would be diluted with high flows in the downstream watershed.

4.4.2.3 Global Warming

Potential effects of global warming on the North Pit Expansion are uncertain due to inherent uncertainties in predicted climate changes. Regional modeling predictions indicate higher than average annual temperatures (with more pronounced increases in the fall and winter periods) and increased winter precipitation which may lead to more intense spring runoff events. However, these increases are easily accommodated by designing the North Pit Expansion and ancillary facilities to handle the more serious probable maximum precipitation (PMP) event.

4.4.3 Natural Hazards - Forest Fires

Buffer zones around the facility infrastructure will be maintained to minimize risks. On-site emergency response includes fire suppression capabilities and fire fighting capabilities of the Province of Saskatchewan. The recurrent nature of forest fires in Northern Saskatchewan are not expected to have a detrimental effect on the Rabbit Lake Operation or the proposed North Pit Expansion.

4.5 Cumulative Effects

Cumulative effects are defined as effects that are likely to result from a project in combination with other current or planned projects or activities. Certain residual effects of the North Pit Expansion have the potential to contribute to cumulative effects through interaction with other existing developments in the region—the nearest being the McClean Lake mine which is approximately 23 km from the Rabbit Lake Operation. Both operations are situated near Wollaston Lake. The Key Lake operation is also located within the watershed boundaries of Wollaston Lake, approximately 165 km from the Rabbit Lake Operation. Potential sources of effects which may contribute to cumulative effects include air emissions, water releases, disturbances to wildlife and changes driven by employment and business opportunities. Table 4.3-1 defines the criteria used to characterize likely residual effects.

4.5.1 Air Emissions

TSP, CO_2, NO_x, SO_2 and noise levels associated with the Project may contribute to incremental increases above existing operational effects to air quality. Consistent with results of recent air emission data presented in Section 3.1.2, incremental effects are expected to be local in geographic extent. Overall, total residual effects (project-related effects plus existing Rabbit Lake Operation effects) are expected to be low in magnitude and local in geographic extent; therefore, Project activities are not expected to provide a measurable contribution to cumulative effects associated with other projects in the region.

4.5.2 Water Releases

Treated water releases from the Rabbit Lake, McClean Lake and Key Lake operations discharge into Horseshoe Creek, Collins Creek and the Geikie River. These drainages all empty into Wollaston Lake. Results of a recent assessment of cumulative effects on Wollaston Lake water quality showed minimal change of most measured constituents from baseline levels and it was determined that it would be difficult to distinguish any incremental effects of the operations from natural variations in constituent levels (*Cameco and AREVA 2008*). Given this recent report, the potential influences of the Rabbit Lake Operation, including incremental effects of the North Pit Expansion, are not expected to be measurable in Wollaston Lake and therefore are not expected to contribute measurably to cumulative effects associated with other projects in the region.

4.5.3 Disturbances to Wildlife

With the relatively small extent of cumulative development in the region and the fact that this Project remains within the Rabbit Lake Operation surface lease area, the Project should not result in any cumulative effects to wildlife. Overall, the incremental and total effects of this Project resulting from disturbances to wildlife are expected to be low in magnitude and local in geographic extent. Incremental effects of habitat and wildlife disturbance associated with the North Pit Expansion are unlikely to be measurable compared to the current disturbance from operations at Rabbit Lake.

4.5.4 Employment and Business

The primary drivers of change in the socio-economic environment as a result of the North Pit Expansion arise from employment and business opportunities.

The indirect effects associated with employment and business opportunities including in-migration, increased pressure on infrastructure and services and community well-being. The incremental effects of the Project on these socio-economic attributes are expected to be small relative to the cumulative effects of other projects in the region.

4.6 Summary of Accidents and Malfunctions

The potential accidents and malfunctions associated with the North Pit Expansion are similar to those for the existing Rabbit Lake Operation and the existing RLTMF. For the purpose of this summary, accidents and malfunctions have been organized into potential spillage and potential physical injury categories and have been assessed based on incremental effects only. See Tables 4.3.1-1, 4.3.2-1, 4.3.3-1, 4.3.4-1, 4.3.5-1, 4.3.6-1 and 4.3.6-2 for accidents and malfunctions specific to individual environmental components.

4.6.1 Potential Spillage

During the operation and decommissioning phases of the North Pit Expansion the transfer of raise water from the pit to the mill for recycling or treatment poses a risk of contamination to surrounding environments if pipelines were to rupture. Pipelines transferring tailings slurry to the pit pose a similar risk. As well, fuel spills due to the transportation of fuel to the construction site, fuelling of equipment and the incremental

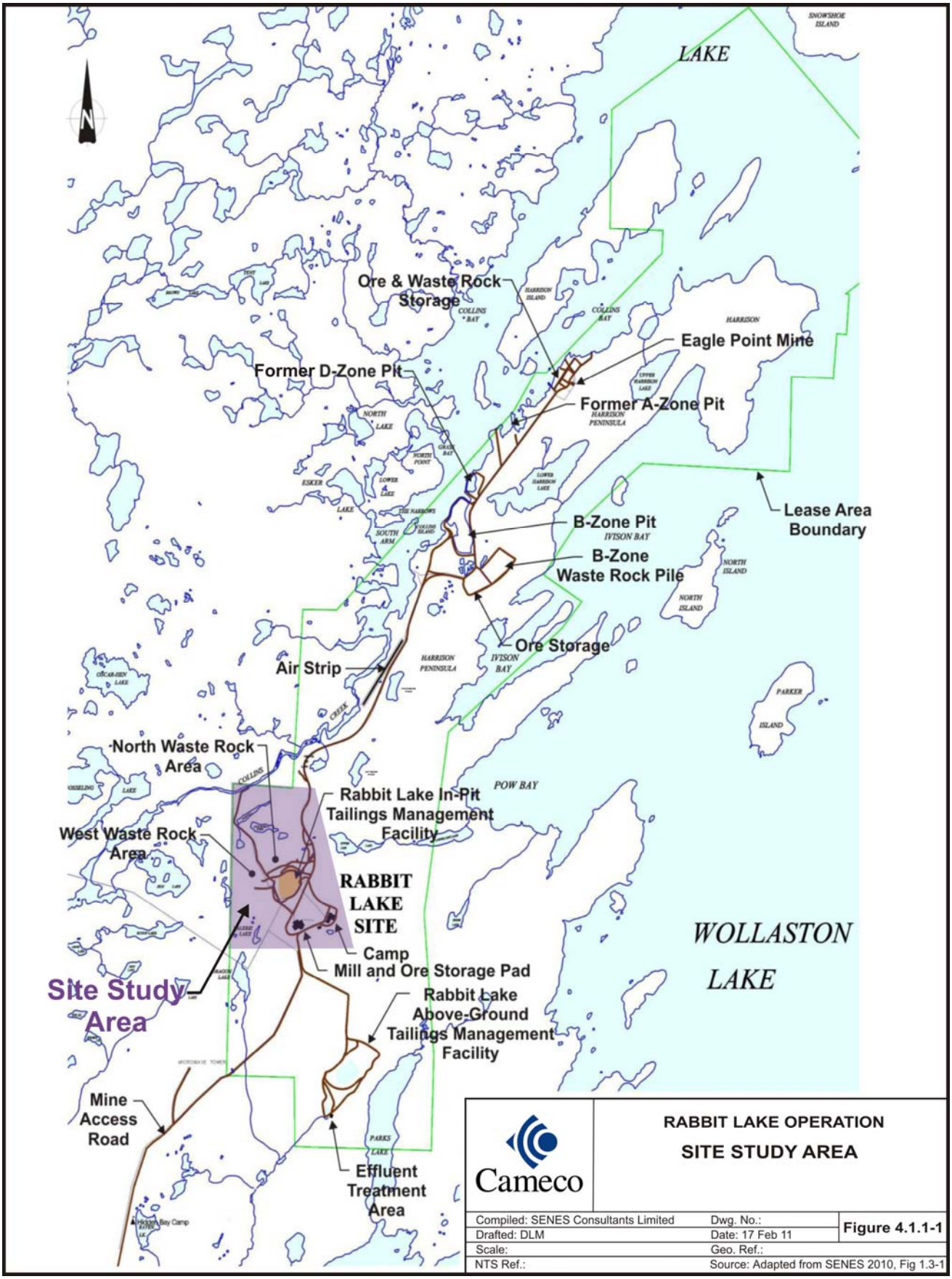
use of vehicles, may result in site-specific hydrocarbon contamination. The risk of high magnitude residual effects from spills on land or water is expected to be low with mitigations that include measures in place to prevent spills for the current operation (i.e. dual contained pipelines), measures that regulate the transportation of fuel and vehicle traffic within the Rabbit Lake site and an emergency response plan to clean up spills in a timely manner.

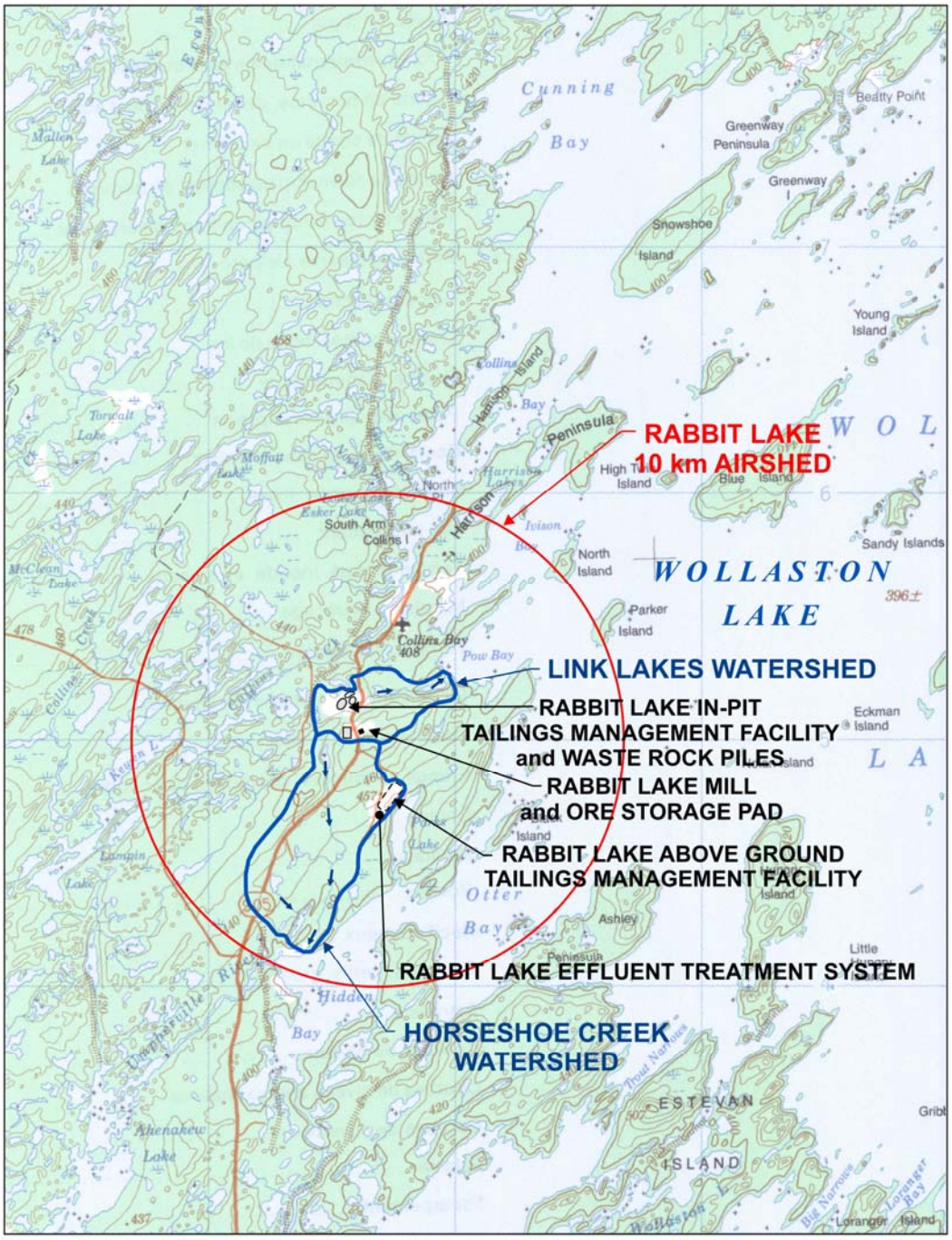
4.6.2 Potential Physical Injury

During construction, operating and decommissioning phases, safety incidents involving both workers and members of the public have the potential to occur. Safety incidents primarily include accidents resulting from the use of vehicles or heavy equipment or the failure of either the pit wall or cover layer of the North Pit Expansion upon decommissioning. To avoid accidents and malfunctions resulting in physical harm to workers or members of the public, the Project will be completed following Cameco conventional health and safety standards including routine performance meetings. (Section 4.3.5 and Table 4.3.5-1)

FIGURES

FIGURES


LAKE
Ore & Waste Rock Storage
Eagle Point Mine
Former D-Zone Pit
Former A-Zone Pit
Lease Area Boundary
B-Zone Pit
B-Zone Waste Rock Pile
Ore Storage
Air Strip
North Waste Rock Area
Rabbit Lake In-Pit Tailings Management Facility
West Waste Rock Area
RABBIT LAKE SITE
Camp
Mill and Ore Storage Pad
Site Study Area
Rabbit Lake Above-Ground Tailings Management Facility
Mine Access Road
Effluent Treatment Area
WOLLASTON LAKE
POW BAY
IVISON BAY
HARRISON PENINSULA
RABBIT LAKE OPERATION
SITE STUDY AREA
Cameco
Compiled: SENES Consultants Limited
Drafted: DLM
Scale:
NTS Ref.:
Dwg. No.:
Date: 17 Feb 11
Geo. Ref.:
Source: Adapted from SENES 2010, Fig 1.3-1
Figure 4.1.1-1



LEGEND:

- Watershed Boundary
- Sub-Watershed Boundary
- Flow Direction

0 — 10 km

Cameco

RABBIT LAKE OPERATION

LOCAL STUDY AREA AIRSHEDS AND WATERSHEDS

Compiled: SENES Consultants Limited	Dwg. No.:	**Figure 4.1.2-1**
Drafted: DLM	Date: 17 Feb 11	
Scale:	Geo. Ref.:	
NTS Ref.:	Source: Adapted from Cameco & AREVA 2008, Fig 3.2.1-2	

SECTION 5

PUBLIC PARTICIPATION: ENGAGING FIRST NATIONS, METIS AND OTHER INTERESTED PARTIES

5.0 PUBLIC PARTICIPATION: ENGAGING FIRST NATIONS, METIS AND OTHER INTERESTED PARTIES

5.1 Introduction

Public participation is a key component of an EA, as well as a reflection of the corporate social responsibility of the EA proponent. This section outlines the public participation program that Cameco is proposing for the Project.

Regarding its operations in northern Saskatchewan generally, Cameco conducts and has for many years conducted, a range of on-going public engagement activities designed to keep northerners (and others) informed about applicable uranium mining and related activities. Consequently, the public in northern Saskatchewan is well positioned to have informed and meaningful discussion regarding Cameco projects and activities on an on-going basis.

For applicable projects proposed by Cameco, including those that trigger formal EAs under the CEAA and/or the SEAA, Cameco designs and implements customized Public Participation programs. Generally, Cameco's Public Participation programs are designed to ensure opportunities for interested parties to provide feedback and/or to identify relevant concerns in relation to proposed projects, to ensure that any such feedback and/or concerns are considered as part of the EA process, to ensure that amendment and/or mitigation strategies that are deemed necessary as a result of such feedback and/or concerns are robust and meaningful and to ensure that interested parties are kept well informed throughout as to the manner in which their feedback and/or concerns are being addressed.

Set out below are the details of the proposed Public Participation program for the Project, including the following:

- Identification of potentially interested parties, including constitutional rights-bearing First Nations and Métis communities;
- Articulation of a set of working principles that Cameco has designed in collaboration with Saskatchewan northerners to help guide Cameco's Public Participation programs;
- A listing of the various engagement "tools" that Cameco intends to utilize in its Public Participation program for the Project;
- Discussion on the manner in which the Public Participation program set out in this chapter is designed to ensure optimal support in the discharge of any applicable Crown consultation and accommodation obligations in the Aboriginal context that may arise in relation to the Project;
- A statement as to public engagement relating to the Project that has taken place to date; and
- Some comments regarding future public engagement planned for the Project.

5.2 Potential Interested Parties

Rabbit Lake is the longest-operating uranium production facility in Saskatchewan, having begun operations in 1975. Cameco and its predecessors have been engaging First Nations, Métis, Municipalities and other interested parties in northern Saskatchewan for many years and, consequently, possess considerable information about applicable interested parties. That said Cameco continues to disseminate site-specific information broadly throughout Saskatchewan and to engage northerners generally so as to ensure that any and all interested parties are identified.

Notably, when Cameco identifies a First Nation, Métis entity, or Municipality as an interested party for a specific project, it aims to involve certain community interest groups in applicable engagement efforts, in addition to the political leaders of the community or group. Such community interest groups typically include:

- Elders;
- Youth;
- Educators;
- Traditional land users;
- Cameco employees who are members of such communities or groups;
- Business leaders/economic development representatives; and
- Other interested community members.

5.2.1 First Nations and Métis

Cameco recognizes that Treaty First Nations and Métis Locals in northern Saskatchewan possess certain Treaty and/or Aboriginal rights, most notably relating to trapping, hunting, fishing and gathering, and that members of these First Nations and Métis entities often exercise such rights in various unoccupied areas of the province. Such First Nations and Métis entities may become an interested party in relation to an EA for a proposed Cameco project as a consequence of there being some potential of that proposed project to adversely impact such Treaty and/or Aboriginal rights. In such instances, applicable Crown consultation obligations trigger. In addition, a First Nation or Métis Local may have another legitimate interest in relation to an EA for a proposed Cameco project, thus compelling some level of engagement by Cameco, even in the absence of the triggering of applicable Crown consultation obligations.

In determining which First Nations and Métis Locals ought to be engaged on applicable projects at the Rabbit Lake Operation generally, Cameco continually endeavors to assess whether or not and to what degree, applicable northern First Nations and Métis Locals could conceivably be adversely impacted by projects and activities pertaining to the Rabbit Lake Operation in relation to any impact of the following categories (as a minimum):

- Trapping, hunting and fishing activities;
- Food/medicine gathering activities;

- Sacred cultural sites;
- Any applicable watershed;
- Any applicable airshed;
- Commercial fishing activities;
- Commercial trapping activities; and
- Outfitting, tourism, or lodge-related interests.

5.2.1.1 First Nations

Historically and based on known information at the time of writing, the following First Nations are the ones that Cameco has and continues to focus on primarily in relation to its public participation programming for the Rabbit Lake Operation:

- Black Lake Denesuline First Nation;
- Fond du Lac Denesuline First Nation; and
- Hatchet Lake Denesuline First Nation.

In addition to these three Athabasca Basin-based First Nations, there are others who over the years have both expressed some interest in and who have received project-specific information regarding the Rabbit Lake site from Cameco. Such First Nations, including but not restricted to English River Denesuline First Nation, Lac La Ronge Cree Indian Band, First Nation Community of Southend (which community is a semi-autonomous sub-community of the Peter Ballantyne Cree Nation), are ones that Cameco has and continues to focus on to a meaningful though somewhat lesser extent than the three Athabasca Basin-based Denesuline First Nations listed above in relation to its Public Participation programming for the Rabbit Lake Operation.

5.2.1.2 Métis

To ensure applicable Métis rights and interests are identified in relation to Cameco projects and activities, Cameco has tended to engage and will continue to engage, applicable Métis Regions in addition to Métis Locals, each generally organized under the governance structure of the Métis Nation of Saskatchewan (MNS). In 2010, Cameco entered into a Memorandum of Understanding (MOU) with four Saskatchewan Métis Regions:

- MNS Northern Region I;
- MNS Northern Region II;
- MNS Northern Region III; and
- MNS Eastern Region I.

This MOU was established with a goal of continuing to work collaboratively with Métis leaders and Métis peoples generally in northern Saskatchewan and to ensure, among other things, that Métis are engaged at appropriate levels and to appropriate extents.

Historically and based on known information at the time of writing, the following Métis Locals are the ones that Cameco has attempted to focus on and will continue to focus on in relation to its public participation programming for the Rabbit Lake Operation (to varying degrees and through differing mechanisms, noting that the structure, organization and governance of Métis peoples in Saskatchewan continues to evolve):

- MNS Local Number 82 (Patuanak);
- MNS Local Number 80 (Stony Rapids); and
- MNS Local Number 50 (Uranium City).

5.2.2 Municipalities

Municipalities in northern Saskatchewan may, for any variety of reasons, have an interest in a proposed Cameco project, thus compelling some level of engagement by Cameco.

Historically and based on known information at the time of writing, the following municipalities are the ones that Cameco has and continues to focus on primarily in relation to its Public Participation programming for the Rabbit Lake Operation:

- Northern Settlement of Camsell Portage;
- Northern Hamlet of Stony Rapids;
- Northern Settlement of Uranium City; and
- Northern Settlement of Wollaston Lake.

In addition to these four municipalities, there are others who over the years have both expressed some interest in and who have received project-specific information regarding the Rabbit Lake operating site. Such Municipalities, including but not restricted to Northern Village of Air Ronge, Northern Village of Brabant Lake, Town of La Ronge and Northern Village of Southend, are ones that Cameco has and continues to focus on to a meaningful though somewhat lesser extent than the four Athabasca Basin-based Municipalities listed above in relation to its public participation programming for the Rabbit Lake Operation.

5.2.3 Other

In addition to applicable First Nations, Métis and Municipalities identified above, there are additional potentially interested parties with whom Cameco has engaged over the years and with whom they will continue to engage in relation to the Rabbit Lake Operation (to varying degrees and in various forums) including in specific regards to the Project. Such additional interested parties typically include:

- Northern Saskatchewan Environmental Quality Committee (NSEQC);
- Local Northern Businesses;
- Political Organizations, including:
  - Prince Albert Grand Council (PAGC);
  - MNS; and
  - AWG.

- Non-Governmental Organizations (NGOs);
- Community Vitality Monitoring Partnership (CVMP);
- Northern Labour Market Committee (NLMC); and
- Northern Career Quest (NCQ).

5.3 Engagement Principles as Developed with Northerners

With respect to operations in northern Saskatchewan, Cameco and northern leaders have collaborated through a roundtable process to develop a series of working principles to help guide Cameco's Public Participation processes. Indicative of the applicable demographics in northern Saskatchewan, these principles are infused with First Nations and Métis perspectives. Set out below are the *Draft Principles of Effective Engagement with Northerners* that will substantially inform Cameco's Public Participation program for the Project:

1. Open Channels for Communication

Cameco should engage with all northerners through various groups including political leadership, youth and Elders and at all stages of activities from exploration to decommissioning – with the goal of building understanding and acting upon concerns.

2. Make it Simple

Cameco should provide information simply and clearly in plain language avoiding technical language so lay people can understand the issues involved and provide meaningful comment.

3. Build Capacity for Understanding

Cameco needs to find ways to assist in further building capacity of northern people to understand technical issues related to uranium mining operations and are able to share information with community members about these activities.

4. Hear the Elders

Cameco recognizes the special stature of Elders in First Nation and Métis culture and should consult with Elders while building their understanding of the uranium mining industry.

5. Include Youth

Youth represent the future for northern Saskatchewan. Cameco should support youth and enhance their understanding of the uranium mining industry, along with the opportunities and impacts involved.

6. Speak and Hear Our Languages

In order to meaningfully engage northern people, Cameco should be able to both provide information and receive comments in traditional aboriginal languages.

5.4 Engagement Methods

Cameco engages interested parties (or potentially interested parties) through a variety of specific engagement methods. Set out below is a listing of the engagement methods and means that Cameco intends to utilize in its Public Participation program for the Project:

- Project fact sheets;
- Project frequently asked questions (FAQ) documents;
- General Project information dissemination through radio, magazine, newsletter, website and newspaper communications, including but not restricted to:
  - Cameco Northern Newsletter;
  - Opportunity North;
  - Cameco's Main Website;
  - Cameco's Northern Saskatchewan Website (pending); and
  - Scrolls/Radio.
- Project-specific meetings in northern communities;
- AWG meetings;
- Environmental Quality Committee (EQC) meetings/sub-committee meetings;
- Cameco Northern Leaders Roundtable;
- Cameco Northern Tour; and
- Cameco satellite offices that provide support and increased accessibility generally for northerners and that are based in applicable northern communities including:
  - Black Lake;
  - Fond du Lac;
  - Hatchet Lake/Wollaston Lake;
  - La Ronge;
  - Patuanak; and
  - Pinehouse.

5.5 Crown Obligations in Aboriginal Context and Cameco Support Thereof

5.5.1 Crown Duty to Consult

When the Crown is considering authorizing a Cameco project or activity that has the potential to adversely impact the exercise of Aboriginal or Treaty rights, a constitutional obligation to consult the applicable rights holders will trigger and, depending on what is learned in the requisite consultation process (i.e. it could become clear that adverse impact to rights is likely to eventuate upon the granting of the applicable Crown authorization), an obligation to accommodate may also trigger.

Crown consultation and accommodation obligations in the Aboriginal context, wherever they arise, are separate and distinct from other "public consultation" requirements mandated as part of applicable EAs. That said, such constitutional consultation and/or accommodation obligations may be discharged concurrently and as part of the over-arching engagement process carried out for applicable EAs.

The goal of any constitutional Crown consultation process in the Aboriginal context is a reasonable determination of whether or not and to what degree, a proposed project may adversely impact the exercise of any applicable Aboriginal or Treaty rights and, if it may, the development of a reasonable accommodation strategy that seeks to avoid, minimize or mitigate any such impact.

5.5.1.1 Role of Project Proponent

Procedural aspects of Crown consultation and/or accommodation obligations may be discharged by project proponents. For this reason, Cameco is always mindful of the potential for its proposed projects and activities in northern Saskatchewan to adversely impact the exercise of Aboriginal and/or Treaty rights. Further, Cameco is mindful of the fact that whenever it is discussing a proposed project with a First Nations or Métis community or addressing feedback and/or relevant concerns raised by such communities regarding that project, it may be contributing in so doing to an *aggregate* discharge of applicable Crown consultation and/or accommodation obligations. Moreover, Cameco's engagement programming is generally designed to ensure that, among other things, aspects of it may be relied upon by the Crown as partial discharge of any Crown consultation and/or accommodation obligations that could conceivably trigger in relation to applicable projects

5.5.1.2 Potential for Novel Adverse Impact to Rights

When it comes to proposed projects in relation to an existing operation like the Rabbit Lake Operation, Crown consultation and/or accommodation obligations will only trigger if it can be demonstrably established that such projects, by themselves, have the potential to cause novel (i.e. new) adverse impact to the exercise of Treaty or Aboriginal rights. That is, historical or speculative impacts (real or perceived) do not suffice to trigger any applicable Crown consultation or accommodation obligations in this context. Cameco will assist the Crown by assessing throughout this entire EA process whether or not there is any potential for the Project to adversely impact the exercise of Treaty or Aboriginal rights.

In its "First Nation and Métis Consultation Policy Framework" (June 2010), the Saskatchewan government mandates the consideration of three substantive tests to gauge the potential for any proposed project to adversely impact Treaty and/or Aboriginal rights: (1) whether or not the proposed project may result in an applicable land disturbance (short-term or long-term); (2) whether or not the proposed project may result in a change in applicable resource availability (i.e. the exercise of certain Treaty or Aboriginal rights will be adversely impacted if resources such as animals, fish, herbs or berries are impacted or diminished in number); and (3) whether or not the proposed project requires a new uptake in land (i.e. land that may be previously have been unoccupied). If adverse impact to rights is anticipated in accordance with any of these three metrics, then the next step is to assess the magnitude or extent of any such impact.

Cameco will utilize these tests throughout the duration of the EA and formally in the documentation thereof for the Project, to help assist the Crown in determining whether or

not there is any potential for the Project to adversely impact the exercise of Treaty or Aboriginal rights.

5.6 Engagement to Date

Cameco engages with northern communities on an on-going basis through efforts such as quarterly Northern Saskatchewan EQC meetings, annual site meetings with EQC sub-committees, AWG quarterly meetings, the annual Northern Tour, as well as numerous community visits made throughout the year by northern affairs representatives.

To date, there have been a number of meetings that have involved dialogue between Cameco and potentially-interested parties on the general topic of tailings and tailings management at Cameco operating sites in northern Saskatchewan, including the Rabbit Lake Operation. The following list of specific meetings, for example, focussed principally on this topic:

- NSEQC meeting in Key Lake (May 27, 2008);
- AWG Meeting in Fond du Lac (October 2, 2008);
- Rabbit Lake Site Town Hall Meetings (October 14 and 21, 2008);
- Site Elders Meeting (November 5, 2008);
- Rabbit Lake Tailings Management Meeting and site tour (November 20, 2008);
- General all NSEQC Meeting La Ronge (December 9, 2008); and
- Northern Focus Group 2 at the Rabbit Lake Operation (December 11, 2008).

5.7 Path Forward

Guided by ongoing input received from interested parties (and potentially interested parties) during the above noted engagement activities, Cameco will continually refine and implement its Public Participation program for the Project throughout the duration of the EA.

SECTION 6

CONCLUSIONS

6.0 CONCLUSIONS

The purpose of the proposed North Pit Expansion is to increase tailings capacity at the Rabbit Lake Operation. The Rabbit Lake Operation presently deposits tailings within the existing RLTMF (the RLITMF and the Pit Crest Expansion) and is seeking to expand the capacity of that facility from the current 9 Mm^3 to 12 Mm^3 by adding the proposed expansion. In order to fully achieve Cameco's vision for the future of the operation, Cameco is seeking to secure approval to increase the capacity of the existing RLTMF and ensure the continued life of the operation. In doing so, the Project will:

- Support the continued operation of Rabbit Lake Operation;
- Occur within the surface lease of the existing Rabbit Lake Operation;
- Add additional capacity with reliable and established tailings management methods;
- Extend as well as provide new employment opportunities to residents of Saskatchewan North (RSNs) and northern contractors;
- Maintain operational flexibility;
- Be incorporated into the CNSC Uranium Mine Operating Licence and the provincial operating permit;
- Not result in an increase in Uranium production capacity of more than 35%, and
- Use existing processes for milling of uranium and tailings management that are authorized under the current licence.

Project details have been provided in this document, including:

- The Project location;
- Intended scope of the Project;
- Anticipated federal and provincial regulatory triggers;
- Description of the existing facility;
- Conceptual design and anticipated changes to the existing facility;
- Project phases and high level scheduling;
- Existing environment and baseline information;
- Potential project-environment interactions;
- Mitigation measures to reduce potential effects;
- Qualitative assessment of potential residual effects; and
- Stakeholder engagement activities.

The environment around the Rabbit Lake Operation has been studied extensively since it began operating in the 1970s. Detailed baseline studies, special investigations, state of the environment reporting and EAs have been completed for the current operation. A conservative screening-level assessment has been completed for this Project, the results of which indicate that (for the most part) the Project will contribute only a relatively minor increase in the level of effects from the existing operation.

The exception is a potential moderate increase in effects in Horseshoe Creek as a result of additional water associated with operating and decommissioning phases of the proposed North Pit Expansion and additional loads of constituents of potential concern to the Link Lakes watershed in the post-decommissioning phase. However, these incremental effects must be considered in combination with total effects from the historic and present day Rabbit Lake Operation. Cameco believes that detailed risk assessment being conducted during the EA of this Project will lead to a conclusion of no significant adverse effects; a full accounting of risk assessment results and conclusions will be detailed in the environmental impact statement.

To date, there have not been any engagement activities that pertain specifically to the Project itself. However, several events have involved dialogue between Cameco and potentially-interested parties on the general topic of tailings and tailings management at Cameco operating sites in northern Saskatchewan, including the Rabbit Lake Operation. Cameco believes that questions and concerns identified during these meetings can be addressed during the assessment process. Furthermore, Cameco welcomes the opportunity of engaging the public to consider the expansion of the existing RLTMF at the Rabbit Lake Operation.

SECTION 7

REFERENCES

7.0 REFERENCES

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