Sisson PROJECT

SISSON PROJECT

Environmental Impact Assessment Report

July 2013

Summary

Volume 1

Volume 2

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FOREWORD

This Plain Language Summary ("the Summary") provides a short, non-technical summary of the Sisson Project, and summarizes the major findings and conclusions of the environmental impact assessment (EIA) of the Project, and how the environmental effects of the Project will be managed from construction through to post-closure. This document is intended to support regulatory review, Aboriginal engagement, and public consultation and is available in English and French. Readers are encouraged to review the full Environmental Impact Assessment Report for additional details on the assessment.

The English version of this Summary and of the Environmental Impact Assessment Report constitutes the official version. If any conflict exists between the English and French versions, the English version shall prevail.

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1.0 INTRODUCTION

This document is a Plain Language Summary ("the Summary") of the Environmental Impact Assessment Report ("EIA Report") for the Sisson Project proposed by Northcliff Resources Ltd. in central New Brunswick.

1.1 PROJECT OVERVIEW

Northcliff Resources Ltd. ("Northcliff") plans to build and operate an open pit tungsten and molybdenum mine and ore processing facility, known as the Sisson Project (herein referred to as "the Project"). The location of the Project is shown in Figure 1.

The Project site is located in a rural and relatively undeveloped area on provincial Crown land. The general area has a long history of natural resource development and use, particularly forest harvesting, which has been central to the New Brunswick economy for over a century. Mining will be a new development in the area, but it is well known elsewhere in the province. While the area is important for resource-based economic activities, Northcliff recognizes that it is also important for hunting, fishing, and outdoor recreation undertaken by the people of New Brunswick. The nearest permanent residence is in Napadogan about 10 km to the northeast of the Project site. The land and resources in the Project area are reported to be currently used for traditional purposes by Maliseet First Nations people.

Northcliff is committed to working with governments, the public, stakeholders, and First Nations to develop the Sisson Project responsibly and to contribute to the sustainable development of the neighbouring communities and the Province of New Brunswick. These commitments are embodied in Northcliff's "Principles of Responsible Mineral Development" (Figure 2).

The Sisson Project involves the construction, operation, and eventual closure and reclamation of a tungsten and molybdenum mine. Ore that contains tungsten and molybdenum will be extracted from the ground using open pit mining methods, and will be processed on-site to produce tungsten and molybdenum concentrates. The tungsten concentrate will be further refined on-site to produce a higher-value tungsten product called ammonium paratungstate, or APT. Products will be packaged and transported to North American and other markets. Mining waste will be stored in a tailings storage facility. A new electrical transmission

The Sisson Project at a Glance

- Open pit tungsten and molybdenum mine.
- Process 30,000 tonnes of ore per day.
- 2 year construction period.
- 27 year operating lifetime.
- Project elements:
  - open pit mine;
  - ore processing plant;
  - tailings storage facility;
  - water and waste management systems;
  - new transmission line;
  - new site access road and internal site roads; and
  - relocated transmission line and forest resource road (Fire Road).
- Up to 500 direct jobs at the peak of construction activity.
- About 300 direct full-time jobs during operation of the Project.

line is required to supply electrical power to the mine site, and an existing transmission line and forest resource road will be relocated around the site.

The Sisson ore deposit was first discovered in the late 1950s, and it has been studied extensively by various exploration and development companies since that time. The Sisson deposit contains a large tungsten-molybdenum ore body that can be extracted through conventional open pit mining. The open pit location is based on the location of the ore body. The design and location of the Project facilities have been carefully planned to minimize potential environmental effects while ensuring the Project is technically and economically feasible.

Following an approximate two-year construction period, the Project will operate for an estimated 27 years. At the end of mining operations, the Project will be decommissioned and the site restored to sustainable land uses. The Project will generate employment and positive economic activity in the area during its lifespan. Up to 500 direct jobs will be created during Project construction, and there will be about 300 direct full-time jobs over its operating lifespan. Along with wages and direct spending associated with the Project, it will also generate profit for Northcliff and tax revenues for the Province of New Brunswick and the Government of Canada and create substantial business opportunities for local supply firms.

1.2 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The Sisson Project is subject to a variety of federal and provincial environmental regulatory requirements including environmental impact assessment requirements. The submission of the Environmental Impact Assessment Report (EIA Report) is an important step in the overall process. The EIA Report has been prepared to meet the requirements of the *Canadian Environmental Assessment Act* and the New Brunswick *Environmental Impact Assessment Regulation*.

1.2.1 Federal Environmental Assessment Process

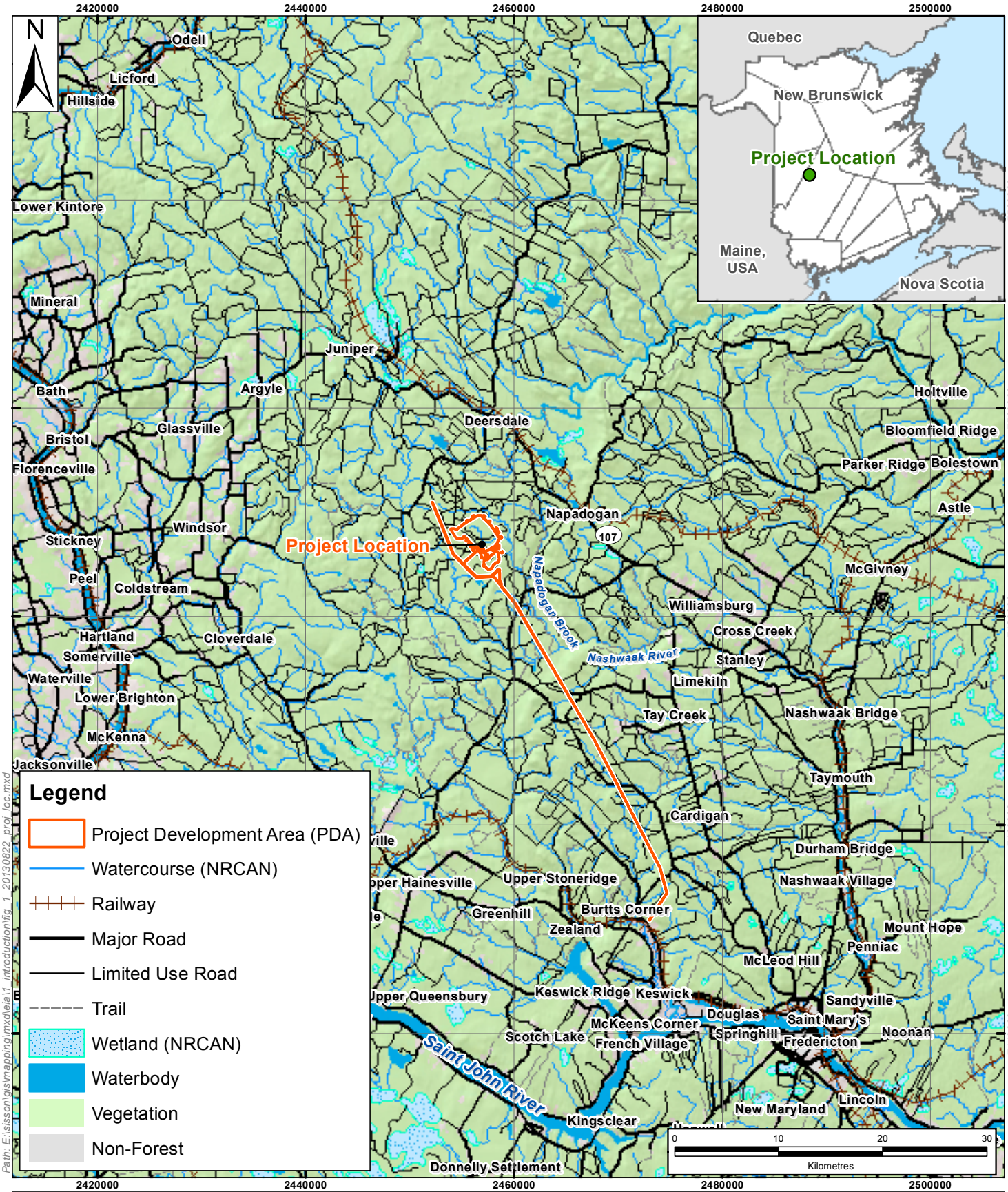
Federal authorizations will be required from Fisheries and Oceans Canada (DFO) and from Natural Resources Canada (NRCan) for the Project to be carried out. These authorizations trigger the requirement for a federal environmental assessment (EA) of the Project under the *Canadian Environmental Assessment Act* (*CEAA*). Because of the anticipated production rate of the mine, the federal EA will be completed as a comprehensive study.

The Sisson Project requires a **federal environmental assessment (EA)** under the *Canadian Environmental Assessment Act* (*CEAA*) as well as a **provincial environmental impact assessment (EIA)** under the New Brunswick *Environmental Impact Assessment Regulation – Clean Environment Act.*

The federal EA is a **comprehensive study** under *CEAA*, and the provincial EIA is a **comprehensive review**.

The provincial EIA commenced in September 2008, and the federal EA in April 2011. The federal and provincial governments have cooperated in conducting a **"harmonized" EIA** of the Project under their respective processes.

The EA of the Sisson Project started under *CEAA* in April 2011. Although that act was repealed and replaced by a new act in July 2012, the environmental assessment of the Sisson Project continues under *CEAA*.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Project Location

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:500,000	121810356	SNB NRCAN, ESRI	1

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Map: NAD83 CSRS NB Double Stereographic

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Responsible Mineral Development

Northcliff Resources Ltd. is committed to working shoulder to shoulder with stakeholders to achieve the responsible development of our projects and to contribute to the sustainable development of the communities in which we work.

All activities are guided by the following principles:

Health and Safety	We operate in a responsible manner so that our activities protect the health and safety of our employees and contractors, and of the communities in which we work.
Stakeholder Engagement	We engage with governments, communities, indigenous peoples, organizations, groups and individuals on the basis of respect, fairness, transparency, and meaningful consultation and participation.
Community Development	We establish productive local partnerships to contribute to achieving development goals identified by communities in which we work, to address local priorities and concerns, and to have communities derive substantive benefits from our activities.
Environment and Society	We apply environmental and social best management practices in the planning, design and implementation of our activities, from exploration through to closure of our mining operations. We meet or exceed regulatory requirements in the jurisdictions in which we work.
Resource Use	We use land, water and energy resources responsibly; strive to maintain the integrity and diversity of ecological systems; and apply integrated approaches to land use.
Human Rights	We respect human rights principles, as well as local cultures, customs and values, in our dealings with employees, communities and other stakeholders.
Labour Conditions	We provide fair treatment, non-discrimination and equal opportunity for our employees, and comply with labour and employment laws in the jurisdictions in which we work. We strive for excellence in relations between management and employees.

Northcliff Resources Ltd. integrates these *Principles of Responsible Mineral Development* within corporate management and decision-making, and we work to continually improve our performance. From project acquisitions and exploration through to mine closure, we will assess the financial, social and environmental benefits and risks of our business decisions. Our goal is international best practice in all our operations, in Canada and around the world.

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Figure 2 Northcliff's Principles of Responsible Mineral Development

1.2.2 Provincial Environmental Impact Assessment Process

As required by the New Brunswick *Environmental Impact Assessment Regulation* under the *Clean Environment Act*, the Sisson Project was registered with the New Brunswick Department of Environment and Local Government on September 5, 2008. The Minister determined on October 24, 2008 that a Comprehensive Review of the Project is required. Final Guidelines for the Environmental Impact Assessment (EIA) of the Sisson Project were issued on March 1, 2009, after public review.

1.2.3 Cooperative Environmental Impact Assessment Process

The Governments of Canada and New Brunswick implemented a "harmonized" environmental assessment process for the Sisson Project. Under this approach, both levels of government have agreed to cooperate in carrying out the EIA. Terms of Reference were issued jointly in April 2012 to define the scope of the EIA. A single Environmental Impact Assessment Report has been prepared by Northcliff to meet the requirements of the Terms of Reference and to fulfill the respective federal and provincial requirements, including the New Brunswick Final Guidelines.

After its submission to the provincial government, the EIA Report undergoes an intensive government review, including by federal agencies, during which review comments and questions are responded to by Northcliff and eventually leading to the report being finalized. The final EIA Report is then subject to a formal public and First Nations review, including public meeting(s), before a provincial approval decision is made.

Under the federal process, the Canadian Environmental Assessment Agency makes the EIA Report public, solicits public, First Nations and federal agency review comments and information requests, and prepares its Comprehensive Study Report (CSR). The CSR is also subject to public and First Nations review before a federal approval decision on the Project.

2.0 PURPOSE AND NEED FOR THE SISSON PROJECT

Tungsten and molybdenum are in demand worldwide for a variety of products and uses, and those demands are expected to increase in the future. The Sisson Project will be an important source of tungsten and molybdenum, and it will help to alleviate supply shortages of both metals caused by export restrictions by China. Supplies from the Project will be available to meet market demands in North America and elsewhere.

Given this, the purpose of the Project is to mine tungsten and molybdenum-containing ore from the Sisson deposit, process it to meet market demand for the mineral products, generate tax revenue for New Brunswick and Canada, and create return on investment for the shareholders of Northcliff.

In addition to helping to meet worldwide market demand for tungsten and molybdenum, the Project will generate profit for Northcliff and tax revenues for the Province of New Brunswick and the Government of Canada. The Project will also generate employment and positive economic activity in the area during its lifespan. Up to 500 direct jobs will be created during the peak of construction and about 300 direct full-time jobs over its operating lifespan. The Project will attract businesses and development to the region, adding to the economic benefits, local development, and standard of living. New Brunswick generally has been hard hit by relatively high unemployment and limited economic growth in recent years, and central New Brunswick has been greatly affected by mill closures and reduced economic activity in the region. The Project will bring much-needed employment to the central New Brunswick communities that surround it, and it will contribute considerably to the overall well-being of the region.

Tungsten is a steel-grey metal that is used to increase hardness in tool making and construction steel. Tungsten components are used in lighting technology, electronics industries, transportation, chemical industries, glass-melting, medical technology, power engineering, and jewelry making.

Molybdenum is used in the manufacture of stainless steel and steel. It is also an important material for the chemical and lubricant industries. Molybdenum is used in automotive parts, construction equipment, gas transmission pipes, and turbine parts.

The Sisson Project will help **fulfill worldwide market demands** for tungsten and molybdenum for a variety of applications.

3.0 DESCRIPTION OF THE SISSON PROJECT

3.1 PROJECT LOCATION

The Sisson Project site is located on provincial Crown land in central New Brunswick, approximately 60 kilometres directly northwest of the city of Fredericton, and approximately 10 kilometres southwest of the community of Napadogan (Figure 1).

3.2 MAJOR PROJECT COMPONENTS AND ACTIVITIES

The Sisson Project is a conventional open pit mine. Figure 3 shows the location of the major components of the Project (which are briefly described below) and the Project Development Area (PDA, with an area of 1,253 hectares, which is the physical footprint of all Project components).

3.2.1 Construction

In addition to the physical construction of project facilities (*e.g*. transmission line and access road, ore processing plant, access road, ancillary buildings), Construction will involve the developments needed for the start-up of ore processing operations: TSF starter dams to collect water, and stripping of the initial open pit area and mining and stockpiling of ore, as needed to begin ore processing.

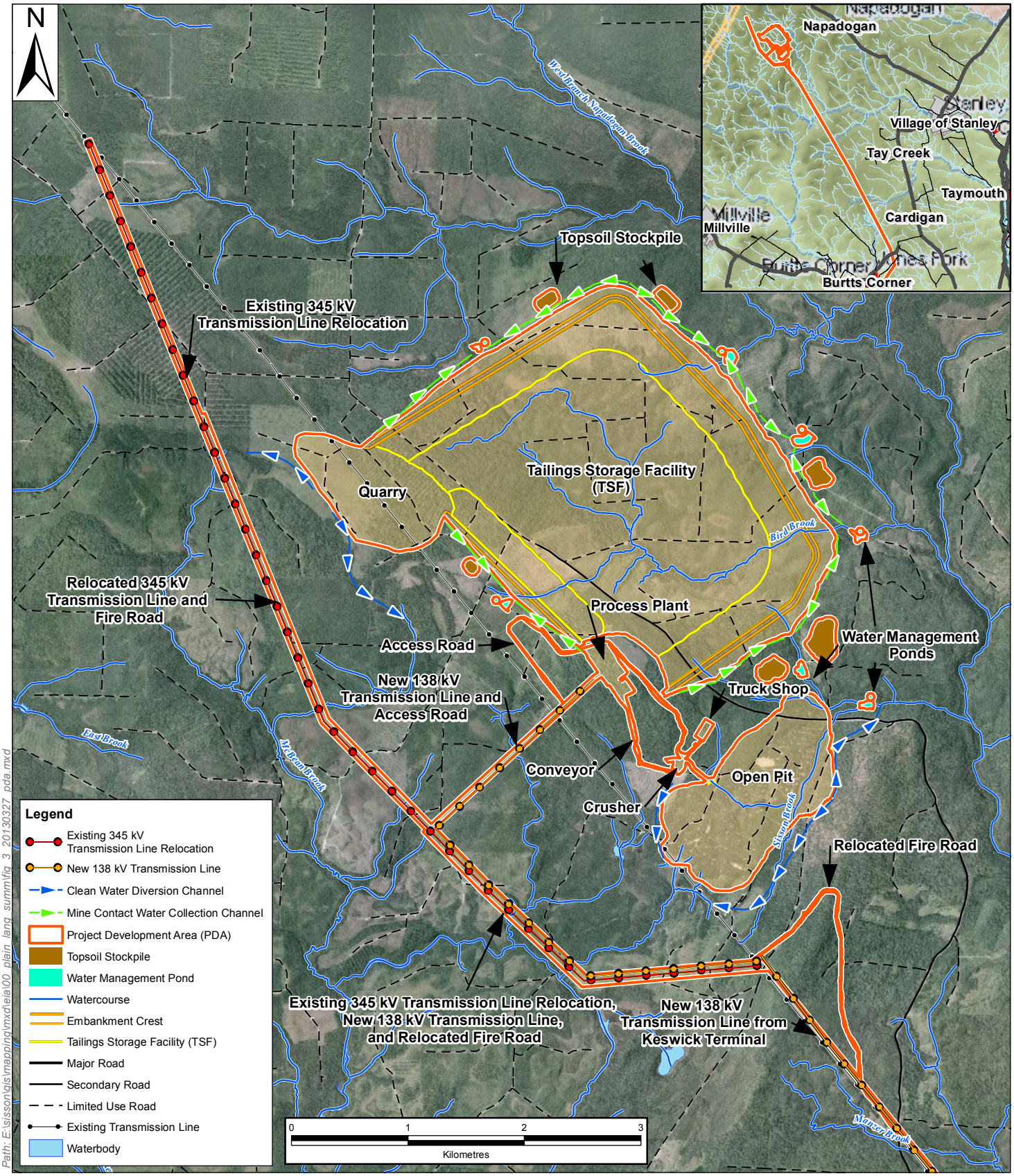
3.2.2 Operation

Open Pit Mine: An open pit mine is an excavation in the ground surface for the purpose of extracting ore. Mining will be carried out by conventional drill, blast and haul methods. The open pit will cover an area of about 145 hectares at its ultimate extent, and will be 300 to 370 metres deep upon completion of mining operations. Waste rock from mining that does not contain economically recoverable amounts of minerals will be stored in the tailings storage facility except during the last stage of mining when it will be stored in mined-out portions of the open pit.

Primary Crusher and Conveyors: The extracted ore will be delivered by truck to a primary crusher at the pit rim. Conveyors will move the crushed rock from the primary crusher to the coarse ore stockpile and from the stockpile to the ore processing plant.

Ore Processing Plant: The ore will be processed through an on-site concentrator that will produce molybdenum and tungsten concentrates. The concentrator will use conventional crushing, grinding and flotation technologies. The molybdenum concentrate will be shipped off-site to markets, while the tungsten concentrate will be further refined on-site to a value-added crystalline product called ammonium paratungstate (APT) before shipment. The refining will use proven metallurgical and chemical processes in a series of continuous and batch operations.

Stockpiles: Topsoil and overburden stripped from facility sites will be stockpiled for future use during reclamation.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Project Development Area (PDA)

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:45,000	121810356	SNB NRCAN, ESRI	3

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
29/07/2013	JAB	DLM

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Map: NAD83 CSRS NB Double Stereographic

Tailings Storage Facility: Tailings are a mixture of ground up host rock and water that result from ore processing. Tailings and waste rock will be stored in the tailings storage facility (TSF) to the northwest of the open pit and immediately north of the plant site. Waste rock and all potentially acid generating tailings will be stored underwater to effectively mitigate the potential for acid generation. The TSF embankments will be constructed of rock quarried on-site. The TSF will ultimately cover an area of approximately 751 hectares.

Water Management Facilities: All water collected on the Project site, including from open pit dewatering, will be stored in the tailings storage facility, and will be used, with recycling, in the ore processing plant. TSF water management systems will collect and recycle run-off from, and seepage through, the TSF embankments. Water from the TSF pond will be clarified before reuse in the ore concentrator process, and the clarifier sludge will be stored in the TSF. Starting in about Year 8 of Project operation, clarified water that is surplus to Project needs will be further treated to meet discharge permit requirements before being released to the environment. The small amount of fresh water requirement will be met from on-site wells.

Access Roads: Existing forest resource roads will provide access to the Project property from the New Brunswick highway system. The two principal access routes to the Project site are shown in Figure 4. The existing Fire Road will need to be relocated around the Project site as shown in Figure 5.

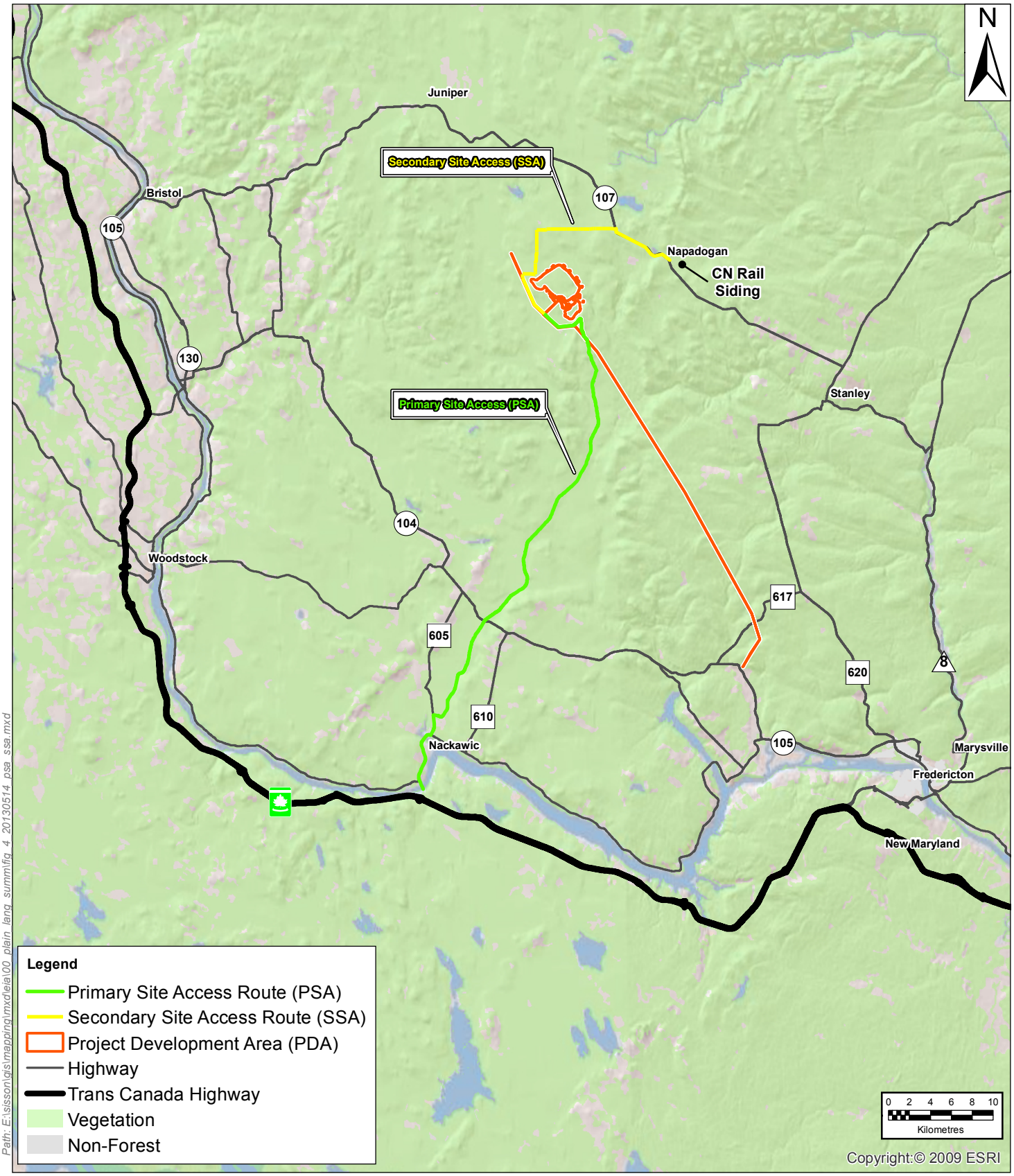
On-Site Buildings: On-site buildings will include the process buildings, an administration building, a laboratory building, truck shop and warehouse, fuel storage, site mixed explosives plant, and explosives and detonator magazines.

Power Supply: A new 42 kilometre-long 138 kilovolt transmission line from the NB Power Keswick terminal will supply power to the Project substation. The transmission line route is shown in Figure 6.

Waste Management: Sewage from the process plant area, administration building, and laboratory will be treated by an on-site leach-bed system. Wastes that cannot be safely stored in the TSF will be trucked to approved and regulated disposal sites.

3.2.3 Decommissioning, Reclamation and Closure

At the completion of mining and processing activities, Project facilities not needed for ongoing care and maintenance activities will be removed, and disturbed surface areas will be stabilized and reclaimed. Surplus water from the TSF will be directed to the open pit via an engineered channel; it is estimated that the pit will fill in about 12 years. The pit lake will then be maintained at an elevation that ensures groundwater only flows into it by pumping the water to a treatment plant before discharge. When the pit lake water quality is acceptable for direct discharge, pumping and treatment will stop and the lake level will be allowed to rise so the lake discharges to Sisson Brook.



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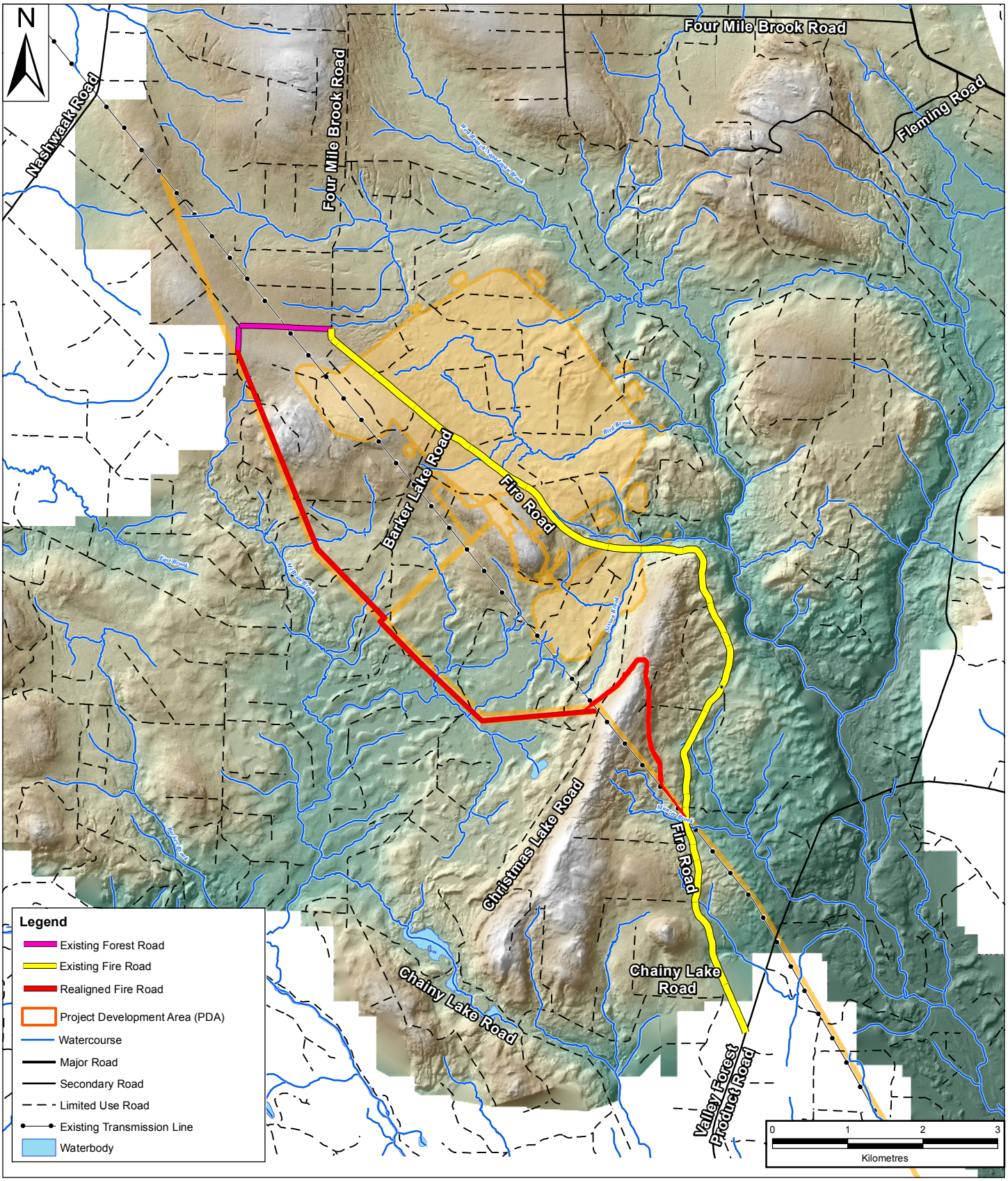
Primary Site Access (PSA) Route and Secondary Site Access (SSA) Route Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B. Client: Northcliff Resources Ltd.	Scale: 1:500,000	Project No.: 121810356	Data Sources: NBDNR ArcGIS Online	Fig. No.: 4	Stantec
	Date: (dd/mm/yyyy) 29/07/2013	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Location of Realigned Fire Road

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:70,000	121810356	NBDNR Leading Edge Geomatics Ltd.	5

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
29/07/2013	JAB	DLM

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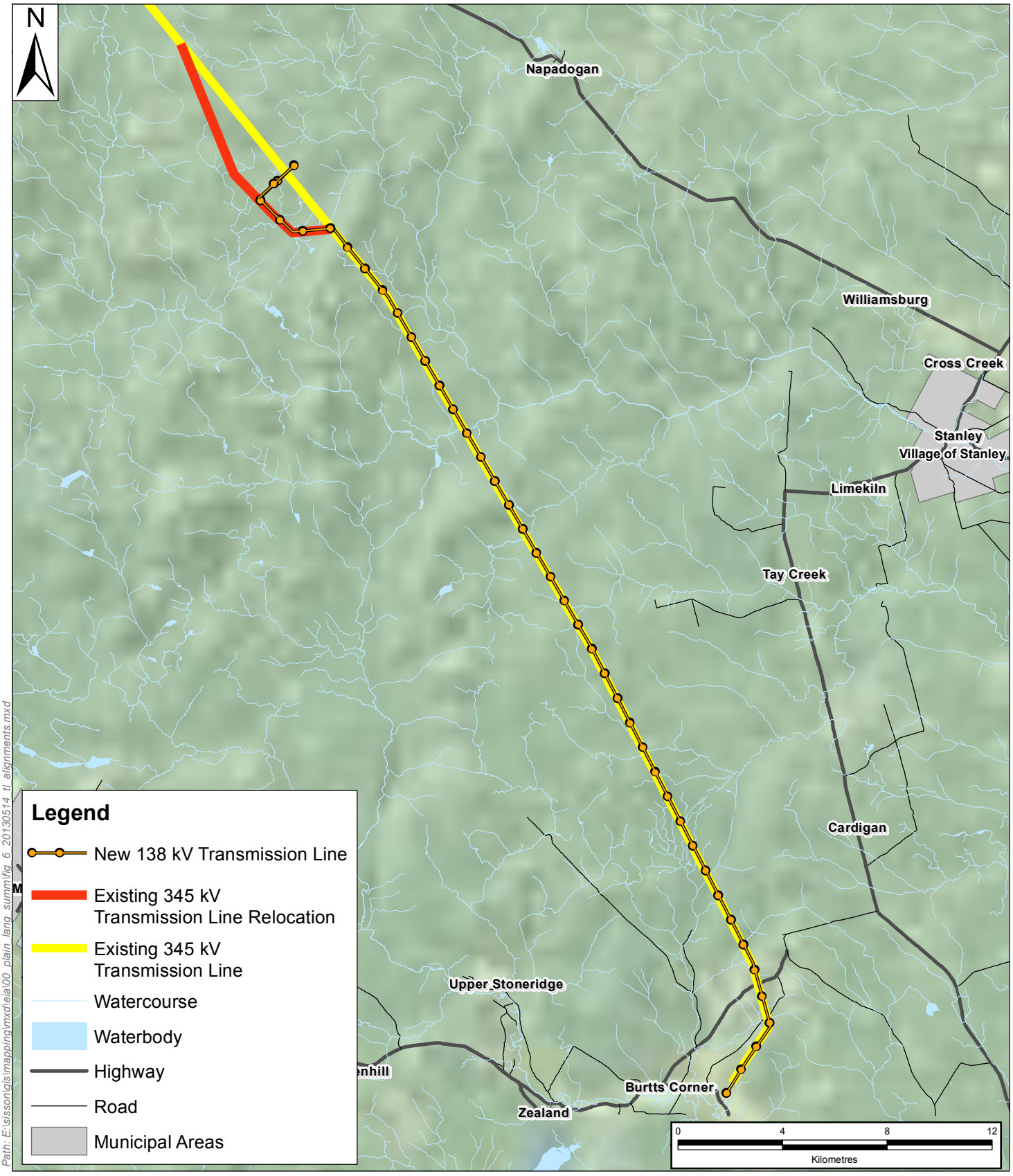
Map: NAD83 CSRS NB Double Stereographic



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Alignments for the New 138 kV Transmission Line and Relocated 345 kV Transmission Line Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.	Scale: 1:200,000	Project No.: 121810356	Data Sources: NBDNR NRCAN, ESRI	Fig. No.: 6	Stantec
Client: Northcliff Resources Ltd.	Date: (dd/mm/yyyy) 29/07/2013	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic

3.3 PROJECT ACTIVITIES

Table 1 provides a list of the key Project activities associated with construction, operation, and decommissioning, reclamation and closure of the Sisson Project.

Table 1 Description of Project Phases, Activities, and Physical Works

Project Activities and Physical Works	Description of Project Activities and Physical Works
Construction Phase	
Site Preparation	Activities associated with preparing the site for physical construction, including: • surveying; • geotechnical investigations; • clearing; • grubbing; • removal and stockpiling of topsoil and overburden; and • grading/leveling.
Construction and Installation of Project Facilities	Construction of buildings and structures, and installation of equipment, including: • construction of surface facilities (for example, processing plants, electrical substation, primary crusher, ore conveyor, maintenance shop, explosives storage); • quarrying, aggregate crushing, and concrete batch plant; • development of starter pit and initial ore stockpile; • establishment of rock and soil stockpiles; • construction of drainage and diversion channels; • loss of Bird and Sisson brooks; • tailings storage facility preparation; • construction of tailings storage facility starter embankments, water management ponds, and ponding of startup water; • establishment of water management system; and • equipment installation.
Construction of Transmission Lines and Associated Infrastructure	Construction of electrical transmission-related facilities, including: • relocation of existing 345 kV transmission line; • construction of new 138 kV transmission line; and • construction of electrical substation.
Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads	Construction of roads, including: • relocation of Fire Road; • construction of site access road and internal site roads; and • construction of watercourse crossings.
Fish Habitat Compensation Initiatives	Activities associated with implementing the Fish Habitat Compensation program, including removal of Lower Lake Dam.
Operation Phase	
Mining	Activities associated with open pit mining, including: • open pit mine operation (operation of explosives magazine, blasting, extraction of ore and waste rock, transportation of ore to crusher, and transportation of waste rock to tailings storage facility); • ore crushing and conveyance to processing plant; and • rock quarrying, trucking and crushing as needed.

Table 1 Description of Project Phases, Activities, and Physical Works

Project Activities and Physical Works	Description of Project Activities and Physical Works
Ore Processing	Activities associated with the processing of ore in and production of products, including: • crushing/grinding; • flotation; • concentrate dewatering; • tungsten refining; and • packaging.
Mine Waste and Water Management	The supply of water for the process operation, and the management and storage of surplus water and byproducts from the process operation including: • dewatering of open pit; • tailings storage in tailings storage facility; • construction of tailings storage facility embankments over life of mine; • waste rock storage in tailings storage facility; • collection and management of site contact water; and • surplus water treatment, release, and monitoring.
Other Emissions and Wastes Management	Management of other emissions and wastes arising from Construction, Operation, Decommissioning, Reclamation and Closure activities, including: • air contaminant emissions; • sound emissions; • vibration; • surface run-off; and • non-mining solid waste disposal.
Operation and Maintenance of Linear Facilities	The physical presence and operation and maintenance of Project-related linear facilities, including the 138 kV transmission line, substation, and site access roads.
Transportation	Transportation of goods, materials, and personnel to and from the Project site during Construction, Operation, Decommissioning, Reclamation, and Closure activities, including: • transportation of equipment, supplies and materials; • transportation of products; and • transportation of personnel to and from the Project site using buses and personal vehicles.
Employment and Expenditure	Employment and expenditures associated with Construction, Operation, Decommissioning, Reclamation and Closure of the Project, including: • purchase of equipment, supplies, and materials; • employment and incomes; and • taxation and royalties.
Decommissioning, Reclamation and Closure Phase	
Decommissioning	Activities associated with the decommissioning of Project components and facilities at the end of mine life, including: • decommissioning and removal of equipment; and • removal of buildings and structures.
Reclamation	Activities associated with reclamation of the Project site at the end of mine life.
Closure	Activities associated with closure of the mine, including filling the open pit with water from the tailings storage facility and from precipitation.
Post-Closure	The existence of the former tailings storage facility and open pit, now filled with water, and the ongoing treatment and release of surplus water, as applicable.

3.4 PROJECT SCHEDULE

The start of Project construction depends on receiving EIA approvals by the provincial and federal governments; obtaining the required permits, approvals or other forms of specific authorizations; a decision by Northcliff's Board of Directors to proceed to construction; and Project financing. Construction is expected to begin in the fourth quarter of 2014, and to take up to 24 months.

Immediately following Construction, Operation will begin with the commissioning of the ore processing plant. Operation will continue for approximately 27 years. The Project will operate 24 hours per day, 7 days per week, for approximately 360 days per year. Operation is expected to begin in the second half of 2016.

Decommissioning of Project facilities, and reclamation and closure of the Project site, will start at the completion of mining and processing activities. It is expected that decommissioning and initial reclamation activities will take about one year, and that the open pit will fill in about 12 years.

4.0 SCOPE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

4.1 SCOPE OF THE PROJECT

For this EIA, as outlined in the Final Guidelines and Terms of Reference, the scope of the Project includes the Construction, Operation, and Decommissioning, Reclamation and Closure phases of the open pit mine, ore processing facility, tailings, ore and waste rock storage areas, and all associated infrastructure, as well as ongoing care and maintenance of the site Post-Closure.

4.2 FACTORS TO BE CONSIDERED

The EIA considers the potential environmental effects of the Project on components of the physical, biological, and socioeconomic environments that may be affected by the Project. The EIA considers the environmental effects that could occur during all phases of the Project, including from credible accidents, malfunctions and unplanned events that could occur. It also considers any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out. Finally, it assesses the significance of these potential environmental effects.

In carrying out the above, the EIA considers:

- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- alternative means of carrying out the Project that are technically and economically feasible, and the environmental effects of any such alternative means; and
- the need for, and the requirements of, any follow-up program in respect of the Project.

The **Final Guidelines** released by the New Brunswick Minister of Environment and Local Government in March 2009 outline the scope of the EIA to meet the requirements of the New Brunswick *Environmental Impact Assessment Regulation*.

The **Terms of Reference** outline the methods by which the requirements of the Final Guidelines will be met, and also detail the scope of the EIA to meet the requirements of the *Canadian Environmental Assessment Act*.

The EIA Report focusses on environmental components that could be most affected by the Project and those that are a concern to governments, Aboriginal people, stakeholders, and the general public. These environmental components are called valued environmental components. Table 2 lists the valued environmental components for this EIA, and the specific factors that were considered for each in order to meet the requirements of the Final Guidelines and Terms of Reference.

Table 2 Factors to be Considered for each Valued Environmental Component

Valued Environmental Component	Factors to be Considered
Atmospheric Environment	• Change in Climate (greenhouse gas emissions). • Change in Air Quality.
Acoustic Environment	• Change in Sound Quality (sound and vibration).
Water Resources	• Change in Water Quality. • Change in Water Quantity (groundwater and surface water).
Public Health and Safety	• Change in Public Health (human health and ecological risks). • Change in Public Safety (accidents, malfunctions and unplanned events.
Aquatic Environment	• Change in fish populations (including fish and fish habitat area, water and sediment quality, primary production, and benthic invertebrate community productivity). • Change in the productivity of fisheries resources. • Change in the usability of recreational fisheries resources. • Change in the abundance or distribution of aquatic species of conservation concern. • Mortality of one or more individuals of a species listed on Schedule 1 of the *Species at Risk Act* or on the New Brunswick *Species at Risk Act.*
Terrestrial Environment	• Change in wildlife populations, including migratory birds, and their habitats. • Species of conservation concern.
Vegetated Environment	• Change in vegetation, particularly with respect to species of conservation concern.
Wetland Environment	• Change in wetland area and/or function.
Labour and Economy	• Change in employment (direct and indirect). • Availability of skilled and unskilled labour. • Change in economy (local, regional, provincial).
Community Services and Infrastructure	• Change in public services. • Change in housing and accommodation.
Land and Resource Use	• Change in Land and Resource Use (use and enjoyment of land for current purposes).
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	• Change in the current use of land and resources for traditional purposes by Aboriginal persons.
Heritage Resources	• Change in heritage resources (including archaeological, historic, or paleontological resources).
Transportation	• Change in Transportation (road infrastructure, railway infrastructure, traffic and traffic safety).

Additionally, the effects of the environment on the Project have been selected for assessment in consideration of the nature and location of the Project, the changing global climate, and the potential expenditures and environmental risks that could result from an adverse effect of the environment on the Project.

4.3 SPATIAL AND TEMPORAL BOUNDARIES

Spatial and temporal boundaries have been developed for each valued environmental component to identify and describe potential Project-related environmental effects.

Spatial boundaries reflect the geographic range over which the Project's environmental effects may occur. The spatial boundaries include a project development area, a local assessment area, and a regional assessment area. The project development area is the area of physical disturbance associated with the Project (in other words, the "footprint" of the Project). The local assessment area is the area within which potential direct and indirect environmental effects of the Project are predicted to occur. The regional assessment area considers the wider area within which cumulative environmental effects may occur. Local assessment areas and regional assessment areas vary from one valued environmental component to another, depending on the nature of predicted environmental effects.

Temporal boundaries reflect the timeframe over which the Project's environmental effects may happen. The temporal boundaries for the environmental impact assessment include the three phases of Construction, Operation, and Decommissioning, Reclamation and Closure (including Post-Closure, as applicable) of the Project.

5.0 PROJECT ALTERNATIVES

5.1 ALTERNATIVES TO THE PROJECT

The purpose of the Project is to develop and operate an open pit tungsten and molybdenum mine in a manner that is socially, environmentally, and technically feasible and will provide a reasonable return on investment. There are no alternatives to the Project that would meet this purpose.

If the Project is not carried out, the market demand for tungsten and molybdenum will not be met from the Sisson Project, and employment and positive economic activity will not be generated in the area. Furthermore, the biophysical environment will remain unchanged from its existing condition, and the socioeconomic benefits of the Project will not be realized.

5.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Northcliff has considered various ways to carry out the Project, including considering different locations for the main facilities. These facilities must be located close to each other in order to keep the overall footprint of the Project to a minimum and to minimize the cost of moving the mined ore, waste rock, and tailings.

The Project location is fixed by the location of the ore body. The only technically and economically feasible means of mining this ore body is by open pit. The ore body at the Project site is only 8 m to 10 m below the ground surface, so underground mining is not an option.

The location of the ore processing plant is governed by the distance between it and the open pit, and the cost of hauling or conveying ore to the plant. To minimize these costs and other effects such as an expanded footprint and more truck travel, the processing plant will be located between the pit and the tailings storage facility.

Technically and economically feasible alternatives that were considered are summarized below.

There are no **alternatives to the Project** that would meet the Project purpose.

Northcliff evaluated several **alternative means of carrying out the Project** that are technically and economically feasible, including:

- Tailings Storage Facility Location Alternatives;
- Alternative Tailings Management Technologies;
- Tailings Storage Facility Embankment Alternatives;
- Alternatives for Low Grade Ore and Waste Rock Storage;
- Transportation Alternatives;
- Alternative Electrical Transmission Line Routes;
- Alternative Options for Decommissioning, Reclamation, and Closure; and
- Alternative Options for Fish Habitat Compensation.

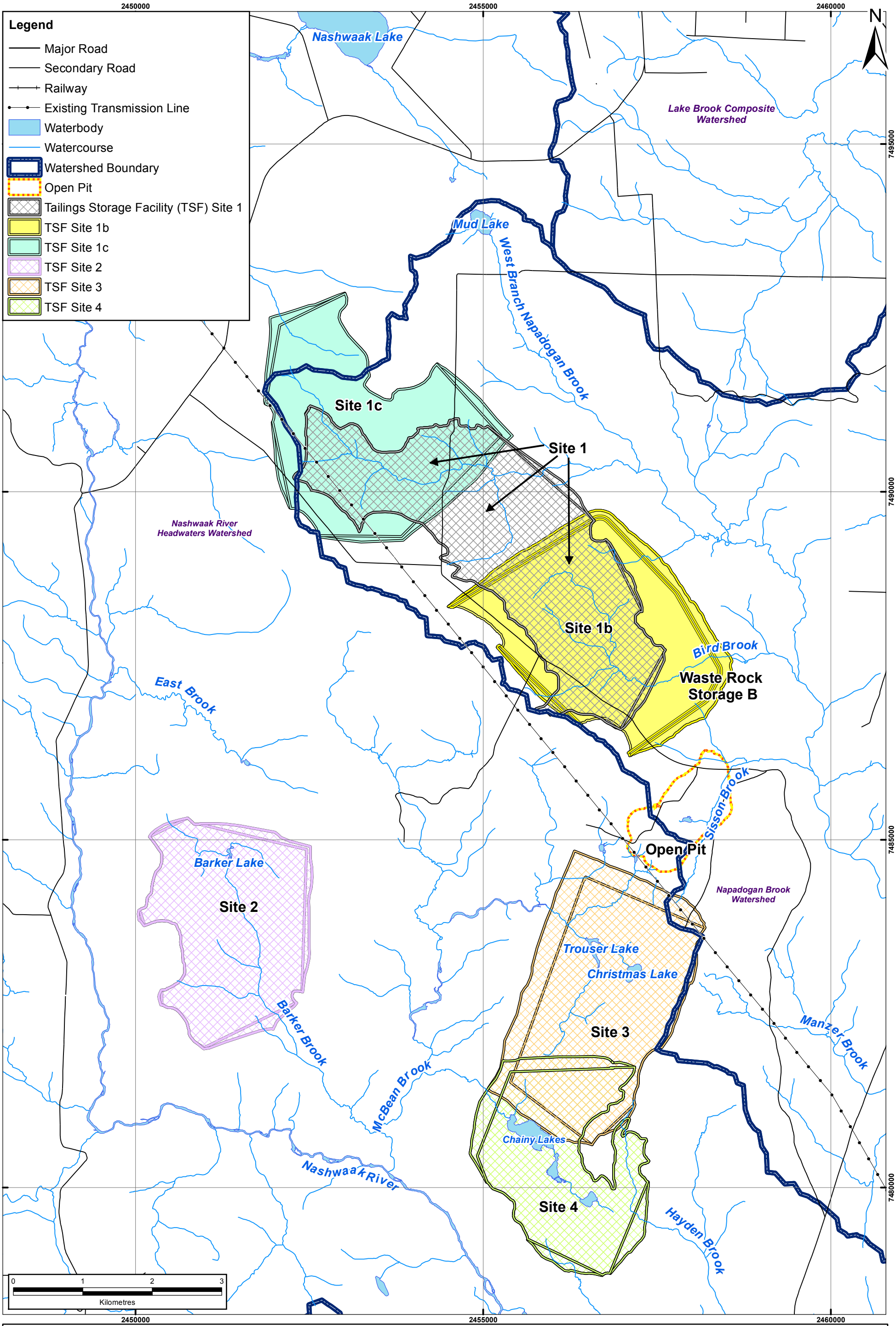
5.2.1 Tailings Storage Facility Location Alternatives

Four main alternatives for locating the tailings storage facility were considered, as shown in Figure 7.

- **Bird Brook (Site 1)** is relatively close to the process plant and open pit, and does not encroach on any lakes.
- **Barker Lake (Site 2),** located approximately 7 km to the southwest of the process plant location, was dismissed because of its distance from the plant, and because it will entail covering a lake and is within the Upper Nashwaak River watershed.
- **Trouser Lake (Site 3),** located approximately 2 km to the south of the process plant location, was dismissed even though it is one of the closest options because it will result in the elimination of lakes, the lakes are known to support a recreational fishery, and the location is within the Upper Nashwaak River watershed.
- **Chainy Lakes (Site 4),** located approximately 4.5 km to the south of the process plant location, was dismissed because of its distance from the plant, and because it will result in the elimination of lakes, the lakes are known to support a recreational fishery, and the location is within the Upper Nashwaak River watershed.

Bird Brook (Site 1) was selected for technical, economic and environmental reasons, and two alternatives within it were further evaluated: Site 1b and Site 1c, both smaller in area than Site 1. Site 1b was selected based on the following factors:

- footprint area;
- area in Napadogan Brook Watershed;
- area of permanent aquatic habitat loss;
- area of permanent wetland loss;
- area of permanent loss of interior forest;
- greenhouse gas emissions;
- storage efficiency;
- distance from process plant;
- ease of operation;
- ease of closure; and
- life of mine capital and operating costs.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Location of Alternatives for the Tailings Storage Facility (TSF)

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:50,000	121810356	NBDNR, SNB NHN, NB Aquatic Data Warehouse	7

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
16/05/2013	JAB	DLM

Stantec

Map: NAD83 CSRS NB Double Stereographic

5.2.2 Alternative Tailings Management Technologies

Three alternative technologies for tailings management were considered:

- un-thickened slurry tailings;
- paste tailings; and
- filtered dry stack tailings.
- an un-thickened slurry tailings system was selected based on several factors, including the local climate, site water balance, overall system complexity, and ease of operation.

5.2.3 Tailings Storage Facility Embankment Alternatives

There are three principal methods of constructing the embankments of the tailings storage facility: upstream, centreline, and downstream (illustrated in Figure 8). All these methods involve sequentially raising the embankments as the tailings storage facility fills with tailings over the life of the mine.

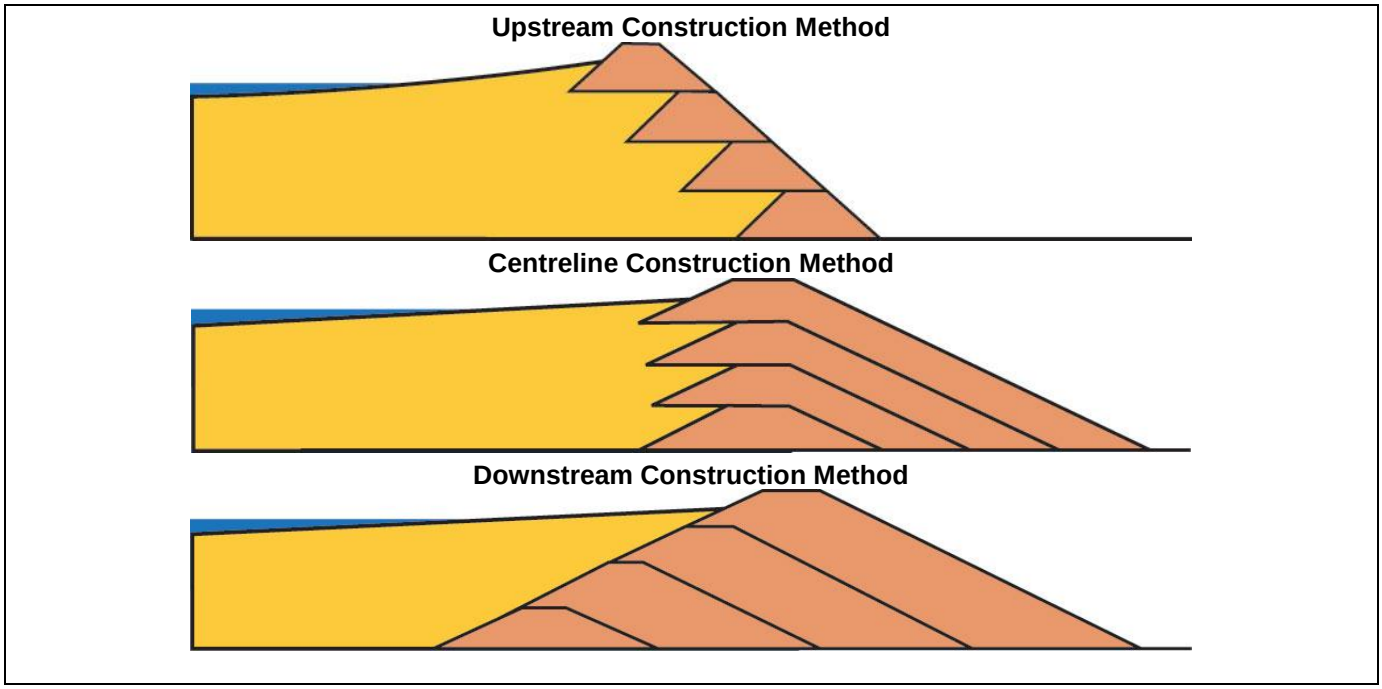


Figure 8 Tailings Storage Facility Construction Methods

The embankment for the tailings storage facility will be constructed using the centreline method. This method is preferred because it has greater stability compared to the upstream method, it has a smaller foundation footprint and more efficient use of rock fill compared to the downstream method, and provides excellent stability for local seismic and precipitation conditions.

5.2.4 Alternatives for Low Grade Ore Storage and Waste Rock Storage

Low grade ore and waste rock may potentially generate acid and are therefore difficult to manage with surface storage and are not suitable for use in building the TSF embankments. As a result, both low grade ore and waste rock will be stored underwater in the tailings storage facility. This will effectively mitigate the potential for long-term environmental effects from acid generation. Alternative locations for storing low grade ore and waste rock were investigated, but their storage in the TSF was determined to be the most technically and environmentally feasible option.

5.2.5 Transportation Alternatives

Northcliff evaluated various ways of accessing the Project site from major highways. The evaluation focused on the transportation of personnel and the delivery of goods and materials to and from the Project site. Primary and secondary site access routes were selected, as shown in Figure 3. The Project will use existing public highways and forest resource roads with only small increases in traffic levels. The alternatives considered have only minor differences in the environmental effects.

A combination of road and rail transportation will be used to ship mineral products from the Project site either directly to markets or to existing port facilities in Saint John or Belledune. All such means of transportation will be considered and used through Operation of the Project, depending on the customer location, logistics, and economics.

5.2.6 Alternative Electrical Transmission Line Routes

NB Power identified five potential power supply options, including three distinct transmission line routes, for supplying the Project with electricity. The three alternative routes are shown in Figures 9, 10, and 11. The following considerations were used to select the preferred route:

- follows existing corridors to the extent possible;
- maximizes the use of public (Crown) land;
- avoids partitioning of large parcels of privately-owned land;
- minimizes its environmental footprint;
- minimizes watercourse crossings;
- avoids environmentally sensitive areas and features to the extent feasible; and
- is technically and economically feasible from an engineering and constructability perspective.

The preferred route was selected primarily based on technical and economic factors. The alternatives considered have only minor differences in the environmental effects and little difference in footprints, emissions, discharges, or wastes.

N

Napadogan

Project Location

ROCKY BROOK STAIRS ESA

NARROWS MTN SUGAR MAPLE-BEECH STAND ESA

Tay Creek

Tay River PNA

620

617

Upper Stoneridge

104

Greenhill

ZEALAND STATION DELTA TERRACES ESA

Zealand

Burtts Corner

0 2 4 6 8 10

Kilometres

Legend

- Ecologically Significant Area
- Major Road
- Minor Road
- Forestry Road/Trail
- Railroad
- Existing 69 kV Line
- Existing 138 kV Line
- Existing 230 kV Line
- Existing 345 kV Line

Proposed Transmission Line Options

- Option A
- Option B
- Option C
- Property Boundary
- Ore Body
- Watercourse (NB DNR)
- Contour (40m)
- Deer Wintering Area
- Waterbody
- Wetland (NBDELG)
- Protected Natural Area
- Provincial Crown Lands

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Potential Route A for an Electrical Transmission Line

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

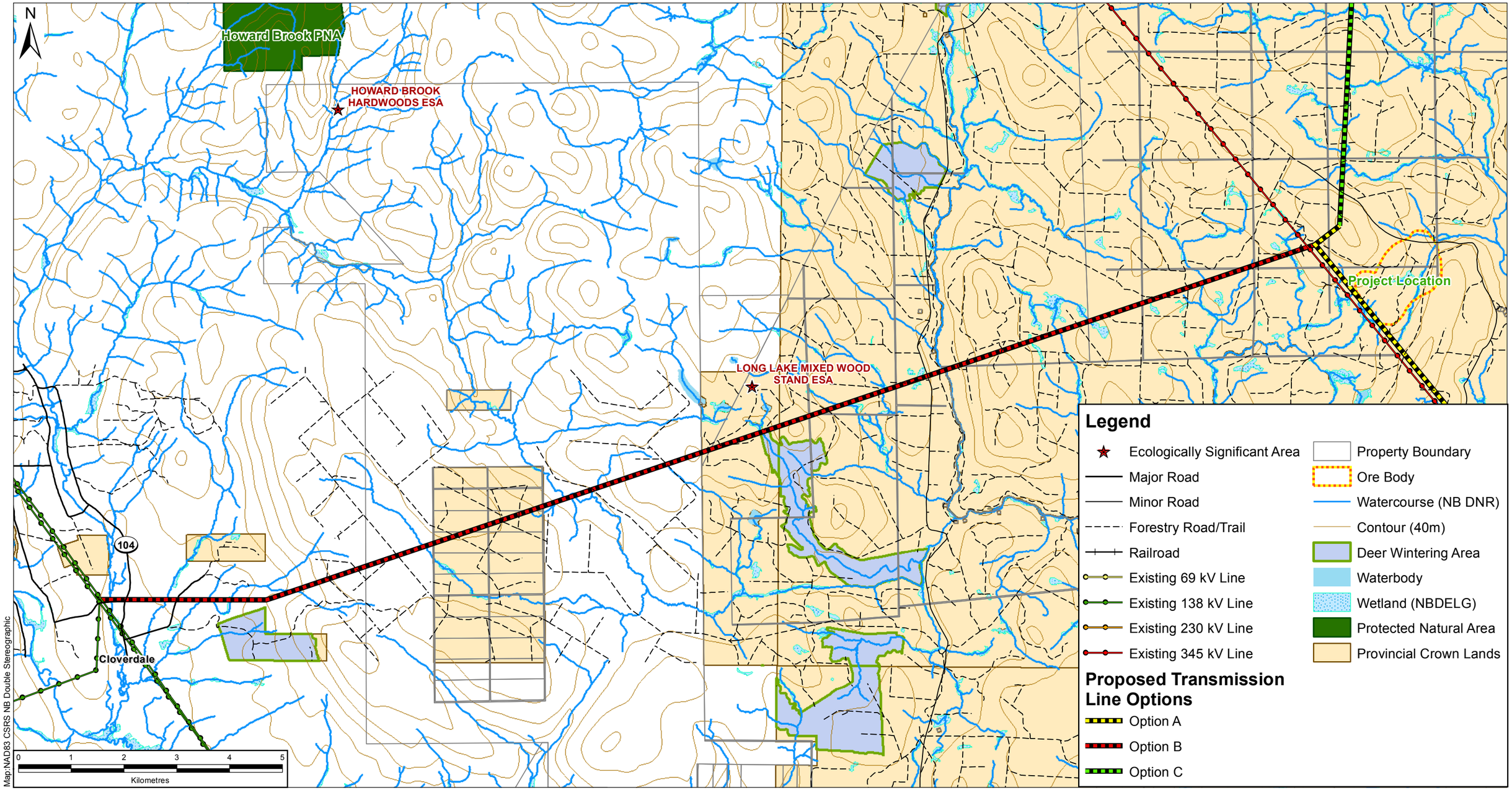
Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:112,000	121810356	NB DNR NB DELG NRCAN	9

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
5/16/2013	KR	DLM

Stantec

Map: NAD83 CSRS NB Double Stereographic



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Potential Route B for an Electrical Transmission Line

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:70,000	121810356	NB DNR, NB DELG, NRCAN	10

Date: (dd/mm/yyyy):	Fig. By:	Appd. By:
5/15/2013	KR	DLM

Stantec

N

Deersdale

Legend

- Ecologically Significant Area
- Major Road
- Minor Road
- Forestry Road/Trail
- Railroad
- Existing 69 kV Line
- Existing 138 kV Line
- Existing 230 kV Line
- Existing 345 kV Line

Proposed Transmission Line Options

- Option A
- Option B
- Option C
- Property Boundary
- Ore Body
- Watercourse (NB DNR)
- Contour (40m)
- Deer Wintering Area
- Waterbody
- Wetland (NBDELG)
- Protected Natural Area
- Provincial Crown Lands

Project Location

0 1 2 3 4 5
Kilometres

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Potential Route C for an Electrical Transmission Line

Sisson Project:
Environmental Impact Assessment (EIA) Report, Napadogan, N.B.

Client: Northcliff Resources Ltd.

Scale:	Project No.:	Data Sources:	Fig. No.:
1:45,000	121810356	NB DNR NB DELG NRCAN	11

Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:
5/16/2013	KR	DLM

Stantec

Map: NAD83 CSRS NB Double Stereographic

5.2.7 Alternative Options for Decommissioning, Reclamation, and Closure

Northcliff has considered various options for decommissioning, reclamation, and closure of the Project site at the end of mine life. A conceptual plan has been developed and is summarized in the EIA Report. This plan, and the desired end land uses it is based on, must be approved by the Province of New Brunswick and will be updated throughout the life of the Project to achieve successful reclamation and closure of the site at any time in its life.

5.2.8 Alternative Options for Fish Habitat Compensation

The Project will result in the loss of much of Sisson and Bird brooks, and small portions of other watercourses to accommodate the Project. A well, there will be some downstream flow reductions in Napadogan Brook. The consequent loss of fish habitat must be authorized and compensated to the satisfaction of Fisheries and Oceans Canada (DFO). With DFO, Northcliff evaluated three main options for compensation of the habitat loss as a result of the Project:

- removal of the Campbell Creek Dam;
- removal of the Lower Lake Dam; or
- provision of Atlantic salmon passage at the Dunbar Stream Falls

Each of these options would improve upstream fish passage. The removal of the Lower Lake Dam was selected by Northcliff as its preferred fish habitat compensation opportunity, and is expected to provide all of the habitat compensation credits that will be required by DFO for Project authorization. Other smaller-scale habitat enhancement opportunities are also being considered by Northcliff, though they are not expected to be needed for Project authorization by DFO.

6.0 CONSULTATION AND ENGAGEMENT

Northcliff engaged the public and First Nation communities early and often throughout the Environmental Impact Assessment process, and will continue to do so over the life of the Sisson Project. This section summarizes the key elements of the public, stakeholder, and Aboriginal engagement activities that were conducted for the Sisson Project, including how Northcliff has considered the input received through this program.

The general public, stakeholder groups and First Nations expressed considerable interest in the Sisson Project. Between November 2010 and May 2013, Northcliff consulted them through the following activities:

- 154 presentations/meetings with various stakeholders, stakeholder groups, and First Nation leaders (or their representatives);
- Project website (www.sissonproject.ca);
- newsletters and emails sent to over 700 subscribers;
- information office in Stanley (80 Irishtown Road);
- three open houses held in Juniper, Millville, and Stanley in September 2011;
- four working groups: a Sustainability Working Group, a Fish Habitat (HADD) Working Group, an Aquatics Stakeholder Working Group, and a First Nations Environmental Assessment Working Group;
- community barbeques;
- career information sessions held in Juniper, Millville, and Stanley in June 2012; and
- two workshops: a Feasibility Study Workshop delivered face-to-face in Stanley, and a Water and Waste Management Workshop delivered online.

Northcliff developed and implemented **an extensive public and stakeholder consultation program**, and an **Aboriginal engagement program**, for the EIA of the Sisson Project.

The goal of these programs is to **improve awareness** of the Project, its environmental effects, and planned measures to minimize damage to the environment from the Project, and to **foster open and transparent communication** about the Project.

Consultation and engagement will continue to occur throughout the EIA Review and the life of the Project.

Northcliff actively engaged the First Nation communities that may be affected by the Sisson Project. Northcliff reached out to the First Nation communities through phone calls, formal and information face-to-face meetings, a First Nations Environmental Assessment Working Group, emails, letters, an Indigenous Knowledge Study, and three open houses held in First Nations communities.

All the information provided by First Nation during these engagement activities, including an Indigenous Knowledge Study funded by Northcliff, was taken into consideration for planning the Sisson Project and preparing the EIA Report.

6.1 SUMMARY OF KEY ISSUES RAISED

The consultation and engagement activities raised many questions, comments, and concerns related to the Sisson Project. A number of these resulted in changes to the work plans for the Environmental Impact Assessment; some brought about changes to the design or mitigation planned for the Sisson Project itself. Table 3 summarizes key issues raised during public and stakeholder consultation as well as First Nations engagement activities. It is important to note that this is an overview only; details are provided in Chapter 4 of the EIA Report.

Table 3 Summary of Key Issues Raised

Category	Key Issues
General	• Bonding requirements for Project decommissioning, reclamation and closure. • Validity of the baseline studies.
Safety	• Tailings storage facility. • Process/pit water. • Recreational users in the Sisson Project area. • Increased truck traffic in the Sisson Project area. • Communication with emergency response services.
Harmful Environmental Effects	• Surface water and groundwater quality. • Vegetation. • Fish and wildlife habitat. • Health of operations to mine workers. • Air quality.
First Nation Communities	• Request to hold traditional ceremony on site before breaking ground. • Ability to influence closure and reclamation plan. • Effect on current, traditional, and future use of the Sisson Project area by First Nation communities. • Effects on water quality, and on fish and wildlife health. • Effect on species not identified in the baseline studies but of importance to First Nation communities. • Loss of harvesting, hunting, and trapping area. • Employment, contracting, and business opportunities for First Nation communities.

7.0 SUMMARY OF EXISTING ENVIRONMENT

This section describes the existing environment where the Sisson Project will be located (see Figure 1) in terms of air, land, water, communities and infrastructure, labour and economy, use of land and resources, heritage resources, and transportation.

7.1 AIR

The best way to describe "air" is in terms of climate, air quality, and sound. Climate is measured based on many different data and includes temperature and precipitation. In this Summary, "air" encompasses two valued environmental components that are assessed separately in the EIA Report, namely Atmospheric Environment and Acoustic Environment. For brevity, they are considered together here.

The temperature in the area of the Sisson Project is generally quite variable, ranging between -35.6 degrees Celsius to 37.2 degrees Celsius during the period of 1971 to 2001. The precipitation is roughly 1,350 millimetres per year; 75% falls as rain and 25% falls as snow.

Since the Sisson Project is located in a rural area far from significant sources of air and noise pollution, the air quality is typically very good and the sound levels are low and typical of a rural environment.

7.2 LAND

In this Summary, "land" encompasses three valued environmental components that are assessed separately in the EIA Report, namely Terrestrial Environment, Vegetated Environment, and Wetland Environment. For brevity, they are considered together here.

The Sisson Project is located in the south part of the Beadle Ecodistrict (part of the Madawaska Uplands portion of the Central Uplands Ecoregion), in an area with broad valleys, rolling hills, and many lakes and forests. Forests in the Beadle Ecodistrict have been logged since the late 1700s. This has created a mosaic of young forests in the area of the Sisson Project. The local climate supports balsam fir; red, white, and black spruce; and tolerant hardwoods like sugar maple, yellow birch, and beech. In targeted surveys completed for this EIA, 446 species of plants were recorded, including one species of conservation concern (nodding ladies'-tresses) located just outside the project development area.

The Sisson Project site is on provincial Crown land in a sparsely populated rural area near Napadogan, New Brunswick. The Project area is generally rolling, forested upland; small lakes and wetlands are common in low-lying areas. Several small headwater brooks in the Project area drain to Napadogan Brook and then to the Nashwaak and the St. John rivers. Wildlife populations are like those in the rest of Central New Brunswick. Brook trout and several other species of fish are common in brooks in and around the site.

Land use is dominated by forest resource harvesting. Land uses also include hunting, fishing, and other outdoor recreational activities. There are recreational campsite leases nearby, the nearest of which is about 1.5 km to the east of the Project. The nearest permanent residence is in Napadogan. The land and resources in the Project area are reported to be currently used for traditional purposes by Maliseet First Nations people.

Common wetland types encountered in the area of the Sisson Project include shrub, open water, and peatlands. The forested wetlands are generally poor in nutrients, low in plant diversity, and dominated by black spruce and balsam fir with heather shrubs. Many beaver dams of varying ages were identified in this area, which have shaped the hydrology and vegetation of the wetlands near the Sisson Project.

Local game abundance is typical of central New Brunswick; species include moose, white-tailed deer, American black bear, eastern coyote, American mink, beak, striped skunk, porcupine, raccoon, and varying hare. Small mammals such as red squirrel, voles, shrews, and mice are also common and widespread near the Project area. The Atlantic Canada Conservation Data Centre identified nine wildlife species at risk within or near the Project area, including Canada lynx, Eastern cougar, wood turtle, bald eagle, common nighthawk, chimney swift, olive-sided flycatcher, Canada warbler, and rusty blackbird. Various reptile and amphibian species such as salamanders, frogs, toads, and snakes were identified near wetlands and watercourses. One herpetile species, wood turtle, is listed as a species at risk, but no wood turtles were observed in the field surveys.

Up to 114 different bird species may be present in the area near the Project. Field surveys conducted for this EIA identified 93 bird species, 10 of which were identified as either at risk, rare, or uncommon.

7.3 WATER

In this Summary, “water” encompasses two valued environmental components that are assessed separately in the EIA Report, namely Water Resources and Aquatic Environment. For brevity, they are considered together here.

The Sisson Project is located within the Napadogan and McBean brook watersheds (Figure 12), both of which drain to the Nashwaak River. The Nashwaak River has a drainage area of approximately 1,700 square kilometres, and flows approximately 110 kilometres from Upper Nashwaak Lake, through the village of Stanley, then south where it meets the St. John River in Fredericton. The surface water in the Napadogan Brook watershed is of high quality. Water samples show that the surface water is generally very soft with a low concentration of dissolved minerals. No domestic water wells are known to exist in the immediate vicinity of the Sisson Project.

Napadogan and McBean brooks support many species of fish, including brook trout, American eel, Atlantic salmon (limited to the West and East Branches of Napadogan Brook, at the mouth of Bird Brook, and in McBean Brook), sea lamprey, slimy sculpin, blacknose dace, pearl dace, creek chub, common shiner, white sucker, and longnose sucker. The Nashwaak River watershed is used for recreational fishing of smallmouth bass, brook trout, burbot, American eel, gaspereau/alewife, muskellunge, chain pickerel, American shad, rainbow smelt, striped bass, white perch, whitefish, yellow perch, and sturgeon. Atlantic salmon is not permitted to be caught anywhere in the Nashwaak River watershed.

7.4 COMMUNITIES AND INFRASTRUCTURE

The village of Stanley (population 1,300) is the largest community near the Sisson Project. Though the nearest First Nations community is located approximately 43 km from the Project, the Project area is considered to be part of Maliseet traditional territory. In general, Census data from Statistics Canada show that the population in this rural area of New Brunswick is sparse, and the population is aging with young individuals moving elsewhere.

The communities near the Sisson Project have fire, police, and medical emergency services. Fire services are offered through the Fredericton Fire Department and volunteer fire departments in Stanley and Millville. The Royal Canadian Mounted Police offers policing services in New Brunswick. Medical services are offered in the Fredericton area, which includes a regional hospital, a community hospital, public health units, and many community health centres and clinics. Together, these establishments offer extensive health care services in emergency and ongoing health fields.

7.5 LABOUR AND ECONOMY

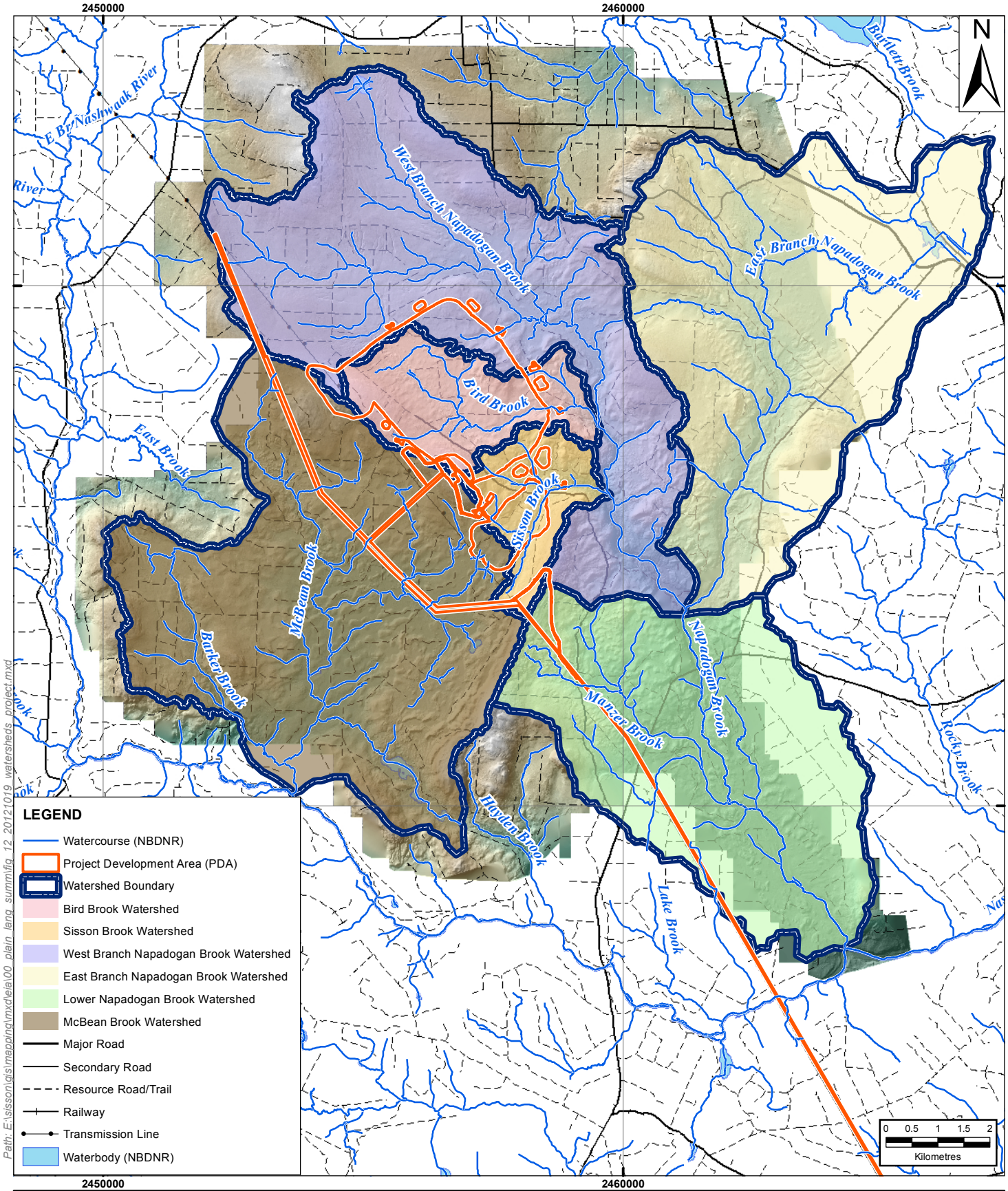
New Brunswick's economy has focused heavily on natural resource development, centred on energy, forestry, mining, and fishing, plus manufacturing industries. Tourism and communication technology industries also significantly contribute to the province's economy. Recent closures of sawmills in the communities of Juniper and Deersdale near the Project site has decreased forestry's contribution to employment in the region. Despite these closures, forestry (especially timber harvesting) is still the main economic industry in the Project area.

The unemployment rate in New Brunswick remains higher than the national average. The most significant job growth in the province between 2001 and 2006 occurred in construction, administrative and support services, retail trade, health care, and social assistance. During the same period, employment declined in manufacturing, agriculture, forestry, fishing, hunting, and utilities. In general, census data from Statistics Canada show that urban areas like Fredericton are thriving, while rural areas have higher unemployment rates and reduced economic activity.

7.6 USE OF LAND AND RESOURCES

In this Summary, "Use of Land and Resources" includes consideration of two valued environmental components considered in the EIA Report: Land and Resource Use; and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.

The Sisson Project is located entirely on Crown land, with the exception of part of the right-of-way for the proposed new transmission line that will eventually service the site. Forests in the Sisson Project area have been logged for more than 100 years, and timber is still actively harvested to this day. Other commercial activities in the area include outfitting and guiding services during the hunting season, cabin rentals, convenience stores, and restaurants. The Napadogan veneer mill is the only industrial activity still in operation in the area of the Project.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Watersheds near the Project Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.	Scale: 1:100,000	Project No.: 121810356	Data Sources: NBDNR Leading Edge Geomatics Ltd.	Fig. No.: 12	Stantec
Client: Northcliff Resources Ltd.	Date: (dd/mm/yyyy) 29/07/2013	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic

Although there are no permanent residences near the Project area, a few cabins are used by local residents. The area is used for many different recreational activities, such as snowmobiling, all-terrain vehicle (ATV) riding, hiking, fishing, and hunting. Aboriginal use of the land and resources in the Project area for traditional purposes are reported to include hunting, fishing, and gathering both in the past and continuing to this day.

7.7 HERITAGE RESOURCES

The Sisson Project area does not include any historic places, national parks, national historic sites, or heritage structures. Trace fossils of the Cambrian era may be found in the area. There are no known archeological sites in or close to the Sisson Project area. However, no professional archeological surveys had been conducted in the area before initiating this EIA. Comprehensive archeological surveys will be completed, and any found artifacts will be recovered, before ground disturbance by the Project.

7.8 TRANSPORTATION

New Brunswick has a network of well-maintained highways connecting its towns and major centres. The closest highway to the Sisson Project is a collector highway, Route 107. The Sisson Project is accessible by various forestry roads that connect to the provincial highway system.

8.0 ENVIRONMENTAL EFFECTS ANALYSIS

The Sisson Project will affect the local environment. These environmental effects may be negative (such as greenhouse gas emissions linked to mining operations) or positive (such as the creation of hundreds of jobs that will boost the local economy). Northcliff will take appropriate mitigation measures to avoid or minimize any negative environmental effects that the Sisson Project may have on the local environment such that the residual environmental effects are not significant.

8.1 ENVIRONMENT IMPACT ASSESSMENT METHODS

The methods used in preparing this environmental impact assessment are based on a methodology developed by Stantec to meet the combined requirements of the *Canadian Environmental Assessment Act* and the New Brunswick *Environmental Impact Assessment Regulation*. The EIA methods used in this EIA Report are illustrated in Figure 13.

The EIA methods address both Project-related and cumulative environmental effects. Project-related environmental effects are changes to the biophysical or human environment that will be caused solely by a physical work or activity of the Sisson Project. Cumulative environmental effects are changes to the biophysical or human environment that are caused by an action associated with the Project, in combination with other projects or activities that have been or will be carried out.

The EIA describes how an environmental effect may occur as a result of the Sisson Project. Northcliff has committed to environmental protection and mitigation measures that are designed to avoid or reduce the environmental effects of the Sisson Project. Residual environmental effects are those that may occur after environmental protection and mitigation measures have been applied. The residual environmental effects are characterized using the criteria listed below.

- **Direction** describes whether the environmental effect is negative (adverse) or positive.
- **Magnitude** describes the severity of the environmental effect.
- **Geographic extent** describes the area where the environmental effect may occur.

The EIA was conducted using a **methodological framework** developed by Stantec to meet the requirements of the *Canadian Environmental Assessment Act* and the New Brunswick *Environmental Impact Assessment Regulation.*

The **potential environmental effects of the Project** during the phases of Construction, Operation, and Decommissioning, Reclamation and Closure have been assessed. **Cumulative environmental effects** of the Project in combination with other past, present, or reasonably foreseeable future projects or activities have also been assessed. Environmental effects of **key accidents, malfunctions or unplanned events** were considered. A **follow-up and monitoring program** has been proposed,

No significant adverse residual environmental effects were predicted for the Project as planned. Some accidents and malfunctions could result in a significant environmental effect, but these are unlikely to occur.

- **Duration and frequency** describes how often an environmental effect may occur and for how long.
- **Reversibility** describes whether an environmental effect can be reversed after it has occurred.
- **Ecological/socioeconomic context** describes the sensitivity of the existing environment to the environmental effect.

These criteria are further defined for each environmental component. The significance of the Sisson Project-related environmental effects is then determined based on thresholds (also called significance criteria).

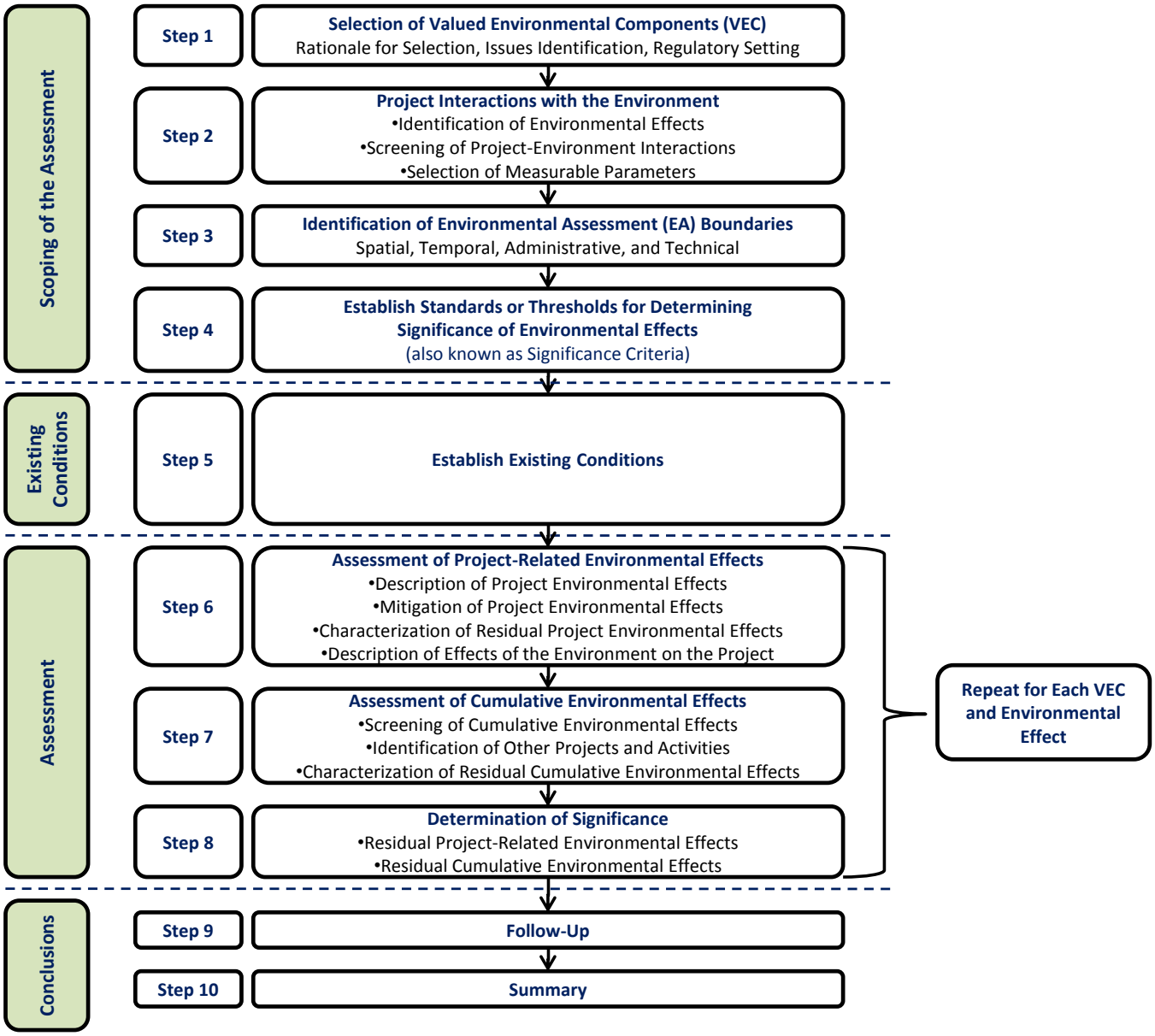


Figure 13 Summary of Stantec Environmental Impact Assessment Methodology

If there is overlap between the environmental effects of the Sisson Project and those of other projects or activities, cumulative environmental effects are assessed to determine whether they could be significant, and to consider the extent to which the Project contributes.

8.2 INTERACTIONS OF THE PROJECT WITH THE ENVIRONMENT

The effect that the Sisson Project may have on the environment was evaluated for each of the environmental components identified at the beginning of the EIA process and compared to the existing conditions described in Section 7 of this Summary.

Table 4 summarizes the potential interactions of the Sisson Project with the local environment.

Table 4 Potential Interactions of the Sisson Project with the Environment

Categories of Valued Environmental Components	Sisson Project Phase		
	Construction	Operation	Decommissioning, Reclamation and Closure
Air	✓	✓	✓
Land	✓	✓	✓
Water	✓	✓	✓
Public Health and Safety	✓	✓	✓
Labour and Economy	✓	✓	✓
Community Services and Infrastructure	✓	✓	✓
Current Use of Land and Resources	✓	✓	✓
Public Health and Safety	✓	✓	✓
Heritage Resources	✓	--	--
Transportation	✓	✓	✓

Legend:
-- No substantial interaction.
✓ Possible interaction.

Many technical analyses were conducted to evaluate the potential effects of the Sisson Project on the local environment, and it is not be possible to reflect the entire breadth or content of each of these analyses in these brief summaries. The summaries provide a high-level overview of environmental effects and mitigation measures; they should not be construed as being all-inclusive or complete. The reader is referred to each associated chapter of the EIA Report for a full discussion, analysis, and conclusions with respect to each environmental component.

8.3 SUMMARY OF ENVIRONMENTAL EFFECTS ASSESSMENT

8.3.1 Air

A healthy atmosphere helps sustain life and maintain the health and well-being of the biophysical environment. Releases of air contaminants to the atmosphere may cause adverse environmental effects on the air, land, and waterways if they are not properly managed. This section summarizes the environmental effects of the Project on the Atmospheric Environment and the Acoustic Environment as assessed in the EIA Report, together which comprise “air”.

Construction and Operation are the two phases likely to generate the highest emissions of air contaminants, greenhouse gases, sounds, and vibrations during the life of the Sisson Project. Table 5 summarizes the various sources of air contaminants that will occur during the different project phases.

Table 5 Sources of Air Contaminants

Sisson Project Phase	Summary of Sources
Construction	• Dust, combustion gases, and greenhouse gases from heavy equipment used on-site, trucks used to deliver equipment and materials to the site, processing plant sources, fugitive emission sources, and passenger and heavy-duty vehicles. • Sound and vibration from earth moving, process equipment and building installation, quarrying, access road construction, and transportation of personnel and materials.
Operation	• Dust from blasting, the movement of ore and rock, and wind erosion of exposed ground surfaces. • Emissions of combustion gases and other contaminants from vehicles and the processing plant. • Sound and vibration from heavy equipment; drilling and blasting of ore and rock; transportation of personnel, materials, and products; crushing and conveying equipment; and processing equipment.
Decommissioning, Reclamation, and Closure	• Interaction will occur but would not result in a significant environmental effect, even without mitigation. The environmental effects are rated not significant and are not considered further in this report.

The atmospheric and acoustic environments were evaluated based on a local assessment area of 25 kilometres by 25 kilometres and 10 kilometres by 10 kilometres, respectively, centred on the Sisson Project site. This area includes recreational campsites (about 1.5 kilometres southeast of the open pit) and, for the atmospheric environment, permanent residences (in Napadogan, about 10 kilometres to the northeast).

To evaluate air contaminants, dispersion modelling of dust, metals, and combustion and process emission gases was conducted. Greenhouse gas emissions were calculated and compared to other mines in Canada. Dispersion modelling predicts what contaminants will accumulate on the ground, at what concentration, and how often. The results of dispersion modelling are then compared to various air quality guidelines for each contaminant. Mitigation for dust is primarily by watering of internal site roads. The air quality guidelines near the Sisson Project may be exceeded in a few cases:

- Due to dust from heavy truck traffic on the forest roads (briefly and infrequently along roadsides during dry conditions) and the operation of the primary crusher (very infrequently within 20 m); and

- Odour as a result of hydrogen sulphide emissions from the APT plant (very infrequently within 20 metres of the plant).

The air quality at the two nearest receptors is not expected to exceed these guidelines. Greenhouse gas emissions from mining operations are considered to be low and similar to other metal mines in Canada.

To evaluate sound and vibration, baseline noise levels were measured near the site for one week then modelling was completed to predict the sound levels at the nearest campsites and permanent residences. The results of the modelling were then compared to objectives and standards to determine the effect on the acoustic environment. With the exception of occasional blasting events, Construction and Operation activities are not expected to be noticeable for the two nearest receptors. Vibration levels are not expected to exceed standards. Environmental effects of the Project on the Atmospheric Environment and Acoustic Environment (including cumulative environmental effects) during all phases were rated not significant.

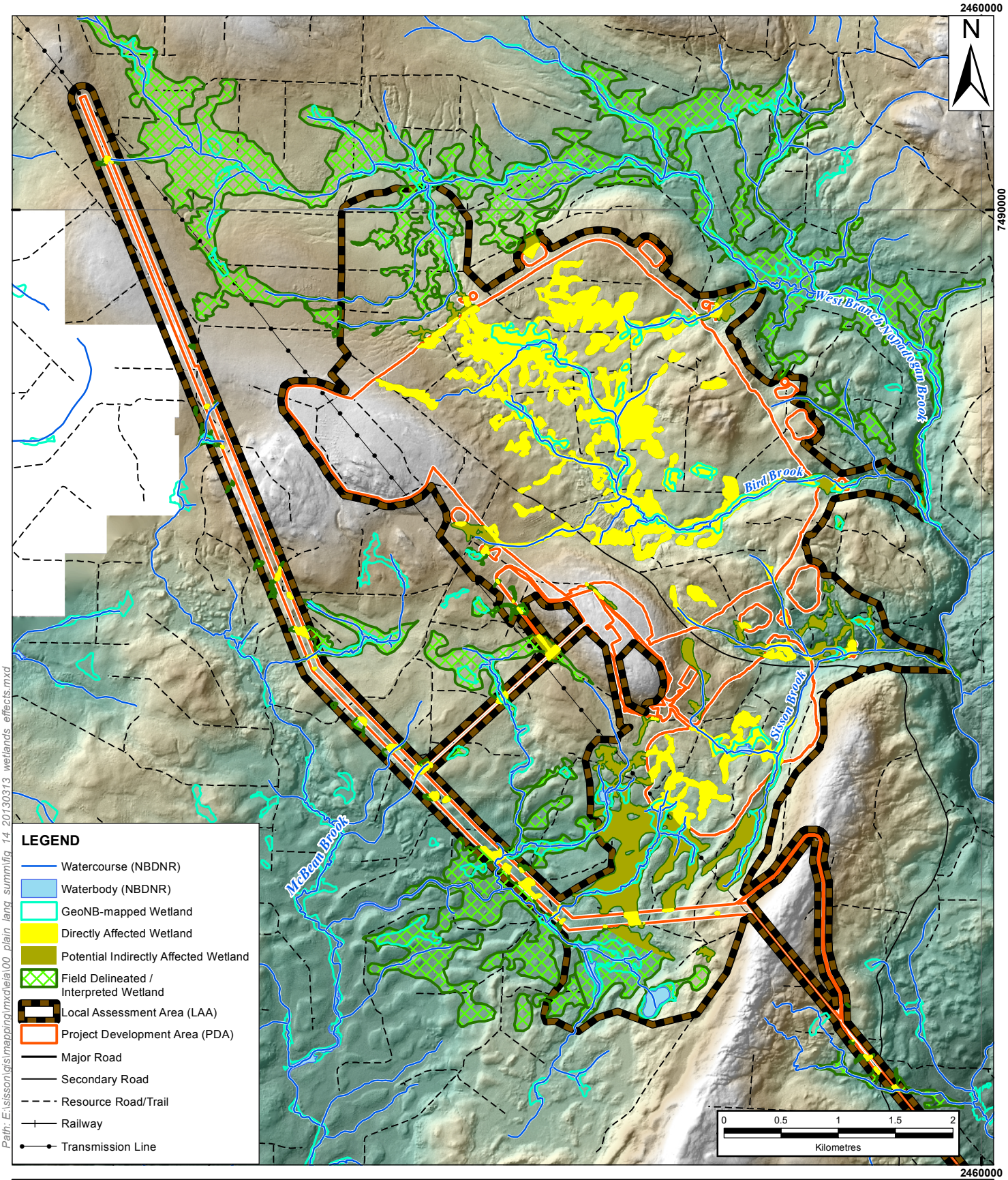
8.3.2 Land

The Sisson Project will occur on forested land that is home to birds, mammals, reptiles, amphibians, plants, and the habitats that support them. Some species that are at risk of decline may also be near the site. This section summarizes the environmental effects of the Sisson Project on the Terrestrial Environment, the Vegetated Environment, and the Wetland Environment as assessed in the EIA Report, together which comprise “land”.

The Sisson Project will change the local ecosystem and subsequently lead to loss of habitat for birds, mammals, reptiles, amphibians, and plants. However, the wildlife habitat type is common and found throughout central New Brunswick, so no unique wildlife habitat will be lost. The potential environmental effects of the Project on wetlands are shown in Figure 14. Table 6 summarizes the environmental effects the Sisson Project will have on the land, and the measures Northcliff will take to mitigate them.

Table 6 Summary of Mitigation Measures for Land

Environmental Effect	Mitigation Measure
Loss of habitat for wildlife	• Some habitat will be restored when the Sisson Project is decommissioned, reclaimed and closed.
Cause decline of species at risk and species of conservation concern	• Restrict timing of clearing and perturbation of habitat.
Decrease biodiversity of plants	• Restrict clearing the area where a plant species of concern was found (Nodding ladies’-tresses). • Monitor species at regular intervals (at years 1, 3, and 5 after Construction).
Loss/change in vegetation communities associated with the construction of facilities	• Restrict clearing to minimum area required to build facilities.
Loss of Old Forest Communities	• Identify and protect replacement communities within the ecoregion, as per the New Brunswick Department of Natural Resources Objectives and Standards document.
Direct loss of wetlands	• Compensate direct loss of wetlands through wetland restoration or conservation.
Indirect loss of wetlands due to changes in draining and local water flow	• Evaluate indirect loss through a follow-up program and take adaptive management action as required.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Potential Environmental Effects on Wetlands Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.	Scale: 1:45,000	Project No.: 121810356	Data Sources: NBDNR Leading Edge Geomatics Ltd.	Fig. No.: 14	Stantec
Client: Northcliff Resources Ltd.	Date: (dd/mm/yyyy) 29/07/2013	Dwn. By: JAB	Appd. By: DLM		

Map: NAD83 CSRS NB Double Stereographic

Despite the loss of terrestrial habitat that will result from the Project, environmental effects of the Project on the Terrestrial Environment, Vegetated Environment, and Wetland Environment (including cumulative environmental effects) during all phases were rated not significant. A follow-up program has been proposed to verify the environmental effects of the Project on wetlands due to groundwater drawdown around the open pit. Monitoring of vegetation was also proposed after one, three and five years following completion of Construction.

8.3.3 Water

Changes in the availability of water, either in quantity or quality, may affect the lives of people, animals, and plants. Water includes groundwater and surface water available for drinking and other uses. It also includes all the rivers, lakes, and streams that provide habitat for fish, benthic communities, and other aquatic species. As such, water plays an important role in generating food for non-aquatic organisms, like birds and mammals. It also provides recreational and harvesting opportunities important for the public and Aboriginal communities. This section summarizes the environmental effects of the Sisson Project on Water Resources and the Aquatic Environment, as assessed in the EIA Report, together which comprise “water”.

Since water is so important to life, it is protected by several federal and provincial laws and guidelines. The intent of these laws and guidelines is to protect or regulate the use of the aquatic environment and the aquatic species it supports.

The Sisson Project will interact with water in many different ways. Table 7 summarizes the various environmental effects the Sisson Project may have on water during the different phases.

Table 7 Environmental Effects of the Sisson Project on Water

Sisson Project Phase	Environmental Effects on Water

Construction	• Modification of watercourses by:
	  ◦ eliminating parts of watercourses to construct Project facilities; and
	  ◦ re-routing or diverting water around Project facilities.
	• Loss of fish habitat in Bird Brook, Sisson Brook, Tributary “A” to the West Branch Napadogan Brook, and a portion of some McBean Brook headwater tributaries due to:
	  ◦ building the tailings storage facility;
	  ◦ preparing the open pit; and
	  ◦ relocating Fire Road.
	• Displacing fish from Bird Brook and Sisson Brook.

Operation	• Dewatering the open pit will lower the local water table up to two kilometres from the centre of the pit, and potentially affect surface water flows and nearby water wells.
	• Retaining water within the TSF, and evaporation from the TSF pond (and from the pit lake Post-Closure) will:
	  ◦ reduce the amount of surface water available in downstream watercourses;
	  ◦ for the first seven years of Operation, and while the open pit is filling for about 12 years during Closure, cause indirect loss of fish habitat in Napadogan Brook due to reduced flows downstream and the possible creation of a partial barrier to fish;
	  ◦ cause changes in dissolved oxygen, temperature, pH, productivity, and benthic community in the downstream receiving waters; and
	  ◦ reduce the amount of surface water available for consumption downstream.
	• Seepage past the TSF water management systems, and the discharge of treated water from the Project, are currently predicted to cause an increase in the concentration of some trace metals and other contaminants in downstream receiving waters some of the time, though consequent environmental effects on fish health are not expected to be significant.

Table 7 Environmental Effects of the Sisson Project on Water

Sisson Project Phase	Environmental Effects on Water
Decommissioning, Reclamation and Closure	• Filling the open pit will reduce the amount of surface water available in downstream watercourses for about 12 years. • Seepage past the TSF water management systems, and the discharge of treated water from the Project are currently predicted to cause an increase in the concentration of some trace metals and other contaminants in downstream receiving waters some of the time, though consequent environmental effects on fish health are not expected to be significant.

The modification of watercourses is shown in Figure 15. Lowering of the water table due to open pit dewatering is not expected to affect water supplies to the recreational cabins about 1.5 km to the east since these are drawn from surface water springs on the east side of the intervening ridge.

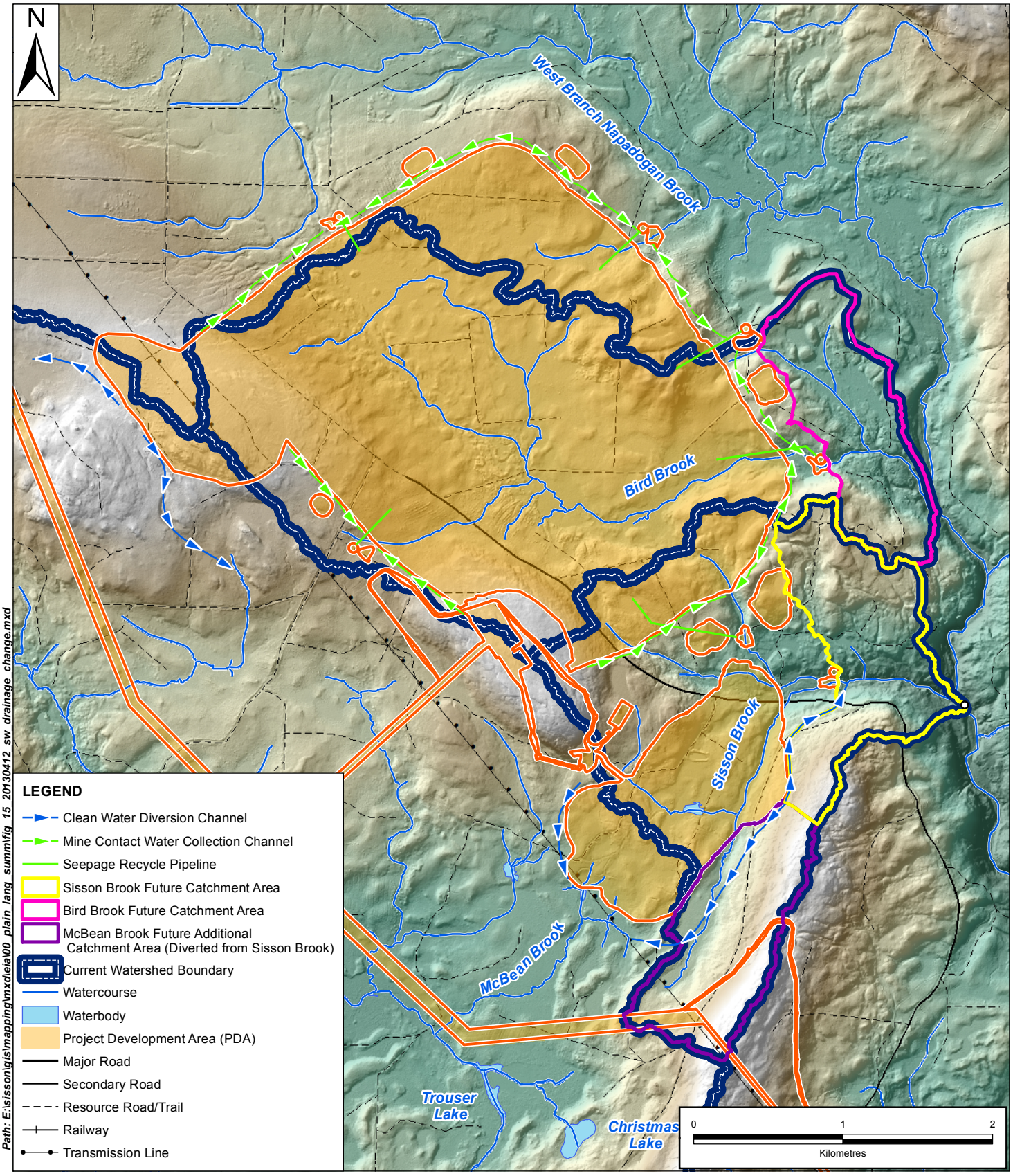
The Sisson Project is designed to avoid or minimize adverse environmental effects on water in the following key ways.

- Almost all of the water needed for the Project will be collected from precipitation onto the site, and from dewatering of the open pit, and then stored and recycled through the TSF. A relatively small amount of fresh water will be obtained from on-site wells.

- All waste rock, and all potentially acid generating tailings, will be stored under water in the TSF to effectively mitigate the potential for acid generation. This is industry best practice.

- Water monitoring and management systems around the TSF will ensure that potentially problematic downstream water quality issues are detected and addressed before they jeopardize human, ecological or fish health. The TSF embankments and water management systems will be designed and managed so that any water that seeps through or past them will not cause downstream groundwater and surface water to persistently exceed Health Canada's Guidelines for Canadian Drinking Water Quality, or to negatively affect freshwater aquatic life. Water quality and environmental effects monitoring required by provincial and federal legislation/permits will provide early warning of potential downstream issues, and the implementation of adaptive management measures to address issues that may arise.

- During Operation and Post-Closure, surplus water will be treated before discharge from the Project site to meet permit requirements set by the Province of New Brunswick. Ongoing discharge monitoring will ensure that any deviations from permit conditions will be quickly rectified.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Changes in Surface Water Drainage Areas Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B. Client: Northcliff Resources Ltd.	Scale: 1:35,000	Project No.: 121810356	Data Sources: NBDNR Leading Edge Geomatics Ltd.	Fig. No.: 15	Stantec
	Date: (dd/mm/yyyy) 12/04/2013	Dwn. By: JAB	Appd. By: GPY		

Map: NAD83 CSRS NB Double Stereographic

Fish habitat will be lost directly to the construction of the Project facilities and indirectly due to withholding of water in the TSF during the first 8 years and in the open pit while it is filling over about 12 years during Closure. There will also be changes in water quality in downstream watercourses as a result of seepage getting past the TSF water management systems and treated surplus water discharge. Despite this, the environmental effects of the Sisson Project on water will not be significant because of the following measures.

- Before the Sisson Project can proceed, Fisheries and Oceans Canada will need to authorize any loss of fish habitat under the *Fisheries Act* based on a habitat compensation plan that will ensure there is no net loss of productive fish habitat. The proposed compensation plan involves removing an abandoned dam on the main stem of the Nashwaak River to eliminate barriers to fish passage at high and low flows, and thus enhance the use of upstream habitat.

- Before Construction begins, as many fish as possible will be relocated from brooks within the Project site in order to minimize fish mortality.

- Retention of water within the TSF during the first 8 years of Operation, and within the open pit as it fills during Closure for about 12 years, will not negatively affect the quantity of downstream groundwater and surface water to known and anticipated users in the Project area.

- Seepage past the TSF water management systems, and the discharge of treated water from the Project, are currently predicted to cause an increase in the concentration of some trace metals and other contaminants in West Branch Napadogan Brook, some of the time. However, with the conservativeness in the predictive modelling and relevant aquatic life guidelines, predictive modelling and Project design refinements during further studies and planning, and adaptive management options available during Operation to address water quality issues that may arise, consequent environmental effects on fish health in the brook are not expected to be significant.

Environmental effects of the Project on Water Resources and the Aquatic Environment (including cumulative environmental effects) during all phases were rated not significant. An extensive follow-up and monitoring program is proposed, with a particular focus on monitoring changes to water quality and downstream water quantity in watercourses during Operation, Closure and Post-Closure of the Project.

8.3.4 Public Health and Safety

This section summarizes the environmental effects of the Sisson Project on Public Health and Safety, as assessed in the EIA Report.

Public health relates to the physical health and well-being of the people in the communities surrounding the Sisson Project area. The effects may be due to air quality, drinking water quality, food, and other factors arising from exposure to contaminants released from the Project. Public safety relates to protecting the general population from injury, damage, or harm by preventing accidents, malfunctions or unplanned events, like fuel spills or vehicle collisions. The Sisson Project will release contaminants into the air, water, and soil that may increase risks to public health. The quality and quantity of some of these releases will be restricted by approvals and permits issued after this EIA. Despite these approvals and permits, any chemical has the potential to cause environmental effects: it is the concentration, duration of exposure, and route of exposure that determines the health risk.

Northcliff completed a Human Health and Ecological Risk Assessment to help evaluate potential environmental effects on public health during all phases of the Sisson Project. This assessment determined the existing concentrations and associated health risks of several metals, including arsenic, chromium, cobalt, lead, manganese, methyl mercury, and thallium. The assessment also predicted the future concentrations and associated health risks for the same metals based on contributions from the Project. The assessment found that existing concentrations of certain metals resulted in elevated health risks when compared to accepted benchmarks. These existing concentrations could potentially pose a risk to Aboriginal persons who may currently be obtaining 100% of their game, 20% of their fish, and 10% of their plants from the Sisson Project area. Predicted future concentrations were generally close to existing concentrations, though higher risks due to arsenic, boron, cobalt, and thallium, primarily from fish tissues, were indicated. These future concentrations were found to be comparable to published fish tissue concentrations in other areas of Canada and North America similar to the Sisson Project area.

Northcliff will minimize the environmental effects of the Sisson Project on Public Health and Safety by taking the following actions:

- applying standard mitigation and environmental management practices/procedures used in the mining industry;
- applying mitigation measures described for air and water to protect public health;
- controlling emissions and discharges from the Sisson Project so that they comply with conditions set by operating permits;
- developing an extensive follow-up program to monitor the environmental effects of the Sisson Project on downstream water and fish tissue quality;
- complying with applicable federal and provincial legislation regarding public safety and occupational health and safety during all phases of the Sisson Project; and
- developing mitigation, planning, and environmental management measures to minimize the risks of accidents, malfunctions or unplanned events that could become a concern for public safety.

Overall, the potential environmental effects of the Project on Public Health and Safety (including cumulative environmental effects) were rated not significant for all phases of the Project.

8.3.5 Labour and Economy

This section summarizes the environmental effects of the Sisson Project on Labour and Economy, as assessed in the EIA Report.

The Sisson Project will boost the local, regional, and provincial economies in many ways, such as by creating jobs, purchasing construction materials and operating supplies, and paying taxes. An economic model was used to predict the economic benefits related to the Sisson Project, and estimates that the Project will:

- create up to 500 direct jobs at the peak of Construction, and about 300 direct, full-time jobs for the Operation phase. Most of this new employment (about 90%) will be created directly in New Brunswick;
- generate $5.91 billion in gross domestic product over its lifetime. $3.75 billion of this will contribute directly to the economy of New Brunswick;
- generate about $1.78 billion in federal and provincial taxes over its lifetime. $742.9 million of this will go to the province of New Brunswick; and
- result in substantial indirect and induced economic benefits to the Province and Canada.

At the same time, the Sisson Project also has the potential to negatively affect the economy by increasing the demand for labour, goods, and services. If the demand exceeds the available supply, this could cause inflation and shortages, leading to unsustainable conditions. For example, a labour shortage could lead to wage inflation. Similarly, a shortage of building materials could affect other projects in the region. It is anticipated that the existing and forecasted supply of labour, goods, and services will be sufficient to meet the Sisson Project's demand and those of other future projects or activities, and thus not cause such adverse effects. Substantive positive economic benefits will result from the Project during Construction and Operation, although those benefits will declined markedly during Closure and Post-Closure.

Overall, the potential adverse environmental effects of the Project on Labour and Economy (including cumulative environmental effects) were rated not significant for all phases of the Project. The positive environmental effects of the Project on Labour and Economy arising from expenditures and economic activity associated with the Project were rated significant.

8.3.6 Community Services and Infrastructure

Community services and infrastructure include the capacity of housing, accommodations, public services, emergency services, and recreational and entertainment facilities. This section summarizes the environmental effects of the Sisson Project on Community Services and Infrastructure, as assessed in the EIA Report.

The Sisson Project will potentially affect community services and infrastructure, as well as the nearby communities' ability to deliver these services to the public. These environmental effects will mostly come from an increase in the local population when workers (and their families) move closer to the Sisson Project area. A higher population will increase demands on businesses, services, medical facilities, and housing.

To avoid or reduce negative environmental effects and enhance benefits, Northcliff will implement a comprehensive Environmental and Social Management System. Table 8 summarizes the various environmental effects the Sisson Project will have on Community Services and Infrastructure and the mitigation measures that Northcliff will undertake to address them.

Table 8 Summary of Mitigation Measures for Community Services and Infrastructure

Environmental Effect	Mitigation Measure
Demands on temporary housing during the Construction phase	• Provide bus services to the Project site during Construction. • Work with communities to help them adapt to these demands.
Demands on permanent housing during the Operation phase	• The local housing market has the capacity to accommodate new residents.
Demands on recreation and entertainment facilities	• The region has the capacity to accommodate this additional demand.

Demands on health, police, and fire facilities are not expected to be substantial since the workforce will be dispersed throughout central New Brunswick. Additionally, there will be emergency fire and medical response resources located at the Sisson Project site.

Northcliff is committed to working with local communities to help them engage with the Sisson Project in ways that contribute to the sustainable development of their communities.

Overall, the potential environmental effects of the Project on Community Services and Infrastructure (including cumulative environmental effects) were rated not significant for all phases of the Project.

8.3.7 Current Use of Land and Resources

The land and its resources are important for recreation, sustenance, industry, and economic development. Long before Europeans made contact more than 400 years ago, Aboriginal people occupied areas of New Brunswick. This section summarizes the environmental effects of the Sisson Project on two valued environmental components assessed in the EIA Report, namely Land and Resource Use, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.

The Sisson Project will change the primary land use in the Project site from forestry to industrial mining. This will result in a loss of recreational land use in the areas that will be occupied by the Project. Aboriginal persons will lose access to this land if they have been using it for traditional purposes. However, land in the surrounding areas can accommodate any displaced land uses and the loss of land caused by the Sisson Project is not substantive.

The open pit and tailings storage facility may be visible from certain areas around the Project, but will not be visible from the nearby recreational campsites and permanent residences. The environmental effect of the Sisson Project on property value is expected to be low and localized. Actual changes in property values are hard to predict because they depend on many factors.

Northcliff will minimize the environmental effects of the Sisson Project on the use of land use and resources by applying the following measures:

- communicate with Crown timber license holders;
- maintain a buffer of vegetation around the Project site;

- communicate with campsite lease holders to identify and resolve land use issues as they arise; and
- work with First Nations and appropriate government agencies to:
    - facilitate the harvesting of resources used for traditional purposes in the PDA prior to site preparation activities (where reasonable within the timeframe of planned activities);
    - reclaim the PDA with consideration of traditional resources, to ensure the land is accessible for traditional purposes post closure of the Project; and
    - work to optimize training, employment, and business opportunities of the Project for Aboriginal people.

Environmental effects of the Project on Land and Resource Use and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (including cumulative environmental effects) during all phases were rated not significant.

8.3.8 Heritage Resources

Heritage resources are created when activities from the past remain and are available to inform present and future societies of that past. They are relatively permanent, although they can easily be damaged or disturbed through construction and other ground-disturbing activities. Heritage resources include built heritage (defined as historical, archeological, and architectural resources) and paleontological resources. This section summarizes the environmental effects of the Sisson Project on Heritage Resources, as assessed in the EIA Report.

Most of the ground-breaking and earth-moving activities will take place during the Construction phase of the Sisson Project. This is where the Sisson Project will have the greatest potential for affecting these resources.

Based on the literature review and field work conducted to date, there are no known heritage resources within the project development area. The Sisson Project area is mostly undeveloped: the sawmill near Juniper was one of the first buildings to be constructed in 1914. Archaeological shovel tests carried out so far at the Project site have also not found evidence of any heritage resources. Additional tests will be completed in the future to determine whether heritage resources may be present elsewhere at the Project site. However, the archeological potential in this area is generally quite low because of the remoteness of the area and the poor ground conditions (for example, wet ground, steep slopes, surface glacial till, and surface bedrock), which make it unlikely that humans would have used the Project site in the past.

Considering that no heritage resources have been found to date, and additional surveys, and if needed, mitigation of found resources before they are disturbed by construction activities, will be carried out, the Project will not have a significant environmental effect on heritage resources.

8.3.9 Transportation

This section summarizes the environmental effects of the Sisson Project on Transportation, as assessed in the EIA Report.

The public relies on the road and rail transportation network in the area of the Sisson Project for access and mobility. This network will also important to safely transport workers and supplies to and from the Project site. The amount of traffic in the area is expected to increase once the Project is initiated, but still within the capacity of the roads that lead to the site. Table 9 summarizes the effects the Project will have on transportation and the actions Northcliff will undertake to mitigate them.

Table 9 Summary of Mitigation Measures for Transportation

Environmental Effect	Mitigation Measure
Increased traffic volume by personnel travelling to and from the site	• Designate off-site parking lots. • Transport personnel by bus during Construction. • Traffic Plan for employees.
Sustained damage to the existing roads due to heavy truck traffic	• Use the provincial highway as a primary truck route and obey maximum allowable weight limits. • Maintain forest road network as per agreement with the Crown Timber Licence Holders and the New Brunswick Department of Natural Resources.

Overall, the potential environmental effects of the Project on Transportation (including cumulative environmental effects) were rated not significant for all phases of the Project.

8.4 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Effects of the environment on the Project are associated with risks of natural hazards and influences of nature on the Project. The environmental attributes selected for consideration include:

- severe weather (for example, wind, rain, snow, floods, hail, electrical storms, and tornadoes);
- climate change;
- earthquakes; and
- forest fires.

These environmental attributes may act on the Project such that the Project components, schedule, and/or costs could be substantively and adversely changed. Effects of the environment are largely addressed through design and compliance with codes and standards that provide sufficient margins of safety to prevent damage. Good engineering design involves the consideration of environmental effects and loadings or stresses (from the environment) on a project. The planning and engineering design for this Project are no exception.

The Project has been designed and will be carried out to withstand environmental conditions by applying good engineering principles and practices, and by following various codes and standards from the National Building Code of Canada and other sources. There are no environmental attributes that, at any time during the Project, are anticipated to have the potential to result in:

- a substantial change to the Project schedule;
- a long-term interruption in service;
- damage to Project infrastructure causing a significant environmental effect or an increased safety risk; or
- damage to Project infrastructure requiring repairs that cannot be technically or economically implemented.

Northcliff will manage its operations throughout the life of the Project to monitor any observed effects of climate change, and adapt the Project infrastructure or operations as necessary so as to prevent a significant environmental effect. The effects of the environment on the Project are rated not significant.

8.5 ENVIRONMENTAL EFFECTS OF POSSIBLE ACCIDENTS, MALFUNCTIONS OR UNPLANNED EVENTS

Accidents, malfunctions and unplanned events refer to events that are not part of any activity or operation of the Project as planned. Even with the best planning and the implementation of preventative measures, accidents or malfunctions can occur during any Project phase. Negative environmental effects can result if these events are not addressed or responded to in an appropriate manner. Many accidents and malfunctions are preventable by good planning, design, emergency response, and mitigation. Northcliff will put in place prevention and response procedures to avoid significant adverse environmental effects, and to deal with them promptly should such an event occur.

The environmental impact assessment focusses on credible accidents or scenarios that have a reasonable probability of occurrence and for which the resulting environmental effects could be significant. The credible accidents and malfunctions considered for this EIA are described in Table 10.

Table 10 Credible Accidents, Malfunctions and Unplanned Events and Scenarios

Accident / Malfunction	Description of Scenario	Potential Environmental Effects
Erosion and Sediment Control Failure	A failure of erosion and sedimentation control devices that will be implemented as key mitigation during Construction and Operation of the Project. The failure of the coffer dams to be constructed to manage sediment during Construction is also included.	An accidental release of sediment or sediment-laden water may adversely affect a watercourse or wetland Failure of the pumps for water management or the coffer dam could result in a large release of sediment laden water into Bird or Sisson brooks.
Pipeline Leak	Leakage from the pipelines: • carrying tailings from the ore processing plant to the tailings storage facility; or • carrying water from the tailings storage facility for use in the ore processing plant.	A spill of tailings or reclaim water could adversely affect surface and groundwater.

Table 10 Credible Accidents, Malfunctions and Unplanned Events and Scenarios

Accident / Malfunction	Description of Scenario	Potential Environmental Effects
On-Site Hazardous Material Spill	A spill of gasoline or diesel, process chemicals, or product. This accident could result from equipment spills, spills from vehicles, on-site trucking accident, or tank leak or rupture, with potential to affect land or water if not addressed in a timely manner.	A large spill may affect groundwater, soil, and surface water, adversely affecting the quality of groundwater, fish habitat, and wetland habitat, and result in the ingestion/uptake of contaminants by wildlife and limiting access to these resources by the public and First Nations.
Release of Off-Specification Effluent from Water Treatment Plant	The release of effluent that exceeds the *Metal Mining Effluent Regulations* or provincial effluent discharge standards. May result from overloading of the Water Treatment Plant.	A release of off-specification effluent could adversely affect Napadogan Brook and eventually the Nashwaak River. This could result in the short-term ingestion/uptake of contaminants by fish, wildlife, the public or First Nations. Downstream groundwater, soil, or wetlands could also be adversely affected.
Failure of a Water Management Pond Pump	The accident is based on a failure of a pump that could cause a Water Management Pond to overflow its embankments. It is assumed that this overflow condition would last a maximum of 12 hours before the problem is identified, and repair or replacement of the pump could occur.	Based on site drainage, an overflow of the water management ponds could potentially contaminate Sisson or Bird Brooks and Napadogan Brook. This could result in the short-term ingestion/uptake of contaminants by fish, wildlife, or the public or First Nations. Downstream groundwater, soil, or wetlands could also be adversely affected.
Off-Site Trucking Accident	An accident involving a truck carrying gasoline or diesel fuel for use on-site, or reagents used in the ore processing, or a spill of product being transported off-site to receiving locations. A spill of fuel, reagents concentrate, or product on external access roads could spread onto land and/or enter an adjacent water body.	An off-site trucking accident could result in a spill of the material being transported. This spilled material could adversely affect water quality in any watercourses close to the spill, the land and wetlands, and could affect the ability of the public and First Nations to use roads.
Vehicle Collision	A Project-related vehicle accident on road transportation networks outside the PDA, without a spill. Includes vehicle to vehicle collision, pedestrian strike, and wildlife strike.	A vehicle collision could adversely affect wildlife, members of the public or First Nations, including pedestrians, using Project access roads.
Fire	A fire resulting from Project activities could occur within the processing facility, or due to a fuel spill, or from an off-site vehicle accident.	A fire could result in release of emissions to the atmosphere, affect adjacent forest, endanger wildlife, and affect the ability of the public and First Nations to use surrounding forest areas.

Although they are unlikely to occur, some accident scenarios may result in significant environmental effects. In the unlikely event of an accident or malfunction, emergency response plans and corrective action procedures will be implemented to avoid or reduce environmental effects. The Project will have safety measures built in to manage potential upsets. Employees will be trained in operational procedures and environmental emergency preparedness and response procedures. With mitigation, most accident scenarios, if they occurred, would not result in significant environmental effects. A fire that endangered the life and/or health of the public and/or employees, or resulted in the mortality of a

species at risk, could be considered to have caused a significant environmental effect, but such an effect is highly unlikely to occur.

8.6 EFFECTS ON CAPACITY OF RENEWABLE RESOURCES

Though not identified as a valued environmental component, the Terms of Reference require that this Summary "address the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and the future".

Renewable resources in the regional assessment area that may be used to meet the needs of present and future generations include water resources, freshwater fish, forest resources and use of other traditional resources by First Nations. A significant adverse environmental effect on these resources could result in a reduced capacity to provide drinking water resources, and to support sustainable fishing and forestry, and other traditional uses.

After consideration of the Project and mitigation measures, no significant adverse residual environmental effects are considered likely to occur for any of the renewable resources. As there are no predicted significant adverse environmental effects on any renewable resources that may be affected by the Project, the effects of the Project on the capacity of these renewable resources are not significant.

8.7 CUMULATIVE ENVIRONMENTAL EFFECTS

For the cumulative environmental effects assessment, the EIA considers the environmental effects of the Project that could overlap with those of other past, present, or reasonably foreseeable future projects or activities. The other projects and activities considered in the EIA of the Project are described in Table 11.

Table 11 Other Projects or Activities for Consideration of Cumulative Environmental Effects

Category of Projects or Activities	Name of Specific Project or Activity	Brief Description of Specific Project or Activity
Past or Present Projects or Activities that have been Carried Out		
Industrial Land Use	Past or present use of land or resources for industrial purposes.	Historical and current use of land for commercial and industrial development in the regional assessment area. In addition, the past or present operation of several mining operations in New Brunswick, including the Bathurst mining camp and the PotashCorp mine.
Forestry and Agricultural Land Use	Past or present use of land or resources for forest resource harvesting or farming activities.	Historical and current use of natural resources for subsistence and economic development in the regional assessment area, particularly forestry resource harvesting, forestry operations, and agricultural and livestock farming.
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Past or present use of land or resources for traditional purposes by Aboriginal persons.	Resource gathering and harvesting activities, such as hunting, fishing, trapping, and plant and timber harvesting, and use of land or resources for spiritual, ceremonial or other traditional activities.
Recreational Land Use	Past or present use of land or resources for recreational activities.	Historical and current use of land for recreational purposes, including recreational hunting, fishing, trail development, and use of land for hiking, all-terrain vehicles, or snowmobiling.

Table 11 Other Projects or Activities for Consideration of Cumulative Environmental Effects

Category of Projects or Activities	Name of Specific Project or Activity	Brief Description of Specific Project or Activity
Residential Land Use	Past or present use of land or resources for development of residential dwellings.	Historical and current use of land and resources for residential development and the rural and urban development of modern towns and villages, including the nearby communities of Napadogan, Juniper, Millville, Stanley, and other nearby villages and communities.
Potential Future Projects or Activities That Will Be Carried Out		
Industrial Land Use	Closure of Brunswick Mine 12.	Brunswick Mine 12 is a base metal mine located in northern New Brunswick that will be closed in 2013. The mine occupies approximately 8.5 km^2 within the Little River Watershed.
	Restart of Open Pit Mining.	Stratabound Minerals Corp. is proposing to restart open pit mining activities at the reclaimed mine site located approximately 15 km to the northeast of the Heath Steele site. The ore will be transported to the mill at the Brunswick 12 mine for processing.
	AV Nackawic Recovery Boiler Capacity Increase.	AV Nackawic Inc. is proposing to increase the capacity of their recovery boiler by installing a separate fan and scrubber on the smelt dissolving tank. This modification will allow the company to increase their production of finished pulp by 50 tonnes per day.
	Shale Gas Exploration.	Throughout many parts of New Brunswick, various proponents are exploring the potential for commercial shale gas extraction.
	Mineral Exploration.	Mineral exploration occurs throughout New Brunswick under licence from the New Brunswick Department of Natural Resources.
	Mining Operations.	Development of new mining operations in the province, with several facilities either under exploration or development: Halfmile Lake mine, Stratmat mine, reopening of Caribou mine, reclamation of Restigouche mine, reopening of Murray Brook mine, reopening of Mount Pleasant mine.
Forestry and Agricultural Land Use	Forest Resource Harvesting Activities.	Future timber harvesting includes the construction and use of forest roads, thinning of trees, and removal of mature trees. Harvested areas are often treated and/or replanted to renew the forest resource.
	Farming Activities.	Future agricultural and livestock farming activities occur in rural areas throughout the province. Preparation of soil, planting of seeds/plants, irrigation, harvesting of crops, and grazing of livestock occurs at farms of various sizes.
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons includes resource gathering and harvesting activities, such as hunting, fishing, trapping, and plant and timber harvesting, and use of land or resources for spiritual, ceremonial or other traditional activities.
Recreational Land Use	Hunting and Fishing Activities.	Authorized future recreational hunting and fishing activities on Crown land and on private land where permitted by the Crown/landowner and when in season.
	ATV Use, Snowmobile, Hiking Trail Activities.	Future recreational use of trail networks in and around the region.
Planned Residential Development	Residential Subdivisions.	Any planned or future residential subdivisions in the area of central New Brunswick between Stanley, Millville, and Juniper.

Overall, there will be very little overlap between the environmental effects of the Project and those of other projects or activities that have been or will be carried out. Environmental effects of forestry activities in the Napadogan Brook watershed could act in combination with residual environmental effects of the Project and result in cumulative environmental effects.

The following additional mitigation measures will need to be employed by parties other than Northcliff to avoid or reduce the cumulative environmental effects of the Project.

- Forested Crown land that will be removed from the PDA will be accounted for by the New Brunswick Department of Natural Resources and the appropriate forest licensee in the management plans of the subsequent forest cycle.

- Conservation vegetation communities within the project development area will be replaced within the ecoregion and license block whenever stands meeting the criteria are available. The licensees, the regional New Brunswick Department of Natural Resources office and the Fish and Wildlife Branch will collaborate to identify replacement stands.

- Any saleable timber within the project development area would be allotted to the current licensee during site preparation, so there should be little or no requirement for additional allotments.

The residual cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried out are rated not significant.

9.0 FOLLOW-UP AND MONITORING

According to the *Canadian Environmental Assessment Act*, the EIA of the Sisson Project must include a follow-up program designed to verify the accuracy of the predictions and to determine the effectiveness of the mitigation measures implemented. Table 12 summarizes the follow-up programs proposed for the Project. Monitoring programs proposed for other purposes (for example, for compliance monitoring) are also identified as appropriate.

Table 12 Summary of Follow-up and Monitoring Programs

Valued Environmental Component	Follow-up or Monitoring Program

Air	• No follow-up required.
	• Monitoring for:
	  ◦ ambient particulate matter;
	  ◦ ambient air quality;
	  ◦ greenhouse gas emissions and reporting; and
	  ◦ sound pressure and vibration levels.

Land	• No follow-up required. • Monitoring program for species of conservation concern (Nodding ladies'-tresses).

Water	• Various follow-up programs to verify predictions of:
	  ◦ water temperature modelling verification;
	  ◦ changes in flow and wetted perimeter modelling;
	  ◦ monitoring of total suspended solids and embeddedness during Construction;
	  ◦ fish passage analysis;
	  ◦ fish tissue analysis;
	  ◦ water quality monitoring program (for surface water and groundwater); and
	  ◦ indirect changes to the wetlands.
	• Monitoring for:
	  ◦ deleterious substances, pH, and acute lethality;
	  ◦ effluent and water quality monitoring studies;
	  ◦ effluent characterization;
	  ◦ sub-lethal toxicity testing;
	  ◦ verification of changes in fish populations, fish usability, and benthic macroinvertebrate community;
	  ◦ water quality monitoring program (for surface water and groundwater).

Public Health and Safety	• Water quality monitoring program. • Fish tissue studies.

10.0 BENEFIT OF THE ENVIRONMENTAL ASSESSMENT TO CANADIANS

An environmental assessment is a valuable planning tool that integrates all environmental, engineering, and socioeconomic aspects of the Sisson Project into one document. The process itself also provides a good opportunity for the public and Aboriginal people to raise issues and concerns; these can then be integrated into the planning, design, review, approval, and development of the Project. Table 13 shows how the EIA process for the Sisson Project has benefitted Canadians.

Table 13 Benefits to Canadians from the EIA

Factors Providing Benefits to Canadians	Project Examples
Maximize positive environmental effects.	• Environmental effects were considered throughout all phases of the Project. • Final Project design will minimize undesirable environmental effects and maximize benefits.
Incorporate principles of sustainable development, including the precautionary principle.	• Project design and development will meet the need for tungsten and molybdenum without compromising the ecosystem's integrity for present and future generations.
Engage the public.	• Substantive and meaningful opportunities were provided for the public, stakeholder groups and communities to become informed about the Project, to voice their interests and concerns, and to provide valuable input into the planning and design of the Project.
Foster dialogue with First Nation communities.	• Many opportunities were provided for Aboriginal participation in the EIA to foster dialogue about the potential benefits of the Project, and to provide opportunities for Aboriginal issues, concerns and interests to be heard and addressed.
Advance scientific knowledge.	• Scientific knowledge of ecosystems in central New Brunswick increased. • It was demonstrated how a mine can be successfully developed in a remote, relatively undeveloped area of New Brunswick in an environmentally appropriate way.
Evaluate economic development.	• Opportunities were provided to all stakeholders and First Nations to learn about the economic development, employment, and other social benefits this Project can bring to New Brunswick communities.

11.0 OVERALL CONCLUSIONS OF THE EIA

Because planned and proven mitigation will be implemented to minimize environmental effects, the Project's planned routine activities will not result in any significant adverse environmental effects. While a significant environmental effect could result from a large scale fire, such an event is highly unlikely given the design measures and mitigation aimed at prevention, and timely and effective response should it occur.

The cumulative environmental effects of the Project in combination with other projects and activities that have been or will be carried out are rated not significant.

The environmental assessment of the Sisson Project has promoted sustainable development by balancing the elements of society, economy, and environment. Potential adverse environmental effects will be mitigated to levels that are considered not significant (or significant but highly unlikely), and therefore acceptable. The mitigation will evolve over the life of the Project in concert with environmental management initiatives, continuous improvement, and adaptive management. Through the government, First Nations and public review of the Environmental Impact Assessment Report, the planning of the Project has been an exercise in the implementation of sustainable development and is consistent with the precautionary principle.

The Sisson Project is particularly important for central New Brunswick, given the need for high quality opportunities to generate employment and income for communities to prosper. Substantial economic benefits will be realized. Northcliff will continue to work with interested stakeholders and First Nations to develop the Sisson Project in a manner that is socially and environmentally sustainable, and economically beneficial to the Project and society alike.

Overall, based on the results of this EIA, it is concluded that, with planned mitigation and management, the residual adverse environmental effects of the Project alone are not significant, except in the event of fire that would be highly unlikely to occur. Cumulative environmental effects of the Project in combination with those of other past, present, or reasonably future projects or activities that have been or will be carried out are rated not significant. A follow-up program is proposed to verify some of the environmental effects predictions or the effectiveness of certain mitigation measures.