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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 1:

Introduction

File No. 121416571

Date: May 2021

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1.0 INTRODUCTION

Joyce Direct Iron Inc. (Joyce Direct Iron; the Proponent) is proposing to develop an open pit iron ore mine in western Labrador, approximately 20 kilometres (km) to the northeast of the Town of Schefferville, Québec. The ore deposit for the Joyce Lake Direct Shipping Iron Ore Project (the "Project") lies on a peninsula of land in Attikamagen Lake (Figure 1.1). The mine will produce up to 2.5 million tonnes (Mt) of product per year. The product will be transported by dedicated trucks to the railway owned by Tshiuetin Rail Transportation Inc. and subsequently connecting to the Quebec North Shore and Labrador (QNS&L) line, for transportation to the Port of Sept-Îles.

The Project was registered with the Newfoundland and Labrador Department of Environment and Climate Change (NLDOECC) on October 15, 2012, but the Newfoundland and Labrador process expired November 18, 2016. A Project Description and Summary were accepted for review by the Canadian Environmental Assessment Agency (the CEA Agency, now called the Impact Assessment Agency of Canada; IAAC) on November 19, 2012. IAAC determined that a federal environmental assessment was required on January 4, 2013. This Environmental Impact Statement (EIS) has been prepared by Joyce Direct Iron in accordance with the requirements of the federal and provincial governments.

Joyce Direct Iron succeeded Labec Century Iron Ore Inc. ("Labec Century") as the Project Proponent on February 18, 2021 following an internal reorganization. All references to Labec Century as the Project proponent may be interpreted as now referring to Joyce Direct Iron.

1.1 Proponent Contact and Legal Entity

The Project is part of the Attikamagen Iron Property (the "Property"). The Property includes one group of claims straddling the boundary between the Provinces of Québec and Newfoundland and Labrador. The Property includes 135 designated claims located in Québec (which include the Hayot Lake taconite deposit) and six mineral licenses in Labrador (which includes the Project). The Property covers a total area of approximately 23,668 hectares.

The Project is comprised of six mineral licences located in Newfoundland and Labrador that are presently 100% owned by Joyce Direct Iron Inc. These licences include a total of 682 mineral claims and cover a total area of approximately 17,050 hectares.

1.2 Proponent

Joyce Direct Iron Inc. ("Joyce Direct Iron"), the Proponent, is 100% owned by Labec Century Iron Ore Inc. ("Labec Century"), the former project proponent. Joyce Direct Iron succeeded Labec Century as the Proponent on February 18, 2021.

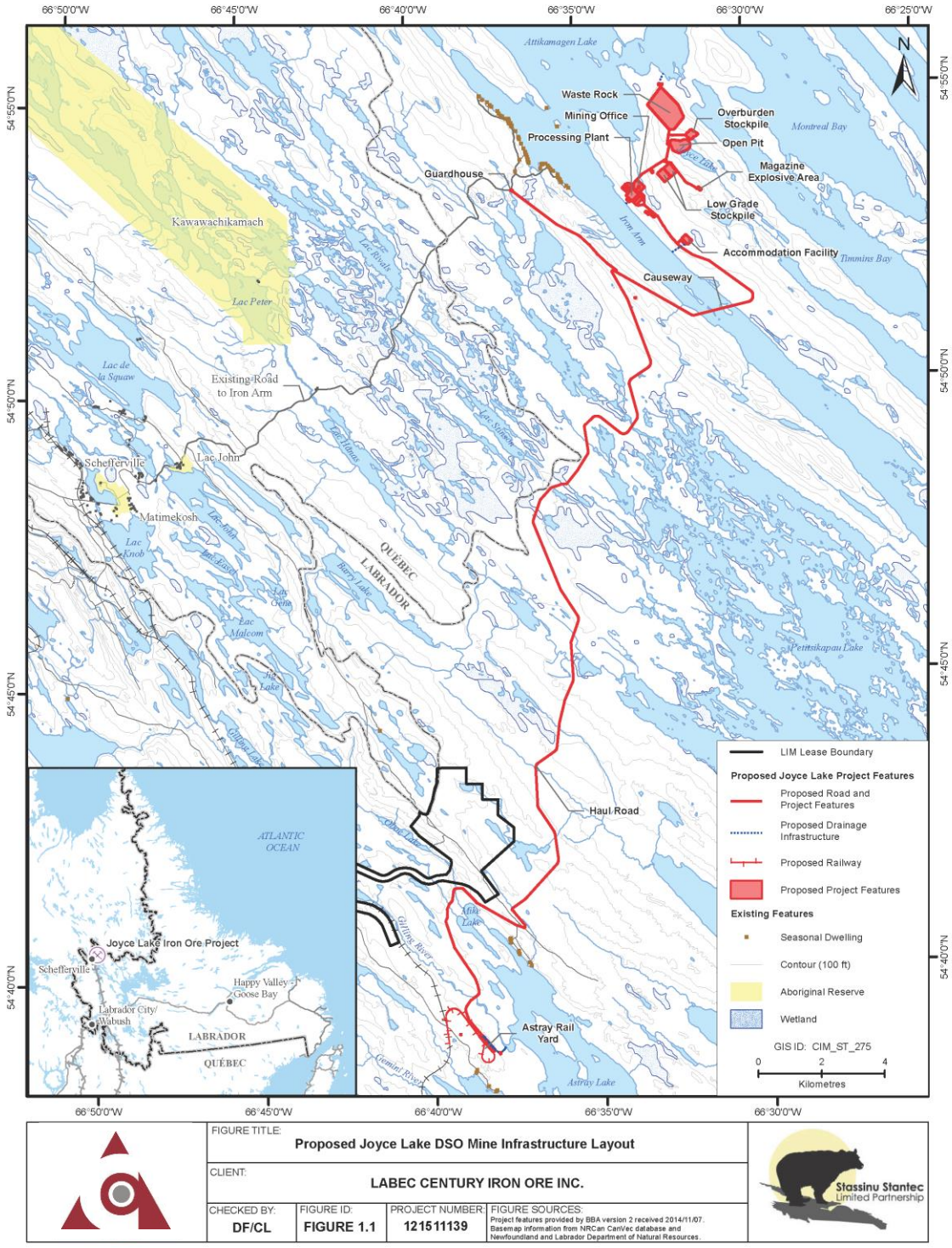

Figure 1.1 Proposed Joyce Lake DSO Mine Infrastructure Layout

Labec Century is a company incorporated in the Province of British Columbia, with 100% ownership by Century Global Commodities Corporation ("Century"), a TSX listed company. Century's interest in Labec Century is held through Century Iron Ore Holdings Inc., a 100% owned subsidiary of Century. An organizational chart for Joyce Direct Iron is shown in Figure 1.2. Contact information for the proponent is below.

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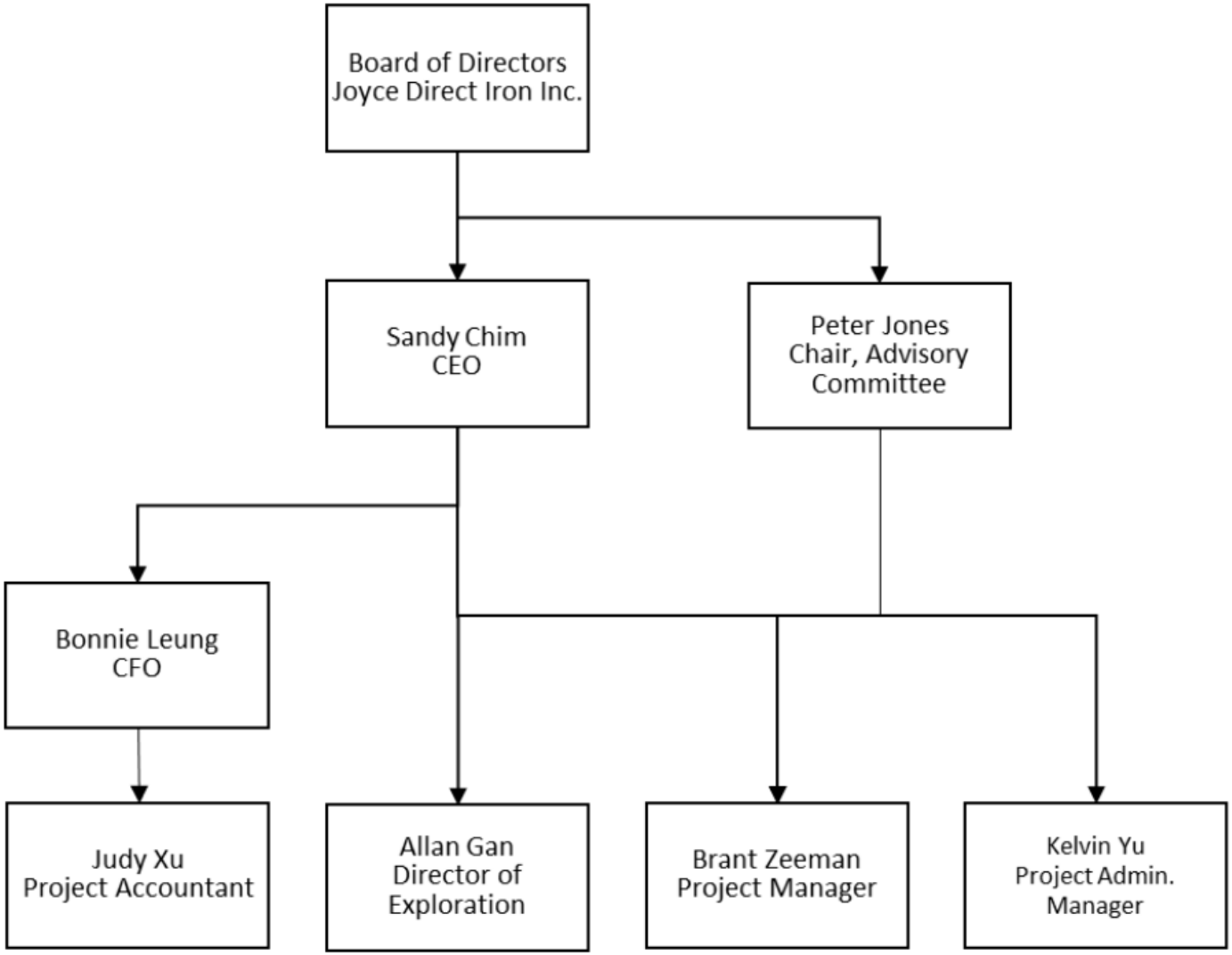

Figure 1.2 Joyce Direct Iron Organizational Chart

1.3 Joyce Lake Policies

Joyce Direct Iron Policies relating to the Project will include: Health and Safety Policy, Environmental Policy, Benefits Policy, Community Relations, Indigenous Relations, Safety, Health and the Environment as well as Benefits policies. The Board of Directors will also be responsible for monitoring the Joyce Direct Iron negotiation of Impact Benefits Agreements (IBAs) and key contractual arrangements with the Government of Newfoundland and Labrador.

1.3.1 Corporate Responsibility and Sustainability

Joyce Direct Iron Board of Directors will regularly review and revise key policies and monitor management's performance of implementing and achieving appropriate results. The policies will:

- Uphold high standards of honest and ethical behaviour;
- Respect the rights of local Indigenous groups;
- Protect the health and welfare of employees and contractors at our sites;
- Provide a good place to work providing opportunity for training and growth of employees;
- Provide a positive partnership for the communities where we operate;
- Reduce environmental harm and rehabilitate land affected by operations;
- Provide safe and environmentally acceptable work practices;
- Build effective business and community relationships;
- Generate positive sentiment with social agreements and regulatory requirements; and
- Use best practices to explore and mine iron ore resources to maximize benefits to all stakeholders.

1.3.2 Insurance and Liability Management

Joyce Direct Iron maintains or will maintain insurance and manage liabilities. Adequate insurance coverage for the Company and as appropriate the Project will be in place consistent with the stage of the Company and the stage of the Project. Insurance coverage includes worker's compensation insurance, automobile liability insurance, and general commercial liability insurance. Following permitting, financing and approval to proceed with Project construction and subsequently during operation and closure, the Company will acquire appropriate insurance coverage commensurate with its liabilities and consistent with normal industry practice.

1.3.3 Health and Safety Policy

The health and safety of Joyce Direct Iron employees and contractors is our priority above all others. We are committed to provide a safe and healthy work environment for employees and contractors and health and safety is not compromised by any other business priority.

Health and safety programs will include training for employees, specific training for emergency response teams, recognition programs for achievement as well as an information flow for continuous safety improvement.

Key Aspects of our Health and Safety Policy include:

- Companies providing services to Joyce Direct Iron, including contractors, must comply with the same high standards of health and safety as the Company;
- Joyce Direct Iron will provide facilities, equipment, tools, procedures, safety programs and training for employees to work in a healthy manner and be injury free;
- Employees in leadership positions are responsible for supporting the Company's overall Safety Program and guiding and instructing employees to use safe working practices and to comply with safety rules; and
- The Company intends to comply with all applicable regulations and standards established by regulatory bodies concerning the health and safety of our employees and contractors.

Joyce Direct Iron will:

- Provide adequate resources for health, safety, and environmental programs;
- Focus on continuous improvement in effectiveness of health and safety by using best practice procedures;
- Comply with all appropriate legislation, regulations, standards and codes of practice;
- Establish and implement a Health and Safety Management system together with generating a positive culture of the primary importance of safety and health as well as environmental responsibility;
- Manage risk by hazard identification, elimination and monitoring;
- Ensure employees and contractors are fully instructed and trained to perform their duties safely;
- Use positive reinforcement and involve employees and contractors in the development of health and safety procedures; and
- Co-operate with government and local communities on health, safety and environmental issues to develop a positive contribution to best practice and to maximize performance.

1.3.4 Environmental Policy

Joyce Direct Iron is committed to a high level of corporate responsibility for environmental stewardship through Project development, operation and closure, by meeting or exceeding legislative requirements.

Our environmental goals include to:

- Set continuously improving environmental targets and measure performance against them;
- Minimizing adverse environmental impacts whenever possible;
- Diligently monitor and report all incidents of an environmental nature as appropriate;
- Comply positively with legislation, regulation, standards and codes of practice;
- Involve regulators and local communities in the monitoring of environmental performance; and
- Pro-actively and progressively rehabilitate during and after operations.

To achieve our goals we will:

- As a high priority implement business practices and systems to monitor and control environmental management for construction, operation and closure;
- Use a management system to monitor and control all aspects of environmental management;
- Wherever possible reduce the Project adverse impacts on the natural environment;
- Use education and training with employees, contractors and suppliers to ensure they adopt Joyce Direct Iron corporate environmental goals and performance requirements;
- Assign monitors to evaluate Project environmental compliance and performance and report and evaluate performance regularly;
- Whenever possible limit impact and apply remediation to return disturbed areas to their pre-disturbance conditions;
- Require contractors and suppliers to provide guidelines of their procedures to reduce usage, and to recycle and reuse materials and to comply with regulations as well as Joyce Direct Iron environmental performance standards;
- Consistently and transparently engage with local communities and other stakeholders to verify performance reporting and monitoring;

- Ensure Joyce Direct Iron maintains financial reserves to rehabilitate the Project by progressive and final rehabilitation at closure; and

- Develop remedial actions in the event of a non-compliance incident and additionally develop plans to be implemented to avoid reoccurrence.

1.3.5 Benefits Policy

Joyce Direct Iron's employment and benefits policy will be governed in part by any contractual agreements, yet to be negotiated, which include Impact and Benefit Agreements with Indigenous groups and agreements with the Government of Newfoundland and Labrador. Joyce Direct Iron expects to negotiate these agreements prior to starting work on the Project.

Whenever possible, priority for employment as well as provision of goods and services will be given to skilled and qualified residents and competitive businesses in the local area of the Project (i.e., Schefferville, Matimekush-Lac John, and Kawawachikamach).

Priority for employment as well as the competitive provision of goods and services will also be given to skilled and qualified residents and competitive businesses in compliance with Newfoundland and Labrador as well as federal government requirements.

Joyce Direct Iron will facilitate initiatives related to training and diversity.

More detail on employment and benefits initiatives will be defined in the Project Benefits and Diversity Plans. These plans are subject to approval by the Government of Newfoundland and Labrador.

1.3.6 Community and Indigenous Relations

The Company respects the interests and rights of individuals and communities where we operate and to continue and maintain constructive dialogue and interaction. We interact with local residents, including Indigenous groups, governments, non-governmental organizations and other interested groups to facilitate beneficial resource development. We will respect agreements with Indigenous groups and will prioritize employment and doing business with local Indigenous communities as well as Newfoundland and Labrador residents.

Our goal is to establish ongoing and open dialogue with local residents, governments and organizations in order to address key issues associated with our business and help improve the quality of life for all. We promote mutual respect, ongoing dialogue and the desire to work together to achieve positive outcomes.

Joyce Direct Iron expects to help communities build capacity to ensure sustained prosperity and to continue to support community projects.

1.3.7 Environmental Management

Joyce Direct Iron will implement the key elements of an environmental management system. This includes the planning, development of Environmental Management Plans, preparation of site-specific Environmental Protection Plans, the presence of an on-site monitor, and regular reporting to government and stakeholders. These are described in more detail in Chapter 7: Environmental Management.

1.4 EIS Team

The EIS and its supporting studies were prepared by Joyce Direct Iron, Stassinu Stantec Consulting Ltd.**,** WSP Global (formerly GENIVAR), BBA, Blumetric and LVM. The qualifications of personnel conducting surveys for migratory birds, species at risk and species of conservation concern, and wetland delineations is provided in Appendix A.

1.5 Purpose of the Project

The purpose of the Project is to develop an open pit iron ore mine at the Joyce Lake Project for the production of lump and fines products through dry processing. These products will be suitable for export sales to international steel producers who essentially purchase out of the seaborne trade. Chinese steel producers are expected to be the primary market for the products, with potential for some products to be sold in European markets. Importantly, existing community and transportation infrastructure will be used by Joyce Direct Iron to support its endeavors to produce iron ore products for the world market.

1.6 Project Overview

The following subsections summarize the history and components of the Project. A detailed description is provided in Chapter 2: Project Description.

1.6.1 Project Background

The Schefferville area is characterized by a sub-arctic continental climate with mild summers and very cold winters. This area is in the boreal forest with low rolling hills rising from 600 to 700 m above mean sea level.

The Project is situated on the eastern end of the Labrador Trough, a rich belt of iron ore that stretches through Labrador and northern Québec. Written references to mineral occurrences in the Schefferville area (originally known as Knob Lake) were first included in the diaries of missionary Louis Babel in 1854. Using those references, Albert Peter Low (A.P. Low) of the Canadian Geological Survey (CGS) began detailed mapping of the area in 1892 and continued the work in 1895/96. During that period, Low published a report which highlighted the existence of large iron ore deposits in the area.

In 1937, Labrador Mining and Exploration ("LM&E") explored the area between the Petitsikapau Lake and Iron Arm. At that time, work consisted of surface mapping and sampling. In 1951, the Iron Ore Company of Canada ("IOC") completed a geological mapping survey covering the area between Schefferville and Attikamagen Lake, which included the Joyce Lake deposit.

Mining operations in the area began in the 1950s when IOC began iron mining operations and established the Town of Schefferville. Although iron ore mining by IOC ceased in the area in the early 1980s, there has been a resurgence of interest in the recent years, with several companies actively exploring and evaluating the iron potential.

Labrador Iron Mines Holdings Limited ("LIM") have been pursuing the development of several properties in the Schefferville area, and their Schefferville Iron Ore (James Mine) operation produced iron ore starting 2012 and ending 2014. The James Mine has since shut down and undergone site reclamation work. LIM continues to advance their Houston Project. Tata Steel is the majority owner of the DSO ("direct shipping ore") project at Elross Lake, also in the Schefferville area.

Other notable work in the area included:

- In 1952, IOC examined 100 km of iron formation near the Iron Arm, Dyke, and Snelgrove Lakes.
- In 1953, IOC studied the area north of Attikamagen Lake. During the same year, LM&E completed 24 km of magnetic survey and collected 70 grab samples and one bulk sample on the Attikamagen Area.
- Geological reconnaissance mapping, diamond drilling, and airborne geophysical surveys were conducted by LM&E from 1960 to 1980.
- In 2007, Champion Iron Ltd. acquired the Attikamagen Iron Project (Labrador side) and conducted an airborne magnetic, gamma-ray and very low frequency electromagnetic (VLF-EM) geophysical survey on the property, as well as a preliminary surface-mapping and a reconnaissance sampling program to provide ground reference samples for correlation with the geophysical data.

Labec Century has undertaken the following exploration activities at the Joyce Lake prospect since 2010:

- In March 2010, Labec Century completed a ground gravity survey of the Joyce Lake prospect in an attempt to discriminate between hematite and magnetite-bearing mineralization based on their density values at Joyce Lake. The data collected from the ground gravity survey were used to determine drillhole locations.

- In the fall of 2010, Labec Century drilled four (4) diamond core boreholes (362 m) at the Joyce Lake prospect. The boreholes encountered very blocky conditions, with a very low core recovery rate in these holes, both the core samples and the fine cutting sludge samples were collected to test the taconites and DSO. The iron assay results ranged from 27% to 68% total iron (TFe); the sludge had a higher iron content than the blocky core samples, indicating the potential for high grade DSO mineralization at the Joyce Lake prospect.

- In 2011, 38 boreholes were drilled at the Joyce Lake prospect for a total of 4,893 m. Of these holes, 32 holes totaling 3,930 m were drilled with reverse circulation (RC) drilling, mainly at the nose and hinge zones of the Joyce Lake Area Syncline, while six holes of diamond core drilling, totaling 1,053 m, were completed to test the flank and southern extension of the Joyce Lake Area Syncline. Drillhole Joy-11-06 intersected 139.0 m grading 53.1% TFe, and drillhole Joy-11-07 intersected 91.0 m grading 52.5% TFe, including 42.0 m grading 65.4% TFe.

- In 2012, 78 holes were drilled, totalling 7,618 m using two RC drill rigs. This program exposed DSO within the hinge and the northern limb of the syncline. The area of high grade mineralization at shallow depth was drilled on a 50 m × 50 m grid. Assay results confirmed the continuity and extension down plunge, along strike of the high grade mineralization (>60% TFe) at Joyce Lake with a thickness up to 66 metres. Additionally, metallurgical and mineralogical studies were completed on three bulk sample to determine various size fractions grading at least 64% TFe.

- In 2013, Labec Century completed a two-phased drill program that encompassed RC and Triple Tube core drilling. 56 drill holes were completed, 30 RC holes and 26 Triple Tube DDH. Meterages totalled 6,244.2. These holes not only expanded the main mineralized zones further south, but also exposed good DSO potentials at northeast flank of the Joyce Lake syncline. Assays continued to show high grades with assay results up to 69.4% TFe.

In addition to ongoing exploration activities in the vicinity of the Project, Labec Century has undertaken environmental and engineering studies in 2012, 2013 and 2014 to provide baseline data to be used to support environmental approvals required for the Project to proceed. The following studies have been initiated and/or completed:

- flora and fauna (e.g., mammals, birds, species at risk, and vegetation);
- fish and fish habitat;
- water and sediment quality (e.g., suspended solids);
- hydrology, including surface waterbodies and wetlands;
- hydrogeology and geotechnical characterization;
- historic and heritage resources;

- land and resource use; and
- baseline socio-economic environment (e.g., community infrastructure, labour, and economy).

Labec Century published a Feasibility Study report on the Project on April 14, 2015, which is available on the System for Electronic Document Analysis and Retrieval (https://www.sedar.com/homepage_en.htm).

1.6.2 Project Components

The Project includes construction, operation and maintenance, and closure and decommissioning of the following primary components:

- open pit;
- waste rock and overburden stockpiles;
- modular/portable dry processing plant;
- ancillary infrastructure to support the mine and processing plant, including a workshop, explosives magazine storage, office buildings, warehouse area and employee facilities;
- conveyors, stockpiles, sewage and water treatment units, generators, fuel storage, mobile equipment, and drainage infrastructure (i.e., ditches, settling ponds);
- haulage road between the processing plant and the Astray rail yard, including a rock causeway linking the open pit area to the mainland across Iron Arm; and
- a rail loop and rail yard at Astray for loading product.

These components are shown in overview in Figure 1.1. Project components are described in more detail in Chapter 2: Project Description.

All components will be permitted, constructed, operated, and decommissioned in accordance with governing federal, provincial, and industry regulations and standards.

1.6.3 Project Activities

To prepare for the surface site works, Joyce Direct Iron will develop protocols to facilitate the execution of the proposed works in an environmentally responsible and safe manner. General construction activities for the Project will include:

- site preparation (i.e., clearing of vegetation and excavation);
- construction of infrastructure;

- installation of facilities; and
- commissioning.

Project construction is scheduled to begin upon completion of all necessary approvals and financing and is subject to market conditions. The Project will use a dry process for processing of iron ore. This will involve dry crushing and dry screening of run-of-mine ore to produce two iron ore products:

- iron ore lump product between 6.3 and 31.5 mm in diameter; and,
- iron ore sinter fines product less than 6.3 mm in diameter.

Self-contained mobile primary and secondary crushing units and a mobile screening unit will be used for ore-crushing and screening on-site to produce the lump and sinter fines products. This process will not produce tailings. The process recovery will be 100% and water will not be used for ore processing. Production tonnage will be up to 2.5 Mt of product per year. Details on the production process and production rate is provided in Chapter 2: Project Description.

A Rehabilitation and Closure Plan will be prepared and submitted, as required under the Newfoundland and Labrador *Mining Act*, Chapter M-15.1, Sections (8), (9) and (10). In accordance with the Act, this Plan will describe the process of rehabilitation of the Project at all stages up to and including Closure. The Rehabilitation and Closure Plan will be adjusted as required over the life of the mine and will be considered a "live" document, with review and update as needed throughout the life of the Project.

The final review of a Rehabilitation and Closure Plan generally occurs once the mine closure schedule is known, and typically 12 months or more before end of operation. The Plan will define the actions necessary to achieve the Rehabilitation and Closure objectives and requirements.

1.7 Project Location and Surrounding Land Uses and Infrastructure

The Project is located on the eastern end of the Labrador Trough, a rich belt of iron ore that stretches through Labrador and northern Québec. The coordinates for elements of the Project are provided in Table 1.1.

1.7.1 Project Location

The infrastructure for the Project, as shown in Figure 1.1, is located wholly on provincial crown land for which the surface property rights belong to the Government of Newfoundland and Labrador, with the exception of the connection point of the new rail loop to the Tshiuetin Rail Transportation main line, which owns surface rights at the rail loop. Joyce Direct Iron will submit an application for a mining lease on Crown Land from the Province in due course, and will enter into an agreement with Tshiuetin Rail Transportation for use of their land to connect to the new product load out rail loop.

Table 1.1 Project Coordinates

Feature	Description	Longitude (x)	Latitude (y)
Project Site Centre	Approximate centre of the entire proposed Joyce Lake Project Site	66° 34' 49.500" W	54° 46' 48.010" N
Processing Plant	Centre of Processing Plant Infrastructure	66° 33' 21.040" W	54° 53' 10.970" N
Open Pit	Open Pit NW of Joyce Lake	66° 31' 53.707" W	54° 53' 59.308" N
Mine Site Centre	Centre of all mine infrastructure found on the peninsula between Iron Arm and Timmins Bay	66° 32' 26.329" W	54° 53' 43.900" N
Rail Loop	Centre of Rail Loop and associated infrastructure	66° 38' 43.896" W	54° 38' 54.713" N
Haulage Road	Centre of the entire length of the haulage road, from the intersection of the processing plant road to the rail loop	66° 35' 23.792" W	54° 45' 58.370" N

1.7.2 Proximity of the Project to Federal Lands

The proximity of the Project area to federal lands such as National Parks, Indian Reserves and Canadian Force Bases is provided in Table 1.2.

Table 1.2 Proximity of Project Area to Federal Lands

Nearest Federal Lands	Approximate Distance from Joyce Lake (km, via straight line)
Newfoundland and Labrador	
Torngat Mountains National Park Reserve	430
5 Wing Goose Bay (Canadian Forces Base)	435
Sheshatshiu (Indigenous community)	442
Québec	
Kawawachikamach (Indigenous community)	13
Lac John (Indigenous community)	19
Matimekosh (Indigenous community)	21
Mingan Archipelago National Park Reserve	563
3 Wing Bagotville (Canadian Forces Base)	792

1.7.3 Geographical Setting

The Joyce Lake Project is located within a relatively rugged physiography with rolling hills and valleys reflecting the structure of the underlying bedrock. Elevation in the vicinity of the Project varies from 472 m on the shores of Iron Arm up to 564 m at the highest point (approximately 350 m north of Joyce Lake). Mineral exploration drilling to date and review of regional geologic mapping indicates a lithological profile characterized by thin deposits of predominantly sandy to silty glacial till and areas of exposed bedrock. The Project is located in the zone of 'isolated patches of permafrost', near the southern extremity of the 'sporadic discontinuous permafrost' zone (Natural Resources Canada [NRCan] 1993). Snow cover is an important hydrological parameter in this area.

The lakes, ponds, and streams in this part of western Labrador form part of the Churchill River watershed. The Project lies on a peninsula of land in Attikamagen Lake, which drains south to Petitsikapau Lake via Iron Arm, then into Dyke Lake, the Ashuanipi River, and into the Smallwood Reservoir. The Smallwood Reservoir is the main source of water to the Churchill River. Streams south of Iron Arm drain into Astray Lake which then drains to Dyke Lake. Joyce Lake is a small waterbody. It has an area of approximately 37 ha and a maximum depth of 23 m. In general, the waterbodies present good-quality water and results are typical of low-productivity waters. Twenty-three stream sections have been identified as stream crossings or potential stream crossings (GENIVAR 2013a).

The rare plant and communities survey conducted for the Project (GENIVAR 2013b) indicates that vegetation habitats occupy much of the area in the vicinity of the Project. Thirteen upland habitats were identified during the survey. Open spruce-moss and spruce-lichen forests are the most abundant forest types in the area. Non-forested upland sites in the area are dominated by post-fire regeneration habitats. Moderately and highly-weathered rock barrens are found on top of most of the highest mountains in the vicinity of the Project and are similar to alpine tundra environments. More marginal habitats such as human disturbances, clear cuts and exposed sand and gravel complete the upland habitats. Peatlands are the most abundant wetland type in the area (GENIVAR 2013b).

An overview of the environment is provided in Chapter 4: Environmental Setting and detailed descriptions of the baseline environment are provided in the Existing Environment section of Chapters 10 to 22.

Wildlife species present in the Project area, and a detailed description of their habitat is discussed in Chapter 16: Birds, Wildlife and their Habitats and Chapter 17: Species at Risk and Species of Conservation Concern. Fish species present in the Project area are discussed in Chapter 15: Fish and Fish Habitat.

1.7.4 Land Tenure and Mineral Rights

The Joyce Lake Project is located within six mineral licenses in Newfoundland and Labrador. Joyce Direct Iron has a 100% registered interest in the licenses. The Project comprises six map-staked licenses totaling approximately 17,050 ha. A description of the Joyce Direct Iron exploration license holdings for the Project is shown in Table 1.3.

Table 1.3 Joyce Lake Licences

Licence	Claims	Approximate Area (ha)	NTS Areas	Issuance Date	Renewal Date	Work Requirement (WR) Year	WR Due Date
020753M	10	250	23J/16	2013-01-11	2023-01-11	9	2022-03-14
020518M	4	100	23J/16 23J/15	2012-10-18	2022-10-18	9	2021-12-17
020517M	51	1,275	23J/15	2012-10-18	2022-10-18	9	2021-12-17
020238M	253	6,325	23J/16 23J/15	2005-11-07	2025-11-07	16	2022-01-06
020232M	108	2,700	23J/15 23O/02	2008-03-20	2023-03-20	14	2022-05-19
020231M	256	6,400	23J/16 23J/15	2005-11-07	2025-11-07	16	2022-01-06

1.7.5 Land Use, Land Zoning or Community Plans

There is no zoning that applies to the Project area. The Project area lies outside the areas for which there is a municipal or provincial land use plan.

The Project falls within Forest Management District 22 (Churchill Falls to Wabush), which is an approximately 8 million ha area of land in western Labrador (NLDOECC 2011). The Project area is also located on lands covered by several management areas for large and small game. A detailed discussion of land use plans that are applicable to the Project area is provided in Chapter 19: Current Use of Land and Resources for Traditional Purposes by Indigenous Persons and Chapter 20: Other Current Use of Land and Resource Use.

1.7.6 Environmentally Sensitive Areas

There are no designated sensitive areas or special areas in the Project area, including designated wildlife areas, stewardship zones, parks and natural areas. Other sensitive areas can include those areas that are important to species of conservation concern, which are discussed in Chapter 17.

1.7.7 Local and Indigenous Communities

The areas most likely to interact with the Project include western Labrador (i.e., Economic Zone 2, which includes Labrador City, Wabush and Churchill Falls), as well as Schefferville, Matimekush-Lac John, and Kawawachikamach in Québec. The population of western Labrador was 9,831 in 2016, with the majority living in Labrador City (Statistics Canada 2017). In 2016, there were 1,402 people residing in the four communities near the Project that are located in eastern Québec (Statistics Canada 2017). Proximity to each community, as well as the communities of Sept-Îles and Uashat are provided in Table 1.4.

Table 1.4 Proximity to Local and Indigenous Communities (From Project Centre)

Feature	Approximate Distance from Project (km)
Schefferville	20
Kawawachikamach	13
Lac John	19
Matimekosh	21
Labrador City	205
Wabush	205
Uashat	507
Sept-Îles	509

Schefferville is located approximately 2 km from the Labrador-Québec border and approximately 20 km from the Project area. It was established by IOC in 1954 to support mining operations in the area. The municipality is adjacent to the Matimekosh reserve, and the two communities are closely linked. In 2016, the Schefferville population was 155 (Statistics Canada 2017).

The Naskapi Nation of Kawawachikamach includes the Kawawachikamach reserve, approximately 16 km northeast of Schefferville, and a larger uninhabited territory to the northeast of the reserve. Kawawachikamach had a total population of 601 people in 2016 (Statistics Canada 2017).

The Innu First Nation of Matimekush-Lac John comprises two communities: the Matimekosh reserve, which is the largest community in the area, on the edge of Pearce Lake adjacent to Schefferville, and the Lac John reserve, located 3.5 km from Matimekosh and Schefferville. In 2016, the population of the Matimekosh reserve was 613 and the population of Lac John was 33.

1.7.8 Traditional Indigenous Territories, Treaty Lands Indian Reserve Lands

Five Indigenous groups with asserted land claims or traditional territory have been identified in the vicinity of the Project:

- Innu Nation of Labrador;
- NunatuKavut Community Council;
- Naskapi Nation of Kawawachikamach;
- Innu First Nation of Matimekush-Lac John; and
- Innu First Nation of Uashat mak Mani-Utenam.

Potential or established Indigenous treaty rights and related interests are identified and assessed in Chapters 8: Potential or Established Indigenous and Treaty Rights and Related Interests and Chapter 23: Adverse Impacts and Measures to Address Adverse Impacts on Indigenous Treaty Rights.

1.8 Regulatory Framework and the Role of the Government

The sections below describe the regulatory framework for the Project, including the provincial and federal environmental assessment (EA) frameworks, and anticipated permitting requirements.

1.8.1 Environmental Assessment Regulatory Framework

The Project is subject to EA under the Newfoundland and Labrador *Environmental Protection Act (*NLEPA*)* and associated *Environmental Assessment Regulation*. The Project is a Designated Project under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). These processes are discussed below.

1.8.1.1 Federal

Federal EA is regulated under CEAA 2012 and is administered by IAAC. Under CEAA 2012, projects included in the *Regulations Designating Physical Activities* require federal EA. The Project is a Designated Project pursuant to CEAA 2012 *Regulations Designating Physical Activities* (Schedule of Physical Activities, Section 16(a)) as it involves the construction, operation, and decommissioning of a metal mine, other than a gold mine, with an ore production capacity greater than 3,000 t/d. The production target for the Project is up to 2.5 Mt/yr, which is equivalent to over 5,000 t/d on an annual basis. Designated Projects are "screened" under the process described in Sections 8 through 12 of CEAA 2012, to determine whether an EA is required. IAAC advised that an EA is required for the Project on January 4, 2013.

Other federal departments are also providing specialized knowledge or expert advice through both the federal and provincial EA processes:

- Environment and Climate Change Canada;
- Fisheries and Oceans Canada (DFO);
- Transport Canada;
- Natural Resources Canada (NRCan)
- Canadian Transportation Agency; and
- Health Canada.

1.8.1.2 Provincial

Mining projects in Newfoundland and Labrador are subject to environmental assessment under the NLEPA and *Environmental Assessment Regulation*. The EA Division of NLDOECC administers the process including:

- consulting at every stage with interested government departments and the public;
- evaluating submissions by proponents and reviewers;

- advising the Minister on potential environmental effects prior to decisions; and
- monitoring released projects to ensure compliance and effectiveness of mitigation.

An undertaking that is subject to the NLEPA is required to be registered for examination by NLDOECC. The registration outlines the proposed project and describes how it will affect the bio-physical and socio-economic environment. At the conclusion of the review period, the Minister advises the proponent whether the undertaking will require an Environmental Preview Report (EPR), an EIS, or if the undertaking has been released or rejected.

Provincial departments and agencies participating on the EA Committee include:

- NLDOECC, EA Division;
- NLDOECC, Pollution Prevention Division;
- NLDOECC, Water Resources Management Division;
- Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA), Wildlife Division;
- NLDFFA, Land Management Division;
- Newfoundland and Labrador Department of Tourism, Culture, Arts and Recreation (NLDTCAR), Provincial Archaeology Office;
- Newfoundland and Labrador Department of Immigration, Population Growth and Skills (NLDIPGS), Skills Development Division;
- NLDIPGS, Labour Market Development Division;
- Newfoundland and Labrador Department of Industry, Energy and Technology (NLDIET), Mines Branch; and
- Intergovernmental and Indigenous Affairs Secretariat.

1.8.2 Other Regulatory Approvals and Legislation

In addition to federal and provincial environmental assessment, federal and provincial legislative and regulatory requirements and approvals may be required for the Project (Table 1.5).

Table 1.5 Potential Permits, Approvals and Authorizations

Permit, Approval or Authorization	Legislation	Issuing Agency
Provincial		
• Release from EA Process	*Environmental Protection Act*	NLDOECC – EA Division
• Permit to Occupy Crown Land	*Crown Lands Act*	NLDOECC – Crown Lands Division
• Permit to Construct a Non-Domestic Well • Water Resources Real-Time Monitoring • Certificate of Environmental Approval to Alter a Body of Water; • Culvert installation; • Fording; • Stream modification or diversion; and • Other works within 15 m of a body of water (site drainage, dewater pit, settling ponds)	*Water Resources Act*	NLDOECC – Water Resources Management Division
• Certificate of Approval for Construction and Operation • Certificate of Approval for Generators • Certificate of Approval for Industrial Processing Works • Approval of Waste Management Plan • Approval of Environmental Contingency Plan (Emergency Spill Response) • Approval of Environmental Protection Plan	*Environmental Protection Act*	NLDOECC – Pollution Prevention Division
• Permit to Control Nuisance Animals	*Animal Health and Protection Act*	NLDFFA – Wildlife Division
• Pesticide Operations License	*Environmental Protection Act*	NLDOECC – Pesticides Control Section
• Blasters Safety Certificate • Magazine License • Approval for Storage and Handling Gasoline and Associated Products • Temporary Fuel Cache • Fuel Tank Registration • Approval for Used Oil Storage Tank System (Oil/Water Separator) • Fire, Life and Safety Program • Certificate of Approval for Waste Management System	*Environmental Protection Act*	Digital Government and Service NL (DGSNL)
• Approval of Development Plan, Closure Plan, and Financial Assurance • Mining Lease • Surface Rights Lease • Quarry Development Permit	• *Mineral Act* • *Mining Act* • *Quarry Materials Act*	NLDIET – Mineral Lands Division
• Operating Permit to Carry Out an Industrial Operation During Forest Fire Season on Crown Land • Permit to Cut Crown Timber • Permit to Burn	*Forestry Act*	NLDFFA – Forestry and Wildlife Agency
• Approval to Construct and Operate a Railway in Newfoundland and Labrador • Protected Roads Access Permit	• *Rail Service Act* • *Urban and Rural Planning Act*	Newfoundland and Labrador Department of Transportation and Infrastructure (NLDTI)

Table 1.5 Potential Permits, Approvals and Authorizations

Permit, Approval or Authorization	Legislation	Issuing Agency
Federal		
• Authorization under the *Fisheries Act*	*Fisheries Act*	DFO
• Application to construct a major work (causeway)	*Canadian Navigable Waters Act*	Transport Canada
• Aquatic Environmental Effects Monitoring (as per MDMER)	*Fisheries Act*	Environment and Climate Change Canada
• License to Store, Manufacture or Handle Explosives	*Explosives Act*	NRCan
• Approval to construct a railway	*Canada Transportation Act*	Canadian Transportation Agency

1.8.3 Government Environmental Policies, Resource Management, Planning, or Study Initiatives

The following provincial, regional, and municipal strategies and plans pertain to the Project:

- Mining the Future 2030: A Plan for Growth in the Newfoundland and Labrador Mining Industry (Government of Newfoundland and Labrador and Mining Industry NL 2018);
- Labrador West Community Needs Assessment (Labrador West Chamber of Commerce 2010);
- Northern Strategic Plan (Labrador and Aboriginal Affairs 2010);
- Provincial Strategy for the Inclusion of Persons with Disabilities in Newfoundland and Labrador (Newfoundland and Labrador Department of Advance Education and Skills 2012b);
- Apprenticeship Wage Subsidy Program (Newfoundland and Labrador Department of Advanced Education and Skills 2012a);
- Aboriginal Consultation Policy on Land and Resource Development Decisions (GNL 2013)
- Guide to Gender Diversity in Employment (Federal-Provincial-Territorial Ministers Responsible for the Status of Women 2016); and
- Uncommon Potential – A Vision for Newfoundland and Labrador Tourism (NLDTCAR 2016).

Where relevant, the implications of government policies, standards and initiatives will be discussed at the appropriate level.

1.8.4 Policies and Guidelines of Potentially Affected Indigenous Groups

Joyce Direct Iron is not aware of any policy of Potentially Affected Indigenous Groups that adversely impacts Joyce Direct Iron or the Project.

1.8.5 Objectives, Standards, and Guidelines

Objectives, standards, and guidelines used in the EIS to assist in the evaluation of potential environmental effects are provided in Table 1.6.

Table 1.6 Standards, Policies, and/or Guidelines

Standard/Guideline	Applicable EIS Chapter
Provincial	
Accord for the Protection of Species at Risk	Chapter 17: Species at Risk and Species of Conservation Concern
Atlantic Canada Conservation Data Centre (AC CDC) Status Rankings	Chapter 17: Species at Risk and Species of Conservation Concern
Centre de données sur le patrimoine naturel du Québec (CDPNQ) - Québec Biodiversity Atlas - Threatened or Vulnerable Species	Chapter 17: Species at Risk and Species of Conservation Concern
Newfoundland and Labrador Policy for Development in Wetlands	Chapter 14: Wetlands
Newfoundland and Labrador Regulation 65/03 *Environmental Control Water and Sewage Regulations*	Chapter 12: Water Resources
NLDFFA Wildlife Division General Status of Species Program	Chapter 17: Species at Risk and Species of Conservation Concern
Species Status Advisory Committee (SSAC)	Chapter 17: Species at Risk and Species of Conservation Concern
Federal	
• IAAC Guidance: • Incorporation of Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003) • Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2018a) • Operational Policy Statement – Addressing Cumulative Environmental Effects Under CEAA 2012 • Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2018b) • Addressing “Purpose of” and “Alternative Means” under the *Canadian Environmental Assessment Act, 2012* • Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archeological, Paleontological or Architectural Significance under the *Canadian Environmental Assessment Act, 2012* • Practitioners Glossary for the Environmental Assessment of Designated Projects Under the *Canadian Environmental Assessment Act, 2012* • Considering Aboriginal traditional knowledge in environmental assessments conducted under the *Canadian Environmental Assessment Act, 2012*	Chapters 2 and 10 to 24
Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Management Plans and Recovery Strategies	Chapter 17: Species at Risk and Species of Conservation Concern

Table 1.6 Standards, Policies, and/or Guidelines

Standard/Guideline	Applicable EIS Chapter
Environmental Code of Practice for Metal Mines (Environment Canada 2009).	Chapter 10: Atmospheric Environment and Climate Chapter 12: Water Resources Chapter 13: Terrain and Acid Rock Drainage/Metal Leaching Chapter 14: Wetlands Chapter 15: Fish and Fish Habitat Chapter 16: Birds, Wildlife and their Habitat Chapter 17: Species at Risk and Species of Conservation Concern
Federal Policy on Wetland Conservation (Government of Canada 1991)	Chapter 14: Wetlands
Guidance Document for the Sampling and Analysis of Metal Mining Effluents (Environment Canada 2002).	Chapter 12: Surface Water
Guidelines for the Use of Explosives in or near Canadian Fisheries Waters (Wright and Hopky 1998).	Chapter 12: Surface Water Chapter 15: Fish and Fish Habitat
Health Canada Noise Limits (Health Canada 2017)	Chapter 10: Atmospheric Environment and Climate
Health Canada – Useful Information for Environmental Assessments (Health Canada 2010)	Chapter 10: Atmospheric Environment and Climate
International Organization for Standardization (ISO) 9613-1 and 9613-2 Acoustics	Chapter 10: Atmospheric Environment and Climate
MDMER – Discharge criteria	Chapter 12: Surface Water Chapter 15: Fish and Fish Habitat
Metal Mining Guidance document for Aquatic Environmental Effects Monitoring. Updated in 2012. (Environment Canada 2012).	Chapter 12: Surface Water Chapter 15: Fish and Fish Habitat

1.9 Non-Governmental Participants in the Environmental Assessment

Since 2010, Labec Century has been meeting with Indigenous groups and people, government agencies, and public stakeholders to discuss various projects it is pursuing in the Schefferville area. Joyce Direct Iron will continue to consult these groups throughout the EA process and the Project. The consultation and engagement process for the Project is described in more detail in Chapter 3: Engagement and Traditional Knowledge. In accordance with Section 5.3 of IAAC Guidelines, participants in the EA, other than federal government, includes engagement with Indigenous peoples, residents of communities potentially affected by the Project, government agencies with regulatory or permitting responsibilities related to the Project, and other interested parties.

Joyce Direct Iron will take into consideration the concerns expressed by Indigenous groups, government agencies, and public stakeholders regarding the Project. Joyce Direct Iron has and will continue to meet with these parties to provide information on the Project, gather information on the biophysical and social environment, obtain feedback, and document interests and concerns.

A record of EIS consultation and engagement activities, including a full list of participants and a discussion of the issues and concerns that were raised, is provided in Chapter 3: Engagement and Traditional Knowledge. These issues are also summarized and addressed in the relevant chapters.

1.10 Land Claims Agreements and Interim Agreements

Five Indigenous groups have asserted Indigenous rights and Indigenous title to lands within the Project Development Area. These groups include two from Newfoundland and Labrador, the Innu Nation (on behalf of the Mushuau Innu First Nation and the Sheshatshiu Innu First Nation) and the NunatuKavut Community Council, and three from Quebec, the Naskapi Nation of Kawawachikamach, La Nation Innu Matimekush-Lac John, and Innu Takuaikan Uashat mak Mani-Utenam. None of the five Indigenous groups currently has a settled land claim which includes any lands within the Project Development Area.

Each Indigenous group's potential or established rights to areas of Labrador and Quebec, including lands within the Project Development Area, is discussed in further detail within this section. A discussion of the related issues of Indigenous consultation and engagement efforts with each of the five Indigenous groups is found in Chapter 3: Engagement and Traditional Knowledge. Additional detail regarding the land claims agreements discussed below is presented in Chapter 8: Potential or Established Indigenous and Treaty Rights and Related Interests.

1.10.1 Innu of Labrador

The Innu of Labrador comprises the Innu people of both the Mushuau Innu First Nation and the Sheshatshiu Innu First Nation communities in Labrador, who are represented in land claims and self-governance negotiations by the Innu Nation (formerly the Naskapi Montagnais Innu Association). The Innu Nation's land claim was accepted for negotiation by the Federal Government in 1978 and a Framework Agreement was signed in 1996. In September 2008 the Innu Nation and the Province of Newfoundland and Labrador signed the historic Tshash Petapen Agreement in which the Innu of Labrador and the Province of Newfoundland and Labrador agreed, among other issues, on the Innu Nation land selections in western Labrador, subject to a formal treaty being signed. In November 2011, the Innu Nation signed a non-binding Agreement-in-Principle (AIP) with Canada and the Province of Newfoundland and Labrador, which also included the same land selections in western Labrador made by the Innu Nation under the Tshash Petapen Agreement. A Final Agreement is currently under negotiation among the parties.

The AIP addresses four categories of lands in Labrador in which the Innu of Labrador will have specific rights and in which the self-governing body established by the Innu of Labrador will have specific legislative authority. Of particular interest for this Project, the Project Development Area is located wholly within one of the Economic Major Development Impacts and Benefits Agreement Areas identified in the AIP, namely the Western Labrador Economic Major Development Impacts and Benefits Agreement Area (WLEMDIBAA). The proponent of any major development in the WLEMDIBAA would therefore, under a Final Agreement entered into by the parties which incorporated the existing land selections in western Labrador, be required to enter into an IBA with the Innu Nation.

1.10.2 NunatuKavut Community Council

The NunatuKavut Community Council represents the interests of the southern Inuit of Labrador, persons of mixed Indigenous ancestry resident across Labrador, and has asserted land claims and other Indigenous rights in respect of a large portion of Labrador since the 1980s. The NunatuKavut Community Council (formerly known as the Labrador Metis Nation) has submitted a comprehensive land claim, on behalf of its members, to its traditional territory NunatuKavut ("Our ancient land") which primarily encompasses south/central Labrador and extends to portions of western Labrador including the Project Development Area. This land claim, which was first submitted by the Labrador Metis Nation in the 1980's, was supplemented in 2010 by further land claim documentation entitled "Unveiling NunatuKavut".

The NunatuKavut Community Council land claim has not to date been accepted for negotiation by either the federal government or the government of Newfoundland and Labrador.

1.10.3 Naskapi Nation of Kawawachikamach

The Naskapi Nation of Kawawachikamach is a First Nations people with a reserve at Kawawachikamach, Quebec which is located in close proximity to Schefferville, Québec and the Project Development Area. The traditional territory of the Naskapi Nation of Kawawachikamach included a large portion of the Labrador Peninsula.

The Naskapi Nation of Kawawachikamach has established Indigenous treaty rights pursuant to the 1978 Northeastern Quebec Agreement, a comprehensive land claims agreement entered into with Canada and the Province of Quebec which settled all claims of Indigenous rights and title of the Naskapis of Quebec within the Province of Quebec.

The Naskapi Nation of Kawawachikamach also asserts Indigenous rights and title to portions of its traditional territory extending in to western, central and northern Labrador, including the Project Development Area. In 1995 the Naskapi Nation of Kawawachikamach formally submitted a land claim to the federal government in respect of a large area of Labrador. The group's claim within Labrador, including the Project Development Area, has not to date been accepted for negotiation by either the federal government or the Government of Newfoundland and Labrador.

1.10.4 La Nation Innu Matimekush-Lac John and Innu Takuaikan Uashat mak Mani-Utenam First Nation

La Nation Innu Matimekush-Lac John is a First Nations people with two Quebec reserves, the Matimekosh reserve on the shores of Lake Pierce and the Lac John reserve, which are both located in close proximity to Schefferville, Québec and the Project Development Area. The traditional territory of La Nation Innu Matimekush-Lac John is shared with the Innu Takuaikan Uashat mak Mani-Utenam First Nation of Sept-Îles, Quebec and Maliotenam, Quebec and includes a large part of eastern Quebec and western Labrador, including the Project Development Area.

La Nation Innu Matimekush-Lac John, together with the Innu Takuaikan Uashat mak Mani-Utenam First Nation, were originally members of the Conseil des Atikamekew et des Montagnais ("CAM"), which in 1979 submitted a comprehensive land claim on behalf of the Atikamekew First Nation and the Innu of Uashat mak Mani-Utenam and the Innu of Matimekush-Lac John. The CAM land claim was accepted by both Canada and Quebec for negotiation and a Framework Agreement establishing the process to negotiate a land claim for those portions of the traditional territory of each group within the Province of Quebec was finalized in 1988. La Nation Innu Matimekush-Lac John and the Innu Takuaikan Uashat mak Mani-Utenam First Nation later joined with the Conseil Tribal Mamuitun and the Nutashkuan Innu First Nation in negotiations with respect to the Quebec portion of their land claims. In 1998 both groups withdrew from the negotiations and the Conseil Tribal Mamuitun, Nutashkuan Innu First Nation, Canada and Quebec concluded an Agreement in Principle on March 31st, 2004.

In 2005, La Nation Innu Matimekush-Lac John and the Innu Takuaikan Uashat mak Mani-Utenam First Nation formed the Ashuanipi Corporation to represent the interests of both Indigenous groups in comprehensive land claim negotiations with Canada and Quebec. Negotiations resumed with Canada and Quebec in 2006 and continued until 2008 but were discontinued and the Ashuanipi Corporation has since been dissolved.

The land claim of La Nation Innu Matimekush-Lac John and Innu Takuaikan Uashat mak Mani-Utenam First Nation to portions of Labrador, including the Project Development Area, has not been accepted for negotiation by either the federal government or the Government of Newfoundland and Labrador.

1.11 Other Registrations

The Project Registration and Project Description were filed with IAAC on October 15, 2012, followed by an amendment to the registration document, filed on November 13, 2012. A Project Update was subsequently filed in October 2014. This update described modifications to the Project as a result of on-going environmental and engineering studies.

1.12 References

CEA (Canadian Environmental Assessment) Agency. 2003. *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*. Available at: http://ceaa.gc.ca/default.asp?lang=En&n=DACB19EE-1. Accessed: August, 2012.

CEA (Canadian Environmental Assessment) Agency. 2018a. Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act, 2012. Available at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/determining-project-cause-significant-environmental-effects-ceaa2012.html

CEA (Canadian Environmental Assessment) Agency. 2018b. Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012*. Available at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html

Environment Canada. 2002. Guidance Document for the Sampling and Analysis of Metal Mining Effluents. EPS 2/MM/5 – April 2001. Minerals and Metals Division. Environmental Protection Service. Environment Canada. Available at: http://www.ec.gc.ca/Publications/30EE2CC9-5118-4D47-A14B-B109294FCABA/p302.pdf. Accessed: June 6, 2013.

Environment Canada. 2009. Environmental Code of Practice for Metal Mines. 2009. 1/MM/17 Mining Section. Mining and Processing Division. Public and Resources Sectors Directorate. Environmental Stewardship Branch. Environment Canada. Available at: http://www.ec.gc.ca/lcpe-cepa/documents/codes/mm/mm-eng.pdf. Accessed June 6, 2013.

Environment Canada 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Available at: https://www.ec.gc.ca/esee-eem/AEC7C481-D66F-4B9B-BA08-A5DC960CDE5E/COM-1434---Tec-Guide-for-Metal-Mining-Env-Effects-Monitoring_En_02[1].pdf

Federal-Provincial-Territorial Ministers Responsible for the Status of Women. 2016. Guide to Gender Diversity in Employment

GENIVAR. 2013a. Joyce Lake Direct Shipping Iron Ore Project. Fish and Fish Habitat Baseline Study. Report prepared for Labec Century Iron Ore.

GENIVAR. 2013b. Joyce Lake Direct Shipping Iron Ore Project. Vegetation Baseline Study. Report prepared for Labec Century Iron Ore.

Government of Canada. 1991. The Federal Policy on Wetland Conservation, Available at: http://nawcc.wetlandnetwork.ca/Federal%20Policy%20on%20Wetland%20Conservation.pdf

GNL (Government of Newfoundland and Labrador). 2013. Aboriginal Consultation Policy on Land and Resource Development Decisions.

Government of Newfoundland and Labrador and Mining Industry NL. 2018. Mining the Future 2030: A Plan for Growth in the Newfoundland and Labrador Mining Industry. Available at: https://www.gov.nl.ca/iet/files/pdf-wf-mining-2018.pdf

Health Canada. 2010. Useful Information for Environmental Assessments. Available at: http://publications.gc.ca/collections/collection_2015/sc-hc/H128-1-10-599-eng.pdf

Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Available at: https://www.ceaa.gc.ca/050/documents/p80054/119378E.pdf

Labrador and Aboriginal Affairs. 2010. Land Claims: Innu Nation of Labrador. Available at: http://www.exec.gov.nl.ca/exec/igas/land_claims/. Accessed June 6, 2013.

Labrador West Chamber of Commerce. 2010. Labrador West Community Needs Assessment. Prepared by EEM Sustainable Management. Available at: http://www.labradorwest.com/modules/Documents/documents/LWCNA_FINAL%20REPORT_Dec%202010.pdf. Accessed: June 6, 2013.

NRCan (Natural Resources Canada). 1993. Canada-Permafrost [map]. Fifth Edition, National Atlas of Canada

NLDAES (Newfoundland and Labrador Department of Advanced Education and Skills). 2012a. Apprenticeship Wage Subsidy Program. Available at: http://www.aes.gov.nl.ca/lmda/apprenticeship Wage Subsidy Program. Available at: http://www.aes.gov.nl.ca/lmda/apprenticeship.html.

NLDAES (Newfoundland and Labrador Department of Advanced Education and Skills). 2012b. Provincial Strategy for the Inclusion of Persons with Disabilities in Newfoundland and Labrador. Available at: http://www.aes.gov.nl.ca/disabilities/consultations.html. Accessed: June 6, 2013.

NLDOECC (Newfoundland and Labrador Department of Environment and Climate Change). 2011. Forest Management District 22: Crown Five-Year Operating Plan (2012-2016). Available at: http://www.env.gov.nl.ca/env/env_assessment/projects/Y2011/1616/index.html. Accessed: December 19, 2014.

NLDTCAR (Newfoundland and Labrador Department of Tourism, Culture, Arts and Recreation). 2016. Uncommon Potential – A Vision for Newfoundland and Labrador Tourism. Available at: https://www.gov.nl.ca/tcar/files/uncommonpotential-2016.pdf

Statistics Canada. 2017. Census Profile, 2016 Census. Statistics Canada, Ottawa, ON. Available at: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm. Accessed: January 28, 2021.

Wright, D.G., and G.E. Hopky. 1998. Guidelines for the use of explosives in or near Canadian fisheries water. Can. Tech. Rep. Fish. Aquat. Sci. 2107: iv + 34 pp.

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 2:

Project Description

File No. 121416571

Date: May 2021

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2.0 PROJECT DESCRIPTION

As detailed in chapter 1, Joyce Direct Iron Inc. succeeded Labec Century Iron Ore Inc. ("Labec Century") as the Project Proponent on February 18, 2021 following an internal reorganization. All references to Labec Century as the Project proponent may be interpreted as now referring to Joyce Direct Iron Inc.

2.1 Purpose of and Need for the Project

The purpose of the Project is to extract, crush, screen, and ship iron ore from the deposit at Joyce Lake to overseas smelters and principally China, in an environmentally and socially sustainable manner. Mining and mineral processing is a vital component of the Newfoundland and Labrador economy.

Community and transportation infrastructure is currently in place to support the iron ore industry in western Labrador and in the northern Québec region and will be used to support Project activities. The construction and operation of the Project will generate direct and indirect employment, present business opportunities for the residents of nearby communities, and provide revenues to provincial and federal levels of government through taxes and royalties.

Market fundamentals for this Project remain strong in the long-term, driven by continued demand for iron ore in key global markets, such as China. The price of iron ore has fluctuated in recent years due to factors such as: international economic and political trends; changes in industrial demand; currency exchange fluctuations; inflation in the consuming economies; interest rates; global and local economic health and trends; speculative activities; the availability and costs of substitutes; and changes in the supply of iron ore due to new mine developments; and mine closures. A feasibility study on the Project, completed in April 2015, assumed a long-term price of US$95 per dry metric ton of 62% iron sinter fines CFR China, and developed a return on investment after tax of 13.68% (based on an initial capital investment of CAN$259.6 million).

2.2 Alternatives to the Project

In the context of an environmental assessment, "alternatives to" a project are defined as functionally different ways to meet the project need and achieve the project purpose (CEA Agency 2013).

The purpose of this Project is to develop the iron ore deposit at Joyce Lake to produce iron ore product suitable for export to international steel markets. The Project will assist in meeting the growing global demand for iron ore and help provide socio-economic benefits to residents of Newfoundland and Labrador, and Canada.

Addressing the overall, worldwide requirement for iron ore could conceivably be achieved through other development projects or initiatives, which may also provide associated economic benefits to the regions and jurisdictions in which they are developed. However, there is no viable

alternative to the Project that still meets the Project's purpose as defined above. The "null alternative", which consists of doing nothing, would not satisfy market needs, provide socio-economic benefits to residents of Newfoundland and Labrador and Canada or provide a reasonable return on investment to Labec Century shareholders.

The Project provides a technically feasible, economically viable, and environmentally and socially responsible means of addressing the need for, and purpose of, the development, and one which will be planned and implemented to avoid or reduce potential adverse environmental effects and optimize socio-economic benefits. The Project is being proposed and planned in accordance with the principle of sustainable development, which has been referenced and defined from an environmental assessment context and from the perspective of the mining industry (e.g., NRCan 1998).

Sustainable development seeks to meet the needs of present generations without compromising the ability of future generations to meet their own needs. The objectives of sustainable development are:

- the preservation of ecosystem integrity, including the capability of natural systems to maintain their structures and functions and to support biological diversity;
- respect for the right of future generations to the sustainable use of renewable and non-renewable resources; and
- the attainment of durable and equitable social and economic benefits.

These concepts have formed the basis of the Project's ongoing planning and design activities and will guide its future implementation. In particular, this environmental impact statement (EIS) describes planning and design approaches and mitigation measures to avoid or reduce adverse environmental and socio-economic effects.

Labec Century is committed to ensuring that relevant Indigenous and non-Indigenous communities and stakeholder groups are engaged throughout the development and operation of the Project. The Proponent continues to engage Indigenous groups with established or asserted rights for the purpose of sharing information on the Project, and addressing questions, issues, or concerns with regard to the Project and its potential effects. These ongoing Indigenous and stakeholder engagement processes have been a vital and integral input to Project planning and design, and to the EIS. Indigenous and non- Indigenous community and stakeholder engagement will continue over the life of the Project. Consultation activities are discussed further in Chapter 3: Consultation.

2.3 Project Changes

There have been a number of changes to the mine plan and the configuration of mine site components for the Project since the initial submission of the Project Description by Labec Century to CEA Agency and NLDOECC in November 2012. These changes reflect the results of the studies completed and discussed in Section 2.8, as well as concerns identified through consultation and engagement activities. A summary of Project changes include:

- requirement to dewater Joyce Lake;
- relocation of mine components within a reduced mine footprint on the north side of the Iron Arm waterway, including water management and crushing and screening processing infrastructure and stockpiles (waste rock, overburden, low-grade ore, run-of-mine) and explosives depot;
- adjustment of haulage and service access road alignment;
- construction and operation of a rock causeway across Iron Arm to replace the previously proposed ice bridges and barge landings;
- use of only a dry process with anticipated 100% recovery (instead of both wet and dry processes) for iron ore processing. As a result, a tailings management facility will no longer be required for the Project; and
- extension of life of mine from approximately four to seven years as a result of increases in mineral reserves.

The previous and current configurations of Project components is presented in Figure 2.1.

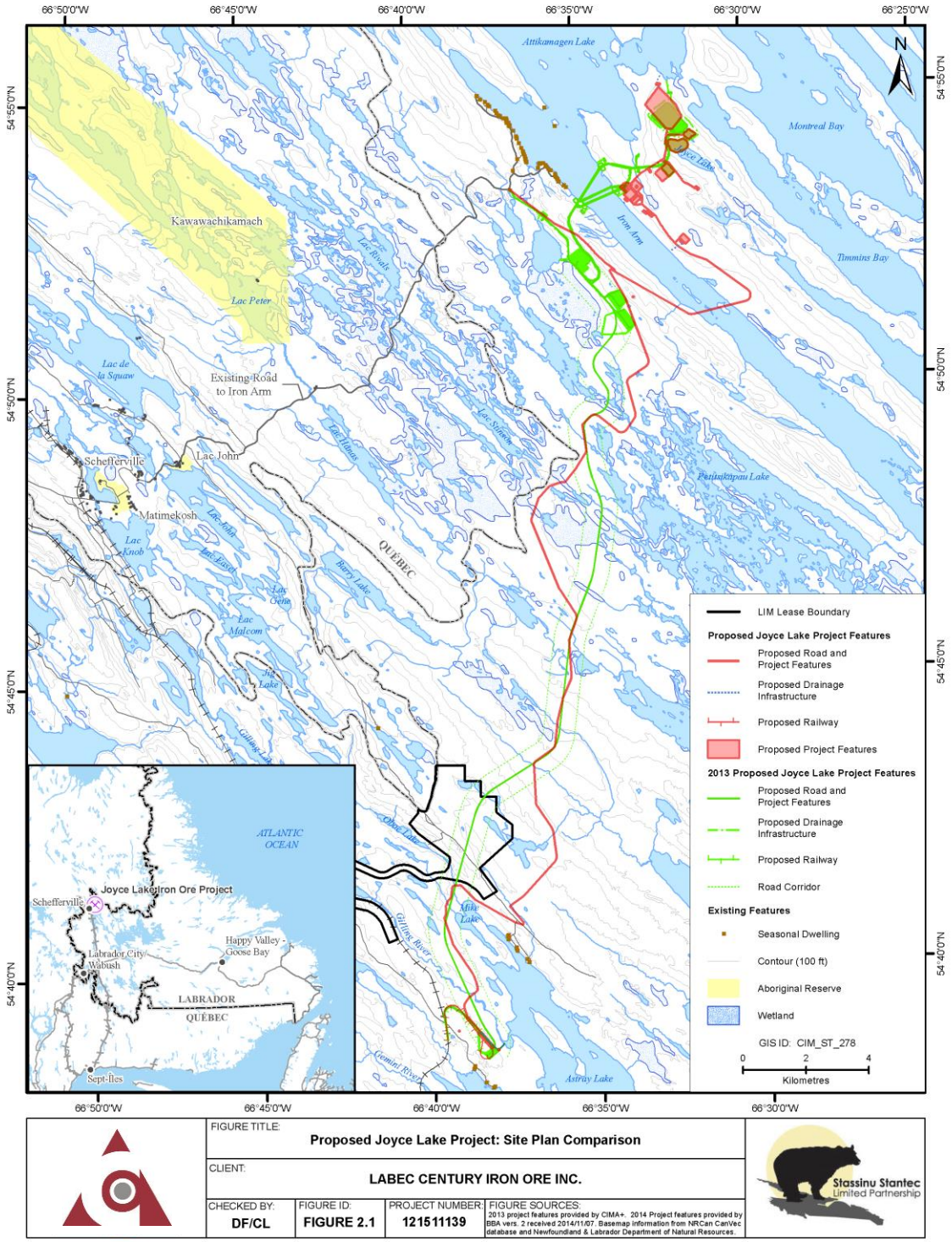

Figure 2.1 A Comparison of Current and Previous Site Plans

2.4 Project Location

The Project is located entirely in Newfoundland and Labrador, on the eastern end of the Labrador Trough (a rich belt of iron ore that stretches through Labrador and northern Québec) and is approximately 20 km northeast of the Town of Schefferville, Québec. The coordinates for key Project elements are provided in Table 2.1.

Table 2.1 Project Coordinates

Feature	Description	Longitude (x)	Latitude (y)
Processing Plant	Centre of Processing Plant Infrastructure	66° 33' 21.040" W	54° 53' 10.970" N
Open Pit	Open Pit NW of Joyce Lake	66° 31' 53.707" W	54° 53' 59.308" N
Mine Site Centre	Centre of all mine infrastructure found on the peninsula between Iron Arm and Timmins Bay	66° 32' 26.329" W	54° 53' 43.900" N
Rail Loop	Centre of Rail Loop and associated infrastructure	66° 38' 43.896" W	54° 38' 54.713" N
Haulage Road	Centre of the entire length of the haulage road, from the intersection of the processing plant road to the rail loop	66° 35' 23.792" W	54° 45' 58.370" N

The infrastructure for the Project, as shown in Figures 2.2 to 2.5, is located wholly on provincial Crown Land. The surface rights belong to the Government of Newfoundland and Labrador, with the exception of the location of the intersection of the new rail loop with the Tshiuetin Rail. Labec Century will submit an application to the Province for a mining lease on Crown Land, and will enter into an agreement with Tshiuetin Rail Transportation for use of their land to connect to the new rail loop.

The property in Newfoundland and Labrador is registered under an exploration lease to Joyce Direct Iron Inc. The Project comprises six map-staked licenses totaling approximately 10,750 ha. A description of the Joyce Direct Iron Inc. exploration license holdings for the Project is provided in Table 2.2.

Table 2.2 Joyce Direct Iron Inc. Exploration Licenses: Joyce Lake Project Area

Licence	Status	# Claims	Approximate Area (ha)	Issue Date	Expiry Date	Work Requirement (WR) Year	WR Due
020753M	Issued	10	250	2013-01-11	2023-01-11	9	2022-03-14
020518M	Issued	4	100	2012-10-18	2022-10-18	9	2021-12-17
020517M	Issued	51	1,275	2012-10-18	2022-10-18	9	2021-12-17
020238M	Issued	253	6,325	2005-11-07	2025-11-07	16	2022-01-06
020232M	Issued	108	2,700	2008-03-20	2023-03-20	14	2022-05-19
020231M	Issued	256	6,400	2005-11-07	2025-11-07	16	2022-01-06

There are no designated sensitive areas or special areas in the Project footprint, including designated wildlife areas, stewardship zones, parks, and natural areas. Non-designated sensitive areas can include areas of importance to species of conservation concern (e.g., wetlands). There are a number of wetland areas in the Regional Study Area and these and other potentially non-designated sensitive areas are documented and evaluated in Chapter 14: Wetlands and Chapter 16: Birds, Wildlife and Their Habitat.

2.5 Facilities and Components

Project components and activities will include the Construction, Operation and Maintenance, and eventual Closure and Decommissioning of the following key elements:

- open pit;
- modular processing plant and associated site buildings;
- accommodations complex;
- mine contact water management facilities;
- waste rock and overburden disposal areas; and
- other ancillary infrastructure and equipment.

Decommissioning of haulage road to rail loop, mine site and access service road and other transportation infrastructure, including the rock causeway and Astray rail loop, will be determined through consultation with local stakeholders, and provincial and federal regulatory authorities.

All proposed mining and mineral processing activities will take place in Labrador, within the Project footprint. Site plans are provided in Figures 2.2 to 2.5 and represent planned site infrastructure based on the information available and developed to date.

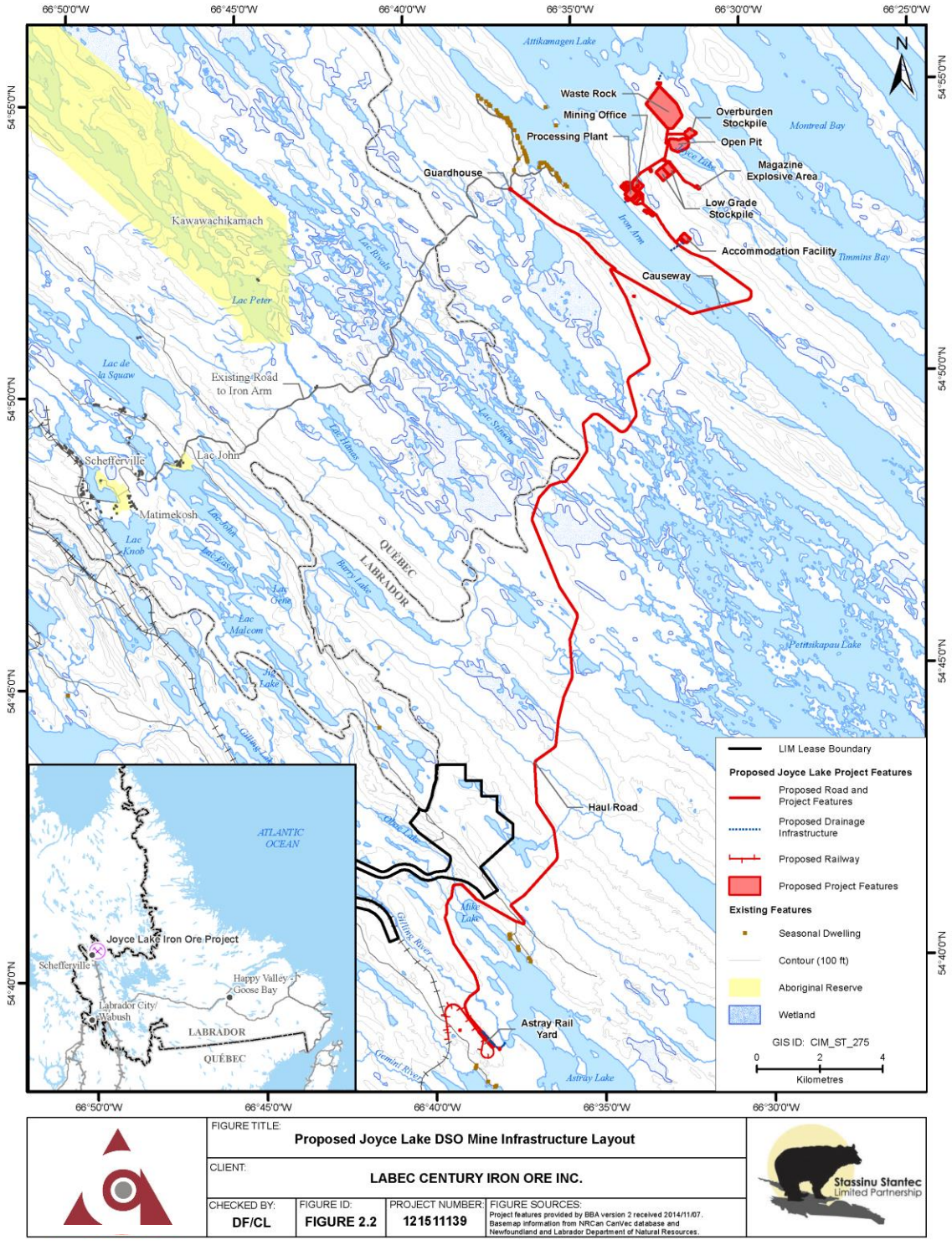

FIGURE TITLE: **Proposed Joyce Lake DSO Mine Infrastructure Layout**				
CLIENT: **LABEC CENTURY IRON ORE INC.**				
CHECKED BY: **DF/CL**	FIGURE ID: **FIGURE 2.2**	PROJECT NUMBER: **121511139**	FIGURE SOURCES: Project features provided by BBA version 2 received 2014/11/07. Basemap information from NRCan CanVec database and Newfoundland and Labrador Department of Natural Resources.	Stassinu Stantec Limited Partnership

Figure 2.2 Mine Infrastructure Layout

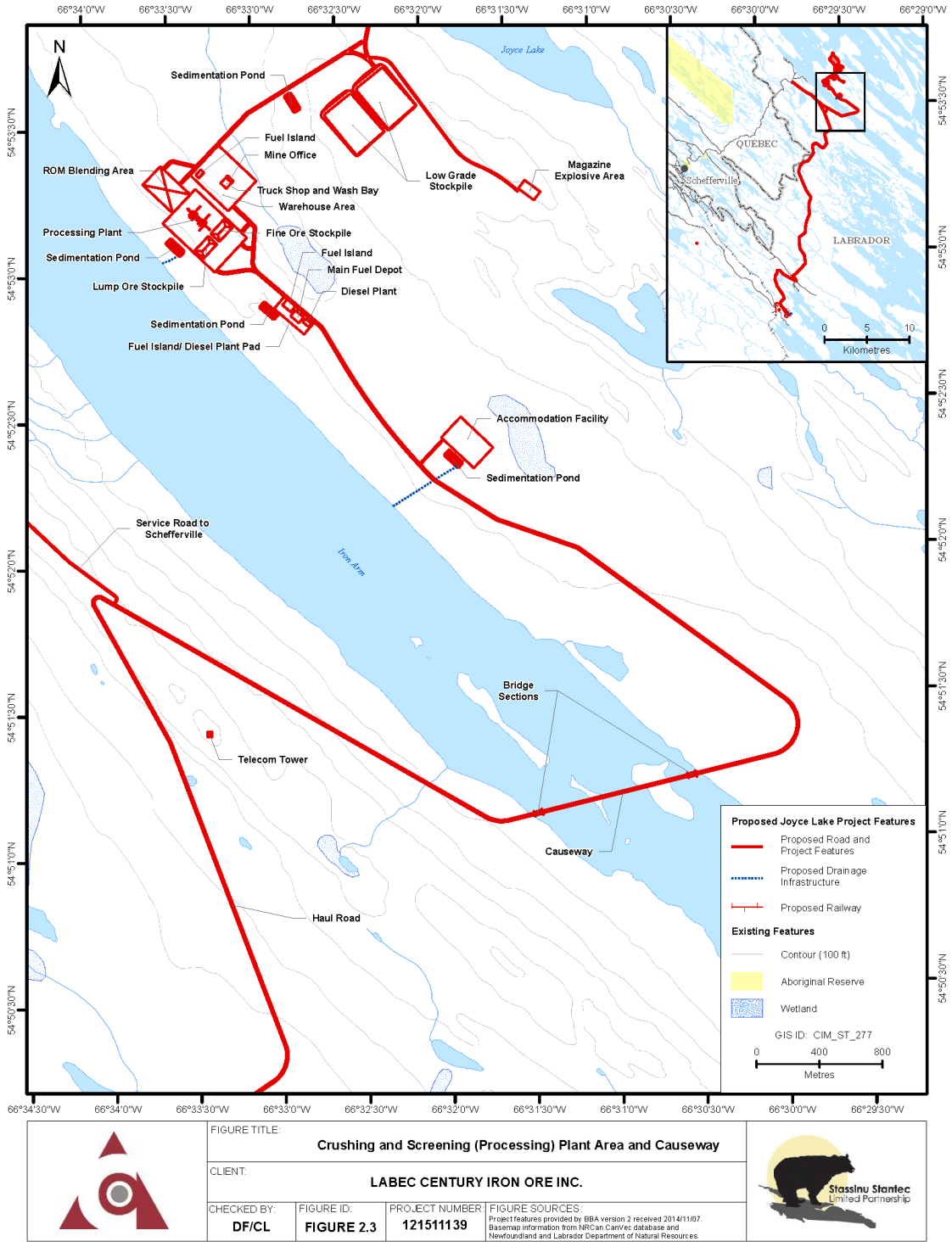

	FIGURE TITLE: Crushing and Screening (Processing) Plant Area and Causeway			
	CLIENT: LABEC CENTURY IRON ORE INC.			
	CHECKED BY: DF/CL	FIGURE ID: FIGURE 2.3	PROJECT NUMBER: 121511139	FIGURE SOURCES: Project features provided by BBA version 2 received 2014/11/07. Basemap information from NRCan CanVec database and Newfoundland and Labrador Department of Natural Resources.

Stassinu Stantec Limited Partnership

Figure 2.3 Crushing and Screening (Processing) Plant Area and Causeway

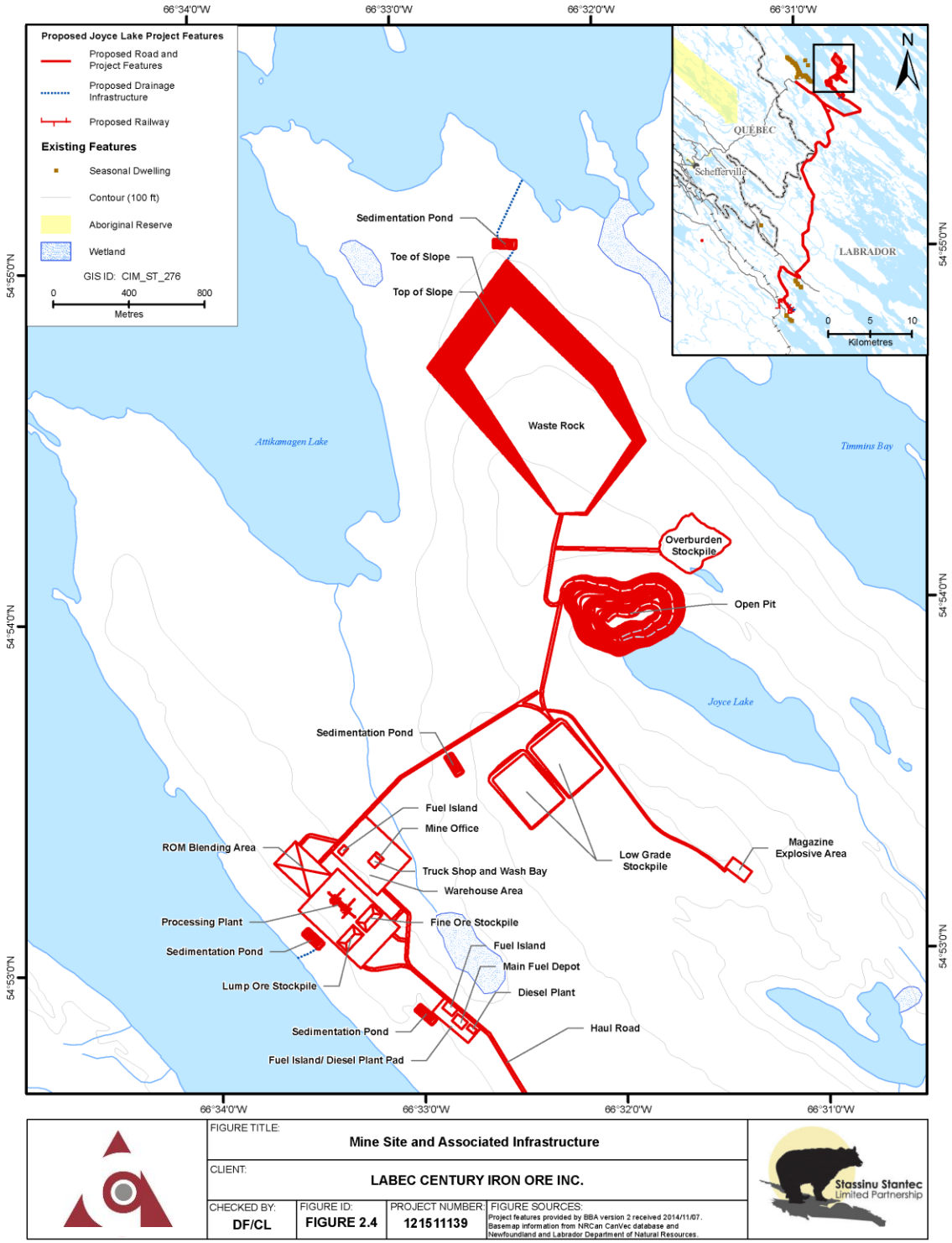

Figure 2.4 Mine Site and Associated Infrastructure

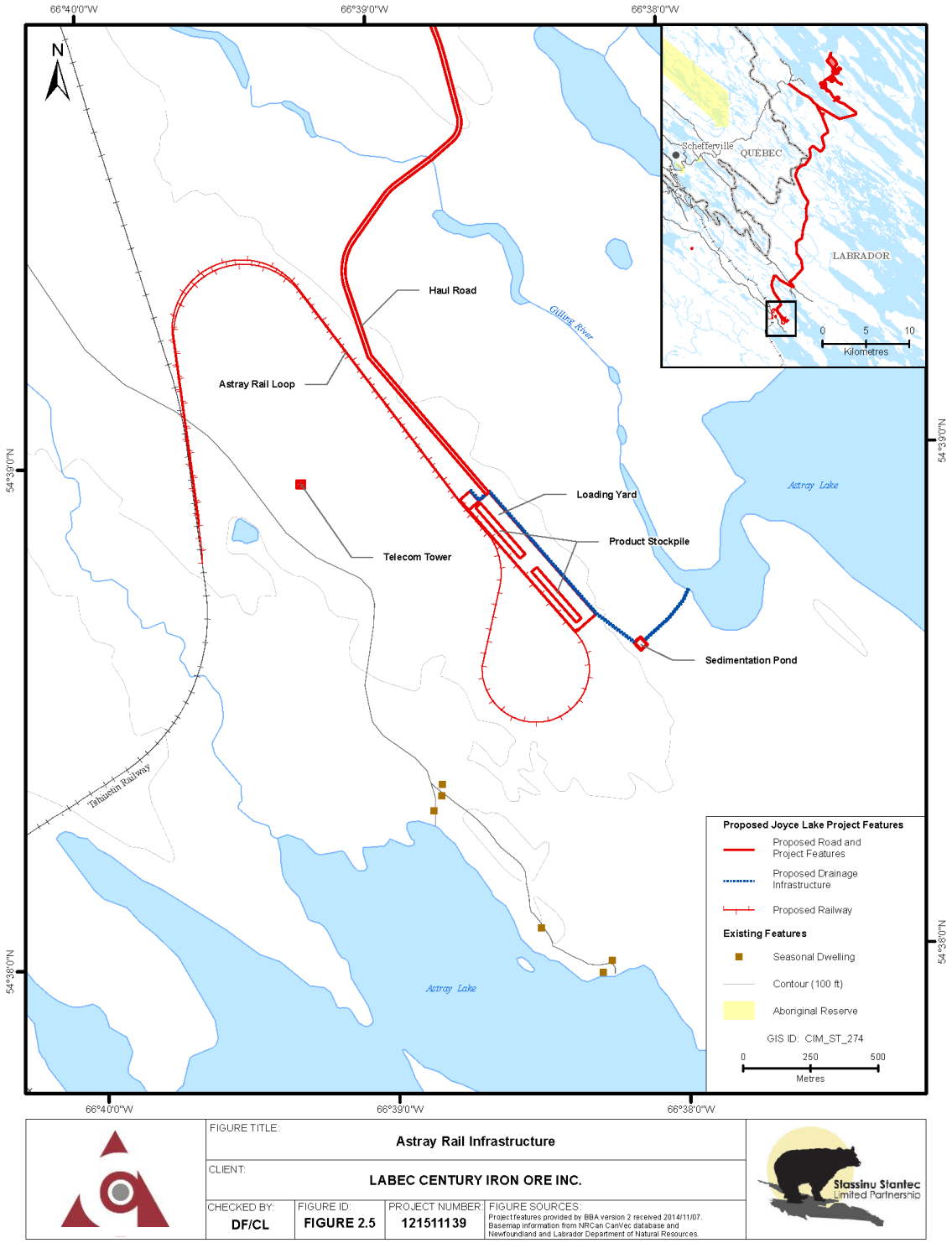

Figure 2.5 Rail Loop Infrastructure

A summary of project infrastructure footprint and tonnage is provided in Tables 2.3 and 2.4.

Table 2.3 Summary of Project Infrastructure Footprint

Project Element	Current Site Plan
Haul Road (Crushing and Screening Plant to Rail Loop)	184 ha
Open Pit Area	41 ha
Mine Site (including open pit)	189 ha
Rail Loop Site	21 ha
Iron Arm Service Road	18 ha

The presence of the elements noted above will affect current viewscapes in the area.

Table 2.4 Summary of Project Tonnage for Life of Mine

Project Element	Current Site Plan
Direct Shipment Iron Ore Tonnage	17,720,000 tonnes
Waste Rock Tonnage	70,080,000 tonnes
Overburden Tonnage	2,330,000 tonnes

2.5.1 Open Pit

The proposed Project will include an open pit mine, which will be located in proximity to Joyce Lake, approximately 20 km northeast of Schefferville. The pit design for the Joyce Lake deposit is approximately 1,100 m long and 575 m wide at surface, with a maximum pit depth of 200 m. The total surface area of the pit footprint will be approximately 0.41 km^2 (41 ha). Figure 2.6 shows the open pit design, including the pit wall configuration.

The final pit walls will have an overall pit slope of 47° and will include a 6 m bench width for every 9 m high bench and account for a 75° face angle. Complete pit slope analysis will be conducted in the detailed design phase. A ramp will access the pit at the 530 m elevation on the northwest side. The ramp will descend the north wall and incorporate several switchbacks. The lowest elevation in the pit will be 321.5 m.

Table 2.5 provides a summary of the in-pit resource and materials estimate and the production profile. The pit will have a strip ratio of 4.09:1, which accounts for the pit ramp, mining recovery, and the fact that there are small pockets of mineralized material in the optimized shell that have been deemed to be non-mineable from pit design studies.

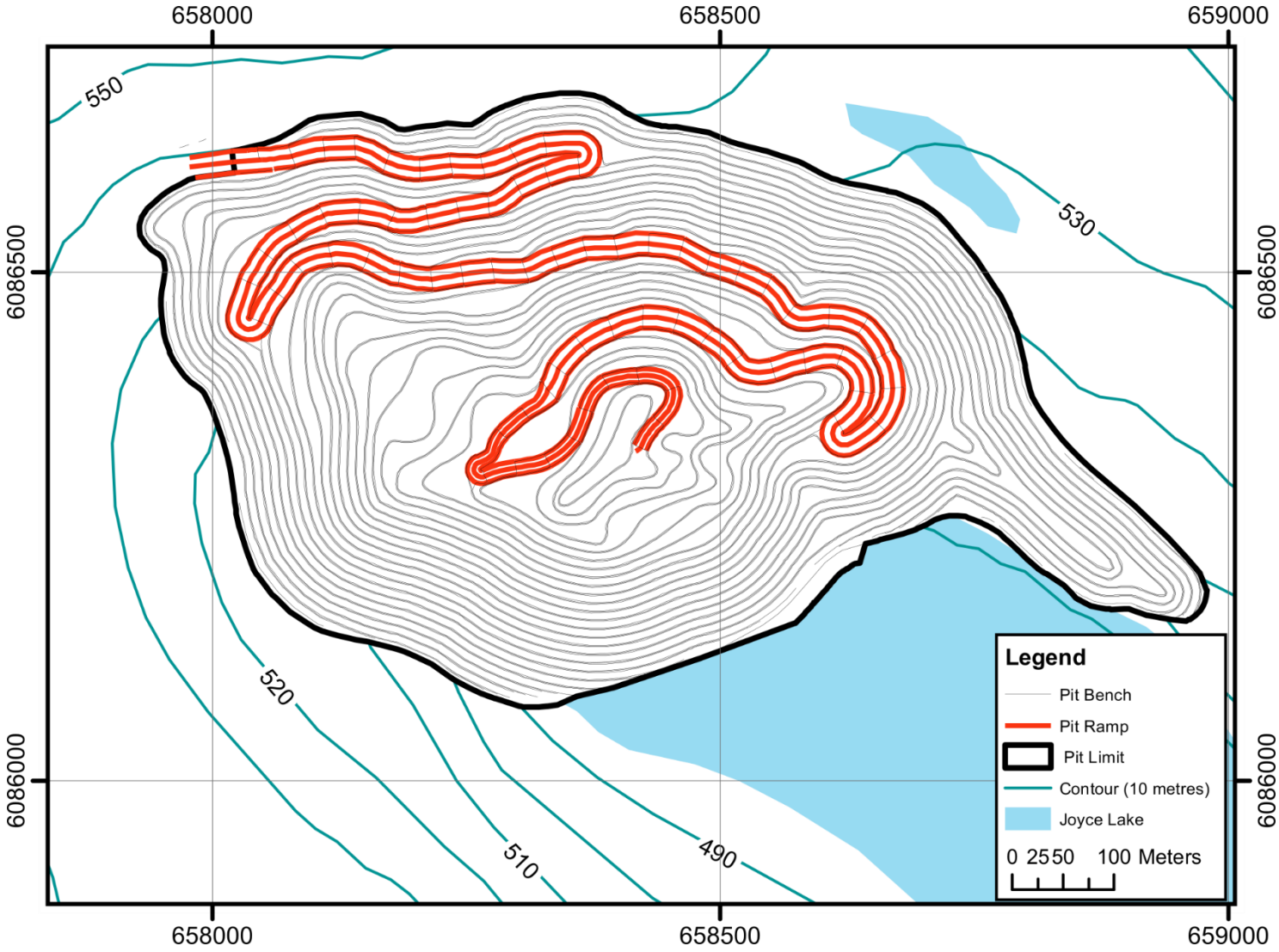

Figure 2.6 Joyce Lake Pit Design

Table 2.5 Joyce Lake Direct Shipping Iron Ore Project, Materials, and Annual Production

	Pre-Production (Cap)	Commercial Production								
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**TOTALS**
Annual Ore Mined (kt)	104	2,167	2,488	2,509	2,449	2,944	1,421	0	0	**14,082**
Annual Low Grade Ore Mined (kt)	80	836	1,340	596	584	186	20	0	0	**3,643**
Annual Waste Mined (kt)	4,615	10,104	14,498	16,370	15,286	8,912	299	0	0	**70,083**
Annual Overburden Mined (kt)	801	1,002	531	0	0	0	0	0	0	**2,334**
Annual Ore Processed (kt)	0	2,238	2,492	2,487	2,485	2,485	2,500	2,500	537	**17,725**

The mining method selected for the Project is a conventional open pit drill and blast operation with rigid-frame haul trucks and front end loaders as well as hydraulic excavators. The proposed mine plan is designed to produce up to an estimated 2.5 million tonnes of DSO products per year. There will be no tailings associated with the Project as production will be limited to a dry crushing and screening with 100% recovery. As indicated in Table 2.5, the total annual removal of waste rock and overburden will vary year to year based on the mine plan. The pit design, cut sequencing, deposit formation, and site topography all provide for an efficient and flexible operation.

2.5.2 Modular Processing Plant and Other Site Buildings

The dry crushing and screening plant will consist of several fully mobile units. The mobile units will use power generation from a centralized power plant. A plant feed stockpile area will include various grade stockpiles for blending purposes to feed the crushing and screening plant. The mineralized material from the stockpiles will be fed by a front end loader into the crushing and screening plant. Figure 2.7 illustrates the processing flow sheet.

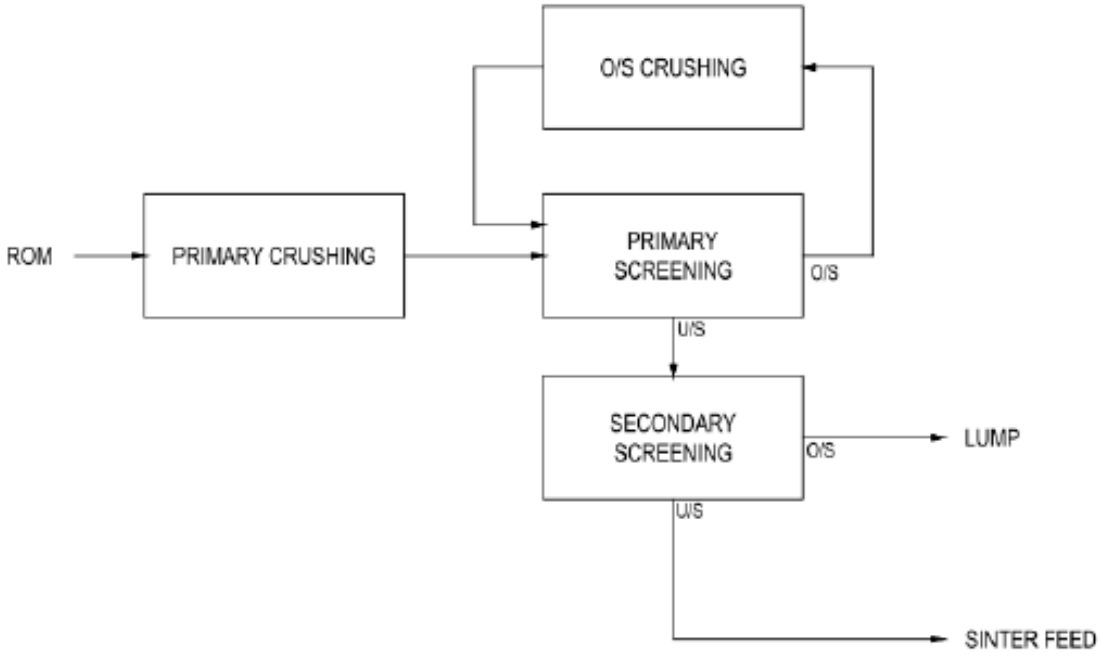

Figure 2.7 Process Flow Diagram of the Crushing and Screening Circuit

Primary Crusher

This unit is the jaw crusher, equipped with a grizzly screen for size separation of the feed. The oversize (>31.5 mm) material will be crushed in the jaw crusher and conveyed into the screening plant feed hopper via a mobile surge bin unit.

Screening Plant

The screening plant is equipped with two screen decks (31.5 and 6.3 mm). The coarse material (>31.5 mm) will be conveyed to the secondary crusher unit for further crushing. The second deck will sort the material coarser than 6.3 mm and produce a stockpile of lump (<31.5 mm / >6.3 mm). The material passing through the two (2) decks will be conveyed into a sinter fine stockpile (<6.3 mm).

Secondary Crusher

This unit is a cone crusher unit and will receive the coarser (>31.5 mm) material from the screening unit for secondary crushing.

The sinter fines and lump stockpile will be reclaimed by a front end loader, into the haul trucks, and transported across Iron Arm, via the rock causeway, to the railway loop.

2.5.2.1 Plant Support Infrastructure

Five office trailers are planned for the plant infrastructure. The workshop for equipment maintenance will be an insulated fabric dome with an aluminum structure. This workshop will be used as the main maintenance shop for the site.

A central power plant for all site facilities will consist of 5x 600 V, 818 kW gensets.

Fuel is stored on site in different areas in proximity of its end users, as shown in the general site plan. Fuel is stored in skid type, double-walled horizontal tanks each having a 50,000 liter capacity, with integrated containment and overfill protection. Each of the fuel storage areas, with the exception of the central power plant, is equipped with a fueling station with metering and will be within an additional containment to reduce spillage.

Fuel locations and amounts are detailed in Table 2.6.

Table 2.6 Fuel Locations and Amounts

Location	50,000 L Tank Requirements
Mine Equipment Station	1 Tank
Power Plant Station	2 Tanks
Pickup Truck Station	1x “5000L” gasoline tank
Product Haul Station	1 Tank
Rail-Loop Station	1 Tank

To reduce the risk of leakage, and to contain spills, all fuel tank stations will be housed within secondary containment.

2.5.3 Worker Accommodations

The Project includes the construction of an accommodations complex with lodging capacity for approximately 144 workers. The following services will be included:

- A cafeteria to accommodate 80 workers;
- A meal preparation section, including all required cooking appliances and utilities, including refrigerators for food storage;
- A laundry section;
- Potable water will be supplied to the building through bottles;
- One entertainment / recreation room;
- One medical clinic facility for first aid and minor interventions to serve the camp;
- Centralized sewage treatment facility; and
- A helipad for emergency transportation.

Prior to completion of the accommodations camp, non-local employees will be accommodated at the existing exploration camp and at proponent-owned facilities in Schefferville. It is not anticipated that additional accommodations within Schefferville or surrounding Indigenous communities will be required during Operations. If it is determined that if during Operations

additional/alternate accommodations are required, the means for providing it will be selected in consultation with local communities and with the approval of the Province of Newfoundland and Labrador.

2.5.4 Haulage, Mine Site and Access Roads

The Project will make use of an existing access road, the service road, linking Iron Arm to Schefferville, new mine site roads, and a haulage road. The access across Iron Arm for both the service road and the haul road will be over a rock causeway. The road network for the Project will include a number of water crossings (see Chapter 5: Fish and Fish Habitat).

Details on road design in specific areas of the site are presented in the following sections.

2.5.4.1 Mine Area Haulage Road and Site Roads

The road network for the Project will be designed with a maximum right-of-way width of 32 m. The roads in the mine area will be designed with a width of 25 m to accept ~100 tonne rigid-frame trucks, loaded with product. All roads will be designed to reduce cut and fill and will have a maximum grade of 10%; this is acceptable for the safe operation of 100 tonne open pit trucks and 150 tonne articulated product haul trucks. The earth excavation will be used to backfill the lower points on the road alignment. Excavated rock will be used, without any further crushing, for the sub-base to a thickness of 1 m. The base of the road will have a thickness of 1.1 m and will be made of crushed stone. The roads in the mine area include:

- Mine site road from the pit to the overburden, waste rock, and low grade stockpiles;
- Mine site road from the pit to the mineral processing plant;
- Haulage road from the mineral processing area to the rock causeway; and
- Haulage road connecting the rock causeway to the rail yard (rail loop).

2.5.4.2 Crushing and Screening Plant Area

There will be two types of roads in the crushing and screening plant area: one with a width of 25 m to accept ~100 tonne rigid-frame trucks; and other roads with a width of 15 m for smaller equipment. All roads will be designed to reduce the cut and fill and will have a maximum grade of 10%. Excavated earth will be used to backfill the lower points on the road alignment. Excavated rock will be used, without any further crushing, for the sub-base to a thickness of 1 m. The base of the road will have a thickness of 0.3 m and will be made of crushed stone.

2.5.4.3 Rock Causeway and Bridges

A 1.2 km rock causeway will be constructed across Iron Arm for the haulage of DSO products (lump and fines ore) and the transport of personnel and equipment. The rock causeway will include two free span bridges, each with a width of 8 m and 2.7 m above the high water mark, to allow access for navigation. The rock causeway will also be designed to not impede passage of

fish and other wildlife in Iron Arm. The causeway will have a base width of approximately 37 m. Additional details of the rock causeway are provided in Appendix B.

2.5.4.4 DSO Product Haulage Road Design

The haul road connecting the rock causeway to the rail loop will be designed to reduce cut and fill. The road width will be 10 m with a maximum grade of 7%. The total length of this haul road will be ~43 km. The earth excavation will be used to backfill the lower points on the road alignment. The rock excavation will be used without any further crushing for the sub-base for a thickness of 1 m. The final base of the road will have a thickness of 0.4 m and will be made of crushed stone.

2.5.5 Rail Loop

The new rail loop, approximately 7 km in length, will be tied into the existing Tshiuetin Rail and located approximately 20 km south of Schefferville, Québec. The rail loop will be designed to accommodate (for winter storage) 480 iron ore gondolas (rail cars). It will be constructed to align with the existing railway as much as possible to reduce the overall footprint.

The Astray rail loop load out area infrastructure includes three trailers housing a dispatch office, a dry room and a lunch room, each able to receive up to six workers. Potable water for these facilities will be supplied in bottles with a provision for chemical, maintenance free toilets. The product loading front end loaders will have a designated area on an open pad for light maintenance and oil changes.

A storm drainage system will be excavated that will use the natural drainage around the rail infrastructure and gravel pads, and will include a network of open ditches and culverts that will connect with a settling pond. Ditches, culverts, and the settling pond will be designed for a 1-in-100 year storm event and will be inspected for peak intensity flows.

2.5.6 Waste Rock and Overburden Disposal Areas

The development of the open pit mine is expected to generate approximately 72.4 Mt of waste over the life of the mine (based on a waste to ore ratio of 4.09:1), including 2.33 Mt of overburden. The waste rock stockpile will be located on the northeast side of the pit beyond the limits of the mineralized zone. The stockpile will have an overall slope of 22° to account for the re-vegetation required during rehabilitation, a capacity of 33 million m^3. The maximum height of the stockpile will be 90 m. The overburden stockpile will have a maximum height of 30 m and a maximum capacity of 1.3 million m^3. The low grade ore stockpile will be designed to accommodate 3 million m^3 of ore.

A ditch system will be established around the footprint of the waste rock and overburden stockpiles. Water collected in these ditches will be directed to settling ponds. Water that is collected in the ditches and sumps will be tested and controlled prior to discharge into the environment. An area of approximately 5.9 ha to the south of the waste rock stockpile will be designated as topsoil and overburden stockpile areas. The stockpile layouts are shown in Figure 2.8.

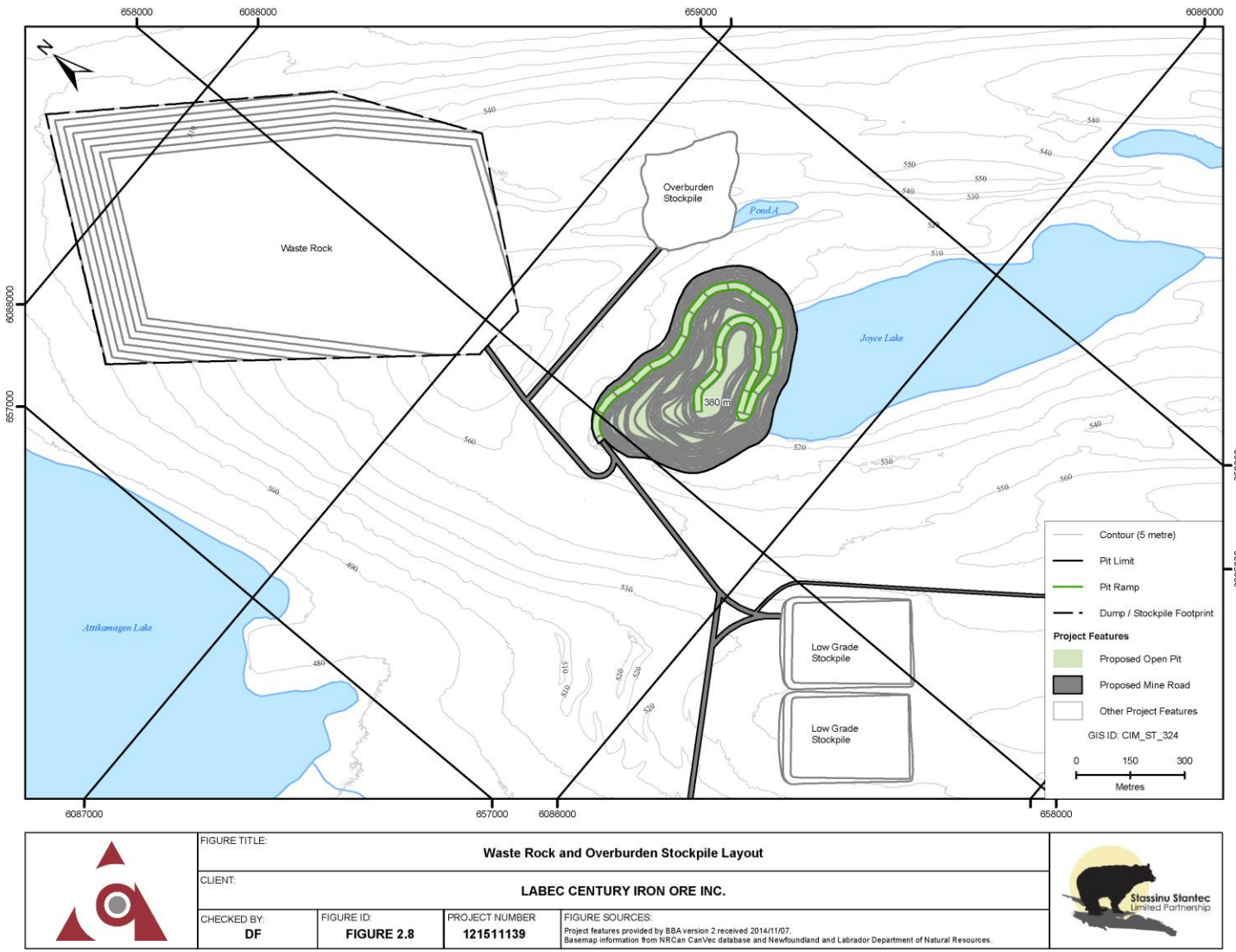

Figure 2.8 Waste Rock and Overburden Stockpile Layout

2.5.7 Effluent Treatment Infrastructure

The crushing and screening plant will only be fed with high-grade iron ore and will use a dry process to produce final products (lump products and sinter fines); therefore, no tailings management facility is required.

A diversion ditching system for surface run-off and mine contact water will be constructed around mine infrastructure. Water from the system will report to settling ponds for treatment prior to discharge to the environment. The water management infrastructure will be maintained during the Operation phase of the mine.

2.5.8 Ancillary Infrastructure and Equipment

Ancillary infrastructure and equipment to support the open pit and processing plant will include:

- Accommodations camp and office buildings;
- A workshop;
- Central power generation;
- Fuel storage stations;
- Mobile equipment;
- Sewage and water treatment units;
- Explosives magazine;
- Drainage infrastructure (i.e., ditches, settling ponds);
- Open pit deep well dewatering system; and
- Communication towers.

Remote areas (rail-loop area, explosives magazine area, telecom towers, guard-house, pit-perimeter dewatering pumps) will be fed by independent, stand-alone 600V diesel generator sets. A water well, with a submersible pump, will be installed beside the mine infrastructure pad. This well will supply the water for the mine infrastructure.

A domestic waste water treatment plant will be used to treat ‘’grey’’ water from the mine infrastructure.

A gravel pad will be constructed in a remote area, at least 1 km from the mine and infrastructure, to house the explosive storage facility. This facility will have a dedicated access road.

2.5.8.1 Site Drainage and Settling Ponds

Stormwater management facilities consisting of sediment ponds, berms, drainage ditches, and pumps will be used to collect and contain surface water run-off from waste rock, low grade ore and overburden stockpiles, open pit, run of mine stockpile, process plant, rail yard, truck shop and truck wash, and accommodation camp. Sediment ponds will be designed to provide on-site storage of local run-off, with slow, controlled releases permitted after appropriate settling and water quality sampling indicates the water is suitable for release.

The settling ponds have been designed following guidelines including the Newfoundland and Labrador *Environmental Control Water and Sewage Regulations, 2003* (O.C. 2003-231). In accordance with stormwater management guidelines and effluent quality criteria, the following water quality control objectives will be met for the sediment ponds for the Project:

- Run-off controls from the Project component areas will be designed for 1:100 year storm events to meet *Metal and Diamond Mining Effluent Regulations* (MDMER); and
- Run-off from the Project component areas for up to 1:100 year storm events with spring snowmelt to be detained in the sediment pond and released slowly to the environment.

2.6 Project Activities and Schedule

The Project will involve the Construction, Operation and Maintenance, and eventual Closure and Decommissioning of each of the components and facilities described above.

There are three main Project phases:

- one-year Construction Phase
- an approximate seven-year Operations Phase; and
- an approximate one-year Closure Phase.

The duration of post-closure monitoring is to be confirmed in consultation with applicable regulatory agencies.

The Project schedule is presented in Table 2.7 Project Schedule.

The key activities associated with each of these Project phases are described in the sections that follow.

Table 2.7 Project Schedule

No	Item Name	Year 1												Year 2												Year 3											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1	Primary and Secondary Permitting																																				
2	Early Works (Service Agreement for Road Rehabilitation)																																				
3	Engineering																																				
4	Procurement																																				
5	Construction																																				
	Rehabilitate Existing Road to Mine																																				
	Rock Causeway Foundation to First Crossing																																				
	Rock Causeway Completed for Operations																																				
	Access Road to Haul Road - 4.3km																																				
	Haul Road Rail Loop to Mine (Northbound) - 17km																																				
	Haul Road Mine to Rail Loop (Southbound) - 26km																																				
	Mine Road #1 - to Overburden Stockpile																																				
	Mine Road #2 - Plant to Waste Dump																																				
	Service Road - Explosive Storage Area																																				
	Service Road - Mine Peripheral Road																																				
	Mine Pads (Shop, Plant, Power Plant, Camp)																																				
	Mine Water Management (Joyce and Pit Dewatering)																																				
	Buildings - Main Gate																																				
	Buildings - Camp																																				
	Buildings - Offices																																				
	Buildings - Maintenance Shop																																				
	Buildings - Power plant																																				
	Water Treatment & Distribution																																				
	Telecommunication																																				
	Rail Loop																																				
	Dry Processing Plant																																				
6	Commissioning																																				
7	Production Ramp-up																																				
8	Operation																																				

2.6.1 Construction

Project Construction will begin upon release from the environmental assessment process and receipt of the relevant permits. Mining activities will be conducted year-round, with crushing and screening and ore shipment by truck and rail occurring for approximately eight months (non-winter months) of the year. The Operations total life of mine (excluding construction and closure) is anticipated to be approximately seven years. This timeframe may be adjusted as exploration proceeds.

General construction activities for the Project will include:

- site preparation (i.e., clearing of vegetation and excavation);
- construction of infrastructure;
- installation of facilities; and
- commissioning.

The areas requiring site surface preparation include: waste rock disposal areas; mine infrastructure area; process plant site; rail loop; rail loading yard; all new roads, including rock causeway; stockpile; and all ancillary infrastructure such as buildings, drainage infrastructure, fuel storage, and sewage and water treatment units. Site grading is required to support the installation of the required site facilities; and this will include the installation of sedimentation and erosion control measures, including drainage infrastructure. Ongoing monitoring of these control measures will be conducted throughout the Construction phase.

2.6.1.1 Site Buildings

The crushing and screening facilities will be mobile so only a pad will be required for installation, other site buildings and infrastructure will require associated clearing, grubbing, and cut and fill activities. This will be followed by the assembly and erection of buildings; installation of electrical systems and other utilities; and the installation of equipment and instrumentation. As most buildings and other facilities will be pre-fabricated off-site or will be portable, disturbance at site will be reduced.

Site buildings for the Project include office buildings, a workshop, fuel storage, water treatment units, explosives magazine storage, and drainage infrastructure.

2.6.1.2 Workers Accommodations

The following will be constructed in the accommodation camp area:

- dormitory building(s);
- kitchen building;
- domestic waste water treatment plant;

- drainage ditch around the pad; and
- settling pond.

A storm drainage system will be excavated at the accommodations complex, which will use the natural drainage around the infrastructure and gravel pads with a network of open ditches and culverts; these will connect with one or more settling ponds.

2.6.1.3 Haulage, Mine Site and Access Roads

On-land road construction will include clearing, grubbing, and application of a gravel-based surface. The gravel materials for road bed and gravel pad construction will be sourced from borrow and quarry pits that will be developed in proximity to the Project footprint. A geotechnical study was completed and identified three suitable borrow and quarry pit areas. Borrow and quarry pit locations will be confirmed when the final hydrogeological and geotechnical studies are completed. Road alignments will be planned to reduce the number of watercourse crossings, habitat disturbance of sensitive habitats (such as wetlands), and direct and indirect effects on species of conservation concern, where feasible. Management of surface run-off and drainage will include construction of roadside ditches and structures (e.g., culverts) to permit drainage at watercourses and wetlands.

No changes to the road alignment or infrastructure for the existing access road linking Iron Arm to Schefferville are anticipated as a result of the Project other than maintenance activities such as surface management (e.g., grading, top-dressing with gravel) and drainage management (e.g., culvert management) and in selected areas minor widening of the road. There will be no additional clearing or grubbing of this existing road alignment. Sediment control measures (e.g., sediment traps) will be implemented to control sediment from entering adjacent watercourses.

2.6.1.4 Rock Causeway

Construction of the causeway will include general rock fill material. Suitable carefully selected and quarried rock materials will be added to support the structure including areas of soft material that will be dredged and replaced with general rock fill on the bottom of the structure. The rock causeway will include two free span bridges, each with a width of 8 m and 2.7 m above the high water mark. The dredged material will be disposed of at a permitted site on land.

2.6.1.5 Rail Loop

A 7 km Astray rail loop will be tied into the existing Tshiuetin Rail at approximately 20 km south of Schefferville, Quebec. Site preparation will include clearing and grubbing. Excavated material will be used to fill the lower points, and a layer of 300 mm of sub-ballast and 300 mm of ballast will be required to support the rail infrastructure.

The following elements will be constructed for the rail yard:

- rail track with loop approximately 7 km long, right-of-way 30 m;
- loading yard pad including two ~24,000 tonne product stockpiles – approximately 62,500 m^2;

- site infrastructure – approximately 2600 m^2;
- drainage ditch around the pad – approximately 1 km long; and
- settling pond (engineered to accommodate the drainage and to meet regulated limits prior to release of water to the environment).

2.6.1.6 Power and Fuel Supply

All power required for the Project will be supplied by local generators that will run on diesel fuel. The two, 50,000 L each, horizontal skid mounted double wall steel fuel tanks to supply the generators will be at a fuel station close to the generators. The mine site will also have a 50,000 L steel double wall tank refueling station for the open pit mine, one station on site for the haul road trucks and one 50,000 L station at Astray rail loop. Each station will also have additional impoundment to contain spills. The other Project areas (i.e., accommodation camp, and Astray rail loop yard) will each have power generator(s). All above ground 50,000 L double walled steel storage tanks with built in containment will also be equipped with secondary containment and installed as per the *Gasoline and Associated Products Regulations (2003)*.

Fuel will be transported to the site by rail from Sept-Îles to Schefferville and then by road from Schefferville to site. Fuel will be unloaded from rail cars and transported from the central depot to Project fuel tank stations locations with a contractor operated fuel truck.

2.6.1.7 Water Supply

Water will be supplied from three water wells:

- bottled water will be provided for consumption at the shop and other remote locations;
- treated well water will be used at the accommodation facility.
- untreated well water will be used at the shop and for fire protection and for dust suppression.

2.6.1.8 Waste Rock and Overburden Disposal Areas

Development of the waste rock and overburden disposal areas will include clearing and grubbing over the footprint of the stockpiles to provide suitable foundation conditions in advance of placing the waste rock. Careful attention will be given to foundation conditions near the outer limits of the footprint where stability could be an issue. Proper drainage and terracing will be implemented so that surface water can be collected within sumps to allow suspended solids to settle prior to release to the environment.

The construction sequence will allow for development and progressive rehabilitation in sections. Placement of the waste rock and overburden will begin at the low point of the disposal areas, and will proceed in a series of lifts as the development of the mine and mineral processing dictate. Material obtained during the clearing and grubbing will be used to re-vegetate the bench and slope of the preceding lift as rehabilitation progresses.

2.6.2 Operation and Maintenance

Operation for the Project will consist of mining the high grade iron ore (DSO) that needs only crushing and screening to produce lump and fines iron ore products for market. Lower grade ore will be stockpiled and processed after mining from the open pit is complete.

Mining will occur throughout the year. Crushing and screening will occur from April to November. During the winter the primary focus will be to mine waste which will be placed on the waste stockpile. Ore mined during the winter will be hauled to the crushing and screening plant and stockpiled, for processing starting in April. DSO iron ore lump and fines products will be trucked to the rail loop during 8 summer months over the rock causeway and along the dedicated haul road. The train haul from the Astray rail loop to Sept-Îles will also occur only in the summer months.

2.6.2.1 Open Pit

The open pit will be mined by drilling and blasting, as required. Shovels and front end loaders will be used to load iron ore into open pit trucks.

Operation and Maintenance requirements for the open pit are:

- Pre-production work, including site clearance and pre-stripping and stockpiling of overburden;
- Implementation of conventional rock drilling, blasting and dozing activities;
- Control of precipitation and groundwater conducted with in-pit sumps and perimeter wells. Collected contact water from the pit will be pumped to an engineered settling pond for control of suspended solids. Residual chemistry of collected water will meet regulated limits prior to release to Attikamagen Lake;
- Mine site and haulage road and service road maintenance will include winter snow clearing and traction control (gravel), as well as summer dust suppression (water). Occasional grading and levelling of these roads will be required;
- Surface run-off diversion ditching will require regular inspection and occasional maintenance. During maintenance, clean-out, and grading, drainage water will be pumped to a settling pond prior to release; and
- In addition to dust management for the Project road network, dust will be suppressed at the open pit and other exposed areas, as required.

A Blast Management Plan for the Project will be completed prior to Construction. Blasting will be conducted using a gassed emulsion type explosive (30% prill), selected for water resistance and to optimize fragmentation of ore and waste material.

2.6.2.2 Dewatering Joyce Lake

Exploration drilling and resource modelling has confirmed that the target ore lies next to and extends under Joyce Lake. Hence, draining of the lake will be necessary during the first year of mine operation.

Prior to mining activities, Joyce Lake will require dewatering to access a portion of the iron ore deposit underneath the lake. Joyce Lake has an isolated fish community with no known Indigenous or recreational fishery (see Chapter 15: Fish and Fish Habitat). Resident fish populations will be relocated during dewatering activities.

A ditch will be established around the perimeter of the final pit to intercept and reduce water infiltration into the pit. Rainwater and groundwater in the pit will be collected in an in-pit sump and pumped to a settling pond at surface. Dewatering wells will be installed around the perimeter of the pit to draw down the groundwater table in the pit area.

Actual data from a hydrogeological study executed in 2014 was used along with the pit construction design to develop a detailed dewatering plan for Joyce Lake.

Lake dewatering will commence after the spring freshet on the falling limb of the freshet hydrograph. Dewatering is estimated to take approximately four to six discontinuous months and continue into October/November. The total volume to be dewatered is approximately 3 million m^3 but may vary based on precipitation over the dewatering period. Dewatering intake will be executed from a floating intake suspended in the water column to avoid disturbance of lake bed sediment. Lake water is not expected to require further sediment removal. The water column becomes turbid as the drawdown reaches the maximum depth point of Joyce Lake, the water can be pumped though sediment control features such as filter bags and/or sediment trap/impoundments to remove suspended sediment prior to release to the environment.

2.6.2.3 Roads

A network of mine site roads will be used for hauling run-of-mine (ROM) ore and waste rock to ore and waste rock stockpiles and the processing plant. Processed ore as lump and fines products will be transported from the mine site to the rail loop over the rock causeway across Iron Arm and along the haul road to the Astray rail loop. The existing access road connecting the Project to Schefferville will also be used as a service road for the transportation of mine personal, equipment and supplies.

2.6.2.4 Railway Loop

Iron ore will be trucked with 150 tonne double trailer side dump trucks from the crushing and screening plant to the new Astray rail loop yard, a distance of approximately 43 km. The new rail loop is approximately 20 km south of Schefferville and in the vicinity of Astray Lake, where iron ore products will be temporarily stockpiled and loaded onto rail cars. Each of two train sets will consist of 240 gondola cars of approximately 100 tonnes capacity each. The train sets will operate approximately 8 months each year (April to November).

2.6.2.5 Ore Processing

Crushing and screening of ore from the pit will produce two products: iron ore lump and sinter fines. These products are differentiated primarily by their particle sizes. The iron content of the ore from the open pit is high enough to be sold without upgrading (i.e., DSO); therefore, the ore only requires dry crushing and screening to separate lump ore from sinter fines.

Crushing and screening of ore will be a dry process, which requires no addition of water. The process starts with a crushing stage to reduce the ore to below 105 mm using a jaw crusher. The jaw crusher product is screened at 31.5 mm on the primary screen. Oversize material is crushed again in the cone crusher and sent back to the primary screen. Undersized material from the primary screen is screened again at 6.3 mm on the secondary screen. Oversize material from the secondary screen (<31.5 mm / >6.3 mm) is the lump product and the undersize material (<6.3 mm) is the sinter fines product. The weight recovery is 100%; no tailings are produced. Because of the simplicity of the dry process, all equipment will be mobile or semi-mobile.

As tailings will not be generated, a tailings management plan is unnecessary.

A block flow diagram for the Project is shown in Figure 2.9.

2.6.2.6 Water Management

Stormwater management facilities including sediment ponds, berms, drainage ditches, and pumps will be used to collect and contain surface water run-off from waste rock, low grade ore and overburden stockpiles, open pit contact water, run-of-mine stockpiles, processing plant area, rail yard area, maintenance shop area, and accommodation camp area. Sediment ponds will be designed to provide on-site storage of local run-off, with slow, controlled releases permitted after appropriate settling and water quality sampling indicates the water is suitable for release.

In the open pit, contact water will be collected in sumps and pumped to settling ponds and controlled to meet regulated limits prior to discharge. There will be perimeter dewatering wells installed around the pit. Collected well contact water will be pumped to settling ponds for monitoring before discharge.

Run-off from stockpiled material areas (i.e., overburden, waste rock, and ore) will be managed and captured through the use of diversion ditches and settling ponds, and controlled to meet regulated limits prior to discharge.

Dewatering of Joyce Lake, hydrogeology studies were undertaken in 2013 and 2014 to determine the connectivity of groundwater in the target rock to surface water in Joyce Lake and to the water table for the surrounding watershed. Hydrogeological information was used along with the pit construction design, and a dewatering plan was designed.

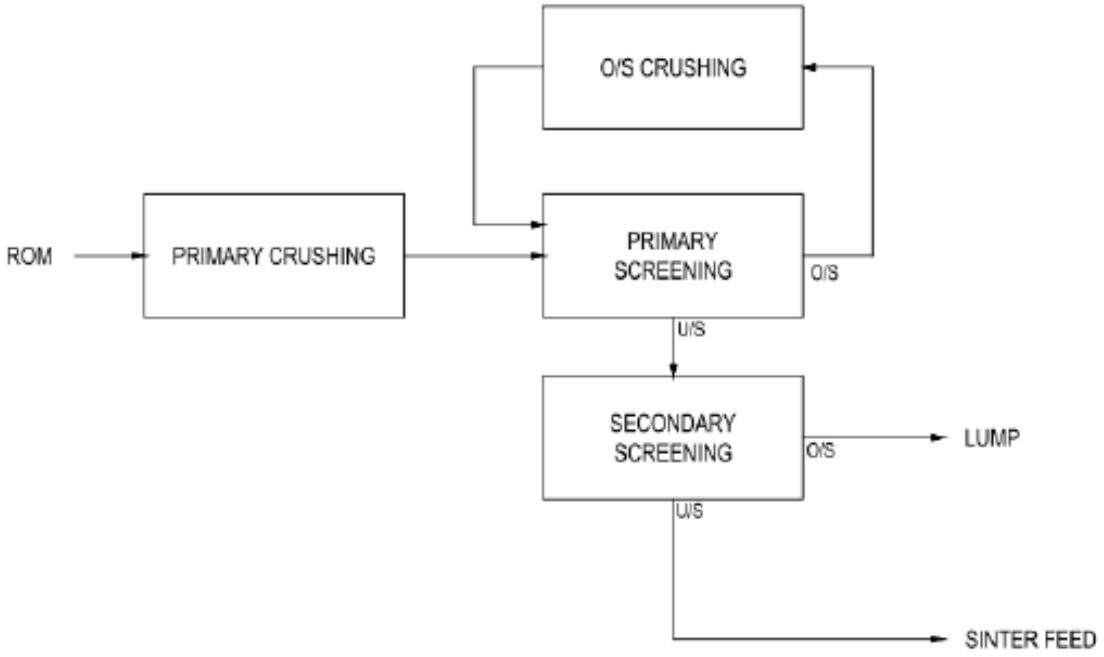

Figure 2.9 Block Flow Diagram

2.6.2.7 Waste Management

Domestic solid waste sources include waste from office and lunchroom activities, and construction wastes. Sewage waste treatment system will develop quantities of solid waste that will be disposed of through a contracted service. All domestic solid waste will be disposed in compliance with the applicable Newfoundland and Labrador regulations.

Efforts to recycle on site will be made. Non-recyclable non-hazardous wastes will be transported offsite to an existing and approved landfill.

Hazardous waste materials will be handled and stored in compliance with applicable regulatory requirements and industry best practices and will be removed from site by a licensed contractor and disposed of at an approved facility. Other control measures for hazardous waste include preparing and implementing an Emergency Response and Spill Response Plan.

2.6.2.8 Fuel Handling and Use

A nominal 250,000 L of fuel will be stored in five double walled horizontal steel fuel tanks with built in containment with 50,000 L capacity each. One tank will be at the open pit mine equipment refueling station, two tanks at the power plant station, one tank at the product haul truck station, and one tank at the Astray rail loop station. Additionally, a 5,000 L gasoline tank will be located at the pickup truck refueling station.

The fuel storage tanks will be double-walled, horizontal skid-type units with integrated containment and overfill protection and will also be placed in additional secondary containment to reduce spills.

Used oil, lubricants and cooling media will be stored at the maintenance shop in interchangeable totes, designed and purchased for the purpose and will be transported to a suitable location for disposal or recycling by contracted third parties. Used oil will be collected for recycling or reuse according to the Newfoundland and Labrador *Used Oil Control Regulations*, and will be stored, transported, and disposed of according to applicable legislation.

2.6.2.9 Maintenance

The truck shop building consists of a structure supported on a series of functional containers. The steel truss roofing system is covered by a fabric membrane. Inside, the rig-mat type flooring system is assembled on site and eliminates the need for a poured concrete pad.

The truck maintenance shop consists of six identically sized garage bays in a back-to-back configuration sized to accommodate CAT 777 or equivalent mine trucks, as well as other mobile mining equipment. The product haul trucks will also be serviced in this facility. Mine truck tire changing will require coordination with adjacent bays in the garage or can be performed outside, weather permitting. A 15-ton gantry crane is provided in the garage bays for heavy lifting duties.

2.6.2.10 Truck Wash

The truck wash building consists of a structure, built in the same configuration as the truck shop building, using containers as part of the structure. The truck wash building will be located in close proximity to the truck shop building.

The truck washing package system includes 2 hoses for high flow/low pressure water and 2 hoses for low flow/high pressure water for finishing. Flooring in the truck wash bay consists of a steel hydropad that drains into a system designed to separate large solids and a filtering system that recycles the water. Raw water is used as make-up water, which is supplied from a nearby well.

2.6.3 Accidents and Malfunctions

The following sections describe reasonable worst case scenarios of key accidents or malfunctions that may occur during Construction and Operation of the Project. For each scenario, preventative measures and emergency response measures are described. Potential effects related to these accident or malfunction scenarios are described for each VC in Chapter 10 through 22.

2.6.3.1 Train Derailment

In November 2014, an IOC train derailed on the QNS&L Railway, derailing 11 cars and spilling 1,000 L of fuel. While this accident brought attention to the potential for such incidents within the mining industry, new track installation for the Project is limited to the approximately 7 km Astray rail loop, which will connect directly to the Tshiuetin Railway. This will involve train sets traveling at a maximum of 8 km/h in the rail loop.

On average, iron ore products will be transported up to approximately four trains each week between the rail loop and the Sept-Îles port. Each train set will carry approximately 24,000 tonnes of ore in 240 gondola cars. Locomotives will be arranged for distributed power operation within

the 240 car train with two units on the front and a second locomotive approximately at the 160 car point. This will help reduce excessive stresses in railcar couplings and provide adequate air pressure for braking systems in severe weather conditions. Based on the speed the train will be travelling in the rail loop (5 miles per hour or 8 km/h), the reasonable worst case is the derailment of a maximum of four to five cars. This could result in the iron ore products being spilled onto the ground or at stream crossings.

Based on the consumption of approximately 1.17 million L of diesel fuel for mobile equipment and power generation purposes in the winter months and 1.75 million L during the summer months, 6 rail cars of 96,000 L capacity will be required per week to transport diesel fuel from Sept-Îles to Schefferville, which will be then trucked to the mine site by a contractor. The tanker cars will be transported between Sept-Îles and Schefferville by the regularly scheduled Tshiuetin rail freight train, separate from iron ore trains. It is expected that a maximum of 6 rail cars will be transported by Tshiuetin rail on their freight train each week.

Railcar numbers are based on shipment in standard 96,000 L tanker cars similar to those already in fuel haulage service in the area. In a reasonable worst case scenario (i.e., where six tanks of diesel fuel are de-railed), approximately 576,000 L (127,000 Imp. gallons) of diesel fuel could be released.

The operation of the iron ore product trains will be under current QNS&L Railway and Tshiuetin Railway environmental and safety procedures, and applicable federal and provincial regulations. Mitigation measures to prevent derailments include the following:

- Manual inspection of rolling stock will be undertaken before trains are loaded at the rail loop, to confirm there are no problems with wheels, couplers, carbody, or brakes. Defective equipment will be removed and kept out of service until repaired.

- Track inspections will be carried out in accordance with Transport Canada regulations to identify track defects that could lead to derailment.

- Fuel will be transported by the Tshiuetin freight train and will be transported from Sept-Îles to Schefferville where existing contractor services will store and distribute the fuel to the mine site and the rail loop by truck. The volume of fuel will be limited to the quantities necessary to supply the needs of the mine vehicles and related facilities.

- The limited speed (8 km/h) in the rail loop will limit potential for derailment.

A detailed Emergency Response and Spill Response Plan will be developed by Labec Century and submitted to appropriate regulatory agencies for review prior to the initiation of Project activities. It will contain specific measures related to train derailment and hydrocarbon spill response. Response measures to recover lost fuel include:

- Immediate response through use of absorbent booms and pads.

- Liquids cleanup using a vacuum truck, if available. This process can be used to capture both fuels and groundwater near the site for removal and disposal.

- Physical reclamation of contaminated soils including removal of contaminated soil and replacement with clean soil.

2.6.3.2 Forest Fire

Although unlikely, Project activities involving the use of heat or flame could result in a fire. Fires can alter habitat, consume riparian vegetation, destabilize shore area soils, and lead to erosion and sedimentation events. The extent and duration of a fire would be dependent on response efforts and meteorological conditions. Fire suppression water systems will be maintained on site. The fire suppression water supply at the mine site will be extracted from well water and stored in a 200,000 L fire water tank prior to use. Staff will be trained to prevent and control fires. A plan for preventing and combating forest fires will be incorporated into the Emergency Response and Spill Response Plan.

The nearest district forest management unit office in Labrador is in Wabush, which has staff and equipment to provide initial suppression activities. The Town of Schefferville also provides fire control services. Labec Century is discussing a reciprocal response arrangement with the Town of Schefferville, approximately 20 km away from the site. In the event of a fire, the on-site response and proximity of fire suppression services in Schefferville will limit the size of any burn.

2.6.3.3 Hydrocarbon Spill

Hydrocarbon spills associated with rail transport are addressed under “Train Derailment”.

Diesel storage tanks will be of 50,000 L capacity and be double-walled, horizontal skid-type units with integrated containment and overfill protection, designed to mitigate and reduce the probability of accidents and malfunctions. The fuel storage tanks will also be in secondary containment and comply with requirements of the applicable provincial and federal acts and regulations, and the conditions of the permit and authorizations.

As part of the Emergency Response and Spill Response Plan, spill prevention and response protocols will include the daily inspection of vehicles and hydraulics for leaks or damage that could cause minor spills. Vehicles and equipment will be parked in controlled areas where containment of spills can be provided. Staff will be trained in the handling of emergency response and spill scenarios.

Spill response equipment stored on site will include containment and absorbent booms, pads, barriers, sand bags, and skimmers, as well as natural and synthetic sorbent materials. The Emergency Response and Spill Response Plan will include the identification of persons responsible for managing spill response efforts, including their authority, role, and contact details, and a description of steps to take to immediately contain and recover spills. In the event of a spill, hydrocarbon-saturated soil will be removed for temporary storage and eventual treatment / disposal.

2.6.3.4 Settling/Sedimentation Pond Overflow

Settling/sedimentation ponds will be established at waste rock, overburden, run-of-mine stockpile areas, at the crushing and screening plant area, at the accommodation camp area, truck shop and truck wash, and at the rail loop. Run-off from the stockpiles and site run-off will be directed to the settling/sedimentation ponds prior to discharge to the receiving environment. The likelihood of an overflow is low because the ponds will be designed to contain run-off associated with a 1:100 year precipitation event. In such an event, settling / sedimentation ponds could overflow, releasing untreated water. Untreated water could have elevated levels of total suspended solids. No other contaminants are anticipated.

In the unlikely event of an overflow, contingency plans will be in place as part of the Emergency Response and Spill Response Plan to mitigate environmental effects to the receiving environment. Water sampling of TSS and other MDMER parameters will be conducted in downstream water bodies. Applicable stakeholders, including regulatory agencies, First Nations and communities, will be consulted to discuss such events and mitigation measures to be implemented.

2.6.3.5 Premature or Permanent Shutdown

As currently planned, the mine will have an operational production period of approximately seven years, (following approximately 1 year of construction) at which time decommissioning and rehabilitation will commence. However, should factors arise that result in the premature shutdown of the mine, regulatory requirements include provision for financial assurance from Labec Century. Any required cost expenditures over and above the financial assurance provided would be considered debt by Labec Century to the Crown.

2.6.3.6 Collisions with Wildlife

There will be a possibility of collision with wildlife along site roads in the Project area; however, preventative measures will be taken to avoid these accidents. All employees operating equipment, or any motor vehicle, will be trained to drive defensively and will follow all rules of the road. Speed limits will be posted and followed. Animals will have the right-of-way in all cases, except along the rail route for safety reasons. Should a collision with wildlife occur, appropriate emergency response will be taken, such as care of any injured passenger, road blockage, and contact of the nearest office of the Newfoundland and Labrador Department of Environment and Conservation, Wildlife Division.

2.6.4 Summary of Potential Project-related Emissions and Discharge (Construction and Operations)

2.6.4.1 Water Emissions and Discharges

Sources of effluents associated with operations will include open pit sump contact water, run-off from waste rock and stockpiled product, discharge from sewage treatment plants, and general site run-off. Effluent quality at all final discharge points will be required to meet both the federal MDMER and the Newfoundland and Labrador *Environmental Control Water and Sewage*

Regulations, 2003. Mitigation will be implemented to achieve compliance and includes settling ponds and sewage treatment. Natural drainage patterns will be maintained to the extent feasible through proper placement of waste rock and the use of properly-sized culverts and/or trenching.

Acid rock drainage and mine leaching from waste rock and open pit drainage are not anticipated (refer to Chapter 13: Terrain and Acid Rock Drainage/Metal Leaching).

2.6.4.2 Air and Noise Emissions

For mining operations, the emissions of concern for air quality are for the most part restricted to:

- Particulate emissions from drilling, blasting, travel on unpaved roads, material handling, processing (crushing, screening), and wind erosion of stockpiles;
- Combustion exhaust gas emissions from the operation of mining equipment, vehicle engines**,** locomotives and diesel generators; and
- Gaseous emissions from blasting, including carbon monoxide.

Dust will be primarily managed at the waste rock disposal areas through best-in-practice design, construction, and dumping / deposition practices, as well as progressive rehabilitation techniques. As required, water trucks will be available on site for dust suppression at these locations and for roadways.

During Construction, noise emissions will occur during blasting, excavation, grading, installation and construction of facilities and buildings, and construction of roadways and the railway loop. Noise emissions may also be generated by trucks and trains used to deliver equipment, materials, product and supplies, as well as to remove waste materials from site. During the Operation and Maintenance stage, noise will be generated by activities such as drilling, blasting, crushing, load-out, and operation of haul trucks and rail cars. Due to the distance of the Project from communities in the region, noise emissions are not expected to be a concern.

2.6.5 Closure and Decommissioning

A detailed Rehabilitation and Closure Plan will be prepared for the Project and a preliminary plan has been completed. The Plan incorporates progressive rehabilitation during all stages of the Project to limit the work required after completion of Operations and to limit the environmental effects during the Project life. Public health and safety will be considered at all stages of progressive rehabilitation, closure and post-closure.

The Rehabilitation and Closure Plan will to be approved by applicable regulatory agencies prior to implementation.

2.6.5.1 Rehabilitation and Closure Principles and Planning

For all mining projects within Newfoundland and Labrador, a rehabilitation and closure plan is a requirement under the Newfoundland and Labrador *Mining Act*. There are three key stages of rehabilitation activity over the life of a mine:

1. progressive rehabilitation;
2. closure rehabilitation; and
3. post-closure monitoring and treatment.

Progressive rehabilitation is completed, where practical, throughout the life of a mine, and includes activities that would contribute to the rehabilitation effort that would otherwise necessarily be carried out upon completion of mining operations. Closure rehabilitation involves measures undertaken after mining operations to restore or reclaim the property as close as reasonably possible to its pre-mining condition. Upon completion of the closure rehabilitation activities, a period of "post-closure monitoring" is then required to confirm that the rehabilitation activities have been successful in achieving the prescribed goals.

The Rehabilitation and Closure Plan for the Project is directly linked to the mine development and operation over the life of the mine and will be a "living" document. The overall objective for the Project site is to return the site to natural conditions as early as possible in terms of:

- decreased health and safety risks;
- erosion control;
- limitation of maintenance and monitoring;
- development of a visually acceptable site for the community; and
- development of a landform design compatible with future site use.

Ongoing and future Project planning and design activities will include the proactive consideration of future closure issues and requirements. The site design will follow the concept of "design for closure" for all site structures. Steps to promote the overall rehabilitation process will include the following:

- terrain, soil and vegetation disturbances will be limited to that which is necessary to complete the work within the defined Project boundaries.
- wherever possible, organic soils, mineral soils, glacial till, and excavated rock will be stockpiled separately for later rehabilitation work.
- surface disturbances will be stabilized to limit erosion and promote natural re-vegetation.
- natural re-vegetation of surface disturbances will be encouraged.

2.6.5.2 Progressive Rehabilitation Opportunities

Progressive rehabilitation will be implemented throughout the life of the mine and will include the following:

- rehabilitation of construction-related buildings and laydown areas;
- completion of re-vegetation studies and trials;
- installation of barricades and signage around the open pit;
- geotechnical and slope stability analysis;
- stabilization and re-vegetation of the waste rock disposal areas; and
- development and implementation of an integrated Waste Management Plan.

2.6.5.3 Final Closure Rehabilitation Activities

Final closure rehabilitation activities are anticipated to be completed in one year following completion of Operations and will generally include:

- Hazardous chemicals, reagents and materials will be removed;
- Equipment will be disconnected, drained and cleaned, disassembled and sold for reuse or to a licensed scrap dealer;
- Any equipment deemed potentially hazardous will be removed from the site and disposed of in accordance with appropriate regulations;
- All buildings and surface infrastructure, including the rail loop, will be dismantled, removed and disposed of;
- Material with salvage value will be removed and sold;
- Fuel storage and dispensing facilities will be removed;
- Soil and groundwater conditions in areas that warrant assessment (e.g., fuel dispensing facility, chemical storage buildings, ore storage areas) will be assessed and remedial measures will be implemented where necessary;
- Dewatering wells and groundwater monitoring wells will be decommissioned;
- Barricades and signage will be installed around the open pit in areas not completed as part of progressive rehabilitation during the operations stage, as necessary;
- In general, site drainage patterns will be re-established, as near as practical, to natural, pre-development conditions; and

- Grading and/or scarification of disturbed areas will be undertaken to promote natural re-vegetation; in areas where natural re-vegetation is not sufficient to control erosion and sedimentation, the placement and grading of overburden will be considered.

The long-term land use of the rehabilitated site must be compatible and sustainable with the topography as well as the soil and climate conditions. Land use options such as agriculture and forestry are not considered viable upon completion of the Closure phase of the Project.

Once the land has been rehabilitated and stabilized according to the final Rehabilitation and Closure Plan, the currently held surface rights could be returned to the Crown.

2.6.5.4 Post-Closure Monitoring

Post-closure monitoring and treatment will be conducted to confirm the chemical and physical outcomes and effectiveness of the rehabilitation work and general site conditions prior to close-out and relinquishment of the land to the Crown. Labec Century will plan and undertake any such post-closure monitoring in consultation with the relevant regulatory agencies and following the relevant regulations and standards in place at the time.

2.7 Labour Force Requirements

2.7.1 Construction Workforce

The Construction Phase personnel working at site is expected to peak at approximately 310 workers. Detailed construction information will be established in conjunction with the development of a contracting strategy for the Project, ongoing negotiations with relevant Indigenous groups, and through the finalization of the Project Benefits Plan. As per the provincial EIS Guidelines, Labec Century understands that the Benefits Plan must be submitted and approved prior to the release of the Project from the EA process, and commits that it will include all the required labour force requirements information.

2.7.2 Operation Workforce

The Operation phase of the Project will commence upon completion of Construction and Commissioning, and is expected to extend for approximately seven years. Peak employment during the Operations and Maintenance phase of the Project is estimated at approximately 269 of which approximately half will be on site at any time.

Table 2.8 provides a summary of the estimated number of employees throughout the Operations and Maintenance Phase. Totals are provided for the following groupings:

- mine and pit operation;
- crushing and screening plant;
- site services and administration;

- product haulage; and
- rail yard.

The workforce will include a wide range of occupations including engineers, geologist, mine technician, mine superintendent, pit foreperson, truck operator, shovel operator, drill operator, labourer, mechanic, blast crew, and surveyor. The breakdown between proponent employees and contractor employees has not yet been determined.

Table 2.8 Estimated Mine and Pit Staffing Requirements

Mining	NOC 2006	NOC 2016.3	Pre-Prod Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8
Salaried Personnel											
Operations											
Mine Superintendent	8221	8221	1	1	1	1	1	1	1		
Mine Shift Foreman	8221	8221	4	4	4	4	4	4	4		
Blaster	7372	7372	2	2	2	2	2	2	2		
Blaster Helper	7372	7372	2	2	2	2	2	2	2		
Production / Maintenance / Mine Clerk	1473	1523	2	2	2	2	2	2	2		
Salaried Open Pit Operations Total			**11**	**11**	**11**	**11**	**11**	**11**	**11**	**0**	**0**
Maintenance											
Maintenance Superintendent	7216	7301	1	1	1	1	1	1	1		
Mechanical/Industrial Engineer	2141	2141	1	1	1	1	1	1	1		
Mine Maintenance Foreman	7216	7301	4	4	4	4	4	4	4		
Mine Maintenance Trainer	4131	4021	2	2	2	2	2	2	2		
Salaried Mine Maintenance Total			**8**	**8**	**8**	**8**	**8**	**8**	**8**	**0**	**0**
Engineering											
Chief Engineer	0211	0211	1	1	1	1	1	1	1		
Mine Planning Engineer	2143	2143	2	2	2	2	2	2	2		
Mine Surveyor	2212	2254	2	2	2	2	2	2	2		
Salaried Mine Engineering Total			**5**	**5**	**5**	**5**	**5**	**5**	**5**	**0**	**0**
Geology											
Chief Geologist	2113	2113	1	1	1	1	1	1	1		
Geologist	2113	2113	1	1	1	1	1	1	1		
Geologist Technician	2212	2212	1	1	1	1	1	1	1		
Salaried Geology Total			**3**	**3**	**3**	**3**	**3**	**3**	**3**		
Sub-total Salaried Personnel			**27**	**27**	**27**	**27**	**27**	**27**	**27**	**0**	**0**

Table 2.8 Estimated Mine and Pit Staffing Requirements

Mining	NOC 2006	NOC 2016.3	Pre-Prod Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8
Hourly Personnel											
Operations											
Shovel Operators	7421	7521	4	6	8	8	8	7	3		
Loader Operators	7452	7452	2	2	2	2	2	2	2		
Haul Truck Operators	7421	7521	18	25	39	42	47	43	21		
Drill Operators	7372	7372	4	6	7	9	8	7	4		
Dozer Operators	7421	7521	12	12	12	12	12	12	12		
Grader Operators	7421	7521	4	4	4	4	4	4	4		
Other Auxiliary Equipment	7421	7521	6	8	8	8	8	8	4		
General Labour	8614	8614	4	4	4	4	4	4	4		
Dewatering	7411	7511	2	2	2	2	2	2	2		
Hourly Open Pit Operations Total			**56**	**69**	**86**	**91**	**95**	**89**	**56**	**0**	**0**
Field Maintenance											
Field Gen Mechanics	7335	7335	4	4	4	4	4	4	4		
Field Welder	7265	7237	2	2	2	2	2	2	2		
Field Electrician	7242	7242	2	2	2	2	2	2	2		
Shovel Mechanics	7312	7312	2	2	3	3	3	2	2		
Shop Maintenance											
Shop Electrician	7242	7242	2	2	2	2	2	2	2		
Shop Mechanic	7312	7312	6	6	8	8	8	8	6		
Mechanic Helper	7612	7612	2	4	4	4	4	4	2		
Welder-machinist	7231	7231	2	2	2	2	2	2	2		
Lube/Fuel Truck	7411	7511	0	0	0	0	0	0	0		
Tool Crib Attendant	7452	7452	2	2	2	2	2	2	2		
Janitor	6663	6733	2	2	2	2	2	2	2		

Table 2.8 Estimated Mine and Pit Staffing Requirements

Mining	NOC 2006	NOC 2016.3	Pre-Prod Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8
Hourly Mine Maintenance Total			**26**	**28**	**31**	**31**	**31**	**30**	**26**	**0**	**0**
Hourly Personnel Total			**82**	**97**	**117**	**122**	**126**	**119**	**82**	**0**	**0**
TOTAL			**109**	**124**	**144**	**149**	**153**	**146**	**109**	**0**	**0**
PROCESSING											
Salaried Personnel											
Processing manager	9211	9211		1	1	1	1	1	1	1	1
Process engineer	7351	9241		1	1	1	1	1	1	1	1
Lab manager	0212	0212		1	1	1	1	1	1	1	1
Area foreman	9211	9211		4	4	4	4	4	4	4	4
Sub-total Salaried Personnel			**0**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Hourly Personnel											
Process plant operator	9411	9411		4	4	4	4	4	4	4	4
Area general labour	9611	9611		4	4	4	4	4	4	4	4
Area mechanics	7335	7335		2	2	2	2	2	2	2	2
Area electricians	7242	7242		2	2	2	2	2	2	2	2
Laboratory attendants	2211	2211		4	4	4	4	4	4	4	4
Loader operators	7452	7452		8	8	8	8	8	8	8	8
Sub-total Hourly Personnel			**0**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**
TOTAL			**0**	**31**	**31**	**31**	**31**	**31**	**31**	**31**	**31**

Table 2.8 Estimated Mine and Pit Staffing Requirements

Mining	NOC 2006	NOC 2016.3	Pre-Prod Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8
HAULING											
Hourly Personnel											
Haul truck operators	7421	7521		40	40	40	40	40	40	40	40
Haul truck and loader maintenance mechanics	7312	7312		6	6	6	6	6	6	6	6
Sub-total Hourly Personnel			**0**	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**46**
TOTAL			**0**	**46**	**46**	**46**	**46**	**46**	**46**	**46**	**46**
RAIL LOADOUT											
Salaried Personnel											
Area foreman	7221	7304		2	2	2	2	2	2	2	2
Sub-total Salaried Personnel			**0**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Hourly Personnel											
Railcar loading/Stacking loader operators	7452	7452		12	12	12	12	12	12	12	12
Sub-total Hourly Personnel			**0**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
TOTAL				**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**

Table 2.8 Estimated Mine and Pit Staffing Requirements

Mining	NOC 2006	NOC 2016.3	Pre-Prod Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8
G & A											
Salaried Personnel											
Resident General Manager	0811	0811		1	1	1	1	1	1	1	1
Human Resources	0112	0112		1	1	1	1	1	1	1	1
Accounting/Payroll	0111	0111		1	1	1	1	1	1	1	1
Health & Safety	0114	0114		1	1	1	1	1	1	1	1
Purchasing	0113	0113		1	1	1	1	1	1	1	1
IT technician	2282	2282		1	1	1	1	1	1	1	1
Environmental engineer	2131	2131		1	1	1	1	1	1	1	1
First aid	3234	3234		2	2	2	2	2	2	2	2
Sub-total salaried personnel			**0**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Hourly Personnel											
Security guard	6651	6541		4	4	4	4	4	4	4	4
Warehouse attendants	7452	7452		2	2	2	2	2	2	2	2
Fuel distribution and dewatering systems	7411	7511		2	2	2	2	2	2	2	2
Site mechanical maintenance	7335	7335		2	2	2	2	2	2	2	2
Road maintenance – general labour	7622	7622		3	3	3	3	3	3	3	3
Road maintenance – light mobile equipment operator	7411	7511		3	3	3	3	3	3	3	3
Sub-total hourly personnel			**0**	**16**	**16**	**16**	**16**	**16**	**16**	**16**	**16**
TOTAL			**0**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**
TOTAL SALARIED			**27**	**45**	**45**	**45**	**45**	**45**	**45**	**18**	**18**
TOTAL HOURLY			**82**	**195**	**215**	**220**	**224**	**217**	**180**	**98**	**98**
TOTAL			**109**	**240**	**260**	**265**	**269**	**262**	**225**	**116**	**116**

Labec Century is committed to employment equity and providing local benefits throughout the life of the Project. As such, Labec Century will prepare a Women's Employment Plan, in consultation with the Office for the Status of Women, and a Benefits Plan, in consultation with the provincial Department of Industry, Energy and Technology, and these will include employment and contracting policies for the Project.

The Project Benefits Plan will include the following:

- detailed information on Construction Phase employment as per the Section 4.4.4.3 of the Provincial guidelines;
- whether the positions are full-time equivalent or actual positions. If they are actual positions, the breakdown of full-time and part-time or full-year and part-year positions;
- an estimate of the number of apprentices (by level) and journeypersons required;
- the estimated percentage of the hired workforce from Newfoundland and Labrador;
- the estimated percentage of hired workforce from Labrador, by gender;
- the estimated percentage of hired Indigenous workforce, by gender; and
- strategies for recruitment.

Labec Century will also work with its contractors to implement the requirements of these plans through its supply chain and contract chain.

2.8 Alternative Means of Carrying out the Project

As required under Section 8 of the federal EIS Guidelines for the Project, the EIS addresses alternative means of carrying out the Project that are technically and economically feasible, and the potential environmental effects of any such alternative means.

The following section provides a discussion and analysis of key alternative means for undertaking the Project that have been considered in Project planning and design including environmental, technical and/or economic factors.

As part of Project planning and design, alternatives were identified and evaluated for the following elements:

- processing and tailings management
- waste rock storage (management and location);
- transportation (including road and rail loop);
- power supply;

- dewatering options at Joyce Lake;
- life of Project;
- labour supply;
- mining methods;
- contaminated water treatment;
- location of infrastructure; and
- worker accommodations and transportation

Specific criteria were applied to the evaluation of these alternative means of carrying out the Project including: technical feasibility; economic feasibility; and environmental effects. Identification of environmental effects is only required if the alternative means is both technically and economically feasible. The following paragraphs describe these criteria in greater detail.

Technical Feasibility

Technical feasibility relates to the appropriateness of an alternative based on engineering and operational performance based on similar projects.

Economic Feasibility

Economic feasibility relates to the ability of the Project to achieve sufficient future cash flows to pay back the capital invested, pay the ongoing operational expenses, and cover the closure costs while generating the necessary return on investment for shareholders. These financial projections generate the expected “Net Present Value” (NPV) of the investment which is used by shareholders and the investment community to allocate capital investment. A project that cannot attract the necessary capital will not be developed; hence, this is a fundamental go/no go decision point for the Project.

Environmental Effects

Environmental acceptability and implications are considered in the decision-making process. Specifically, the expected severity of adverse residual effects on the environment for alternative means of carrying out the Project is considered. The “environment” in this context refers to the natural and the socio-economic environments, focusing on valued components identified in the effects assessment (Chapter 5: Environmental Assessment Methods and Scope of Assessment). Environmental effects are considered if the alternative means are both technically and economically feasible.

2.8.1 Trade-off and Optimization Studies

Labec Century completed trade-off and optimization studies to evaluate alternative means of carrying out the Project based on economic and technical feasibility criteria. The results of these studies are presented below and include the specific criteria used for the evaluation of each option.

2.8.1.1 Wet versus Dry Ore Processing

As part of the feasibility study, BBA studied the use of wet ore processing versus dry ore processing. The trade-off study included:

- Review of process test work which determined no additional test work was required;
- Determination of flow sheets, mass and water balances and water management;
- Location of equipment and buildings;
- Determination of key performance indicators;
- Determination of economically exploitable mineral resources;
- Establishing of timing of application of wet processing whether at the start of production or close to end of operations;
- Determination of seasonal periods of operation and, in particular, the transporting of fines and lump products; taking into consideration moisture content and periods when they can be transported to Sept-Îles; and
- NPV considerations.

The study clearly indicated dry processing to be the preferred process option, and wet processing was not found to be economically viable.

2.8.1.2 Ore Transfer across Iron Arm

BBA, the author of the feasibility study, evaluated alternatives to the ice bridge, originally contemplated in the Preliminary Economic Assessment (PEA), for iron ore product transport across Iron Arm.

Alternatives considered included:

- rock causeway;
- ore and equipment ferry;
- floating bridge;
- cable suspended conveyor; and

- cable suspended skip.

Consideration was given to the implications of mine operability together with ore and waste release from the mine, environmental implications and permitting schedule, capital and operating costs, safety and health, as well as substantive risks to production. NPV of each alternative was evaluated.

A rock causeway was selected as the preferred option to transfer products across Iron Arm, as it was the case that provided acceptable safety of personnel, project continuity, the lowest operating costs, and best NPV. It also allowed reduction of the site footprint to the north side of Iron Arm only.

2.8.1.3 Road or Rail to the Process Plant

A dedicated truck haul road between the process plant and the Astray rail loop which connects to the Tshiuetin main rail line was considered in a trade-off study, which also considered extending a rail line from the Tshiuetin main line approximately 20km south of Schefferville towards the site process plant.

The study included:

- A rail line spur to the area of the process plant;
- Consideration of other Century potential DSO and Taconite projects in the area;
- Consideration of the cost effective application of a rail loading loop versus a spur;
- Practical operational considerations, including stockpile and loading systems; and
- NPV evaluations.

A haul road was selected as the preferred haulage method for products from the plant to the rail loop, as the rail extension was uneconomic.

2.8.1.4 Joyce Lake Deposit Open Pit, Annual Capacity and Target Production Grade

The Feasibility Study selected a mine production target of 62% Fe. An optimization study was required to determine the best exploitation plan target grade consistent with maintaining deleterious elements, particularly SiO_2, within acceptable limits for the sale of DSO products.

The optimization study included:

- Use of the most updated mineral resources from SGS Canada Inc.;
- Sizing of mining equipment;
- Opportunities to extend life of mine utilizing the lowest ore grade possible;

- Ore release from the open pit to determine the return of the NPV of the project;
- Optimum production rate per annum to ensure the economic viability; and
- Seasonal mining and processing to best utilize the remaining ore reserves.

From the evaluation process, it was determined the open pit be mined at 2.5 Mt per year over a period of 5.7 years, at life of mine grade at 61.4% iron using 100 tonne capacity haul trucks and suitable related equipment. Ore in excess of 52% iron but below 55% iron mined within the confines of the open pit will be stockpiled and processed at the end of mining, thereby extending mine life by 1.5 years. A summary of alternatives analysis for the Project, including preferred options, is presented in Table 2.9.

2.9 References

Canadian Environmental Assessment Agency. 2013. *Operational Policy Statement Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012*. 6 pp. Available at: https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=1B095C22-1.

Natural Resources Canada. 1998. *Background Paper on Land Access, Protected Areas, and Sustainable Development.* Resource Management Division, Mineral and Metal Policy Branch, Minerals and Metals Sector, Ottawa ON. ix + 48 pp.

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Processing and Tailings Management					
1a	Site Ore Processing • wet	• Feasible	• Uneconomic	• Tailings generated • Tailings impoundment required • Red water potentially created	**Option 1b**
1b	Site Ore Processing • dry	• Feasible	• Economic	• Lowest impact • 100% ore recovery to products • No tailings, therefore no red water created	
Open Pit Waste Rock Storage Management and Location					
2a	Waste rock stockpile placed close to open pit	• Feasible and normal practice worldwide	• Economic	• Good drainage and positioning of perimeter catchment • Ground slopes assisting drainage and catchment • 104 m maximum pile height • Shallow angles on sides of stockpile to reduce erosion and encourage continuous re-vegetation • Maximizes distance from major water body	**Option 2a**
2b	Waste rock stockpile placed further from the open pit	• Feasible	• Less economic or uneconomic depending on distance from open pit	• Similar footprint and height to 2a • Less catchment and drainage advantage • Closer to water body	
2c	Waste rock returned to open pit	• Feasible for some but highly unusual	• Uneconomic	• GHG emissions from mining equipment to move the waste rock • The open pit would not be large enough to contain all of the waste rock removed	

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Transportation					

3a	Ice Bridges across Iron Arm to truck ore/products over ice	• Not practical - poor reliability
		  ◦ Worker safety issues
		  ◦ Shipping from mine to Process Plant limited to approximately 3 months per year
			• Uneconomic	• Process Plant would be located on the south side of Iron Arm, closer to cabins
				• Increased site footprint
				• Risk of loss of ore into Iron Arm
					Option 3d

3b	Ore and Service Barge Across Iron Arm	• Not Practical
		  ◦ Worker safety issues
		  ◦ Available ~6 months per year
			• Uneconomic	• Process Plant would be located on the south side of Iron Arm closer to cabins
				• Increased site footprint
				• Risk of loss of ore into Iron Arm
					Option 3d

3c	Cable suspended conveyor and skip to move ore over Iron Arm	• Not Practical ◦ Service ice bridge and summer service barge still required	• Uneconomic	• Process Plant would be located on the south side of Iron Arm, closer to cabins • Increased site footprint • Risk of ore spillage into Iron Arm	
3d	Rock Causeway Across Iron Arm	• Practical ◦ Safe for products transfer, service vehicles and personnel access	• Economic	• Process Plant would be located close to Open Pit • Reduces site footprint • Increases Process Plant distance to cabins	

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
4a	All Season Dedicated Haul Road (~43km) to connect Process Plant to Rail Loop, for rail transport to Sept-Îles on existing lines	• Feasible ◦ Although it can be operated 12 months of the year, the haul road will be operated only during the eight-month Process Plant operational period	• Economic	• Only practical and economic method to move products between Process Plant and Rail Loop.	**Option 4a**
4b	Rail extension to Process Plant from existing main rail line (Schefferville to Sept-Îles).	• Feasible	• Highly uneconomic	• Less dust would be generated during operation compared to haul trucks • Extension of the rail line requires low grades and major backfilling and rock cuts, creating large footprint	

5a	Products transported from rail loop 20km south of Schefferville by rail to Sept Iles port on existing rail line	• Feasible
		  ◦ Tshiuetin Rail Transportation (TRT) line used by other mines and also connects to the QNS&L line (owned by IOC)
		  ◦ TRT line owned and operated by Indigenous groups
			• Only practical and available economic way to transfer products to port.	• Operating practices well established and risks are mostly associated with spillage of iron ore products which is relatively benign	**Option 5a**

5b	Pipeline to transfer products from Process Plant to Sept-Îles	• Not practical
		  ◦ Operation of a pipeline in these remote conditions and low temperatures is not proven
			• Uneconomic
			  ◦ Pipeline for this tonnage is not economic
				• Risk of pipeline plug-up and breakage causing spill of significant volume of iron ore product in slurry form which would be more difficult to clean up compared to solid iron ore products	**Option 5a**

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Power Supply for the Mine and Facilities					
6a	Five diesel generators skid mounted near Process Plant to meet an estimated 2.4 MW of demand and smaller diesel generation capacities at the pit for water pumping, at the rail loop, at the explosive magazine, at the guardhouse, and at the telecommunication towers for minor power requirements	• Feasible	• Economic but expensive per kWh produced ◦ Low capital and generation units can be added, subtracted, replaced or relocated to match requirements	• Small footprint • Low noise levels • Use same fuel as mobile equipment • Power generated fluctuates to power demand	**Option 6a**

6b	Tie to local grid and supply grid power to site	• Inadequate power available in local area as fully used by others
		• Grid power in area from Menihek Generating Station and increasing power generation is complex and expensive and not technically feasible for this Project
			• Uneconomic
			  ◦ Distance to existing power line from site (~28km)
			  ◦ Complex and not viable to increase hydro generation at Menihek Hydro dam for this project
			  ◦ Inadequate power available
				• Small footprint
				• Low noise levels	

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option

6c	Solar or Wind electrical power generation for primary or supplemental requirements	• Not practical because Project has continuous demand: 24 hours/day required for 8 months each year and 12 months/year for open pit
		• Solar or wind systems do not provide continuous power required for this Project, so 100% diesel power backup is required
			• Uneconomic
			  ◦ Short project life of ~7 years including construction cannot justify solar or wind installation, even for provision of supplemental power
			  ◦ Solar or wind systems do not provide continuous power required for this Project, so 100% diesel power backup is required
			  ◦ Solar or wind installations are too distant from communities to be of use after closure of Project
				• Solar or wind power generation would reduce diesel emissions	**Option 6a**

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Dewatering Options at Joyce Lake					

7a	Full dewatering	• Feasible
		  ◦ Full dewatering of Joyce Lake requires complete water removal prior to pit edge incursion into the lake area
			• Greater economic viability
			  ◦ does not require the construction of an in-lake dam
				• Loss of Joyce Lake during operations; however water levels restored after closure	**Option 7a**

7b	Partial dewatering with dam installed within Joyce Lake to isolate Open Pit	• Feasible
		  ◦ Partial dewatering of Joyce Lake would require lowering of lake levels to a level compatible with an in-lake dam
			• Uneconomic
			  ◦ Dam consequence level would be high to very high due to potential loss of life to pit workers in the event of a dam failure (e.g., from Open Pit blasting). Thus, the dam would be an extremely robust structure and high cost to construct
				• Partial loss of Joyce Lake during operations
				• Blasting may result in impacts on residual fish communities	

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Life of Project					
8a	Approximately seven years of production including processing of low grade ore at end of mine life	• Feasible	• Economic	• Waste rock will be stockpiled close to Open Pit and re-vegetated	**Option 8a**
8b	Greater than approximately seven years of production	• Feasible	• Uneconomic ○ Would only be economic if additional mineral reserves discovered in Open Pit area	• Likely increase in waste rock produced and stockpiled • Likely increase in footprint of Open Pit • Amount of ground water pumped from open pit perimeter wells will be greater as pumping time increased • Contact water pumped from open pit would increase as pumping is for greater duration • Diesel emissions from open pit power generators and mobile equipment would increase as longer duration • Labour force would be downsized later, as compared to Option 8a	
8c	Less than approximately seven years of production	• Feasible	• Uneconomic ○ Production duration may be curtailed and mine closed if selling price of iron ore is low for extended period	• If mine closes prematurely then closure plan and rehabilitation would be done earlier • Size of waste stockpiles would be reduced and size of open pit footprint would be smaller • Ground water pumped from Open Pit perimeter wells would be less as operational duration would be less • Contact water pumped from pit would be less as duration of pumping is less • Diesel emission from Open Pit power generation and from mobile	

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
				equipment would be less as shorter duration • Labour force would be down-sized earlier as compared to option 8a.	
Labor Supply					
Labour supply will be determined in a manner consistent with the Benefits Policy outlined in Chapter 1 of the EIS and in the Project Benefits Plan					
Mining Methods (e.g., open pit versus others)					
10a	Open Pit mining with conventional drilling and blasting with shovels and trucks to move ore and waste	• Open Pit is highly practical way to extract this iron ore deposit, especially with significant ground water present	• Economic	• Residual open pit that will flood post closure to existing elevation of connected Joyce Lake • Waste and overburden stockpiles of 70.08 Mt that will be drained, contoured and re-vegetated	**Option 10a**
10b	Underground mining	• Could practically be done but difficult with quantities of ground water present and shallow nature of deposit	• Uneconomic ◦ Underground mining of this deposit is not economically viable at any foreseeable iron ore selling price	• Smaller physical footprint	
Contaminated Water Treatment					
11a	Based on the characterization of mine water, sedimentation pond infrastructure is the only practical option to meet regulatory standards	Mine site contact water discharge will be treated through a series of sedimentation ponds to MDMER and applicable NL effluent criteria	Sedimentation ponds are economically viable and an efficient means to manage both mine water quantity and quality	The potential for sedimentation, ARD/ML, ammonia and red water quality were assessed; it was determined that the sedimentation ponds in combination with monitoring and if required ammonia management will achieve effluent regulatory criteria	Sedimentation ponds are the preferred mine water treatment approach

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Location of Infrastructure					

12a	For the operation phase, a permanent accommodations facility will be installed at site
	• For the construction phase, accommodations requirements will be sourced from the Schefferville area
		• Feasible
		  ◦ For the operation phase, locating a self-contained camp at site is a practical and convenient arrangement
			• Economic
			  ◦ This is economically viable and is part of the quality of accommodation necessary to attract and retain production employees
				• Operation phase site accommodations will be self-sufficient and effluents will be treated before discharge
				• Impact of operation phase accommodation on community services is expected to be minimal due to on-site accommodations
				• On-site accommodations will result in fewer emissions due to commuter traffic
					Option 12a

12b	Accommodation for both construction and operation phases in local area in Labec Century owned facilities, rented camps, private residences, and hotel rooms	• Feasible ◦ Transportation from local area viable when rock causeway is operational	• Economic but unlikely to provide operational accommodation of adequate quality to attract and retain employees in production phase	• The impact will be principally dust generated and the diesel and gasoline emissions from vehicles for those employees who commute from local residence along the service road and the causeway to site • Speed restrictions will be in place on the service road so wildlife collision is expected to be minimal • For employees and contractors commuting to site from area residences and accommodations, generation of dust and diesel and gasoline emission resulting from traffic will be increased as compared to Option 12a • Impact on community services will be increased as compared to Option 12a • Impacts with wildlife are expected to be minimal as speed restrictions will be in place on the service road	**Option 12a**

Table 2.9 Alternative Analysis

Option	Description	Technical Feasibility	Economic Viability	Environmental Implications/Acceptability	Preferred Option
Location of Rock Causeway					
13a	Rock Causeway across Iron Arm • Shallow water and near shore to shore distance	• Practical in planned location with shallow water draft and distance shore to shore (~1.2 km), allowing removal after Project closure or retention if requested by local communities and acceptable to regulators	• Economic ○ Comparison of methods of crossing of Iron Arm and associated location of Process Plant, identified the rock causeway as the most practical, safest and most economic alternative	• Minimal clean waste rock mined and placed • Two 8 m wide bridges to keep water movement to low velocity to allow for continued fish migration patterns and navigation • Rock placement during fish spawning season will be reduced	**Option 13a**
13b	Rock Causeway across Iron Arm • Deep water location and greater distance shore to shore	• Less practical if not totally impractical in deep water especially with increased shore to shore distance as amount of rock required increases dramatically and reclamation at closure of project becomes impossible	• Uneconomic ○ Quantity of waste rock for stability, footprint on lake bottom will dramatically increase, as will capital cost of placement and, if attempted, cost of removal	• Increased rock required • Larger footprint	
Location of Final Effluent Discharge					
14	Final effluent discharge point	• Final Discharge Points (FDPs) are located downstream of each of the six proposed sedimentation ponds and the discharge pipe from the sanitary effluent treatment plant	The FDPs are economically viable to monitor	Appropriate MDMER and NL effluent regulatory criteria will be achieved at FDPs	The proposed FDPs are the preferred FDPs

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 3:

Engagement and Traditional Knowledge

File No. 121416571

Date: May 2021

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3.0 ENGAGEMENT AND TRADITIONAL KNOWLEDGE

The goals for public, stakeholder, and Indigenous engagement for this EIS have been to:

- Inform interested parties about the Project;
- Assist in the identification of key issues and concerns regarding the Project;
- Build support for the Project;
- Obtain information that may assist in carrying out baseline or predictive studies for the EA; and
- Collect information on the Current use of Land and Resources for Traditional Purposes by Indigenous persons, and to share information about the Project with local communities, stakeholders, Indigenous groups, and the general public.

Additional objectives for engagement activities include building support for the Project in the community and with governments with respect to the Project's direct and indirect benefits.

As detailed in chapter 1, Joyce Direct Iron Inc. succeeded Labec Century Iron Ore Inc. ("Labec Century") as the Project Proponent on February 18, 2021 following an internal reorganization. All references to Labec Century as the Project proponent may be interpreted as now referring to Joyce Direct Iron Inc.

This chapter summarizes the issues and comments received by Labec Century from Indigenous persons and stakeholders during engagement activities associated with the Project to date.

During the preparation of the EIS, Labec Century held meetings and public sessions in the Communities of Schefferville and Kawawachikamach in Québec to provide Project information and solicit Project-related feedback. Labec Century has actively engaged with a variety of stakeholders, including Indigenous groups, members of the public, and regulatory agencies throughout the Project design and EA processes. Issues and responses have been documented and incorporated throughout the EIS, including through Project design and effects management procedures. Indigenous communities and stakeholders have expressed considerable interest in the Project throughout the engagement process. A summary of Project changes since the submission of the Project Description/Registration is presented in Chapter 2: Project Description. Issues raised throughout the engagement process are reflected in these changes.

The website http://CenturyGlobal.ca and Century's SEDAR profile (accessible at http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&issuerNo=00026555) contains information on current projects. The website contains information about the Project, as well as a number of Project-related documents including other potential projects in the area:

- NI 43-101 Feasibility Study of the Joyce Lake Direct Shipping Iron Ore (DSO) Project (released on April 14, 2015);
- NI 43-101 Technical Report on the Mineral Resources of the Joyce Lake DSO Iron Project Newfoundland & Labrador (released on April 17, 2014);
- NI 43-101 Technical Report, Preliminary Economic Assessment (PEA) Study Report for the Joyce Lake DSO Project Newfoundland & Labrador (released on May 9, 2013);
- NI 43-101 Technical Report, Joyce Lake DSO Iron Project Newfoundland & Labrador (released on April 18, 2013);
- Independent Technical Report on the Attikamagen Project (released on May 11, 2011);
- Mineral Resource Evaluation, Black Bird DSO Deposit, Sunny Lake Property, Schefferville, Quebec (released on April 14, 2015);
- Preliminary Economic Assessment Report for the Full Moon Project (released on April 14, 2015);
- NI 43-101 Technical Report on the Mineral Resources of the Hayot Lake Taconite Iron Project (released on November 9, 2012).

Labec Century has also given numerous presentations to industry and the public regarding the Project and its activities generally.

3.1 Summary of Regulatory Engagement Activities

Table 3.1 summarizes the topics that were discussed during meetings with regulators. Throughout the engagement process, meetings were held with agencies who have a regulatory and/or permitting responsibility for the Project. Meeting topics included Project overviews provided by Labec Century, discussions about baseline data, the Project Description/Registration process, Project employment and benefits, as well as issues and concerns related to specific components of the environment.

Table 3.1 Regulatory Engagement

Stakeholder	Type of Engagement	Date	Summary of Discussion
NLDOECC (Water Resources and EA Divisions)	Private meeting	15-Oct-12	Century provided an overview of the Project and discussion of anticipated surface water interactions
NLDOECC (Water Resources and EA Divisions)	Private meeting	15-Oct-12	Reviewed discussions to date with government agencies and feedback on provincial registration
NLDOECC (Pollution Prevention)	Outgoing call	16-Oct-12	Discussion of baseline air quality information and review by Pollution Prevention
NLDOECC (Wildlife)	Private meeting	8-Nov-12	Presentation of project overview and work plans and discussion of request for caribou collar data
DFO	Outgoing call	5-Dec-12	Comments from DFO on project description
DFO	Private meeting	7-Dec-12	Discussion of baseline work conducted in support of fish and fish habitat, and DFO's comments on project description – effects of water crossings on fish and fish habitat
NLDOECC (Pollution Prevention)	Outgoing call	17-Jan-13	Discussion of ambient air quality modeling
NLDOECC	Outgoing call	21-Jan-13	Discussed changes presented during January 16 EA Committee meeting
CEA Agency, now IAAC	Meeting	19-Jun-13	Discussed engagement activities with Indigenous groups. Other topics discussed: • Economics of project • CEAA process • Permitting process • Issues identified to date
Stephen Hinchey, Mineral Lands Division, Newfoundland and Labrador Department of Natural Resources (NLDNR) (now part of the Newfoundland and Labrador Department of Industry, Energy and Technology [NLDIET])	Letter from Century	14-Apr-14	Addressed concerns Mr. Hinchey had previously brought to Century's attention: • Hiring of Indigenous workers • Consultation with stakeholders and residents • Long term and sustainable benefits
Government of Quebec	Meeting	23-Jul-14	Century provided an update of the project and discussed challenges faced with trap lines of one of the families of the Innu Matimekush Lac-John Band against company claims
Heather Rafuse, Mineral Lands Division, NLDNR (now part of NLDIET)	Letter from Century	29-Jul-14	Addressed concerns Ms. Rafuse had previously brought to Century's attention: • Hiring of Indigenous workers • Consultation with stakeholders and residents • Long term and sustainable benefits

Table 3.1 Regulatory Engagement

Stakeholder	Type of Engagement	Date	Summary of Discussion
IAAC	Meeting	3-Nov-14	Meeting with IAAC regarding Project Update, consultation activities, and submission schedule
NLDOECC (Water Resources and EA Divisions)	Meeting	6-Nov-14	Meeting with representatives from NLDOECC regarding Project Update, consultation activities, and submission schedule
DFO	Meeting	6-Nov-14	Meeting with representatives from DFO regarding Project Update and review of causeway option
Paul Carter, Royalties & Benefits (NLDNR)	Meeting	7-Nov-14	Discussion of IBA considerations for employment of Indigenous workers
Transport Canada	Meeting	27-Nov-14	Meeting with representatives from Transport Canada regarding Project Update, consultation, and implications of revised Navigation Protection Act (revised again to the Canadian Navigable Waters Act)
Environment Canada	Meeting	27-Nov-14	Meeting with representatives from Environment Canada regarding Project Update and consultation
DFO	Meetings	8-Dec-14	Meeting with representatives of DFO related to EA approach and specific concerns related to effects of causeway (i.e., sedimentation and flow).
Provincial Archaeology Office	Meetings	16-Dec-14	Discussion of effects of causeway on archeological site identified in PDA.
CEA Agency	Outgoing call	18-Dec-14	Discussion of community questions and concerns from the meeting with Naskapi Nation of Kawawachikamach (December 4, 2014)
Christopher Coggan & Lindsay Richardson (Atmacinta)	Letter from Century	9-Feb-15	Update about response to community questions and concerns from the meeting with Naskapi Nation of Kawawachikamach (December 4, 2014)
IAAC	Letter from Century	17-Oct-19	Informing IAAC of decision to continue Project environmental assessment under CEAA 2012.
NLDOECC	Letter from Century	31-Oct-20	Update of Proponent contact information for Project-related matters.
IAAC and NLDOECC	Letter from Century	21-Dec-20	Re-introduction to project, update on project status, and re-activation of environmental assessment process.
IAAC and NLDOECC	Meeting	5-Jan-21	Re-introduction to project, update on project status, and re-activation of environmental assessment process.
IAAC and NLDOECC	Meeting	1-Feb-21	Update on progress and discussion of approach to EIS submission with respect to inter-agency coordination.
IAAC and NLDOECC	Letter from Century	16-Feb-21	Change of proponent to Joyce Direct Iron Inc.

Table 3.1 Regulatory Engagement

Stakeholder	Type of Engagement	Date	Summary of Discussion
IAAC and NLDOECC	Meeting	18-Mar-21	Discussion of approach to EIS submission with respect to inter-agency coordination.
NRCan	E-Mail correspondence	18-Mar-21	Re-introduction of project and request for informal feedback.
Health Canada	Meeting	31-Mar-21	Re-introduction of project, discussion of emissions modeling and discussion of effects on country food sources.
Transport Canada	Meeting	1-Apr-21	Re-introduction of project, discussion of Canadian Navigable Waters Act and discussion of Navigation Protection Program application process.
Environment and Climate Change Canada (ECCC)	Meeting	6-Apr-21	Re-introduction of project and discussion of potential additional bird survey requests.
DFO	Meeting	20-Apr-21	Re-introduction of project and discussion of potential habitat offset strategies.
Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA, Wildlife Division)	E-Mails	23-Apr-21	Re-introduction of project and request for guidance on bat surveys.
IAAC	Meeting	26-Apr-21	Discussion of approach to EIS submission with respect to inter-agency coordination.

3.2 Indigenous Engagement

According to Section 2.3 of the federal EIS guidelines, one of the purposes of CEAA, 2012 is to "*promote communication and cooperation with Aboriginal peoples, including First Nations, Inuit and Métis. To work toward this goal, the proponent will ensure that it engages with Aboriginal people and groups that may be affected by the project or that have potential or established Aboriginal and Treaty rights and related interests in the project area, as early as possible in the project planning process. The Proponent is strongly encouraged to work with Aboriginal groups in establishing an engagement approach*."

In addition to the federal EIS guidelines, the Government of Canada has developed guidelines for direct engagement with Indigenous groups (Aboriginal Affairs and Northern Development Canada [AANDC] 2011). These guidelines are informed by Canada's understanding of the legal parameters of the duty and provide policy-based guidance to assist officials in their efforts to effectively incorporate consultations and, where appropriate, accommodation into government activities and processes. Through consultation, the Crown seeks to strengthen relationships and partnerships with Indigenous peoples and thereby achieve reconciliation objectives. In addition to pursuing policy objectives, the federal government consults with Indigenous peoples for legal reasons. Canada has statutory, contractual and common law obligations to consult with Indigenous groups. The process leading to a decision on whether to consult includes a consideration of all of these factors and their interplay (AANDC 2011). IAAC identified five Indigenous groups to be consulted with respect to the Project assessment:

- Innu Nation of Labrador
- Naskapi Nation of Kawawachikamach
- Innu First Nation of Matimekush-Lac John
- Innu First Nation of Uashat mak Mani-Utenam
- NunatuKavut Community Council

The Government of Newfoundland and Labrador is committed to consulting Indigenous organizations when the Province contemplates making land and resource development decisions that have the potential to adversely impact asserted Indigenous rights or asserted treaty rights. As such, the Province has developed its Aboriginal Consultation Policy on Land and Resource Development Decisions (Government of Newfoundland and Labrador 2013). Newfoundland and Labrador will endeavour to ensure the Policy is coordinated with measures that are or may be undertaken by the federal government.

The Labec Century Indigenous Engagement Strategy was informed by The Government of Newfoundland and Labrador's Aboriginal Consultation Policy on Land and Resource Development Decisions and Aboriginal Consultation and Accommodation Updated Guidelines for Federal Officials (AANDC 2011). The strategy recognizes the location of the Project within Labrador, and its proximity to both Newfoundland and Labrador and Québec-based Indigenous groups.

Labec Century has structured its Indigenous engagement activities, as per the federal EIS guidelines, to provide adequate time for Indigenous groups to review the relevant information in advance and to ensure there are sufficient opportunities for individuals and groups to provide oral input in the language of their choosing. Consultation activities have been and will be appropriate to the groups' needs and have been arranged through discussions with the groups.

Consultation and engagement with Indigenous groups began in 2010 during the exploration/pre-development phase and has been ongoing. Throughout this time, Labec Century has held more than 30 meetings and phone calls with the Innu Nation of Labrador, Naskapi Nation of Kawawachikamach, Innu of Matimekush-Lac John, and Innu of Uashat mak Mani-Utenam. While Preliminary contact was made with the NunatuKavut Community Council and a post-EIS-submission consultation schedule was discussed with IAAC in September 2014.

Labec Century has also considered comments received by both IAAC and NLDOECC in consultation processes related to the Project Description/Registration and Draft Guidelines.

A summary of topics discussed during meetings with Indigenous groups is provided in Table 3.2. Topics included the proper protocol for consultation, Project updates, Project employment, IBA, and specific issues and concerns, among others.

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Labrador			
Grand Chief Joseph Riche of the Innu Nation	Meeting	20-Jun-12	• Corporate introduction meeting
Innu Nation	Meeting	28-Nov-12	• IBA meeting
Innu Nation	Meeting	9-Jan-13	• IBA meeting
Innu member	Meeting	11-Feb-13	• Discussion of the current and historical use of the cabins lining Iron Arm
Innu Nation	Meeting	30-Apr-13	• IBA meeting
Innu Nation	Meeting	4-Dec-14	• Century provided updates about its business plans, activities, and next steps • Discussed importance of training for local workers in future IBA discussion
Innu Nation	Letter	9-Mar-21	• Re-introduction of the project, update on project status and request to meet.
NunatuKavut Community Council	Letter	9-Mar-21	• Re-introduction of the project, update on project status and request to meet.
NunatuKavut Community Council	E-Mail	24-Mar-21	• Renewed request to meet.
NunatuKavut Community Council	Phone Call	31-Mar-21	• Renewed request to meet.
Donna Paddon (Innu Nation)	Phone Call	6-Apr-21	• Discussion of project status and scheduling meeting.
Québec			
Naskapi Chief Louis Einish	Meeting	18-Nov-10	• Received support letter for the 2010 drill program in Lac Sans Chef, plus an overview of work at the Attikamagen Project was presented. This visit was done with previous exploration management at Century
Real McKenzie and council members from Conseil de Ia Nation Innu Matimekush-Lac John	Meeting	1-Mar-11	• Introduction of the Century team and projects
Rosario Pinette and the Conseil de Ia Nation Innu, Takuaikan Uashat Mak Mani-Utenam	Letter	7-Mar-11	• Re- Mar 4th, 2011 meeting in Sept Iles for Corporate introduction
Real McKenzie	Letter	7-Mar-11	• Summarized meeting on Mar 1st, 2011

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Chief Gregoire and Band Council members plus Armand McKenzie from Conseil de Ia Nation Innu, Takuaikan Uashat Mak Mani-Utenam	Meeting	Mar-11	• Corporate introduction meeting with Mr. Sandy Chim, CEO, of Century Iron Mines Corp
Naskapi Chief and Naskapi Nation of Kawawachikamach Band Council	Meeting	11-May-11	• Corporate introduction meeting
Chief Real McKenzie and Chief Ernest Gregoire	Meeting	Mar-12	• Planning for an IBA discussion in the future
Lawyers from O'Reilly and Associes representing Conseil de Ia Nation Innu, Takuaikan Uashat Mak Mani-Utenam	Meeting	6-Jun-12	• Kick-started the pre-production agreement negotiation
Nadir Andre lawyer for the Conseil de Ia Nation Innu Matimekush-Lac John	Meeting	13-Jun-12	• Discussed rail strategy
Chief Real McKenzie and his Band council members	Meeting	11-Jul-12	• Exploration program update
Naskapi Nation of Kawawachikamach Band Council	Meeting	12-Jul-12	• Exploration program update
Chief Louis Einish and council members	Meeting	18-Jul-12	• Nothing of note discussed
Naskapi member	Meeting	18-Feb-13	• Discussed use of cabins along Iron Arm • Concern about operation noise affecting cabin owners
Consultants to the Naskapi Band Council	Meeting	20-Feb-13	• Discussed doing business with Naskapi
Naskapi Nation Kawawachikamach Band Council	Meeting	19-Mar-13	• Update on winter drill program
Family of the late Chief Isaac of the Naskapi at Kawawachikamach	Visit	20-Jun-13	• Sympathies extended
Naskapi of Kawawachikamach Elders and Band Council	Meeting	20-Jun-13	• Century presented overview of project • Concerns of residents were discussed, including employment, water quality, transportation infrastructure
Board members of Radio Kue Attinukan	Meeting	20-Jun-13	• Discussed support for new radio station construction but no agreement reached
Jean Claude Pinette of Innu Takuaikan Uashat mak Mani-Utenam Band Council	Phone call	27-Jun-13	• Discussed potential meeting with band council and his documentary

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Bande de la Nation Innu Takuaikan Uashat mak Mani-Utenam	Guideline Comments	7-Aug-13	• Concern over how the Project would affect land use within Beaver Reserve Lots 209 and 211, which were identified as being of critical importance to the Innu of Uashat mak Mani-Utenam • Concern that Draft Guidelines do not adequately consider future traditional use of the area
Naskapi Chief at Kawawachikamach	Meeting	17-Oct-13	• Introduction to the new Chief
Chief Real McKenzie, Councillor Pauline Aster and Councillor Ann-Marie Ambrose	Meeting	25-Oct-13	• Recap of Century Iron's activity during 2013 and addressed some questions from Real and the Band Council members about local workers hired by Century
Bande de la Nation Innu Takuaikan Uashat mak Mani-Utenam	Meeting	27-Jan-14	• Importance of consultation and proper protocol for communicating with residents - all communication or engagement must go through the Chief and his Band Council. • IBA too general and needs to be more specific about potential job/business opportunities
Bande de la Nation Innu Matimekush-Lac John	Meeting	27-Jan-14	• Importance of support from mining companies for community infrastructure – swimming pool and ice rink. • Chief said that the Band is opposed to mining exploration and development and it will be hard to get support from the community for the project. • Experience with past dealing with other mining companies has been disappointing since they hadn't received payments as per signed IBA
Bande de la Nation Innu Matimekush-Lac John	Visit	11-Feb-14	• Attended ice rink reopening ceremony at the invitation of the Chief
André Michel (Innu Takuaikan Uashat mak Mani-Utenam)	Letter	13-Mar-14	• Acknowledged sponsorship request for local fishing event and provided support
Marie-Marthe McKenzie (Innu Matimekush Lac-John)	Letter	9-Apr-14	• Acknowledged sponsorship request for local carnival event and provided support
Real McKenzie and council members from Conseil de Ia Nation Innu Matimekush-Lac John	Letter	9-Apr-14	• Concern over the project conflicting with family territory and concerns about pumping of the lake
Rene Gabriel (Innu Takuaikan Uashat mak Mani-Utenam)	Letter	10-Apr-14	• Acknowledged receipt of faxed letter about the project on his family territory

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Louise André (Innu Matimekush-Lac John, Naskapi)	Letter	16-Apr-14	• Acknowledged sponsorship request for Jimmy Sandy Memorial School graduates and provided support
Kawawachikamach Band Council (Paul Mameanskum, George Guanish, Ken Lam, Léonard McKenzie)	Meeting	10-Jun-14	• Discussed use of cabins and aerial photos were used to identify cabin owners • Concern about potential Project effects on water quality of Iron Arm and fish populations
Naskapi Nation of Kawawachikamach	Meeting	27-Jun-14	• Century provided updates about its business plan, activities, and next steps • Discussed upcoming Open House and hiring for project jobs - Chief Swappie explained that the Naskapi Nation Band Council had a Human Resources coordinator to provide a list of qualifications of suitable workers to assist in the hiring process • Concerns about waste management and sewage affecting the water supply
Bande de la Nation Innu Matimekush-Lac John, Naskapi Nation of Kawawachikamach	Open House	30-Jun-14	• Century provided updates about its business plans, activities, and next steps • Discussed exploration plans for Joyce Lake, Blackbird Lake, Saint Martin Lake, Bruin Lake • Concerns from community members were discussed about lake drainage and environmental oversight of the project
Paul Mameanskum (Naskapi Nation of Kawawachikamach)	Letter	2-Jul-14	• Acknowledged sponsorship request for local fishing event and provided support
Chief Real McKenzie (Matimekush)	Letter	16-Jul-14	• Acknowledged receipt of faxed letter about the project conflicting with the territory of Auguste Jean-Pierre
Bande de la Nation Innu Matimekush-Lac John	Meeting	23-Jul-14	• Discussed for the Labec Century projects in the area and how this project would create jobs and business opportunities for the area
Naskapi Nation of Kawawachikamach	Letter	22-Aug-14	• Century provided updates about its business plans, activities, and next steps
Yan Dominique, Gilles Dominique (Matimekush)	Phone call	28-Aug-14	• Discussion of who gave permission for Century to drill in the area and request for exploration plans

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Yan Dominique, Chief Real McKenzie and council members from Conseil de Ia Nation Innu Matimekush-Lac John	Letter	31-Aug-14	• Acknowledgement of request for exploration plans and provision of maps, plans, and other materials
Chief Real McKenzie (Matimekush)	Meeting	2-Sep-14	• Discussed appropriate response to Yan Dominique and potential threats to Century property and personnel
Yan Dominique (Matimekush)	Letter	4-Sep-14	• Discussed the protocol for communication as requested by the Chief and the Band Council
Jimmy James Einish (Naskapi Nation of Kawawachikamach)	Letter	5-Sep-14	• Acknowledged sponsorship request for local softball event and provided support
Joanne Strasser	Letter	2-Oct-14	• Acknowledged sponsorship request for Terry Fox Foundation Run and provided support
Naskapi Nation of Kawawachikamach	Letter	25-Oct-14	• Invitation for community meeting/open house
Bande de la Nation Innu Matimekush-Lac John	Letter	25-Oct-14	• Invitation for community meeting/open house
Bande de la Nation Innu Matimekush-Lac John, Naskapi Nation of Kawawachikamach	Letter	11-Nov-14	• Century provided updates about its business plans, activities, and next steps
Charlotte Pien (Naskapi Nation of Kawawachikamach)	Letter	17-Nov-14	• Acknowledged sponsorship request for suicide prevention conference and provided support
Claudine Auger, Emilie Hamel	Letter	17-Nov-14	• Acknowledged sponsorship request for Ecole Kanatamat Tshitipenitamunu school trip and provided support
Naskapi Nation of Kawawachikamach	Meeting/Open House	4-Dec-14	• A variety of issues and questions were brought forward. These issues are detailed in Table 3.4.
Bande de la Nation Innu Matimekush-Lac John	Letter	15-Jan-15	• Invitation for community meeting/open house
Chief Real McKenzie (Matimekush)	Letter	17-Feb-15	• Invitation for community meeting/open house
Chief Noah Swappie (Naskapi Nation of Kawawachikamach)	Letter	19-Aug-15	• Provided support through sponsorship of equipment to the Nuuhchimiiyuschiiy Camp
Joanne Strasser	Letter	25-Aug-15	• Sponsorship of musical equipment to the Jimmy Sandy Memorial School
Chief Noah Swappie, Denis Drolet (Naskapi Nation of Kawawachikamach)	Letter	16-Sep-15	• Acknowledged sponsorship request for Jimmy Sandy Memorial School hockey team and provided support
Chief Real McKenzie (Matimekush)	Letter	16-Oct-15	• Sponsorship of diesel fuel for the Matimekush-Lac John community
Chief Noah Swappie (Naskapi Nation of Kawawachikamach)	Letter	16-Oct-15	• Sponsorship of diesel fuel for the Naskapi Nation of Kawawachikamach community

Table 3.2 Engagement with Indigenous Groups

Stakeholder	Type of Engagement	Date	Summary of Discussion
Naskapi Nation of Kawawachikamach	Letter	9-Mar-21	• Re-introduction of the project, update on project status and request to meet.
Bande de la Nation Innu Matimekush-Lac John	Letter	9-Mar-21	• Re-introduction of the project, update on project status and request to meet.
Naskapi Nation of Kawawachikamach	E-Mail	24-Mar-21	• Renewed request to meet.
Bande de la Nation Innu Matimekush-Lac John	E-Mail	24-Mar-21	• Renewed request to meet.
Stella Pien (Naskapi Nation of Kawawachikamach)	Phone Call	31-Mar-21	• Discussion regarding project status and request to meet.
Andre Michel (Innu Takuaikan Uashat mak Mani-Utenam)	Phone Call	31-Mar-21	• Discussion regarding project status and request to meet.
Bande de la Nation Innu Matimekush-Lac John	Phone Call	31-Mar-21	• Discussion regarding project status and request to meet.
Morgan Kendall (Innu Takuaikan Uashat mak Mani-Utenam)	E-Mail	5-Apr-21	• Renewed request to meet.
Naskapi Nation of Kawawachikamach	Meeting	9-Apr-21	• Presentation of Project, development plans and discussion of a variety of issues and opportunities for the Naskapi Nation of Kawawachikamach.

3.3 Local and Indigenous Traditional Knowledge

Adverse impacts on Indigenous and treaty rights are discussed in Chapters 8 and 23.

IAAC defines Indigenous Traditional Knowledge (ITK) as “a body of knowledge built up by a group of people through generations of living in close contact with nature. ITK is cumulative and dynamic. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change” (CEA Agency 2013).

ITK can be used to inform an environmental assessment in the following ways:

- Providing relevant biophysical information, including historical information, that may otherwise have been unavailable;
- Identification of potential environmental effects;
- Improved project design;
- Improved/strengthened mitigation measures;
- Development and enhancement of long-term relationships between proponents, Indigenous groups, and/or responsible authorities;
- Improved decision making; and
- Contribution to the overall development of ITK capacity within Indigenous communities and build an awareness of, and appreciation for, ITK in non-Indigenous communities.

For the purpose of the EIS, local, community and Indigenous knowledge is referred to as “Local and Indigenous traditional knowledge”. ITK was collected through a combination of secondary source research and direct engagement with Indigenous Groups active in the area of the Project. Information sources are provided in Table 3.3. No specific reports were completed related to ITK. This information has been incorporated into each VC as applicable and has been considered in the assessment. For example, the noted spawning area near Goose River was considered in the assessment of fish and fish habitat.

The results of ITK collected for the Project are summarized in Table 3.3. Where a specific location for activity has been identified through consultation or through other research, the activity is shown on Figure 3.1.

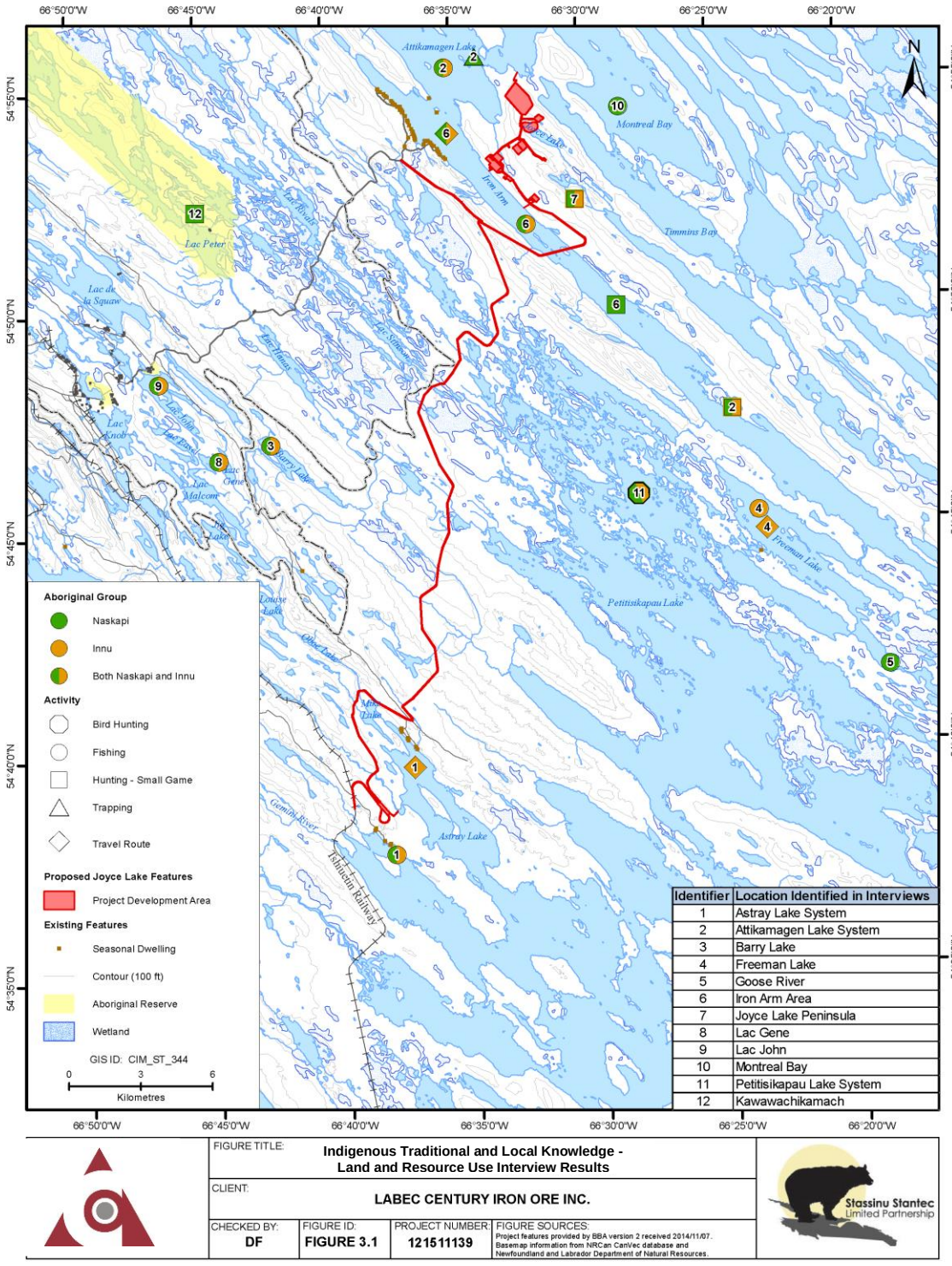

Figure 3.1 Indigenous Traditional Knowledge

Table 3.3 Summary of Indigenous Traditional Knowledge

Group	Source	Page or Date Reference	Comment or Excerpt	Map Reference (Figure 3.1)
Fisheries				
Naskapi of Kawawachikamach	Weiler, M. 2009. Naskapi Land Use in the Schefferville, Quebec, Region. Prepared as an Appendix to the Environmental Assessment of the Direct Shipping Ore Project	p. 7	Fishing during the early phase of settlement at Schefferville was focused on the Attikamagen Lake system.	2
Naskapi of Kawawachikamach	Weiler, M. 2009. Naskapi Land Use in the Schefferville, Quebec, Region. Prepared as an Appendix to the Environmental Assessment of the Direct Shipping Ore Project	p. 8	“Small game harvesting in the Schefferville region was reported to occur to the northwest and the south and southeast of Attikamagen Lake. These areas show the highest level of small game harvesting activity based on the sample of interviewed harvesters.”	2
Naskapi of Kawawachikamach	Consultation		Montreal Bay Very large lake trout in the area	10
Naskapi of Kawawachikamach	Consultation		Goose River Spawning area for trout; good fishing	5
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Fishing takes place on most lakes in the area, including the ones near the communities. Specifically, the Lakes between Schefferville and Astray Lake (Lac John, Lac Gene, Barry Lake)	3, 8 and 9
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Attikamagen Lake (throughout) Lake trout, speckle trout and pike are the main species caught. Most lakes in the system are used for fishing. Everyone consumes fish. Year-round activity.	2
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Pike are found at Iron Arm associated lakes Iron Arm and associated lakes	6
Innu (Schefferville)	Consultation		Astray Lake Many Innu travel from the community to Astray Lake, which is a point of departure to other locations in the lake system	1
Innu (Schefferville)	Consultation		Freeman Lake was identified as a key Innu fishing area Travel to Freeman Lake is via Astray Lake.	4
Innu (Schefferville)	Consultation		Many Innu travel from the community to Astray Lake, which is a point of departure to other locations in the lake system.	1

Table 3.3 Summary of Indigenous Traditional Knowledge

Group	Source	Page or Date Reference	Comment or Excerpt	Map Reference (Figure 3.1)
Birds and Wildlife				
Naskapi of Kawawachickamach	Weiler, M. 2009. Naskapi Land Use in the Schefferville, Quebec, Region. Prepared as an Appendix to the Environmental Assessment of the Direct Shipping Ore Project	p. 7	The area of Attikamagen Lake and the series of lakes to the northwest of it was one of three core areas for hunting caribou in the early decades of settlement near Schefferville.	2
Naskapi of Kawawachikamach	Consultation Assessment Report CEAR Doc#501		The Naskapi moved with the herd, ranging through its annual range, travelling north to Ungava Bay, east to the coast and south to the Churchill River. They hunted caribou during the migration past Indian House Lake.	NA
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Ptarmigan hunting takes place in winter, primarily on the islands, on Petitisikapau Lake. For both Innu and Naskapi	11
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Many years (decades) ago caribou hunting took place near Joyce Lake.	7
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Caribou seen near to the cabins on Iron Arm approx. 3 years ago.	6
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Near cabins (Iron Arm and Astray) As soon as the ice melts, travel by boat to fishing or other harvesting areas is staged from areas near cabins.	1 and 6
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		There appear to be more bears where development takes place – i.e., where there are people.	NA
Naskapi of Kawawachikamach/ Innu (Schefferville)	Consultation		Trapping of small mammals: fox, marten, otter, rabbit, and porcupine Furs are used for various purposes, and sometimes sold. Porcupine is “like caviar” to the Naskapi.	NA
Innu (Matimekush – Lac John)	Clément, D. 2009. Innu Use of the Territory and Knowledge of its Resources. Prepared as an Appendix to the Environmental Assessment of the Direct Shipping Ore Project.		Attikamagen Lake has been identified as a rutting area for Caribou. Peat bogs are the preferred location for calving, which occurs in May or June.	2

Table 3.3 Summary of Indigenous Traditional Knowledge

Group	Source	Page or Date Reference	Comment or Excerpt	Map Reference (Figure 3.1)
Naskapi Nation of Kawawachikamach	Alderon Iron Ore Corp. 2012. Environmental Impact Statement: Kami Iron Ore Mine and Rail Infrastructure, Labrador	Vol. II, Chapter 22	The caribou once came through the Kawawachikamach community but no longer. At one point there were 900,000 caribou; now there are around 80,000. One caribou came into the Kawawachikamach community over Christmas (2012), and this was the first in 6 years.	12
Naskapi Nation of Kawawachikamach	Consultation Assessment Report CEAR Doc#501	p.13-9	The Naskapi moved with the herd, ranging through its annual range, travelling north to Ungava Bay, east to the coast and south to the Churchill River (Henriksen 1978). They hunted caribou during the migration past Indian House Lake.	NA

3.4 Summary of Issues and Concerns Raised During Consultation and Engagement Activities

Issues arising from Indigenous, public, and regulatory engagement activities were documented and applied in the EA process, where applicable.

Throughout the EA process, issues raised through consultation with Indigenous groups and regulatory agencies has been incorporated into Project design and the environmental effects analysis.

Table 3.4 provides a summary of issues and the location in the EIS where the the issues are addressed, including where these issues have been incorporated into Project design. Relevant issues are reiterated and applied in each VC chapter, as applicable.

In general, concerns were expressed regarding effects of the Project on:

- Wildlife;
- Fisheries and Fish Habitat;
- Consultation;
- Employment;
- Project Benefits;
- Water Quality;
- Waste Management;
- Noise;
- Fuel Storage; and
- Transportation.

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Safety and Liability	Naskapi of Kawawachikamach	What happens if someone gets injured while on the job? Will Naskapi employees be given security?	While the details of employment at the Project are not yet available there will be a comprehensive system of training and control processes regarding all aspects of Safety, Health and the Environment. While accidents are expected to be infrequent, in the event an employee is injured then if the injury is minor he would be given first aid at the mine site. In the event the injury was more serious he would be evacuated to either Schefferville for medical treatment or in severe cases flown to a larger community for treatment in a hospital there. Labec Century will develop plans and processes to coordinate with medical staff and facilities both in Schefferville and elsewhere to ensure availability of the best treatment for an injured employee or contractor. Security of employment will be in compliance with regulations in effect in Newfoundland and Labrador and will be the same for all employees. Benefits for eligible employees will include workers compensation and short-term sickness coverage as well as annual vacation etc.	Chapter 1: Introduction
Project Design	Wildlife Division	Planned rail loop crossing of Gemini River and its effects on wildlife Division representatives asked about the rail loop and the planned crossing of the Gemini River. This river is already crossed by the existing rail line and representative wondered if two crossings were required.	This was addressed by Project design changes that were successful in avoiding two crossings.	Chapter 2: Project Description
Transportation infrastructure	Naskapi of Kawawachikamach Elders and Band Council	Clarification on where the planned road is going. There were some concerns that it was going to the east – reports of trail markers Importance of road from the community to Iron Arm cabins was addressed	The road route was clarified at the time of the discussion. As the Project advances, Century will put additional funds in maintaining this road.	Chapter 2: Project Description

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Mine Waste	Naskapi of Kawawachikamach	Can waste be placed elsewhere?	For the Project to be economic waste rock must be placed in the immediate vicinity of the open pit and this is a standard practice throughout the world.	Chapter 2: Project Description
Mine Waste	Naskapi of Kawawachikamach	Can waste be put back in pit?	Replacing waste rock back into the open pit is very expensive and if done will result in the Project being uneconomic. Storage of waste in the immediate vicinity of the open pit is the standard practice throughout the world.	Chapter 2: Project Description
Mine Waste	Naskapi of Kawawachikamach	What will the waste pile look like after the project is over?	The stockpiles will be encouraged to naturally revegetate and eventually are expected to be covered with grasses and small trees. The waste stockpiles remaining at the end of mine life will be geotechnically stable and graded to 22º along their slopes to reduce gulleying and erosion by water runoff. The maximum height of the waste stockpiles will be 90m above ground level measured from the base of the stockpile.	Chapter 2: Project Description
Closure and Decommissioning	Naskapi of Kawawachikamach	What will the area look like after closure?	A detailed Closure and Reclamation Plan will be prepared for the Project, as required by the Newfoundland and Labrador Mining Act. The Plan will provide a final closure strategy for the open pit, waste piles, mine roads, and other mine facilities, and will incorporate progressive rehabilitation during all stages of the Project, to limit the work required after cessation of operations and to limit the environmental effects during the Project life. A preliminary plan for the closure of the mine includes erosion control by re-vegetation wherever possible, stabilized slopes, and barricades around the open pit. Once work on the Closure and Reclamation Plan is complete the site will not have any building or plant installations remaining and the open pit and Joyce Lake will eventually refill with ground water and precipitation to the level that Joyce Lake is at today. Where possible significant parts of the disturbed area will be revegetated	Chapter 2: Project Description

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
			and the entire site will eventually revegetate naturally. The haul road and the causeway will be removed unless regulations and local community approve them remaining to allow ongoing vehicle access.	
Closure and Decommissioning	Naskapi of Kawawachikamach	What will the closure plan be? Who will approve closure plan?	A detailed Closure and Reclamation Plan will be prepared for the Project, as required by the Newfoundland and Labrador Mining Act. The Plan will detail a final closure strategy for the open pit, waste piles, mine roads, and other mine facilities, and will incorporate progressive rehabilitation during all stages of the Project to limit the work needed after cessation of operations and also to limit the environmental effects during the Project life. Public health and safety and land use will be considered at all stages of progressive rehabilitation, closure and post-closure. A preliminary plan for the closure of the mine includes erosion control by re-vegetation wherever possible, stabilized slopes, and barricades around the open pit. The Closure and Reclamation Plan will to be approved by applicable regulatory agencies prior to implementation along with input by various regulatory bodies such as DFO and DTW and through consultations with various Indigenous groups	Chapter 2: Project Description
Closure and Decommissioning	Naskapi of Kawawachikamach	What if you run out of funding half-way through the project, as LIM has? LIM started Houston Road but might have to leave it the way it is. Naskapis do not want a repeat of LIM and IOC.	Labec Century JV is owned by WISCO and Century. WISCO Canada, a major subsidiary of Wuhan Iron & Steel (Group) Corporation (“WISCO Group”), headquartered in the People’s Republic of China and in 2014 was ranked No.310 on the Fortune Global 500 list. Century Iron Mines Corporation is headquartered in Toronto and listed on the TSX and controls one of the world’s largest iron ore resources principally in Quebec and Newfoundland and Labrador in several deposits. WISCO and Century are determined not to start Project development until they have a comprehensive understanding of Project economics and the Project demonstrates that during operations it is adequately robust to be profitable during the ups and downs of the mining cycle.	Chapter 2: Project Description

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
			While bonding arrangements with the province of Newfoundland and Labrador have not yet been discussed, normally financial bonding is to be provided by Labec Century. These funds are held as security by the province of Newfoundland and Labrador, ensuring that the extent of bond funding at any time during construction or operation will be adequate to rehabilitate the site if work permanently stops. In the event that Labec Century permanently stops work at the site and does not rehabilitate the site, then the province of Newfound and Labrador will be entitled to use the bond as security to rehabilitate the site.	
Project Viability	Naskapi of Kawawachikamach	What is iron ore price at which project is viable?	The price of iron ore necessary to justify proceeding with Project development will only be known when the bankable feasibility study is complete and published and this is expected in approximately the first quarter of 2015 and will be available to the public when complete. The iron ore price at which the project will be economically viable will be contained in the study. We expect that an iron ore price in excess of US$100 tonne for 62% Fe fines CFR China is likely necessary before consideration could be given to project development. Despite current iron ore prices which are well below US$100 per tonne Labec Century has continued to advance Joyce Lake through a bankable feasibility study and an Environmental Impact Statement (“EIS”) and additionally last summer did exploration work for DSO style mineralization at the Blackbird exploration target.	Chapter 2: Project Description Chapter 9: Economic and Social Benefits of the Project

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Rock Causeway on Iron Arm	Naskapi of Kawawachikamach	Rock causeway – what is a clean rock (to be used to build causeway)	"Clean" in this context is also generally understood to be free of fines and debris (e.g., woody material and wastes) and additionally will not react with air or water to generate acid conditions or red water. The clean rock to be used in the causeway construction will be carefully selected and be quarried on the "mainland" south of Iron Arm. The preliminary quarry location has been identified.	Chapter 2: Project Description Chapter 11: Water Resources
Mine Waste	Naskapi of Kawawachikamach	How high will the waste pile be?	The maximum height of any of the waste stockpiles will be 90m above ground level measured from the base of the stockpile. Waste stockpiles will be geotechnically designed for stability and the design will include the impact of precipitation and ground water sources that may accumulate on or around the stockpile. Stockpile side slopes will also be designed to slope at 22º such that water flows will not cause gulleys or erosion of the stockpile. The stockpiles will also have perimeter ditches to collect runoff and groundwater seepage and direct it to sedimentation ponds before release to the environment.	Chapter 2: Project Description Chapter 13: Terrain and Acid Rock Drainage/Metal Leaching
Infrastructure	Naskapi of Kawawachikamach	There is already too much traffic on Iron Arm road, what will be done to avoid this?	The existing road between Schefferville and Iron Arm will be upgraded and widened where necessary. This road once improved is planned to be used for Project construction access and during operations for service vehicles only. No product will be hauled on this road and the road will be open for use by the public. The improved road will provide better public access by vehicle to the Iron Arm area.	Chapter 2: Project Description Chapter 21: Community Services and Infrastructure

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Consultation	NLDOECC	Concern regarding transparency of the consultation process and need to provide opportunities for public comment on revised Project Description.	Consultation and engagement activities will be fully documented in Chapter 3: Engagement and Traditional Knowledge. The revised Project description has been communicated to communities and Indigenous groups in the immediate area.	Chapter 3: Engagement and Traditional Knowledge
Consultation	Bande de la Nation Innu Takuaikan Uashat mak Mani-Utenam	Importance of consultation and proper protocol for communicating with residents – all communication or engagement must go through the Chief and his Band Council.	Century assured the Chief and Band Council that Century would follow the protocol strictly and he would not allow any breach or deviation	Chapter 3: Engagement and Traditional Knowledge
Consultation	Bande de la Nation Innu Matimekush-Lac John	Importance of consultation and proper protocol for communicating with residents – all communication or engagement must go through the Chief and his Band Council.	Century assured Chief Real McKenzie that Century would follow the protocol strictly and he would not allow any breach or deviation.	Chapter 3: Engagement and Traditional Knowledge
Indigenous Rights/ Engagement	Naskapi of Kawawachikamach	The other mining companies are already in the area so the community doesn't have much to say about them. But this project has not yet happened so we do have a say. We need to be educated and share and talk about this project. This is what we have left. We were nomadic people, then the government restricted us to a bit of land and now mining companies are restricting us even more. It is good that the people are being informed and I am happy that Council made the company come and speak with the community. We need to be educated and our voices need to be heard.	Labec Century recognizes and respects the heritage and culture of the Naskapi and is committed to ensure that the Naskapi are fully informed about the Project. Extensive consultation has taken place and we expect this process to be ongoing. This will provide for the opportunity for all community concerns to be raised and discussed.	Chapter 3: Engagement and Traditional Knowledge

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Indigenous Rights/ Engagement	Naskapi of Kawawachikamach	You come into our community and say "we" as if you are part of this community, but you are not, it is not "we". Don't talk to us like you own us, we don't sell our spirits. I am wide awake here and you have to listen to the people. This is the truth, we are saying no to this project. People are going to gather together and we're going to talk about this.	Labec Century intends to earn your trust and respect and be part of the community. Extensive consultation has already taken place with the Naskapi, including a town hall meeting, and consultation is expected to be ongoing. During the December 2014 town hall meeting Labec Century gave an assurance that alignment with the Naskapi would be obtained prior to proceeding with the Project. This demonstrates that Labec Century is listening and responding to the community.	Chapter 3: Engagement and Traditional Knowledge
Indigenous Rights	Naskapi of Kawawachikamach	Hunters must be respected and fully compensated for impacts of mine.	Labec Century fully appreciates and respects hunters, however research and consultation has not identified the mine site area as a preferred area for hunting and other land use activities. Other areas, such as the lakes and rivers adjacent to the causeway, haulage road, and rail loop, have been identified as key land use areas for Indigenous residents and compensation for the impact of the mine will be addressed in negotiations towards an Impact and Benefits Agreement. Hunters and fishers will be able to cross the haul road and additionally the upgraded and improved Iron Arm Project service road will improve access for vehicles to the Iron Arm area. The Project is expected to have minimal impact on species habitat and details of this are provided in the Environmental Impact Statement. Employees residing in camp will be restricted from hunting in the Project area.	Chapter 3: Engagement and Traditional Knowledge Chapter 8: Establishment of Indigenous Treaty Rights Chapter 19: Current Use Of Land And Resources For Traditional Purposes By Indigenous Persons Chapter 23: Effects of the Project on Indigenous Treaty Rights

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Land and Resource Use/ Indigenous Rights	Naskapi of Kawawachikamach	In the 80s or early 90s the Newfoundland Government banned hunting and seized firearms. The Naskapis went to court and fought this. There was a document produced by the Government protecting the land use of the Naskapis and this area specifically. Therefore, if the Newfoundland Government says that Naskapis have no say, that is simply not true and we need to remind them of this document.	Labec Century recognizes the rights of area Indigenous groups to engage in land use activities in Newfoundland and Labrador. The effects of the Project on these rights are discussed in our Environmental Impact Statement for the Project and this document is public and part of the consultation process.	Chapter 3: Engagement and Traditional Knowledge Chapter 8: Establishment of Indigenous Treaty Rights Chapter 19: Current Use Of Land And Resources For Traditional Purposes By Indigenous Persons Chapter 23: Effects of the Project on Indigenous Treaty Rights
Fuel Storage	Naskapi of Kawawachikamach Elders and Band Council	Concern about fuel storage safety	Barrels are stored farther away from Iron Arm than is required by regulations. Detailed Emergency Response and Spill Response Plan will be developed by Labec Century and submitted to appropriate regulatory agencies for review prior to the initiation of Project activities. It will contain specific measures related to train derailment and hydrocarbon spill response. .	Chapter 7: Environmental Management

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Waste Management	Naskapi Nation of Kawawachikamach	Concerns about waste management and sewage affecting the water supply	Mine contact runoff will be treated to the regulatory effluent criteria in sediment ponds located throughout the project area. Sanitary effluent will also be treated to regulatory effluent criteria in several septic systems located at worker concentration points throughout the Project area. A filtration system was installed at Iron Arm camp after 2012 band council visit resulted in some concerns and Century is committed to environmental compliance.	Chapter 7: Environmental Management Chapter 11: Water Resources
Waste management	Naskapi of Kawawachikamach Elders and Band Council	Question of what will be done with raw sewage from the camp.	Sanitary effluent will be treated to regulatory effluent criteria in several septic systems located at worker concentration points throughout the Project area. A filtration system was installed at Iron Arm camp after 2012 band council visit resulted in some concerns and Century is committed to environmental compliance.	Chapter 7: Environmental Management Chapter 11: Water Resources
Waste Management	Naskapi of Kawawachikamach	How will waste, including human waste, be treated? We do not want a dump.	Mine contact runoff water will be controlled and will comply with the regulatory effluent criteria in sediment ponds located throughout the project area. Sanitary effluent will also be controlled to regulatory effluent criteria in several septic systems located at worker concentration points throughout the Project area. Waste management practices are discussed in Chapter 7 of the EIS under Environmental Management. Plans will be developed and put in place for the management of all Project wastes in accordance with provincial regulations and in recognition of community concerns.	Chapter 7: Environmental Management Chapter 11: Water Resources

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Waste Management	Naskapi of Kawawachikamach	Every 4-5 years a lot of snow is dumped on that area, what are they going to do to avoid any oil spills or spills of human waste into the environment? We drink the water in Iron Arm.	The sediment ponds are designed to capture all runoff, including snow melt from storms up to the 1: 100 year return period event. Sediment ponds and other features also intercept and contain potential oil and fuel releases. Sanitary sewage will be treated in appropriately sized and located septic systems to avoid potential release of sanitary waste to the environment.	Chapter 7: Environmental Management Chapter 11: Water Resources
Waste Management	Naskapi of Kawawachikamach	There will be runaway fuel and oils relating to operations. How will this be cleaned-up and prevented?	Risk of oil and fuel spills will be addressed through design of oils and fuels storage and containment facilities to ensure they meet all applicable codes and regulations. Any spilled oil or fuel will additionally be collected in runoff trapped in sediment ponds. A detailed Emergency Response and Spill Response Plan will be developed by Labec Century and submitted to appropriate regulatory agencies for review prior to the initiation of Project activities. It will contain specific measures related to train derailment and hydrocarbon spill response.	Chapter 7: Environmental Management Chapter 11: Water Resources
Waste Management	Naskapi of Kawawachikamach	Will the water quality be affected by mining, i.e., tailings? Surface runoff?	The Project ore processing during operations will comprise “dry” crushing and screening only. Tailings will not be created. Mine contact water will be controlled to regulatory effluent criteria in sediment ponds prior to release to the environment.	Chapter 7: Environmental Management Chapter 11: Water Resources Chapter 12: Groundwater Resources
Indigenous Rights	Naskapi of Kawawachikamach	The project will only go ahead if the project is approved by Naskapi. Naskapi approval is required. It is not Century’s land. Century must listen to the population.	Labec Century will continue to consult with the Naskapi and also expect to negotiate an Impact and Benefits Agreement with the Naskapi.	Chapter 8: Establishment of Indigenous Treaty Rights Chapter 23: Effects of the Project on Indigenous Treaty Rights

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Indigenous Rights	Naskapi of Kawawachikamach	Naskapi have not said yes, and have not said no.	Consultation has already taken place with the Naskapi, including a town hall meeting, and consultation is expected to be ongoing. During the December 2014 town hall meeting Labec Century gave an assurance that alignment with the Naskapi would be obtained prior to proceeding with the Project.	Chapter 8: Establishment of Indigenous Treaty Rights Chapter 23: Effects of the Project on Indigenous Treaty Rights
Impact Benefits Agreement	Naskapi of Kawawachikamach	How do we know we will get what we were promised?	Labec Century expects to enter into Impact and Benefit Agreements with several Indigenous groups as well as employment related matters with the province of Newfoundland and Labrador. The Impact Benefit Agreement to be negotiated between Labec Century and the Naskapi will be legally binding. Negotiation of an IBA has not yet started but will likely be negotiated prior to work starting on the Project.	Chapter 9: Economic and Social Benefits of the Project
Impact Benefits Agreement	Bande de la Nation Innu Matimekush-Lac John	Experience with past dealing with other mining companies has been disappointing since they hadn't received payments as per signed IBA	Labec Century expects to enter into Impact and Benefit Agreements with several Indigenous groups as well as employment related matters with the province of Newfoundland and Labrador. The Impact Benefit Agreement to be negotiated between Labec Century and Bande de la Nation Innu Matimekush-Lac John will be legally binding. Negotiation of an IBA has not yet started but will likely be negotiated prior to work starting on the Project.	Chapter 9: Economic and Social Benefits of the Project

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Impact Benefits Agreement/ Employment	Bande de la Nation Innu Takuaikan Uashat mak Mani-Utenam	IBA too general and business opportunities for the communities were not specific enough – looking for job opportunities and business opportunities, and that they were seeking to grow business in order to facilitate empowerment IBA needs to benefit all four Band Councils (Innu Takuaikan Uashat mak Mani-Utenam, Innu Matimekush-Lac John, Naskapi Nation of Kawawachikamach, Innu Sheshatshiu, and Natuashish) and benefits should be the greatest for Innu Takuaikan Uashat mak Mani-Utenam, and the Band Council of Chief Real McKenzie, Innu Matimekush-Lac John	Century maintained that there had been no discussions with other Band Councils about the IBA and that Century wanted to take things slowly and prudently in accordance with the Project timetable. Century asked how to balance opportunities between the Bands in Sept-Îles and in Schefferville and suggested that Chief Mike McKenzie and Chief Real McKenzie work together to ensure that there would be no favoritism among the families in their Bands	Chapter 9: Economic and Social Benefits of the Project
Employment	Naskapi of Kawawachikamach Elders and Band Council	Concern about the ages of the workforce Question about how people can find employment with the Project	Opportunities will not be limited to younger residents. Ability to do the work is the main consideration. Century promotes from within – a Naskapi resident who began as a helper is now being trained as a driller. In the past, Century has accepted referrals from the Band Council or from other Indigenous Employees.	Chapter 9: Economic and Social Benefits of the Project Chapter 22: Employment, Economy and Business
Employment	Naskapi Nation of Kawawachikamach	Chief asked who will be responsible for hiring for the project. Chief Swappie explained that the Naskapi Nation Band Council had a Human Resources coordinator that would be able to provide a list of qualifications of suitable workers to assist in the hiring process.	It was explained that Leonard McKenzie would be assisting in the hiring process for projects and he will follow up with the Human Resources coordinator to obtain the list for future consideration.	Chapter 9: Economic and Social Benefits of the Project Chapter 22: Employment, Economy and Business

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Noise	Naskapi of Kawawachikamach Elders and Band Council	Questions related to blasting and how far away it would be heard	Blasting is not considered as part of the worst case scenario for the chapter. Blasting activities are interrupted within a large security perimeter. Many factors can influence the noise produced during blasting, including the type and amount of explosives and the sequence.	Chapter 10: Atmospheric Environment and Climate
Noise	Naskapi – anonymous	Concern about operation noise affecting cabin owners but stakeholder thought that they would be open to finding a fair solution to the problem	Based on the current anticipated production rate, blasting will likely occur once every five to six days. Blasting will involve a comprehensive blast design and will be implemented under a strictly controlled environment. Typical assessments of vibration effects on sensitive receptors due to blasting is expected to be below the limit due to the setback	Chapter 10: Atmospheric Environment and Climate
Dust	Naskapi of Kawawachikamach	What about the dust? How will they control dust on the road?	Appropriate dust management will be in place including vehicle speed restrictions on the service road which will be accessible to the public.	Chapter 10: Atmospheric Environment and Climate
Water Quality	Naskapi of Kawawachikamach	Will there be any red lakes?	Red water is a specific water quality effect associated with iron ore tailings effluent. This DSO Project will use dry crushing and screening and will not generate tailings, so no red water is expected.	Chapter 11: Water Resources
Water quality	Naskapi of Kawawachikamach Elders and Band Council	Some of the elders who were at the meeting used to work for IOC and had concerns related to their history with that operation.	Water will be captured and cleaned before discharge to the environment	Chapter 11: Water Resources
Water Quality	Naskapi of Kawawachikamach	Weather changes a lot in that area, how are they planning to secure the waste so that it will not leak into the lake, the soil, the groundwater, etc.?	Overburden, waste rock and low grade ore stock piles will be graded (sloped at 22º) to avoid issues with erosion and gullying. These stockpiles will also have perimeter ditches to collect runoff and groundwater seepage and direct it to sedimentation ponds before release to the environment.	Chapter 11: Water Resources Chapter 12: Groundwater Resources

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Waste Water	Naskapi of Kawawachikamach	Can the plant be placed further than 200m from lake? It seems very close and will create dust. Water runoff will bring oil and waste into lake.	Dust suppression will be an ongoing maintenance activity to reduce impacts to soil and water quality. Also, oil and fuel potentially collected in runoff will be trapped in sediment ponds. The 200 m between the plant and Attikamagen Lake will be a buffer zone and is considered adequate to ensure there is no impact on the lake.	Chapter 11: Water Resources
Dewatering/Water Quality	Naskapi of Kawawachikamach	Will water being pumped out be of same quality as lake water?	Water drained from Joyce Lake will be naturally-occurring water, the same water that is currently in Joyce Lake, This water will not be used for any purpose but will simply be drained by pumping to Attikamagen Lake.	Chapter 11: Water Resources
Dewatering	Naskapi of Kawawachikamach	How will they drain the open pit (Joyce Lake)? Where will the water drain? How will drainage of Joyce Lake affect Iron Arm Lake water levels? How will 'filling-up' Joyce Lake affect water levels?	Joyce Lake dewatering will take place during the first year of operations. Water from the lake will be pumped to perimeter ditches where it will gravity drain to the Joyce Lake outlet system, currently in place at the east end of Joyce Lake. The open pit will be dewatered in two ways: using a series of drawdown wells around the pit perimeter drilled to intercept clean groundwater; and drained by pumping water directly to the Joyce Lake perimeter ditches and also if necessary by using pumps in sumps within the pit to pump mine contact water out to a sediment pond before release to the environment. The dewatering of Joyce Lake and pumping from the open pit are not expected to increase water levels in Attikamagen Lake. When the mine is closed, Joyce Lake and the open pit will refill with water from precipitation and ground water recharge to the same level that Joyce Lake is today.	Chapter 11: Water Resources Chapter 12: Groundwater Resources

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Dewatering	Naskapi of Kawawachikamach	How will you prevent flooding from occurring once the mine is closed?	To prevent flooding once the mine is closed Joyce Lake and the open pit will refill with water naturally from precipitation and ground water recharge. When water levels reach the current elevation of Joyce Lake today, water in the lake and open pit will spill out through the existing outlet system, mitigating potential flooding, as it is doing today. To prevent flooding on other areas of the Project site including the haul road and rail loop after closure, mine features will be removed/rehabilitated to eliminate potential barriers to water flow (e.g., culverts and bridges) and to maintain flooding conditions that currently exist.	Chapter 11: Water Resources Chapter 12: Groundwater Resources
Closure and Decommissioning	Naskapi of Kawawachikamach	What will happen with the mine once you are done mining the iron ore?	A detailed Closure and Reclamation Plan will be prepared for the Project, as required by the Newfoundland and Labrador Mining Act. The Plan will provide a final closure strategy for the open pit, waste piles, mine roads, and other mine facilities, and will incorporate progressive rehabilitation during all stages of the Project. to limit the work required after cessation of Operations and to limit the environmental effects during the Project life. A preliminary plan for the closure of the mine includes erosion control by revegetation wherever possible, stabilized slopes, and barricades around the open pit.	Chapter 2: Project Description Chapter 11: Water Resources Chapter 12: Groundwater Resources
Effects on water and aquatic environment	Naskapi of Kawawachikamach	What are the impacts on water and on the environment?	Overburden, waste rock and low grade ore piles will be graded (sloped and stable) to avoid issues with erosion and gullying. The overburden, waste rock and low grade ore stockpiles will also have perimeter ditches to collect runoff and groundwater seepage and direct it to sedimentation ponds before release to the environment. The primary potential effects of the quarried rock for causeway construction on Iron Arm water will arise from some explosives residue on the surface of the blasted rock. The explosives residue may cause elevated ammonia or nitrogen concentration for a short and temporary period, however the concentrations are not	Chapter 11: Water Resources Chapter 12: Groundwater Resources Chapter 15: Fish and Fish Habitat

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
			expected to exceed the long term exposure limits of the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life.	
Rock Causeway on Iron Arm	Naskapi of Kawawachikamach	How will the year-round bridge and rock causeway affect the fish and the lake? (we fish in that area near those islands).	Stantec has assessed fish passage through the causeway bridges and their recommendations to reduce water velocities for resident species such as Northern Pike and Lake Trout to pass has been adopted and incorporated into the bridges and causeway designs by increasing the width of both bridges from 4m to 8m. The causeway bridge designs also allow for easy passage of fishers and others in small boats under both of the bridges.	Chapter 11: Water Resources Chapter 15: Fish and Fish Habitat
Water Quality/ Fish and Fish Habitat	DFO	Would like to know plans for crossing structures. Project design should try to stay out of water to avoid issues with fish and fish habitat. Consider bottomless culverts or bridge with no in-water footprint. Flow data required for stream crossings as they are important for determining impacts on existing fish habitats at potential impact areas and any areas downstream that may rely on them. Potential impacts of pit drainage on Joyce Lake.	There are four bridge structures proposed at this point. Two along the access road and two in the causeway. All bridges and culverts area designed for fish passage which for culverts means culvert embedment as per DFO recommendations. Regional flow data will be gathered to size all culverts and bridge openings. The Joyce Lake and open pit water management plan provides details regarding the recommended Joyce Lake dewatering strategy and the approach to draining non-contact water from the Joyce Lake watershed to the downstream receiving water system during operations.	Chapter 11: Water Resources Chapter 15: Fish and Fish Habitat
Water quality/Fish and Fish Habitat	Kawawachikamach Band Council (Paul Mameanskum, George Guanish, Ken Lam, Léonard McKenzie)	Concern about potential Project effects of Iron Arm on water quality and fish populations	Mine contact water will be treated to regulatory effluent criteria in sediment ponds to meet Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic	Chapter 11: Water Resources Chapter 15: Fish and Fish Habitat
Fish and Fish Habitat	DFO	Important to consider Indigenous and recreational fisheries.	These fisheries have been considered in the assessment.	Chapter 15: Fish and Fish Habitat

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Wildlife and Wildlife Habitats	Naskapi of Kawawachikamach	What about the environment and the wildlife for our future generations?	With the proposed mitigation and environmental protection measures, the environmental effect of the Project on Birds, Wildlife and their Habitat is anticipated to be not significant, as there are no unique or limiting habitats within the Project Development Area, and the species occurring in the Regional Study Area are expected to maintain sustainable populations outside the Project Development Area. Studies, reviews and evaluations as well as other details regarding Birds, Wildlife and their Habitat are contained in several chapters of the EIS.	Chapter 16: Birds, Wildlife and Their Habitats
Wildlife/Land and Resource Use	Naskapi of Kawawachikamach	How will the project affect hunting? We are still hunting heavily in that area, helicopters have already caused disturbance, and animals are already scared off by exploration activities. What will the hunters do once the mine is being constructed and operations begin? Caribou have been seen, but seem to flee the noise of choppers. Will caribou flee the sound of mining? What about other animals like moose? Future generations are going to inherit disturbed land.	Habitat loss for key species is expected to be low (<0.5% of habitat available in the area). Research and consultation has not identified the mine area as a preferred area for hunting and other land use activities. Other areas, such as the lakes and rivers adjacent to the causeway, haulage road, and rail loop, have been identified as key land use areas for Indigenous residents. Mitigation measures to reduce effects on habitat include: • Reduce construction footprint to the extent feasible; and • Restrict activities associated with maintenance (e.g., vegetation management, periodic grading and ditching). It is anticipated that if caribou were to return to the region in large numbers, they would generally avoid the open habitat created from Project construction. The EIS and Environmental Protection Plan include measures to reduce the effects on the movement and distribution of species. Mitigation will include: • Limit noise through the use of mufflers on equipment, enclosed motors and other equipment to attenuate sound propagation, and regular maintenance on vehicles and other equipment to reduce air and sound emissions;	Chapter 16: Birds, Wildlife and Their Habitats Chapter 19: Indigenous Land and Resource Use for Traditional Purposes

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
			• Limit lighting to that required for safe operation, use motion sensors for security lighting, and/or shield exterior lights from above; and • Grade or engineer slopes along roads at locations of potential crossing points for caribou. A complete description of mitigation and effects on wildlife is provided in the EIS.	
Land and Resource Use	Naskapi of Kawawachikamach	Tata Steel has restricted people from hunting on some traditional grounds, (for security reasons) will this also happen with the construction of the project and the haulage road?	While there will be access restrictions to the mine site for public safety and security reasons, this area has not been identified as a preferred area for hunting and land use activities. While there will be access restrictions for public vehicles on the haul road, users will not be prevented from crossing the road to access adjacent areas. After mining operations end, the haul road would facilitate access to areas not previously accessible by vehicles, if regulations and consultation allow the road to remain in place after mining operations end. Similarly the causeway, if consultation and regulations allow it to remain in place after mining operations end, will provide vehicle access to previously inaccessible areas. Concerns about access will also be addressed through ongoing consultation with area residents.	Chapter 19: Indigenous Land and Resource Use for Traditional Purposes
Land and Resource Use	Naskapi of Kawawachikamach	Outsiders will use the area to hunt and fish. This will affect Naskapis.	All mine employees who are staying in camp will be prohibited from hunting or fishing. This will be controlled by prohibitions on bringing fishing gear and/or hunting equipment into camp. Indigenous residents of nearby communities who commute to the Project can engage in these activities during non-working hours and the rotational work schedule will facilitate their use of the area during non-work hours.	Chapter 19: Current Use Of Land And Resources For Traditional Purposes By Indigenous Persons

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Employment and Benefits	Naskapi of Kawawachikamach	What will be done to encourage Naskapis to work there? What assistance will be given to young families?	Labec Century's employment and benefits policy will be governed in part by any contractual agreements, yet to be negotiated, and include Impact and Benefit Agreements with several Indigenous groups and also agreements with the government of Newfoundland and Labrador. Labec Century expects to negotiate these agreements prior to starting work on the Project. Whenever possible priority for employment as well as provision of goods and services will be given to skilled and qualified residents and competitive businesses in the local area of the Project (i.e., Schefferville, Matimekush-Lac John, and Kawawachikamach). Priority for employment as well as the competitive provision of goods and services will also be given to skilled and qualified residents and competitive businesses in compliance with Newfoundland and Labrador as well as federal government requirements. Additional initiatives will be explored to facilitate initiatives related to training and diversity. More detail on employment and benefits initiatives will be defined in the Project Benefits and Diversity Plans. These plans are subject to approval by the Government of Newfoundland and Labrador, which is the governing jurisdiction of the Joyce Lake Project.	Chapter 22: Economy, Employment and Business Other: Benefits Plan

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Employment and Benefits	Naskapi of Kawawachikamach	Local population must be prioritized and trained in advance. Ambitious targets must be set. Will the local Naskapi people be prioritized for employment opportunities? (Not just residents of Newfoundland and Labrador.)	Labec Century's employment and benefits policy will be governed in part by any contractual agreements, yet to be negotiated, which include Impact and Benefit Agreements with Indigenous groups and agreements with the government of Newfoundland and Labrador. Labec Century expects to negotiate these agreements prior to starting work on the Project. Whenever possible priority for employment as well as provision of goods and services will be given to skilled and qualified residents and competitive businesses in the local area of the Project (i.e., Schefferville, Matimekush-Lac John, and Kawawachikamach). Priority for employment as well as the competitive provision of goods and services will also be given to skilled and qualified residents and competitive businesses in compliance with Newfoundland and Labrador as well as federal government requirements. Labec Century will facilitate initiatives related to training and diversity. More detail on employment and benefits initiatives will be defined in the Project Benefits and Diversity Plans. These plans are subject to approval by the Government of Newfoundland and Labrador.	Chapter 22: Economy, Employment and Business Other: Benefits Plan

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Employment and Benefits	Naskapi of Kawawachikamach	Working conditions must be good for Naskapis and adapted to address: Training, Benefits (pension, sick days), and Workshifts (hours). Such conditions must also apply to sub-contractors.	Labec Century's employment and benefits policy will be governed in part by any contractual agreements, yet to be negotiated, which include Impact and Benefit Agreements with Indigenous groups and agreements with the Government of Newfoundland and Labrador. Labec Century expects to negotiate these agreements prior to starting work on the Project. Labec Century expects to provide good working conditions for all employees and contractors and to be in full compliance with all regulatory requirements. Additional training will be available to ensure that any employee or contractor is competent and safe to perform tasks associated with his work. Additionally explicit training will be provided to employees new to the workplace. While arrangements must be in compliance with the requirements of the Project, extended shifts are planned on a rotational system with continuous days of work followed by several days of rest, an excellent arrangement for employees requiring time away from work for hunting, fishing or family recreation. The employee benefits package regarding pension, sick days and other benefits has not yet been determined. Labec Century will have a competitive benefits package for all employees and whenever possible similar benefits for sub-contractors.	Chapter 22: Economy, Employment and Business Other: Benefits Plan

Table 3.4 Issues Raised During Engagement Activities

Question / Issue	Community/ Organization	Summary of Comments	Response	Chapter
Employment	Naskapi of Kawawachikamach	People come by plane and get jobs and don't know anything of where they are and who lives here.	Whenever possible priority for employment as well as provision of goods and services will be given to skilled and qualified residents and competitive businesses in the local area of the Project (i.e., Schefferville, Matimekush-Lac John, and Kawawachikamach). Priority for employment as well as the competitive provision of goods and services will also be given to skilled and qualified residents and competitive businesses in compliance with Newfoundland and Labrador as well as federal government requirements. Labec Century will facilitate and support initiatives promoting living in the region.	Chapter 22: Employment Economy and Business
Cumulative Effects	Naskapi of Kawawachikamach	Other mines are in operation and it was done in a precipitated manner. Naskapi want to take time to do this one right. Have everyone in community involved. Elders, Hunters, Mothers, Youth, etc.	Consultation has already taken place with the Naskapi, including a town hall meeting, and consultation is expected to be ongoing. This will provide a full opportunity for all community concerns to be raised and discussed.	Chapter 24: Cumulative Effects

3.5 Future Consultation and Engagement Plans

Opportunities for consultation are incorporated within the EA process. Labec Century remains committed to continuing and expanding its outreach activities to ensure interested parties are aware of and understand the Project, and are provided with opportunities to discuss the conclusions of the EA and the Project generally. Following the submission of the EIS, Labec Century will be an active participant in the review of the document by all stakeholders, particularly the Indigenous groups and communities most likely to be affected by the Project.

These activities will serve to inform stakeholders, Indigenous groups, and the public about the EA and its results, and thus assist them in reviewing the EA Report and in engaging in the EA review process.

Following EA approval and permitting, Labec Century will continue its ongoing engagement with the public, stakeholder groups, communities and Indigenous groups throughout Construction, Operation and into Closure and Decommissioning. Key objectives of the ongoing engagement program are:

- to promote transparency and accountability about the company's environmental management and social responsibility performance;
- to promote continuing opportunities to discuss interests and concerns, and to resolve issues, related to the Project; and
- to work in partnership with local communities and Indigenous groups to have the Project contribute to the achievement of their own development goals based on their priorities and aspirations.

A number of issues outlined in Table 3.4, while addressed in policies and commitments identified in the EIS, will require ongoing engagement and discussion and may not be fully resolved as a result of changes to the project, mitigation measures, or public consultation. Specific topics that will require ongoing consultation include:

- Provincial and Indigenous Benefits, including the negotiation of IBAs and associated agreements;
- Indigenous involvement in monitoring and effects management; and
- Reclamation and closure.

Where an unresolved question or concern relates to a particular component of the environment, those concerns are considered in Chapters 10 to 22 of the EIS. Where additional follow-up is required following review of the determinations presented in the EIS, these issues will be incorporated into future Indigenous, public and regulatory engagement.

3.6 References

AANDC (Aboriginal Affairs and Northern Development Canada). 2011. Aboriginal Consultation and Accommodation, Updated Guidelines for Federal Officials to Fulfill the Duty to Consult. Available at: http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/intgui_1100100014665_eng.pdf

Alderon Iron Ore Corp. 2012. Environmental Impact Statement: Kami Iron Ore Mine and Rail Infrastructure, Labrador. Available at: https://www.gov.nl.ca/eccm/projects/project-1611/

CEA (Canadian Environmental Assessment) Agency. 2013. Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted under the Canadian Environmental Assessment Act: Interim Principles. Available at: https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=4A795E76-1.

Clément, D. 2009. *Innu Use of the Territory and Knowledge of its Resources*. New Millenium Capital Corp. Direct-Shipping Ore Project.

Government of Newfoundland and Labrador. 2013. Aboriginal Consultation Policy on Land and Resource Development Decisions.

Hammond, M. 1976. A Socio-Economic Study of the Naskapi Band of Schefferville: Preliminary Report. Naskapi Band Council of Schefferville, Montreal.

Weiler, M.2009. *Naskapi Land Use in the Schefferville, Québec, Region*. Final report presented to New Millennium Capital Corp.

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 4:

Environmental Setting

File No. 121416571

Date: May 2021

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4.0 ENVIRONMENTAL SETTING

The Project is located in western Labrador, approximately 20 km to the northeast of the Town of Schefferville, Québec. The Project is located on the eastern end of the Labrador Trough, a rich belt of iron ore that stretches through Labrador and northern Québec. Mining operations in the area began in the 1950s when the IOC began iron ore mining operations and established the Town of Schefferville. Although iron ore mining by IOC ceased in the area in the early 1980s, there has been a resurgence of interest in the recent decade, with several companies actively exploring and evaluating the iron potential, and two mines progressing to operation.

The Schefferville area experiences a subarctic climate with long and severe winters and cool to mild summers. Prevailing winds are from the northwest. Air quality is considered similar to that of a pristine environment. Baseline noise measurements show that the sound levels in the Project area are very low.

Surface water surveys conducted within the Project vicinity indicate that, in general, the waterbodies in the vicinity of the Project have water quality typical of low-productivity waters. Some waterbodies are sensitive to acidification due to low pH and low alkalinity. Baseline data show that existing surface water quality is good, with several parameters occasionally and slightly exceeding guidelines. Surface water hardness is generally low and therefore some heavy metals have a lower concentration toxicity threshold. The Canadian Water Quality Guidelines were exceeded for aluminum (Joyce Lake, Attikamagen and Petitsikapau Lakes), total chlorine (Gilling River), copper (Petitsikapau Lake) and zinc (Joyce Lake and Attikamagen Lake).

The Project lies within the Mid Subarctic Forest (Michikamau) and the High Subarctic Tundra Ecoregions – ED312 and ED300 Ecodistrict of western Labrador (Figure 4.1). Habitat types common to western Labrador (i.e., open spruce-moss forest, open spruce-lichen forest and forested fens) are found throughout the Project area (Figure 4.2). These habitat types support a wide range of wildlife species that are common throughout the region such as black bear, grey wolf, red fox, snowshoe hare and beaver.

Species at risk and species of conservation concern that have been observed during field surveys in the Project area are the Gray-cheeked Thrush, Rusty Blackbird, and Lesser Yellowlegs. There were no observations of any listed at-risk plant species per the *Species at Risk Act* or the Newfoundland and Labrador *Endangered Species Act* within the surveyed area. During the 2012 and 2013 field surveys, 73 plant species of conservation concern were recorded in the vicinity of the Project.

Wetlands cover a sizable proportion of the natural landscape of Labrador and are common throughout the Project area. These were found to cover approximately 13% of the Wetlands Regional Study Area (RSA) and 15% of the Wetlands Local Study Area (LSA) and include fens, bogs, swamps and shallow waters such as pond and temporary ponds.

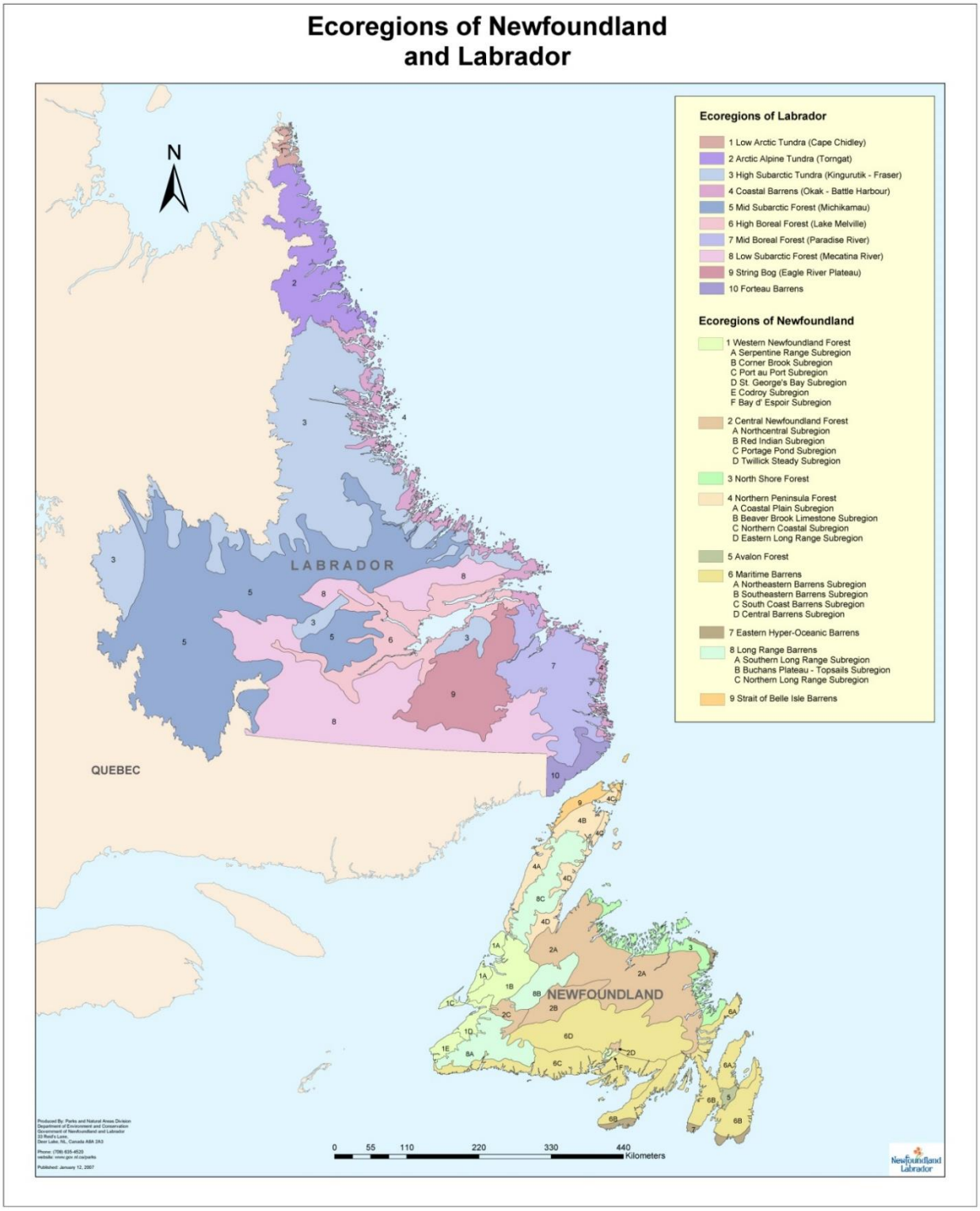

Figure 4.1 Ecoregions of Newfoundland and Labrador

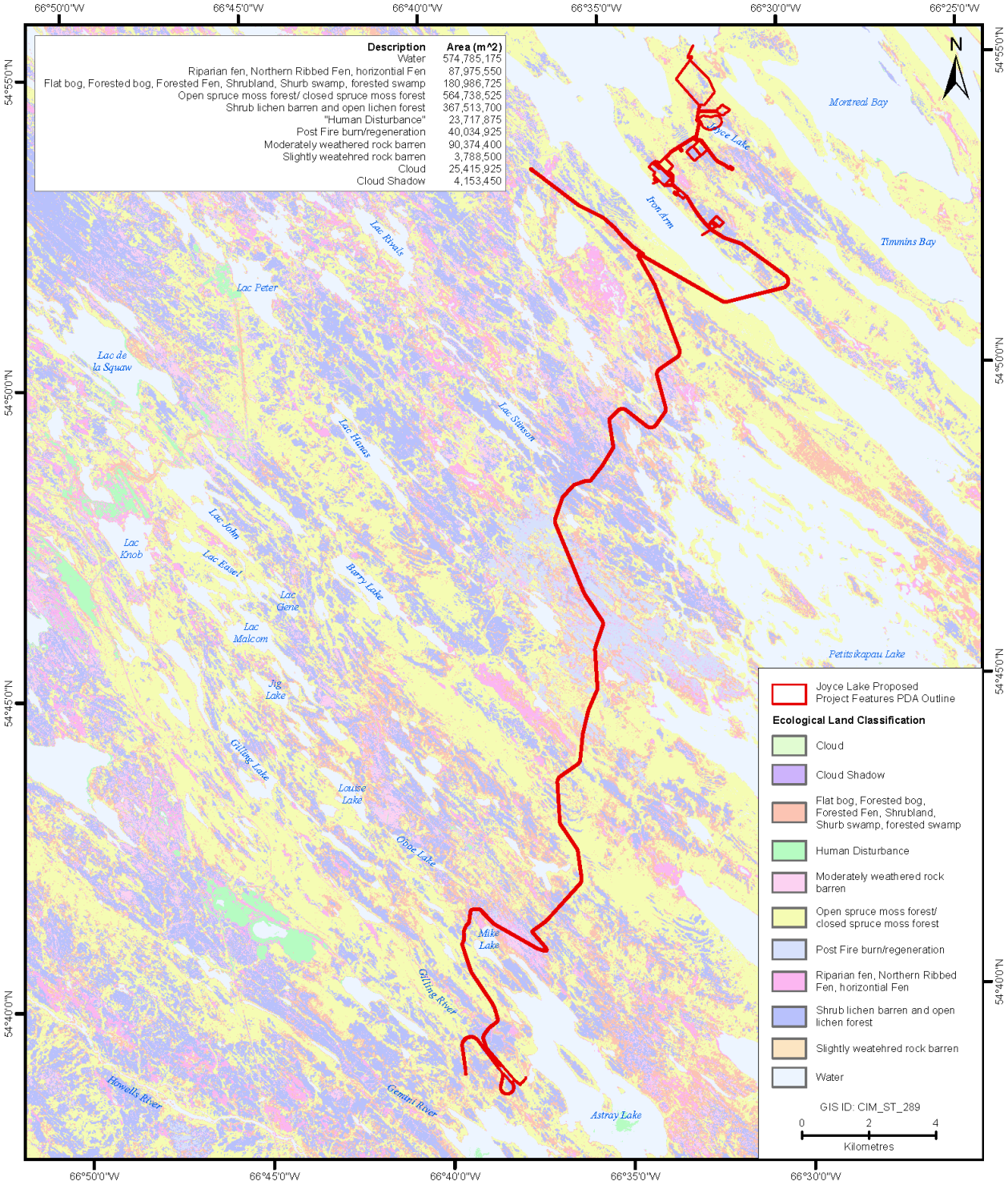

Figure 4.2 Ecological Land Classification Overview

Fish species and habitat common to western Labrador are present within the Project area. The main fish found during the 2012-2013 field campaigns were lake trout and rounded whitefish in lakes, while brook trout and northern pike were predominant in streams. In Joyce Lake, lake chub, longnose sucker, and burbot were found. There were no fish species listed as species at risk within the surveyed area and no commercial fisheries have been identified in or near the Project area. Lakes throughout the region, including Attikamagen Lake (including Iron Arm), Freeman Lake, Petitsikapau Lake, and Astray Lake have been identified as Indigenous fishing areas.

Current land and resource use in the vicinity of the Project includes cabin use, hunting and trapping, angling, wood harvesting, berry picking, snowmobiling, and boating. Over 30 cabins have been identified in the Iron Arm and Astray Lake areas. These cabins are known to be seasonally occupied by Indigenous people in the area.

In addition to the Town of Schefferville, two Indigenous communities exist in close proximity to the Project: the Innu Nation of Matimekush-Lac John and the Naskapi Nation of Kawawachikamach (Figure 1.3). These are located 20 and 13 km, respectively from the Project site. Background research of published and unpublished data sources indicates that the Project lies within a region that has seen intermittent occupation by Indigenous people for the past several millennia, and that the use by Indigenous people, Europeans and Euro-Canadians continued throughout the Historic Period and to the present day.

The EIS provides detailed descriptions of the existing biophysical and socio-economic environment that could be affected by the Project for each relevant valued component (VC). Detailed baseline descriptions for each specific environmental component are found in Chapters 10 to 22 within each detailed VC analysis.

Stand-alone baseline studies, models, and other reports which describe the existing environment in more detail to support the environmental effects assessment, the development of mitigation measures and monitoring and follow-up programs have been conducted for:

- Hydrogeology;
- Geotechnical;
- Water and Sediment Quality;
- Vegetation;
- Rare Plants;
- Fish and Fish Habitat;
- Avifauna;
- Wildlife;
- Air Quality;

- Ambient Noise; and
- Socio-economic.

The stand-alone baseline studies are included with the EIS document as appendices (Appendices C through AE).

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 5:

Environmental Assessment Methods and Scope of Assessment

File No. 121416571

Date: May 2021

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5.0 ENVIRONMENTAL ASSESSMENT METHODS AND SCOPE OF ASSESSMENT

The EIS has been completed using the methodological framework developed by Stantec to meet the requirements of CEAA 2012 and the NLEPA. These methods are based on a structured approach that:

- focuses on issues of greatest concern;
- considers the issues raised by the public and stakeholders;
- incorporates Indigenous Traditional Knowledge and Local and Community Knowledge; and
- integrates engineering design and programs for mitigation and follow-up into a comprehensive environmental planning process.

The EIS focuses on specific environmental components called VCs in the IAAC EIS Guidelines (March 2013), and called Valued Ecosystem Components in the NLDOECC EIS Guidelines (November 2013). The term Valued Component or its abbreviation, VC, is used in the EIS for presentation purposes and is equivalent to the Valued Ecosystem Component terminology used in the NLDOECC Guidelines. VCs are broad components of the ecological, social, and economic systems that comprise the environment and which, when they interact with the Project, may be of concern to regulatory agencies, Indigenous peoples, resource managers, scientists, and/or the general public. In this context, environment is defined to include not only biological systems but also human, social, and economic conditions that are affected by changes in the biological environment. VCs will be used within the EIS for the Joyce Lake Direct Shipping Ore Project (the Project) in order to facilitate a focused and effective environmental assessment that complies with government requirements and supports public review.

As detailed in chapter 1, Joyce Direct Iron Inc. succeeded Labec Century Iron Ore Inc. ("Labec Century") as the Project Proponent on February 18, 2021 following an internal reorganization. All references to Labec Century as the Project proponent may be interpreted as now referring to Joyce Direct Iron Inc.

5.1 Overview of Approach

Project-related environmental effects are assessed using a standard framework for each VC. Tables and matrices are used to facilitate, summarize, and support the evaluation. Residual Project-related environmental effects (i.e., after mitigation has been applied) are characterized using specific criteria (i.e., direction, magnitude, geographic extent, duration, frequency, reversibility, and environmental/socio-economic context) that are specific to each VC. The significance of residual Project-related environmental effects is then determined based on defined thresholds (also called significance criteria). Where site-specific data have been collected or

where models have been applied, the methodology has been presented to be transparent and reproducible.

Where applicable, cumulative environmental effects of the Project, in combination with other identified projects or activities, are assessed to determine if those effects could be significant, and to consider the contribution of the Project to those effects.

The environmental effects assessment approach used in this EA is shown graphically in Figure 5.1.

The environmental effects assessment framework includes the following steps:

- **Scope of Assessment** – The scope of the overall assessment is defined, including: selection of VCs; description of measurable parameters; description of temporal and spatial assessment boundaries; definition of the parameters that are used to characterize Project-related environmental effects; and identification of the standards or thresholds that are used to determine the significance of environmental effects. This step relies upon the scoping undertaken by regulatory authorities (e.g., EIS guidelines); consideration of the input of the public, stakeholders, Indigenous peoples; and the professional judgment of the Study Team.

- **Existing Conditions** – Existing (baseline) environmental conditions for the VCs are established. In many cases, existing conditions expressly and/or implicitly include those environmental effects that may be, or may have been, caused by other past or present projects or activities that have been or are being carried out.

- **Assessment of Project-Related Environmental Effects** – Project-related environmental effects are assessed including: interactions between the Project and the VC; mitigation and environmental management measures proposed to reduce or eliminate adverse environmental effects; and the characterization of residual environmental effects. The focus of the assessment is on residual environmental effects (i.e., the environmental effects that remain after planned mitigation has been applied). All phases of the Project are assessed (i.e., Construction, Operation and Maintenance, and Closure and Decommissioning), as are accidents, malfunctions, and unplanned events. Evaluation also considers the effects of the environment on the Project. For each VC, a determination of significance is then made, based on the identified significance criteria. The effects of the environment on the Project are also assessed. The capacity of renewable resources that are likely to be significantly affected to meet the needs of the present and those of the future, and their sustainable use, is considered.

- **Assessment of Cumulative Environmental Effects** – Cumulative environmental effects of the Project are identified in consideration of EIS guidelines, as well as other past, present or reasonably foreseeable projects or activities, for all phases of the Project. For Project-related environmental effects that overlap temporally and spatially with those of other projects or activities, an assessment of potential interactions is completed. The residual cumulative environmental effects of the Project in combination with other past, present, or future projects or activities that have been, or will be carried out are then evaluated, including the contribution of the Project to those cumulative environmental effects.

- **Determination of Significance** – The significance of residual Project-related and cumulative environmental effects is determined, in consideration of the significance criteria (based on regulatory standards where applicable and/or professional judgement as required).

- **Recommendations for Follow-up** – Follow-up and monitoring programs to verify the environmental effects predictions or to assess the effectiveness of the planned mitigation are recommended, where applicable.

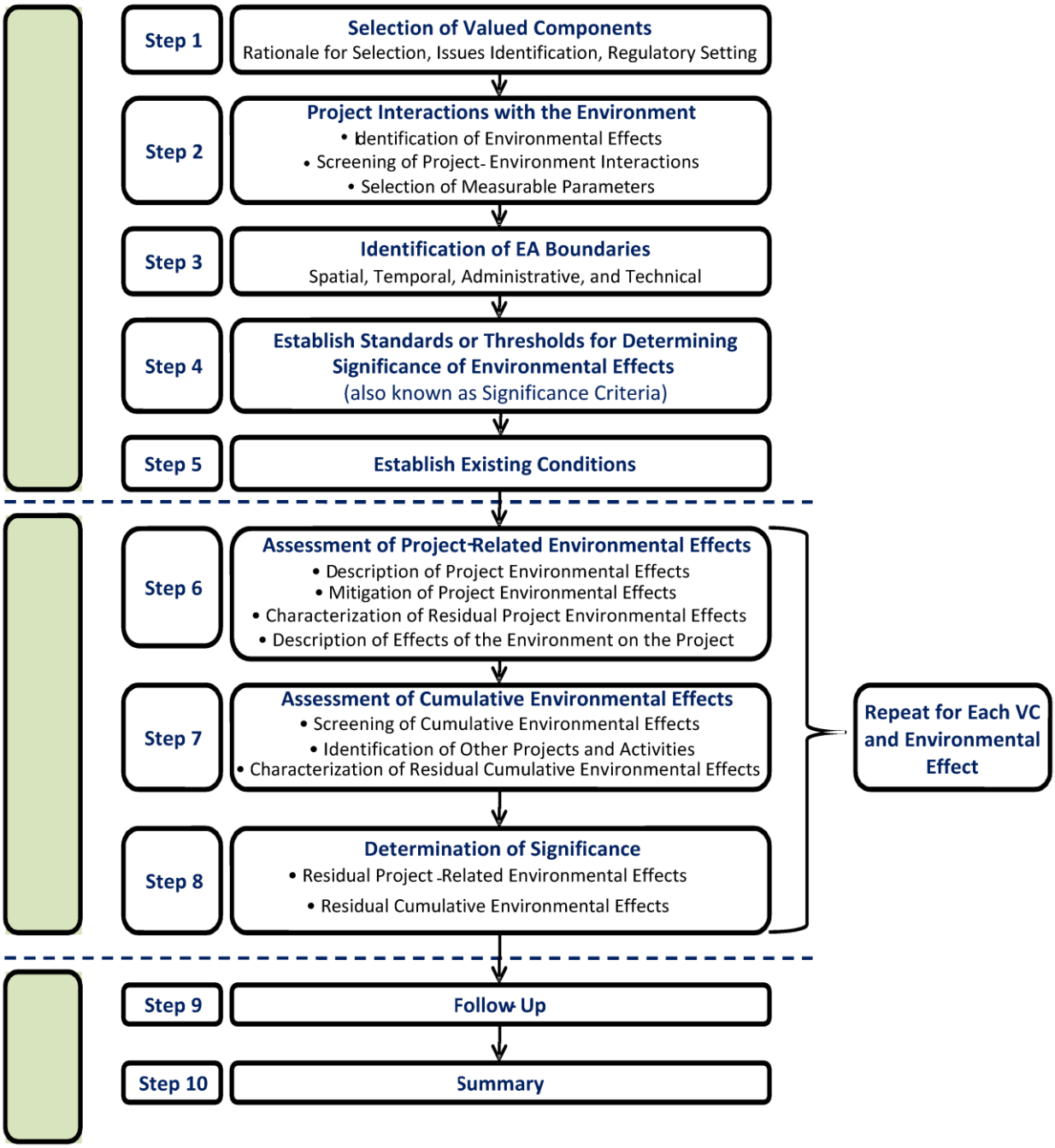

Figure 5.1 Overview of Environment Assessment Method

5.2 Scope of the Project

The EIS will include expanded descriptions of the construction, operation, maintenance, foreseeable modifications, and where relevant, closure, decommissioning and restoration of sites and facilities associated with the Project, and pursuant to the requirements of IAAC EIS Guidelines and the NLDOECC EIS Guidelines. This project description focusses on those elements of the Project, including effluents, emissions and discharges, to be evaluated in the EIS, and includes design mitigation. These elements are detailed in Chapter 2: Project Description.

5.3 Scope of the Assessment

5.3.1 Factors to be Considered

The EIS considers the potential environmental effects of planned activities and mitigation to be carried out during the Project, as required under Sections 19(1) (a-h) of CEAA 2012 and IAAC and NLDOECC EIS Guidelines, including the potential cumulative environmental effects of other projects or activities that have been or will be carried out. The potential environmental effects of credible accidents, malfunctions, and unplanned events that could occur during these phases and/or as part of these activities will also be assessed for each VC. Accidents, malfunctions, and unplanned events to be considered for each VC are described in Chapter 2: Project Description.

The EIS also considers comments received from Indigenous engagement and public consultation. A summary of the Indigenous engagement and public consultation conducted as part of this EA process is provided in Chapter 3: Engagement and Traditional Knowledge.

5.3.2 Identification of Valued Components

The EIS focuses on VCs, which are components or attributes of the environment that are important for ecological, legal, scientific, cultural, economic, or aesthetic reasons. The assessment considers potential environmental effects that the Project may have on these VCs.

VCs were selected for the EIS based on the scope of the Project, information regarding baseline conditions as prescribed by IAAC Guidelines (Sections 9.1.2 and 9.1.3), Part II of the NLDOECC Guidelines: Detailed Guidance on Select Environmental Components (Sections 4.15 to 4.23), and the potential for interaction between the Project and the biophysical and human environments (Table 5.1).

Table 5.1 Concordance of Valued Components in the EIS with the IAAC and NLDOECC Guidelines

VC and Chapter of EIS	Biophysical and Human Environment Components – IAAC EIS Guidelines	NLDOECC EIS Guidelines
Atmospheric Environment and Climate	Atmospheric Environment and Climate	Atmospheric Environment
Water Resources	Lacustrine Environment Water Resources (surface water)	Water Resources (surface water)
Groundwater Resources	Water Resources (hydrogeology)	Water Resources (groundwater)
Terrain and Acid Rock Drainage/ Metal Leaching[1]	Terrestrial Environment – Geology and Geochemistry Surficial Geology (i.e., Terrain and Soil)	Landforms, Soils, Snow and Ice
Wetlands	Wetlands	Not applicable
Fish and Fish Habitat	Fish and Fish Habitat	Not applicable
Birds, Wildlife, and their Habitat	Birds, Wildlife, and their Habitat Ecosystems	Wildlife and Their Habitats and Protected Areas
Species at Risk and Species of Conservation Concern	Species at Risk and Species of Conservation Concern Flora	Species at Risk and Designated Species
Historic and Cultural Resources	Physical and cultural heritage, including structures, sites, or things of historical, archaeological, paleontological or architectural significance	Historic and Cultural Resources
Current Use of Land and Resources for Traditional Purposes by Indigenous Persons	Current use of land and resources for traditional purposes by Indigenous persons	Not applicable
Other Contemporary Land and Resource Use	Land use context Navigation	Other Contemporary Use of Lands and Resources
Community Services and Infrastructure	Health and Socio-economic Conditions	Not applicable
Economy, Employment and Business	Not applicable	Economy, Employment and Business
Note: [1] Includes an analysis of acid rock drainage potential and metal leaching		

A description of each VC and the rationale for its selection is presented within each VC environmental effects analysis section (Chapters 10 to 22). VCs were selected based on information gathered from:

- baseline studies completed by Stassinu Stantec and WSP (formerly GENIVAR) throughout 2012 and 2013;
- Indigenous engagement;
- input from IAAC, federal expert authorities, and the Province of Newfoundland and Labrador along with associated written government guidance (e.g., EIS Guidelines (issued by IAAC and NLDOECC in 2013); and
- the professional opinion of Stassinu Stantec and WSP Study Team members.

5.3.3 Effects of Potential Accidents, Malfunctions or Unplanned Events

The EIS includes an assessment of potential Project-related accidents, malfunctions, and unplanned events. These events were identified and included in the assessment based on IAAC and NLDOECC EIS Guidelines, input from Project engineers and the professional judgment and experience of the Study Team. The overall approach to the assessment of accidental events considers probability and consequences, and focusses on plausible worst-case scenarios and the potential environmental effects of these scenarios. A description of each potential accidental event and malfunction scenario is included in Chapter 2: Project Description. Geographic and temporal boundaries may be different than those used in the assessment of Project effects to VCs, in which case these are described within the assessment of accidental events for each VC (Chapters 10 to 20). Prevention and contingency procedures and plans are also identified and described. Further details on assessment of potential accidents or malfunctions is provided in Section 5.5.10.

5.3.4 Effects of the Environment on the Project

In accordance with Section 19(1) of the CEAA 2012, Section 7.1.3 of IAAC Guidelines, and Section 4.9 of the NLDOECC Guidelines, the EIS includes a discussion of the expected and potential effects of the environment on the Project's design, construction and operation. Predictions are provided on how local conditions and natural hazards, such as severe or extreme weather conditions and external events (e.g., flooding, ice jams, rock slides, landslides, fire, outflow conditions, and seismic events) could adversely affect the Project and how this in turn could affect the environment (e.g., environmental emergencies due to extreme environmental conditions). Measures that will be implemented to prevent and respond to such events are also described.

5.3.5 Scope of the Factors

The consideration of environmental effects in the EIS are conceptually bound in both time and space. This is more commonly known as scoping the spatial and temporal boundaries of the assessment. The spatial and temporal boundaries vary among VCs, depending on the nature of the predicted effects. The spatial boundaries must reflect the geographic range over which the Project's environmental effects may occur, recognizing that some effects will extend beyond the Project area and will be considered on a regional basis. Spatial and temporal boundaries have been developed in consideration of:

- timing/scheduling of Project activities;
- natural variations of each VC;
- the time required for recovery from an effect; and
- potential for cumulative effects.

The determination of spatial and temporal boundaries for each VC considers local and community knowledge and Indigenous traditional knowledge where available, as well as concerns raised through public and Indigenous consultation. This is described in Chapter 3: Engagement and Traditional Knowledge. Spatial and temporal boundaries for each VC are presented in the respective VC analyses.

5.4 Guiding Principles

5.4.1 Environmental Assessment as a Planning Tool

As indicated in Section 2.1 of IAAC EIS Guidelines, environmental assessment is a planning tool, to be used so that projects are considered in a careful and precautionary manner to avoid or mitigate the possible adverse environmental effects of development on the environment. It is also used to encourage decision makers to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy.

In accordance with this, the EA of the Project:

- considers and evaluates alternatives (Chapter 2);
- documents consultation activities (Chapter 3);
- proposes measures to mitigate adverse environmental effects (Chapters 10 through 22);
- identifies the Project's residual environmental effects (Chapters 10 through 22);
- assesses whether residual environmental effects are significant (Chapters 10 through 22);
- assesses cumulative effects (Chapters 10 through 22);
- assesses whether cumulative effects are significant (Chapters 10 through 22, and 24);
- lists and cites all information sources (Chapter 26);
- outlines the design of studies (Chapters 10 through 22);
- addresses concerns raised by the public or Indigenous groups and ways in which the concerns have been addressed (Chapter 3 and Chapters 10 through 23); and
- defines and discusses the effect on the Project on potential or established Indigenous treaty rights and related interests (Chapters 8 and 23).

The EIS considers the relationships and interactions among the various components of the ecosystems. This includes, where relevant, the extent to which biological diversity may be affected by the Project and how the Project meets the needs of the present as well as future populations.

5.4.2 Public Consultation

Public stakeholders were consulted by Labec Century to identify environmental issues with the Project, and ways to address these issues. Consultation events and issues that were raised are presented in Chapter 3. The information was also used to scope the selection of VCs.

5.4.3 Local and Indigenous Traditional Knowledge

For the purpose of the EIS, local, community and Indigenous knowledge are referred to as “Local and Indigenous traditional knowledge” or as “traditional knowledge”, equivalent to community knowledge and Indigenous traditional knowledge referenced in IAAC Guidelines and to local knowledge and Indigenous traditional knowledge referenced in the NLDOECC Guidelines. Local knowledge has been collected by Labec Century through land and resource interviews and workshops, meetings with stakeholders, public information sessions and review of existing literature. Labec Century has developed an understanding of Indigenous traditional knowledge through its direct engagement efforts with Indigenous groups in proximity to the Project. Labec Century has also reviewed relevant secondary sources, including existing literature and other publicly available information provided by the Indigenous groups in the context of other developments. A discussion is provided if and where conclusions based on scientific and technical knowledge differ from those based on traditional knowledge.

The EIS considers potential or established Indigenous and treaty rights and related interests and considers concerns identified through consultation with Indigenous communities. Adverse impacts on Indigenous and treaty rights are discussed in Chapters 8 and 23.

5.4.4 Precautionary Approach

One of the purposes of federal EA is to carefully consider projects in a careful and precautionary manner before authorities take action in connection with them, so that such projects do not cause significant adverse environmental effects.

The Government of Canada (GOC) document, *A Framework for the Application of Precaution in Science-based Decision Making About Risk* (GOC 2003), sets out guiding principles for the application of precaution to science-based decision making in areas of federal regulatory activity for the protection of health and safety, the environment, and the conservation of natural resources.

The purpose of the framework is to:

- improve the predictability, credibility, and consistency of the federal government's application of precaution to ensure adequate, reasonable, and cost-effective decisions;
- support sound federal government decision making while minimizing crises and controversies and capitalizing on opportunities;

- increase public and stakeholder confidence, in Canada and abroad, that federal precautionary decision making is rigorous, sound and credible; and

- increase Canada's ability to positively influence international standards and the application of precaution.

In this document, the definition and “application of "precaution", "the precautionary principle", or "the precautionary approach" recognizes that the absence of full scientific certainty shall not be used as a reason for postponing decisions where there is a risk of serious or irreversible harm” (GOC 2003).

The list below outlines the ways in which the precautionary principle was considered in the design of the Project.

- All aspects of the Project have been examined and planned in a careful and precautionary manner so that they would not cause serious or irreversible damage to the environment, especially with respect to environmental functions and integrity, and considering system tolerance and resilience (Chapter 2).

- Assumptions made about the effects of all aspects of the Project and the approaches to reduce these effects are outlined and justified (Chapters 10 to 22).

- Where the Proponent is considering options for development, the assessment considers the most conservative reasonable assumptions (Chapters 10 to 22).

- Alternative means of carrying out the Project were evaluated and compared in light of risk avoidance and adaptive management capacity (Chapter 2).

- Priority has been given to strategies that avoid the creation of adverse effects in designing and operating the Project where feasible (Chapter 2).

- Contingency plans that explicitly address accidents and malfunctions will be prepared (Chapter 7).

- Follow-up and monitoring activities are proposed, particularly in areas where scientific uncertainty exists in the prediction of environmental effects or effectiveness of proposed mitigation measures (Chapters 10 to 22, and Chapter 25).

- Public concerns about the Project are presented (Chapter 3 and Chapters 10 to 22).

5.5 Effects Assessment Methods

The environmental effects of the Project on the VCs are assessed in Chapters 10 to 22. The methods used to assess the environmental effects are further described below.

5.5.1 Valued Component Definition and Rationale for Selection

A description of each VC and the rationale for its selection is presented in each VC environmental effects analysis chapter. The regulatory setting for each VC is presented to provide context. Issues that have been raised by stakeholders relating to each VC are summarized, and linkages to other VCs are described.

5.5.2 Selection of Environmental Assessment Boundaries

Boundaries are established for each VC to focus the environmental assessment. Boundaries include spatial, temporal, and administrative.

Spatial Boundaries

The spatial boundaries reflect the geographic range over which the Project's environmental effects may occur, recognizing that some environmental effects may extend beyond the Project footprint. The Project Development Area (PDA) is the area of physical disturbance resulting from the Project and includes the pit, waste rock disposal areas, processing area, accommodations area, on-site roads, and rail loop.

The LSA is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. The LSA is defined for each VC to capture the likely direct interactions of the Project with the VC. It includes the PDA and any adjacent areas where Project-related environmental effects may reasonably be expected to occur. The RSA is a broader area defined for each VC to capture the expected overall spatial extent of the Project's effects, based on factors such as the distribution or movement of the VC (e.g., the range of the various animal populations that may be affected, the communities or regions / economic zones that may feel Project benefits or effects). It is also the area within which cumulative effects for each VC may occur, depending on physical and biological conditions and the type and location of other past, present, and reasonably foreseeable projects. The RSA is the area within which the significance of residual Project environmental effects and cumulative environmental effects is predicted.

LSA and RSAs are defined for each VC.

Temporal Boundaries

The temporal boundaries for the environmental assessment include the Project phases of Construction, Operation and Maintenance, and Closure and Decommissioning. The temporal boundary for Construction is one year (pre-operation), for Operation and Maintenance is approximately seven years, and for Closure and Decommissioning is approximately one year.

Temporal boundaries that reflect seasonal variations or life cycle requirements for biological VCs or forecasted trends for socio-economic VCs are also described where relevant in Chapters 10 through 22.

Administrative Boundaries

Relevant regulations, policy, and administrative/management mechanisms are described for each VC to establish the associated administrative boundaries.

5.5.3 Establishing Standards or Thresholds for Determining the Significance of Residual Environmental Effects

As prescribed in Section 13.1 of IAAC EIS Guidelines and Section 4.11 of the NLDOECC EIS Guidelines, the criteria for evaluating the significance of residual environmental effects, as well as significance thresholds (i.e., significance definitions) are provided in the environmental effects analysis for each VC (Chapters 10 to 22). The criteria for evaluating significance include those prescribed by the Guidelines and are: direction, magnitude, geographic extent, duration and frequency, reversibility, and ecological and socio-economic context. Significance thresholds for each VC are defined in consideration of these criteria as well as within the context of environmental standards, guidelines or objectives, providing a defined threshold beyond which a residual environmental effect would be considered significant. Effects are rated as either “significant” or “not significant”.

A summary of effects will be provided in the Summary and Conclusions chapter.

5.5.4 Potential Project-Valued Component Interactions

To focus the assessment, the effects are defined and detailed measurable parameters proposed. The rationale for selection of each environmental effect and measurable parameter is provided in each VC (Chapters 10 through 22).

So that all potential Project environmental effects are assessed, activities associated with each Project phase and with accidental events were identified and applied as a standard list for the evaluation of each VC. The Study Team considered each Project activity and determined if it was likely to interact with each VC to result in an environmental effect. If the activity would not result in an environmental effect (i.e., no measurable interaction), the interaction was rated as 0. If standard environmental protection measures or codified effects management measures are prescribed so that any resulting environmental effects are not significant, the interaction was rated as 1. For those interactions where codified environmental protection measures or effects management measures do not exist, and where there is more public or regulatory concern, the interaction is rated as 2. Table 5.2 provides an example of the interaction table completed for each VC. A brief but complete environmental assessment and discussion of significance is provided for interactions rated as 0 or 1, and is not considered further in the environmental effects assessment. Interactions rated as 2 are assessed in more detail.

Table 5.2 Project Activities and Physical Works (Example)

Project Activities and Physical Works	Potential Environmental Effects		
	Environmental Effect #1	Environmental Effect #2	Environmental Effect #3
Construction			
Site Preparation (including clearing, grubbing, excavation, material haulage, grading, removal of overburden, ditching, and stockpiling)			
Construction of Roads			
Construction of Causeway			
Construction of Site Buildings and Associated Infrastructure			
Construction of Rail Loop and Associated Infrastructure			
Construction of Stream Crossings			
Installation of Water Supply Infrastructure (wells, pumps, pipes)			
On-site Vehicle/Equipment Operation			
Waste Management			
Transportation of Personnel and Goods to Site			
Expenditures			
Employment			
Operation and Maintenance			
Maintenance of Causeway			
Open Pit Mining (including drilling, blasting, ore and waste haulage, stockpiling, dewatering)			
Dewatering Joyce Lake			
Ore Processing (including crushing, conveying, storage, grinding, screening)			
Waste Rock Disposal on Surface			
Water Treatment (including mine water and surface runoff) and Discharge			
Rail Load-Out and Transport			
On-site Vehicle/Equipment Operation and Maintenance			
Waste Management			
Transportation of Personnel and Goods to Site			
Fuel Transport			
Fuel Storage and Dispensing			
Progressive Rehabilitation			
Expenditures			
Employment			
Closure and Decommissioning			
Site Decommissioning			
Site Reclamation (building demolition, grading, scarifying, hydroseeding)			

Table 5.2 Project Activities and Physical Works (Example)

Project Activities and Physical Works	Potential Environmental Effects		
	Environmental Effect #1	Environmental Effect #2	Environmental Effect #3
Accidents and Malfunctions			
Hydrocarbon Spill			
Train Derailment			
Forest Fire			
Settling/Sedimentation Pond Overflow			
Premature or Permanent Shutdown			

Key:
0 No interaction.
1 Interaction occurs; however, based on past experience, the resulting environmental effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices. No further assessment is warranted.
2 Interaction occurs, and resulting environmental effect may exceed acceptable levels without implementation of specific mitigation. Further assessment is warranted.

5.5.5 Existing Environment

For each VC (Chapters 10 through 22), the existing conditions, reflecting any effects from historical and present human activities, are described for the PDA, LSA, and, if required, the RSA. The level of detail is sufficient to:

- identify, assess, and determine the significance of adverse environmental effects that may be caused by the Project;
- identify and characterize the beneficial effects of the Project; and
- provide preliminary data to enable effective follow-up.

As defined in Section 10.1.1 of IAAC EIS Guidelines, the assessment was conducted using a framework that categorizes the levels of details and quality of the data required for the assessment based on the following tiers:

- Tier 1: Qualitative (expert opinion, including traditional and local knowledge, literature review, and existing site information);
- Tier 2: Semi-quantitative (measured site-specific data and existing site information); and
- Tier 3: Quantitative (recent field surveys and detailed quantitative methods).

The application of these tiers is based on the expert opinion of the Study Team, consultation with regulators and in consideration of legislative/regulatory expectations and requirements. That is, a qualitative, semi-quantitative, or quantitative assessment was conducted where data warranted.

Existing baseline conditions for each biophysical VC are described considering scientific, traditional, and local knowledge (where available) and perspectives regarding ecosystem health.

Biophysical VCs consider the resilience of relevant species populations, communities, and their habitats, as well as the size, geographic extent and density of animal or floral populations.

Habitat at regional and local scales is described for aquatic and terrestrial vegetation types and/or communities. Habitat use at regional and local scales is characterized by type of use (e.g., spawning, breeding, migration, feeding, nursery, rearing, wintering), frequency, and duration.

Existing baseline conditions for each socio-economic VC are described, including rural, Indigenous, and urban communities likely to be affected by the Project, the Project's proximity to sensitive features such as residences, cabins, public drinking water supplies, sacred sites, places of worship, and locations of hunting and gathering activities. Baseline information relevant to human health as per Health Canada (2010) guidance is presented in Chapter 21 (Community Services and Infrastructure).

Baseline data limitations or gaps, if they occur, are described and the approach to address them in the context of effects analysis is provided.

5.5.6 Assessment of Project-Related Environmental Effects

Potential Environmental Effects

For interactions rated as 2 (i.e., those where codified environmental protection measures or effects management measures do not exist, and/or where there is more public or regulatory concern), the potential environmental effects are assessed for each VC. Quantitative analyses are completed where possible and where warranted, relying on the defined measurable parameters (e.g., area of habitat lost or affected). The assessment of effects is based on existing knowledge gathered from scientific research and literature reviews, experiences with similar projects, particularly the results of environmental monitoring programs, from the professional knowledge and judgment of the Study Team, and from local and Indigenous traditional knowledge, as applicable.

Mitigation of Project Environmental Effects

Mitigation measures and/or effects management measures are proposed for each VC to reduce adverse environmental effects, as well as measures to address public concerns. Types of mitigation measures considered include:

- environmental protection strategies;
- site-specific measures (i.e., timing of activities to avoid biologically sensitive periods, site-specific mitigation design measures); and
- contingency measures to address the possibility of accidental events that could affect the environment.

As per Sections 3.2, 4, 10.1.1 and 11.1.1 of IAAC EIS Guidelines, and Section 4.7 of the NLDOECC EIS Guidelines, only those mitigation measures considered to be technically and economically feasible, and standard and proven, are considered. Proposed mitigation measures

have been shown to be effective for similar projects elsewhere and in the region, and severity of consequence in the event of mitigation failure is anticipated to be low. Therefore, the risk of mitigation failure is very low. If applicable, technically and economically feasible mitigation measures other than the preferred mitigation measure will also be presented. The potential risks of new and unproven mitigation measures will be presented, where relevant. For socio-economic VCs, effects management measures to optimize Project benefits are also identified.

A summary of mitigation measures, effects management and commitments will be provided in Chapter 25: Commitments made in the EIS. Adverse Impacts specific to Indigenous groups will be discussed in Chapter 8: Adverse Impacts and Measures to Address Adverse Impacts on Indigenous Treaty Rights.

5.5.7 Characterization and Summary of Residual Project Environmental Effects

Residual environmental effects (i.e., those environmental effects that would remain after mitigation has been applied) are assessed and characterized, using the environmental effects criteria described in Section 5.5.3 (direction, magnitude, geographic extent, duration, frequency, reversibility, and context). The residual environmental effects of the Project on each VC are summarized in a tabular format (Table 5.3), and discussed. The assessment uses a conservative approach; therefore, ratings for these criteria are based on credible worst-case scenarios for each Project phase. For instance, if most construction activities are rated as having low magnitude, but one activity is rated as having a high magnitude, the overall rating of magnitude for Construction would be considered low to high. As well, if several activities during the Construction phase are considered to have a positive effect on a socio-economic VC, but others are considered to be adverse, both the adverse and positive effects are considered.

5.5.8 Determination of Significance of Residual Adverse Environmental Effects

The significance of adverse environmental effects resulting from the Project is determined based on the VC-specific significance thresholds, and in consideration of the application of mitigation or effects management measures.

If the environmental effects are rated as significant, then the likelihood of the environmental effect occurring (high, medium or low likelihood) is indicated. The confidence of the predictions is discussed, based on quality and/or quantity of data, understanding of environmental effect mechanisms, and/or effectiveness of the proposed mitigation/effects management.

5.5.9 Follow-up and Monitoring

A Follow-up Program is proposed, where appropriate, to verify the accuracy of the environmental effects predictions and to determine the effectiveness of the measures implemented to mitigate adverse environmental effects.

5.5.10 Accidents and Malfunctions

Five potential accidental event and malfunction scenarios have been considered for the Project, based on IAAC and NLDOECC EIS Guidelines and requirements for previous similar projects. Although these events are not likely to occur, the resulting environmental effects are assessed where relevant for each VC. Accidental event scenarios are described in Chapter 2: Project Description. The potential environmental effects of each potential accidental event and malfunction are assessed for each VC, based on the existing conditions of each VC and existing knowledge about the environmental effects of the accidental events. The same methods to assess the environmental effects of the Project described above are used. For example, residual environmental effects (i.e., after mitigation has been applied) are characterized using specific criteria (i.e., direction, magnitude, geographic extent, duration, frequency, reversibility, and environmental/socio-economic context) that are specific to each VC. The significance of residual environmental effects that may result from accidents and malfunctions is then determined based on defined thresholds.

Table 5.3 Summary of Project Residual Environmental Effects (Example)

Project Phase	Mitigation/Compensation Measures	Residual Environmental Effects Characteristics									Recommended Follow-up and Monitoring
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental/Socio-economic Context	Significance	Prediction Confidence	
[Effect Name #1]											
Construction											
Operation and Maintenance											
Closure and Decommissioning											
[Effect Name #2]											
Construction											
Operation and Maintenance											
Closure and Decommissioning											

Key:

Direction:
P Positive.
A Adverse.
N Neutral.

Magnitude:
L Low: Varies with VC.
M Moderate: Varies with VC.
H High: Varies with VC.

Geographic Extent:
Varies with VC
S Site (PDA).
L Local: within the LSA.
R Regional: within the RSA.

Duration:
Quantitative measure; or
ST Short-term.
MT Medium-term.
LT Long-term.
P Permanent – will not change back to original condition.

Frequency:
Quantitative measure; or
O Once per month or less.
S Occurs sporadically at irregular intervals.
R Occurs on a regular basis and at regular intervals.
C Continuous.
U Unlikely to occur

Reversibility:
R Reversible.
I Irreversible.

Environmental or Socio-economic Context:
U Undisturbed: Area relatively or not adversely affected by human activity.
D Developed: Area has been substantially previously disturbed by human development (e.g., urban setting) or human development is still present.

Significance:
S Significant.
N Not Significant.

Prediction Confidence:
Based on scientific information and statistical analysis, and effectiveness of mitigation or effects management measure
L Low level of confidence.
M Moderate level of confidence.
H High level of confidence.

N/A Not Applicable.

Accidents, malfunctions, and unplanned events are assessed using the framework detailed in Table 5.3.

5.6 Cumulative Effects Assessment Methods and Scoping

The consideration of other projects or activities that have been or will be carried out with potentially overlapping environmental effects is a necessary component of the assessment of cumulative environmental effects to meet the requirements of IAAC and the NLDOECC EIS Guidelines.

5.6.1 Methods

Cumulative effects are the result of multiple projects or activities. They are residual effects on the environment (i.e., environmental effects that occur after mitigation measures have been put in place) that are likely to arise from the Project in combination with other projects or activities that have been or will be carried out. The cumulative effects assessment methods used in this EIS address, and are consistent with, the requirements of CEAA 2012 , IAAC EIS Guidelines and the NLDOECC EIS Guidelines for the Project, the Operational Policy Statement (OPS) – Assessing Cumulative Environmental Effects Under CEAA 2012 (Government of Canada 2014), and are consistent with the Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012*. As prescribed in the OPS, a five-step methodology was used (Scoping, Analysis, Mitigation, Significance, Follow-up).

The EIS assesses and evaluates cumulative effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out. The cumulative effects assessment is reported in a separate subsection for each VC, and is summarized in a stand-alone chapter (Chapter 24) as prescribed in Section 3.5 of IAAC EIS Guidelines.

The general level of detail provided in the analysis of cumulative effects for each VC in Chapters 10 through 22 is based on:

- the probability of the effect
- the likely scale or magnitude of the effect, and
- the extent to which these effects can be accurately and reasonably quantified and described within the receiving environment.

Depending on the probability, likely magnitude, and extent, potential cumulative effects of the Project in combination with each of the other projects are rated as 0 (no interaction and therefore no effect), 1 (likely to interact, but the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices), or 2 (likely to interact, and the resulting cumulative effects may exceed acceptable levels without implementation of project-specific or regional mitigation).

The cumulative effects assessment in Chapter 24 considers the cumulative effect on the VC as a result of the Project's likely residual environmental effects and those of other relevant projects and activities, using the staged approach detailed below.

- Past and on-going projects and activities and their environmental effects are reflected in the existing environment subsections for each VC in Chapters 10 through 22. An overview of these previous and on-going developments and other human activities in the general area of the Project is provided in Tables 5.4 and 5.5. The current condition of the VC as a result of these natural and/or anthropogenic factors, and thus its overall sensitivity or resiliency to further disturbance or change, is integrally considered throughout the environmental effects assessment. This current condition of the VC is again briefly summarized at this step.

- With the current VC condition established, the cumulative effects assessment then summarizes and considers whether and how this current condition will be changed by the introduction of the Project and its residual environmental effects (as assessed in detail in the earlier components of each VC section).

- From here, other on-going and likely future projects and activities that are relevant to this VC and its cumulative effects assessment are identified. These comprise any current or reasonably foreseeable future projects or activities whose effects on the VC would likely overlap in space and time with those of the Project (e.g., overlap with the Project area or its zone of influence, affect the same wildlife populations or communities). Where such interaction with the effects of another identified project is considered likely or unlikely to occur, the rationale for this determination is also provided.

- In cases where the predicted residual environmental effects of the Project on the VC will overlap in space and time with those of one or more other existing and/or future projects and activities, the potential cumulative effects of the Project in combination with those of these other relevant developments are assessed and evaluated. The same effects descriptors and significance definition and approach used for the Project-specific environmental effects assessment are used for the cumulative effects assessment. The significance of cumulative environmental effects is then determined.

The cumulative effects assessment considers and analyzes each of the potential types of cumulative effects that may occur from:

- potential additive effects, where the total cumulative effect is equal to the sum of the individual effects that have contributed to it;

- interactive or synergistic effects, where the total environmental effect may be greater or less than the sum of the contributing effects, such as possible reactions between them, the exceedance of some ecological or social threshold; and

- induced activities and their effects.

In summary, the cumulative effects assessment assesses and evaluates the overall (total) environmental effect on the VC resulting from the likely residual effects of the Project in combination with those of other relevant projects and activities.

5.6.2 Scoping of Other Projects and Activities

The other projects and activities considered in the cumulative environmental effects assessment in this EIS were identified in the NLDOECC EIS Guidelines, review of materials in the public domain, and knowledge of the Study Team. Tables 5.4 and 5.5 provide an overview of these projects and activities and Figure 5.2 displays their location. Each of these projects or activities is considered as relevant in the cumulative effects analysis for each VC.

Table 5.4 Summary of Other Projects and Activities

Owner	Project	Location	Distance to Joyce Lake	Project Type/Status	Production Rate	Product Transport	Employed/Operating life
Champion Iron Ltd.	Kami Iron Ore	Wabush, Labrador City and Fermont (QC)	230 km	Iron ore mine/ on hold	7.8 million tonnes per year	QNS&L Railway	Currently on hold. If it proceeds: 500+/23 years
ArcelorMittal	Mont-Wright Mine	Fermont, QC	245 km	Iron ore mine/active	15 million tonnes per year concentrate; 9 million tonnes per year pellets	Railway to Port Cartier Facility	Approx. 900/16 years
Champion Iron Ltd.	Fire Lake North Iron Ore Project	Fermont (QC)	245 km	Open-pit mine & iron ore/ Prefeasibility Study completed. Feasibility Study being conducted/EA in progress	Average production of 9.3 million tonnes per year	361 km new rail line to Pointe-Noire port facility	Approx. 400/20 years
Tacora Resources Inc.	Scully Mine	Wabush	225 km	Iron ore mine/ active	6 million tonnes per year	QNS&L Railway	260/26 years
Champion Iron Ltd.	Bloom Lake Mine and Rail Spur	Quebec (400 km north of Sept Iles)	221 km	Iron ore mine/ active	7.4 million tonnes per year (Phase I)	Bloom Lake Railway, QNS&L Railway	Approx. 600/21 years
IOC	Labrador Operation	Labrador City	220 km	Iron ore mine/ active	Up to 22 million tonnes per year of concentrate, with pelletizing capacity	QNS&L Railway	Approx. 2,000/50 years
Labrador Iron Mines	Houston 1&2 iron ore project	Western Labrador	25 km	Iron ore mine/on hold	2 million tonnes per year	Tshiuetin Rail Transportation and QNS&L Railway	Not available/10+ years
Nalcor	Lower Churchill Hydroelectric Generation Project	Muskrat Falls	420 km	Hydroelectric facility/under construction	3,074 MW/16.7 TW hours per year	Overhead Transmission Line	Approx. 2,700 peak/ongoing

Table 5.4 Summary of Other Projects and Activities

Owner	Project	Location	Distance to Joyce Lake	Project Type/Status	Production Rate	Product Transport	Employed/Operating life
NSP Maritime Link Inc.	Maritime Transmission Link Project	Island of Newfoundland/ Nova Scotia	>500 km	Transmission Line/active	500 MW HVdc and 230 kV HVac transmission lines	Not applicable	17/50+ years
Tata Steel Minerals Canada	DSO Iron Ore Project	NL, QC	35 km	Iron ore mine/ in development	4 million tonnes per year	Tshiuetin Rail Transportation and QNS&L Railway	Phase 1: construction 300 (peak) Phase 1 ops: 190 Phase 2 construction: 20 Phase 2 ops: 15/10 years

Table 5.5 Projects and Activities Considered for Assessment of Cumulative Effects

Champion Iron Ltd., Kami Project
Champion Iron Ltd. (Champion) has proposed to develop an open-pit iron ore mine in western Labrador and to build associated infrastructure at the Port of Sept-Îles, Québec. The proposed mine site is located 6 km south of Wabush Mines in the vicinity of the towns of Wabush, Labrador City and Fermont. The mine site is situated entirely within Labrador and has an approximate area of 7,700 ha. The project will produce up to 7.8 million metric tonnes of iron ore concentrate per year that will be transported by existing railway to the Port of Sept-Îles, QC. The proposed project includes construction, operation, rehabilitation and closure of the following primary components: open pit, waste rock disposal areas, processing infrastructure, tailings management facility, ancillary infrastructure to support the mine and processing plant, and a rail transportation component. The project is currently on hold, pending receipt of start-up financing; if the project proceeds, operations are projected to be approximately 23 years.
ArcelorMittal, Mont-Wright Mine
The Mont-Wright mining complex includes a concentrator, workshops and an automated concentrate train loading system in Fermont, QC. The site is linked by company rail to the Port-Cartier industrial complex, which includes a pellet plant, storage areas and port facilities for shipping. The company's stockpile areas at Port-Cartier have a capacity for 2.5 million tonnes of concentrate and 1.7 million tonnes of pellets (ArcelorMittal 2012). The current area of development is approximately 47 km^2.
Champion Iron Ltd., Fire Lake North Iron Ore Project
The Fire Lake North (FLN) Project is being developed by Champion Iron Mines Ltd. (Champion). The FLN project is situated entirely in northern Québec, approximately 55 km south-west of Wabush and immediately adjacent to the north of ArcelorMittal's Fire Lake pit. The FLN project covers 173 km^2 of mineral claims and consists of two specular hematite deposits referred to as the East deposit and West deposit. A total of 464.6 Mt of Mineral Reserves will be processed over 20 years using conventional open pit mining and processing methods. Over the 20-year mine life, an annual average of 9.3 million tonnes of concentrate at 66% Fe will be produced. The material collected from the open pit mines will be ground and treated to separate hematite particles into a concentrate. The tailings generated will be pumped to a tailings management facility located near the concentrator, while the final hematite concentrate will be filtered, dried and loaded into rail cars for delivery to the Port of Sept-Îles. The project includes a rail link from FLN to Pointe-Noire, rail garages and rolling stock. The Pointe-Noire site includes a stockyard and ship loading facilities where the concentrate will be stockpiled and loaded onto ships prior to final delivery to Champion's clients.
Tacora Resources Ltd., Scully Mine
The Scully Mine is operated by Tacora Resources Ltd. (Tacora). The Scully Mine previously operated from 1965 to 2014 as Wabush Mines, producing iron ore concentrate that was pelletized at Pointe-Noire, Quebec. The Scully Mine is adjacent to Wabush and entirely in Labrador. The mine produces ore from an open pit, grinds and concentrates ore, and disposes of tailings in a tailings pond. The restart of the mine is ongoing, and at full production the mine is expected to produce up to 6 million tonnes per year of iron ore concentrate over a 26 year mine life. The concentrate is sold without pelletizing to Tacora's clients and is delivered via the Pointe-Noire site's stockyard and ship loading facilities. The area of development is approximately 21 km2.
Champion Iron Ltd., Bloom Lake Mine and Rail Spur
The Bloom Lake iron ore mine (Bloom) is located in Québec approximately 12 km from Fermont and abuts the Labrador border. Bloom was acquired by Champion in 2015 after Cliffs Natural Resources (Cliffs) shut down operations in late 2014. Champion restarted the mine, with first production occurring 2018. The mine reserves are estimated to be 807 million tonnes. The mine produces ore from two open pits, grinds and concentrates ore, and disposes of tailings in a series of tailings ponds. Bloom has a mine life of 20 years and a nameplate capacity of 7.4 million tonnes per year of iron ore concentrate, which is sold to clients and delivered via the ship loading facilities and stockyard at Pointe-Noire. Champion is currently expanding the mine to increase production to 15 million tonnes per year of iron ore concentrate. The end-of-life area of development of the expanded mine is in excess of 15 km2. An approximately 31 km long railway was constructed to transport iron concentrate from the mine in Québec to the QNS&L Railway in western Labrador.

Table 5.5 Projects and Activities Considered for Assessment of Cumulative Effects

IOC, Labrador Operation
Iron Ore Company of Canada, owned by Rio Tinto, is Canada's largest iron ore pellet producer and operates an open pit mine, concentrator, and pellet plant at Carol Lake in western Labrador, port facilities in Sept-Îles, QC, and the QNS&L Railway. IOC began production from the Carol Lake Mine in 1962. Proven and probable reserves are 1.5 billion tonnes; measured and indicated resources are 2.4 billion tonnes. Annual mine production at the open pit operation is in the 35 to 38 million tonne range at an average grade of approximately 40% total iron. Annual production capacity is 18 million tonnes of iron ore product (NLDF 2011). IOC has completed an iron ore product expansion program to increase production capacity to 23.3 million tonnes. In 2018, IOC completed construction of Moss pit, a new open pit mine at its Labrador West mine site. During Project operations, a portion of IOC's existing labour force (an estimated 136 persons) will be redeployed from the existing mine pits to carry out mining and support activities at Wabush 3 (IOC 2014).
Labrador Iron Mines, Schefferville Iron Ore Mine and Houston 1 & 2 iron ore project
Labrador Iron Mines Holdings Ltd. (LIMH) began operations near Schefferville in 2011. In its first year of operation, LIMH shipped 412,000 tonnes of iron ore to China, under a transportation and sales agreement with Rio Tinto. LIMH was expected to ship approximately 1.7 million tonnes of ore in 2012 (NLDNR 2012). However, LIMH put production and shipping on hold for 2014 as a result of declining ore prices and lack of immediate access to high quality ore, ultimately closing James mine and Silver Yards processing plant and rehabilitating both sites (LIMH 2020). LIMH is advancing the Houston 1 & 2 iron ore project near Schefferville to a Preliminary Economic Assessment and is expected to produce 2 million tonnes of iron ore annually over a project lifespan of approximately 10 years (LIMH 2021).
Nalcor Energy, Lower Churchill Hydroelectric Generation Project
The Lower Churchill Hydroelectric Generation Project will include hydroelectric generation facilities at Gull Island and Muskrat Falls, and interconnecting transmission lines to the existing Labrador grid. The Muskrat Falls site is being constructed at the current time, and will consist of a generation facility 824 MW in capacity and will also include dams and a reservoir. The Muskrat Falls Reservoir will be 59 km long and the area of inundated land will be 41 km². If it proceeds, the Gull Island site will consist of a generation facility with a capacity of 2,250 MW and include a dam and a reservoir. The Gull Island Reservoir will be 232 km long, and the area of inundated land will be 85 km². The transmission lines consist of a 735 kV link between Gull Island and Churchill Falls and a double circuit 230 kV transmission line between Muskrat Falls and Gull Island. The 735 kV transmission line is 203 km long and the 230 kV transmission line is 60 km long. Both lines are north of the lower Churchill River, generally parallel to an existing right-of-way, and the tower structures are built of lattice-type steel (Nalcor 2009).
NSP Maritime Link Inc., Maritime Transmission Link Project
ENL Maritime Link Inc., a wholly owned subsidiary of Emera Newfoundland and Labrador Holdings Inc., is proposing to design, develop and operate the Maritime Link Transmission Project between the Island of Newfoundland and Cape Breton, Nova Scotia. The transmission link is a 500 MW high voltage transmission system that includes: transmission line along new and existing corridors between Granite Canal and Cape Ray, NL; two subsea cables spanning the Cabot Strait (approximately 180 km) from Cape Ray to Point Aconi in Cape Breton, NS; and a new transmission line (approximately 50 km) parallel to the existing transmission corridor centerline between Point Aconi and Woodbine (ENL 2011). First power was delivered in 2017 (ENL 2011). Total employment during the operations and maintenance phase is expected to be approximately 17.

Table 5.5 Projects and Activities Considered for Assessment of Cumulative Effects

Tata Steel, DSO Project
The DSO Project is a two-phased open pit iron ore mining project located in western Labrador, approximately 10 km northwest of Schefferville, QC. The previously mined site consists of 10 open pit deposits. Ore will be trucked to a plant for crushing, screening and washing to produce lump ore and sinter fine ores. From the plant, the ore is transported via rail to a marshalling yard in Schefferville, and then sent via rail to Sept-Îles, QC for shipment to customers. TSMC began shipments from Sept-Îles to Europe in 2013. Full capacity is expected to be approximately 4.2 million tonnes. The project will operate year round for an expected life of 12 years and will support an estimated 180 person years of employment annually (NLDIET 2020).

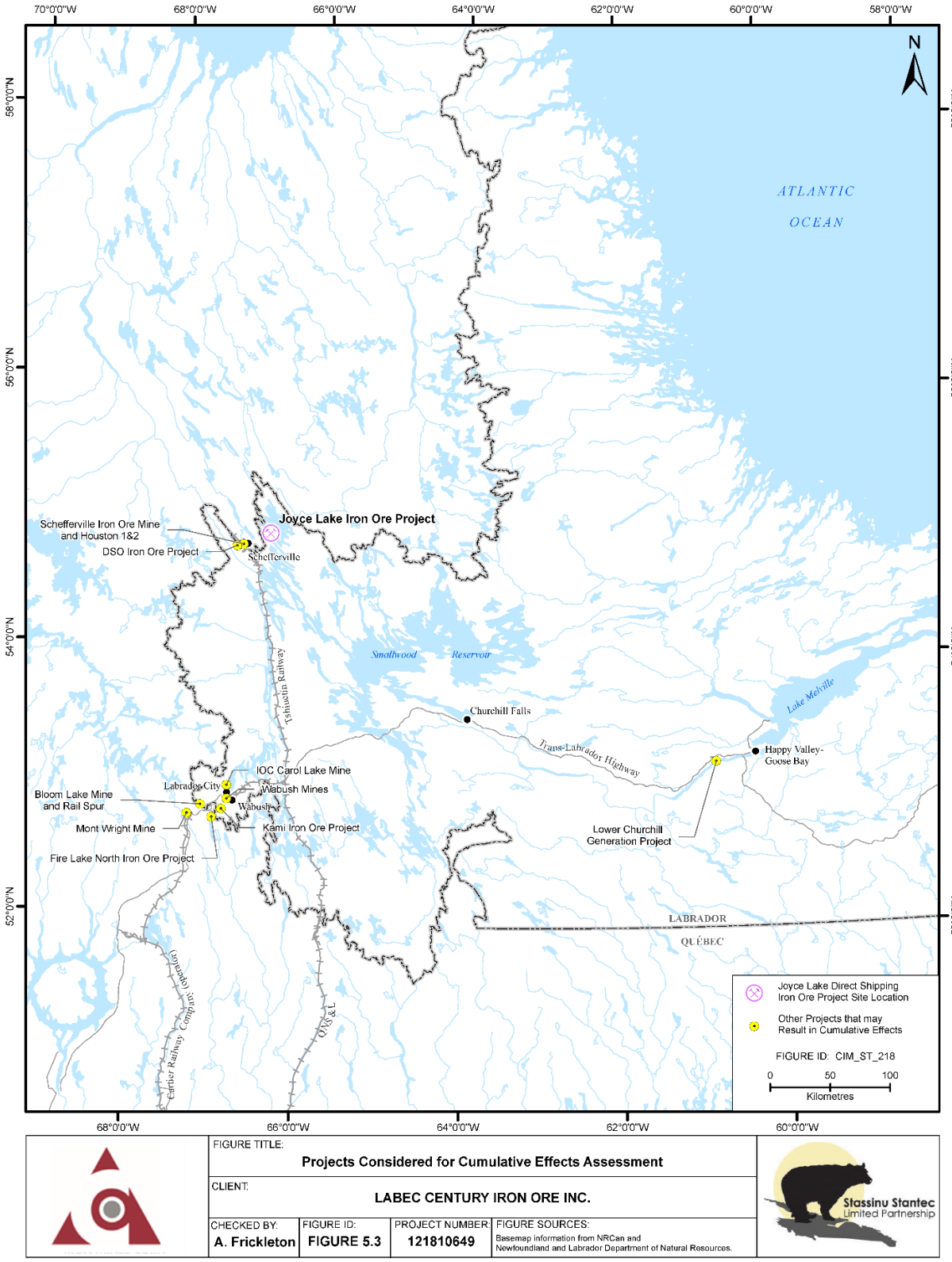

Figure 5.2 Projects Considered for Cumulative Effects Assessment

5.7 References

ArcelorMittal Mines Canada. 2012. About-Mont Wright Mining Complex. Available at: http://www.arcelormittal.com/minescanada/en/about/operations/Mont_Wright.aspx. Accessed: November 2014.

ENL (Emera Newfoundland and Labrador). 2011. The Maritime Link Transmission Project – Project Description. November 30, 2011. Available at: http://www.emeranl.com/site/media/emeranl/20111207%20Maritime%20Link%20Final%20 Project%20Description1.pdf. Accessed: November 2014.

GOC (Government of Canada). 2003. A framework for the application of precaution in science-based decision making about risk. Available at: http://www.pco-bcp.gc.ca/docs/information/publications/precaution/Precaution-eng.pdf. Accessed October 2014.

GOC (Government of Canada). 2014. Operational Policy Statement (OPS) – Assessing Cumulative Environmental Effects under CEAA 2012.

Health Canada. 2010. Useful Information for Environmental Assessments. Available at: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/eval/environ_assess-eval/environ_assess-eval-eng.pdf. Accessed October 2014.

IOC (Iron Ore Company of Canada). 2014. Wabush 3 Open Pit Mine Project. Environmental Impact Statement. Plain Language Summary. Available at: http://www.env.gov.nl.ca/env/env_assessment/projects/Y2013/1711/1711_wab3_eis_plain_lang_summ.pdf. Accessed: November 2014.

LIMH (Labrador Iron Mines Holdings Ltd.). 2020. Labrador Iron Mines reports first quarter June 30, 2020 results. Press Release, August 27, 2020, Toronto, ON. Available at: http://www.labradorironmines.ca/pdf/LIMHNRQ1Results.pdf Accessed: January 26, 2021.

LIMH (Labrador Iron Mines Holdings Ltd.). 2021. Update on Houston Project Preliminary Economic Assessment (PEA). Press Release, January 25, 2021, Toronto, ON. Available at: http://www.labradorironmines.ca/pdf/LIMHNR2021JAN25%20-%20Update%20on%20Houston%20Project%20Preliminary%20Economic%20Assessment.pdf Accessed: January 25, 2021.

Nalcor Energy. (2009). Lower Churchill Hydroelectric Generaton Project Environmental Impact Statement, Volume 3 Socio-Economic Assessment. Nalcor Energy. St. John's, NL.

NLDF (Newfoundland and Labrador Department of Finance). 2011. The Economic Review 2011. Available at: http://www.economics.gov.nl.ca/PDF2011/TheEconomicReview2011.pdf. Accessed: October 31, 2014.

NLDIET (Newfoundland and Labrador Department of Industry, Energy and Technology). 2020. Gross Value of Mineral Shipments by Commodity. Available at: http://www.geosurv.gov.nl.ca/minesen/mineral_shipments/. Accessed: January 20 2021.

NLDNR (Newfoundland and Labrador Department of Natural Resources). 2012. Mining in Newfoundland and Labrador February 2012. Revised June 15, 2012. Available at: http://www.nr.gov.nl.ca/nr/mines/investments/Mining%20in%20Newfoundland%20and%20Labrador%20Overview.pdf. Accessed: November 2014.

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 6:

Effects of the Environment on the Project

File No. 121416571

Date: May 2021

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6.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

In accordance with the requirements of IAAC and NLDOECC Final Guidelines, this chapter provides a discussion of the expected and potential effects of the environment on the Project's design, construction and operation. Predictions are provided on how local conditions and natural hazards, such as severe or extreme weather conditions and external events could adversely affect the Project and how this in turn could affect the environment. Measures that will be implemented to reduce and respond to such events are also described.

The effects on the Project due to the physical environment can range from minor facility improvement to major failure. Ultimately, to mitigate the effects of the physical environment on the Project, there must be adequate planning, design and operation procedures that consider normal and extreme physical environmental conditions. There must also be adequate monitoring and forecasting of physical environmental conditions. Through adequate monitoring and forecasting, Project activities can be adaptively managed to maintain a safe working environment.

The primary mitigation tool is the implementation of sound planning. Engineering design will adhere to national and international standards. These standards document the proper engineering design for site-specific normal and extreme physical environmental conditions and provide design criteria that the regulatory agencies consider satisfactory for withstanding the potential physical environmental conditions. These codes consider physical environmental criteria, such as temperature, wind, snow and ice loading, and drainage. In addition, the design life of the Project is taken into consideration so that materials are chosen with sufficient durability and corrosion resistance.

As detailed in chapter 1, Joyce Direct Iron Inc. succeeded Labec Century Iron Ore Inc. ("Labec Century") as the Project Proponent on February 18, 2021 following an internal reorganization. All references to Labec Century as the Project proponent may be interpreted as now referring to Joyce Direct Iron Inc.

6.1 SPATIAL AND TEMPORAL BOUNDARIES

The LSA for assessing the effects of the environment on the Project is the watershed areas that are upstream of the Project features (mine, waste disposal areas, roads, and rail) (Figure 6.1). This area was selected as the LSA for most of the environmental factors because water (water supply, flooding, and ice) will have the greatest potential effect on the Project as determined within the distinct sub watersheds. Other environmental factors, such as climate and geology (including seismicity), are considered within the RSA because the effects are transient (such as weather) or more widely felt (such as seismicity).

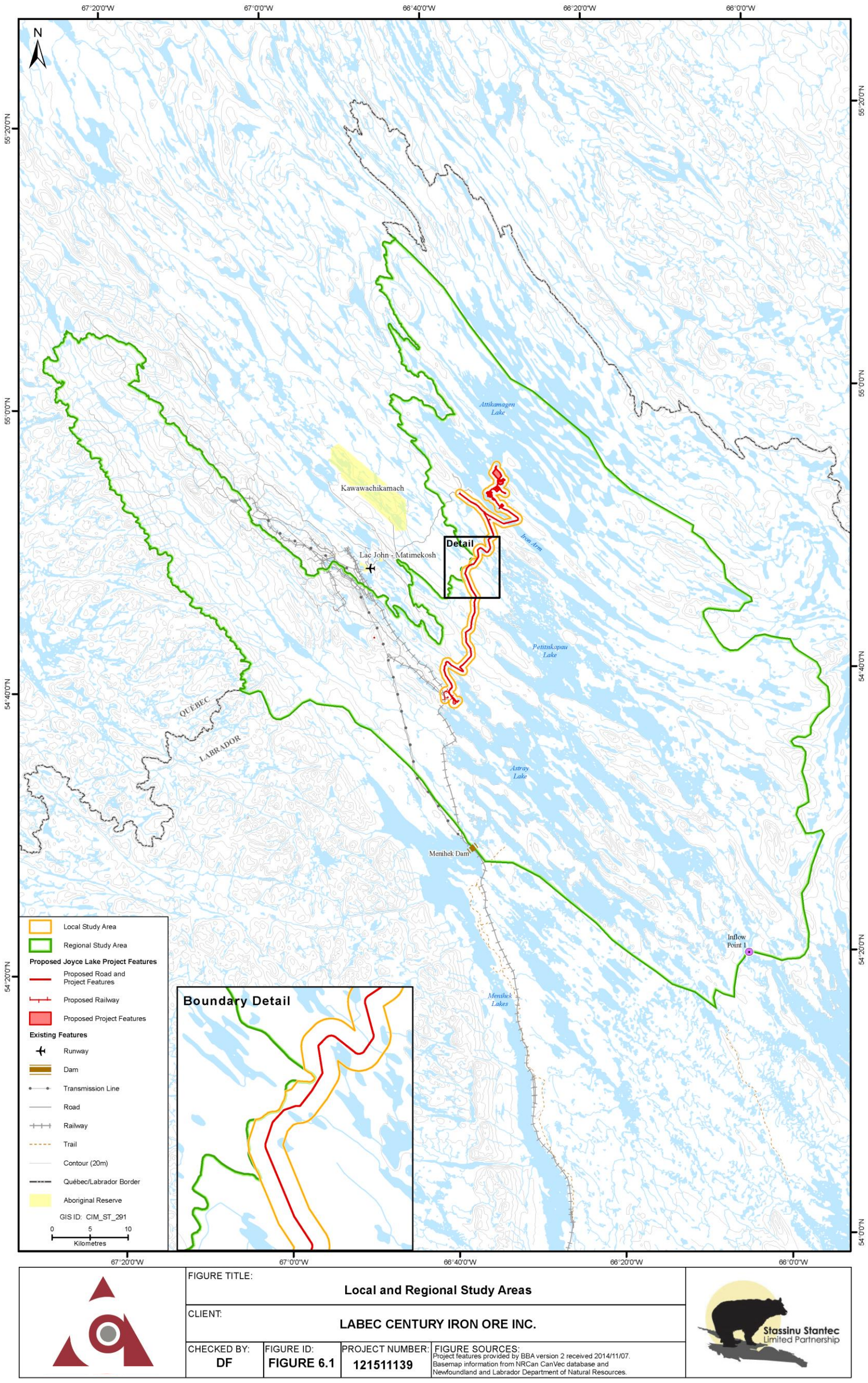

Figure 6.1 Local and Regional Study Area for Effects of Environment on the Project

The temporal boundaries include Construction (one year), Operation and Maintenance (approximately seven years), and Closure and Decommissioning (approximately one year) of the Project.

6.2 Environmental Factors Considered

The Final Guidelines from IAAC and NLDOECC require that the EIS consider how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events (e.g., drought, flooding, ice jams, landslides, avalanches, fire, erosion, subsidence, outflow conditions and seismic events) could adversely affect the Project and how this in turn could affect the environment (e.g., extreme environmental conditions result in malfunctions and accidental events). They also require consideration of longer-term effects of climate change, including a description of climate data used.

In addition, the NLDOECC Final Guidelines also requires consideration of the following baseline conditions:

- Physiography: topography, drainage network;
- Climate: historical records of total precipitation (rain and snow), mean, maximum and minimum temperatures;
- Geological context: bedrock and surficial cover stratigraphy and composition, geotechnical properties and structural geology features such as fractures and faults, in the mine area and where major Project infrastructure and earthworks are proposed (e.g., mine open pit, infrastructures, cutting and tunneling locations along the railway route);
- Hydrogeological context: hydrogeological characteristics of the different geological units (hydraulic conductivities, porosity, storage coefficients); groundwater geochemistry and groundwater levels for the areas that will be disturbed by major Project components;
- Streamflow data records (levels and yields) of surroundings lakes, rivers and brooks; and
- Geotechnical properties of Quaternary sediments (most recently laid geologic strata), such as slope stability and bearing capacity of facility foundations and the railway line route under both static and dynamic conditions, including ground ice and thermal conditions.

Note that most of this baseline information is presented in various other sections of the EIS as part of the assessment of relevant VCs. In these cases, the appropriate cross-references have been indicated in this section.

With the requirements of both IAAC and NLDOECC Guidelines in mind, the EIS focuses on the following potential environmental conditions that could affect the Project:

- Climate conditions, including air temperature, precipitation, wind and extreme weather events;
- Climate change including, but not limited to, the effect of extreme weather events associated with climate change;
- Geotechnical and geophysical hazards, including potential seasonal subsidence, seismicity and faulting, risks associated with cut/fill slopes and constructed facilities. Where appropriate, the assessment is supplemented by illustrations including maps and figures;
- Geological fractures and faults and associated implications of these features on foundation stability of major Project components, Project planning and engineering design. Project components assessed include, but are not limited to, railway embankments, tunnels, major watercourse crossings and open pits;
- Extreme and/or unusual hydrological conditions, including drought, flooding or ice jams;
- Groundwater level and potential effects on mining operations; and
- Forest fires and potential effects on Project infrastructure and safe operations.

As required, the EIS describes measures that will be implemented to prevent and respond to such events and discusses the sensitivity of the Project to changes in climate and related environmental parameters, including total annual rainfall, total annual snowfall, frequency and/or severity of precipitation extremes, watercourse levels and stream flow.

6.3 Environmental Effects Analysis and Mitigation

6.3.1 Climate

6.3.1.1 Existing Conditions

Precipitation and Temperature

A description of total precipitation (rain and snow) and temperatures is provided in Section 10.5.3 and 11.5.3. In general, the climate within the Project area is subarctic with annual, summer and winter average temperatures of -5.3, 9.7, and -20.9°C respectively. Because of the large elevation peaks in the north and south (1200-1500 m) of Labrador, the moderating influence of the Atlantic Ocean is confined to the islands and near shore. Snowfall is heavy with the interior of Labrador being one of the snowiest places in Canada. Precipitation in Labrador is heaviest in the south and decreases northwards. On the whole it is much lighter than in Newfoundland.

Wind

A description of wind speed and directionality for the Schefferville station is provided in Section 10.5.3. Monthly average wind speeds from the 30-year (1971 to 2000) climate normals measured at the Schefferville airport station range from 15.1 to 17.8 km/hr, with an annual average wind speed of 16.5 km/hr (ECCC 2021). The dominant wind direction is from the northwest for all months.

Maximum hourly wind speeds range from 61 km/hr (recorded in August) to 97 km/hr (recorded in February and June). Maximum gusts for the same period range from 101 km/hr (recorded in May) to 153 km/hr (recorded in December).

On average, there have been 13.9 days each year with hourly mean winds greater than 52 km/hr and 3.3 days each year with hourly winds greater than 63 km/hr.

Fog

Fog is defined as a ground-level cloud and consists of tiny water droplets suspended in the air and with visibility reduced to less than 1 km (ECCC 2017). The nearest meteorological station to the Project Area with available visibility data climate normals is Schefferville Airport, approximately 20 km north of the mine site. The 1971 to 2000 climate normals (in absence of available 1981-2010 data for this station) for visibility for the Schefferville station are presented in Table 6.1. There is a measured decrease in the hours of reduced visibility (less than 1 km) in the summer months relative to the other months (ECCC 2021 (Table 6.1). The Schefferville station has experienced, on average, 173 hours (7.21 days) per year when visibility is less than 1 km.

Table 6.1 Hours with Visibility Climate Normals, Schefferville (1971-2000)

Distance Visible	Visibility (hours with)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
< 1 km	25.8	20.6	17.8	19.8	13.4	7.9	2.7	1.7	6.2	15.3	23.4	18.6	173
1 to 9 km	172	138	135	117	90.3	70.4	60.2	47.7	85.3	136	158	170	1379
> 9 km	546	521	592	583	640	642	681	695	629	593	538	55+	7215
Source: ECCC 2021													

Extreme Weather Events

Extreme weather events that could affect the Project and occur at or near the Project Area include severe storms, and drought. The Project Area is not expected to experience hurricanes, tornadoes, landslides, or avalanches. Severe storms can occur throughout the year in Labrador and can result in threats to public safety, disruptions to transportation systems, and damage to utilities and/or property. Winter storm events can consist of high winds, and heavy precipitation in the form of snow, ice, and freezing rain. Severe weather can develop during warmer months including thunder, lightning, and hail storms.

Agriculture and Agri-Food Canada publishes monthly records of droughts dating back to 2002 through their *Canadian Drought Monitor* tool (Agriculture and Agri-Food Canada 2021). The records were reviewed for the surrounding area from 2002 to end of March 2021. There were several months in which most or part of the surrounding area was classified as “Abnormally Dry”. There were no occurrences of moderate, severe, extreme, or exceptional droughts, although these events are categorized as occurring less frequently (e.g., every 50 years for exceptional droughts).

Historical intensity-duration-frequency (IDF) curve data for precipitation can be used as a method to characterize and assess extreme adverse weather events. The NL Office of Climate Change published IDF data for several locations within the province that were developed by Memorial University of Newfoundland (MUN) in 2018 and are available online (Government of NL 2021). Historical IDF curves for the Schefferville station are available and results are presented in Table 6.2 .

Table 6.2 Historical IDF Precipitation Curves for Schefferville Station

Duration	Total Rainfall (mm)					
	2 year	5 Year	10 year	25 Year	50 Year	100 Year
5 minutes	3.69	5.53	6.74	8.28	9.42	10.55
10 minutes	5.24	7.6	9.17	11.14	12.6	14.06
15 minutes	6.04	8.57	10.25	12.36	13.93	15.49
30 minutes	7.46	10.41	12.37	14.84	16.67	18.49
1 hour	10.07	13.41	15.62	18.42	20.49	22.55
2 hour	13.4	17.38	20.02	23.34	25.81	28.26
6 hour	22.36	28.84	33.12	38.54	42.56	46.54
12 hour	28.85	37.08	42.53	49.41	54.51	59.58
24 hour	36.72	48.76	56.73	66.81	74.28	81.7
Source: MUN 2018; Government of NL 2019						

6.3.1.2 Effects Analysis and Mitigation

Potential effects of climatic conditions on the Project include:

- Deep frost ground penetration;
- Water supply is from wells and detailed design will determine how to prevent water from freezing for above ground portions. Around camp we have an Arctic corridor for piping.
- Discharge water is continuously pumped to trenches. No insulated piping has been considered;
- Long and extensive snow storage during winter, which requires snow clearing and plowing capacity;
- Reduced visibility and inability to maneuver construction and operation equipment;

- Snowfall accumulations can be large due to little winter snow ablation and minimal sublimation and therefore the Project will need to account for large structural snow loads; and

- Extreme precipitation and/or storm events can cause power outages, road blockages, exceedance of erosion and sedimentation control measures; and shut-down of part or all of Project activities until conditions return to normal. Extreme events during construction can create difficult and unsafe working conditions and may result in work stoppages. During operation, excessive rainfall/snowfall events can result in reduced visibility and hazardous conditions for operators. This in turn can increase the potential for accidental events, such as spills which can affect the environment.

The processing plant and associated facilities including infrastructure such as site buildings, roadways, transmission lines, and sedimentation (settling) ponds will be designed and constructed in accordance with applicable laws and regulations, industry standards and codes. Project design and construction will also incorporate and accommodate anticipated effects of the environment and consider project climate change over the life of the Project. The design of Project components and associated installations will comply with the applicable Federal and Newfoundland codes and regulations and where necessary, designs will be certified by Professional Engineers or other qualified professionals as appropriate.

The processing plant and associated facilities including infrastructure such as site buildings, roadways, transmission lines, and sedimentation (settling) ponds will be designed and constructed in accordance with applicable laws and regulations, industry standards and codes. Project design and construction will also incorporate and accommodate anticipated effects of the environment.

The applicable standards and codes and relevant organizations may include:

ACGIH	American Conference of Governmental and Industrial Hygienists
ABMA	American Bearing Manufacturers Association
AGMA	American Gear Manufacturer's Association
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
AMPP	Association for Materials Protection and Performance
ANSI	American National Standards Institute
API	American Petroleum Institute
AHRI	Air Conditioning, Heating, and Refrigeration Institute
ASHRAE	American Society of Heating, Ventilating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CAGI	Compressed Air and Gas Institute
CEMA	Canadian Electrical Manufacturers Association
CEMA	Conveyor Equipment Manufacturers Association
CFEM	Canadian Foundation Engineering Manual
CGA	Canadian Gas Association
CGS	Canadian Geotechnical Society
CGSB	Canadian General Standards Board

CISC	Canadian Institute of Steel Construction
CMAA	Crane Manufacturer's Association of America
CSA	CSA Group (Canadian Standards Association)
CWB	CWB Group (Canadian Welding Bureau)
CWS	Canadian Welding Society
EEMAC	Electrical and Electronic Manufacturers Association of Canada
FM	Global Factory Mutual Insurance Company (Factory Mutual System)
FPI	Fluid Power Institute
HI	Hydraulic Institute Standards
HMI	Hoist Manufacturer's Institute
IEEE	Institute of Electrical and Electronics Engineers
IGCI	Industrial Gas Cleaning Institute
ISA	International Society of Automation
ISO	International Organization for Standardization
MPTA	Mechanical Power Transmission Association
MSHA	Mining Safety and Health Administration
MSS	Manufacturer's Standardization Society
NBC	National Building Code of Canada
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Fluid Power Association
NAIMA	North American Insulation Manufacturers Association
PFI	Pipe Fabrication Institute
RMA	Rubber Manufacturers' Association
SMACNA	Sheet Metal and Air Conditioning National Association
STLE	Society of Tribologists and Lubrication Engineers
SSPC	Society for Protective Coatings
TEMA	Tubular Exchanger Manufacturers' Association
ULC	Underwriters Laboratory Canada
VSMA	Vibrating Screen Manufacturers' Association

The design and fabrication will comply with the Newfoundland Occupational *Health and Safety Act*, as well as the requirements of all other relevant provincial and federal authorities.

Design requirements address such environmental extremes as:

- Lateral wind loads;
- Storm water drainage, from rain storms and floods;
- Weight of snow and ice, and associated water;
- Lateral earthquake loads; and
- Erosion protection of slopes, embankments, ditches and open drains.

To account for potential weather extremes, engineering specifications of the National Building Code of Canada contain design specific provisions, such as:

- Critical structures, piping, tanks and pressure vessels steel selection to prevent brittle fracture at low temperature ambient conditions;
- Piping designed to prevent overpressure due to volumetric expansion as a result of solar heat gains;
- Electrical grounding of structures for lightening protection; and
- Winterization and freeze protection.

Materials used for construction of site buildings will comply with applicable building codes for anticipated temperatures, winds and precipitation (rainfall, snow and ice), including the consideration of projected climate change over the life of the Project, and will maintain designed structural integrity. Sediment and erosion control measures designed for the mine site will be designed to handle extreme seasonal fluctuations (rainfall, snowfall and melt). The settling ponds are designed following appropriate guidelines including NL *Regulation 65/03*. In accordance with storm water management guidelines and effluent quality criteria, the following Water Quality Control objectives are to be met for the sediment ponds for the Project:

- Runoff from the Project component areas for the storm events up to 1:10 year to be provided water quality controls to meet MDMER concentrations; and
- Runoff from the Project component areas for the storm events up to 1:100 year with spring snowmelt to be detained in the sediment pond and released slowly to the environment.

An Emergency Response Plan will be developed and implemented in the event of anticipated extreme weather conditions.

The electrical power required for the Project will be supplied by local generators which will run on diesel fuel. Generators are less likely to fail during extreme weather conditions. The fuel storage for the power plant will incorporate two 50,000 L self-contained storage tanks and a fueling station.

With respect to railway design, it will follow the standards for track construction as set out by the American Railway Engineering and Maintenance of Way Association track standards. Standard subgrade construction techniques are expected to be applied taking into consideration the anticipated environmental conditions as identified in Section 6.3. In addition, three heavy haul locomotives will be required to operate each Labec Century iron ore train. The locomotives will be arranged for distributed power operation within the train with two units at the front and one unit approximately 160 cars behind the front of the train. This standard arrangement for a 240 car iron ore train helps to reduce excessive stresses in railcar couplings and provides adequate air pressure for the braking system throughout the train in severe cold weather conditions.

A storm drainage system will be excavated that will exploit the natural drainage around the rail infrastructure and pads with a network of open ditches and culverts that will connect with a settling pond. Ditches and culverts associated with rail infrastructure will be designed for a 1-in-25 year recurrence event and will be checked for peak intensity flows.

Road alignments will be planned to reduce, to the extent practicable, the number of watercourse crossings and management of surface runoff and drainage will include construction of roadside ditches, where needed, and construction of structures (e.g., culverts) at watercourses and wetlands to allow drainage to freely pass underneath the roadway. Banks of streams crossings will be stabilized where required. The design flow frequency selected for this Project is the 1:25 year flood flows. This is consistent with Environmental Guidelines for Watercourse Crossings (NL Water Resources Management Division, Water Rights, Investigations and Modelling Section, 2017). A minimum culvert size of 600 mm will be used to reduce the potential blockage due to ice, sediment, beaver activities and vegetation.

During slippery conditions or conditions with reduced visibility, drivers will reduce speeds on roadways to reduce the potential for accidental events as a result of environmental conditions. Winter snow clearing and traction control (gravel) will be included as part of on-site Project activities to allow rapid response and action as conditions require. Plowing and sanding of the causeway will require careful consideration and planning so as to reduce potential effects on fish and fish habitat. During dry summer months, dust suppression (water or and approved chemical treatments) will be used on Project roads to reduce conditions of reduced visibility and dust generation, especially focussed on areas impacting seasonally occupied cabins.

Mining will occur throughout the year, including waste haulage from the mine to the waste stockpiles and ore haulage to the crushing and screening plant, with activities scheduled to reduce hazards from extreme winter conditions. The crushing and screening plant will operate only during summer months; similarly, the trucking of ore products between the crushing and screening plant and the rail yard as well as rail haulage of products to port will occur during the summer.

6.3.1.3 Residual Effects

While it is recognized that extreme precipitation or storm events could cause temporary disruptions to Project operations, the Project will be designed in such a way as to reduce the likelihood that these extreme events could in turn result in adverse effects on the environment. Routine maintenance, inspections, and monitoring will be regularly conducted to prevent deterioration of Project infrastructure and equipment, and support Project compliance with applicable design criteria, codes and standards, and to identify potential problems and promptly apply mitigation measures. In the event of extreme rain, measures will be in place to address erosion and sedimentation concerns and to reduce the potential environmental effects. Any temporary shutdowns due to extreme weather conditions are not likely to result in significant effects on the Project.

6.3.2 Long-Term Climate Change

In accordance with standard practice, the IAAC procedural guide, *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEA Agency 2003) was used as guidance. The Intergovernmental Panel on Climate Change (IPCC) defines climate change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer" (IPCC 2014). Climate change can be a result of naturally occurring internal processes (e.g., volcanic activity), external forces (e.g., solar cycles), or anthropogenic activities altering the composition of the atmosphere or land use (IPCC 2014). The United Nations Framework Convention on Climate Change distinguishes between climate change attributed to anthropogenic activities and the variability attributed to natural causes. The United Nations Framework Convention on Climate Change defines "Climate Change" as the change that is attributed, whether directly or indirectly, to human activities, which is in addition to the naturally occurring climate variability observed over comparable periods (IPCC 2007).

Between now and the end of the twenty-first century, Atlantic Canada will likely experience warmer temperatures, a greater frequency of storm events, increasing storm intensity, rising sea level, storm surges, coastal erosion, and flooding (Government of Canada 2019). The assessment in this section focuses on the potential climate change scenarios based on recent modeling results. The Project will be engineered in consideration of the potential climate changes and associated limitations discussed in that section, it is worth noting the Project will be ending prior to when mid-century climate change predictions become applicable. Additional information on climate change is detailed in Section 11.5.3.

Limitations to Model Results

The effects of climate change are becoming better understood. Since it is not possible to conduct experiments on the climate or to reproduce its intricacies in the laboratory, climate models facilitate increased understanding of climate change (Natural Environment Research Council 2011, in Alderon Iron Ore Corp. 2012). Climate models are based on the laws of physics to describe how temperature, pressure, winds, currents, and other variables interact and change over time (Natural Environment Research Council 2011, in Alderon Iron Ore Corp. 2012). Climate

models are the only scientifically-credible tools for making detailed predictions about climate at the scale of geographical regions. Nonetheless, because climate models are mathematical approximations of the climate system and not the real system itself, their results must be treated and used with due scientific caution (Natural Environment Research Council 2011, in Alderon Iron Ore Corp. 2012).

Predicting future environmental effects of climate change for a specific area using global data sets can be problematic because generic data do not take into account local natural mechanisms, such as variations in ocean circulation and changes in the atmospheric composition, and others, which "force" the climate to change by upsetting the energy balance (climate forcing). Accurate regional and local projections require specific regional and local climate variables and climate change scenarios (Lines et al. 2005). As a result, downscaling techniques have emerged over the past decade as an important advancement in climate modelling, particularly in Atlantic Canada, where variability is inherent with the predominantly coastal climate. Statistical downscaling uses global climate model predictions and historical data from weather stations across the region, to show the relationship between these stations. In 2018, the Government of NL funded Finnis and Daraio (2018) to conduct an update to their *Climate Projections Study* to identify the changing climate throughout the twenty first century at 28 locations within the Province (Government of NL 2019).

Regardless of the variability and inconsistency in the predictions from these models, the climatological community generally agrees on the overall anticipated environmental effects of climate change. This is supported by many of the changes that are documented as underway. For example, according to Fisheries and Oceans Canada's 2018 State of the Atlantic Ocean Synthesis Report (issued in 2018), the amount of sea ice off the coast of Newfoundland and Labrador for the past decade (leading up to 2018) had ice volumes generally lower than normal, reaching record low values in 2011. Between 2010 and 2016, the coast of Newfoundland and Labrador had three of the seven lowest sea-ice volumes on record.

In 2018, the Government of NL funded Finnis and Daraio (2018) to conduct an update to their *Climate Projections Study* to identify the changing climate throughout the twenty first century at 28 locations within the Province (Government of NL 2019). Climate change projections often refer to four different GHG concentration trajectories known as representative concentration pathways (RCPs). RCPs represent different ranges of potential radiative forcing values (the difference between sunlight absorbed by the earth and energy radiated back to space), that could result in GHG-related heating of the planet by the year 2100 (relative to pre-industrial values) (Moss et al. 2010). The four RCP values are RCP2.6, RCP4.5, RCP6.0, and RCP8.5, and represent GHG-related heating of the planet at rates of 2.6 Watts per square metre (W/m^2), 4.5 W/m^2, 6 W/m^2, and 8.5 W/m^2, respectively. Finnis and Daraio (2018) focused on the RCP8.5 (business as usual) scenario.

Climate change projections are to be considered for four locations in Labrador: Churchill Falls; Goose Bay; Wabush Lake; and Schefferville. The precipitation and temperature results from the Government of Newfoundland and Labrador 2021) at these four locations are presented in Table 6.3 and Table 6.4, respectively. The 20^{th} century data represent historical trends observed from 1968 to 2000.

Table 6.3 Precipitation Projections at Select Locations on the Island of Newfoundland

Location	Period	Mean Daily Precipitation (mm per day)			Mean Intensity of Precipitation Events (mm per event)		
		20th Century	2041-2070 Projection	2071-2100 Projection	20th Century	2041-2070 Projection	2071-2100 Projection
Churchill Falls	Dec.-Feb.	2.7	1.9	2.3	6.7	7.0	8.0
	Mar.-May	2.5	2.0	2.2	6.6	6.9	7.3
	June-Aug.	3.5	3.4	3.6	7.5	8.5	8.9
	Sept.-Nov.	3.4	2.8	2.9	6.9	8.1	8.3
Goose Bay	Dec.-Feb.	2.1	2.6	2.8	6.7	7.4	7.9
	Mar.-May	2.1	2.5	2.8	6.7	7.1	7.6
	June-Aug.	3.2	3.8	4.1	8.1	8.7	9.3
	Sept.-Nov.	2.6	3.1	3.2	7.6	8.5	8.8
Wabush Lake	Dec.-Feb.	2.6	2.6	2.9	6.2	6.3	6.7
	Mar.-May	2.3	2.7	3.0	6.4	6.8	7.2
	June-Aug.	3.5	4.4	4.5	7.4	8.3	8.7
	Sept.-Nov.	3.2	3.6	3.8	6.5	7.4	7.7
Schefferville	Dec.-Feb.	2.1	2.2	2.5	5.6	6.0	6.2
	Mar.-May	2.0	2.4	2.6	5.7	6.6	6.9
	June-Aug.	3.2	4.1	4.2	6.8	8.1	8.3
	Sept.-Nov.	3.1	3.5	3.8	6.4	7.1	7.4
Source: Government of Newfoundland and Labrador 2021							

Table 6.4 Temperature Projections at Select Locations on the Island of Newfoundland

Location	Period	Daily Mean Temperature (°C)			Daily Minimum Temperature (°C)			Daily Maximum Temperature (°C)		
		20th Century	2041-2070 Projection	2071-2100 Projection	20th Century	2041-2070 Projection	2071-2100 Projection	20th Century	2041-2070 Projection	2071-2100 Projection
Churchill Falls	Dec.-Feb.	-20.3	-15.1	-11.8	-26.0	-20.3	-16.6	-14.6	-9.9	-7.1
	Mar.-May	-5.2	-3.8	-1.6	-11.0	-9.3	-6.9	0.6	1.7	3.6
	June-Aug.	11.7	13.8	15.9	6.5	8.6	10.7	17.0	19.0	21.1
	Sept.-Nov.	-0.8	2.7	5.0	-4.6	-1.1	1.3	3.1	6.5	8.7
Goose Bay	Dec.-Feb.	-14.7	-8.7	-5.5	-19.1	-12.5	-8.7	-10.2	-5.0	-2.3
	Mar.-May	-1.6	1.1	3.3	-6.5	-3.4	-0.9	3.4	5.6	7.5
	June-Aug.	14.2	17.1	19.2	9.0	11.9	13.9	19.4	22.4	24.5
	Sept.-Nov.	3.2	6.8	9.0	-0.5	3.4	5.6	7.0	10.3	12.5
Wabush Lake	Dec.-Feb.	-20.0	-14.3	-10.9	-25.6	-19.1	-15.3	-14.4	-9.4	-6.6
	Mar.-May	-4.9	-2.4	-0.3	-10.8	-7.8	-5.3	1.0	3.0	4.8
	June-Aug.	12.1	14.9	17.0	6.8	9.5	11.7	17.4	20.2	22.4
	Sept.-Nov.	-0.2	3.6	5.9	-3.9	0.0	2.4	3.6	7.1	9.4
Schefferville	Dec.-Feb.	-21.5	-15.3	-11.7	-26.5	-19.5	-15.5	-16.5	-11.0	-7.9
	Mar.-May	-7.1	-4.5	-2.1	-12.6	-9.4	-6.7	-1.7	0.5	2.5
	June-Aug.	10.7	13.3	15.4	5.8	8.5	10.5	15.5	18.2	20.3
	Sept.-Nov.	-1.7	2.4	4.6	-5.1	-0.8	1.5	1.8	5.5	7.7

Source: Government of Newfoundland and Labrador 2021

The mean daily precipitation and mean intensity of precipitation events are expected to increase at each of the four locations and during each of the seasonal periods presented, with the exception of Churchill Falls, where mean daily precipitation is predicted to be slightly lower (Table 6.3). The daily mean temperature, daily minimum temperature, and daily maximum temperature are expected to increase at the four locations annually and during each of the seasonal periods assessed (Table 6.4).

In addition to increases in mean precipitation and temperatures, climate change is expected to increase the intensity, frequency, and duration of adverse weather events. The life of the Project, including the decommissioning, rehabilitation and closure phase, is expected to end within seven years of start of operations, which predates the beginning of the mid-century climate-induced projected changes.

The IDF curve projections for precipitation can be used to quantify projected changes of extreme adverse weather events. IDF predictions for differing duration events for precipitation prepared by MUN (2018) for mid-century and end of century are presented in Table 6.5 and , respectively, for Schefferville (Government of NL 2021). These IDF curves can be compared to historical curves presented in Table 6.2.

Table 6.5 Projected IDF Precipitation Curves for Mid-century (2041-2070) Near the Project Area (mm)

Duration	Total Rainfall (mm)					
	2 year	5 Year	10 year	25 Year	50 Year	100 Year
5 minutes	4.95	7.25	8.78	10.72	12.15	13.57
10 minutes	6.86	9.82	11.79	14.27	16.12	17.94
15 minutes	7.77	10.95	13.06	15.72	17.69	19.65
30 minutes	9.48	13.19	15.65	18.76	21.07	23.36
1 hour	12.35	16.56	19.34	19.34	22.85	28.05
2 hour	16.12	21.13	24.44	28.63	31.73	34.82
6 hour	26.78	34.93	40.32	47.13	52.19	57.21
12 hour	34.47	44.82	51.67	60.33	66.75	73.13
24 hour	44.94	60.09	70.12	82.8	92.2	101.53
Source: Government of NL 2021; MUN 2018						

Table 6.6 Projected IDF Precipitation Curves for Mid-century (2071-2100) Near the Project Area (mm)

Duration	Total Rainfall (mm)					
	2 year	5 Year	10 year	25 Year	50 Year	100 Year
5 minutes	5.58	7.95	9.52	11.5	12.97	14.43
10 minutes	7.67	10.72	12.73	15.28	17.17	19.04
15 minutes	8.64	11.91	14.07	16.8	18.82	20.8
30 minutes	10.5	14.31	16.83	20.02	22.39	24.73
1 hour	13.51	17.82	20.67	24.28	26.95	29.6
2 hour	17.49	22.63	26.03	30.32	33.51	36.67
6 hour	29.02	37.37	42.9	49.89	55.08	60.22
12 hour	37.31	47.93	54.95	63.83	70.42	76.96
24 hour	49.1	64.64	74.93	87.93	97.58	107.15
Source: Government of NL 2021; MUN 2018						

A comparison of the IDF projections (Table 6.5 and) to the historical IDF results (Table 6.2) indicates that an increase in precipitation accumulation can be expected for each of the duration periods (e.g., from 5-minutes to 24-hour) and for each of the return intervals (e.g., from 2-year to 100-year). With climate change, the frequency of intense rainfall episodes is expected to increase, with what was historically considered a 100-year storm now expected to occur every 25 years. For example, a historical 100-year 24-hour storm received 81.7 mm of precipitation over a 24-hour duration, while by mid-century, a 25-year storm is expected to receive 82.8 mm of precipitation, and by the end of century, a 25-year storm is expected to receive 87.93 mm of precipitation. By mid-century, a 25-year storm may result in more rainfall in the Project area than what was historically considered a 100-year storm, the Project will be ending prior to when these mid-century climate change predictions become applicable.

6.3.2.1 Effects Analysis and Mitigation

Mean daily precipitation change in Schefferville is predicted to range from 4.8% (December to February) and 28.1% (June to August) between now and 2041-2071 and from 19% (December to February) and 31.3% (June to August) between now and 2071-2100 (Table 6.3). This variation in precipitation is not expected to be an issue as the water supply in the summer is predicted to be greater in the future and Labec Century is committed to reducing water consumption and will not be using water for processing (only sanitary and potable water requirements and water for use in dust and fire suppression).

Mean daily temperature change in Schefferville is predicted to range from 2.6°C (March to May and June to August) and 6.2 °C (December to February) between now and 2041-2070 and from 4.7 °C (June to August) and 9.8°C (December – February) between now and 2071-2100 (Table 6.4). A longer and warmer summer season could increase the demand for water used in road dust suppression. This will be taken into account when planning the dust suppression activities for the mine. As increased precipitation is also predicted, water supply is not expected to be an issue.

A large increase in precipitation could affect the water levels in the settling ponds, potentially causing them to overflow. The projected mean precipitation increase of 16.5% for Newfoundland and Labrador during the summer months for 2041-2070 (Table 6.3) will be taken into account in the design for the settling ponds.

The warmer fall and winter temperatures for Newfoundland and Labrador could mean later freeze up; wetter, heavier snow; more liquid precipitation occurring later into the fall; and possibly more freezing precipitation during both seasons. There is less agreement among the global circulation and regional downscaling models regarding changes in precipitation.

Nicholson's (1978) research on permafrost distribution in the Schefferville area indicates that deep permafrost underlies areas of exposed high elevation, where vegetation cover consisted of tundra. The depth of the permafrost ranged from 60 to 100 m, and entirely unfrozen areas occurred in the valleys and within 30 m from permanently covered shoreline. Earlier research found that permafrost was not present on less exposed and low-lying wood covered ground surfaces and was not expected to exist beneath water bodies that are too deep to freeze solid during the winter (Nicholson and Lewis 1976). Construction over permafrost terrain may be an issue should construction take place in areas of thaw unstable permafrost. This issue is further discussed in Section 6.3.3.2.

6.3.2.2 Residual Effects

Potential effects of climate change on operation of the Project would be primarily related to increases in the frequency and magnitude of adverse weather events, increased temperatures, and changes in precipitation (increased frequency and intensity of events). Storm surges are not expected to influence the Project due to the Project's inland location. Increases in extreme weather events could potentially affect operation of the Project by increasing unscheduled maintenance due to storm damage. Also, as the Project requirements for water are limited to non-process requirements, any decreases in the local precipitation and water table, if they occur, are not expected to be at a level that would adversely affect the Project's limited need for water supply. As the Project is located far inland from the ocean, rising sea levels will not affect it. Potential environmental effects due to accidents, malfunctions, and unplanned events are discussed in detail in Chapters 10 to 22**.**

Although climate change will affect the Project, it can be designed to accommodate forecasted changes and is, therefore, not sensitive to long-term climate variability. Also, the current operational life of the mine is approximately seven years, making the Project less susceptible to longer-term changes. As these predicted changes are less than the annual variations observed in the region, the mitigation measures and design standards being applied to the Project are considered sufficient to accommodate these longer term changes.

6.3.3 Geotechnical and Geophysical Hazards

6.3.3.1 Existing Physiography, Geological and Geotechnical Conditions

A detailed description of the bedrock geology (including local and regional geology and structure), overburden geology, physiography and landforms, permafrost and soils within the Project's LSA and RSA is provided in Section 13.5.3.

6.3.3.2 Effects Analysis and Mitigation

There are a number of ways in which geotechnical and geophysical hazards could affect the Project. These include conditions and events such as:

- landslides, avalanches, and rockfalls as a result of seismic activity;
- seasonal subsidence;
- geological fractures or faults; and
- permafrost.

Each of these can in turn affect the slope or foundation stability of various Project components and must be considered during the design of the Project.

Seismic Events

Over 160 geological hazards and disasters have been recorded in Newfoundland and Labrador dating from 1782 to present, including landslides, avalanches, rockfalls, and coastal flooding as a result of seismic activity offshore (Liverman et al. 2001, Liverman et al. 2003). Most of these events have occurred in coastal locations including seven that occurred in Labrador; otherwise the province is relatively immune from seismic activity, particularly in western Labrador, which is one of the lowest risk areas in the country. A 4.4 magnitude earthquake was recorded in central Labrador, about 150 km south, southwest of Happy Valley–Goose Bay, on July 8, 2012, but was not strong enough to result in any damage. Further detail on seismic risk in the area can be found in Section 13.5.3.6. The Project, and all related facilities, will be designed to the applicable standards based on earthquake risk in this area. The intent of these design standards is to protect the integrity of the facilities based on the level of risk for an earthquake in the area.

Landslides are mass movements of soil or rock downslope and are a major natural hazard in certain parts of Canada. The hazard posed by landslides can be attributable to the impact of rapidly moving debris, the failure of ground directly beneath a structure, or due to secondary effects such as river damming or landslide generated waves. Natural Resources Canada maintains a database/map of major landslides and areas prone to landslides (https://open.canada.ca/data/en/dataset/dda14a5e-8893-11e0-bbc6-6cf049291510). This map indicates that the Project is not located in an area prone to landslides and no landslides resulting in fatalities have been recorded in Labrador. Due to the gentle undulating landscape, bedrock control of topography and lack of historic precedence for landslides in the region, landslides are not expected to occur in the LSA.

Rockfalls involve a smaller rock mass that breaks apart and falls, bounces, and rolls on steep slopes. They are a frequent problem along transportation routes and through rocky terrain and could interrupt service along a road or railway. As such, best construction practices will be followed, including safe set-backs from steep rocky slopes or cuts to reduce any potential effects of rockfalls on the Project. Similarly, debris flows are smaller and less rapid forms of landslides. They occur when a saturated mass of surficial deposits moves down a steep stream channel. Debris flows are frequently triggered by heavy rains. Geological investigations in support of the design of the road and railway infrastructure will identify localized areas of soft soils. Areas prone to high surface runoff will be identified before and/or during construction and appropriate mitigative measures identified, such as rock lined channels and diversion ditches.

Subsidence

Subsidence is the downward movement of the ground surface that results from loss of volume in the underlying subsurface. This process can occur naturally, due to the dissolution of calcareous bedrock, such as limestone or dolomite; a process known as karst development. Subsidence can also be caused by the collapse of man-made subsurface voids, such as mines or tunnels, which result in the movement of the overlying rock and overburden into the collapsed space. Within the LSA and RSA, karst features and related sinkholes have not been observed and are not anticipated. No underground workings are associated with the Project development.

Slope Stability

The basic unit of the open pit design is the bench, formed by a single cut or lift. The bench configuration, controlled by the bench face angle, bench height and bench width, defines the inter-ramp angle. The overall slope angle consists of inter-ramp sections separated by wide ramps.

Bench configurations, recommended by LVM (Appendix C and D), are based on a bench height of 9 meters, as established by the block model for the optimized open pit mine. Bench widths should be sufficient to provide effective protection against rockfall. The following modified Ritchie criteria (Ryan and Pryor 2000) is commonly used for initial estimates of design of bench width:

$$\text{Bench Width (m)} = (0.2 * \text{Bench Height}) + 4.5 \text{ m}$$

In the present case, this will yield 6 m bench width.

Slope stability analyses are generally performed using the Limit Equilibrium Method, where the safety factor is represented by the ratio of resisting forces to the acting forces. General guidance to pit slope design acceptance criteria, based on standard mining industry practice, is summarized in Table 6.7. The Factor of Safety (FOS) calculated by the Limit Equilibrium Method or other stability analysis methods are compared to these values to determine that the stability of the slope represents an acceptable risk.

Table 6.7 Acceptance Criteria for the Pit Slope Design

Slope Scale	Consequences of Failure	Acceptance Criteria		
		FOS (min) (Static)	FOS (min) (Dynamic)	POF (max) P[FOS≤1]
Bench	Low to High	1.1	N/A	25%-50%
Inter-ramp	Low	1.15-1.2	1.0	25%
	Medium	1.2	1.0	20%
	High	1.2-1.3	1.1	10%
Overall	Low	1.2-1.3	1.0	15%-20%
	Medium	1.3	1.05	5%-10%
	High	1.3-1.5	1.1	≤5%

The slope angles were determined based on the acceptance criteria for probability of failure (PoF). The PoF value incorporates the variations associated with the input parameters data set. In the present study the available data set is quite small and variable. To address this, a probabilistic analysis has been conducted to assess slope angles.

The factors considered in pit slope design are described in Table 6.8. Additional information on slope stability and slope design can be found in Appendix C: Geotechnical Engineering Feasibility Study - Open Pit Design and Appendix D: Geotechnical Feasibility Study – Surrounding Areas.

Table 6.8 Factors Affecting Pit Slope Design

Design Factor	Description
Ground Water	Open pit slope drainage and depressurization is a key factor in presence of highly fractured rock masses. Water pressure in discontinuities diminishes the overall resistance of the rock mass.
Ice formation	Deep depressurization of rock slope, especially in cold climate where frost penetration can reach decametric order of magnitude, is important in order to avoid rock mass disturbance due to ice formation and water pressure build up behind the iced zone.
Blasting	Hoek et al, 2002 recommends that the rock mass strengths be downgraded to disturbed values to account for rock mass disturbance associated with heavy production blasting and vertical stress relief and stress rotation. Hoek et al. (2002) indicates that, in deep open pits, a disturbance factor of 0.7 would be appropriate for a mechanical excavation where no blasting damage is expected. Experience indicates that a disturbance factor approaching the value of 0.7 may be achievable for moderate height slopes with the application of excellent controlled blasting practices. A disturbance factor of 1.0 is assumed for conventional production blasting. In the present case, mechanical excavation is foreseen and if blasting proves to be necessary, precautions must be used. The blasting strategy should keep blast holes a certain distance from the bench slope surfaces. It should consider excavating with mechanical means the zone in between the blast holes and the bench faces. The intensive presence of discontinuities in the rock mass will quite obviously absorb the blasting energy rapidly thus limiting the range of damages penetration to the rock slope. With this procedure, it is expected that the disturbance factor should be reduced.

Slope failures can be triggered by atmospheric processes, geologic processes, and natural and anthropogenic modification of the landscape. Slope failures can occur in any season, and are most likely to be triggered by weather events, such as rain, snow, or freezing and thawing of pore water. Permanent and variable factors influence slope failures. Permanent factors are

characteristics of the landscape that remain unchanged or vary little from a human perspective (i.e., the steepness of a slope or rock type that slowly changes over time). Variable factors are characteristics that change quickly as a result of some triggering event such as ground vibration (i.e., earthquakes or blasting), a rapid rise in groundwater levels and increased soil moisture due to intense precipitation and human activity.

Slope failures are unlikely and slopes will be monitored throughout the life of the Project. While slope failures are a concern from an occupational health and safety perspective and from an operations perspective, environmental effects resulting from failure of pit slopes or waste rock disposal areas would be site specific and are not likely to result in significant adverse effects to the surrounding environment.

Permafrost

The Project is located within the discontinuous, sporadic or isolated permafrost zone (Brown and Pewe 1973, Brown 1979). Areas of discontinuous permafrost are susceptible to thawing as a result of both construction activities which remove vegetation cover and as a result of climate change. Thawing of the existing permafrost may result in thaw settlement, ground instability, drainage course changes, high-suspended solid concentration in streams, and foundation settlement (SENES Consultants Limited 2005). Construction of infrastructure over permafrost can lead to thawing, which could lead to soil instability and subsequent damage to the structure, altered drainage patterns in the area, or increased siltation to nearby water bodies.

Landforms associated with permafrost such as pingos, palsas and stone nets are found in the physiographic region, but have not been identified within the Joyce Lake RSA. Construction over permafrost terrain is not an issue in western Labrador due to the limited distribution of permafrost and the thin sediment cover over bedrock (Vasseur and Catto 2008). The presence of permafrost and permafrost related landforms will be determined through site-wide geotechnical investigations to be completed prior to mine development. Permafrost locations, if any, will be avoided as much as possible. If unavoidable, padding of the permafrost using locally available fill will take place. No cuts will be made into the permafrost and vegetation removal will be reduced.

6.3.3.3 Residual Effects

Given the relatively low seismic hazard area in which the Project is located and the planned design standards and standard mitigation measures in place, the potential effects of seismic events, landslides, rockfalls, and subsidence will be limited and unlikely to occur. With appropriate mitigation in place, potential adverse effects of permafrost on Project construction, operation or major components can be effectively managed. Through proper design and standards, however, it is unlikely that geological conditions in the area would result in slope failures.

In summary, with appropriate design and mitigation measures in place, residual effects of geotechnical and geophysical hazards on Project components and activities can be appropriately managed.

6.3.4 Hydrological Factors

6.3.4.1 Existing Conditions

A description of the existing surface water environment is found in Section 11.5.3 and includes local climate, topography, surficial geology, vegetation, drainage patterns, watershed delineation, streamflow data, hydrological characteristics, water and sediment quality, local water supplies and local receiving water assimilative capacity. A description of groundwater conditions is contained in Section 12.5.3.

6.3.4.2 Effects Analysis and Mitigation

Hydrological conditions at site could affect Project operations if there is insufficient water available to meet Project requirements, if unusual conditions such as flooding, drought or ice jams pose a hazard or impediment to Project activities, or if groundwater affects the open pit operation.

Surface Water Availability

Project water demands are expected to include:

- Sanitary water uses;
- Potable water uses;
- Road dust suppression water uses; and
- Fire suppression water uses.

Sanitary water uses are non-consumptive meaning that all the water taken for sanitary uses is cycled back to the environment after treatment. Sanitary water uses are generally continuous throughout the year. Most water used for road dust suppression is non-consumptive, with the consumptive portion being lost to evaporation. Dust suppression water use peaks during the warmer snow-free season, with little need for dust suppression during the snow-cover season.

As part of the approval process for water withdrawal, an assessment of the local receiving water assimilative capacity has been conducted in Section 11.5.3.6. It concludes that there is sufficient water supply to support the Project, without affecting the sustainability of local water resources and given the range of hydrological conditions expected throughout the Project, including consideration of long-term climate change.

Unusual Hydrological Events (Flooding and Ice Jamming)

The mine haul road will cross watercourses and the engineering design of culvert crossing will address the hydraulic performance of the culvert during low and high flow conditions. Specifically, the following will be considered:

- Potential for damage to the culvert and/or roadway during floods;
- Potential for upstream flooding due to headwater ponding; and
- Potential for downstream scour/erosion due to excessive outlet velocities.

If flooding were to occur, it could result in erosion or washout of the road surface or rail bed. This could cause a temporary halt in operations until repairs on the road or rail infrastructure are made. Ditches and culverts associated with the road and rail infrastructure will be designed to accommodate anticipated hydrological conditions and to prevent flooding of infrastructure. The culverts will be designed according to the Canadian Highway Bridge Design Code Handbook of Steel Drainage & Highway Construction Products (American Iron and Steel Institute 2002) which provides general guidance for corrugated steel pipe design.

Stream freeze-up produces a mass of ice on a river. Break-up of river ice may result in ice jams and ice forces on water crossings. The resulting ice jam may result in the following effects on Project infrastructure and the local environment:

- Increased scour at waterway constrictions;
- Flooding upstream of an ice jam and aggravated channel scour downstream resulting in damage to land and properties;
- Damage to stream crossings due to ice abrasion;
- Impact of ice forces on bridges, abutments and piers which could result in structural damage or destruction;
- Channel icing which may reduce the conveyance capacity of a water crossing, resulting in upstream flooding; and
- Surges of flow from sudden release of jams may aggravate these problems.

The following will be considered during the design of water crossings:

- Each stream crossing site will be assessed to determine whether a site under consideration is prone to significant ice problems and its suitability for a stream crossing;

- For sites potentially subjected to ice runs, the following locations will be avoided for a stream crossing:
    - the outside of a meander bend; and
    - historically known locations for ice jams.
- High ice conditions at water crossing sites should be considered in the design of water crossing.

Unusual hydrological events, such as floods or ice jams, will also be of concern for the causeway. Potential environmental effects on snow and ice are discussed in Chapter 11: Water Resources and Chapter 13: Terrain and Acid Rock Drainage/Metal Leaching.

Groundwater Seepage into Open Pit

Hydrogeological information will be used along with the pit design to develop a dewatering plan for Joyce Lake. Dewatering of the pit is anticipated to begin immediately and of Joyce Lake within one year of the start of the pit excavation and will likely continue throughout the life of the Project. The groundwater level could affect mining operations, as it will determine the volume of water that will be required to be removed to maintain the open pit in a dewatered condition. Design of the Project will take this into consideration with sufficient pumping capability to pump water from the pit area as necessary.

During mine operation, there will be a requirement for the gradual lowering of water levels in bedrock from wells located close to the perimeter of the open pit, as the excavation of the open pit proceeds. As the mining progresses, the degree of groundwater table decline within several hundred metres of the open pit will gradually increase in both overburden and bedrock. At the onset of the work, the groundwater levels in the vicinity of the open pit will be in hydraulic equilibrium with Joyce Lake. As Joyce Lake is isolated and dewatered during mining, the groundwater levels surrounding the former lake shore will begin to decline to the new base level (e.g., the lake bottom initially or the mine pit sump later during operation) once the water is removed. Subsequent to this, the lake bottom sediments and the overburden in the vicinity of the open pit footprint will then be removed, resulting in groundwater seepages entering the excavation from the adjacent overburden along the former shorelines and perimeter of the landward portions of the open pit. The volumes of inflow from the overburden are presently not determined, but would eventually reach equilibrium proportional to the hydraulic conductivity of the overburden materials once the excavation reaches bedrock.

6.3.4.3 Residual Effects

With appropriate mitigation measures in place, the potential effects on the Project from anticipated hydrological conditions can be managed to acceptable levels.

6.3.5 Forest Fire

The potential for and effects of forest fire on the Project and the environment are assessed for each VC in Chapters 10 to 22. In summary, forest fires are a natural, re-occurring event within the Project area and could occur during any Project phase. Smoke associated with forest fires has the potential to reduce visibility and air quality, such that operations might require temporary closure to protect worker health and safety. Fires that spread to the immediate Project site could result in subsequent damage to Project infrastructure, necessitating closures until such time as conditions are safe and necessary repairs are made. The Project will be designed and will operate in accordance with the codes and standards identified in Section 6.3.1.2.

6.4 Summary of Residual Effects

Planning and design of the Project has and will continue to consider extreme climatic, hydrologic, and geohazard criteria. Experience of other iron ore mines in the area, in combination with prescribed codes and standards, provides a high level of confidence that potential effects resulting from environmental conditions can be mitigated to acceptable levels. Site monitoring will be undertaken to identify potential problems and verify effective mitigation. With this in mind, there is limited potential for the environment to result in effects on the Project which in turn would result in effects on the environment (i.e., as a result of an accident or malfunctions).

6.5 References

Agriculture and Agri-Food Canada. 2021. Canadian Drought Monitor. Available at: https://open.canada.ca/data/en/dataset/292646cd-619f-4200-afb1-8b2c52f984a2

Alderon Iron Ore Corp. 2012. Kami Iron Ore Mine and Rail Infrastructure, Labrador Environmental Impact Statement: Volume 1, Part I. Available at: https://www.gov.nl.ca/eccm/files/env-assessment-projects-y2011-1611-kami-eis-volume-1-part-i.pdf

Brown, R.J.E. 1979. Permafrost distribution in the southern part of the discontinuous zone in Québec and Labrador. *Géographie physique et Quaternaire*. 33(3-4): 279-289.

Browne, R.J. and T.L. Pewe. 1973. Distribution of permafrost in North America and its relationship to the environment; A review 1963 – 1973. In Permafrost, North American Contribution, Second International Permafrost Conference, Yakutsk, USSR. National Academy of Science Publication 2115 p. 71 – 100.

CEA (Canadian Environmental Assessment) Agency. 2003. *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*. Available at: http://ceaa.gc.ca/default.asp?lang=En&n=DACB19EE-1. Accessed: August, 2012.

ECCC (Environment and Climate Change Canada). 2021. Canadian Climate Normals. 1971 to 2000 Climate Normals and Averages. Available at: https://climate.weather.gc.ca/climate_normals/index_e.html

ECCC (Environment and Climate Change Canada). 2017. Glossary: Fog. Available at: https://climate.weather.gc.ca/glossary_e.html#f

Finnis, J and Daraio J. 2018. Projected Impacts of Climate Change for the Province of Newfoundland and Labrador: 2018 Update. Available online at: https://www.turnbackthetide.ca/tools-and-resources/whatsnew/2018/Final_Report_2018.pdf

Fisheries and Oceans Canada. 2018. State of the Atlantic Ocean Synthesis Report. Available at: https://waves-vagues.dfo-mpo.gc.ca/Library/40801755.pdf

Government of Canada. 2019. Canada's Changing Climate Report (CCCR). Available at: https://changingclimate.ca/site/assets/uploads/sites/2/2020/06/CCCR_FULLREPORT-EN-FINAL.pdf

Government of Newfoundland and Labrador. 2021. Climate Data. Available at: https://www.gov.nl.ca/eccm/occ/climate-data/

Hoek, E., C. Carranza-Torres and B. Corkum. 2002. Hoek-Brown Failure Criterion – 2002 Edition. Pp. 267-273, In: NARMS-TAC 2002: Mining and Tunneling Innovation and Opportunity, Vol. 1 R Hammah et al, Eds. University of Toronto Press, Toronto, 2002.

IPCC (Intergovernmental Panel on Climate Change). 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. Available at: https://www.ipcc.ch/report/ar5/wg1/

Lines, G.S., M. Pancura and C. Lander. 2005. Building Climate Change Scenarios of Temperature and Precipitation in Atlantic Canada Using the Statistical Downscaling Model (SDSM). Meteorological Service of Canada, Atlantic Region, Science Report Series 2005-9 October 2006 revision.

Liverman, D.G.E., M.J. Batterson, D.M. Taylor and J. Ryan. 2001. Geological Hazards and Disasters in Newfoundland and Labrador. Can Geotech. J. 936-956.

Liverman, D.G., M.J. Batterson and D. Taylor. 2003. Geological Hazards and Disasters in Newfoundland – Recent Discoveries. Current Research (2003) Newfoundland Department of Mines and Energy Geological Survey Report 03-1, 273-278.

Memorial University of Newfoundland. 2018. Projected Impacts of Climate Change for the Province of Newfoundland & Labrador: 2018 Update. Submitted by: Dr. Joel Finnis, Department of Geography and Dr. Joseph Daraio, Faculty of Engineering, Memorial University of Newfoundland, St. John's, NL. 198 pp.

Moss, R.H., J.A. Edmonds, K.A. Hibbard, M.R. Manning, S.K. Rose, D.P. van Vuuren, T.R. Carter, S. Emori, M. Kainuma, T. Kram, G.A. Meehl, J.F. Mitchell, N. Nakicenovic, K. Riahi, S.J. Smith, R.J. Stouffer, A.M. Thomson, J.P. Weyant and T.J. Wilbanks. 2010. The Next Generation of Scenarios for Climate Change Research and Assessment. Nature, 463: 747-756.

Nicholson, F.H. 1978. Permafrost distribution and characteristics near Schefferville, Québec: Recent Studies. Proceedings, 3rd International Permafrost Conference, National Research Council of Canada, Ottawa, ON. 427-433.

Nicholson, F.H. and J.S. Lewis. 1976. Active Layer and Suprapermafrost Groundwater Studies, Schefferville, Québec. Reprinted from Proceedings of the 2nd Conference on Soil Water Problems in Cold Regions, September 1-2, 1976. Edmonton, AB.

Newfoundland and Labrador Water Resources Management Division, Water Rights, Investigations and Modelling Section. 2017. Chapter 3: Environmental Guidelines for Watercourse Crossings. Accessed January 15, 2020. Available online: https://www.gov.nl.ca/eccm/files/waterres-regulations-appforms-chapter3-2.pdf.

Ryan, T. M. and P.R. Pryor. 2000. Designing Catch Benches and Interramp Slopes, Chapter 3, Slope Stability in Surface Mining, Society for Mining, Metallurgy, and Exploration, Inc., 27 pp.

Senes Consultants Limited. 2005. NWT Environmental Audit. Status of the Environment Report. Accessed in November 2014 at: http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-NWT/STAGING/texte-text/soep_1316619744666_eng.pdf.

Vasseur, L and N. Catto. 2008. Atlantic Canada. In From Impacts to Adaptation: Canada in a Changing Climate 2007, Government of Canada, Ottawa, ON, P.119-170.

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 7:

Environmental Management

File No. 121416571

Date: May 2021

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7.0 ENVIRONMENTAL MANAGEMENT

The key elements of environmental management are planning, development of tools such as Environmental Management Plans (EMPs) and site-specific Environmental Protection Plans (EPPs), the presence of on-site monitoring, and regular reporting to regulators and stakeholders. The following sections describe how these elements are planned to be implemented by Joyce Direct Iron for the Project.

7.1 Planning

Detailed EMPs, including an Emergency Response Plan (ERP) and EPP, for all phases of the Project will be developed in consultation with provincial and federal governments, Indigenous groups, local communities, the public, and other stakeholders. The EMPs will be developed within an Environmental Management System (EMS), which will be prepared prior to Construction to manage environmental compliance, monitoring and follow-up. The EMS will function as the system through which Joyce Direct Iron will manage compliance with EA commitments, authorization commitments, and other legal requirements pertaining to the Project.

Environmental Management Plans will detail environmental management procedures and practices to manage the construction and daily operation of the mine and the mineral processing, as well as the rail loop, the rock causeway and other transportation infrastructure. The EMPs will specify responsibilities and resources, and include a contact list as well as a summary of response and reporting requirements. The EMPs will incorporate the management measures identified in the EIS. Consistent with the Environmental Policy, the management of Project features and activities that may result in environmental effects is described below. The Environmental Policy is described in Chapter 1: Introduction.

Emissions, discharges, and wastes will be managed so as to avoid contamination of the surrounding environment. Mitigation measures and management strategies are summarized below. Detailed strategies for managing Project related emissions, discharges and wastes are provided in Chapters 10 to 22.

The ERP will document the procedures and contingencies to be followed in the event of an emergency. The objectives of the ERP will be to establish, document, and communicate emergency response procedures that are protective of human health, the environment, and the Project. ERPs will be developed in accordance with permitting or other regulatory instruments for the Project.

7.2 Environmental Management Plans

Environmental Management Plans will be developed using pertinent legislation, regulations, industry standards, and guidance. The following plans will be developed and in place prior to the activities they will govern:

- An EPP will be developed for the Project. In general, the EPP will identify environmental concerns and general protection measures that are to be considered in developing mitigation, and will outline the general environmental protection measures to be followed for Project work. It will be updated and modified regularly according to the Project phase and as determined by site-specific conditions.

- As described in Section 7.2.2. the Mine Water Management Plan will outline water management in and around the major Project component areas (i.e., ore stockpiles and overburden/waste rock disposal areas, open pit, and roads, rail line, and water crossings).

- A Waste Management Plan will be developed to manage domestic waste, waste water, and hazardous wastes.

- An Avifauna Management Plan will be developed to reduce potential environmental effects on birds, including bird species at risk. This plan will include mitigation measures to reduce the likelihood of interaction between the Project and avifauna during clearing and construction.

- An ERP will be developed to, among other things, provide a response framework to quickly and effectively respond to a spill in the unlikely event that one should occur.

- As described in Section 7.2, a Rehabilitation and Closure Plan will be developed for the Project.

The timing for the preparation and implementation of these plans is presented in Table 7.1.

Table 7.1 Timing for Environmental Management Plans

Plans	Prepared / Updated In			
	Pre-construction Phase	Construction Phase	Operation and Maintenance Phase	Decommissioning and Reclamation Phase
EPP	x	x	x	x
Mine Water Management Plan	x	x	x	x
Waste Management Plan		x	x	x
Avifauna Management Plan	x	x	x	
ERP (Contingency Plan)	x	x	x	x
Rehabilitation and Closure Plan	x	x	x	x

7.2.1 Environmental Protection Plan

A separate site-specific EPP will be developed for each Project phase. The objective of the EPP will be to provide direction to on-site personnel regarding areas to be avoided, environmental protection procedures, Project-specific mitigation, reporting procedures, sensitive areas and seasons, and training.

7.2.2 Mine Water Management

A Water Management Plan will be developed for the Project. This plan will outline water management in and around the major Project component areas (i.e., ore stockpiles and overburden/waste rock disposal areas, open pit, and roads, rail yards, and water crossings).

Water on the Project site requires careful management for several reasons, including:

- considerations related to the dewatering of Joyce Lake;
- water will collect in the open pit and will need to be removed by in-pit sumps to allow for excavation and removal of rock;
- the proximity of the Project to watercourses poses the potential for contamination and/or sedimentation if site run-off is not carefully managed; and
- run-off from parking lots, laydown areas and other service areas may come into contact with hydrocarbons and/or other solids.

The Water Management Plan will describe how water on site will be diverted, collected, treated, and/or stored so as to avoid adverse environmental effects and maximize Project efficiencies through water conservation. Water management will include:

- pit water management;
- pit perimeter diversion ditches;
- in-pit sumps;
- perimeter dewatering wells;
- collection of water to be pumped to settling ponds for treatment; and
- testing, treatment, and monitoring in compliance with relevant legislation.

Drainage management is required to reduce surface erosion, scour, and sedimentation. Runoff from stockpiled material (i.e., overburden, waste rock and ore stockpiles) and infrastructure will be managed and captured through the use of diversion ditches and appropriately sized settling ponds that incorporate appropriate treatment methods to meet or exceed regulated limits prior to discharge.

7.2.3 Waste Management Plan

Domestic Wastewater Treatment

Commercially available waste water treatment units will be installed in four locations, including the mine site, the mineral processing plant, the accommodations camp, and the rail yard. Maintenance of the facilities will be conducted in compliance with applicable legislation.

Domestic Solid Waste

Domestic solid waste sources include both construction waste, and waste from office and lunchroom activities. Waste management will be included within the EMS, so that domestic solid wastes will be disposed of in compliance with applicable Newfoundland and Labrador regulations. Domestic solid waste will be separated into recyclable and non-recyclable portions, and sent to licensed facilities.

Hazardous Materials and Wastes

All staff will be appropriately trained in the handling, storage and disposal of hazardous material. The use, storage, and handling of fuels and oils, solvents and grease, and other petroleum products will comply with the Newfoundland and Labrador *Storage and Handling of Gasoline and Associated Products Regulations, 2003* under the NLEPA.

Hazardous material to be used may include the following:

- fuels and oils;
- solvents and grease; and
- batteries.

The site-specific ERP will be developed to reduce, contain, and control potential releases of hazardous material.

Small quantities of used and waste oils, solvents, and other chemicals may be kept at the Project site. These hazardous wastes will be stored in secured, labeled containers, and Safety Data Sheets will be available for all chemicals used or kept at the Project site. A used oil storage tank will be on site, and used oil will be collected for recycling or reuse. The collection, storage, transportation, and disposal of used oil will comply with the Newfoundland and Labrador *Storage and Handling of Gasoline and Associated Products Regulations, 2003* and *Used Oil Control Regulations.* A licensed hazardous waste disposal company will be engaged to dispose of such material.

The storage and handling of diesel and management of hazardous waste will be included within the EMS, to prescribe measures for compliance with relevant regulatory and legislative requirements as described above.

7.2.4 Avifauna Management Plan

An Avifauna Management Plan will be developed prior to construction to consolidate and implement the relevant mitigation measures to reduce adverse effects to avifauna, as presented in Chapter 16.

7.2.5 Emergency Response Plan

An ERP will be developed to establish emergency response procedures that protect human health, the environment, and the Project. ERPs will be developed in accordance with permitting or other regulatory instruments for the Project.

7.2.6 Rehabilitation and Closure Plan

A Rehabilitation and Closure Plan will be prepared and submitted, as required under the Newfoundland and Labrador *Mining Act*, Chapter M-15.1, Sections (8), (9) and (10). In accordance with the Act, the Plan will describe the process of rehabilitation of the Project at all stages up to and including Closure. For each year of the mining lease term, the work plans for Project rehabilitation will be submitted to the Province as prescribed in the *Guidelines to the Mining Act.* The final review of the Rehabilitation and Closure Plan generally occurs once the mine closure schedule is known, and typically 12 months or more before end of mining. The final Rehabilitation and Closure Plan will define in detail the actions necessary to achieve the Rehabilitation and Closure objectives and requirements. For the purpose of the EIS, the Rehabilitation and Closure Plan is equivalent to the decommissioning and reclamation plan prescribed by IAAC Guidelines.

The Rehabilitation and Closure Plan will address the following activities:

- removal of hazardous chemicals, reagents and materials;
- disconnection, drainage and cleaning, disassembling and storage of equipment for future reuse in another project, or for selling;
- removal of potentially hazardous equipment from the site and disposal in accordance with appropriate regulations;
- dismantling and removal or disposal of buildings and infrastructure;
- removal and selling of material and equipment with salvage value;
- removal and burial in place of concrete foundations if possible, or disposal in an appropriate manner;
- removal of fuel storage and dispensing facilities;
- assessment of soil and groundwater conditions in areas where it is warranted (*e.g.,* fuel dispensing facility, chemical storage buildings, ore storage areas) and implementation of remedial measures, where necessary;

- decommissioning of dewatering wells and groundwater monitoring;
- installation of barricades and signage around the open pit in areas not completed during the operation stage, as necessary;
- re-establishment of site drainage patterns, as near as practical, to natural, pre-development conditions or otherwise to meet land use objectives;
- grading of disturbed areas and/or otherwise scarifying or landscaping to control erosion and sedimentation; and
- providing a means to address special rehabilitation requirements associated with the site, such as removal of culverts and infilling of drainage or diversion ditches which are no longer required.

A preliminary outline of the Rehabilitation and Closure Plan is proposed:

INTRODUCTION
- Background and Scope of Work
- Objectives
- Site Location and Description
- Project Description
- Property History

PROGRESSIVE REHABILITATION

CLOSURE REHABILITATION
- Proposed Restoration Scenarios
- Wall Stability
- Restoration of the Open Pit
- Waste Rock and Overburden Areas
- Water Management
- Surface Infrastructure and Heavy Machinery
- Dismantling of Transportation Infrastructure
- Hazardous Materials
- Contaminated Soils and Materials
- End Land Use

POST-CLOSURE MONITORING
- Structure Integrity
- Environmental Monitoring
- Land Cover Monitoring

TIME AND ECONOMIC CONSIDERATIONS

Closure and rehabilitation activities for the Project site will be informed by ongoing consultation with local communities and Indigenous groups. In the event of transfer of ownership, the responsibility for implementation of the Rehabilitation and Closure Plan, and monitoring and maintaining structures will be transferred to the new owner, in accordance with applicable conditions as stipulated in the Plan.

7.2.6.1 Progressive Rehabilitation

Rather than deferring all rehabilitation activities until the end of operation of the mine, components of the Project and parts of the Project footprint will be progressively rehabilitated throughout the duration of the Project as opportunity allows. The potential for erosion and sedimentation will be reduced, and the visual aesthetics will be improved as a result of re-vegetation of disturbed sites. Progressive rehabilitation will be implemented for the site during the operational phase and may include the following:

- rehabilitate construction-related buildings and laydown areas;
- re-vegetation studies and trials; and
- stabilize and re-vegetate waste rock disposal areas.

An environmental monitoring program will be conducted as part of the mine development and the resulting information will be used to evaluate the progressive rehabilitation program on an ongoing basis

7.3 Follow-up and Monitoring Program

The purpose of follow-up programs is to verify the accuracy of the predictions made in the environmental assessment as well as the effectiveness of the mitigation measures. Follow-up programs are proposed in those cases where the level of confidence in an effects prediction is low due to the nature of the effect (i.e., unique or relatively unknown), or where follow-up is a regulatory requirement. This information will be used to refine and optimize mitigation measures and implement adaptive management measures associated with the Project.

A follow-up and monitoring program will be designed in consultation with provincial and federal governments, and Indigenous groups. The program will be conducted, as appropriate, during all phases of the Project. Requirements for follow-up and monitoring have been determined based on regulatory guidance and the professional judgment of the Study Team. Where warranted, these programs are presented for each VC (Chapters 10 to 23). A summary is provided in Chapter 25.

Compliance and inspection monitoring will also be conducted, the object of which is to confirm that the Project is being operated in compliance with mitigation commitments, and that releases from the Project meet regulated levels. Elements of compliance and inspection monitoring will also be incorporated into the EPP.

The follow-up program will be designed to monitor the implementation of mitigation measures resulting from Indigenous consultation, including:

- verifying predictions of environmental effects with respect to Indigenous peoples, as well as residual impacts that could not be addressed within the context of the EA;
- determining the effectiveness of mitigation measures as they relate to environmental effects with respect to Indigenous peoples in order to modify or implement new measures where required;
- supporting the implementation of adaptive management measures to address previously unanticipated adverse environmental effects with respect to Indigenous peoples or unanticipated adverse impacts to Indigenous rights;
- verifying measures identified to prevent and mitigate potential adverse effects of the project on established or asserted Indigenous and Treaty rights; and
- providing information that can be used to improve and/or support future EAs and Indigenous consultation processes.

Based on the results of the environmental effects assessment, an initial list of potential follow-up programs, are presented in Table 7.2.

Table 7.2 Summary of Follow-up and Monitoring Programs

VC/Topic	Proposed Monitoring Objective or Activity	Monitoring Area or Location	Construction	Operation and Maintenance	Closure and Decommissioning	Post-closure
Groundwater	Groundwater Chemistry and Levels	Open Pit Mine, and Select Mine Facilities		x	x	x
	Mine Sump Discharge Monitoring	Open Pit		x	x	
Surface Water Resources and Fish and Fish Habitat	End of Pipe Water Chemistry Monitoring	Discharge Location	x	x	x	x
	Water Quality and Toxicity Monitoring	Receiving Environment	x	x	x	x
Fish and Fish Habitat	Success of Habitat Offsetting (if required)	Location of Measures Implemented for Offsetting Plan (if required)		x		
Air Quality	Levels of Dust and Emissions	At Perimeter of Project Property	x	x	x	
GHG Emissions	Gas Emissions will be Quantified on an Annual Basis as per the GHG Emissions Reporting Program	At Perimeter of Project Property	x	x	x	
Noise	Noise Levels	Cabins Nearest to Infrastructure at Iron Arm	x	x	x	

The MDMER under the *Fisheries Act* specify the environmental effects monitoring requirements for operating metal mines in Canada. These requirements include daily, weekly, monthly and annual monitoring of liquid effluents discharged by mines, in addition to regular biological monitoring. Aquatic monitoring programs for the Project will include process monitoring (i.e., monitoring that is internal to the facility, and is intended to provide assurance that the facility is operating as per design specifications); end-of-pipe monitoring (i.e., monitoring of liquid effluent at the point of discharge to the environment, where regulatory requirements such as non-lethality and authorized limits on total suspended solids, metals and pH must be maintained); and environmental monitoring in the receiving environment. The environmental monitoring includes regular sampling of water quality at reference locations as well as points downstream of the effluent discharge location, in addition to the regular biological monitoring required under MDMER.

Follow-up and monitoring programs will be finalized following release from the EA process, and prior to the relevant Project phase (i.e., Construction, Operation and Maintenance, Closure and Decommissioning, Post-closure). The frequency and duration of monitoring will be determined at that time. Monitoring objectives (i.e., confirmation of mitigation, confirmation of assumptions, and verification of predicted effects) will be established within a field-testable and statistically verifiable framework.

If potential adverse effects on a listed wildlife species or its critical habitat are identified, a monitoring plan will be developed in accordance with the Newfoundland and Labrador *Endangered Species Act* (NLESA) and *Species at Risk Act* (SARA), and in consultation with regulators, to identify the circumstances under which corrective measures may be needed to address any issue or problem identified through the monitoring (i.e., if unanticipated adverse environmental effects occur or the significance of residual adverse environmental effects are greater than anticipated).

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 8:

Potential or Established Indigenous and Treaty Rights and Related Interests

File No. 121416571

Date: May 2021

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8.0 POTENTIAL OR ESTABLISHED INDIGENOUS AND TREATY RIGHTS AND RELATED INTERESTS

8.1 Introduction

This chapter describes the potential or established treaty rights and related interests of the five Indigenous groups potentially affected by the Project:

- Innu Nation of Labrador;
- NunatuKavut Community Council;
- Naskapi Nation of Kawawachikamach;
- Innu First Nation of Matimekush-Lac John; and
- Innu First Nation of Uashat mak Mani-Utem.

This section also includes, or references where located elsewhere in the EIS, the available information on the geographical extent, nature, frequency and timing of the use by the Indigenous groups of land and resources in the study area, including maps and data sets where available.

“Indigenous peoples” is a collective name for the original peoples of North America and their descendants and includes three groups of Indigenous people: Indians (commonly referred to as First Nations), Metis and Inuit (AADNC 2014). The existing Indigenous and treaty rights of the Indigenous peoples of Canada are recognized and affirmed by the Section 35 of the Canadian Constitution Act and the asserted rights of Indigenous peoples are protected by a fiduciary duty placed on governments to consult and, where appropriate, accommodate the asserted rights of affected Indigenous groups. The Supreme Court of Canada, in Haida (Haida 2004) identified when this duty to consult arises. The Crown has a duty to consult when a) it has knowledge of the potential existence of the Indigenous right or title and b) contemplates conduct that may adversely affect the Indigenous right or title. An Indigenous right protects an activity which is an element of a practice, custom or tradition that was an integral part of an Indigenous group’s distinctive culture prior to contact with the Europeans, such as religious practices or harvesting practices (Sparrow 1999). The existence of such rights is analyzed on a site-specific basis under Canadian law.

Anthropologists and historians agree that the interior of the Québec-Labrador Peninsula was an area used by the Innu and Naskapi Indigenous peoples for millennia before contact with Europeans for purposes of hunting and later, in the colonial era and post-Confederation with Canada, for hunting and for the exploitation of fur resources. The traditional harvesting activities of the Innu and Naskapi Indigenous peoples in the interior of the Québec-Labrador Peninsula was centered upon nomadic caribou hunting; however, like the other nomadic populations of Indigenous peoples in eastern Canada, the Innu and Naskapi made wide use of all available

resources depending upon the seasonal and periodic changes in the natural environment. The literature suggests that, before contact, the study area was not capable of being occupied on a regular or exclusive basis by any Indigenous group due to the migration of caribou and a scarcity of supplementary resources. As a result, a system based on shared use of the vast interior region by highly mobile family groups of both Innu and Naskapi Indigenous peoples existed for hunting, fishing and foraging.

Industrial development in and around Schefferville, Québec, in the middle of the 20th century resulted in the establishment of three Indigenous communities in the study area: the Innu communities of Lac John and Matimekush, and the Naskapi community of Kawawachikamach. This establishment of communities redefined the pattern of land and resource use to reflect the more sedentary lifestyle of a wage-earning economy. The use by the Indigenous groups of land and resources in the vicinity of the study area became generally characterized by fall hunting of big game, when available, fishing and hunting of small game year round, hunting of waterfowl in the spring, berry and plant gathering in the summer, cabin occupation by individuals and families as well as travelling through the area for traditional purposes.

8.2 Indigenous Groups and their Potential or Established Treaty Rights and Related Interests

As noted in Section 8.1, five Indigenous groups have asserted Indigenous rights and/or Indigenous title to lands in the vicinity of the study area. None of the five Indigenous groups currently have a settled land claim or a signed treaty which confirms their Indigenous rights and/or Indigenous title to lands in the vicinity of the study area, although the Innu Nation is in negotiations towards a Final Agreement which will engage a treaty right if the current land selections are confirmed.

8.2.1 Innu of Labrador

The Innu of Labrador are First Nations people of two communities in Labrador, the Mushuau Innu First Nation and the Sheshatshiu Innu First Nation, who have traditionally used and occupied lands in Newfoundland and Labrador. The ancestors of the Innu of Labrador were Innu and Naskapi Indigenous people who used and occupied portions of the Québec-Labrador Peninsula for millennia before contact. The Mushuau Innu First Nation occupies a registered reserve at Natuashish, NL, which, as of December 2020, has a registered population of 1,007 persons. The Sheshatshiu Innu First Nation occupies a registered reserve at Sheshatshiu, NL, which, as of December 2020, has a registered population of 1,614 persons (CIRNAC 2020). The Innu Nation is the organization which represents both Labrador Innu communities in land claims and self-governance negotiations.

The traditional territory used by the Innu of Labrador is asserted by the Innu Nation to include much of the Québec-Labrador Peninsula, including most of Labrador and portions of eastern Québec. In terms of its potential treaty rights, the Innu Nation claims Indigenous title and Indigenous rights over most of Labrador, including the Project Development Area, and over portions of eastern Québec. The Innu Nation’s land claim in relation to most of Labrador is currently in the process of negotiation towards a Final Agreement under the Federal

Comprehensive Land Claims Policy. The Innu Nation's land claim in relation to Labrador was first accepted for negotiation by the Federal Government in 1978 and a Framework Agreement was signed in 1996 under the Federal Comprehensive Land Claims Policy.

In September 2008, the Innu Nation and the Province of Newfoundland and Labrador signed the historic Tshash Petapen (New Dawn) Agreement. The Agreement settled outstanding issues between the parties in land claims negotiations and cleared the way for the development of the Lower Churchill Project. The parties agreed in principle to the Innu Nation land selections and rights in Labrador, including the Economic Development Area in western Labrador containing the Project Development Area, subject to a formal treaty being signed. In November 2011, the Innu Nation, Canada and the Province of Newfoundland and Labrador concluded an AIP under the Federal Comprehensive Land Claims Policy which included the Innu Nation land selections and rights in Labrador under the Tshash Petapen Agreement. A Final Agreement is currently being negotiated among the parties.

The AIP outlines different categories of lands in Labrador in which the Innu of Labrador will have settled Indigenous title and/or Indigenous rights. These categories of land are Labrador Innu Lands (LIL), approximately 13,000 km² in which the Innu of Labrador will have Indigenous title; the Labrador Innu Settlement Area (LISA) outside LIL, approximately 36,000 km² in which the Labrador Innu will enjoy specific Indigenous rights; the Permit Free Hunting Area, approximately 33,670 km² in which the Innu of Labrador will have the right to hunt without obtaining any form of provincial or federal licence or permit that would be required for a Non-Participant; and, the Economic Major Development Impacts and Benefits Agreement Areas and Hydro Electric Major Development Impacts and Benefits Agreement Areas, in which the Innu of Labrador will have the right to receive the benefit of an Impacts and Benefits Agreement for a "major development" as defined in the AIP. Once a Final Agreement has been concluded and is in effect, Canada and Newfoundland and Labrador will continue to consult the Innu of Labrador in accordance with the terms of the Final Agreement.

Article 5.5.2 of the AIP provides that the right of the Innu of Labrador under any Final Agreement applicable in the Economic Major Development Impacts and Benefits Agreement Areas is limited to the right to acquire an Impacts and Benefits Agreement for a major development as defined in the AIP (Government of Newfoundland and Labrador 2008). A major development is defined as "a development that involves, during any five year period, either more than two hundred and fifty (250) person-years of employment or capital expenditures of more than fifty (50) million dollars in constant 2005 dollars, where such development is within any of the Economic Major Development Impacts and Benefits Agreement Areas…" (Government of Newfoundland and Labrador 2008). Figure 19.1 shows the geographic extent of the Western Labrador Economic Major Development Impact and Benefit Agreement Areas.

Based on the foregoing, a potential treaty right of the Innu Nation will be engaged if the Joyce Lake Iron Ore Project proceeds as planned, because the planned scope of the Project will involve either more than 250 person-years of employment or capital expenditures or more than 50 million dollars in constant 2005 dollars and therefore it will constitute a "major development" within the meaning of the AIP. Therefore, and assuming the Final Agreement incorporates the existing land

selection in the Western Labrador Economic Major Development Impacts and Benefits Agreement Area and the final planned scope of the Project will exceed the employment and capital expenditure threshold, the Innu Nation would have the treaty right under a Final Agreement to acquire an Impacts and Benefits Agreement with Joyce Direct Iron as the proponent of the Joyce Lake Iron Ore Project.

In terms of available information on the geographical extent, nature, frequency and timing of the use of the land and resources in the vicinity of the study area by the Innu Nation, as noted in Section 19.5.3.1 the relevant studies and literature indicate that Innu family groups were nomadic caribou hunters and later trappers of the interior area of the Québec-Labrador peninsula.

In terms of contemporary land and resource use, there is some documentation of current traditional harvesting and land use in western Labrador by the Sheshatshiu Innu First Nation; however, the core areas used by its members all lie outside the study area.

In conclusion, members of the Mushuau Innu and Sheshatshiu Innu continue to use the interior of the Québec-Labrador Peninsula for hunting, foraging, fishing and for travel purposes; however, there is little information concerning the contemporary use of the land or resources in the vicinity of the study area by members of either the Mushuau Innu First Nation or the Sheshatshiu Innu First Nation.

8.2.2 NunatuKavut Community Council

The NunatuKavut Community Council has asserted land claims and other Indigenous rights in respect of a large portion of Labrador, including the study area, since the 1980s. The NunatuKavut Community Council (formerly known as the Labrador Metis Nation) represents the interests of the “southern Inuit of Labrador” who are Indigenous persons of mixed ancestry resident in communities across Labrador but primarily in the Lake Melville region and the coastal communities of southern Labrador. The Indigenous ancestors of the members of the NunatuKavut Community Council are the Inuit of Labrador who used and occupied portions of the Québec-Labrador Peninsula for millennia before contact. The membership of the NunatuKavut Community Council is estimated by that group to be approximately 6,000 (NunatuKavut 2015).

This Indigenous group’s land claim, which was first submitted by the Labrador Metis Nation in the 1980s, was supplemented in 2010 by further land claim documentation entitled “Unveiling NunatuKavut” which lays claim, on behalf of its members, to its traditional territory NunatuKavut (“Our ancient land”) which primarily encompasses south/central Labrador and extends to portions of western Labrador including the study area. The NunatuKavut Community Council land claim has not to date been accepted for negotiation by either the federal government or by the government of Newfoundland and Labrador. As an asserted claim the NunatuKavut land claim to Labrador is covered by the duty to consult and where appropriate accommodate the asserted Indigenous rights of affected groups.

A review of the relevant studies and literature does not reveal information that suggests that the members of the NunatuKavut Community Council or their Inuit ancestors used or occupied the study area for traditional land and resource use in the historic period.

In terms of contemporary land and resource use, the members of the NunatuKavut Community Council currently reside across a large number of communities in Labrador, mostly in central and southern coastal Labrador; however, some members reside in western Labrador. In a 2012 land use study commissioned for a project proponent in western Labrador the core areas for land and resource use by members of this Indigenous group residing in western Labrador were identified as being in central and southern coastal Labrador.

In conclusion, with the exception of the asserted land claim, there is little information currently available concerning the potential treaty rights or related interests of the members of the NunatuKavut Community Council in the vicinity of the study area.

8.2.3 Naskapi Nation of Kawawachikamach

The Naskapi Nation of Kawawachikamach is a First Nations people who primarily reside on a reserve at Kawawachikamach, Québec, in close proximity to the Project Development Area. The ancestors of the Naskapi Nation of Kawawachikamach are the Naskapi Indigenous people who used and occupied portions of the Québec-Labrador Peninsula for millennia before contact. The Kawawachikamach reserve has a registered population of 691 persons as of December 2020 (CIRNAC 2020).

The traditional territory of the Naskapi Nation of Kawawachikamach is asserted to include a large portion of the Québec-Labrador Peninsula. In terms of its existing treaty rights, the Naskapi Nation of Kawawachikamach has established Indigenous treaty rights over lands in Québec pursuant to the 1978 *Northeastern Québec Agreement* which is a modern-day treaty entered into among the Naskapi Nation of Kawawachikamach, Canada and the Province of Québec under which its members are the beneficiaries. The *Northeastern Québec Agreement* is a treaty protected under Section 35 of the *Constitution Act, 1982* and the treaty rights and benefits enjoyed under it have constitutional protection. This treaty and the 1975 *James Bay and Northern Québec Agreement* outline an area where the Naskapi enjoy special harvesting and outfitting rights.

In terms of potential treaty rights and related interests, while the 1978 *Northeastern Québec Agreement* settled all claims of Indigenous rights and Indigenous title of the Naskapis of Québec within the Province of Québec, the Naskapi Nation of Kawawachikamach also asserts Indigenous rights and title to portions of its traditional area extending into Labrador. In 1995, the Naskapi Nation of Kawawachikamach formally submitted a land claim under the Federal Comprehensive Land Claims Policy in respect of a large area of Labrador, including the study area. This Naskapi land claim to portions of Labrador, including the study area, has not been accepted for negotiation under the Federal Comprehensive Land Claims Policy or by the Government of Newfoundland and Labrador.

In the early 20th century, the Naskapi family groups of the interior discontinued their nomadic lifestyle and divided into two groups circa 1916. The Indigenous group now residing at Kawawachikamach proceeded from the interior north to settle at Fort Chimo, now Kuujjuaq, Québec, with the other group going east to settle at Davis Inlet on the Labrador Sea. Naskapi residing at Fort Chimo moved to the area of Schefferville in the mid-1950s and lived at what was later the Lac John reserve from 1956 to 1972 and at the Matimekosh reserve from 1972 to 1984.

The Kawawachikamach reserve was established for members of the Naskapi Nation in 1984 and is approximately 15 km from the Project Development Area.

There is direct evidence of contemporary land and resource use in the study area by the Naskapi Nation of Kawawachikamach (Section 19.5.3.2). This use was established through research related to the re-emerging mining industry in the area, in particular through research completed by Michael H. Weiler, author of “Naskapi Land Use in the Schefferville, Québec Region” (Weiler 2009). This report was completed for the environmental assessment of the DSO Project. Also, as discussed in Chapter 3: Engagement and Traditional Knowledge, the proponent has undertaken meetings with the Naskapi Elders and Band Council.

Section 19.5.3.2 outlines in detail the contemporary and current land use pattern of the Naskapi Nation of Kawawachikamach in the study area. As discussed, caribou availability in the interior area of the Québec-Labrador peninsula has been subject to dramatic fluctuations over time. According to Weiler, the recovery of the George River caribou herd in the 1970s and the closure of the IOC mines on the Ridge Area in 1982 resulted in the caribou migration route extending through the study area. As a result, more caribou were being seen in the study area and Naskapi hunters gained easy access to the animals via the IOC road system and railway. Weiler also reports year round fishing in study area by Naskapi. Another important traditional activity of the Naskapi was waterfowl hunting, carried out during the spring migrations of geese at Attikamagen Lake, and ptarmigan hunting in winter at Petitsikapau Lake.

According to Weiler, trapping of fur bearing animals was not traditionally a major part of the Naskapi land use pattern. Weiler concluded in terms of contemporary use that Attikamagen Lake, along with the Howells River basin and the Ridge, were the three most heavily used resource areas by the Naskapi Nation of Kawawachikamach. Finally, in terms of current use there are a number of cabins in the area between Schefferville and Iron Arm, including some in the study area, seasonally occupied by Naskapi residents of Kawawachikamach. The Naskapi are accustomed to travelling on roads and trails in the study area for many land and resource use activities.

In conclusion, based on the available information, in addition to the asserted land claim, it appears that the land and waters in the vicinity of the study area are currently a productive harvesting area for hunting, foraging, fishing and for travel purposes for members of the Naskapi Nation of Kawawachikamach.

8.2.4 La Nation Innu Matimekush-Lac John

La Nation Innu Matimekush-Lac John is a First Nations people who live primarily in the Matimekosh reserve on the shores of Lake Pearce and the Lac John reserve, located in close proximity to Schefferville, Québec, and to the study area. The ancestors of La Nation Innu Matimekush-Lac John are the Innu Indigenous people who used and occupied portions of the Québec-Labrador Peninsula for millennia before contact. Between them, the Matimekosh and Lac John reserves have a registered population as of December 2020, of 849 persons (CIRNAC 2020).

La Nation Innu Matimekush-Lac John is comprised of Innu people who moved to the Schefferville area for employment in the 1950s from the Innu communities of the lower north shore of the St. Lawrence River, in particular near Sept Iles, Québec. Their ancestors, along with those of the Innu Takuaikan Uashat mak Mani-Utenam First Nation of Sept-Îles, Québec, and Maliotenam, Québec, traditionally accessed the interior of the Québec-Labrador peninsula for the purposes of subsistence hunting and the available fur resources via ancestral travel routes. Their traditional territory is therefore shared with the Innu Takuaikan Uashat mak Mani-Utenam First Nation of Sept-Îles, Québec, and includes the lands of the Saguenay Beaver Reserve, which is referenced in greater detail in the next section.

In terms of potential treaty rights and related interests, both groups were originally members of the Conseil des Atikamekew et des Montagnais, which in 1979 submitted a comprehensive land claim that was accepted by both Canada and Québec for negotiation under the Federal Government Comprehensive Land Claims Policy. A Framework Agreement establishing the process to negotiate a land claim for those portions of the traditional territory of each group within the Province of Québec was finalized in 1988. In 1998 both Indigenous groups withdrew from land claim negotiations and in 2005 they formed the Ashuanipi Corporation to represent their interests in further comprehensive land claim negotiations with Canada and Québec. These negotiations resumed in 2006 but were discontinued in 2008 and the Ashuanipi Corporation has since been dissolved.

The land claim of La Nation Innu Matimekush-Lac John includes a large portion of Labrador, including the Project Development Area and has not been accepted for negotiation by either the Federal Government or the Government of Newfoundland and Labrador.

There is substantial direct evidence of contemporary land and resource use in the vicinity of the study area by La Nation Innu Matimekush-Lac John, which is outlined in greater detail in section 19.5.3.2. As noted in section 19.5.3.1 and above, the relevant studies and literature indicate that Innu family groups were nomadic caribou hunters and later trappers of the interior area of the Québec-Labrador peninsula, and that the Moisie River, which drains into the St. Lawrence near Sept Iles, was part of a canoe route that had been used for centuries to access the interior In a report prepared for the EA of the DSO Project (Clément 2009), the author discussed the relocation of Innu to the Sept-Îles area after the closure of trading posts at Lake Michikemau and Fort Nascopie on Petitsikapau Lake in the second half of the 19th century. Given the available documentary and Indigenous evidence of free and open hunting in the vast interior plateau of the Québec-Labrador peninsula, the study area was part of the traditional area used for the purpose of subsistence hunting and access to the available fur resources by ancestors of La Nation Innu Matimekush-Lac John.

Clement concludes that land use by the Innu was relatively constant since contact and was characterized by two annual migration cycles. With the establishment of the communities of Lac John and Matimekosh and a shift to sedentary employment there was a considerable reduction in individuals and families engaged in hunting and harvesting on a full-time or extended basis, but the activities remained of important cultural significance to the Innu of Matimekush-Lac John. The use of Innu names for geographic locations and for the locations of fish, birds and game in the

study area is supportive of the conclusion that there has been extensive past and present use of the lands and resources, particularly near the communities and in the southern part of the study area.

The pattern of current land and resource use by the Innu Matimekush-Lac John is characterized in fall big game hunting when available, goose hunting in the spring, fall and winter trapping and summer berry gathering as well as fishing and small game hunting throughout the study area. Finally, in terms of current use there are a number of cabins at Astray Lake seasonally occupied by Innu residents of Matimekush-Lac John, and the Innu are accustomed to travelling on roads and trails in the study area for many land and resource use activities.

In conclusion, based on the available information in addition to the asserted land claim, it appears that the land and waters in the study area are currently a productive harvesting area for hunting, foraging and fishing and for travel purposes for members of La Nation Innu Matimekush-Lac John.

8.2.5 Innu Takuaikan Uashat mak Mani-Utenam First Nation

The Innu Takuaikan Uashat mak Mani-Utenam First Nation is a First Nations people living on two Québec reserves, the Uashat reserve and the Maliotenam reserve, located near Sept-Îles, Québec, approximately 500 km from the Project area. The ancestors of the Innu Takuaikan Uashat mak Mani-Utenam First Nation are the Innu Indigenous people who used and occupied portions of the Québec-Labrador Peninsula for millennia before contact. Between them, the reserves have a registered population in December 2020 of 3,603 persons (CIRNAC 2020).

As indicated above, the ancestors of the Innu Takuaikan Uashat mak Mani-Utenam First Nation of Sept-Îles, Québec, and Maliotenam, Québec, traditionally accessed the interior of the Québec-Labrador peninsula for the purposes of subsistence hunting and the available fur resources via ancestral travel routes including the Moisie River system. Their traditional territory is therefore shared with La Nation Innu Matimekush-Lac John and includes the lands of the Saguenay Beaver Reserve, which is addressed in greater detail in this section. The history of treaty rights for Innu Takuaikan Uashat mak Mani-Utenam First Nation is discussed in Section 8.2.4.

In terms of available information on the geographical extent, nature, frequency and timing of the use of the land and resources in the vicinity of the study area by the Innu Takuaikan Uashat mak Mani-Utenam First Nation, as noted in Section 19.5.3.1 and above, the relevant studies and literature indicate that Innu family groups were nomadic caribou hunters and later trappers of the interior area of the Québec-Labrador peninsula and that the Moisie River, which drains into the St. Lawrence near Sept-Îles, was part of a canoe route that had been used for centuries to access the interior (Boutet 2013). Clement concluded, based on historical sources, that some of the Innu of the interior relocated to the Sept-Îles area after the closure of trading posts at Lake Michikemau and Fort Nascopie on Petitsikapau Lake in the second half of the 19th century. Given the available documentary and Indigenous evidence of free and open hunting in the vast interior plateau of the Québec-Labrador peninsula, it appears the study area was occasionally used in the historic period for the purposes of subsistence hunting and accessing the available fur resources by ancestors of the Innu Takuaikan Uashat mak Mani-Utenam First Nation.

In terms of contemporary land and resource use there is little direct evidence of such use in the vicinity of the study area by the Innu Takuaikan Uashat mak Mani-Utenam First Nation; however, members of the Innu Takuaikan Uashat mak Mani-Utenam First Nation undoubtedly continue to use the interior of the Québec-Labrador Peninsula for hunting, foraging, fishing and for travel purposes. For example, Figure 19.11 shows the Historic and Current Trails and Campsites used by the Innu. While the Clement report does not contain any direct information on land and resource use from members of the Innu Takuaikan Uashat mak Mani-Utenam First Nation, it indirectly references the use of the area. In particular, Clement references the use of the study area by the family groups from Sept-Îles who carried on traditional hunting and trapping activities in the area and were understood to be the users of the beaver lots in the Saguenay Beaver Reserve inland of the area of Sept-Îles which possibly continued until the 1970s.

The Saguenay Beaver Reserve (Réserve à Castor de Saguenay), including Matimekosh and Lac John, was created in 1954 and the area studied by Clement was part of Lot 207 and Lot 211 of the Saguenay Beaver Reserve. Figure 19.8 shows the area covered by the Saguenay Beaver Reserve and Lots 208, 209, 211 and 212 are in the vicinity of the Project site, with the majority of the Project Development Area being in Lot 209 and portions of the haulage road and rail loop in Lot 211.

In conclusion, in addition to the asserted land claim, there is some information, such as the existence of the Saguenay Beaver Reserves and the historic and current trail and campsite system, concerning the geographical extent, nature, frequency and timing of contemporary use of the land or resources in the vicinity of the study area by members of either the Uashat reserve or the Maliotenam reserve.

8.3 References

AANDC (Aboriginal Affairs and Northern Development Canada). 2014. Aboriginal Peoples and Communities. Available at: www.aadnc-aandc-gc.ca/eng.1100100013785/1304467449155.

Boutet, J.-S. 2013. “Opening Ungava to Industry: a Decentering Approach to Indigenous History in Subarctic Québec, 1937-54”. Cultural Geographies, 0 (0): 1 – 19. Online First Version, February 2013.

CIRNAC (Crown-Indigenous Relations and Northern Affairs Canada). 2020. First Nation Profiles. Accessed January 15, 2020. Available online: https://fnp-ppn.aadnc-aandc.gc.ca/fnp/Main/index.aspx

Clément, D. 2009. Resource knowledge and land use by the Innu. Final report presented to New Millennium Capital Corp. 110 p + Appendices.

Government of Newfoundland and Labrador. 2008. The Tshash Petapen (New Dawn) Agreement. Available at: http://www.releases.gov.nl.ca/releases/2008/exec/0926n07.htm

Haida Nation v. British Columbia (Minister of Forests),[2004] 3 S.C.R. 511 [Haida]. Supreme Court of Canada Case Information: 29419. Available at: https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/2189/index.do

NunatuKavut. 2015. About. Who We Are. Available at: https://nunatukavut.ca/about/who-we-are/.

R. v. Sparrow, [1990] 1 S.C.R. 1075. Supreme Court of Canada Case Information: 20311. Available at: https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/609/index.do

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Joyce Lake Direct Shipping Iron Ore Project:

Chapter 9:

Economic and Social Benefits of the Project

File No. 121416571

Date: May 2021

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9.0 BENEFITS OF THE PROJECT AND OF THE ENVIRONMENTAL ASSESSMENT

9.1 Introduction

The Project will contribute benefits to Canadians as a result of employment and expenditures, as well as the social benefits related to higher employment, income, and economic development. Joyce Direct Iron Inc. (Joyce Direct Iron; the Proponent) will implement its Newfoundland and Labrador Benefits Plan and its Gender Equity and Diversity Plan in order to enhance the economic and related social benefits of the Project. The Benefits Plan will include employment and procurement provisions that will actively recruit from the provincial labour force and industrial supply base. The Gender Equity and Diversity Plan will include initiatives to promote the recruitment of female and Indigenous candidates and facilitate contracts with businesses owned by women and Indigenous people. The Newfoundland and Labrador mining industry is a substantial driver of provincial economic development, contributing to employment, business, education, training, and diversity. The Project will build upon these existing contributions, while providing a source of employment, income and government revenue.

The economic benefits of the Project will result in social benefits, including contributions:

- Through employment to:
    - Personal Incomes;
    - Self-esteem; and
    - Reductions in social inequality
- Through Project taxes, royalties, and grants, to provincial and municipal governments' ability to deliver:
    - Health services;
    - Recreation services; and
    - Other services and infrastructure

9.2 Economic Conditions

The economy of Newfoundland and Labrador has undergone a major shift since offshore oil production began with the Hibernia project in 1997. The Newfoundland and Labrador Department of Finance (NLDF) estimates that provincial gross domestic product (GDP) grew by more than 50% between 1997 and 2010, averaging an annual growth rate of 3.6%. Approximately half of this economic growth is attributed to oil and gas production (NLDF 2011).

After the global recession in 2009, provincial GDP grew by an estimated 6.1% in 2010, fueled by investment growth and a rebound in exports. GDP growth and employment growth in Newfoundland and Labrador have remained robust since 2010. Provincial GDP increased by 4.0% in 2019, representing the second-highest growth among the Canadian provinces (NLDF 2011, 2012, 2020).

The provincial unemployment rate has decreased since the 2009 recession (Newfoundland and Labrador Statistics Agency 2020). In 2019, unemployment declined to 11.9%, the lowest on record since 2013 (NLDF 2020).

Provincial economic decline was expected in 2020 compared to 2019. This is due to several factors, including responses to the COVID-19 pandemic, declines in oil production, and project delays in the Labrador mining industry (NLDF 2020).

9.3 Economic Benefits from the Project

The Project will provide a valuable economic contribution to the Province, reinforcing the general trend of economic growth over the past decade and providing employment and government revenue. In particular, it will:

- Help sustain growth in government revenue, employment, and business;
- Result in the development of new infrastructure and additional education, training, and industrial capabilities;
- Contribute to a diverse labour force and the success of women-led and Indigenous companies; and
- Deliver economic diversification and sustainability.

Economic benefits from the Project will increase when residents and businesses within the region and Province can take advantage of the employment and business opportunities that arise. The more people and companies involved in these opportunities, the greater the revenues to government from personal and corporate taxes. Joyce Direct Iron's policies on employment and procurement will enhance benefits as outlined below.

Joyce Direct Iron's employment and benefits policy will be governed in part by any contractual agreements, yet to be negotiated, which include Impact and Benefit Agreements with Indigenous groups and agreements with the government of Newfoundland and Labrador. Joyce Direct Iron expects to negotiate these agreements prior to financing and before construction work commences on the Project.

Whenever possible priority for employment as well as provision of goods and services will be given to skilled and qualified residents and competitive businesses in the local area of the Project (i.e., Schefferville, Matimekush-Lac John, and Kawawachikamach).

Priority for employment as well as the competitive provision of goods and services will also be given to skilled and qualified residents and competitive businesses in compliance with Newfoundland and Labrador, as well as federal government requirements.

Joyce Direct Iron will facilitate initiatives related to training and diversity.

More detail on employment and benefits initiatives will be defined in the Project Benefits and Diversity Plans. These plans are subject to approval by the Government of Newfoundland and Labrador.

9.3.1 Government Revenue, Employment, and Business

Project expenditures during Construction and Operations and Maintenance will contribute to provincial GDP, facilitated by the Project Benefits Plan and its benefits management, employment, training, procurement, contracting, and supplier development. Based on Feasibility Study (FS) figures, the initial capital cost of the Project is estimated at $259.6 million. Total operating cost over the life of the mine is approximately $1,032 million. A substantial portion of Project costs will contribute to provincial GDP, while benefits planning measures, including employment and procurement, will enhance provincial economic benefits.

The Project will also contribute to provincial and federal government revenue, both directly as a result of Project activities, and indirectly as a result of increased employment and business.

Economic benefits will be generated through employment of Indigenous and local workers. Joyce Direct Iron will hire local workers who have the skills and experience required to work on the construction and operation of the Project. Employment of Indigenous people will be enhanced through agreements made between representative Indigenous organizations and Joyce Direct Iron, as well as through the provisions of the Gender Equity and Diversity Plan.

Qualified personnel will be hired from the northeastern Québec communities near the Project. Based on current labour conditions, it is expected that a large portion of workers will need to be drawn from elsewhere. Joyce Direct Iron is committed to hiring residents of Newfoundland and Labrador who have the skills and experience required to work on the Project and priority will be given to qualified residents of the Province.

During Construction, it is estimated that the Project employment will peak at 310 employees. Certain positions, such as those in management, will be required throughout the Construction stage, while other occupations will be required for short periods of time.

During Operation and Maintenance, the workforce will include approximately 269 employees at peak production of which approximately half will be on site at any time. Employees who are not hired from adjacent communities or local Indigenous groups will work on a rotational fly-in, fly-out (FIFO) schedule. All FIFO employees will work on a two week on, two week off rotation.

Jobs created during Construction and Operation and Maintenance will generate economic spinoffs in the form of indirect and induced employment. These spinoffs will be enhanced by the Project Benefits Plan and the Gender Equity and Diversity Plan, which will contribute to increased

employment and incomes through contracting with companies in the Province in addition to direct employment policies. Joyce Direct Iron will actively engage with local and Indigenous-owned businesses, to facilitate local participation in supply and service contracts.

9.3.2 Infrastructure

The Project will directly require the construction of new industrial and transportation (road and rail) infrastructure in the Menihek area. Project activity will also contribute to demand for a range of other infrastructure and services, such as air transportation and the existing rail owned by Tshiuetin Rail Transportation Inc. The result will be expanded and improved infrastructure and services.

9.3.3 Education and Training

Joyce Direct Iron will work with education and training institutions to facilitate the employment of local and Newfoundland and Labrador residents. Century has had preliminary discussions with the College of the North Atlantic and private training institutions in Labrador City to identify graduating or recently graduated students in the required skill sets. The Proponent will review its job requirements against the existing pool of expertise to identify training required for certain skills or trades.

The provisions of the Project Benefits Plan will facilitate increased involvement of qualified Newfoundland and Labrador companies in supplying goods and services for the Project. Joyce Direct Iron will work with Newfoundland and Labrador companies bidding and undertaking Project work to help them be successful, including through the adoption of best practice health, safety, environmental and quality processes, and standards. Local companies that are successful in bidding Project work will be better positioned to win future contracts on other projects as a result of the skills and expertise developed for Project work.

9.3.4 Indigenous Interests and Gender Diversity

Joyce Direct Iron recognizes the Indigenous communities in the area of the Project, as well as the AIP negotiated by the Innu Nation with the federal and provincial governments that provides for the negotiation of an IBA with them in the Menihek region. The Proponent will negotiate an IBA with the Innu Nation and reach appropriate agreements with the other Indigenous communities that have asserted claims. Benefits to Indigenous people will be enhanced through agreements made between representative Indigenous organizations and Joyce Direct Iron, as well as through the provisions of the Gender Equity and Diversity Plan. Through these initiatives, Joyce Direct Iron will promote and support the employment, training, business opportunities and social benefits the Project will afford for Indigenous people. Indigenous interests are discussed in greater detail in Chapters 8 and 23.

The Gender Equity and Diversity Plan will include measures to promote a diverse workforce including qualified female employees. Joyce Direct Iron has committed to making additional recruitment efforts to encourage more women to apply. Such initiatives will expand the Province's labour pool by facilitating the participation of women. Joyce Direct Iron will also work to promote business access by companies owned and operated by women. Contracts to women-owned and

women-led businesses will both support indirect employment and allow these businesses to expand their capacity and expertise, strengthening their position to successfully bid on future work.

9.3.5 Economic Diversification and Sustainability

By delivering an additional mining project, expanding the labour pool, expanding local business capabilities and capacities, delivering new infrastructure, and supporting education and training, the Project will contribute to the increasing diversification and sustainability of the Newfoundland and Labrador economy.

9.4 Social and Environmental Benefits from the Project and Environmental Assessment

Project-related economic development will directly and indirectly increase the wellbeing of residents of the Province. This will result from the effects of employment on incomes and self-esteem, and reductions in social inequality. Additionally, the EA process facilitates the incorporation of environmental planning into the Project design phase and allows for the maximization of environmental benefits.

The government revenues discussed above may also be used to enhance the social well- being of the Province and community through the provision of education, health, recreation and other services and infrastructure.

9.4.1 Incomes and Self-esteem

The Project will result in employment opportunities and associated income benefits for local and Indigenous workers. Project employment and economic spin-off will generate direct, indirect, and induced incomes to workers and local businesses. These incomes, and the related employment experience and skill sets enhanced on the job, will contribute to the future employability in the region or outside and the self-esteem of the individuals involved, and to the well-being of their families.

Higher incomes typically lead to a higher standard of living and reduced financial stress. Those who earn higher incomes often increase their participation in a variety of recreational and community activities. Operations and maintenance phase workers and their families will receive the benefits of good, steady incomes, while also having extended periods of time together. Project workers will benefit from training and personnel policies, gaining valuable work experience and benefiting from related increases in self-esteem and confidence. Greater self-esteem and confidence, as well as an improved standard of living, can contribute to a decline in social problems such as substance abuse, crime, and violence.

Income, employment, and social status are among the most important determinants of health. Individuals perceive themselves as being healthier when their socio-economic status and income levels rise. In contrast, high levels of unemployment and economic instability cause substantial mental and social health problems and adverse effects on the physical health of unemployed individuals, their families, and their communities. Closely associated with new or increased

income, employment and self-reliance is an increasing sense of self-esteem, and therefore enhanced personal health and well-being. Project and Project-related employment, will provide opportunities for currently unemployed individuals to withdraw from social assistance or other forms of government support, leading to increased self-esteem, a means to gain a sense of control over the individual's position in the community, and to provide assistance to their immediate and extended family.

Project related activity and work can also, both directly and indirectly, increase the availability and quality of community services, infrastructure, and other components, leading to an enhancement in the well-being and quality of life of local residents.

9.4.2 Social Equality

Assisted by Gender Equity and Diversity Plan initiatives, the Project will facilitate the participation of women and Indigenous people and the companies they own and operate. These diversity initiatives will help reduce social inequalities and build a vibrant and diverse province.

9.4.3 Sustainability and the Environment

Sustainable development seeks to meet the needs of present generations without compromising the ability of future generations to meet their own needs. The objectives of sustainable development are:

- The preservation of ecosystem integrity, including the capability of natural systems to maintain their structures and functions and to support biological diversity;
- Respect for the right of future generations to the sustainable use of renewable and non-renewable resources; and
- The attainment of durable and equitable social and economic benefits.

These concepts have informed the planning and design of the Project. In particular, this EIS describes planning and design approaches and mitigation measures to avoid or reduce adverse environmental and socio-economic effects. The Project will be undertaken using conventional mining methods and technically proven mitigation measures. As a result, the use of technological innovations to address environmental effects is not anticipated. However, opportunities to take advantage of technological developments will be evaluated throughout the life of the Project.

Baseline scientific information on water, vegetation, birds, wildlife, and historic resources has been collected as part of the EA process. These data will substantially add to the body of knowledge in the region and can be drawn on to benefit the assessment of other potential Projects as appropriate.

A summary of Project changes is included in Chapter 2: Project Description. Potential environmental benefits of these changes include a reduction in the volume of water required by the Project and avoidance of potential effects to the receiving environment from tailings management and associated effluent. There will also be reduced effects on cabin owners resulting from the relocation of Project infrastructure away from the cabins on Iron Arm.

9.5 References

NLDF (Newfoundland and Labrador Department of Finance). 2011. The Economic Review 2011. Available at: http://www.economics.gov.nl.ca/PDF2011/TheEconomicReview2011.pdf. Accessed: October 31, 2014.

NLDF (Newfoundland and Labrador Department of Finance). 2012. The Economic Review 2012. Available at: http://www.fin.gov.nl.ca/fin/publications/economic_review_2012.pdf. Accessed: November 20, 2014.

NLDF (Newfoundland and Labrador Department of Finance). 2020. The Economy 2020. Available at: https://www.gov.nl.ca/fin/files/The-Economy-2020.pdf. Accessed: January 20, 2021.

Newfoundland and Labrador Statistics Agency. 2020. Statistical Information for Newfoundland and Labrador (Various Tables). Available at: http://stats.gov.nl.ca/Statistics/. Accessed: January 21,2021.