IRON ORE COMPANY OF CANADA
HUMPHREY SOUTH EXTENSION PROJECT
LABRADOR CITY

Environmental Assessment Registration

Pursuant to the Newfoundland & Labrador *Environmental Protection Act (Part X)*

Submitted by:
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December 2020

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ABA	Acid Base Accounting
ACCDC	Atlantic Canada Conservation Data Centre
ACOA	Atlantic Canada Opportunities Agency
AGL	Above Ground Level
AMEC	AMEC Environment & Infrastructure
ARD	Acid Rock Drainage
ATO	Automatic Train Operation
BACT	Best Available Control Technology
BASA	Biological Assessment Study Area
BRRP	Business Resilience and Recovery Program
BSF	Black Spruce Feathermoss
CAN/CSA	Canadian Standards Association
CAC	Criteria air contaminants
CAP	Community Advisory Panel
CCB	Climate Change Branch
CH4	Methane
CHMP	Cultural Heritage Management Plan
CAN	College of the North Atlantic
CO	Carbon Monoxide
CO2	Carbon Dioxide
CO2eq	Carbon Dioxide Equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch-per-unit effort
CWCS	Canadian Wetland Classification System
CWS	Canadian Wildlife Service
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
EMS	Environmental Management System
EPP	Environmental Protection Plan
ERRP	Emergency Response and Reporting Plan
GIS	Geographical Information System
GHG	Greenhouse gases
GNL	Government of Newfoundland and Labrador
GPM	Gallons per minute
GPS	Global Positioning System
Ha	Hectares
HSEQ MS	Health, Safety and Environmental and Quality Management System
IOC	Iron Ore Company of Canada
IN	Innu Nation
ITUM	Innu of Uashat mak Mani-Utenam
kBcm	Thousand Banked cubic metres

kg	Kilogram
km	Kilometre
km/h	Kilometres per Hour
kt	Kilotonne
LIF	Lower Iron Ore Formation
LIORC	Labrador Iron Ore Royalty Corporation
LWHCC	Labrador West Health Care Centre
MAC	Mining Association Canada
MASL	Metres Above Sea Level
MBCA	Migratory Birds Convention Act
m	Metre
m^2	Square metres
m^3/d	Cubic metres per day
MBCA	Migratory Birds Convention Act
mbgs	Metres Below Ground Surface
MGGA	Management of Greenhouse Gas Act
MGGR	Management of Greenhouse Gas Regulations
MIF	Middle Iron Ore Formation
mm	Millimetre
MDMER	Metal and Diamond Mining Effluent Regulations
Mm3	Million Cubic Metres
mRL	Metres Relative Level
Mtpa	Million tonnes per annum
Mt	Million tons
MW	Megawatt
N_2O	Nitrous oxide
NAG	Non-acid generating
NCC	NunatuKavut Community Council
NLDECCM	NL Department of Environment, Climate Change and Municipalities
NLDFLR	NL Department of Fisheries and Land Resources
NLIET	NL Department of Industry, Energy and Technology
NLDTCAR	NL Department of Tourism, Culture, Arts and Recreation
NNK	Naskapi Nation of Kawawachikamach
NL EPA	Newfoundland and Labrador Environmental Protection Act
NL ESA	Newfoundland and Labrador Endangered Species Act
NLSA	Newfoundland and Labrador Statistics Agency
NPG	Neutralizing Potential Ratio
PAG	Potentially Acid Generating
NOX	Nitrogen Oxides
PAO	Provincial Archaeology Office
PM	Particulate Matter
PM2.5	Particulate matter less than 2.5 microns
PM10	Particulate matter less than 10 microns
PPD	Pollution Prevention Division

QNS&L	Quebec North Shore and Labrador
RAA	Revenue Administration Act
RTF	Regional Task Force
S	Sulphur
SAR	Species at Risk
SARA	Species at Risk Act
SEM	Sikumiut Environmental Management
SO_2	Sulfur dioxide
SOP	Standard Operating Procedure
TLH	Trans Labrador Highway
TMF	Tailings Management Facilities
TPM	Total Particulate Matter
UIF	Upper Iron Ore Formation
USGPM	US Gallons per Minute
UAV	Unmanned Aerial Vehicle
WD	Wildlife Division
WNS	White-nose Syndrome
WRMD	Water Resources Management Division
WSFF	White Spruce-Balsam Fir-Feathermoss

1.0 Introduction

Project Name: Humphrey South Extension Project

The Iron Ore Company of Canada (IOC) has been operating in Labrador City since the early 1960s. The company's current mining operations consist of open pit mines, mineral processing, e.g., concentrator and pellet plant, and tailings management facilities, as well as transportation infrastructure and other associated components and activities.

IOC is proposing to expand development of the existing Humphrey South Pit to support its existing operations in Labrador City. The proposed Humphrey South Extension Project (HSEP or the 'Project') will be an extension of the existing Humphrey South (HS) iron ore deposit and will include development into the White Lake area (Figure 1).

The Project is situated within IOC's existing mining lease and encompasses approximately 370 hectares (ha) (3.7 km^2) of land. The Project comprises an extension of the HS pit to the east and south, development of a waste dump south of White Lake, extension of the existing Carol waste dump, construction of new power lines, construction of new pit dewatering wells and the development of surface water handling systems.

Activities associated with the Project will involve vegetation and tree clearing/mulching, removal and stockpiling of overburden, organic material and topsoil, road construction, drilling and blasting, waste rock removal and storage, construction and installation of surface and ground water management infrastructure, and transportation of ore to existing on-site facilities for processing. Contractors will be used for the initial pit development and waste rock dump development, and IOC's existing workforce, equipment and infrastructure will be used during operations activities of the Project. IOC will extend the commitments made in the final and approved, Wabush 3 Industrial and Employment and Gender Equity and Diversity Plan (GEDP), to cover the Project construction phases, including the reporting requirements relative to the commitments.

The proposed open pit mining operations for the Project will be carried out using IOC's existing mining practices. IOC will use ore mined from Project pits to maintain concentrator feed, supplementing feed sourced from other areas of its operations. The footprint of the Project represents less than 5 % of IOC's total mining lease area (9500 ha) in the Labrador City area.

This environmental assessment (EA) Registration document has been prepared in relation to the HSEP by IOC, with assistance from GEMTEC Consulting Engineers and Scientists Limited (GEMTEC). The document format follows the guidance for Project Registration as described under the Newfoundland and Labrador (NL) EA process.

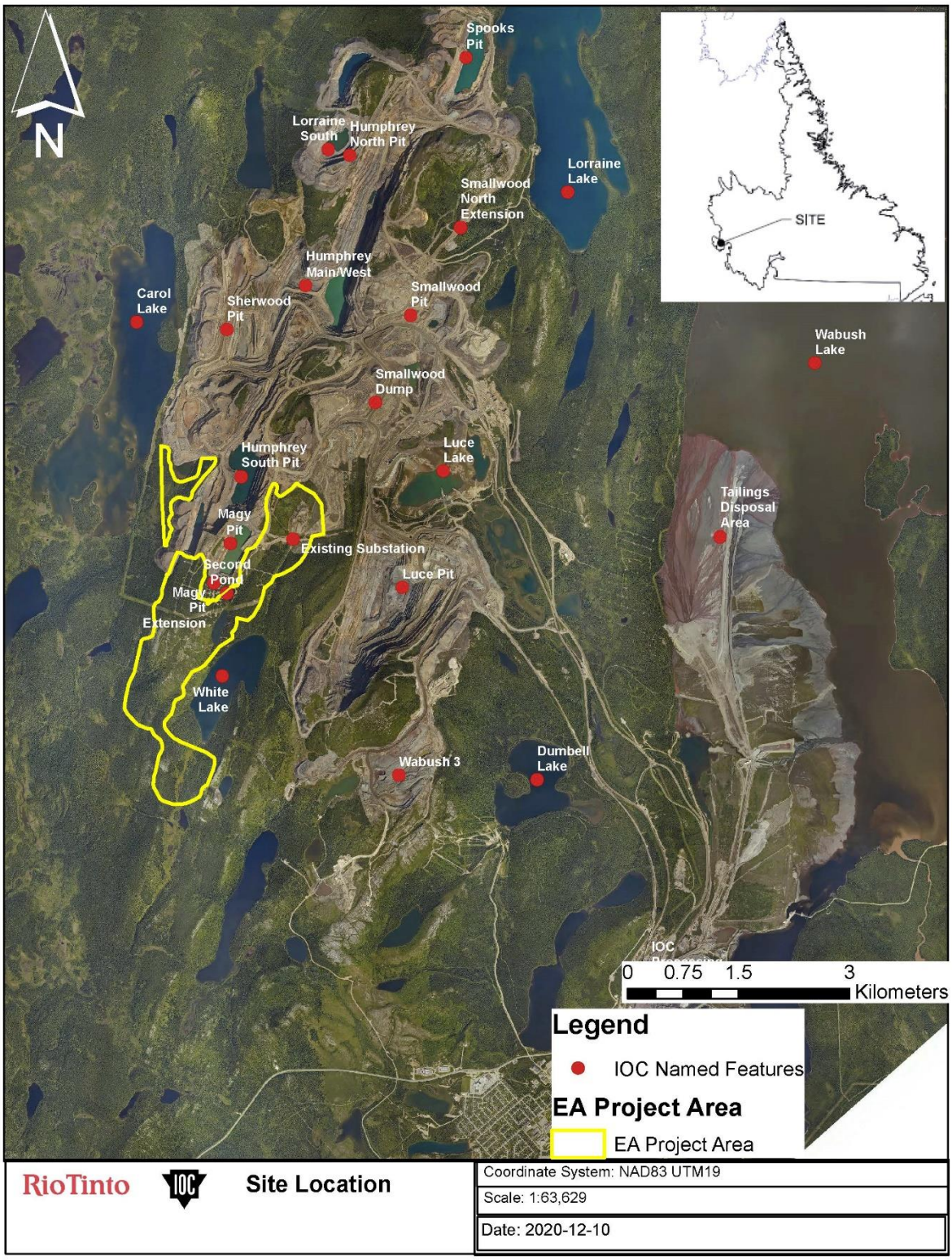


Figure 1: Site Location

1.1 Proponent Information

IOC is a major producer of iron ore in Canada, and a leading global supplier of iron ore pellets and concentrate.

Name of Corporate Body:	Iron Ore Company of Canada
Corporate Address:	1190 des Canadiens-de-Montréal ave., Suite 400, Montreal, Quebec H3B 0E3 T: (418) 968-7400
Labrador City Operations Address:	2 Avalon Drive, Labrador City, NL Canada A2V 2Y6
President and Chief Executive Officer:	Mr. Clayton Walker
Principal Contact Person for the Purposes of EA	Mr. Patrick Lauzière Manager, Environment & Sustainable Development 1 Retty Street, Sept-Îles, QC Canada G4R 3C7 Tel. (418) 968-7400 (Ext 7513) Email. Patrick.Lauziere@ironore.ca

IOC currently operates open pit mines, a concentrator and a pellet plant in Labrador City, and transports its products along a 418 km railway to its port facilities in Sept-Îles, Quebec on the St Lawrence Seaway. Approximately 1,900 persons are employed in permanent positions at IOC's Labrador City facilities.

The company's existing mining operations in Labrador City consist of three active open pit mining areas (Luce, Moss and Humphrey Main/West/Sherwood (HMWS), and three that are currently idled (Humphrey South, Lorraine South, and Spooks). Note that Magy, Sherwood and Sherwood North are phases or pushbacks of HMWS and Humphrey South (Figure 2). IOC's Labrador City properties also contain substantial quantities of additional iron ore reserves for potential future development.

IOC's concentrator has an annual production capacity of approximately 23 million tonnes of iron ore concentrate. Of that amount, approximately 9 to 13 million tonnes are pelletized and the balance is sold directly as iron ore concentrate.

After processing at the Labrador City facilities, the iron ore concentrate and pellets are transported south via the Quebec North Shore and Labrador (QNS&L) railway, a wholly owned subsidiary of IOC, to the company's shipping terminal and deep water port in Sept-Îles, Quebec, which handles ore carriers up to 255,000 tonnes. IOC exports its concentrate and pellet products to major North American, European and Asian steel makers.

IOC has a comprehensive Health, Safety and Environment and Quality Management System (HSEQ MS) with associated health, safety and environmental standards, work practices and

procedures in place for its construction and operational activities. These have been developed and implemented, and are continuously updated, in accordance with Rio Tinto's *Iron Ore Health, Safety, Environment, Communities and Quality Policy* (Appendix A) and applicable legislation and policies. As part of its HSEQ MS, IOC has a comprehensive Environmental Management System (EMS), including plans and procedures designed to reduce the environmental effects of its activities. Associated with its HSEQ MS, IOC has a rigorous internal and external auditing process which annually evaluates the management systems' performance with the objective of continuous improvement.

The Project, as it develops through its various phases from conception to closure, will be evaluated to promote conformance to IOC's internal standards and with applicable legislation. Risk evaluation is required through each phase of the Project and mitigation measures will be identified and implemented to avoid or reduce risks. IOC's major shareholder and operator, Rio Tinto, has developed world class standards in the area of health, safety, and environment and community relations.

1.2 Rationale for the Undertaking

IOC mines ore from multiple open pits, (e.g., large, long life pits and smaller, shorter life pits), to maintain feed to its concentrator. IOC's large Humphrey South (HS) deposit has been partially mined, including the Magy Pit, but still contains substantial mineral reserves and resources (Table 1). The Magy Pit Extension Project will be developed from 2020-2022 and is scheduled to produce ore in 2022. The mineral resources of the HS deposit extend into undeveloped areas and it is this area of the deposit that this Project will be targeting for development (Figure 2).

Figure 2: Project Site Overview

Table 1: Humphrey South Deposit Mineral Reserves and Mineral Resources (Dec 2019)

Mineral Reserves	As -mined		Saleable Product	
	Tonnes (millions)	Iron Grade (Fe %)	Tonnes (millions)	Iron Grade (Fe %)
Proven Reserves	237	39%	102	65%
Probable Reserves	25	38%	10	65%
Total Mineral Reserves	**262**	**39%**	**113**	**65%**
Mineral Resources	**In-situ**		**Saleable Product**	
	Tonnes (millions)	Iron Grade (Fe %)	Tonnes (millions)	Iron Grade (Fe %)
Measured Resources	68	41%	28	65%
Indicated Resources	114	39%	49	65%
Total Measured and Indicated Mineral Resources	**181**	**40%**	**76**	**65%**
Inferred Resources	254	38%	106	65%

Notes:

1. Mineral Resources exclude Mineral Reserves.
2. Mineral resources are reported on an in-situ basis and mineral reserves are reported on an as-mined (i.e. net of dilution and mining losses) basis. In-situ and as-mined material is reported on a dry basis.
3. Saleable product comprises 57% pellets and 43% CFS at 2% natural moisture content.
4. Mineral Reserves have been estimated by Tim Leriche who meets the criteria for being a Qualified Person, as defined by National Instrument 43-101 and who is a former employee of IOC. Mineral Resources have been estimated by Ramsey Way, Beverly Power and Mervin McDonald, who meet the criteria for being Qualified Persons, as defined by National Instrument 43-101 and who are all full time employees of IOC.
5. Mineral Reserves comprise all economically viable oxide mineralised material within the Middle Iron Formation of the Sokoman Formation. Limonitically altered material, however, is excluded from Mineral Reserves in all deposits except Humphrey Main. For the Humphrey Main deposit, limonitically altered ore is included in Mineral Reserves. Mineral Resources include limonitically altered material in all deposits. No cut-off grade has been applied within the Middle Iron Formation, since all mineralised material is economically viable (i.e. above 25% weight yield). Current operating practice at IOC is to process all mineralised material from the Middle Iron Formation. Economic viability of both Mineral Reserves and Mineral Resources is determined using industry standard pit optimization software with projected long term selling prices and operating costs.
6. Most of the assays and density determinations used in the Mineral Reserve and Mineral Resource estimates have been carried out by the IOC laboratory. QA/QC protocols have been in place since 2004. Assay standards are inserted after each 12th sample and duplicate assays are carried out on every 50th sample. A limited number of twinned holes have been compared to validate the assays from holes drilled before the commencement of the QA/QC program. The sampling protocol has been reviewed and the chain of custody of samples has been reviewed on an ad-hoc basis, although this is not part of the routine QA/QC process. Reconciliations of modelled ore tonnes and qualities against measured tonnes and qualities are carried out monthly, to validate the reserve models.
7. Reserves and resources are quoted at the end of 2019

The HS deposit is a source of low grind energy ore, which can be blended with higher grind sources, to maximize concentrator throughput. In addition, the HS deposit contains 21% of IOC's remaining Reserves and 27 % of its remaining Resources. The efficient operation of IOC's concentrator requires that the remaining Reserves and Resources of the HS deposit be progressively brought into production. Strategic mining of both reserves and resources from multiple pits and locations can support IOC's efforts to:

- Meet product quality criteria by blending ores of differing quality;
- Balance strip ratios to decrease the variability of material movement rates;
- Provide feed sources close to the various loading pockets of the ore delivery system; and
- Reduce the disruption to production during blasting operations by providing multiple ore sources.

The Project will be fully integrated with IOC's overall Labrador City Operations, and will use its existing:

- Mining equipment;
- Labour force;
- Maintenance facilities;
- Ore delivery systems;
- Processing plants; and
- Tailings storage facilities (TSF).

Development of the HSEP, a larger, longer duration project, is critical to IOC achieving and maintaining production goals and ensuring its long-term sustainable mining strategy is followed. While decreasing production risks, development of the Project at this time also maintains efficient use of available mine equipment.

The current design of the Project includes 262 million tonnes of mineral reserves, 181 million tonnes of measured and indicated mineral resources and potentially 254 million tonnes of inferred mineral resources processed over approximately 50 years. Extraction of these reserves and resources requires the mining of up to 900 million tonnes of waste rock. IOC will gain access to the HSE orebodies in a planned and staged approach (Table 2), a strategy that supports IOC remaining competitive in the industry and enables IOC to contribute in positive ways to the local and provincial economy. The HSEP Stages 1-4 correspond to the HS Phases C/D through to L. Development activity will commence during the mining of the Magy Pit Extension, which was previously registered and released from the provincial EA process.

The Project will use IOC's existing labour force and as such, a smooth and efficient transition from EA release to construction and production will lessen pitfalls to the local economy. IOC will consult with the Government of NL if there are changes to the planned sequence or scope of development activities.

This document has been prepared to register the HSEP, representing the remaining HS Mineral Resources, (i.e., those located beyond the Magy Pit Extension), for environmental assessment review under the NL EPA.

1.3 Environmental Assessment Process and Requirements

The NL EPA requires anyone who plans a project that could have a significant effect on the natural, social or economic environment (an "Undertaking") to present it for examination through the provincial EA process.

Under the NL EPA definitions, an Undertaking "includes an enterprise, activity, project, structure, work or proposal and a modification, abandonment, demolition, decommissioning, rehabilitation and an extension of them that may, in the opinion of the minister, have a significant environmental effect".

The associated *Environmental Assessment Regulations* (Part 3) list those projects, potentially including proposed modifications and extensions of same, which require registration and review. These include, for example:

> *"s.33(2) An undertaking that will be engaged in the mining, beneficiating and preparing of a mineral as defined in the Mineral Act whether or not these operations are to be performed in conjunction with a mine or at mills that will be operated separately."*

Following public, Indigenous and governmental review of this EA Registration, the Minister of the NL Department of Environment, Climate Change and Municipalities (DECCM) will issue a decision that will be one of the following:

- Release, with or without conditions;
- Further review, in the form of an Environmental Preview Report (EPR) or an Environmental Impact Statement (EIS); or
- Rejection of the proposed undertaking via a recommendation to Cabinet.

IOC also reviewed the Schedule of Physical Activities under the *Regulations Designating Physical Activities* of the new federal *Impact Assessment Act, 2019,* and did not identify any formal federal triggers for this Project.

2.0 Project Description

The following sections describe the Project location, geographic setting and land tenure.

2.1 Property Description and Location

The Project is located immediately southwest of the Magy Pit, west of the Luce and Moss pits and adjacent to White Lake (Figure 2), and within IOC's existing mining property boundaries at Labrador City. The approximate coordinates of the Project are 53°00'36.51" N, 66°58'33.02" W at an elevation of 820-840 metres above sea level (MASL). The area is not road accessible and has been surrounded by mining activities since the early 1960s.

Initial development of the HS deposit at IOC's Labrador City mining operations was started in 1980s and although this deposit has been partially mined, there are still significant Mineral Reserves and Resources (Table 1) available to be mined. This Project will be targeting mineral resources and reserves of the HS deposit that extend into undisturbed areas, south of the current area of disturbance (Figures 2 and 3).

In keeping with past practice, and based on advice from various government regulators, IOC has endeavored to present a Project description that describes a mining sequence that is spatially and temporally connected (Table 2). All four (4) stages of the Project are interconnected and while the Project duration may exceed 50 years, IOC recognizes that grouping these four stages together is logical and avoids potential project splitting.

The Project has a surface area of approximately 350 ha, made up of nine (9) phases or pushbacks (276 ha) and two (2) waste rock stockpiles (75 ha) that will be developed over four (4) stages (Table 2). The Project also involves the development of a waste rock dump south of White Lake, the extension of the existing Carol waste rock dump, construction of new power lines, construction of new dewatering wells and the development of surface water handling systems. Each stage and its associated infrastructure will be presented further in this document.

Table 2: HSEP Stages

HSEP Stage	HS Phase	Description	Pit Areas (ha)	Estimated LOM
NA	B	Magy Pit Extension		2026
1[1]	J, K & L	White Lake Phases	70	2037
2	C/D, E & F	Humphrey South Reserve phases	83	2058
3[2]	G	Humphrey South resource phase – strike extension of west limb	25	2055
4[2]	H & I	Humphrey South resource phases – down-dip pushbacks on east limb	98	2071

[1] Stage 1 pits can be targeted for development independently of Stages 2, 3 and 4
[2] Stages 3 and 4 cannot undercut Stage 2

Substantial preparatory and development work will be completed leading up to the start of mining and will be initiated once the Project has been released from the provincial EA process. IOC's tentative schedule at this time will see development in the Stage 1 resource area start in 2024. The final Stage of work is expected to be completed in approximately 50 years, in the early 2070s.

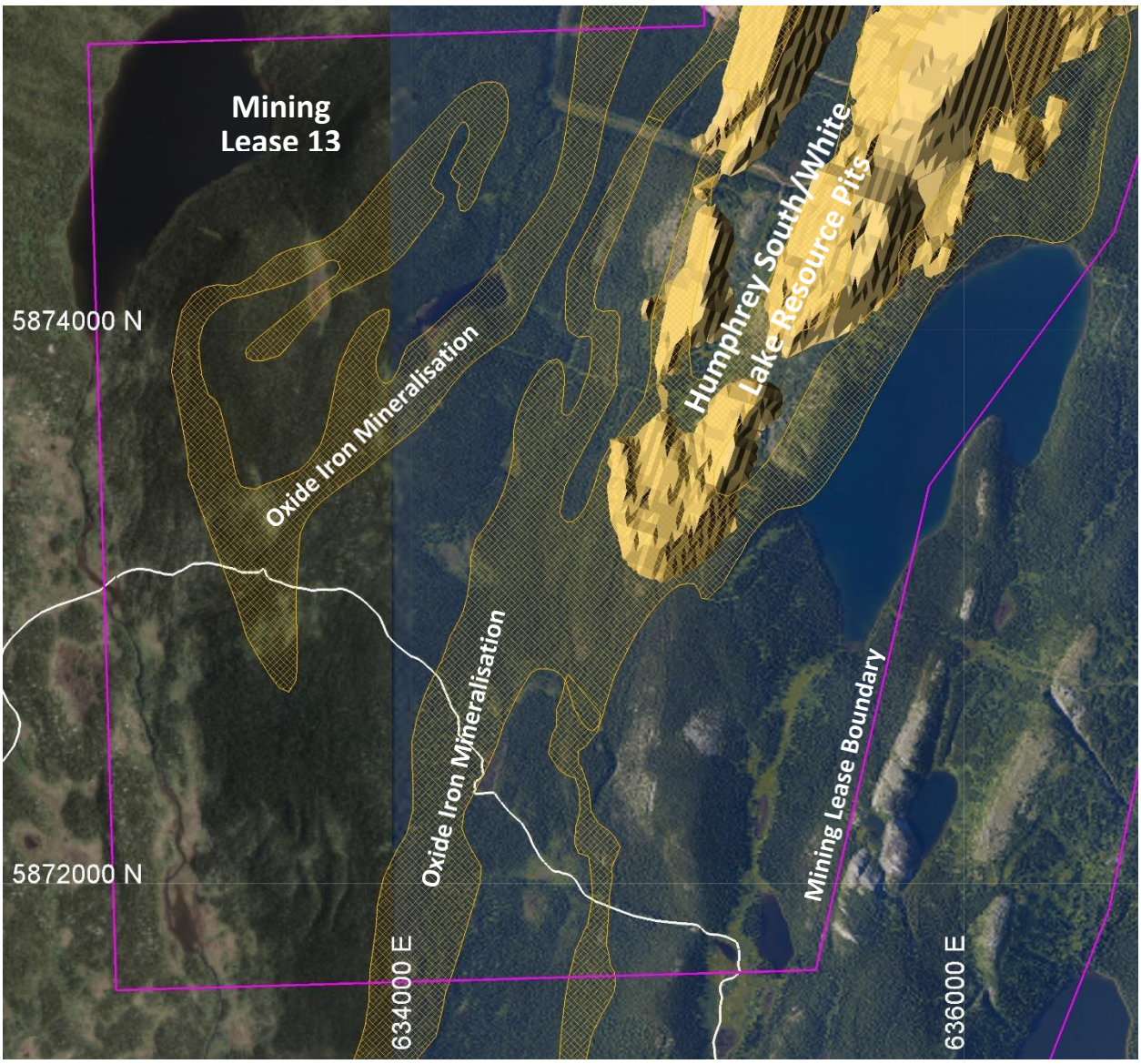


Figure 3: Oxide Iron Mineralization from Aeromagnetic Survey

2.2 Land Tenure

The Project is located entirely within the IOC's Labrador City mining property and is taking place on land that is covered by an existing mining lease (Mining Lease 13, Block 22-3), which was issued in the early 1960s to the Labrador Iron Ore Royalty Corporation (LIORC) (Figures 4 and 5). LIORC also holds surface rights over a portion of this mining lease and subleases the mineral and surface rights to IOC. Additional surface rights will be required to execute the project. The current mining lease extends tenure to 2052, after which mineral tenure will be governed by the *Mineral Act*, with lease extensions of up to 10 years being permitted.

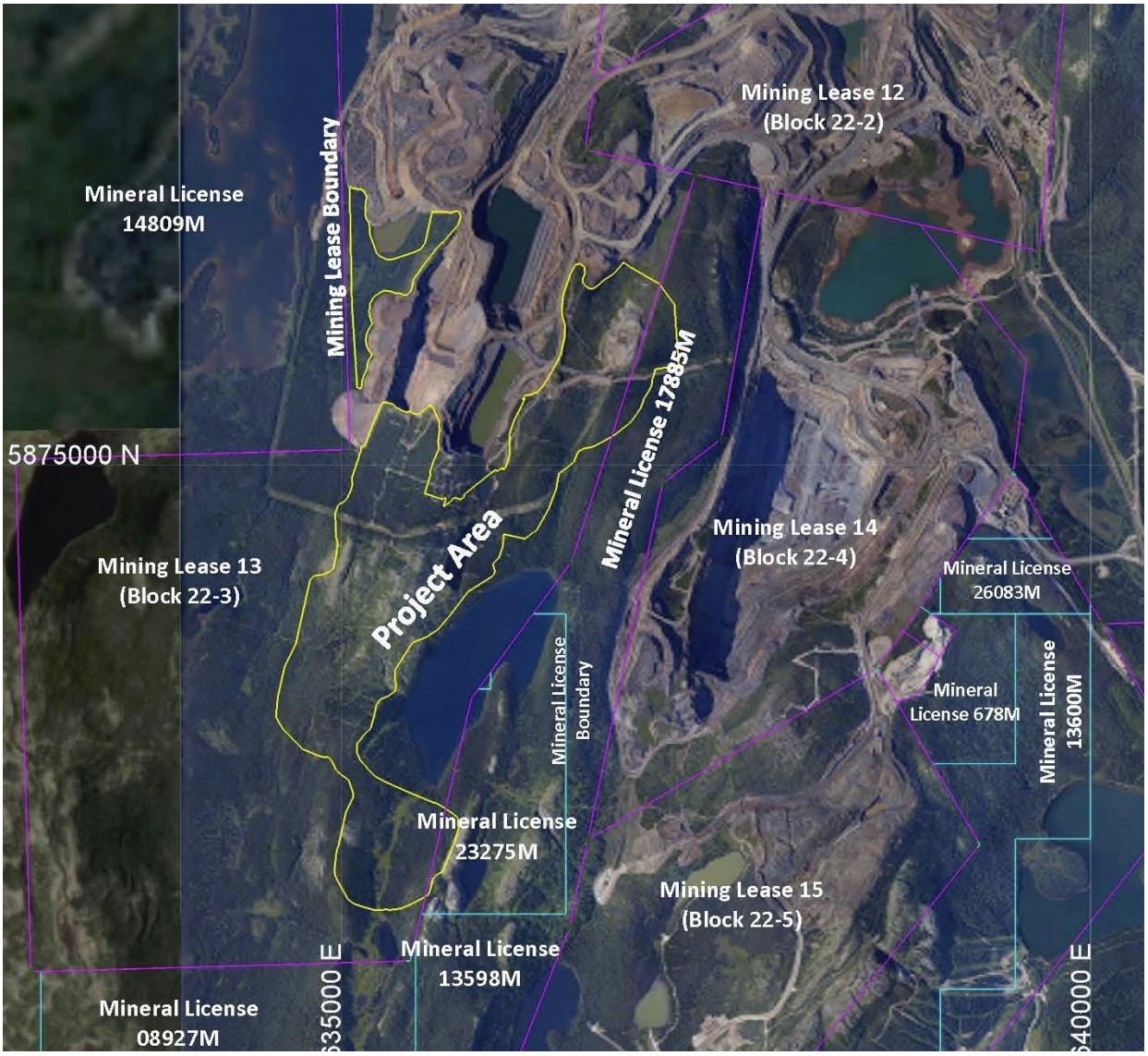


Figure 4: Mineral Tenure – HSEP – UTM NAD27 Zone19

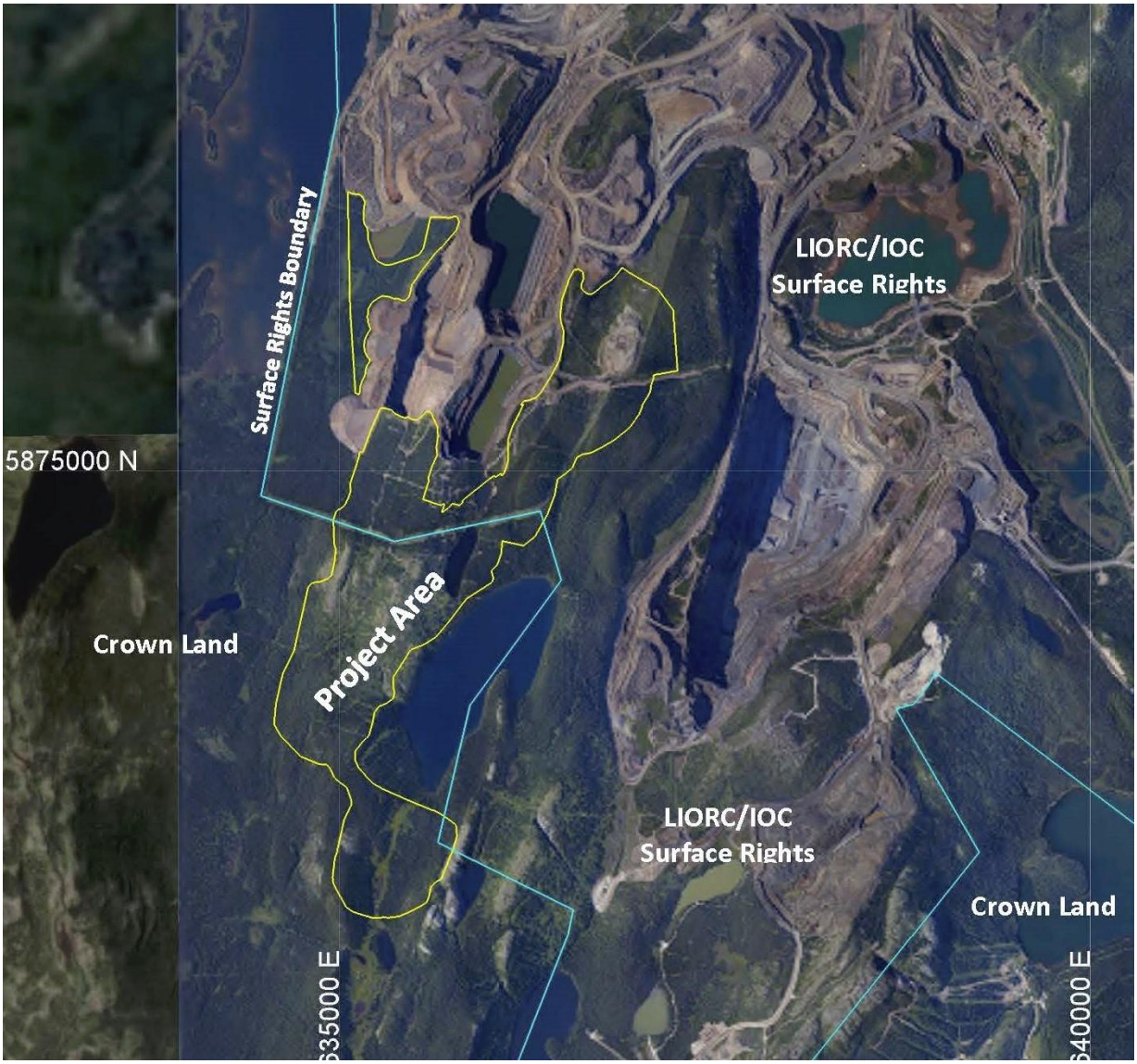


Figure 5: Surface Rights – HSEP - UTM NAD27 Zone19

2.3 Alternatives to the Project

IOC has considered alternative means of carrying out the Project, wholly or in part. The alternatives to the Project are:

- A delay of the Project;
- Development of other iron deposits within the IOC leases;
- Closure of IOC operations once existing operating pits have been exhausted; or
- No project.

None of these options are feasible for maintaining IOC's production levels. A delay in the Project will leave a shortfall in concentrator throughput which will result in either a reduced output or require an increase in stripping to access replacement ore from existing pits. Reducing the concentrator throughput will adversely affect IOC's competitiveness, which will adversely affect the economy of the Labrador West region. Unpredictable production rates can lead to workforce instability, which can create adverse socio-economic effects to local communities. IOC prefers to progressively develop new resources such that stable production rates and stable employment can be maintained, and predictable benefits can accrue to the communities where IOC operates.

The HSEP is a large development that needs to be brought into production to ensure progressive development of IOC's full resource potential and to promote long term sustainable benefits to both the region and the province. Although there is mine life remaining in a number of existing operating pits, limiting development to those pits could result in an earlier closure of IOC's operations, thus adversely affecting both the region and the province. Looking to other reserves would also cause delays as additional exploration drilling and delineation would be needed at other potential sources.

The No Project scenario would not allow IOC to fully exploit mineral reserves in areas adjacent to active pits, and as such, could result in an earlier than predicted closure of its mining operation in the region.

IOC has considered alternative means of carrying out the Project, however as this is simply an extension of an existing mining area, there are few alternative activities available for consideration. The method of mining, (i.e., stripping, drilling and blasting, hauling/conveying), is industry standard for iron ore mining activities and IOC has been improving these methods for many years based on cost, schedule and environmental considerations. The open pit footprints are developed based on the economic model for the pits, and as per the NL *Mining Act* requirements that require all economical ore from the ore body to be exploited.

There are alternatives to the waste rock disposal locations, and it would be preferable to deposit these materials in existing, mined-out open pits. By following the proposed staged approach for development, IOC will use completely mined out open pits that are within reasonable proximity to the HSE pits for waste rock storage, e.g., Stage 1 - Resource areas J, K, and L and Stage 2 – Reserve areas C/D, E, F. The use of mined out pits for waste rock storage will comply with

requirements of the *Mining Act* relative to the avoidance of sterilization of resources. This approach will decrease the extent of future waste rock dumps by placing waste rock back into exhausted areas of the HSE pits where possible. The stripped organics and overburden will be stockpiled and used for future rehabilitation of mining affected areas.

2.4 Project Components

The HS deposit comprises a sequence of tightly folded, overturned, east dipping synclines (Figure 6). The anticipated depth of the open pit mines will range from 80 m in the White Lake area to 350 m adjacent to the existing HS pit. The Project has been designed for development in four stages (Table 3) and will be a series of conventional open pit mines with associated components and activities, which are being designed to support flexible ore feed to IOC's existing production facilities. Standard open pit drilling and blasting techniques will be used to break the rock mass and allow excavation and movement of the rock materials.

Development in the HS area through to 2024 will take place in the Magy Pit Extension area (HS Phase B), a project that was released from the NL EA process in 2018. Figure 7 shows the configuration after the Magy Pit Extension, Luce pit and Humphrey Main pits have been developed.

Beginning in 2024, development of the HSEP will begin and will involve permitting, construction, operations, closure and rehabilitation and post-closure monitoring activities of work associated with further developing the HS deposit (Table 3, Figure 8).

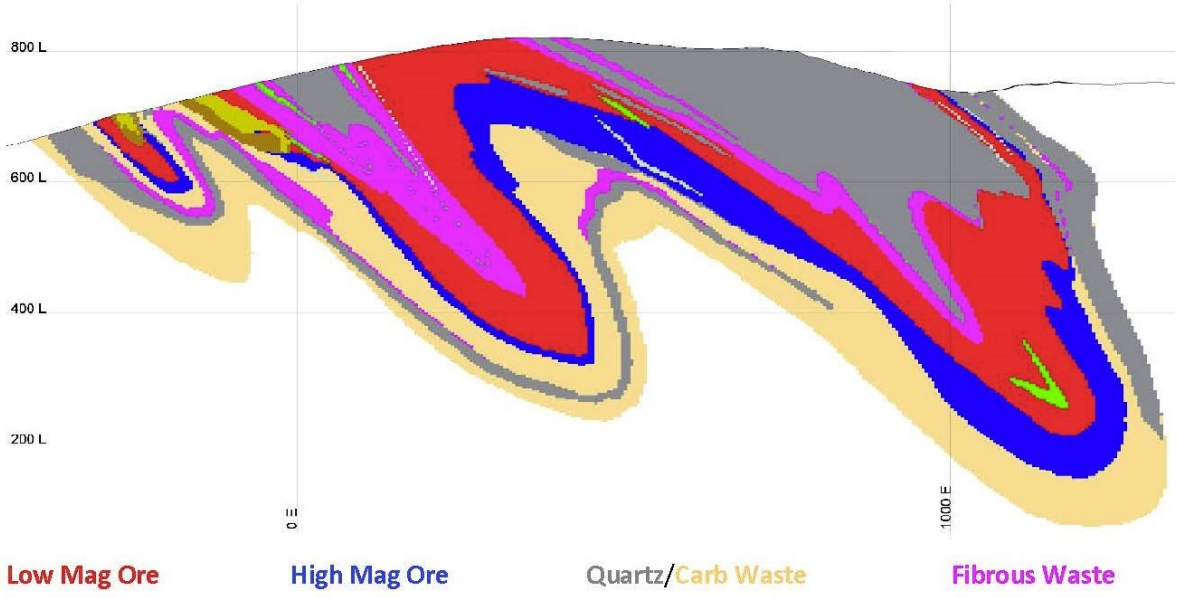


Figure 6: Humphrey South Deposit - Typical Cross Section

Figure 7: Mine Configuration after Completion of Luce, Humphrey Main and Magy Pits

Table 3: Stages of HSEP with Development Dates and Life of Mine

Project Stage	Humphrey South Phase	Description	Development Start	Development End	Estimated LOM
NA	B	Magy Pit Extension	2020	2022	2026
1[1]	J, K & L	White Lake pits	2024	2025	2037
2	C/D, E & F	Humphrey South Reserve phases	2026	2028	2058
3[2]	G	Humphrey South resource phase – strike extension of west limb	2044	2045	2055
4[2]	H & I	Humphrey South resource phases – down-dip pushbacks on east limb	2048	2051	2071

[1] Stage 1 pits can be targeted for development independently of Stages 2, 3 and 4
[2] Stages 3 and 4 cannot undercut Stage 2

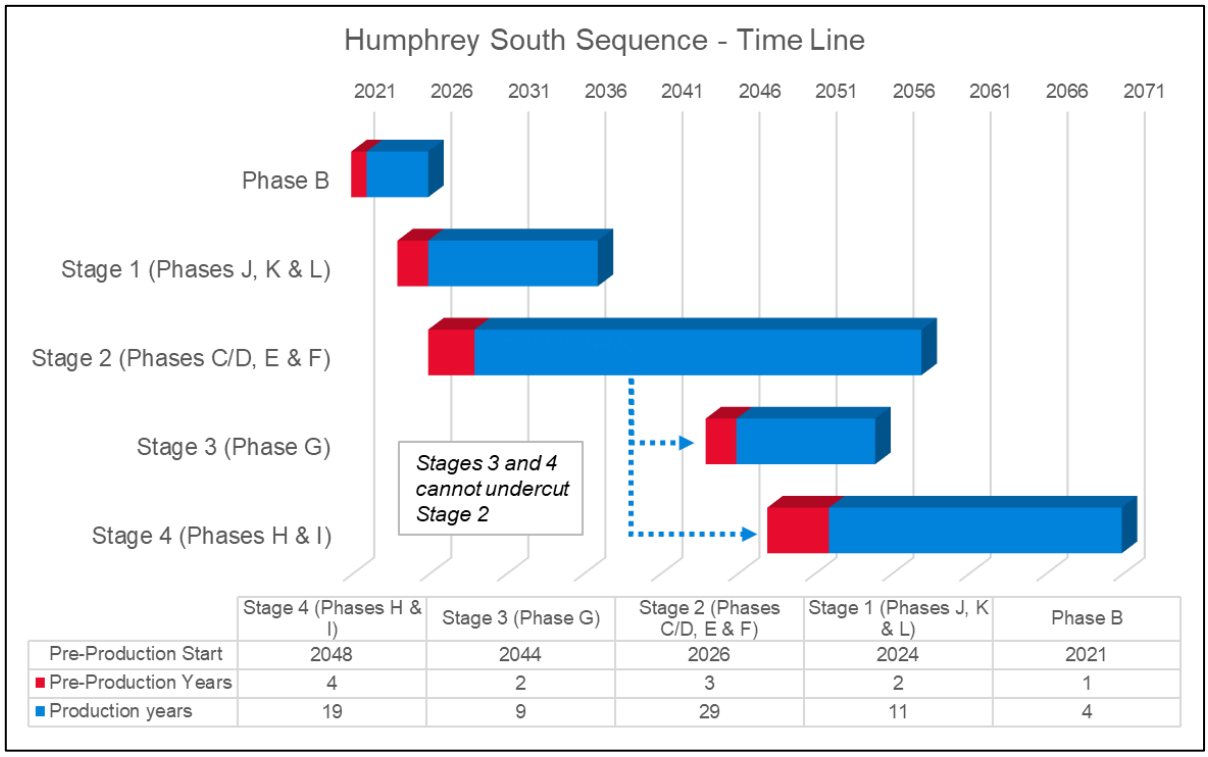


Figure 8: HSEP Development Sequence

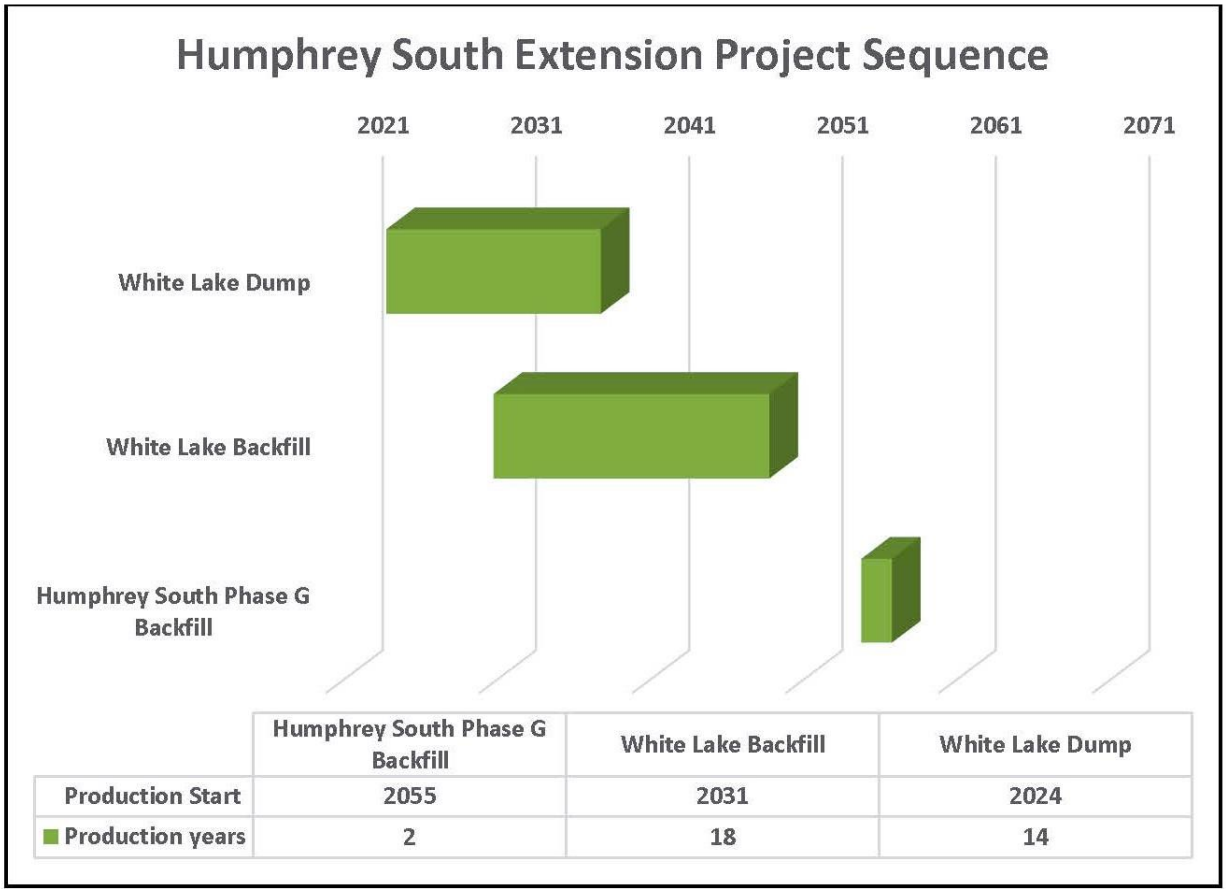
Waste and feed material will be separated at the dig face by the shovels and loaders with waste material being moved to the White Lake waste rock dump or to one of two designated pits to be

backfilled, (i.e., White Lake Pits and Pit G) (Figure 9). Feed material will be transported to the mill for processing.

Development of the four stages of the HSEP will include the following physical components:

- Open pit(s);
- Overburden stockpile(s);
- Waste rock storage site(s);
- Haul road(s) to connect the open pit(s) to waste rock storage site(s), the overburden stockpile area(s), the existing ore delivery system and the concentrator facilities;
- Realignment and/or installation of power lines;
- Groundwater extraction system and associated pipelines; and
- Mine surface water management system and associated pipelines.

Each of these components is discussed in the following sections that outline the planned staged development.



	Humphrey South Phase G Backfill	White Lake Backfill	White Lake Dump
Production Start	2055	2031	2024
Production years	2	18	14

Figure 9: HSEP Dumps and Backfill – Time Line

The current design of the HSEP will see 181 million tonnes of ore and 252 million tonnes of waste processed over several decades. IOC will gain access to the HSEP orebodies in a planned and staged approach (Table 4), a strategy that supports IOC remaining competitive in the industry and continues to contribute in positive ways to the local and provincial economy. Development during each mining phase, (i.e., C through L), will require:

- Site clearing of vegetation;
- Removal of organic material and topsoil;
- Removal of overburden (glacial till); and
- Drilling and blasting of the exposed rock to allow development of the first mining bench.

Components of each stage of the HSEP are summarized in Table 4 and are described in greater detail in the sections that follow.

Table 4: Key Components of Project by Stage

HSEP Stage	HS Deposit	Description	Area (ha)	Key Project Components
1	J, K & L	White Lake pits	70	First Pond dewatering, haul road extension, powerline extension, new waste rock dump, surface water management and water effluent treatment as required.
2	C/D, E & F	Humphrey South reserve phases	83	No waterbodies affected, uses existing powerline, ex-pit haul roads, waste rock piles and overburden stockpiles. Requires new dewatering bores and pipework, new surface water management system, e.g., sumps, pumps, pipework and effluent treatment as required
3	G	Humphrey South resource phase – strike extension of west limb	25	Extensions to haul roads and powerlines. New dewatering bores. Extension to Stage 2 surface water management system and water effluent treatment as required. Extension to existing Carol waste rock dump.
4	H & I	Humphrey South resource phases – down-dip pushbacks on east limb	98	New haul road, realignment of powerlines, new dewatering bores, extensions to Stage 2 surface water management system and water effluent treatment as required. Extension to existing Smallwood waste rock dump. Complete investigations re groundwater connectivity to White Lake.

2.4.1 Stage 1 – White Lake Pits

IOC anticipates developing the White Lake Pits as the first Stage of this Project. This Stage can be developed independently of Stages 2, 3 and 4 and will target the relatively shallow pits, J, K and L, in proximity to White Lake. The two smaller and shallower pits, K and L (Figure 10), adjacent to White Lake are currently planned to be mined first, with the larger and deeper pit, J being mined later (Figure 11). Physical components of Stage 1 include:

- Development of three open pits;
- Dewatering of First Pond prior to Phase J mining. IOC will obtain all required permits prior to the start of any work;
    - Construction of diversion channels around First Pond to reduce surface water inflow to First Pond.
    - Controlled dewatering of First Pond. Discharge will meet all the required provincial and federal discharge criteria.
    - Installation and maintenance of a sump pump system in the First Pond basin to manage groundwater infiltration, surface water inflows and snowmelt runoff.
- Haul road extension;
- Powerline extension; and
- New waste rock dump.

Figures 10 and 11 depict infrastructure associated with mining Pits J, K and L during Stage 1 of the Project.

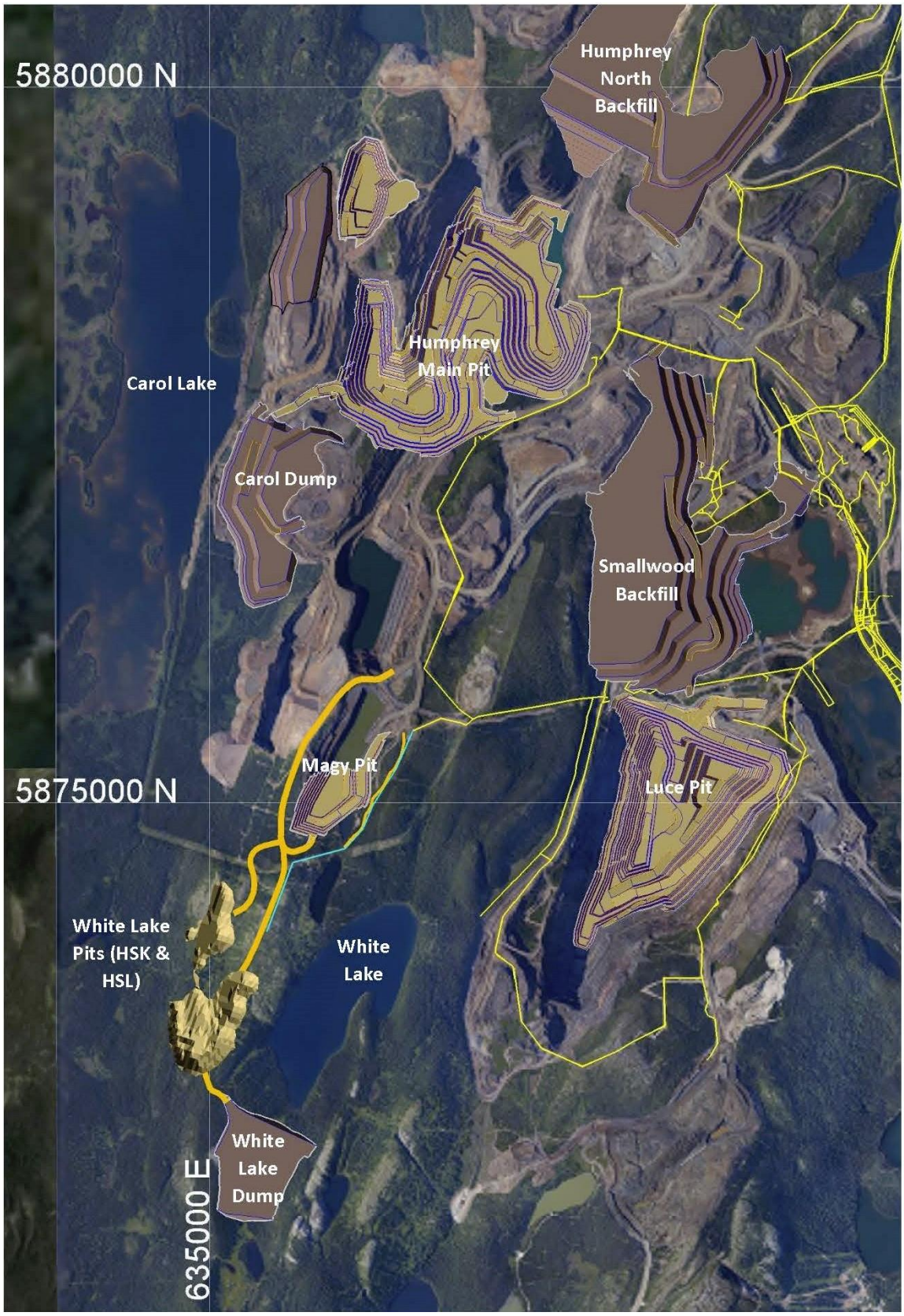


Figure 10: Stage 1 - White Lake Pits K and L

Figure 11: Stage 1 – White Lake Pit J

2.4.2 Stage 2 - HS Reserve Deposits

IOC plans to develop and mine the HS reserve pits (C/D, E and F) (Figure 12) after developing the White Lake pits. These deposits are located on an existing brownfield site and no water bodies will be affected by this stage of operations. This stage will use an existing powerline, existing ex-pit haul roads, existing waste rock and overburden stockpiles. Waste from these pit phases will be placed in the Smallwood dump, the White Lake dump, the White Lake backfill and the backfill in the Sherwood area of the Humphrey Main pit (Figure 12). Components of this stage of work will include:

- Development of several open pit mines;
- Groundwater management that will require new dewatering bores and pipework;
- New surface water management system that includes sumps, pumps, and pipework; and treatment infrastructure as required.

Figure 12 depicts infrastructure associated with mining Pits C/D, E and F during Stage 2 of the Project.

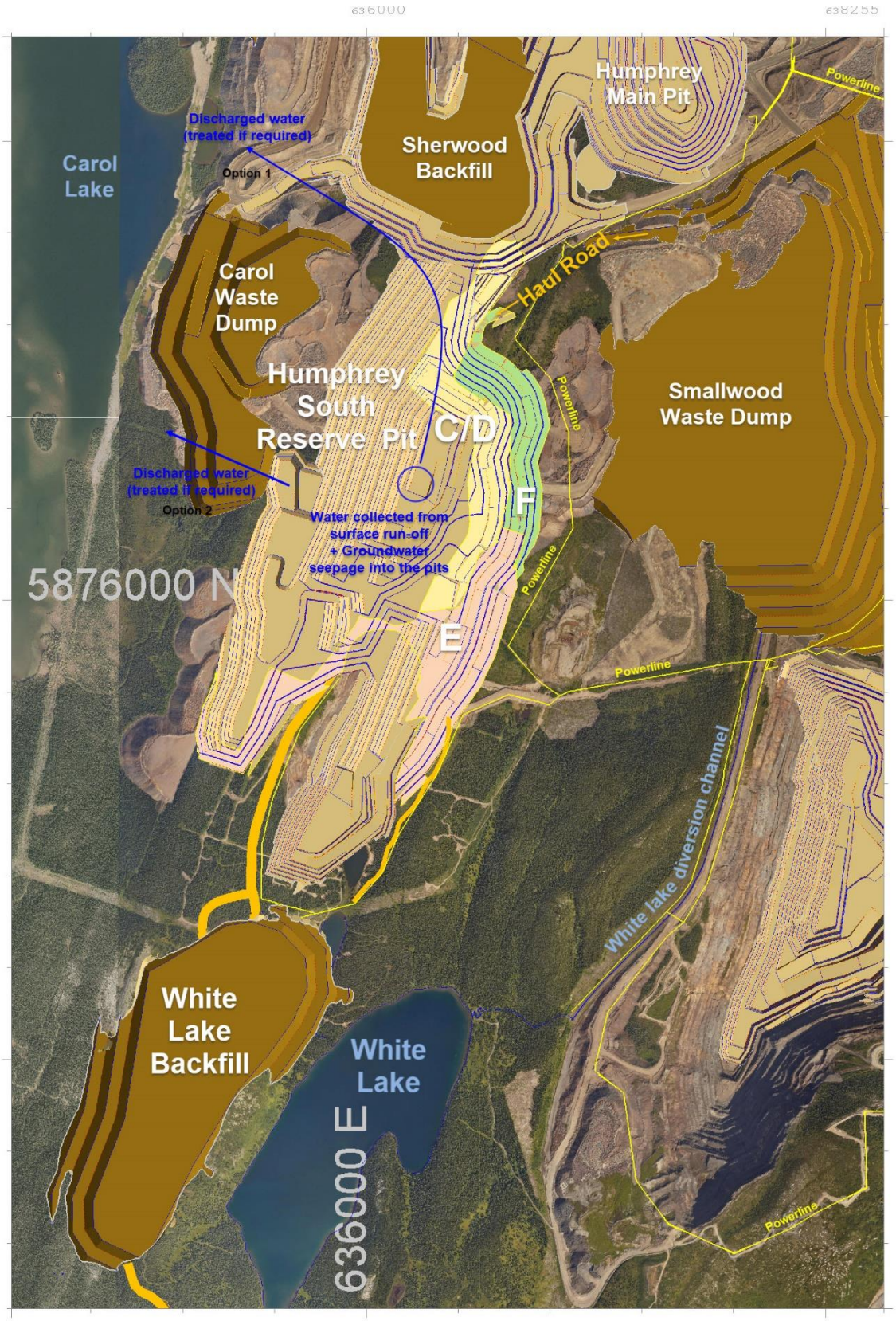


Figure 12: Stage 2 – HS Reserve Pits C/D, E and F

2.4.3 Stage 3 - Humphrey South Resource Phase G

This stage will target the strike extension of the west limb of the HS deposit, Pit G (Figure 13). Components of this stage of work will include:

- Development of one open pit mine;
- Extensions to haul roads and powerlines;
- Groundwater management that will require new dewatering bores and pipework;
- Extension to Stage 2 surface water management system; and
- Extension to existing Carol waste rock dump.

Figure 13 depicts infrastructure associated with mining Pit G during Stage 3 of the Project.

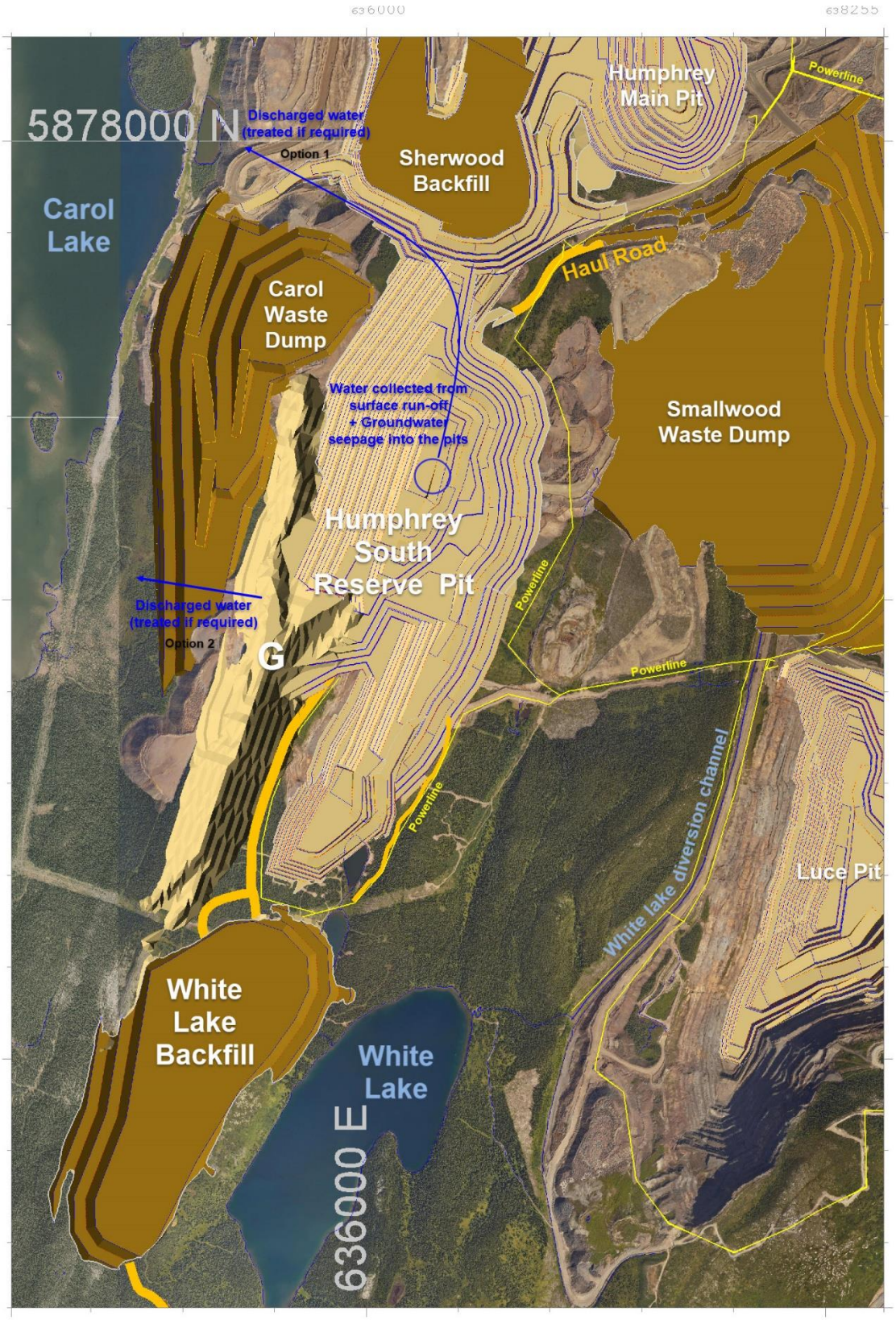


Figure 13: Stage 3 – HS Resource Pit G

2.4.4 Stage 4 - Humphrey South Resource Phases H and I

This stage will target the down-dip pushbacks on the east limb of the HS deposit (Pits H and I). Components of this stage of work will include:

- Development of two open pit mines;
- New haul road;
- Realignment of powerlines;
- Groundwater management that will require new dewatering bores and pipework;
- Extensions to Stage 2 surface water management system; and
- Extension to existing Smallwood waste rock dump.

Figure 14 depicts infrastructure associated with mining Pits H and I during Stage 4 of the Project.

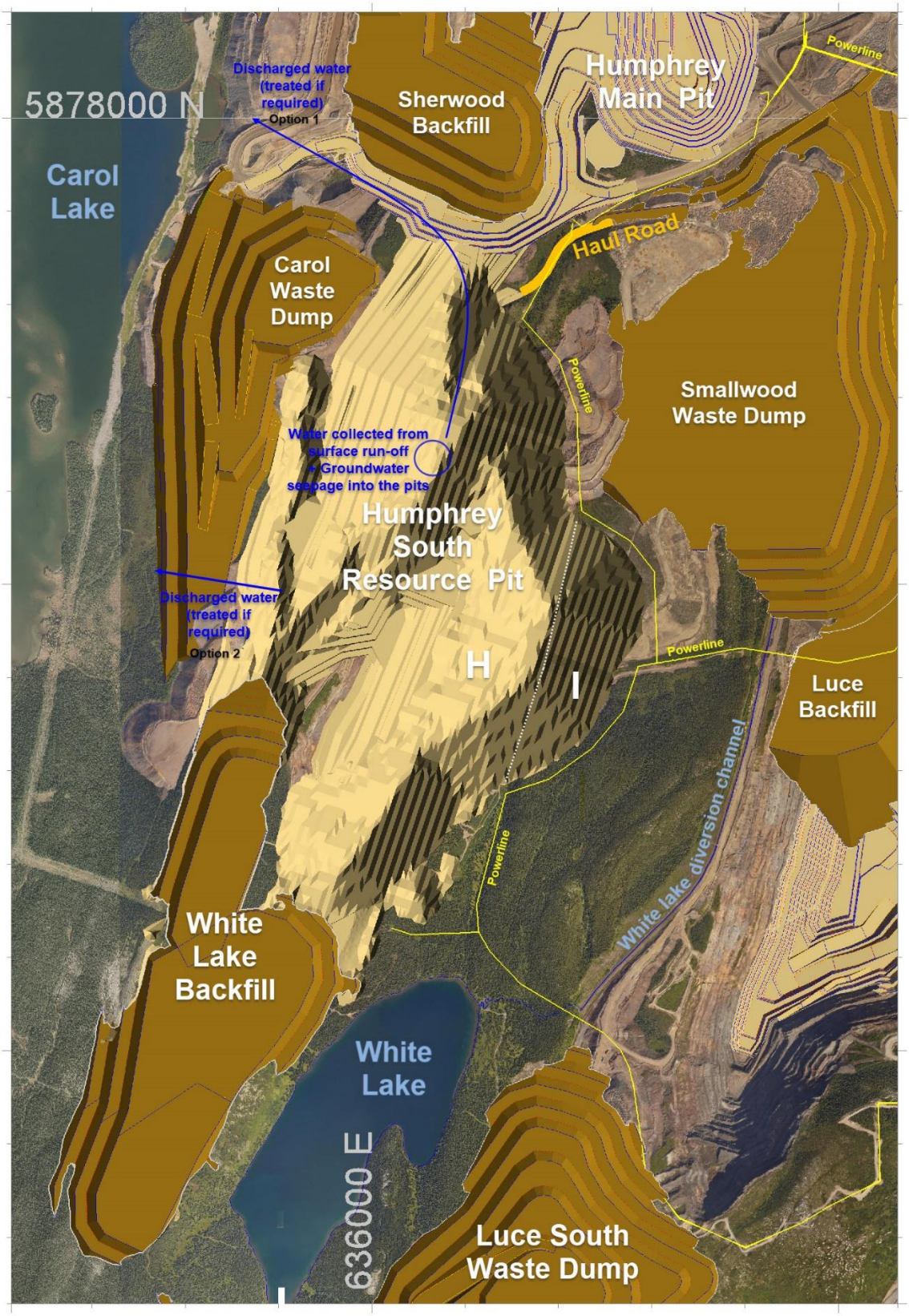


Figure 14: Stage 4 – HS Resource Pits H and I

2.4.5 Overburden Handling and Storage

Prior to commencing overburden removal from both open pits and waste rock dump areas, the sites will be cleared of brush, shrubs or trees. Trees in the area of the pit and the waste dump will be cut if > 100 mm diameter, or mulched if < 100 mm diameter.

Till thicknesses are highly variable and not currently well defined in the HS area. For preliminary assessment a thickness of one metre has been assumed. Topsoil is assumed to be 0.3 m thick. Table 5 lists the estimated development quantities for each Stage of the Project, as well as for the Carol and White Lake waste dumps.

Table 6 is a destination matrix for topsoil and till sources during development stripping. Phase C/D will send stripped material to stockpiles, from where it will be extracted in the future for rehabilitation works. Organic rich material, i.e., peat, topsoil, mulched vegetation, etc., in the pit area will be segregated from the underlying glacial till. The stripping from all other phases is expected to be hauled directly to on-going rehabilitation works. For planning purposes it has been assumed that topsoil and till will be placed for rehabilitation using the same thicknesses assumed above, i.e., 0.3 m for topsoil and 2.0 m for till. Studies are underway to assess the effects of variable till and topsoil thickness on revegetation performance. The results of these studies will direct future rehabilitation prescriptions.

Table 5: Estimated Overburden HSEP Development Quantities

HSEP Stage	Development Area & Phase	Clearing Area	Stripping		
			Topsoil	Till	Total
		ha	m^3	m^3	m^3
NA	HS - Phase B	15.9	47,649	317,660	365,309
1	HS - Phase J	28.7	86,070	573,800	659,870
	HS - Phase K	11.4	34,278	228,520	262,798
	HS - Phase L	28.4	85,128	567,520	652,648
2	HS - Phase C/D	28.2	84,666	564,440	649,106
	HS - Phase E	38.3	114,981	766,540	881,521
	HS - Phase F	16.8	50,301	335,340	385,641
3	HS - Phase G	25.3	75,939	506,260	582,199
4	HS - Phase H	67.1	201,402	1,342,680	1,544,082
	HS - Phase I	30.6	91,815	612,100	703,915
	Carol Waste Dump Phase B	31.8	95,274		95,274
	White Lake Waste Dump	42.9	128,844		128,844
	Total	**365.4**	**1,096,347**	**5,814,860**	**6,911,207**
	Total HSE		**1,048,698**	**5,497,200**	**6,545,898**

Table 6: Topsoil & Till Source – Destination Matrix (kbcm of combined topsoil & till)

HSEP Stage	Source	Destination							Total
		Stockpiles		Rehabilitation					
		Smallwood Overburden Stockpile	Magy Overburden Stockpile	White Lake Waste Dump	White Lake Backfill Phase A	White Lake Backfill Phase B	Luce South Waste Dump	Humphrey South West Backfill	
NA	HS – Phase B		365						**365**
1	HS - Phase J						660		**660**
	HS - Phase K						263		**263**
	HS - Phase L						653		**653**
2	HS - Phases C/D	649							**649**
	HS – Phase E				882				**882**
	HS – Phase F			386					**386**
3	HS - Phase G			582					**582**
4	HS - Phase H					1544			**1544**
	HS- Phase I							703	**703**
	Carol Waste Dump Phase B					95			**95**
	White Lake Waste Dump						129		**129**
	Total	**649**	**365**	**968**	**882**	**1639**	**1705**	**703**	**6911**
	Total HSEP	**649**		**968**	**882**	**1639**	**1705**	**703**	**6546**

2.4.6 Waste Rock Storage

Estimated waste rock volumes and tonnages, by Stage, are listed in Table 7 below. Waste rock from Stage 1 will be placed in a new dump located to the south of White Lake. Stage 1 pits will subsequently be backfilled by waste from Stage 2 pits.

Waste from Stage 2 pits will go to the White Lake dump and to backfill other areas, i.e., Smallwood, White Lake and Sherwood.

Waste from Stage 3 will be used to finish the White Lake backfill, with the remaining waste being placed in the adjacent Carol waste dump (Table 7).

Waste from Stage 4 pits will be used to backfill Stage 3 and the Sherwood area of the Humphrey Main pit (Table 7). The remaining waste from Stage 4 will be placed in the Smallwood dump and the Humphrey North pit backfill. Figure 15 indicates the locations of proposed waste rock storage areas for the Project.

Table 7: Waste Rock Management – Source and Destination Matrix (Mm^3)

HSEP Stage	Source	Destination							Total
		Dump		Backfill					
		Carol	White Lake	Smallwood	Humphrey North	White Lake Backfill	Sherwood	Humphrey South Phase G	
1	White Lake Phases J, K & L		20			30			**50**
2	HS Reserve Pits C/D, E & F		10	315		55	60		**440**
3	HS Pit Phase G	20				20			**40**
4	HS Pits H & I			105	80		105	60	**350**
	Total	**20**	**30**	**420**	**80**	**105**	**165**	**60**	**880**

Further drilling is required to assess the mineralization potential of the remainder of the waste rock dump area. The dump will be phased to correspond with progressive assessment of mineralization potential. If potentially economic material is encountered within the waste rock dump footprint, either that material will be mined and fed to the concentrator to allow the dump to progress, or the dump will be terminated before the mineralization and the remaining waste will be redirected to one of IOC's other operational waste rock dumps (probably the Carol Waste Dump). Use of a more distant dump will require the pit design to be re-optimized to account for the higher costs of the longer waste hauls.

All trees within the waste rock dump footprint will be cut or mulched and all organic rich material, i.e., vegetation and topsoil, will be recovered for use in rehabilitation work.

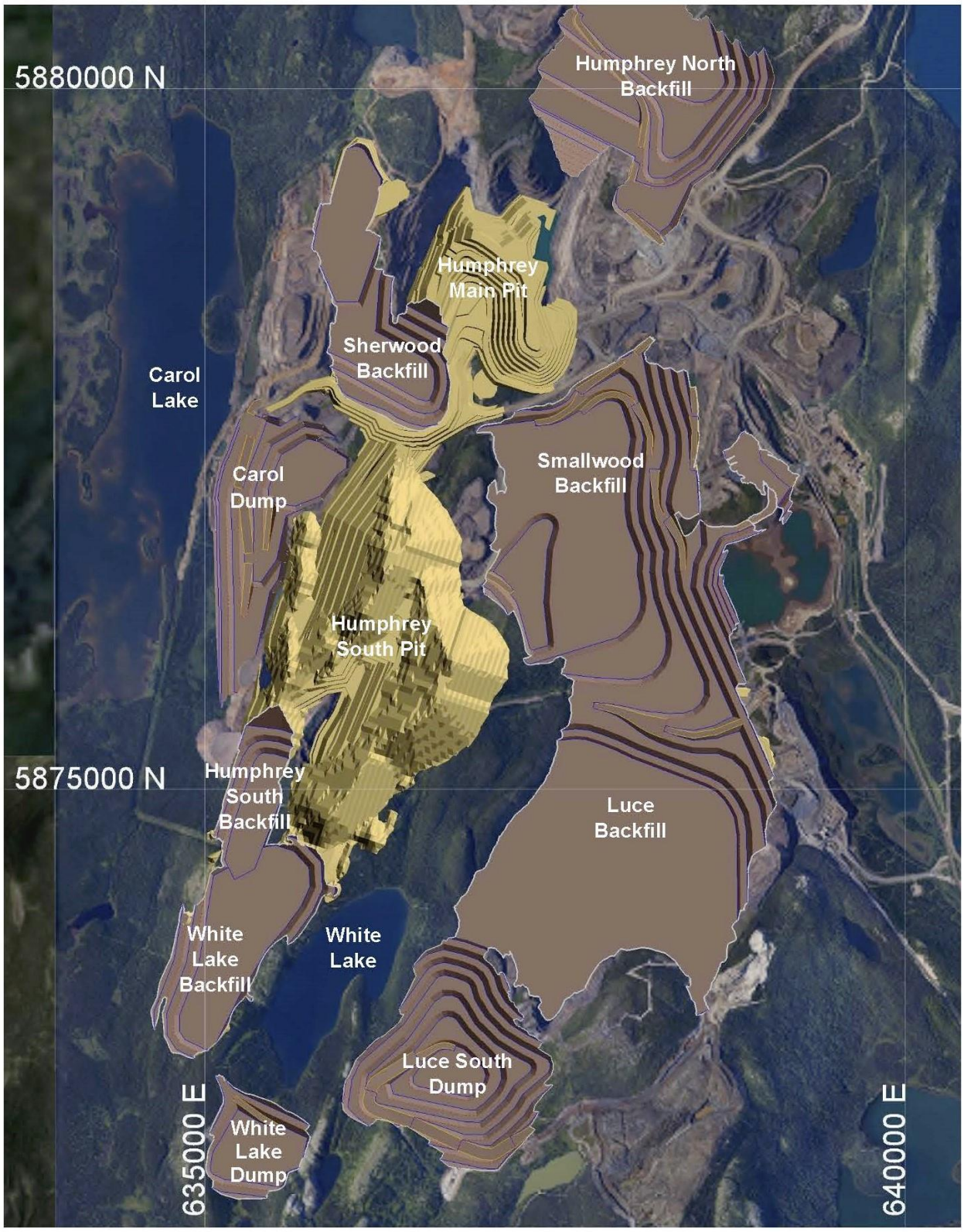


Figure 15: Waste Rock Disposal Areas for the Project

2.4.7 Ex-Pit Haul Roads

The first stage of mining operations of the Project will not require new ex-pit haul roads to be constructed but will require extensions to existing ex-pit haul roads. Stage 2 is a brownfield site with existing ex-pit routes and light vehicle roads. Stage 3 will require the construction of a new ex-pit haul road and Stage 4 will require extensions to existing haul roads.

IOC will mitigate the risk of collision between pieces of heavy equipment and light vehicles by maintaining conservative road widths and by constructing minimal intersections and switchbacks (Figure 16). Few intersections are planned for the Project and only one switchback will be required out of each pit.

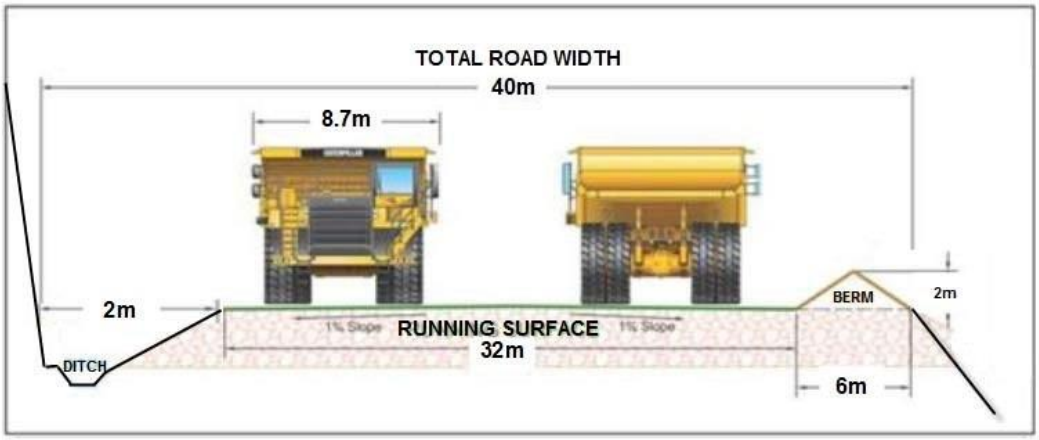


Figure 16: Haul Road Configuration

2.4.8 Powerlines

Two 36 kV power lines currently feed into the Humphrey South mining area; one from the north and one from the east (Luce pit). These two lines are connected next to the Magy overburden stockpile to form a loop, thus providing a redundancy of supply (Figure 10). A substation was located adjacent to this connection point for the mining of the Magy pit. The same substation location will be used for the Magy pit extension, but an extension to the line will be required to provide power to the White Lake phases (Figures 11 and 12).

Development of Stage 2 (HS reserve phases) will require relocation of a section of the electrical supply line which will lie within the expanded pit footprint (Figure 13). The final section of the White Lake power line will also be re-routed, to provide power to the southern highwall of HS phase E.

The development of Stages 3 and 4 (HS resource phases) will require a further relocation of the power line (Figures 14 and 15). The existing earthing grid is suitable for use with the Project power distribution system.

2.4.9 Groundwater Management

Current depth to groundwater in all stages as been determined to be approximately 17-120 m below ground level. As the pit levels are lowered, ongoing dewatering will be required to manage groundwater ingress, precipitation, snow melt runoff and surface runoff. IOC's standard mine water management system will be used for each Stage of mining activity.

IOC will use dewatering wells to depress the water table in the area of the HSE pits. One well has been installed for the Magy Pit Extension and additional wells will be installed as required to facilitate the development of the Stage 1 pits and the other Stages of the HSE Project. Dewatering wells will be sited to intersect fractured rock aquifers in or adjacent to the planned pits. Extensive altered zones on both the eastern and western synclines are likely targets for these wells. The number of wells and the required extraction rate are currently uncertain, but pumping from the existing well during the mining of the Magy Pit Extension will provide more information regarding aquifer characteristics and required extraction rates.

There have been no known in-depth, historical hydrogeological studies carried out in the Project area. However, two groundwater investigation boreholes were drilled to the north of, and adjacent to, the Project area near the current Magy Pit late in 2017. One of these boreholes is adjacent to Second Pond and observations of groundwater occurrence at both locations indicate that Second and Third Ponds are very likely to be perched surface water features with limited connection to the deeper groundwater system.

Although inconclusive, the data also suggests that the deeper groundwater environment could be closely related and connected to White Lake. This is supported by the recent history of dewatering in the active Magy Pit. A narrow gauge investigation hole, including pump testing, is anticipated to be completed in the near future and the results of that investigation will provide insight into groundwater occurrences in the immediate area of White Lake, and will inform ongoing planning. IOC is also planning further investigations in the area to determine the level of connectivity between White Lake and the regional groundwater system.

Piezometers will be installed in strategic locations throughout Project development Stages to allow IOC to better understand the aquifer characteristics and to allow the progress of pit dewatering to be monitored. If monitoring of the water table indicates that one well will not provide sufficient draw down of the water table within the mine plan timeframe, additional dewatering infrastructure may be developed.

Groundwater extracted from wells located outside active mining areas that is clean will be discharged directly into White Lake or into an area of undisturbed forest. Water quality will be routinely monitored, in accordance with existing permits and practices. Groundwater extracted from wells located within active mining areas will not be discharged directly into water bodies but will be discharged into areas of undisturbed forest. Water quality will be routinely monitored, in accordance with existing permits and practices.

Any potential discharge that will be pumped to a vegetated area will be located more than 100 m from a waterbody or stream, to allow filtering of suspended solids through a natural vegetative filter, as has been successfully done in other small mining areas at IOC. Discharge points will be designed to prevent erosion and should this be problematic, water will be treated in order to ensure that it meets discharge criteria before being discharged into a waterbody.

It is intended that the two discharge points, i.e., for groundwater and surface water, will be located near each other, to facilitate the on-going monitoring of both discharges. The discharge points will be moved as required to prevent adverse effects on the forest.

2.4.10 Surface Water Management

For the Stage 1 pits, the quantities of surface run-off will be relatively small, due to the small surface area of the pits. This runoff will be pumped to an area of undisturbed forest:

Precipitation and surface run-off entering the Stage 2 pits, as well as groundwater entering the pits via seepage through the pit walls, will be captured via in-pit sumps and pumped to a discharge point in an undisturbed forested area. As indicated above, the sump discharge point will be a vegetated area more than 100 m from a waterbody or stream and the water will discharge freely from the pipe onto a prepared rock surface. The rock will be sized according to the flow to reduce erosion potential from the discharge. Discharges are also monitored to confirm reduced adverse effects to vegetation and that no direct channels are made to waterbodies in the area. Limited in-pit groundwater seepage is anticipated during Stage 2 operations.

During Stages 3 and 4, the larger quantities of run-off will prevent the use of a vegetative filter. IOC plans to manage water quality prior to discharging to a natural water body. Water quality will meet provincial and federal discharge criteria prior to being released.

The water quality of these discharges will be routinely monitored in accordance with existing and future permits and practices. Discharge points will be routinely monitored to assess sediment buildup and/or soil saturation. The discharge points will be moved as required to prevent adverse effects on the forest.

The positioning of the discharge points will also be selected to reduce the potential for discharge to saturate the foundations of the waste rock dump.

As noted above, piezometers will be installed in strategic locations throughout Project development Stages to allow IOC to better understand the aquifer characteristics and to allow the progress of pit dewatering to be monitored. If monitoring of the water table indicates that one well will not provide sufficient draw down of the water table within the mine plan timeframe, additional dewatering infrastructure may be developed.

2.5 Construction

The planned date for the start of construction activities associated with the Project is spring 2024, subject to release from EA, and once all other regulatory approvals and permits are in place. Construction activities associated with the Project, all phases combined, include the following:

- Vegetation clearing and grubbing,
- Haulage road extension and/or construction,
- Power line extension and installation,
- Overburden removal and storage,
- Waste rock removal and storage to gain access to mining benches,
- Installation of groundwater management infrastructure,
- Installation of surface water management infrastructure, e.g., sumps, pumps, pipelines, and
- Dewatering of First Pond.

Development of Stage 1, White Lake Pits J, K and L, is anticipated to be the first stage started. Vegetation clearing will see large diameter trees either cut and stockpiled for use as firewood, or mulched with other vegetation. The mulched vegetation and approximately 30 cm of topsoil will be removed from the cleared area and either used for mine rehabilitation works or stockpiled for use in future rehabilitation activities.

After removal of the topsoil, the remaining glacial till will be removed and either used in rehabilitation or stockpiled separately from the topsoil for future rehabilitation. In areas where lakes, ponds or wetlands lie within the planned pits, bottom sediments will be removed and used or stockpiled in the same way as till. When stockpiled, bottom sediments are generally encapsulated within till stockpiles due to their low strength and inability to be piled independently.

Stage 1 will see controlled dewatering of First Pond and diversion channels constructed to intercept surface water flow away from First Pond. In addition, IOC will install and maintain a sump pump system in the First Pond basin to manage any groundwater infiltration, surface water inflows and snowmelt runoff.

Removal of the till will expose the underlying, uneven rock surface. Since IOC's mining equipment is designed to operate on flat mining benches, it will be necessary to blast the uneven rock surface down to the level of the first mining bench using smaller equipment supplied by earthworks contractors. Once this development blasting is completed, IOC's heavy mining equipment can be moved in to commence production.

Development of waste dumps generally only requires clearing and removal of organics and topsoil. In areas where the till is of poor quality and unsuitable for use in a dump foundation, the till will also be removed.

Initial development volumes for the development of Stages 1, 2, 3 and 4 are listed in Tables 8-11. The clearing area listed includes the planned area of pits and dumps. Some of this area, however, is un-vegetated due to either rock outcrops or previous clearing, e.g., roads or drill sites, so the actual clearing area may be somewhat less than listed below.

Table 8: Development Volumes – Stage 1

	Material	Area (ha)	Volume (kbcm)	Mass (kt)
Clearing (Pit & Dump)		**69**		
Contractor Load & Haul	**Total**		**1,575**	**3,247**
	Topsoil		205	370
	Overburden		1,370	2,877
Contractor Drill & Blast			**469**	**1,595**

Table 9: Development Volumes – Stage 2

	Material	Area (ha)	Volume (kbcm)	Mass (kt)
Clearing (Pit & Dump)		**83**		
Contractor Load & Haul	**Total**		**1,916**	**3,949**
	Topsoil		250	450
	Overburden		1,666	3,499
Contractor Drill & Blast			**571**	**1,940**

Table 10: Development Volumes – Stage 3

	Material	Area (ha)	Volume (kbcm)	Mass (kt)
Clearing (Pit & Dump)		**25**		
Contractor Load & Haul	**Total**		**582**	**1,200**
	Topsoil		76	137
	Overburden		506	1,063
Contractor Drill & Blast			**173**	**589**

Table 11: Development Volumes – Stage 4

	Material	Area (ha)	Volume (kbcm)	Mass (kt)
Clearing (Pit & Dump)		**98**		
Contractor Load & Haul	**Total**		**2,248**	**4,633**
	Topsoil		293	528
	Overburden		1,955	4,105
Contractor Drill & Blast			**669**	**2,275**

2.6 Operations and Maintenance

Once the Project has received all required approvals and construction activities have been completed, open pit mining activities will begin. The Project will be operated in the same manner as all of IOC's existing open pits. Contractors will be used to clear vegetation, strip organic material and glacial till and carry out the initial drilling and blasting. The contractors will also build the initial haul road and remove some ore and waste from the initial mining benches. Once the first pit has been developed to the point where IOC's larger mining equipment can operate efficiently, the contractors will be replaced by IOC's mining fleet, which will be moved from other areas of the operation. Ore from the HSEP pits will be hauled to IOC's Automatic Train Operation (ATO) for transportation to the concentrator. Figure 17 shows the overall concentrator feed schedule for the IOC's Labrador City operations.

Stage 3 of the Project is currently scheduled to be mined after Stages 1 and 2, but there may be some overlap. Stage 4, which represents the eastern resource phases of the HSEP, will be developed after Stage 3 during the mid-2050s. Phase I may be hydraulically connected to the adjacent White Lake and planned test wells will confirm whether this is the case well in advance of planned development in this area. If test wells indicate that dewatering of White Lake will be required, IOC will work with all relevant regulators to obtain all permits and authorizations prior to the planned development start date of 2054.

Figure 17 shows the currently planned concentrator feed mining schedule and Figure 18 shows the currently planned total material (feed plus waste) mining schedule for IOC's reserves and resources. Both figures show the timing of the HSEP mining. It should be noted that more than half of the resources shown in Figure 17 are inferred resources.

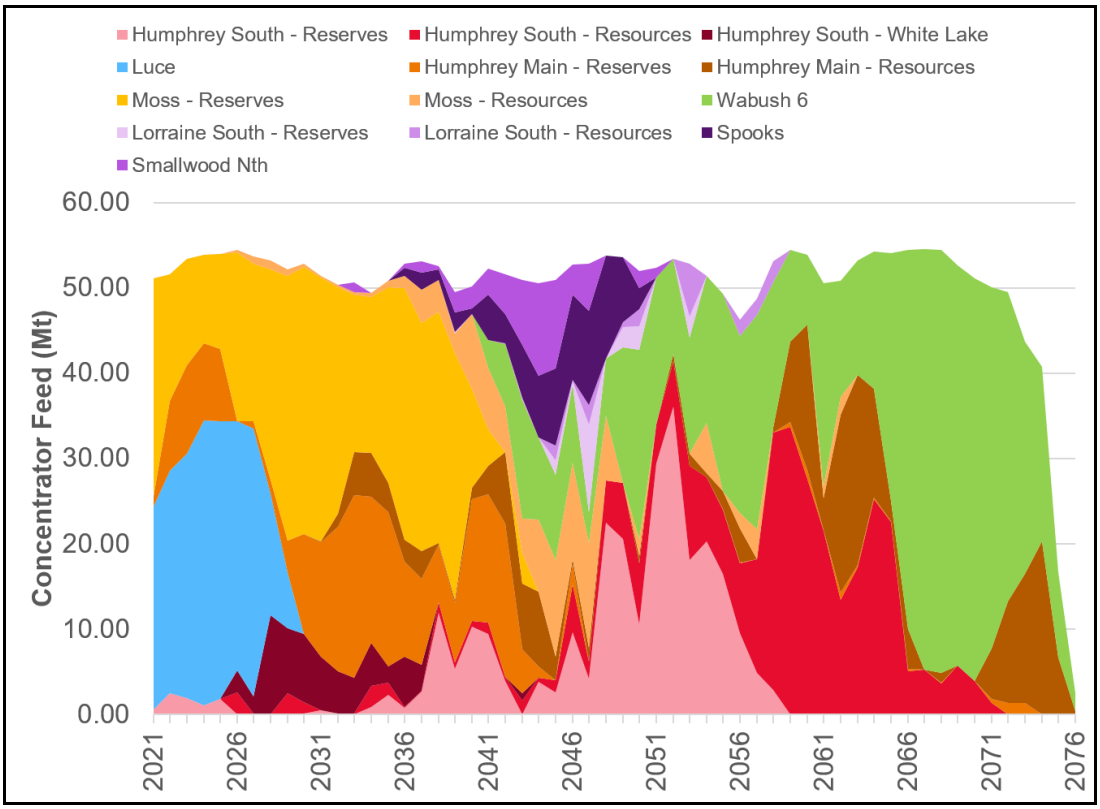


Figure 17: Concentrator Feed Schedule

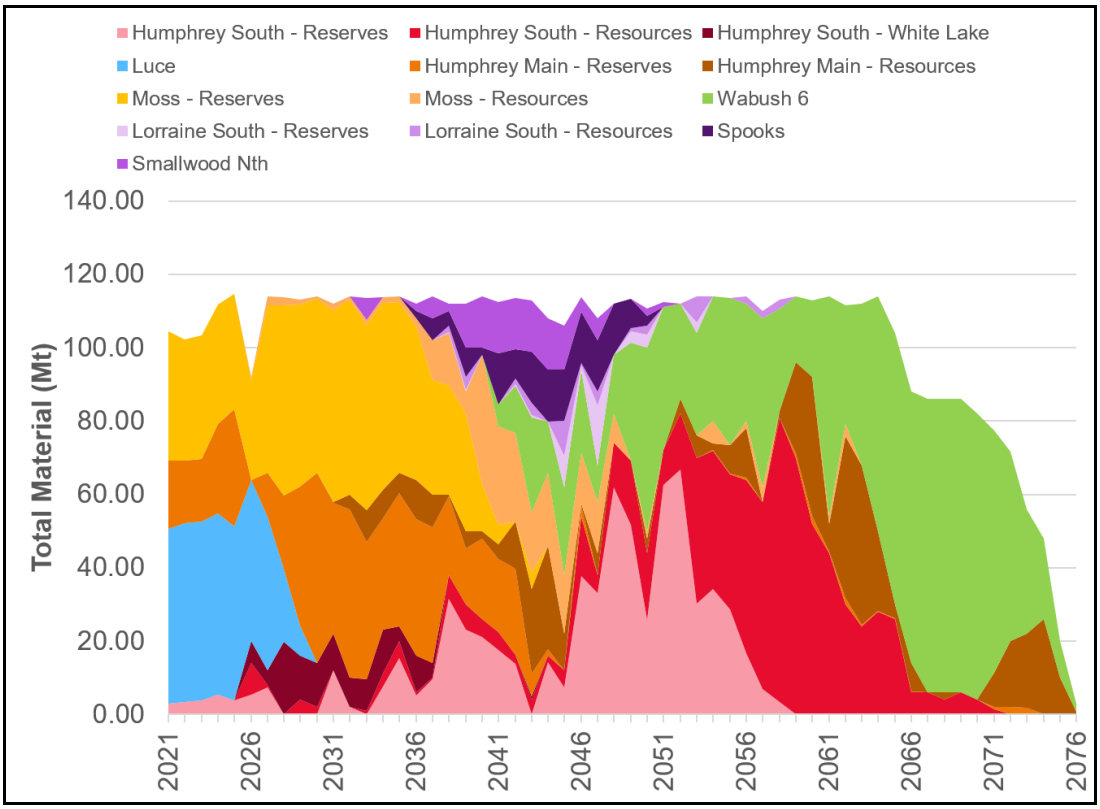


Figure 18: Total Material Schedule

2.7 Possible Accidents and Malfunctions

Human health and safety and environmental protection will be paramount considerations by IOC in the planning and detailed design of the Project. In the construction, operation and maintenance of the Project, established safety procedures specific to human health and environmental protection will be strictly adhered to. IOC has a site wide EPP (Appendix B) whose policies and procedures will be applicable to all aspects of the Project. In addition, there are comprehensive Health, Safety and Environmental Management Systems and associated plans and procedures in place for all of IOC's operations in Labrador City. These will be updated as required for the Project. In addition, the construction and operation of the Project will be designed in compliance with relevant legislation, regulations, standards and guidelines. Emergency response and spill response procedures are captured in existing IOC plans and procedures. Potential accidental events or malfunctions that may occur include, but are not limited to, the following:

- An accidental spill of chemicals, fuels or other deleterious substances;
- A fire or explosion;
- Pit slope failures;
- Electrical malfunctions;
- Equipment failure; and
- Traffic mishaps.

2.8 Closure and Decommissioning

Exploitation of the Project area will occur in four stages over a period of approximately 50 years. Development is staged and as deposits are mined out and waste rock storage areas are filled, progressive reclamation will occur where possible. Progressive rehabilitation of disturbed mine areas such as pits, roads, waste dumps, etc., usually involves the placement of a layer of till, over which topsoil is spread and then seeded. Vegetation to be planted is comprised of native provincial species, and are selected to ensure natural ecological succession. Seeding will be completed by either broadcast/drill seeding or hydroseeding methods.

The last iteration of IOC's site wide Rehabilitation and Closure Plan (RCP) for its existing mining, processing and product delivery infrastructure at Labrador City was submitted to NL Department of Industry, Energy and Technology (DIET) in 2019 for review. RCPs are updated every five years and the 2019 RCP is currently under review.

IOC is committed to following all guidelines outlined by permitting agencies for closure and rehabilitation activities. IOC undertakes progressive rehabilitation wherever and whenever possible at their Labrador City site and it is their goal to remediate the area to end-states that are safe and stable as well as to preserve local biodiversity. IOC also understands that a final RCP for their Labrador City site may be required to be reviewed by the EA Division prior to the decommissioning of all infrastructure and activities at their Labrador City mining property.

Upon completion of Stages 1, 2, 3 and 4 operations of the HSEP, continued mine water management will be carried out as required by regulatory requirement. The rehabilitation of the Project site will be added to the IOC's overall RCP for their Labrador City operations. The estimated rehabilitation costs will be calculated and appropriate financial assurances will be put in place through DIET. The updated RCP will address Stages 1, 2, 3 and 4 closure activities as those Stages are executed.

The incremental rehabilitation plan for Stages 1, 2, 3 and 4 of the HSEP (pits and dumps) will comprise:

- Dismantling and removal of all powerlines, pipelines, pumps and associated equipment;
- Removal of all material from site, as per the approved RCP;
- Flattening of waste dump faces to 20 degrees or less;
- Stabilization of the abandoned pit slopes;
- Construction of a perimeter bund around abandoned pits;
- Revegetation of disturbed areas, as per the approved closure plan; and
- Progressive reshaping and revegetating of waste dumps where feasible.

The above rehabilitation activities are consistent with IOC's current site-wide RCP. Figure 19 shows the conceptual rehabilitated landform of the Project site after all four Stages have been completed.

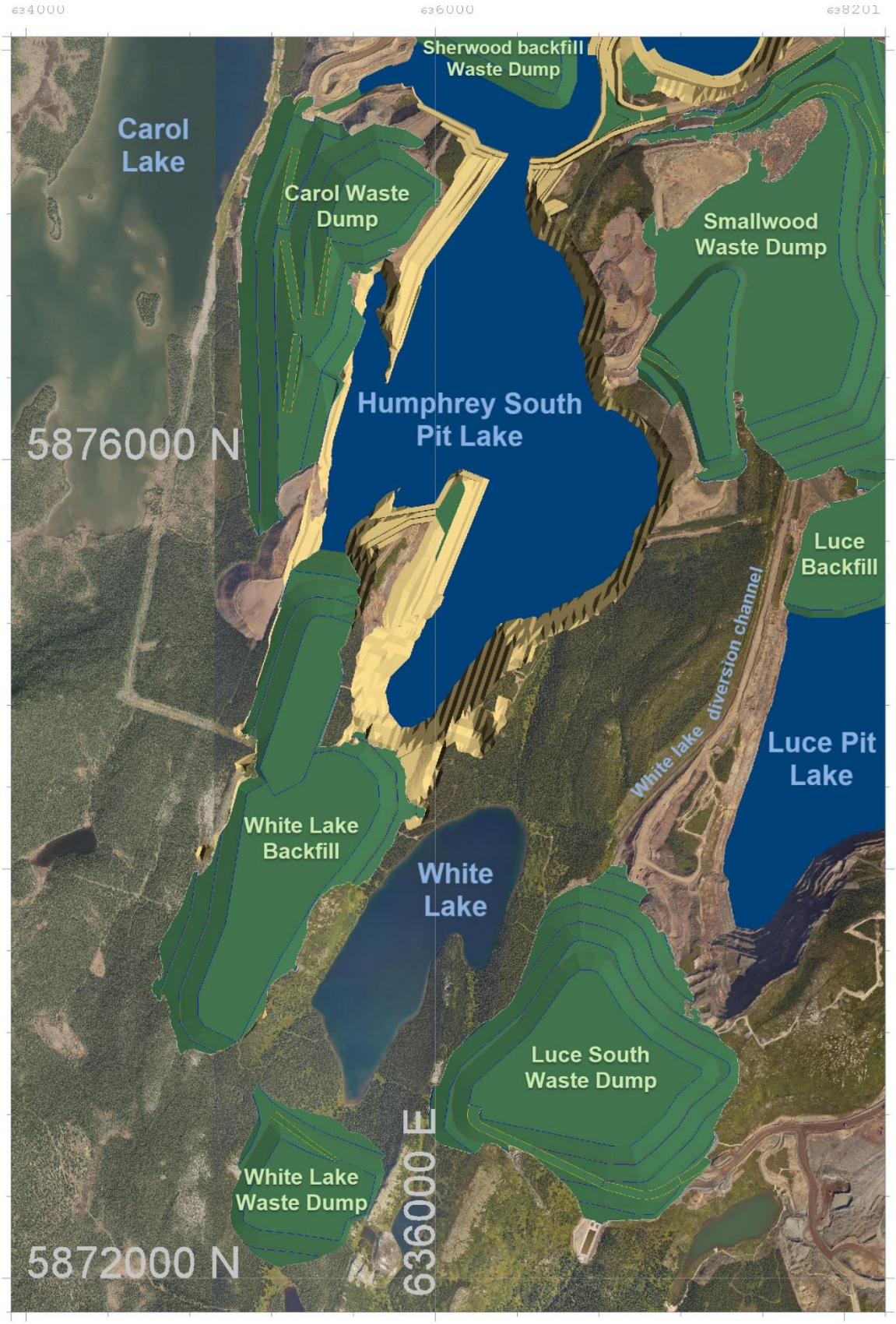


Figure 19: Conceptual Rehabilitated Project Site

2.9 Effects of the Environment on the Project

The regional topography, climate, existing development and hydrogeological conditions primarily influenced the design of the Project. The primary anticipated effect from the environment on the Project is water inflow into the pits. Stages 1-3 of the Project will not require specific or special mitigation measures beyond normal water management strategies to manage possible effects of the environment on the Project.

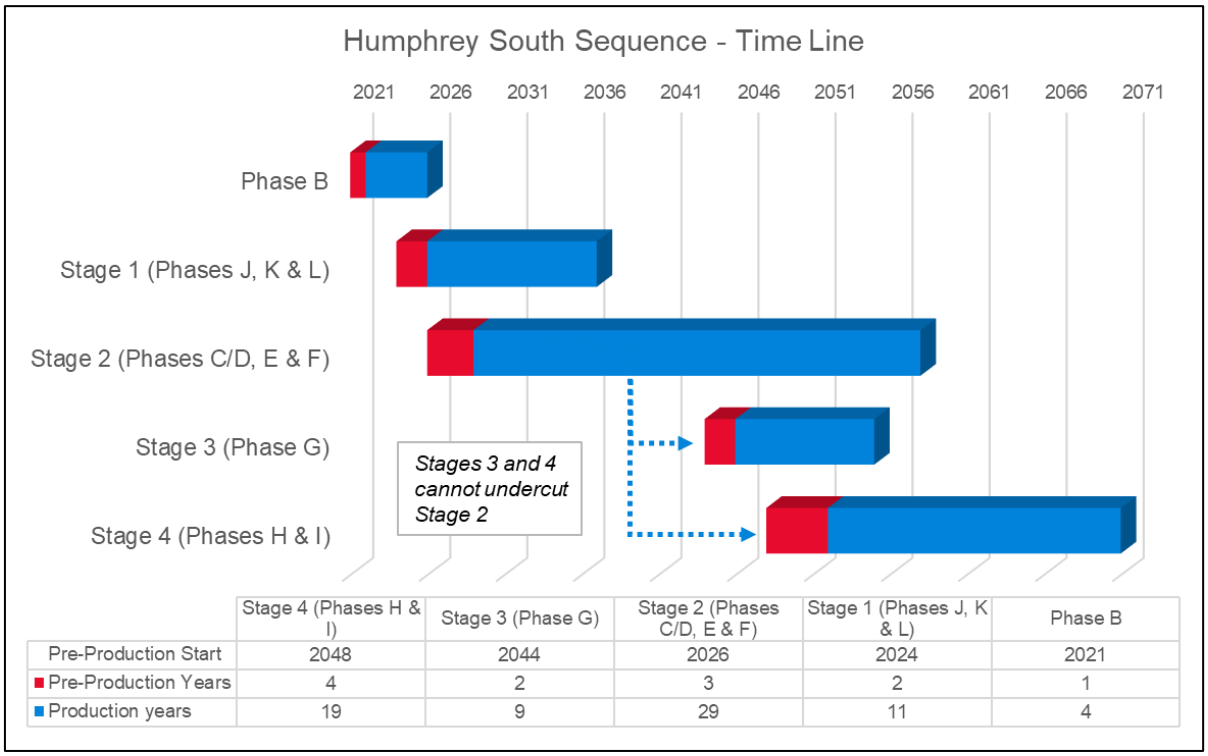
Prior to the start of Stage 4 of the Project, IOC will have a good understanding of the hydrogeological regime in the area as ongoing groundwater monitoring programs will have provided substantial amounts of data on the entire Project site. This data will enable IOC to accurately predict whether the level of hydraulic connectivity between the previously mined Stages and the Stage 4 area is such that dewatering of White Lake will be required. Dewatering will only be considered if the health and safety of workers is deemed to be at risk during planned mining of the Stage 4 resource areas. If data indicates there is strong hydraulic connectivity in this area of the Project area, IOC will employ a number of strategies to support safe dewatering practices according to required authorizations, and in a manner that reduces the potential for adverse effects of the environment on the Project. IOC has been in discussions with various regulators about the potential for dewatering White Lake in later stages of the Project and understands that public and Indigenous consultation will be required relative to potential authorizations and/or approvals that will be issued for this work.

2.10 Project Reports

Biophysical and aquatic baseline studies in the Project area were conducted in 2018 and these reports are available on request. Other studies or plans referenced in this Registration document are also available upon request.

2.11 Project Schedule

IOC is anticipating a 2024 start of construction activities, assuming release from EA and the receipt of all required environmental approvals and permits. Open pit mining operations would follow as soon as pit construction activities are completed, by 2026 (Figure 20). The operations phase of Stage 2 is the longest of the four stages and is anticipated to last approximately 30 years. Stages 1, 3 and 4 operations will be staged and will overlap to a certain extent with Stage 2 mining activities. Development activities for Stage 4 of the Project are scheduled to begin in 2048 with mining beginning in 2052 and lasting through to the early 2070s.



	Stage 4 (Phases H & I)	Stage 3 (Phase G)	Stage 2 (Phases C/D, E & F)	Stage 1 (Phases J, K & L)	Phase B
Pre-Production Start	2048	2044	2026	2024	2021
Pre-Production Years	4	2	3	2	1
Production years	19	9	29	11	4

Figure 20: Humphrey South Extension Sequence – Time Line

2.12 Environmental Management and Protection

The Project will be constructed and operated as part of on-going and long-standing work associated with IOC's Labrador City operations. IOC has in place a comprehensive Health, Safety and Environmental Management System (HS EMS) and associated environmental plans and procedures for its development and operational activities. These have been developed and are being implemented and continuously updated in accordance with Rio Tinto's corporate *Health, Safety, Environment, Communities and Quality Policy*, other relevant corporate requirements and guidelines, and with a view to meeting, and seeking to surpass, the provisions of applicable legislation and regulations.

The Project will be constructed and operated in accordance with applicable legislation and regulations, including the environmental protection and planning measures defined through the EA review, and in compliance with IOC policies, procedures and standards.

Table 12 provides a list of some of IOC's existing environmental plans for its Labrador City development and operations activities. A review and updating of these and other existing procedures will be carried out as Project planning and implementation progress, including the incorporation of the Project activities into IOC's overall integrated management system.

Table 12: Existing Environmental Management Plans

Title of Plan
Contaminated Soil Management
Spills of Toxic or Hazardous Materials
Environmental Reporting
Spill Response Reporting
IOC Lab City - Operational and Development Environmental Protection Plan (EPP)
Hazardous Materials and Non-Mineral Waste Control and Minimization Plan/Procedures
Water Quality Protection and Water Management Plans/Procedures
Land and Watercourse Disturbance and Rehabilitation Plans/Procedures
Emergency Response and Reporting Plan (ERRP)

2.12.1.1 Environmental Protection Plan (EPP)

Environmental protection planning is an integral part of IOC's construction, operations and maintenance programs. As a company with substantial experience in constructing, operating and maintaining mining related infrastructure and activities in Labrador City, IOC has proven policies and procedures related to environmental protection and management which will be implemented during the construction and operation of this Project.

An EPP is an important tool for consolidating environmental protection information and procedures in a document that provides sufficient detail for the implementation of environmental protection measures in the field. An EPP provides concise instructions to personnel regarding environmental protection procedures and descriptions of techniques to reduce the environmental effects associated with construction and/or operations activities.

IOC has developed and implemented a site wide EPP for its Labrador City mining activities. This EPP was last updated in September 2018 and describes environmental protection measures associated with components and activities of construction and operation activities of the Project.

The EPP includes procedures and measures relative to activities such as vegetation clearing, grubbing, storage and handling of fuel, blasting, quarrying, dust control, waste and sewage disposal, work in or near water, as well as contingency plans for unplanned events such as spills, rehabilitation and compliance monitoring. A copy of IOC's current site wide EPP is included in Appendix B.

2.12.1.2 Emergency Response and Reporting Plan

IOC proactively identifies potential emergency situations and develops Emergency Response and Reporting Plans (ERRP), the purposes of which are to identify responsibilities and procedures in the event of an unplanned incident, such as an incident that may affect human health or safety, or the accidental release of hazardous material, and to provide the information and procedures required for the effective response and reporting of such an incident.

There are comprehensive incident prevention, response and reporting plans and procedures in place for IOC's overall Labrador City mining operations. These plans and procedures will be adopted and updated as required for the this Project, which will be designed, constructed and operated in compliance with relevant legislation, regulations, standards and guidelines.

IOC has established a Business Resilience and Recovery Program (BRRP) that has identified high emergency risks and has developed detailed plans to mitigate identified risks. The purpose of the BRRP is to promote readiness by making available the appropriate resources and facilitating the preparation, practice and availability of appropriate incident response plans. The plans provide an effective response for the mitigation, control and recovery from incidents which can affect business at IOC. Activities associated with the Project will be evaluated under the BRRP. The BRRP is routinely tested and audited to confirm it meets IOC's needs.

2.13 Other Required Environmental Approvals

In addition to approval under the provincial EA process, the Project may require a number of other permits, approvals and/or authorizations. IOC will obtain all required permits, approvals and/or authorizations.

3.0 Existing Environment

The sections below provide an overview of the existing biophysical and socioeconomic environments for the Project.

3.1 Natural Environment

The Project is located within the municipal boundary of Labrador City, in the western portion of IOC's existing mining property site. The Project is located in an area that has been affected by IOC's large scale mining operations for the past five decades.

For purposes of this undertaking, IOC has identified a number of components of the natural environment that may be affected by this Project or alternatively, may affect Project components or the local and/or regional environments. These components have been identified below and a description of their existing status is presented in this document.

3.1.1 Atmospheric Environment

Iron ore mining forms the industrial base for the Towns of Labrador City and Wabush and is the main industry affecting the quality of the local atmospheric environment. The various components of the atmospheric environment that this document examines include regional climate, air quality, greenhouse gas emissions, noise and vibration.

3.1.1.1 Regional Climate

The Project is located in Labrador City, within IOC's existing mine property. The site is located within the extensive *Mid Subarctic Forest* ecoregion (Meades 1989; 1990), which encompasses the upland plateaus of central and western Labrador. This area has a continental, subarctic climate with cool, short summers and long cold winters. At Wabush Airport, daily average temperatures range from -22.7 ^{o}C in January to +13.7 ^{o}C in July, with 482.6 mm of rainfall and 445.7 cm of snowfall per year and prevailing westerly winds (Environment Canada 2004).

Climate information for the Project area presented in Table 13 is based on data recorded from 1981-2010 at the Wabush Lake Airport climate station (Environment and Climate Change Canada 2016). The Project area, at an elevation of 820-840 MASL, is located approximately 9 km northwest of the Wabush Airport, which is located at an elevation of 551 MASL.

The average monthly temperature in the area is -3.1°C. The average monthly temperature range from October to April is 0.5 to -22°C and 4.0 to 7.6°C from May to September. (Environment and Climate Change Canada 2016).

Monthly precipitation from May to September ranges from 53.5 to 96.5 mm and monthly average snowfall ranges from 42 to 75 cm in the winter months. Almost half of the annual precipitation falls in the June to September period.

Table 13: Wabush Airport Climate Normals (1981-2010)

Parameter	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall	mm	0.6	1.6	2.6	12.1	40.4	80.6	113.9	103.4	92.3	42	10.9	2.5	502.9
Snow	cm	63.8	50.9	65.9	44.3	14.4	2.1	0.0	0.1	4.4	39	77.5	66.2	428.7
Precipitation	mm	49.2	40.3	54.1	48.8	53.5	82.7	113.9	103.5	96.5	75.7	70.9	50.4	839.5
Average Temperature	oC	-22.2	-20.6	-13.3	-4.3	4.0	10.3	13.8	12.5	7.6	0.5	-8.2	-17.5	-3.1

Source: Environment and Climate Change Canada http://climate.weather.gc.ca/climate_normals/results_1981_2010

3.1.1.2 Air Quality

Releases of air contaminants are generally classified into criteria air contaminants (CACs) and greenhouse gases (GHGs). CACs are a set of criteria pollutants that cause smog, acid rain and other health hazards, and include particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NOX), and carbon monoxide (CO).Table 14 provides a list of typical sources of CAC emissions from iron ore operations.

Table 14: Iron Ore Mining - Sources of CAC Emissions

Source of Emissions	Type of Emission
Use of large trucks and excavators to mine iron ore	Particulate, NO_2, SO_2 and CO
Blasting	Particulate, NO_X and SO_2
Fugitive emissions from active quarries and tailings piles	Particulate
Rock crushers	Particulate
Concentrator Plants	Particulate, metals, NO_2, SO_2 and CO
Pelletizing Plants	Particulate, metals, NO_2, SO_2 and CO
Transport – Rail	Particulate, NO_2, SO_2 and CO
Use of smaller service trucks onsite	Particulate, NO_2, SO_2 and CO

Mining operations at IOC are typical of other open pit mining operations in the area. Blasting is conducted to free the crude ore by drilling holes into the rock and filling them with emulsion explosives product. Ore and waste rock are mined using large front end loaders and electrical shovels. Haul trucks, the automatic train operation and the overland conveyor system transport the rock to the primary crushers. The ore is reduced in size in the crushers and then sent to the concentrator where it is ground to a fine sand size to separate the iron ore from the waste or tailings. The tailings are slurried and piped to the tailings disposal areas. At IOC, a portion of the concentrate is pelletized with additional grinding and drying in a furnace. Pellets and concentrate are loaded and transported by rail to Sept Îles for export.

The main contributor to negative air quality at IOC's Labrador City operations is the pelletizing operation. IOC has improved the air quality of their operations over the past 20 years through pollution abatement projects. There has also been a large reduction in particulate emissions with the replacement of dry mill processes with wet grinding mills.

IOC maintains three air quality monitoring stations at their Labrador City operations that are in close proximity to the local community and to recreational facilities (Figure 21). Data from these monitoring stations is compiled by the NL Department of Environment, Climate Change and Municipalities (DECCM) and the results compiled and published in annual Air Quality reports. These reports can be viewed at the following web address: https://www.gov.nl.ca/eccm/files/2019-Air-Quality-Annual-Report.pdf

Results from the 2019 monitoring programs indicate no annual concentration exceedances of SO_2, NOX, PM2.5 or total particulate matter at established monitoring locations. IOC believes that given the distance of the Project from both Labrador City and Wabush, there are unlikely to be adverse effects to the air quality data during construction or operation of the various Project components. Air quality monitoring will however continue and the data analyzed to verify these predictions. No new or modified air quality monitoring or modeling is planned given the results of on-going air quality monitoring and also given the distance of the Project from residential areas (Figure 21).

IOC has a Standard Operating Procedure (SOP) in place relative to fugitive dust management, which applies to all operations at their Labrador City operations. Implementation of the SOP includes continued efforts to carry out progressive rehabilitation and revegetation of inactive sections of the TMF and this has led to reductions in fugitive dust. Some minor revegetation also occurs within the mining area at berms and other small areas no longer in use. IOC has also installed a dust suppression system to mitigate the fugitive dust in the pellet plant loadout area. Mitigations such as regular road watering also contribute to substantially reducing fugitive dust levels at the mine sites and in the neighboring communities. All applicable mitigations will be implemented as necessary during development and operation of the Project.

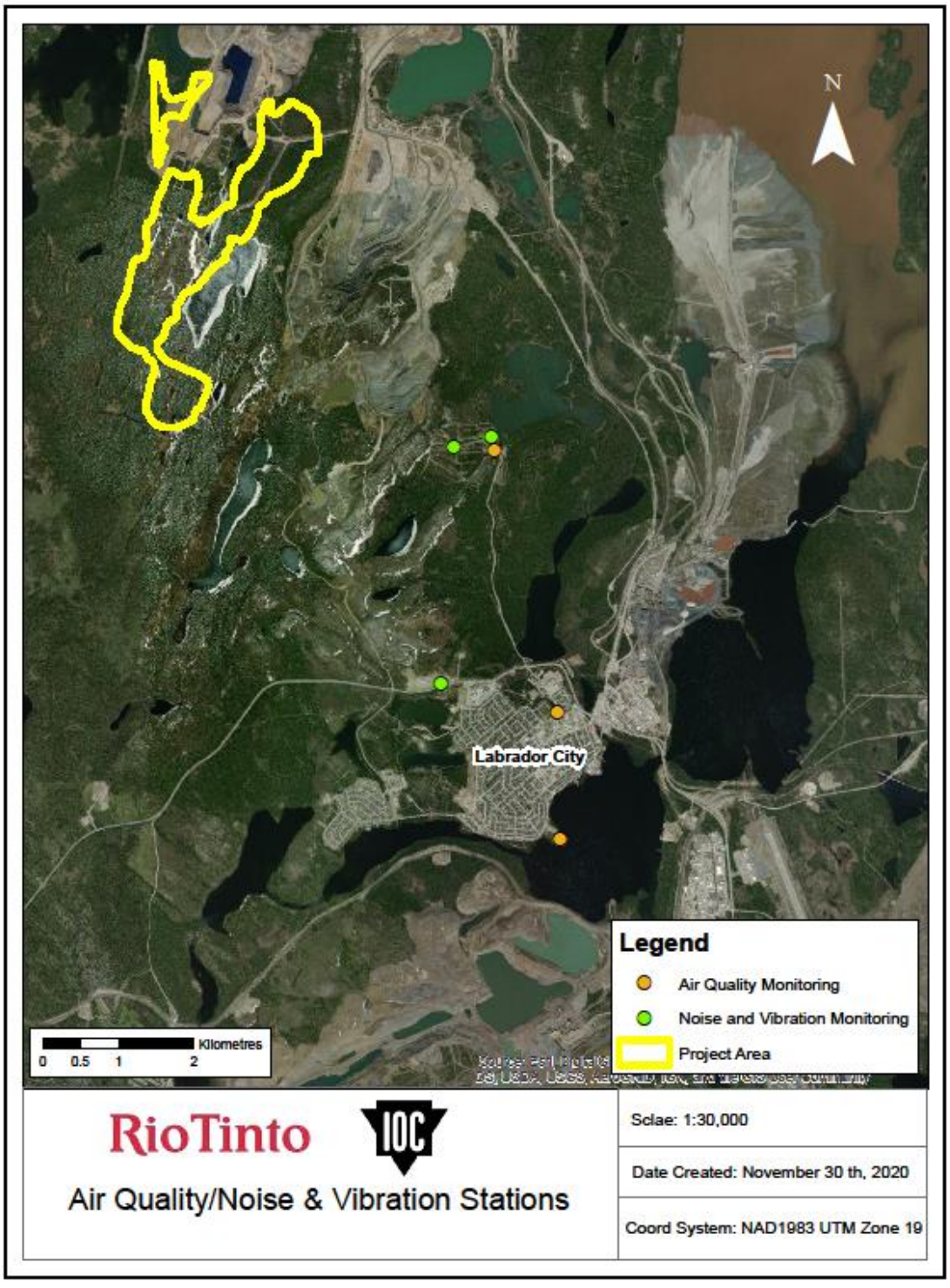


Figure 21: Air Quality Monitoring Stations at Labrador City Operations

3.1.1.3 Greenhouse Gas Emissions

Greenhouse gas emissions (GHGs), including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), can be emitted from a number of natural and anthropogenic sources and processes. The principal GHG emissions generated from diesel fuel combustion are CO_2, CH_4, and N_2O. The 2018 total NL GHGs expressed as carbon dioxide equivalent (CO_2 eq) was 11.0 Mt CO_2 eq (Environment and Climate Change Canada 2019), an increase of 2.1 % from the 2005 level. On average, normal IOC Carol operations, i.e., mining, transport, processing, produce approximately 1.0 Mt CO_2 eq annually, which account for approximately 10% of the CO_2 eq emissions for the province.

Generally the analysis and prediction of the effects of GHG emissions are global in scale. Both the federal government, as part of the 2015 Paris Agreement, and the provincial government, as part of The Way Forward on Climate Change (2019), have committed to reducing GHG emissions by 30 percent below 2005 levels by 2030. The 2016 PanCanadian Framework on Clean Growth and Climate Change included commitments to introduce carbon pricing in all provinces and territories. The Province's carbon pricing system went into effect on January 1, 2019 and includes performance standards for large industrial facilities and large scale electricity generation, measured in terms of GHG emissions per unit of output within a facility boundary, and a carbon tax on fuels combusted outside regulated facilities' boundaries. Certain new industrial facilities are also required to use best available control technologies (BACT). The *Management of Greenhouse Gas Act* (MGGA) and its *Regulations* (MGGAR) are the mechanisms to implement performance standards and BACT, and the *Revenue Administration Act* (RAA) and its *Regulations* are the mechanisms to implement a carbon tax.

In accordance with requirements of the MGGA and the MGGR, IOC follows prescribed methods for calculating their site wide GHG emissions, and carries out these calculations on a monthly basis. The exercise essentially involves calculating fuel usage across all activities by source and from there deriving an estimate of GHG emissions. IOC produces a GHG report for provincial regulators and sets annual targets that are verified by an independent third party. The estimation of energy consumption, by type, is done for construction, operating and decommissioning phases.

IOC has been incorporating BACT into their Labrador City operations since 2004 and engages regularly with officials from the Pollution Prevention Division of the NL DECCM to share and discuss air quality issues relative to their Labrador City operations. GHG emissions outside the Project boundary, i.e., rail shipments, port activities, are regulated by the provincial RAA and *Regulations* carbon tax provisions.

The 2018 total Canada GHGs were 729 megatonnes of carbon dioxide equivalent (Mt CO_2 eq), almost equal to the 2005 level (Environment and Climate Change Canada 2020). Between 1990 and 2018, national emissions increased by 20.9%, or 126 Mt CO_2 eq. Canada's emissions growth over this period was driven primarily by increased emissions from mining and upstream oil and gas production as well as transport. A comparison of the total CO_2 eq emissions for Canada with CO_2 eq emissions from the existing IOC operations indicates that IOC emissions represent approximately 0.14 % of the CO_2 eq emissions for Canada. IOC continues to review their performance and expects to reduce their current GHG emissions by 12% by 2022. No targets are currently set after this date.

Since both construction and operations activities associated with the Project will use existing equipment and employment resources, and no net increase in ore production is anticipated, no additional GHGs will be produced as a result of this Project.

Detailed calculations relative to GHG emissions for IOC's overall Labrador City operations are completed and submitted to the provincial Climate Change Branch (CCB) and Environment and Climate Change Canada (ECCC) on an annual basis, June 1.

3.1.1.4 Noise and Vibration

IOC has established noise and vibration monitors in the Labrador City area to monitor noise and vibration from their blasting operations (Figure 21). These monitors will continue to record data from IOC's Labrador City blasting operations, however, given the distance of the Project from recreational and residential areas, it is unlikely that adverse effects will be felt at these locations as a result of proposed activities at the Project site.

3.1.2 Terrestrial Environment

3.1.2.1 Ecological Land Classification

The Biophysical Assessment Study Area (BASA) (Figure 22) relative to the Project is located approximately 6 km north of Labrador City, and is situated southeast of Carol Lake and west of Wabush Lake. Construction activities for the Project will include the removal of forested habitat of varying ages and compositions, along with other ecotypes such as barrens and wetlands.

The BASA is located within the Mid Subarctic Forest ecoregion (Protected Areas Association of Newfoundland and Labrador 2000), and is characterized by spruce-dominated forests, string bogs and fens, with open spruce-lichen forests nearer to the treeline.

SEM completed an Ecological Land Classification (ELC) within the BASA using a well-established approach and methodology, and which identified 64 individual polygons representing a variety of ecotypes (SEM 2018).

The White Spruce-Balsam Fir-Feathermoss (WSFF) ecotype is the most abundant ecotype in the BASA (Figure 23) with white spruce *(Picea glauca)* and balsam fir *(Abies balsamea)* dominating the tree stratum.

Black spruce *(Picea mariana)* tends to occur near ecotype boundaries where WSFF is transitioning to other ecotypes. The shrub layer in the WSFF generally consists of scattered individuals or small patches of understory balsam fir and low shrub species such as Labrador tea *(Ledum groenlandicum)*, glandular birch *(Betula glandulosum)*, and lowbush blueberry *(Vaccinium angustifolium)*. Herbaceous vegetation consists of bunchberry *(Cornus canadensis)*, twinflower (*Linnea borealis*), Clinton lily *(Clintonia borealis),* creeping snowberry *(Gaultheria hispidula),* and stiff clubmoss *(Lycopodium annotinum)*. Ground cover consists of a continuous layer of feathermoss species, namely Scheber's moss *(Pleurozium schreberi)*, stairstep moss *(Hylocomium splendens)* and plume moss *(Ptilium crista-castrensis)*.

The Open Black Spruce Lichen (OBSL) ecotype occurs on topographically confined ridge tops or areas where soils are thin and bedrock is exposed. OBSL is characterized by an open forest of black spruce in various stages of development and a continuous understory of lichens, e.g., *Cladina* spp. (Figures x). The shrub layer tends to consist of scattered low shrubs dominated by Labrador tea, lowbush blueberry (*Vaccinium angustifolium*), mountain cranberry (*Vaccinium vitis-idaea*) and alpine blueberry *(Vaccinium uliginosum*) (SEM 2018).

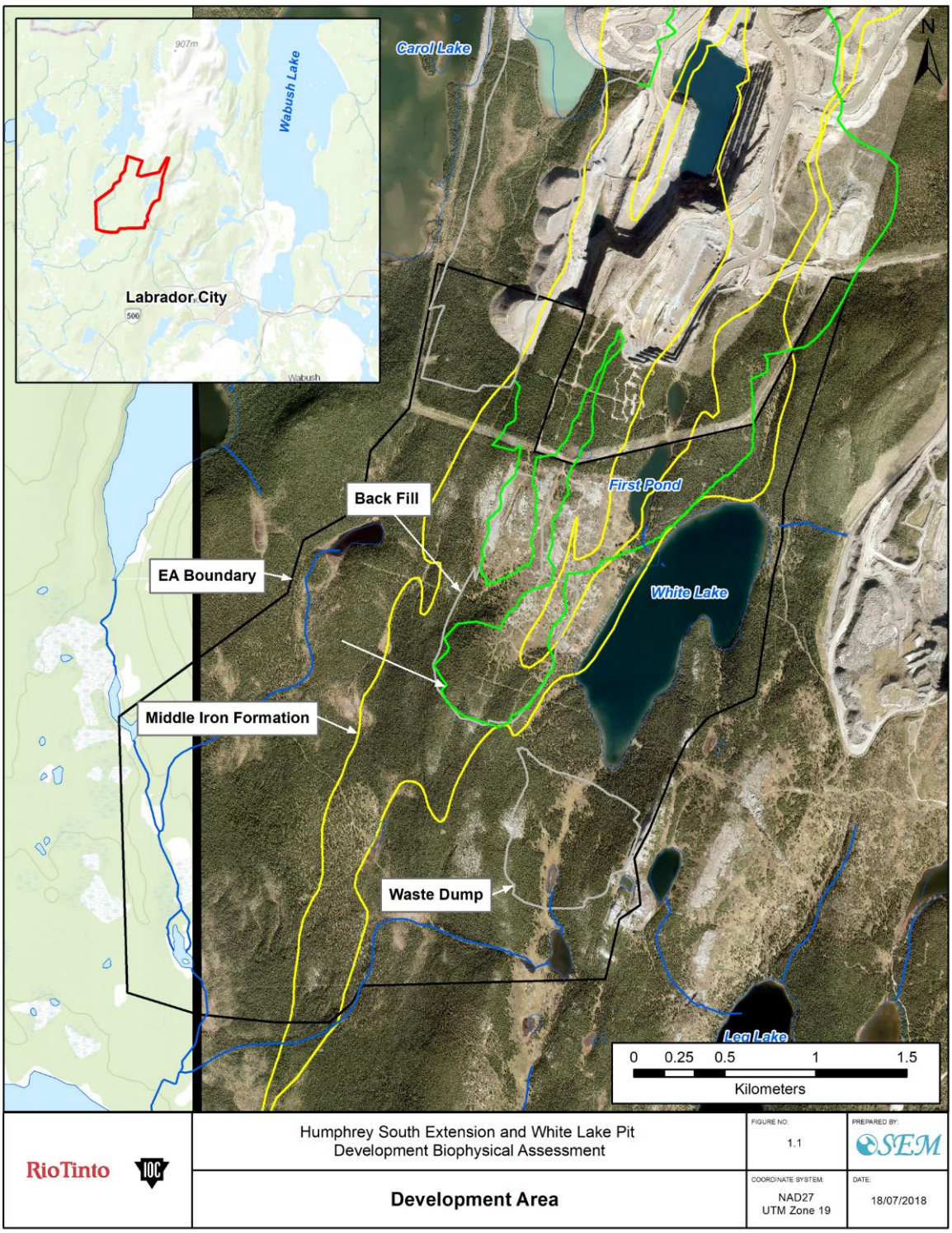


Figure 22: Biophysical Assessment Study Area

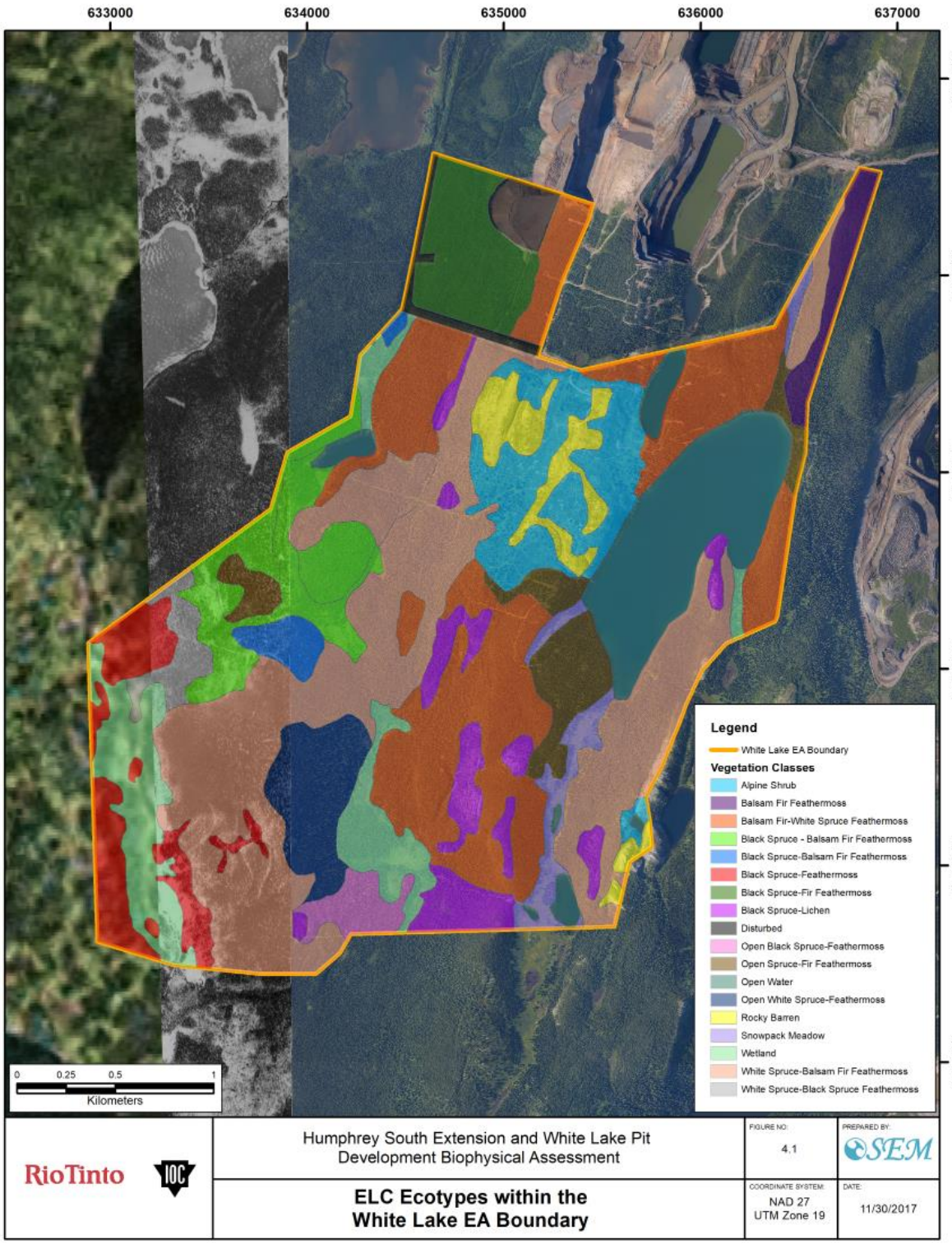


Figure 23: ELC Ecotypes within the EA Boundary

The Black Spruce Feathermoss (BSF) ecotype is similar to the WBFF ecotype but with black spruce as the dominant tree species and with a lesser component of Balsam Fir compared to the WSFF ecotype. The observed differences in species composition and structure are due to differences in site conditions, e.g., lack of calcium availability and/or impeded soil drainage. The shrub layer generally consists of scattered individuals or small patches of understory Black Spruce and low shrub species such as Labrador tea, lowbush blueberry and alpine blueberry. The herbaceous layer is dominated by bunchberry, creeping snowberry, and stiff clubmoss. Ground cover consists of a continuous layer of feather moss species, namely Scheber's moss, and plume moss (SEM 2018).

The area around the Project has been affected by mining-related activities since the 1960s and is characterized by patches of mixed wood forest interspersed with areas of moss, lichen cover and exposed rock and earth, with roads, trails and other previously disturbed and developed areas being present throughout the area.

3.1.2.2 Vegetation and Rare Flora

In conjunction with the ecological land classification, SEM completed rare flora surveys within the BASA in 2018. Plant lists and detailed methodologies are outlined in SEM 2018. Several S2 ranked plants were identified, specifically *Parnassia parviflora*, *Veratrum viride*, *Omalotheca norvegica*, and *Sparganium natans* in 2018 (Table 15*)*. Although a ranking of S2 by the ACCDC is considered rare in NL, these species are not necessarily rare in Labrador West. For example, *Veratrum viride* is ranked as an S2 plant, but is found in abundance throughout many open areas, wetlands and meadows across IOC's property in Labrador City (Figure 24). *Parnassia parviflora* had a patchy distribution and was mostly found along disturbed areas on upland sites. Dedicated surveys would be required to determine the relative abundance of these species within the boundaries of the BASA (SEM 2018).

Table 15: Rare Plants identified within the BASA

Latin Name	Common Name	S-Rank
Muhlenbergia uniflora	Fall dropseed muhly	S2S3
Omalotheca norvegica	Norwegian cudweed	S2S3
Parnassia parviflora	Small-flower grass-of-parnassus	S2
Potamogeton alpinus	Northern pondweed	S2S4
Pyrola asarifolia	Pink wintergreen	S3S4
Schizachne purpurascens	Purple oat	S3S5
Scirpus atrocinctus	Black-girdle bulrush	S3S5
Sparganium natans	Small bur-reed	S2S4
Spiranthes romanzoffiana	Hooded ladies'-tresses	S3S4
Triantha glutinosa	Sticky false-asphodel	S3S4
Trichophorum alpinum	Alpine cotton-grass	S3S5
Vahlodea atropurpurea	Mountain hairgrass	S3S4
Veratrum viride	American false-hellebore	S2
Viola renifolia	Kidney-leaf white violet	S2S4
Botrychium spp.	Botrychium spp.	

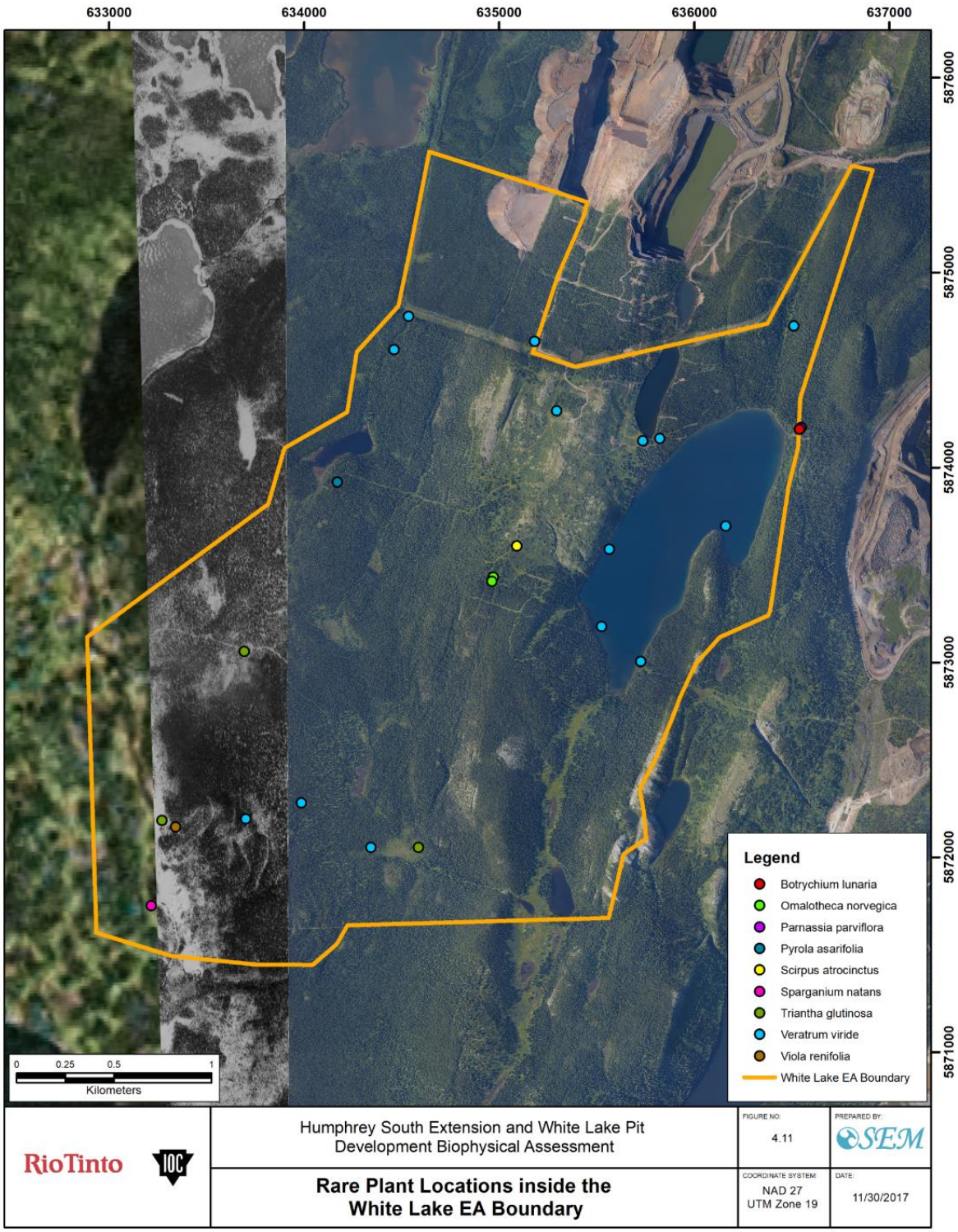


Figure 24: Rare Plant Locations within the BASA

3.1.2.3 Wetlands

Wetland ecotypes were classified using the Canadian Wetland Classification System (CWCS), which divides wetlands into class, form and type. Of the five wetland classes recognized by the CWCS, only the fen was identified within the BASA (Figure 25). Fens are characterized by the movement of mineral rich surface water via pools, channels and open water. Three forms of fen were identified in the BASA: slope fen, string fen (subform: Northern ribbed fen), and riparian fen (subform: stream fen). The vegetation types within the surveyed fens were predominately forest and sedge complexes (SEM 2018).

Figure 25: Typical Slope Fen in the BASA

3.1.3 Avifauna and Species at Risk

A desktop avifauna habitat assessment was completed prior to field surveys to determine the avian species, including raptor or waterfowl species at risk (SAR), that were likely to occur in the Project area, based on the habitat types available and the spatial extent of each. Two rounds of avifauna field surveys were conducted throughout all habitat types within the BASA in late summer 2018. Three-hundred and three (303) observations of 35 bird species were noted over the two rounds although observations were not mutually exclusive across rounds. In addition, an unmanned aerial vehicle (UAV) flight was completed to supplement ground surveys that provided observational and habitat information on raptors and waterfowl (SEM 2018).

3.1.3.1 Passeriformes and Other Perching Birds

SEM determined from the desktop avifauna habitat assessment that a broad diversity of bird habitats was present in the BASA. Field surveys were carried out in August 2018, fairly late in the season, so SEM supplemented the field data with species known to breed in those types of habitats, from data collected on other IOC projects in the area. This comprehensive approach increased the likelihood that species using the BASA would factor into the biophysical assessment.

The most commonly observed species throughout the various habitats of the BASA were dark-eyed junco, common raven, back-backed and/or Three-toed woodpecker (observed indirectly through bark-scaling evidence on white spruce trees), white-throated sparrow and boreal chickadee (SEM 2018). The suite of species observed represents the most easily detected birds once the breeding season has ended, (i.e., after birds have stopped singing) (Table 16).

Table 16: Species Detected in the BASA 2018

Species	No. of observations
Dark-eyed junco	49
Common raven	44
Black-backed and/or three-toed Woodpecker	29
White-throated sparrow	19
Boreal chickadee	19
Golden-crowned kinglet	17
Gray jay	16
Common redpoll	16
Spruce grouse*	12
Ruby-crowned kinglet	12
Yellow-rumped warbler	9
Canada goose	9
White-winged crossbill	6
Common loon*	5
Pine siskin	4
Pine grosbeak	4
Wilson's snipe	3
Willow ptarmigan	3
Savannah sparrow	3
Lincoln's Sparrow	3

Species	No. of observations
Yellow warbler	2
Northern goshawk*	2
Blackpoll warbler	2
Bald eagle*	2
White-crowned sparrow	1
Swainson's thrush	1
Solitary sandpiper*	1
Red-tailed hawk*	1
Merlin*	1
Great-horned owl*	1
Fox sparrow	1
American robin	1
American kestrel*	1
Swamp sparrow	1

*not a Passerine or Perching Bird, but included to facilitate comparison.

Based on other studies conducted during breeding season on adjacent properties, the species expected to be using the habitat types in the BASA for breeding are identified in Table 17.

Table 17: Potential Breeding Passerine Species in the BASA

Species	Suitable Habitat within BASA
Alder flycatcher	Shrubs near water
Hermit thrush	Forest
Northern flicker	Open areas
Northern water thrush	Shrubs near water
Orange-crowned warbler	Coniferous forest
Palm warbler	Bogs, wet areas
Red-breasted nuthatch	Coniferous forest
Swamp sparrow	Bogs, wet areas
Tennessee warbler	Boggy forest
White-winged crossbill	Coniferous forest
Winter wren	Forest
Yellow-bellied flycatcher	Coniferous forest, Bog edge

There were no avian SAR detected during the 2018 avifauna surveys. Point count surveys conducted during the breeding season would be more appropriate for surveying for the provincially and federally listed olive-sided flycatcher and rusty blackbird in the BASA.

3.1.3.2 Raptors

A UAV survey for raptors and waterfowl was carried out on September 12, 2018 in clear conditions. The sense Fly eBee UAV was flown at 180 m AGL to give a resolution of 3.30 cm/pixel. The surveys were planned to minimize disturbance to birds and to maintain adequate distance above late nesting birds. A second observer alerted the pilot to aerial hazards or observed behavioral effects to avifauna in the area. Transects overlapped to ensure 100% coverage. To supplement the aerial survey and to increase the likelihood that owls and smaller raptors were surveyed, SEM also recorded observations of raptors while conducting ground surveys.

No large raptor nests were detected within the Project area from the UAV aerial survey orthomosaic images. However, several observations of raptors and owls, as well as raptor and owl evidence, were detected during ground surveys, including those for Northern goshawk, bald eagle, red-tailed hawk, merlin, great-horned owl, and American kestrel. Surveys would be necessary earlier in the breeding season to determine the status of these species as breeders within the boundaries of the BASA.

3.1.3.3 Waterfowl and Waterbirds

Wetlands and other waterbodies within the Project area were surveyed in 2018 for observations of waterfowl and waterbirds. Visual scans of all shorelines, wetland areas, and waterbodies were conducted using high quality optics.

Observations of Canada goose, common loon, solitary sandpiper, and Wilson's snipe were recorded around waterbodies in the BASA. Based on surveys of other IOC properties and established range maps for the area, there are a number of other species that would likely be using the waterbodies and wetlands in the BASA:

- American black duck (*Anas rubripes*);
- Common goldeneye (*Bucephala clangula*);
- Common merganser (*Mergus merganser*);
- Green-winged teal (*Anas crecca*);
- Northern pintail (*Anas acuta*);
- Red-breasted merganser (*Mergus serrator*);
- Ring-necked duck (*Aythya collaris*);
- Surf scoter (*Melanitta perspicillata*);
- Black scoter (*Melanitta nigra*); and
- Snow goose (*Chen caerulescens*) (during migration only).

3.1.3.4 Avian Species at Risk (SAR)

SAR can be particularly susceptible to anthropogenic disturbance and habitat removal or fragmentation and may warrant comprehensive evaluation during projects that could affect their abundance, reproduction and movement. Therefore, the delineation of SAR habitat, the determination of presence or absence of SAR and estimates of abundance, where possible, are often major considerations during all phases of project planning and implementation (SEM 2018).

The Atlantic Canada Conservation Data Centre (ACCDC) provided records that indicated rusty blackbird, common nighthawk, harlequin duck, Barrow's goldeneye and short-eared owl are "*possible"* within the Project Area; while peregrine falcon is "*possible, but unlikely*". The ACCDC database searches a radius of 5 km around the center of the development area.

An assessment of available habitat determined that there was no available breeding habitat for harlequin duck within the boundaries of the BASA. Typical breeding habitat, i.e., tree cavities near waterbodies, for Barrow's goldeneye exists within the BASA, but no ACCDC records exist for this species for the study area (SEM 2018).

Given the habitat types present such as wetland areas, open areas for common nighthawk, and a large open upland on the western side of White Lake, it is possible that one to four avian SAR can be found within the BASA. These are the common nighthawk, the olive-sided flycatcher (Threatened under the NL ESA and SARA*),* the rusty blackbird (Vulnerable under the NL ESA and Special Concern under SARA*)* and the short-eared owl (Vulnerable under the NL ESA and Special Concern under SARA*)*. Dedicated surveys during breeding season would be required to categorically determine the presence or absence of these species within the BASA however.

The activities associated with the Project may have direct and/or indirect effects on SAR. Direct effects include the removal or fragmentation of habitat that directly affects breeding behavior and/or success, or otherwise directly affects vigor or causes health issues for SAR (SEM 2018). Indirect effects include increased noise in the area, the presence of humans and machinery in previously undisturbed areas or a degradation of air quality that leads SAR to avoid the area.

3.1.4 Mammals and Species at Risk

Mammal species detected during the 2018 surveys included moose, red squirrel, gray wolf, red fox and others. All species were detected from scat and/or tracks along transects throughout the various habitat types of the BASA (Table 18).

Table 18: Species Detected from Scat and Tracks in the BASA

Species	No. of Observations
Moose	38
Red squirrel	23
Gray wolf	18
Red fox	11
Snowshoe Hare	9
Porcupine	5
Beaver	4
Black bear	4
Canada Lynx	3
Vole spp.	3
Muskrat	1
Total observations	**119**

Other mammals that may be found in the BASA, but were not detected during 2018 surveys, include American marten, American mink, cinereus shrew, pygmy shrew, Eastern heather vole, rock vole, ermine (*Mustela erminea*), least weasel, little brown bat, meadow jumping mouse, meadow vole, deer mouse, otter, Northern bog lemming (*Synaptomys borealis*), Northern flying squirrel, Southern red-backed vole, and star-nosed mole.

3.1.4.1 Mammal SAR

According to the NL ESA (2001) and the federal SARA Public Registry (2017), there are four mammal SAR that could potentially occur in Labrador West, wolverine (*Gulo gulo*), woodland boreal caribou (*Rangifer tarandus caribou*), Northern long-eared bat or Northern myotis (*Myotis septentrionalis)*, and little brown bat or little brown myotis *(Myotis lucifugus),*

The Atlantic Canada Conservation Data Centre (ACCDC) records indicated that woodland boreal caribou are "*possible"* within the Project Area. The ACCDC database searches a radius of 5 km around the center of the development area.

The current range of the Lac Joseph herd is to the south and east of the Project area and current information also indicates that the quickly-declining migratory George River herd occurs to the north and northeast of the Project area (SEM 2018).

Wolverine has not been verified in Labrador since 1950, and there is no evidence to suggest this species exists in the vicinity of White Lake or other IOC properties in Labrador City. The woodland boreal caribou, currently listed as Threatened under the NL ESA and SARA, are unlikely to inhabit lands in such close proximity to mining operations. A study by Weir et al. (2007) determined that caribou avoid mine areas by as much as 4 km, and group sizes were affected up to 6 km from mine sites.

SEM also identified the little brown bat and the Northern long-eared bat as potentially occurring in the BASA. The little brown bat and Northern long-eared bat were given an emergency listing of "Endangered" by SARA in 2014 because of rapid population declines in Canada due to a deadly disease, white-nose syndrome (WNS). According to ECCC, "the population decline that has been documented for these species is considered by some experts to be the most rapid decline of mammals ever documented anywhere in the world" (Environment Canada 2014).

Based on the 2018 wildlife survey, and the habitat types identified in the BASA, it is possible the federally endangered little brown bat and Northern long-eared bat are using the area. Open habitats would provide sufficient foraging sites, snags would provide roosting sites and snags and/or large overmature trees would provide maternity sites.

To gain a better understanding of the potential use of its mining property by *Myotis* spp. IOC implemented a bat monitoring program in late summer 2020 on its Labrador City mining property whereby five full spectrum Anabat Swift detectors were installed in four locations, in areas considered to have high potential for bat occurrences. One of the locations was in the White Lake area (Figure 26). Detectors were passively monitored on a pre-determined schedule, (i.e., from dusk until dawn) and echolocation calls were recorded from late August to late September. Results indicate the presence of both Northern long-eared bat and little brown bat on IOC's Labrador City mining property, including a direct observation of the Northern long-eared bat near White Lake, on the Project site (Table 19). Planned future monitoring efforts will clarify the distribution and abundance of this species, and potentially others, throughout the Project area (SEM 2019 and 2020).

Table 19: Locations of *Myotis* spp. Observations on Labrador City Mining Property

Site	Little brown bat	Myotis spp.	Northern long-eared bat	Unknown	Total
Dorothy Lake	7	1	3	5	16
Drum Lake					0
Luce Lake	2				2
White Lake			1		1
Total	9	1	4	5	20

As indicated above, the activities associated with the Project may have direct and/or indirect effects on SAR. Direct effects include the removal and/or fragmentation of habitat that directly affects breeding behavior and/or success, or otherwise directly affects vigor or causes health issues for SAR (SEM 2018). Indirect effects include increased noise in the area, the presence of humans and machinery in previously undisturbed areas or a degradation of air quality that leads SAR to avoid the area.

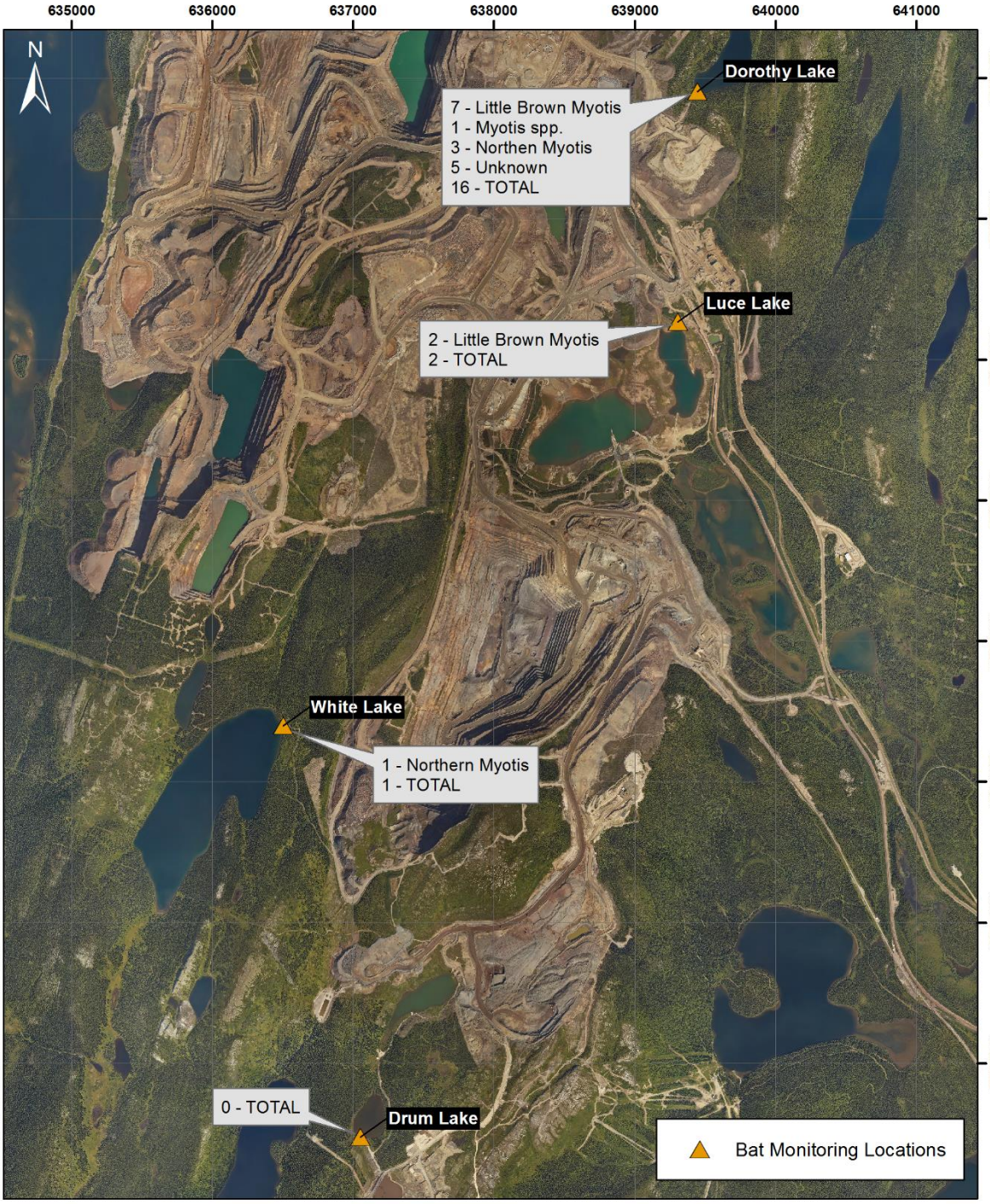


Figure 26: Bat Monitoring Locations

3.1.5 Amphibians

During ground surveys for avifauna and mammals, biologists noted the presence of amphibian habitat and probable amphibian habitat.

Based on surveys in other IOC areas, information from the Wildlife Division and the NL Nature Atlas, possible amphibian species occurring in the BASA include:

- American toad (*Anaxyrus americanus);*
- Wood frog (*Lithobates sylvaticus);*
- Mink frog (*Lithobates septentrionalis);*
- Northern leopard frog (*Lithobates pipiens*);
- Spring peeper (*Pseudacris crucifer*);
- Blue-spotted salamander (*Ambystoma laterale*); and
- Northern two-lined salamander (*Eurycea bislineata*).

The amphibian species known to occur in Labrador West would require dedicated surveys during breeding season to adequately establish their presence and relative abundance within the boundaries of the BASA (SEM 2018).

3.2 Freshwater Environment

Development of the Project will result in the removal of First Pond during Stage 1 activities and has the potential to affect White Lake and its outlet during Stage 4. Two ponds outside the Project footprint, Humphrey South Pond 1 (HSP1), Humphrey South Pond 2 (HSP2), may also be indirectly affected. White Lake, First Pond, HSP1, HSP2 and their associated streams were the focus of a detailed aquatic survey carried out in 2018 by SEM.

Prior to 2004, White Lake was a fishless waterbody that was used as habitat compensation for the loss of Hakim Lake as part of the Luce Lake mining development. Brook trout and lake chub were transferred from Hakim Lake to White Lake and habitat enhancement activities were completed on the White Lake outlet as part of the overall compensation program. Given White Lake's transition from fishless to fish habitat, and the likelihood that First Pond will be removed as a result of the Project, IOC determined that a detailed fish and fish habitat assessment of both these waterbodies was warranted.

Loss of fish habitat will require an approval from the federal department of Fisheries and Oceans (DFO). In anticipation of changes to the federal *Canada Fisheries Act*, *2019*, IOC collected sufficient information during field surveys to support a thorough assessment of the Project. Work included the quantification and classification of fish habitat, determination of fish populations and characterization of the supporting biological communities of White Lake and First Pond. A general description of habitat and aquatic resources of other waterbodies within the proposed development area was also completed.

3.2.1 Aquatic Baseline Information Collection

3.2.1.1 Historical Information

All available historical information on the aquatic habitat and biological communities of White Lake was reviewed in 2018. In 2003, IOC expanded into the Luce Lake watershed and Hakim Lake, and populations of brook trout and lake chub in those waterbodies were lost. At that time, DFO permitted IOC to transfer 1,081 brook trout and 980 lake chub from Hakim Lake to White Lake as habitat compensation. The outlet of White Lake was also enhanced to provide additional habitat for transferred fish.

Multi-year monitoring for White Lake and its outlet to determine the effectiveness of the fish transfer was carried out between 2004 and 2010 and included mark-recapture surveys, fyke net surveys and electrofishing surveys. Appropriate metrics were used to estimate fish population, size structure, growth, health, and condition.

Catch-per-unit-effort (CPUE) data from 2005-2008 confirmed that brook trout had survived and there were indications in 2008 that the lake chub population was surviving and increasing. Electrofishing surveys of the outlet channel also confirmed successful spawning and recruitment was occurring (SEM 2018).

3.2.2 Aquatic Surveys – 2018

The detailed aquatic assessment of White Lake and First Pond was comprehensive and included the following:

- Lake habitat assessment following methods outlined in Bradbury *et al*. (2001) including:
    - Bottom/sediment mapping;
    - Bathymetric survey;
    - Littoral and profundal zone mapping;
    - Water quality survey; and
    - Sediment quality survey.
- Stream habitat assessment following methods outlined in McCarthy, Grant and Scruton (2007);
    - Flow assessment (streams).
- Pond fish population assessment using a mark and recapture program;
- Stream and pond population assessment using quantitative electrofishing;
- Benthic community survey; and
- Phytoplankton and zooplankton community and chlorophyll assessment.

A number of smaller water bodies (HSP1 and HSP2) outside the Middle Iron Formation footprint that will not be directly affected by the Project may be subject to other environmental effects, e.g., fugitive dust. A general description of the habitat and aquatic resources associated with these water bodies was completed in 2018 and included:

- Approximate depth of ponds;
- Presence/absence of fish and identification of species found;
- Pond connectivity upstream and downstream;
- Overview of substrate and vegetation in streams; and
- Flow rates in streams only.

In 2018, four main sampling stations were established on White Lake and one each on First Pond, HSP1 and HSP2. At each station, secchi depth and field water chemistry data were determined, and samples were collected for water chemistry, sediment chemistry and plankton analyses. Benthic samples were collected from While Lake and First Pond. Plankton and benthic samples were not collected from HSP1 and HSP2 (SEM Aquatics 2018).

Table 20: Measured Parameters for potentially affected Project Water Bodies

Water Body	Surface Area	Volume	Maximum Depth	Mean Depth	Littoral Zone Area	Profundal Zone Area
White Lake	697,158 m^2	13,365,051 m^3	42 m	15.2 m	217,776 m^2	479,382 m^2
First Pond	56,255 m^2	320,675 m^3	14 m	4.7 m	33,959 m^2	22,294 m^2
HSP1	38,183 m^2	76,648 m^3	7.6 m	2.7 m	31,614 m^2	6,569 m^2
HSP2	25,601 m^2	33,550 m^3	3.3 m	1.5 m	25,601 m^2	0

Overall results of the fish population assessment are shown in Table 21 and Figure 27.

3.2.2.1 White Lake Aquatic Survey Summary

White Lake is one of the largest waterbodies on IOC's mining property and measures approximately 1.7 km x 4.0 km. There is a single outlet at its north end that connects to a compensation channel flowing into the Luce Lake drainage system. There are no perennial tributaries flowing into White Lake but there is one intermittent channel flowing in from First Pond during high flow conditions. The shoreline is relatively pristine and is primarily large timber intermixed with overhanging vegetation.

White Lake has a circumneutral pH, low alkalinity and conductivity and was very clear with little turbidity during field wok in 2018. Most metal levels in the water were below detection limits and iron was undetected despite the high presence in the surrounding bedrock. Water chemistry profiles indicated a clear thermocline over the depths from 7 to 12 m. Bottom temperatures were very cold, between 4 and 6^0 C. There was no evidence of anoxia in deeper waters and the temperature was close to 100% saturation throughout the water column. The sediment quality of White Lake was good with most metals at measurable levels. Iron was very high ranging from 52,000 to 180,000 mg/kg (SEM Aquatics 2018).

A habitat survey of the White Lake outlet was completed from the confluence of the lake to the end of the constructed compensatory reach. The upper reaches had a modest gradient and were comprised mostly of riffles and runs with small pools. The gradient increased along the channel and the habitat in the lowest reaches consisted of riffles interspersed with pools, cascades and small waterfalls. The last reach was primarily comprised of chutes that were complete barriers to fish passage.

White Lake was fished with fyke nets and gill nets and brook trout and lake chub were the only species captured. Electrofishing was conducted at two stations in the outlet stream.

A benthic community survey was conducted on White Lake and indicated a mean benthic density of 53.0 while the mean benthic diversity was 8.8 per site. Phytoplankton and zooplankton biomass were also investigated and detailed results are available in the 2018 SEM Aquatic report.

Table 21: Summary of Fisheries Data

	Brook Trout					Lake Chub				
	Number Captured	**Recapture Rate (%)**	**Population Estimate**	**Average Length (mm)**	**Average Weight (g)**	**Number Captured**	**Recapture Rate (%)**	**Population Estimate**	**Average Length (mm)**	**Average Weight (g)**
White Lake	1268	10.7	4583	147.5	51.3	255	4.7	2070	91.4	15.0
WL Outlet (per 100 $m^{2)}$	NA	NA	32.0 66.4	133.1	30.4	NA	NA	NA	NA	NA
First Pond	1	NA	NA	NA	NA	0	NA	NA	NA	NA
HSP1	141	NA	NA	148.8	NA	0	NA	NA	NA	NA
HSP2	0	NA	0	NA	NA	0	NA	0	NA	NA

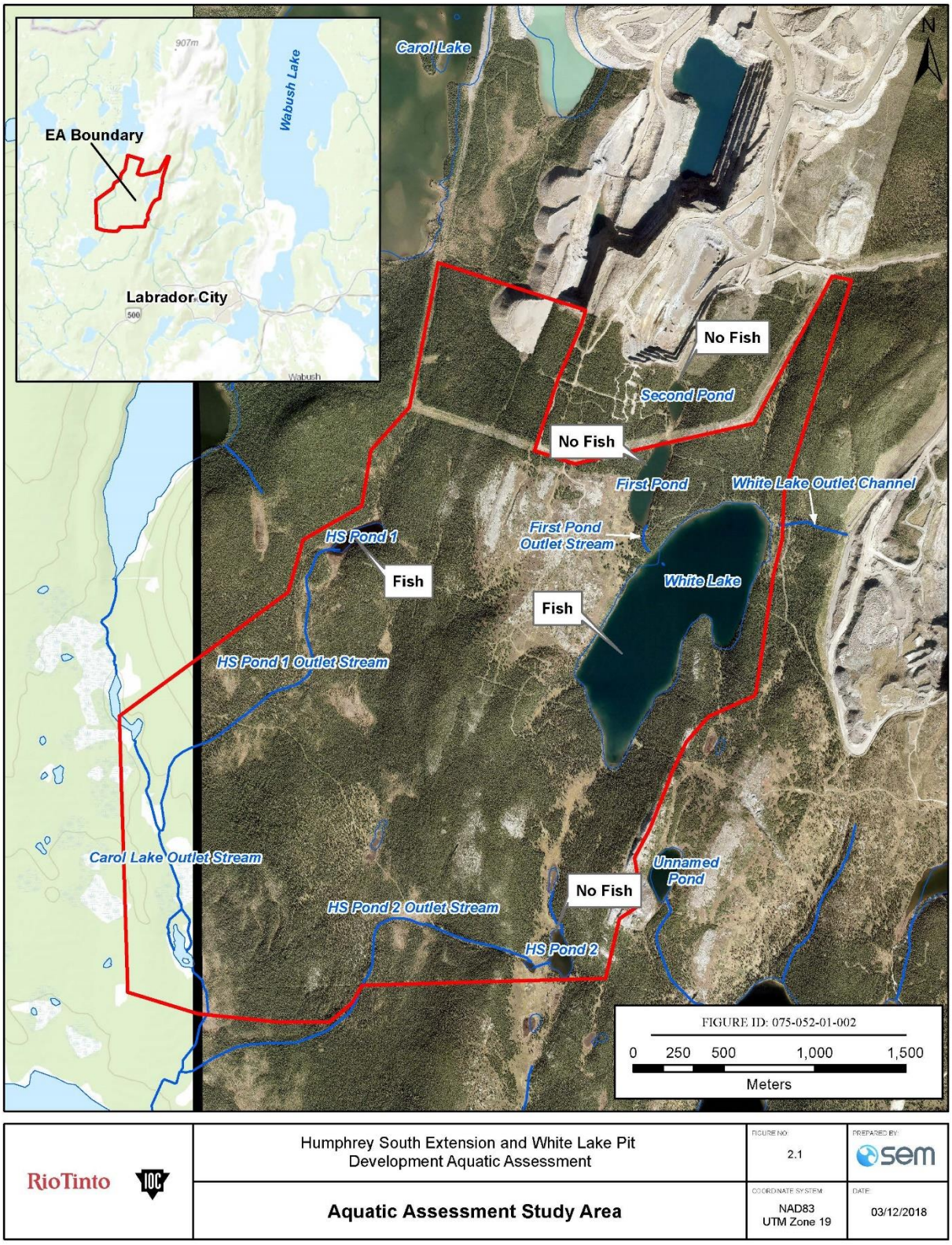


Figure 27: Fish Population Assessment

3.2.2.2 First Pond Aquatic Survey Summary

First Pond measures approximately 500 m x 130 m and is located 120 m northwest of White Lake and 100 m southeast of Second Pond. There is a single outlet stream located at the south end that flows intermittently to White Lake and there is an intermittent tributary on the north side draining from Second Pond. The shoreline provides good cover for fish along approximately 60% of its length but there are no beaches, islands, aquatic vegetation or bedrock outcrops.

The outlet stream was assessed and no visible flow was evident in the wetted areas. The terrain surrounding the channel is steep but during high flow events, it is possible that fish could ascend the stream.

First Pond was sampled for standard chemistry parameters and results indicated a circumneutral pH, low alkalinity and conductivity, with most metals below detection limits. Iron was undetected despite the high presence in the surrounding ore body. Detailed results are presented in SEM's Aquatics 2018 report.

First Pond was fished intensively using both fyke nets and gill nets (Figure 28). The total fishing effort for fyke netting was 22 net nights and only one brook trout was captured with a catch per unit of effort of 0.045. In addition, two gillnets were set on August 18, 2018 but no fish were caught.

SEM concluded that it was likely that this fish had moved up from White Lake during high flow conditions, as there was no evidence of an established trout population in First Pond (SEM Aquatics 2018).

These results were discussed with DFO officials and they indicated that based on the fishing effort, the conclusion of one fish moving into First Pond during high flow conditions is a probable one.

3.2.2.3 Humphrey South Pond 1 (HSP1) Aquatic Survey Summary

HSP1 measures approximately 350 m x 100 m and is located 1.5 km west of White Lake. HSP1 has one primary inlet located on the North east side while the outlet is located on the western shore. The outlet stream flows for approximately 2 km to the Carol Lake outlet. The shoreline is pristine and undisturbed and provides substantial cover for fish species with extensive coarse woody debris and undercut banks along the lake shoreline.

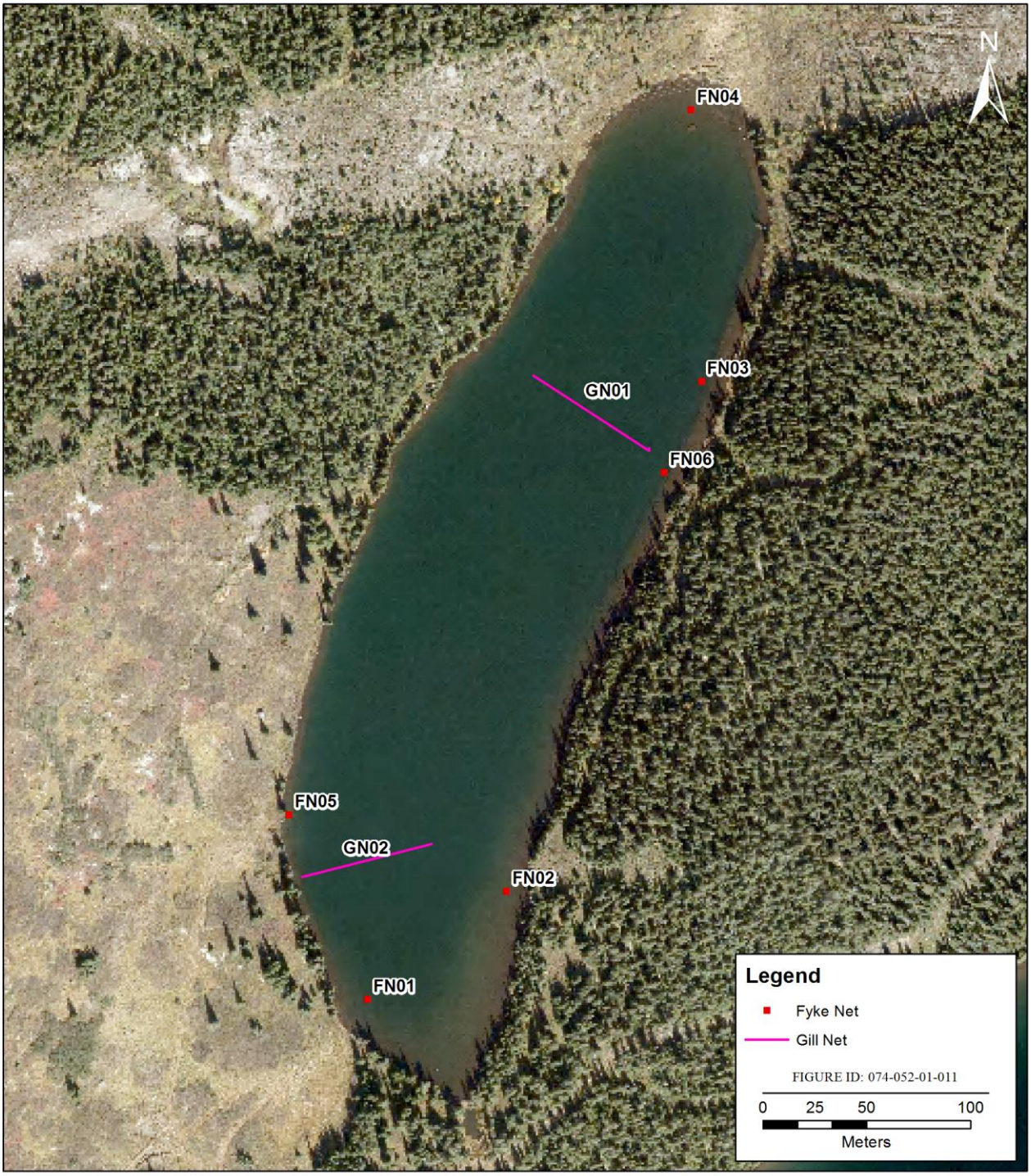
Stream habitat surveys were completed on both the inlet and outlet streams. The inlet stream went underground once it left the pond, reappeared approximately 30 metres upstream and then meandered through a wetland. It is likely that the inlet stream is intermittent during low flow periods. The outlet channel contained good fish habitat and it is likely that brook trout use the habitat due to the abundance of trout present in HSP1.

A field water chemistry profile determined that both temperature and dissolved oxygen declined from the surface with temperatures reaching 4.2^0 C at the bottom. Dissolved oxygen showed a clear decline to levels that were close to anoxic at the bottom at 2.6 mg/L. Dissolved oxygen was less than saturation level below 3 m, and declined to only 17.8% saturation at the bottom. The trend and decline in dissolved oxygen suggests the strong possibility of groundwater contribution to this pond.

3.2.2.4 Humphrey South Pond 2 (HSP2) Aquatic Survey Summary

HSP2 is located approximately 1 km south of White Lake and measures approximately 300 m x 100 m. The Pond is primarily comprised of littoral habitat and there are no apparent inlet or outlet channels. A shallow wetland to the west likely conveys water from HSP2 during high flows. A field water chemistry profile indicated no trends in temperature or dissolved oxygen with depth.

Although fished with fyke nets and gill nets, no fish were captured. This can likely be attributed to the shallow nature of the pond and the probability that a large portion of the pond freezes in winter, thereby limiting overwintering fish habitat (SEM Aquatics 2018).



RioTinto IOC	Humphrey South Extension and White Lake Pit Development Aquatic Assessment	FIGURE NO: 3.32	PREPARED BY: SEM
	First Pond Fish Sampling Locations	COORDINATE SYSTEM: NAD 83 UTM Zone 19	DATE: 03/12/2018

Figure 28: 2018 First Pond Fish Sampling Locations

3.2.3 Hydrology

Hydrological information for the area is mainly limited to IOC's Carol Operations. An understanding of the existing hydrology of the area is based on climate, drainage, geology and topography. Surface water run-off from the four development stages will be captured via sumps and either pumped or gravity fed via ditches to promote runoff to vegetated areas, and away from natural waterbodies. The discharge points (Figures 11-15) for surface water collected will be in vegetated areas more than 100 m from a waterbody or stream (Figure 29).

Figure 29: Typical Discharge Scenario for Water Management at the HSEP

3.2.4 Hydrogeology

In 2002, Piteau Associates (Piteau) undertook a review of the hydrogeology of current and historic operations of the IOC Carol Operation in the area of the Project. That review provides information on the basic hydrostratigraphy that occurs at the existing and historic IOC mine operations to the north of Labrador City. An important aspect of the hydrostratigraphy is the occurrence of deep pre-glacial limonitic weathering occurring to depths in excess of 200 meters below ground surface. According to Piteau (2002), the most permeable hydrostratigraphic unit is limonitic altered (weathered) Lower Iron Formation (LIF). The unaltered, parent, version of the LIF contains a high percentage of carbonate minerals. The relatively high hydraulic conductivity of this unit is caused by dissolution, over millions of years of groundwater-rock interaction, of the carbonate minerals and oxidation of iron minerals (e.g., magnetite and specularite) to goethite and limonite. Alteration is most intense in rock that has been faulted. The Humphrey South orebody contains significant zones of limonite alteration. The hydraulic conductivities of the limonitic (weathered) zones are noted as being as high as 1 x 10-4 to 1 x 10-3 m/s. Therefore regions of the LIF, and possibly the base of the Middle Iron Ore Formation (MIF), that are limonitically altered may form aquifer material capable of providing base flow to local streams/rivers where the relationship between the topography and the water table promotes natural groundwater discharge at surface.

When mining progresses below the water table, groundwater ingress to open pits results. A previous hydrogeological investigation (Piteau 2002) assessing IOC's open pits estimated groundwater seepage into each pit at that time for mitigation purposes. Reported groundwater ingress estimates ranged from as low as 80 USGPM (~440 m3/d) for Humphrey South Pit up to 1,000 USGPM (~5,400 m3/d) for the Humphrey Main Pit. At Spooks Pit groundwater ingress was estimated at 1,740 USGPM (~9,500 m3/d) and was primarily associated through flow in the weathered eastern face from Lake Lorraine (Piteau 2002).

During September 2020 two separate vertical piezometers (MW134 and MW135) were constructed between the existing Magy Lake Pit and White Lake (Figure 30). The purpose of these piezometers is to collect groundwater level data and establish baseline (pre-mining) seasonal groundwater level patterns/cycles. Both piezometers were drilled in limonitic zones within the Sokoman Iron Formation. MW134 was constructed to 101.4 meters depth and had an initial water level of 17.81 meters below ground surface (Figure 31). MW135 was drilled and constructed to 90.4 meters and had an initial water level of 21.18 meters below ground surface (Figure 32). Water level sensors, programmed to collect level and temperature readings every two hours, will be installed in these piezometers during the first quarter of 2021.

Figure 30: Location of 2020 Vertical Piezometer Installations

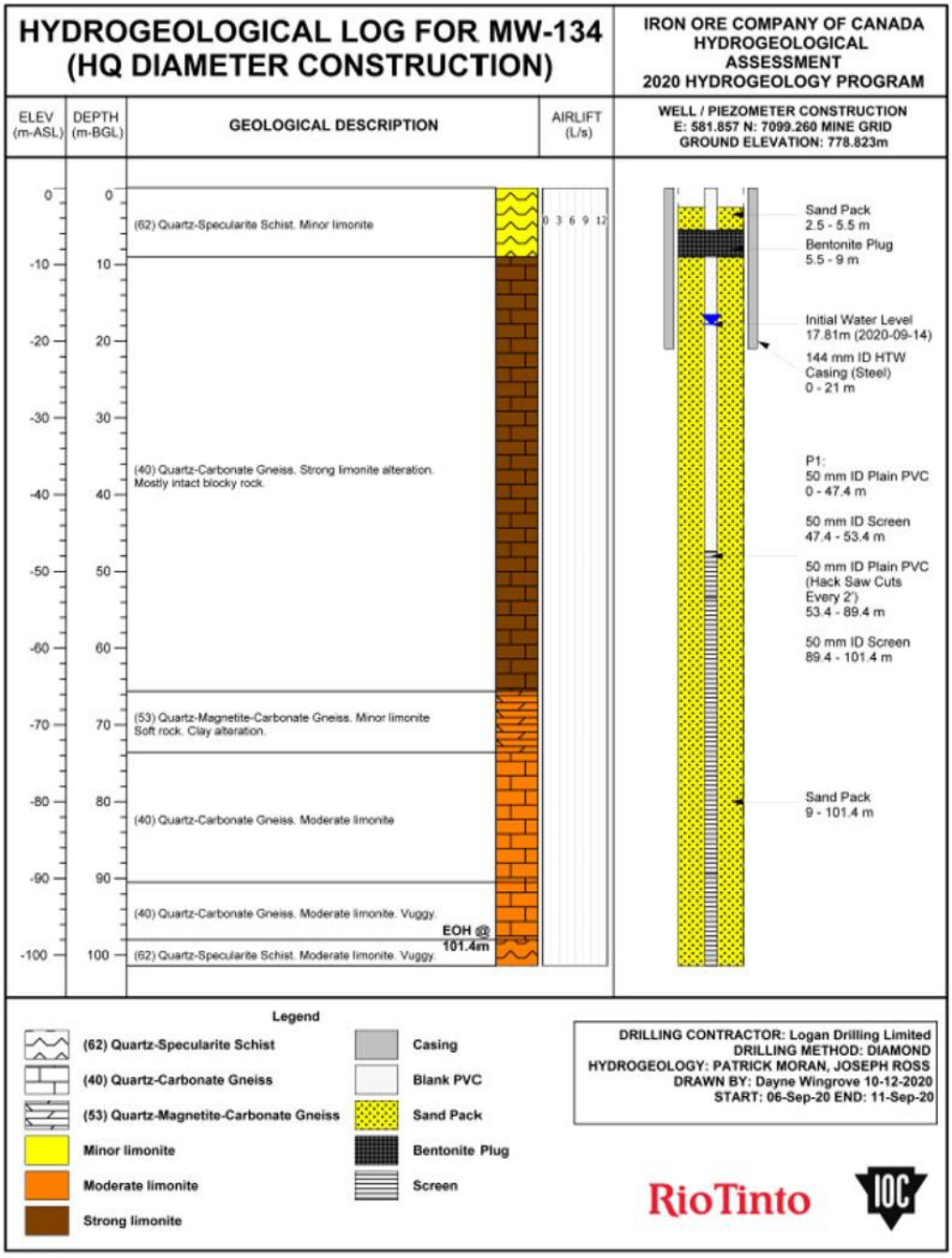


Figure 31: Hydrogeological Log for Piezometer MW134

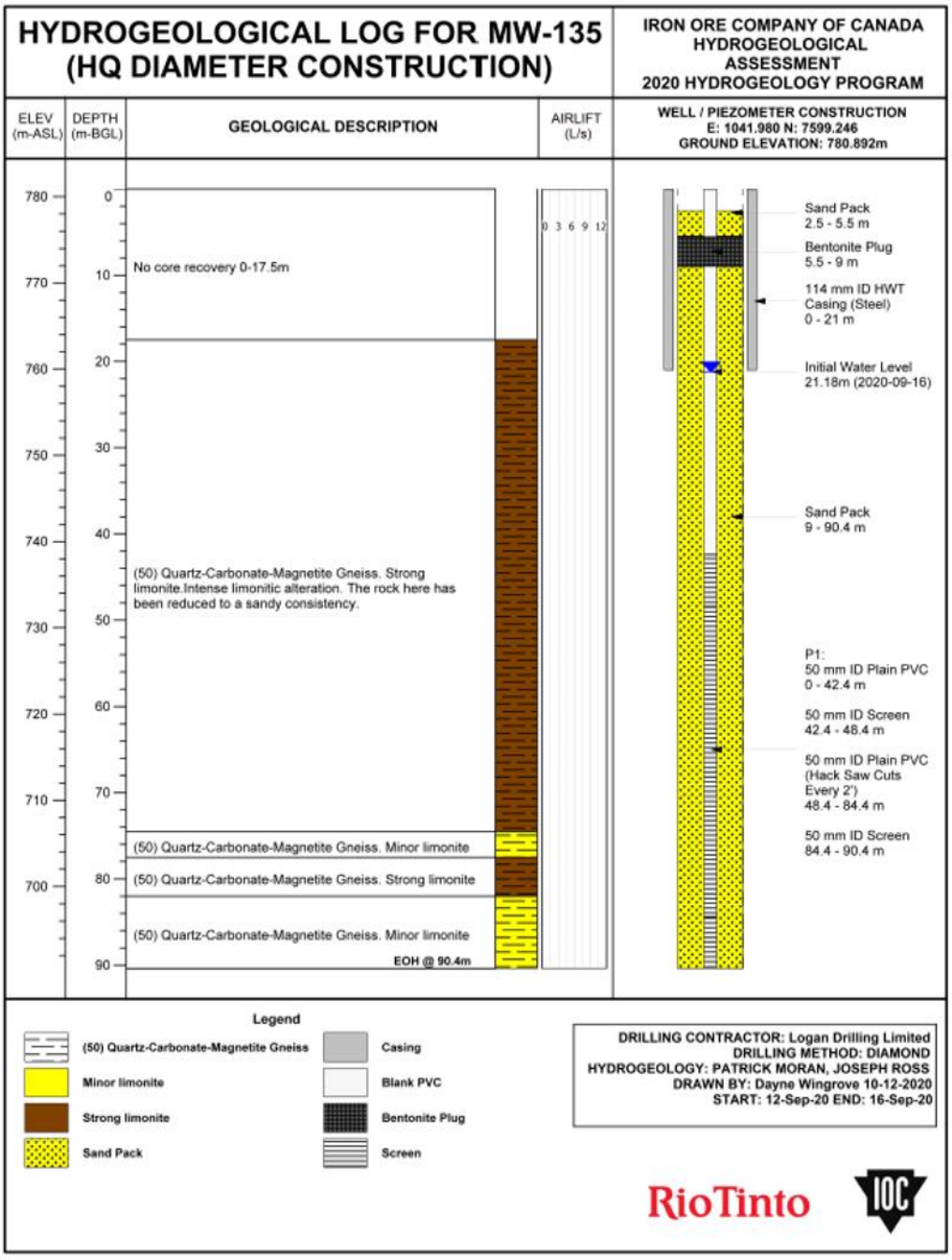


Figure 32: Hydrogeological Log for Piezometer MW135

3.2.5 Geology and Topography

The topography of the Project area is typical of the larger, surrounding region, and is largely bedrock controlled and somewhat rugged with rolling hills and valleys.

The Project is situated in the Labrador Trough, which comprises a thick Proterozoic sedimentary sequence. This area is part of the Grenville Orogeny and has undergone medium to high-grade metamorphism and extensive multi-phase deformation to form a terrain that is characterized by thrusting and non-cylindrical folding. Like the other iron ore deposits at IOC, the Humphrey deposit, of which the Project is a part, is locally referred to as a meta-taconite and may be classified as a metamorphosed version of the "Lake Superior-Minnesota Type".

As with all of IOC's reserves and resources, the HS deposit lies within the Sokoman Iron formation, which consists of a lower waste unit, the LIF, overlain by a middle ore-bearing unit, the MIF, which is, in turn, overlain by an upper waste unit, the Upper Iron Ore Formation (UIF) (Table 22). The MIF unit is also cut by internal waste units of quartz-carbonate, fibre, limonite, and metagabbro.

Table 22: Bedrock Geology of the Carol Lake Operation, Stratigraphically Upwards

Formation		Primary Rock Types
Shabagomo		Metagabbro gneiss dykes and sills with lesser amphibolite schist
Menihek		Youngest formation of Knob Lake Group comprising mainly quartz-feldspar-mica-graphite schist
Sokomon (previously Wabush)	Upper Iron Ore Fm (UIF)	Light brown/white quartz-carbonate (siderite) gneiss with variable amounts of magnetite, hematite, grunerite, tremolite, and actinolite
	Middle Iron Ore Fm (MIF)	Quartz-magnetite, and/or quartz-specular hematite-magnetite, and/or quartz-specular hematite-magnetite-carbonate, and/or quartz-specular hematitite-magnetite-anthophyllite gneiss and schist units
	Lower Iron Ore Fm (LIF)	Light brown/white quartz-carbonate (siderite) gneiss with variable amounts of magnetite, hematite, grunerite, tremolite, and actinolite-quartz-carbonate, and/or quartz-carbonatemagnetite, and/or quartz-carbonate-silicate, and/or quartzcarbonate-silicate-magnetite, and/or quartz-magnetitespecular hematite units
Wishart (previously Carol)		White massive to foliated quartzite
Attikamagen (previously Katsao)		The oldest formation of the Knob Lake Group comprising medium to coarse grained quartz-feldspar-biotite-muscovite schist and lesser gneiss

The HS deposit comprises a sequence of tightly folded, overturned, east dipping synclines.

3.2.6 Acid Rock Drainage Metal Leaching (ARDML) Potential

Acid rock drainage in mining operations results from the oxidation of sulphide minerals. IOC's deposits are low in sulphides, with sulphur grades typically less than 0.05%. Carbonate grades generally range from 2-15%, with the major waste units having predominantly quartz-carbonate mineralisation. As a consequence, no acid rock drainage (ARD) has been observed in any of IOC's operations in its 55 years of operations.

Recent studies have, however, identified the potential for local ARD issues in rock types with elevated sulphur content (generally gabbro intrusions) or depleted carbonates (limonitically altered material). The HS deposit (including the White Lake area) has zones of intense alteration with significant carbonate depletion, as well as a number of intrusive gabbro units.

IOC currently logs all blast holes for lithology and approximately 16% of blast holes in ore units and gabbro intrusions (every second hole on every third row) and approximately 11% of holes in other waste types (every third hole on every third row) for chemistry.

ARD Fundamentals

Acid Rock Drainage (ARD) is caused by the oxidation of sulphide minerals, leading to the generation of sulphuric acid (Price 2009 and Lorax 2018a). For pyrite, the reaction is:

$$FeS_2 + \frac{15}{4}O_2 + \frac{7}{2}H_2O \Longrightarrow Fe(OH)_3 + 2SO_4^{2-} + 4H^+ \quad \textbf{Equation 1}$$

Acid generated from oxidation of sulphides can be neutralized, either partially of completely, by carbonates in the rock. At near neutral conditions (6.3<pH<10.3), the carbonates react with the acid to produce bicarbonate ions. This requires four moles of carbonates ($CaCO_3$ or $MgCO_3$) to neutralize the acid produced from each mole of pyrite:

$$FeS_2 + \frac{15}{4}O_2 + \frac{7}{2}H_2O + 4[Ca, Mg]CO_3$$
$$\Longrightarrow Fe(OH)_3 + 2SO_4^{2-} + 4HCO_3^- + 4[Ca^{2+}, Mg^{2+}] \quad \textbf{Equation 2}$$

In more acidic conditions (pH<6.3), the carbonates react to CO_2 and H2O. This reaction only requires 2 moles of carbonate to neutralize the acid produced from each mole of pyrite:

$$FeS_2 + \frac{15}{4}O_2 + \frac{7}{2}H_2O + 2[Ca, Mg]CO_3$$
$$\Longrightarrow Fe(OH)_3 + 2SO_4^{2-} + 2H_2O + 2CO_2 + 2[Ca^{2+}, Mg^{2+}] \quad \textbf{Equation 3}$$

The methodology used by IOC to assess the ARD potential during grade control operations is the Acid-Base-Analysis (ABA), as documented in the *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials* (the MEND Report) (Price 2009). This involves estimating sulphide and carbonate contents of the rock from grade control assays and determining the molar ratio of carbonates to sulphides. If the ratio is higher than four, there should be sufficient carbonates present to neutralize the acid produced by the sulphides and the rock is classified as being non-acid producing. If the ratio is less than two, there should not be sufficient carbonates present to neutralize the acid produced by sulphides and the rock is classified as being acid producing. If the ratio is between two and four, it is possible that the carbonates present will not completely neutralize the acid produced by sulphides and the rock is classified as being potentially acid producing.

ARD Assessment

The standard methods used for ARD assessment in Canada (including the ABA method being used for grade control at IOC) are documented in the *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials* (the MEND Report) (Price 2009). The ABA outlined in the MEND Report uses estimates of Acid Potential (AP) and Neutralizing Potential (NP) to characterise the above acid generating and neutralizing chemical reactions. Neutralizing potential is expressed as kg/t of $CaCO_3$. For simplicity, the AP is also expressed as the kg/t of $CaCO_3$ which would be required for complete neutralization of the acid assuming that the neutralizing reaction in equation 3 above occurs, (i.e., complete neutralization to carbon dioxide and water).

The MEND Report uses the Net Potential Ratio (NPR) to determine the acid generating potential of a sample, where:

$$NPR = \frac{NP}{AP} \qquad \textbf{Equation 4}$$

If NPR < 1, the AP is greater than the NP and the sample is acid generating. If NPR>2, then the NP is more than twice the AP, so there is sufficient neutralizing capacity for complete neutralization according to the neutralizing reaction shown in equation 2 above (i.e., producing bicarbonate, rather than carbon dioxide and water). In this case the sample is not acid generating. For 1<NPR<2 the sample is potentially acid producing.

IOC's laboratory provides assays for Sulphur (%S), carbonate (%CO_2), calcium (%CaO) and magnesium (%MgO) for all grade control samples. The most conservative approach is to assume that all sulphur is present as sulphides. For gabbro samples, the CO_2 assay is used to estimate carbonate content. For IOC's other rock types, however, some of the carbonates can be present as siderite, which is not acid neutralizing. As a consequence, for these rock types the CaO and MgO assays are used to estimate the "useful" carbonate content of the rock.

The MEND Report provides the following relationships for converting sulphur and carbon dioxide assays into AP and NP values expressed as kg/t of $CaCO_3$:

$$AP = \%S \times 31.25$$ **Equation 5**

$$NP = \%CO_2 \times \frac{100.09}{44.01}$$ **Equation 6**

For all rock types except the gabbro, the equivalent CO_2 grade to be used in the above equation is derived from the CaO and MgO grades using the following equation:

$$\%CO_{2eq} = \%CaO \times \frac{44.01}{56.08} + \%MgO \times \frac{44.01}{40.30}$$ **Equation 7**

In equation 7 above, 44.01 is the molecular weight of CO_2, 56.08 is the molecular weight of CaO and 40.30 is the molecular weight of MgO.

ARD Assessment of Drill Core

An ABA has been carried out on the sample database for the HS deposit. This analysis used assayed sulphur and carbon dioxide grades from all diamond drill holes in the deposit. This analysis indicates that approximately 14% of the material in the HS deposit is potentially acid generating, although at a very low sulphur grade (0.035%). The ARD risk associated with this material will be managed by encapsulating this material in carbonate rich, neutralizing waste in waste dumps and pit backfills.

Table 23 compares the ARD potential of the HS deposit with a number of other IOC deposits. The proportion of potential acid generating (PAG) material in the HS deposit is higher than in the other large deposits (i.e., Luce and Moss). The ARD risk in the HS deposit is primarily due to the carbonate depletion, resulting from intense alteration in sections of the deposit. Carbonate grades in the non-acid generating material (86% of samples) are comparable with other IOC deposits and suitable for effective encapsulation of acid generating waste.

The sample data base targets ore units, rather than waste units, so further work is required to adequately characterise the ARD potential of the waste rock. IOC plans to increase sampling and ARD analysis of waste units in upcoming drilling programs. It also plans to execute an external ARD assessment of the deposit using a geochemist qualified in ARD assessment.

Table 23: Comparison of ARD Potential – Drill Hole Database

Pit	Number of Samples	% of samples with ARD Potential	%S		$\%CO_2$	
			ARD samples	Non-ARD samples	ARD samples	Non-ARD samples
Luce	19,382	8%	0.04	0.02	0.57	6.39
Moss	16,433	18%	0.04	0.02	0.51	4.32
Sherwood	3,677	23%	0.04	0.01	0.33	5.46
Humphrey South	**7,650**	**47%**	**0.03**	**0.02**	**0.24**	**4.52**

3.2.6.1 Management of Potentially Acid Generating Material

IOC currently logs all blast holes for lithology and approximately 16% of blast holes in ore units and gabbro intrusives (every second hole on every third row) and approximately 11% of blast holes in other waste units (every third hole on every third row) for chemistry. Blast holes are drilled on a regular pattern with burdens and spacings typically ranging from 6-7 m.

The above ABA methodology is applied to all grade control samples, to derive an NPR value. All grade control samples with NPR values of 2 or less are flagged as potentially acid generating. All potentially acid generating waste is encapsulated by carbonate rich, neutralizing waste within the waste dump. Encapsulation of potentially acid generating material ensures there is at least 5 m of cover remaining over this material when the dumps are re-shaped for rehabilitation (Figure 33).

Note that Figure 33 is a generic, schematic diagram of the encapsulation concept. When mining in areas with high proportions of PAG waste, sources of high carbonate waste will also be scheduled from other areas of HS or from other pits, to allow adequate encapsultion of the PAG waste.

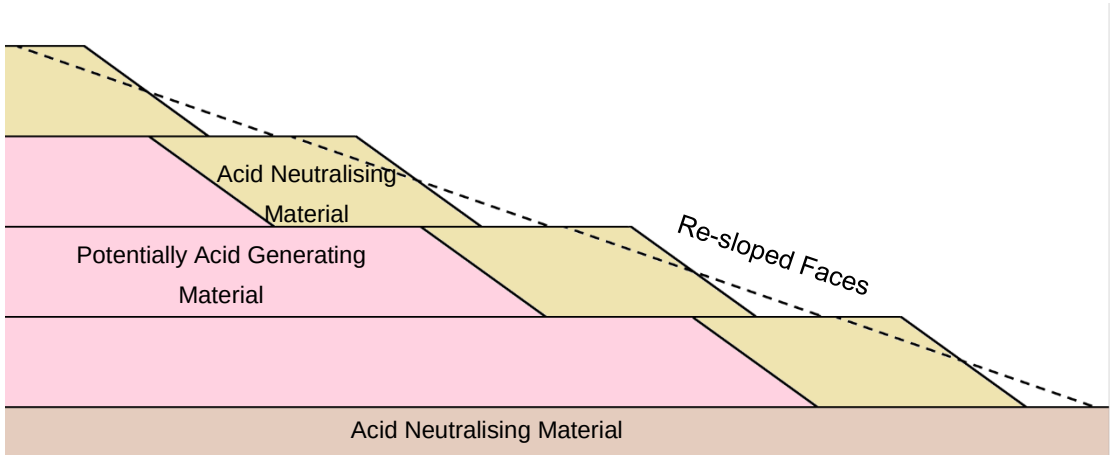


Figure 33: Conceptual Encapsulation of Acid Generating Material

The ARD risk in the Project Area can be effectively managed by either encapsulating the PAG waste with high carbonate waste, or ensuring good mixing of acid generating and acid neutralising wastes. Encapsulation of altered waste (low strength limonitic waste) with unaltered waste, and mixing are the two strategies currently being used in IOC's operations to promote stability in the waste dump.

To date, IOC has not encountered metal contents in mine effluent that approach the Metal and Diamond Mining Effluent Regulations (MDMER) limits. The similarity of the Project metal contents to those in the rest of HS deposit indicates that there are unlikely to be problematic metal levels in Project mine water discharges.

IOC will continue to carry out water quality monitoring at all stages of construction, development, operations and decommissioning of the Project to ensure compliance with applicable legislation.

3.3 Socioeconomic Environment

The Labrador West region includes the communities of Labrador City (38.83 km^2) and Wabush (46.25 km^2), which had a combined population of 10,528 residents and 4,424 residences in 2016 (Statistics Canada 2016).

The Socioeconomic Environment consists of components of the human and cultural environments that may directly or indirectly be affected by Project activities. Key components identified for this document include:

- Historic and heritage resources;
- Human health and wellbeing;
- Economy and Employment;
- Community Services; and
- Land and Resource Use, e.g., commercial, municipal, traditional, recreational.

3.3.1 Historic and Heritage Resources

Historic and heritage resources include sites, objects or other materials of historic and archaeological, paleontological, architectural, cultural and/or spiritual importance. In Newfoundland and Labrador, such resources are protected under provincial legislation. Construction activities and associated ground disturbance have the potential to disturb or destroy archaeological sites and other historic and heritage resources.

In 2018, IOC undertook steps to identify known archaeological sites within its operational areas in Labrador and Québec through the development of its Cultural Heritage Management Plan (CHMP). Summaries of relevant studies conducted in 2012 and 2018 are included in the CHMP.

The 2012 study, conducted relative to the planning process for the Moss Pit determined that there was low risk of encountering archaeological sites within the operational area and vicinity (Wood 2019).

The 2018 study included the extents of IOC and LIORC mining leases and exploration licences within a radius of no more than 25 km from the centre of the mining operation (Figure 34).

Two sites were identified in the general area of White Lake, the Heath Lake site and the Drum Lake Camp site. The Heath Lake site is about 3.5 km north of White Lake and the Drum Lake Camp site is about 2 km to the southeast of White Lake. There is no evidence that either area has ever been assessed by an archaeologist (Wood 2019).

During project construction, standard precautionary and reporting procedures will be implemented. Should an accidental discovery of historic resources occur, all work will cease in the immediate area of the discovery until authorization is given for the resumption of the work. Archaeological materials encountered will be reported to the Provincial Archaeology Office, including information on the nature of the material discovered and the location and date of the find.

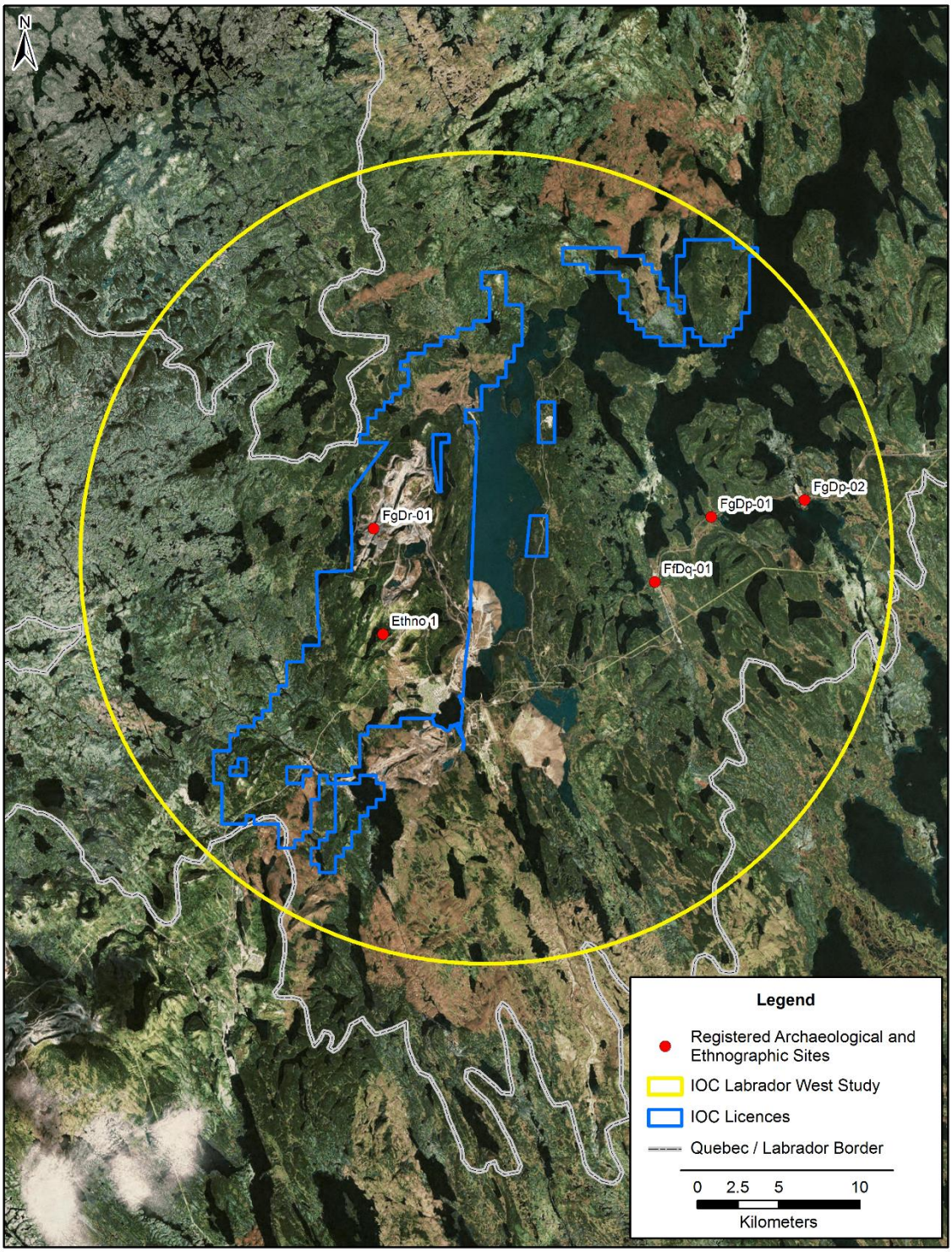


Figure 34: Registered Historic Resources in the Labrador West Study Area (Wood 2019)

3.3.2 Human Health and Wellbeing

Wood's socioeconomic report reports that the Labrador West Health Care Centre (LWHCC) in Labrador City is an acute care facility with 28 beds and inpatient medical, emergency, surgery, obstetrics / gynecology, pediatric, respite, palliative and psychiatric services. Specialist physicians also visit the area on a regular basis to see patients through outpatient clinics (Labrador-Grenfell Regional Health Authority, 2019a). Usage of LWHCC facilities have been fairly consistent.

As of early December 2019, the LWHCC had 15 health care professional vacancies in Labrador West, e.g., family physician, primary care paramedic, registered nurses, licensed practical nurses, etc. This indicates that the region has ongoing attraction and retention issues in the healthcare sector (Labrador-Grenfell Regional Health Authority, 2019b). The Health Authority reports that the rate of acute care bed occupancy has been increasing since 2015, while emergency room visits and births are fairly stable overall (Labrador-Grenfell Regional Health Authority, 2019b) (Wood 2019).

A range of community health services are also provided by the LWHCC such as home care, health promotion and education, mental health and addictions services and occupational therapy. Overall usage of mental health and additions services in all of Labrador has increased steadily from 2008-2018 which may indicate an increase in access to services.

3.3.3 Economy and Employment

The economy of Labrador West is largely dependent on iron ore mining, processing and shipping from resources of the Labrador Trough. In 2018, IOC produced about 15 million tonnes of iron ore, down 21% from 2017 - a decline due to a two-month work stoppage in the spring of 2018.

Mining development has been variable for various operations in Labrador West over the past number of years. In 2019, Tacora Resources reopened the Scully iron ore mine in Wabush that had been closed since 2014. Tata Steel Minerals Canada is finalizing the construction of a $700 million wet processing plant for iron concentrate, which had been put on hold in 2016 due to low commodity prices. In 2013, operations at Labrador Iron Mines in the Schefferville area were suspended and several mine development projects, e.g. Kami Iron Ore Project, NuTac Iron Ore Project, were placed on hold indefinitely (Wood 2019).

At least four large scale capital projects have been identified in the short term for the Labrador West region, Economic Zone 2 (Table 24) (Wood 2019).

Table 24: Major Capital Projects, Economic Zone 2

Project	Capital Cost ($M)	Start / End	Comments
Mine Reactivation - Tacora Resources Inc.	335	2018/19	Reactivation of the Scully iron ore mine and mill in Wabush
Electric Utility Capital Expenditures - Churchill Falls (Labrador) Corporation	66.5	2019/19	Capital expenditures for improvements and upgrades at Churchill Falls
Air Terminal Building Modification – Transport Canada	13.9	2018/20	Reconfiguration of Wabush Airport terminal building floor space, replacement of electrical / mechanical systems and overall renovation
Apartment Building Renovations - Northview Apartment REIT	5.8	2019/19	Capital improvements, renovations and upgrades on various properties in Labrador City, Gander and St. John's

Source: (NL Department of Finance, 2019)

Wood reported in their 2019 socioeconomic report that since 2016, government investments in Labrador West municipalities and other agencies has totaled more than $2M. Contributions include investment in a data centre and a study to determine mining training needs at the College of the North Atlantic (CNA). Funds are also being used to implement improvements in recreation infrastructure, (e.g., walking trails, ice arenas, cross-country ski trails, snowmobile trails), and in various tourism initiatives such as investments in the visitor centre and promotion of the Cain's Quest Snowmobile Endurance Race (ACOA, 2019) (Wood 2019).

Labour force statistics describe the population 15 years of age and over who are participating in the labour force – employed or looking for work. The percentage of the population in Labrador City and Wabush engaged in the labour force and employed, increased between 2001 and 2011, while in 2016 these percentages decreased to around 2006 values (Table 25) (Wood 2019).

Employment is likely to have increased since 2016 as mining activity has increased in the area. Tacora Resources reopened the Scully Mine and hired 260 individuals, thus contributing to an increase in employment rates in the region. In 2020, IOC is challenged to fill some highly specialized technical positions.

Table 25: Labour Force Characteristics

Indicator	Labrador City			Wabush		
	2006	2011	2016	2006	2011	2016
Population 15 years and over	5,935	5,900	5,830	1,460	1,510	1,510
Participation rate	72.9%	77.5%	71.3%	71.6%	68.5%	72.2%
Employment rate	66.4%	73.6%	65.2%	65.4%	64.9%	64.2%
Unemployment rate	8.9%	5.2%	8.5%	8.1%	5.8%	11.1%

Source: (Statistics Canada, 2017b) (Statistics Canada, 2016)

Mining and mineral processing, together with related support industries, have always been the backbone of the economy in Labrador West. IOC remains one of the largest employers in the region.

In 2016, Labrador City and Wabush combined had a total labour force of 4,940 workers, of which 1,585 (32 percent) worked in “mining and quarrying”. In that year, the region had a labour force participation rate of 64.9 percent, an unemployment rate of 8.9 percent (Statistics Canada 2016). The average household income in these communities in 2016 was approximately $124,959.

In 2018, there were approximately 268 businesses located in Labrador West, (including Churchill Falls). This represents 1.7% of the total number of businesses in the province for that year. The number of businesses in Labrador West generally decreased between 2006 and 2018 (NL Department of Finance, 2019) (Wood 2019).

Initial development of the Project will require modest and short term employment through the hiring of contractors for site clearing. No new employment will result from the operation of the Project as employees for operations will be redeployed from other IOC operating mines.

3.3.4 Community Services and Infrastructure

Labrador West is served by two fire departments, has 911 service, air and ground ambulance service and policing service through the Royal Newfoundland Constabulary.

The region is connected to other parts of Labrador, Newfoundland and Québec by air, road and rail. Wabush Airport, owned and operated by Transport Canada, sees daily commercial flights by a number of airlines. The majority of flights at the airport are commercial and as passenger activity increases, flight availability becomes an issue in Labrador West (Wood 2019).

According to Transport Canada, airport infrastructure is ageing, both airside and in the terminal building where additional space is required during busy periods for security screening, passenger waiting areas and commercial tenants. Space can also be limited on runways and in vehicle parking areas (Transport Canada, 2016) (Wood 2019).

Labrador West is connected to via Route 389 to Québec and via Route 500 (Trans-Labrador Highway-TLH) to central and coastal Labrador and ferry service access to the Island of Newfoundland.

There is a federally regulated railway with common carrier obligations, the QNS&L that runs between Schefferville and Sept-Îles, Québec. Rail spurs connect both Labrador City and the Wabush Scully Mine to the railway. With increases in mining activity and associated ore shipments, there have been some concerns raised about the capacity of the system.

The Labrador West region has telephone, internet, satellite and cable television services available. Cell and internet service reliability can be an issue and no cell phone connectivity exists on the TLH.

Although Newfoundland and Labrador Hydro invested in upgrades to its substations in Labrador West, the region still requires increased power supply and transmission infrastructure to accommodate potential new mining projects.

Both Labrador City and Wabush offer a range of infrastructure for recreational activities. The region has ice arenas, a curling facility, a bowling alley, a golf course, softball fields, a skateboard park, soccer fields, an indoor swimming pool and a trap and skeet / rod and gun club. Facilities are also available for downhill skiing, snowboarding, cross country skiing and snowmobiling (Figure 35). Public and private fitness facilities offer equipment and programs for various programs (Wood 2019).

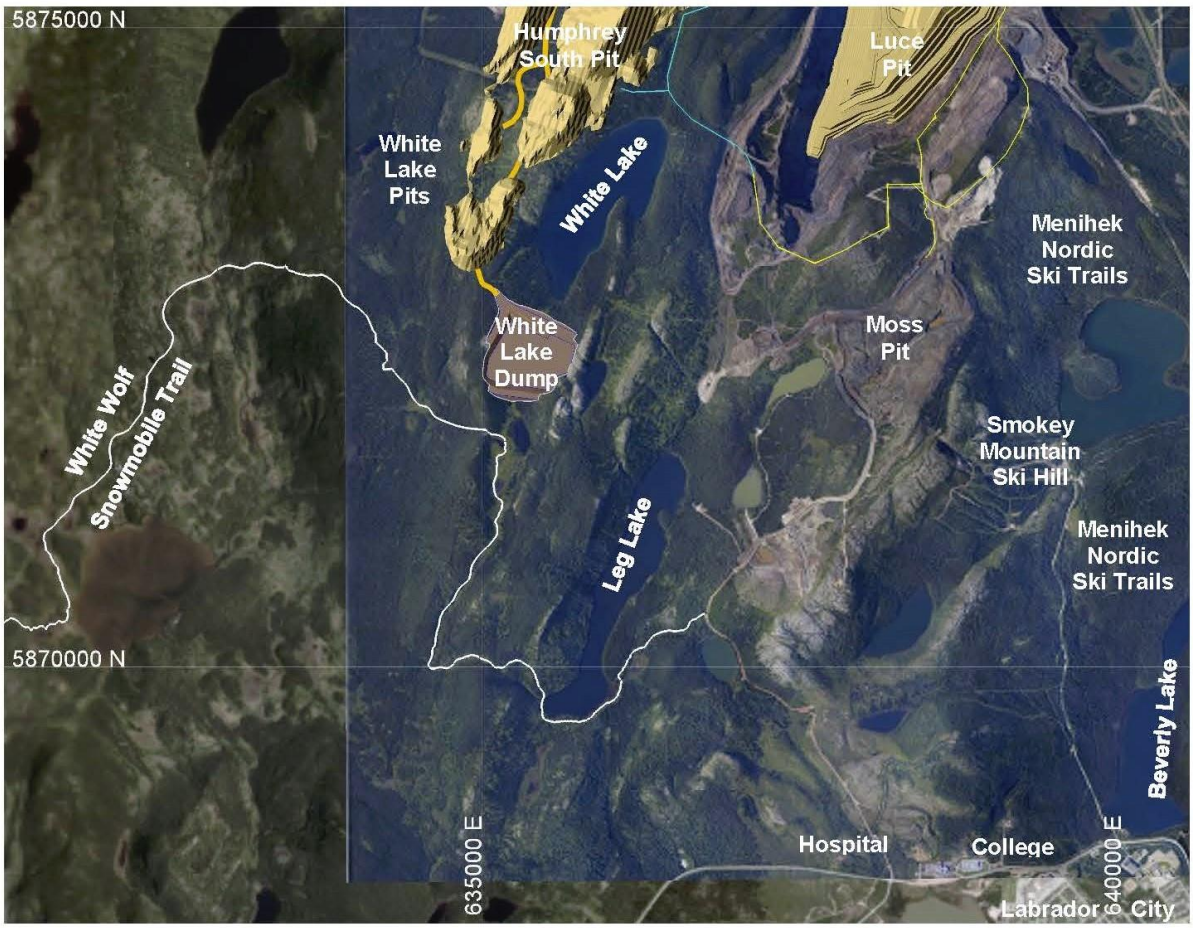


Figure 35: Recreational Facilities and Community Infrastructure

3.3.5 Land and Resource Use

The Project is located within IOC's existing mining property which is located within the municipal boundary of the Town of Labrador City. The Town's municipal planning area is currently 446 km^2 and the majority of it is zoned as mining reserve – rural (MRR), which allows for mineral exploration and other natural resources and industrial uses. The built up areas of the Town are surrounded by mining exploration and extraction zones and two water supply watersheds, one current and one potential, are also within the Town's boundary (Town of Labrador City, 2016b) (Wood 2019).

The adjacent Town of Wabush has a municipal planning area of 428 km^2 and includes areas zoned for residential areas, cabin development, commercial, industrial, public use, open space, conservation, rural, mineral workings and municipal watershed.

There have been periods when Labrador West has experienced challenges with lack of land for growth due to the prevalence of mineral exploration licenses and mining leases. The NL DECCM has worked with both Labrador City and Wabush and local mining interests to identify land that could potentially be developed for industrial, commercial and residential purposes. The Town of Labrador City has recently completed the concept design of a 27 ha industrial park to meet future light industrial demands (Town of Labrador City, 2018) (Wood 2019).

There are no outfitting operations located in Labrador City or Wabush, however 25 outfitter lodges and camps do operate in western Labrador. (NL Department of Tourism, Culture, Industry and Innovation, 2019) (Wood 2019).

Recreational and subsistence activities are an important part of the culture and lifestyle of the people of Labrador West. Recreational activities that occur near the proposed footprint include, berry picking, hiking, snowmobiling, hunting, fishing, cross country skiing, alpine skiing, wood cutting, ATV use and boating. The southern boundary of the Project area is 580 m from the White Wolf Snowmobile Trail (Figure 36).

Public access to the majority of the Project site is restricted. There is public access to White Lake and recreational fishing does currently occur there. Some hunting and trapping may also occur in the vicinity of White Lake. IOC acknowledges that during Stage 4 of this Project, there may be a requirement to dewater White Lake if ongoing hydrogeological work confirms a strong hydraulic connectivity between Stage 4 pits and the lake. As the Project advances, IOC will ensure that if dewatering is required for safety reasons, all required permits and authorizations will be applied for and obtained, and consultation will be carried out prior to the start of development activity. Typically, if dewatering a waterbody is required, fish relocation and habitat compensation activities are completed via a permitting system administered by DFO. When Project development starts, there will be no public access to White Lake or to recreational fishing activities there.

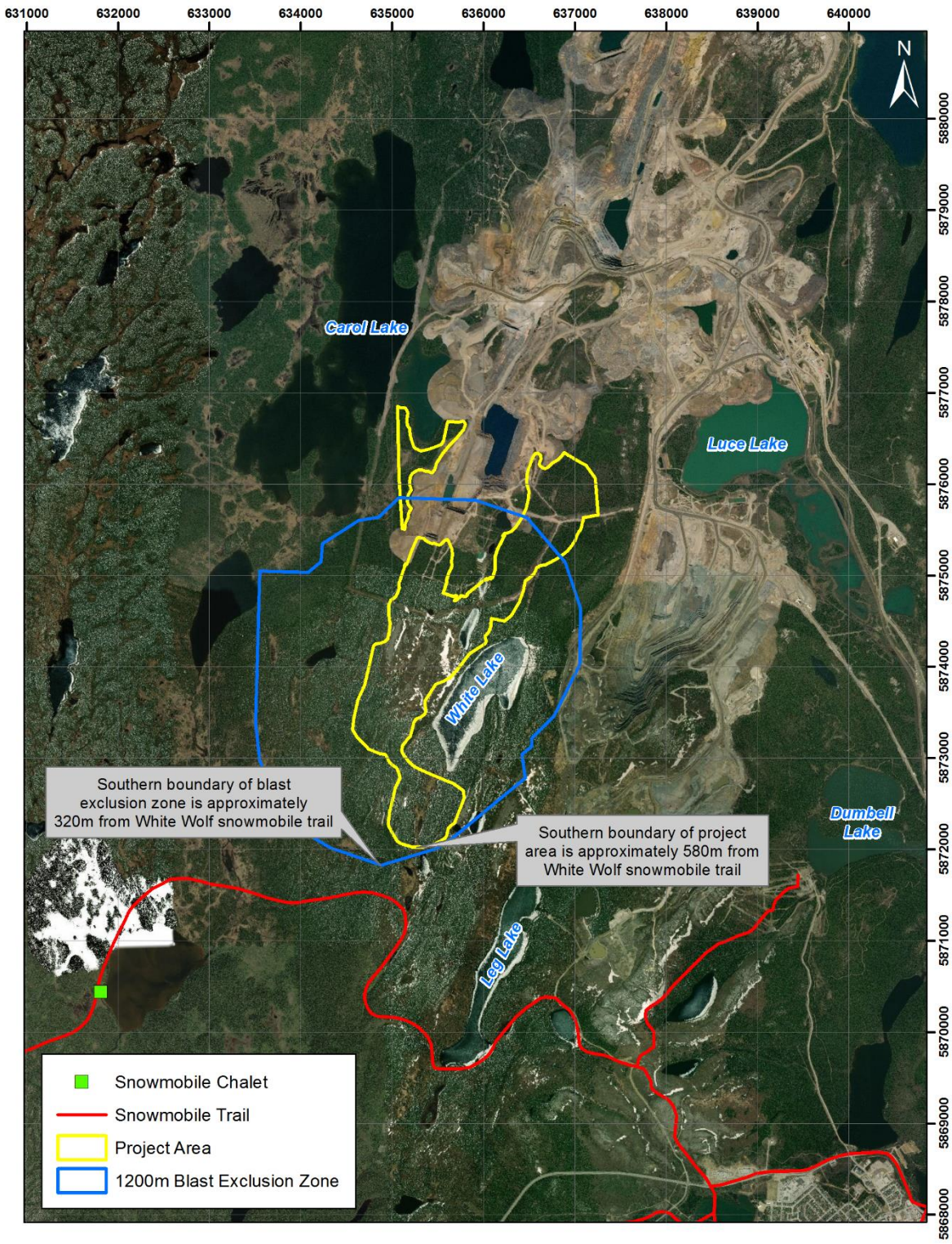


Figure 36: Proximity of White Wolf Snowmobile Trail to Project Area

3.3.6 Indigenous Organizations and Traditional Activities

Several Indigenous organizations have overlapping claims and/or assert Indigenous rights and/or other interests in the region where IOC operates. These organizations are the:

- Labrador Innu, represented by Innu Nation (IN) - Sheshatshiu and Natuashish, Labrador;
- NunatuKavut Community Council (NCC) - Labrador;
- Innu of Uashat mak Mani-Utenam (ITUM) - Québec;
- Innu of Matimekush-Lac John - Québec; and
- Naskapi Nation of Kawawachikamach (NNK) - Québec.

The claims and/or asserted Indigenous rights and/or other interests of these organizations are at varying stages, however IOC engages in a variety of ways with the five identified Indigenous organizations in Labrador and Québec (Figure 37). IOC Indigenous Implementation committees have been established for five of the identified Indigenous organizations, and meet on a quarterly basis.

Indigenous traditional uses typically refers to the practices, traditions and customs that distinguish the distinctive culture of an Indigenous organization, and which were practiced prior to European contact. These uses can include hunting and fishing for either food or ceremonial purposes. Section 35 of the *Canadian Constitution Act* (1982) recognizes and affirms the existing Indigenous and treaty rights of the First Nations, Inuit, and Métis peoples of Canada, the nature, scope and existence of which have been further defined through various legal decisions as well as through Land Claims and other agreements (treaties) between governments and particular Indigenous organizations in specific areas. The following sections provide an overview of these Indigenous organizations.

Labrador Innu

The Labrador Innu are Indigenous inhabitants of an area they refer to as Nitassinan, an area which comprises much of the Québec-Labrador Peninsula. The Labrador Innu were traditionally a nomadic people, whose movements reflected the seasons and the migrations of the animals they relied upon.

The Labrador Innu currently number about 2,856 and reside primarily in two communities - Sheshatshiu in Central Labrador and Natuashish on the Labrador North Coast. Small numbers of Labrador Innu also reside in other parts of Labrador and on the island portion of the province. The Sheshatshiu Innu and the Mushuau Innu of Natuashish are separate Bands, and each community is a Reserve with an elected Chief and Council. Both communities are represented by Innu Nation (IN) in land claims negotiations and on other matters of common interest.

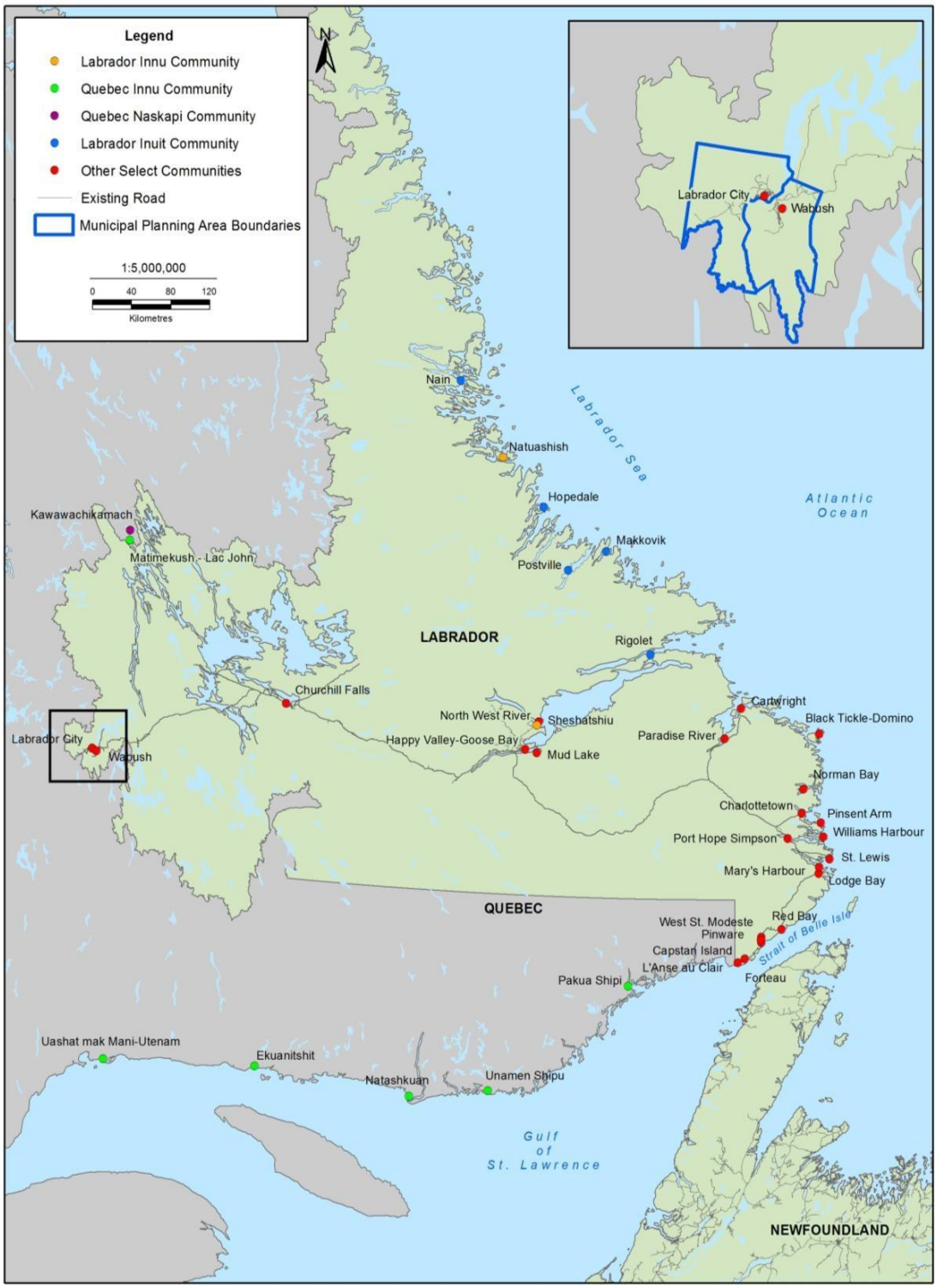


Figure 37: Indigenous Communities in Labrador and Quebec

NunatuKavut Community Council

The NunatuKavut Community Council (NCC) reports a membership of over 6,000 persons who reside primarily in southeastern and central Labrador and who are descendants of Inuit and Europeans who traveled to Labrador in the 1700-1800s (NCC, 2019).The NCC's membership live throughout Labrador, particularly in the communities along the southeast coast from Hamilton Inlet south to the Labrador Straits, including the towns of Cartwright, Charlottetown, Port Hope Simpson, St. Lewis and Mary's Harbour, and the communities of Paradise River, Black Tickle-Domino, Norman Bay, Pinsent's Arm, Williams Harbour and Lodge Bay, as well as in central and western Labrador.

The NCC has asserted a land claim that covers much of Central and Southeastern Labrador – including Labrador West – but this has not been accepted for negotiation by the federal or provincial governments (Aboriginal and Treaty Rights Information System, 2019). On July 12, 2018, the Government of Canada and the NCC announced the initiation of discussions on recognition of Indigenous rights and self-determination (NunatuKavut Community Council, 2019).

Québec Innu and Naskapi Groups

A number of Québec Indigenous organizations, including Innu and Naskapi communities in the Schefferville area and along the Québec North Shore, claim Indigenous rights and/or title to parts of Labrador, including several groups that claim lands and/or assert such rights in or near the areas of western Labrador.

The land claims asserted by Québec First Nations for territory in Labrador have not been accepted for negotiation by the Government of Newfoundland and Labrador (NL Intergovernmental and Indigenous Affairs Secretariat, 2019).

Matimekush - Lac John First Nation

Matimekush and Lac John are located in the Schefferville, Québec area, with a combined population of 1,014 registered First Nations persons (Indigenous and Northern Affairs Canada, 2019). The Matimekush Reserve, located on the shore of Lac Pearce, covers an area of approximately 0.68 km^2, and the Lac John Reserve is approximately 0.23 km^2 in size and located about 3.5 km from Matimekush. The reserves are administered by Conseil de la Nation Innu Matimekush-Lac John (NIMLJ). The Innu of NIMLJ are descendants of an Indigenous population that traditionally occupied much of the Québec-Labrador Peninsula (Nalcor Energy, 2011) (Wood 2019).

Innu of Uashat mak Mani-Utenam

Uashat Mak Mani-Utenam (ITUM) are First Nations peoples with approximately 4,761 members, most of whom live in the communities of Uashat and Mani-Utenam. Uashat (1.77 km^2) is located

on the western outskirts of Sept-Îles and Mani-Utenam (5.27 km^2) is located 16 km east of Sept-Îles. The traditional language spoken by members of the Uashat Mak Mani-Utenam is Innu-aimun.
Both Reserves constitute a single Band governed by Innu Takuaikan Uashat mak Mani-Utenam (ITUM).

The Innu of Uashat mak Mani-Utenam are the descendants of an Indigenous population that has occupied parts of the Québec-Labrador peninsula for centuries. The traditional territory of this First Nation encompasses much of eastern Québec and western Labrador, and extends along the rivers from the coast of the Québec North Shore into the Québec-Labrador interior (Hydro-Québec, 2007).Traditionally, this group was involved in nomadic hunting and fishing.

Naskapi Nation of Kawawachikamach (NNK)

The Naskapi Nation of Kawawachikamach (NNK) has a registered First Nations population of 1,056, most of whom reside in the community of Kawawachikamac. The community is located approximately 12 km northeast of the Town of Schefferville on the Québec-Labrador border which is only accessible by plane, or by train from Sept-Îles. Claims of the Naskapi in Québec have been resolved, but NNK members continue to assert Indigenous rights and title to a large portion of Labrador including Labrador West. In 1995, the NKK submitted a Statement of Claim for the area, which remains unresolved (Aboriginal and Treaty Rights Information System, 2019).

The NNK traditionally followed the migration patterns of the George River Caribou Herd across the Québec-Labrador Peninsula (Weiler, 1992). Land and resource use activities such as hunting, trapping and fishing remain important to the culture and economy of the NNK, whose members continue to pursue these activities near Kawawachikamach, along the TLH and Quebec North Shore and Labrador (QNS&L) Railway, and occasionally at outpost camps (CAM 1983; Weiler 1992; 2009).

Summary

The area that encompasses the Project has seen on-going mining activity since the 1960s. As a result of the long-standing industrial activity surrounding the Project area, and the public site access restrictions that have been in place on IOC's mining property since that time, traditional land and resource use activities do not occur in this area.

Innu Nation (Sheshatshiu and Natuashish), Labrador Resource Development Agreement

In 2014, IOC and the Innu Nation of Labrador achieved an important milestone in the signing of a "Life-of-mine" agreement, representing our solid commitment to developing valuable and mutually beneficial relationships with Indigenous partners. Through the agreement, the Innu Nation supports IOC's activities, aligns with our values as a company and our community engagement philosophy, while IOC commits to improving access to benefits for the Innu Nation through training, education, employment, business opportunities and other benefits.

NunatuKavut Community Partnership Agreement

In 2014, IOC also signed an agreement with the NunatuKavut Community Council to support business, education, training and employment benefits as well as the opening of the Indigenous Service Center in Labrador West in March 2015.

4.0 Consultation

Consultation is a legislated component of the EA process and a key aspect of IOC's approach to its planning and development activities. During the EA process, the EA Division of the NLDECCM will make this Registration document available for public, Indigenous and regulatory review and comments are encouraged from all potentially affected parties. At the end of the review period, the Minister of the DECCM will make a determination on whether the Project will be subject to further assessment or released. IOC has endeavored to provide sufficient detail in the Registration document such that stakeholders can understand and provide relevant commentary on the Project. IOC and its representatives will be available throughout the review period to address any additional questions that may arise.

4.1 Regulatory Consultation

IOC provided Project information to regulators on various occasions relative to this Project. IOC has met and/or consulted with provincial officials from the EA Division, the Pollution Prevention Division (PPD), Water Resources Management Division (WRMD), the Wildlife Division and Natural Resources (DNR), and with federal DFO officials on a number of occasions since 2018 relative to this Project. IOC and/or its representatives will continue to consult with government officials during the EA review process as required. IOC will proactively consult with the Town of Labrador City and all five Indigenous organizations during the EA review process.

IOC understands that this Project will require permitting in the post-EA phase and this process will allow for additional consultation between IOC and relevant regulatory departments and agencies. IOC will apply for and adhere to all required permits and other authorizations for Project construction and operations.

4.2 Indigenous Consultation

IOC recognizes that Indigenous consultation is an integral part of the EA process. As such, during the provincial EA process, this Registration document will be made available by the EA Division of the DECCM to five Indigenous organizations and governments, for their information, review and comment. IOC will endeavor to support the efforts of the EA Division as they communicate with relevant Indigenous organizations regarding the Registration document and to address comments or concerns specific to the Project that may arise. During the post-EA permitting process, major permit applications may also be subject to Indigenous consultation.

4.3 Public Consultation

Public engagement is also an integral part of the EA process. IOC has been operating in Labrador City since the early 1960s, and has maintained a long-standing presence and has been a contributor to the local communities and overall region. IOC has a number of established consultative forums in place through which it regularly communicates and discusses ongoing business objectives and project changes and developments with stakeholders.

In 2006, IOC formed a Community Advisory Panel (CAP), consisting of representatives of the town councils of Labrador City and Wabush as well as local community stakeholders. The CAP meets quarterly to discuss issues of common interest in the region. IOC also established the Labrador West Regional Task Force (RTF) in 2011. The RTF's mandate is to bring regional mining companies together with provincial and local government representatives to discuss and address socioeconomic challenges associated with ongoing and future mining operations. In addition, IOC meets quarterly with the Town of Labrador City as a Joint Planning Committee member to provide updates on relevant topics affecting both the business and the community.

IOC will continue to consult with local communities and stakeholders on its operations, including the Project, through these and other forums.

5.0 Environmental Effects & Analysis

5.1 Natural Environment

The Natural Environment is comprised of relevant components of the biophysical environment that may interact with the Project, including air quality, noise and vibration levels, vegetation, wetlands, avifauna, wildlife, species at risk, fish and fish habitat and water resources.

5.1.1 Construction

Project construction will involve site clearing activities covering an overall area of approximately 370 ha and covers all proposed stages. The Project area is characterized by brownfield sites, patches of mixed wood forest interspersed with areas of moss, lichen cover and exposed rock and earth.

5.1.1.1 Air Quality

Air quality monitors will be in operation during the construction phase of the Project and the results analysed to determine if these activities are contributing to a reduction in air quality for the area. Given the distance and routine nature of the activities associated with the construction phase, it is not anticipated that there will be cumulative increases in emissions at the mine site due to construction activities.

5.1.1.2 Noise and Vibration Levels

Noise and vibration monitors will remain in operation during the construction periods of the different Project stages. These monitors will record data from IOC's Labrador City blasting operations and the results analysed to determine if these activities are contributing to an increase in noise and vibration levels in the area. However, given the distance of the Project from recreational and residential areas, it is unlikely that adverse effects will be felt at these locations as a result of activities at the Project site.

5.1.1.3 Vegetation and Rare Flora

The Project area is within IOC's existing lease and the surrounding areas have been subject to previous development and disturbance related to mining for a number of decades. Fieldwork in 2018 did identify a number of rare plants in the BASA and a complete list of vegetation encountered is presented in Appendix C. IOC has been in consultation with officials from the Wildlife Division relative to the rare plants identified in the BASA and any required mitigation relative to their presence.

Each Project stage will be developed sequentially and vegetation clearing and other ground disturbance activities will be confined to those areas where it is required (by stage) and limits of clearing will be marked in advance. Clearing for the different stages of the Project will be completed in compliance with relevant permits and regulations, and merchantable timber will be salvaged.

5.1.1.4 Wetlands

Wetlands are fairly common outside the Project area thus providing highly functioning wetland habitat in close proximity to the Project area. It is therefore unlikely that the removal, if necessary, of any wetland areas within the Project area would be considered limiting to wildlife currently living in or moving through the Project area.

5.1.1.5 Avifauna and Species at Risk

IOC anticipates initial clearing of the Project site (Stage 1) to begin by mid-2024. IOC will endeavour to schedule construction activities relative to each stage of Project development outside the bird breeding season. As such, IOC does not anticipate adverse interactions between Project construction activities and avifauna during the several construction phases. If clearing within the bird breeding season is required relative to Stage 1-4 activities, IOC will follow the mitigations specific to avifauna outlined below:

- Monitoring for bird nests will be conducted in advance of site clearing during the breeding season (May 1 to August 15) and efforts will be made to avoid trees with nests during that time. Qualified professionals will conduct non-intrusive surveys for nests, in accordance with the Specific Considerations Related to Determining the Presence of Nests (Environment & Climate Change Canada 2012) prior to any land disturbance, and based on findings, the monitoring surveys may continue throughout the Project.
- The Migratory Birds Convention Act (MBCA) protects most bird species and their nests, with the exception of the following groups: certain game birds (grouse, quail, pheasants and ptarmigan), raptors (hawks, owls, eagles and falcons), cormorants, pelicans, crows, jays and kingfishers, and some species of blackbirds (starlings, mynas).
- Should a nest of a migratory bird be found, the following steps will be taken (in accordance with guidelines outlined in the MBCA)*:*
    - all activities in the nesting area should be halted until nesting is completed (*i.e.,* the young have left the vicinity of the nest);
    - any nest found should be protected with a buffer zone appropriate for the species and the surrounding habitat until the young have left their nest; and
    - nests should not be marked using flagging tape or other similar material as these increase the risk of nest predation.

- Raptors, although not protected under the MBCA, are protected under NL's *Wild Life Act*. In accordance with provincial guidelines, should a nest of a raptor be found, the following steps will be taken:
    - a buffer zone of 800 m should be maintained while the nest is active;
    - after the young have left their nest, a buffer zone of 250 m should be maintained; and
    - if work within the appropriate buffer zone cannot be avoided, the NL Department of Fisheries and Land Resources (NLDFLR) should be contacted for advice on how to limit disturbance to the nest.

5.1.1.6 Wildlife and Species at Risk

Mining activity has been occurring around the Project area for the past five decades. Recent studies have confirmed that the area is not within the current range of the migratory and sedentary caribou populations that occur in Western and Central Labrador and Quebec, and therefore the Project will not likely result in adverse effects to caribou.

Baseline studies have shown that a number of wildlife species do travel through the area via transmission lines, but given the Project's proximity to industrial mining activity, it is unlikely that this is an area of key importance for many species. Wildlife, including avifauna that use the area, have likely habituated to on-going human activity. The potential for interactions between the Project and regional wildlife is therefore limited. There are no listed SAR that are documented as occurring within or near the Project area.

A number of measures will be implemented during the construction phase of the Project to further reduce the potential for interactions between Project activities and wildlife that may occur in the area of each staged development:

- Construction areas will be kept clear of garbage;
- Construction personnel will not hunt of harass wildlife while on site;
- Pets will not be permitted on the construction site;
- There will be no feeding of wildlife;
- Equipment and vehicles will yield the right-of-way to wildlife; and
- Nuisance animals will be dealt with in consultation with the NL Wildlife Division.

5.1.1.7 Fish and Fish Habitat

A number of waterbodies may be either directly or indirectly affected by this Project. There are two unnamed ponds outside the Project footprint, one of which is fish bearing, HSP1, that may be affected by dust and water management activities associated with Project development and operations activities. IOC will implement standard mitigations relative to dust and siltation control such that it is unlikely that indirect effects will be felt at this location due to Project activities. First Pond lies within the Project footprint but aquatic studies completed in 2018 indicated there are no fish in that pond.

IOC has undertaken, and will continue to undertake, hydrogeological studies to confirm the level of hydraulic connectivity between White Lake and the Stage 4 pits. If this ongoing work indicates strong connectivity, there may be a need, for health and safety reasons, to dewater White Lake. If this is required, IOC will follow all protocols relative to fish and fish habitat compensation, as set out by DFO prior to the start of any construction activities.

5.1.1.8 Water Resources

Water management activities during construction will be focused on managing mostly surface runoff from clearing and pit development. As required, ditching will be used to direct surface water via gravity feed, away from mine infrastructure and natural water bodies, e.g., First Pond, Second Pond, White Lake, and to a discharge area in a nearby undisturbed forest. Sediment and erosion control procedures will be implemented as required during construction to prevent runoff from impacting nearby water bodies. All discharged water will meet provincial and federal discharge criteria. Also as required, vegetated areas will be used to filter discharged surface water. If required, sumps created from surface water collection will be filtered and dewatered via pumps or gravity feed in undisturbed forest. Dewatering wells will be installed as needed in all pits, and for each phase of development, and will remain in place during construction and operations activities as required. The need for additional in-pit dewatering wells will be assessed on an ongoing basis and as each pit is developed.

5.1.2 Operations

During the mining operations phase of the Project, it is unlikely there will be an increase in interactions with components of the biophysical environment, i.e., air quality, noise and vibration levels, vegetation and soils, wetlands, wildlife, avifauna, fish and fish habitat and water resources. All four stages of the Project will be mined using existing equipment and personnel. The activities will not be noisier or otherwise more disruptive than normal in this area of long-standing and on-going industrial activity.

5.1.2.1 Air Quality

Air quality monitors will continue to be operated and the results analysed to monitor changes over time to the air quality in the vicinity of IOC's Labrador City operations. It is not anticipated that there will be a net increase in operations activities as a result of the Project. As a result, it is not anticipated there will be corresponding cumulative increases in GHG or particulate emissions as a result of operations activities.

5.1.2.2 Noise and Vibration Levels

Noise and vibration monitors will remain in place during the operation periods of the different Project stages. These monitors will record data from IOC's Labrador City blasting operations and the results analysed to determine if these activities are contributing to an increase in noise and vibration levels in the area. However, given the distance of the Project from recreational and residential areas, it is unlikely that adverse effects will be felt at these locations as a result of activities at the Project site

5.1.2.3 Vegetation and Rare Flora

During operation of each Stage of the Project, there will be no additional soil or vegetation disturbance, therefore, little or no potential for further effects to these biophysical components are anticipated.

5.1.2.4 Wetlands

It is unlikely that operation activities will lead to direct or indirect loss of wetlands outside of the Project area due to changes in drainage and local hydrology. Dewatering of the deeper more regional groundwater source is unlikely to affect wetlands and fens in the area that would be dependent upon discreet perched groundwater sources of limited areal extent.

5.1.2.5 Wildlife and Species at Risk

The area will be progressively cleared during construction and it is expected that wildlife species will avoid these areas of major disturbance and relocate to adjacent undisturbed areas. Blasting has been occurring at IOC's Labrador City mining property for decades and in varying pit locations. Wildlife that live in the general area have presumably become acclimatized to this source and level of noise or have relocated to other areas.

5.1.2.6 Avifauna and Species at Risk

As indicated above, as each Stage is progressively cleared during construction, it is expected that avifauna and avifauna species at risk will avoid these areas of major disturbance and relocate to adjacent undisturbed areas. Blasting has been occurring at IOC's Labrador City mining property for decades and in varying pit locations. Avifauna that live in the general area have presumably become acclimatized to this source and level of noise or have relocated to other areas.

5.1.2.7 Fish and Fish Habitat

Although First Pond is unlikely to support any fish populations, IOC will continue to consult with DFO and other provincial regulators relative to the planned removal of this waterbody. In Stage 4 of the Project, White Lake may require dewatering. This will be determined as the Project advances and as more information is collected relative to the effects of development of early Project stages on the planned fourth stage. If White Lake requires dewatering for health and safety reasons, IOC will consult early and as required with federal and provincial regulators prior to the start of Stage 4 activities.

5.1.2.8 Water Resources

Water management activities during operations will primarily involve dewatering well(s) and in-pit pumps to dewater the pit(s) as necessary. If required, the use of sumps may be required seasonally to manage surface water runoff. Also as required, ditching will be used to direct surface water, via pumps and gravity feed, away from mine infrastructure and fish bearing water bodies, e.g., White Lake and HSP1, and to a discharge area in an undisturbed vegetated area.. Sediment and erosion control procedures will be implemented as required during construction to prevent runoff from impacting nearby water bodies. Where possible, vegetated filters will be used to filter surface water discharge to meet provincial and federal discharge criteria. Should the flow rate or quality of water to be discharged be such that discharge in this manner is impossible, IOC will provide treatment such that provincial and federal discharge criteria can be met.

There are no dewatering wells currently in the planned Project area but as the mining Stages are developed, required dewatering wells will be constructed. Possible locations for new dewatering wells are discussed earlier in this document as each mining Stage of the Project is presented.

5.1.3 Accidental Events

Spills or releases of hazardous substances, e.g., fuels, oils and lubricants, from accidents or malfunctions of vehicles and equipment are possible during all Project stages. Such accidental events have the potential to result in adverse environmental effects to the atmospheric environment, soil and/or water.

The likelihood of occurrence of an accidental spill or release of hazardous substances, and extent of resulting environmental effects, is reduced through adherence to applicable mitigation measures throughout all Project stages. Fuel and other hazardous materials will be securely stored and vehicles and equipment will be refueled at designated areas. In addition, equipment and vehicles are inspected and maintained in good working order, and leaks are addressed immediately. Emergency spill kits are onsite at all times. Mitigation measures to avoid collisions such as adhering to posted speed limits, and respecting established radio communication protocols will reduce the likelihood of an accidental spill or release.

Potential accidental events or malfunctions during Project construction and/or operations such as a fire or a spill of fuel or other chemicals could affect the atmospheric environment, vegetation, soils and/or other aspects of the Natural Environment in or around the Project area. The resulting environmental effects of such an incident would depend on the nature and magnitude of the event.

As indicated above, IOC has various measures, plans and procedures in place to prevent potential accidents and malfunctions, such as a fire, spill, or other associated event, as well as to respond to such an accident should one occur. These measures will be applied, and refined as required, to the Project, and will be further reinforced through the various provincial government permits, other authorizations and regulations, and compliance standards that will be relevant to the construction and operation of the Project.

IOC currently has procedures in place for the management of solid and hazardous wastes at its Labrador City operations, which will apply to the construction and operations phases of the Project. Waste materials generated through construction activities that cannot be reused or recycled will be removed from the area and disposed of at an approved site. Non-hazardous construction refuse will be stored in covered metal receptacles, and will be disposed of on an as-needed basis at an approved landfill site, as per IOC's on-going operations and practices. Under no circumstances will solid wastes be buried onsite.

Hazardous wastes will be stored in sealed, labelled containers and disposed of according to applicable regulations and standard IOC practice. These practices include procedures for the characterization, identification, storage, inspection, labelling and transportation of hazardous wastes produced at the facility, as well as emergency preparedness, prevention and training. It is not anticipated therefore that there will be adverse interactions between construction waste materials and the environment.

5.1.4 Summary of Environmental Effects Analyses - Natural Environment

Table 26 provides a summary of potential environmental interactions, identified mitigation measures and predicted residual environmental effects of the Project on the Natural Environment.

Table 26: Environmental Effects Analysis – Natural Environment

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Air Quality	X	X	• Some temporary additional emissions predicted from either construction or operations activities • Construction and operations activities may generate fugitive dust and other particulate matter	• Substantial distance from residential areas & no increased levels of site wide emissions predicted • Ongoing mitigations for fugitive dust control • Existing mitigations for construction and operations activities • Follow the EPP • Continue with progressive rehabilitation measures such as revegetation • Monitors to determine changes in air quality • Additional mitigations can be implemented should data indicate a reduction in air quality • Compliance with regulations and permits • Accident event prevention and response • No significant increases in GHG emissions predicted as work is ongoing in the area and this Project is not meant as an increase in operations activities	NS
Noise and Vibration	X	X	• Typical construction activities leading up to mining commencement, e.g., heavy equipment, blasting etc. will generate localized noise and vibration • Typical mining operations, e.g. blasting, trucking, crushing, sorting, etc. will generate localized noise and vibration	• Compliance with regulations and permits • Accident event prevention and response procedures and plans in place • Substantial distance from residential areas & no increased levels of site wide noise predicted • Follow the EPP • QC program in place re blasting program • Blast noise monitors in place • No additional site-wide noise predicted • Onsite workers will follow OHS requirements re personal protective equipment	NS

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Vegetation & Rare Flora	X		• Clearing and grubbing required for pit development, other infrastructure • Vegetation removal will occur in a staged manner during construction and will be a direct loss	• Compliance with regulations and permits • Accidental event prevention and response procedures and plans in place • Only necessary clearing will be carried out • Progressive rehabilitation will be carried out wherever possible • Overburden and organics will be stockpiled for rehabilitation purposes • Follow EPP • Additional plant surveys may be conducted as recommended by regulators	N
Wetlands	X	X	• Potential change in hydrology of wetlands (fens) within Project footprint • Potential loss of portion(s) of functioning wetland(s) • Excavation of organic material may be required • Dewatering activities as part of operation of the open pits have the potential to affect wetlands within and outside the Project footprint through lowering of groundwater levels	• Avoidance of development on wetlands where possible • If removal is necessary, obtain necessary permits and consult with GNL • Avoid or reduce interaction with wetlands outside the Project area • Compliance with regulations and permits • Accident event prevention and response procedures and plans in place • Follow EPP	NS

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Avifauna & Avifauna SAR	X	X	• Loss of habitat due to vegetation clearing • If site preparation occurs during bird breeding season, there may be adverse impacts • Project activities may impact avifauna presence and use of the area by avifauna • Potential for bank swallow and common nighthawk to use the area	• Where possible, construction will occur outside the bird breeding season • Mitigations in place should disturbance activities occur in breeding season • Avifauna observations to be recorded by IOC staff, including raptors, waterfowl and other avifauna • Additional baseline may be needed at later stages • Follow EPP • Few SAR documented in or near the Project area • Suitable habitat available nearby for displaced SAR • Monitoring for avifauna SAR is ongoing at IOC mine Property • Observations of SAR will be recorded and appropriate mitigations determined in consultation with appropriate regulators	NS
Wildlife & Wildlife SAR	X	X	• Travel corridors currently through Project area • Loss of habitat due to vegetation clearing • Potential interactions with Project personnel and equipment during Project activities • Potential for little brown bat to use the area	• Mitigations in place for all phases of Project • Additional baseline may be required prior to start of later construction Stages • IOC will monitor all wildlife sightings, including SAR, in or near the Project site • Follow EPP • Compliance with regulations and permits • Accident event prevention and response procedures and plans in place • Construction and operations areas will be kept clear of garbage • Few SAR documented in or near the Project area • Additional baseline may be needed at later Stages	NS

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Fish and Fish Habitat	X	X	• Potential effects to downstream Project waterbodies from accidental spills • Dewatering First Pond • If strong hydraulic connectivity between Stage 4 pits and White Lake, draining of White Lake may be required and a loss of fish and fish habitat will result	• Follow EPP • Accident event prevention and response procedures and plans in place • Compliance with regulations and permits • Additional baseline may be needed at later stages • Habitat compensation may be needed if White Lake is drained. This will offset significant adverse environmental effects to fish and fish habitat	NS
Surface Water	X X	X	• Potential accidental spills • Potential for increase in surface area runoff for White Lake watershed	• Follow EPP • Compliance with regulated discharge criteria and permits • Accident event prevention and response procedures and plans in place • Design mitigation (erosion and sediment control plan, spill containment, etc.) • Water quality monitoring prior to discharge to environment	NS
Groundwater Quantity and Quality	X	X	• Discharge rate may need to be monitored and adjusted • Changes in groundwater quantity (water levels) may effect surface water features and wetlands, mainly through operations phase dewatering activities • Local changes in shallow groundwater quality near the ore and overburden	• Follow EPP • Compliance with regulations and permits • Design mitigation (pump down plan, spill containment, controlled pumping rate, etc.) • Accidental event prevention and response procedures and plans in place • Discharge of extracted groundwater within the surface watershed of the Project area • Water quality monitoring prior to discharge to the environment	NS

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Potential ARDML Effects	X	X	• Potential impacts to surface water and groundwater if ore, waste rock or soil are found to be acid generating or metal leaching	• Follow EPP • Ongoing monitoring of waste rock and ore • Control structures for runoff • Treatment of effluent if required • The RCP provides in-depth discussion on ARDML mitigations, wherever appropriate, for both the short and long term.	NS

Key:

X	Potential Project Interaction (by Stage)
N	No likely adverse residual environmental effect
NS	No significant adverse residual environmental effect
S	Significant adverse residual environmental effect
P	Positive residual environmental effect

5.1.5 Cumulative Effects Assessment

The cumulative effects assessment (CEA) relative to the Natural Environment can be defined as changes to the natural environment as a result of an action, project or activity in combination with other existing or future projects and activities. The CEA considers potential environmental effects associated with the Project.

The Project will have an effect on vegetation and soils within the construction footprints as a result of clearing and excavation activities during the construction phases of each Project Stage. To decrease the overall mining footprint in the area, IOC will be progressively rehabilitating areas during Project construction and operations phases. The clearing and excavation activities for the Project will not overlap or interact cumulatively with those of other projects and activities in the area.

The operation of the Project will not result in an increase in overall production of iron concentrate or pellets. Therefore, the discharge of tailings to the TMF will not increase or change in metallurgical or chemical composition and thereby not contribute to cumulative environmental effects.

The water quality of discharges or runoff from the Project will be controlled with treatment systems designed to comply with federal and provincial requirements. Potential effects to water quality caused by the Project would likely be restricted to water bodies near or downstream of the operation. There is potential for cumulative environmental effects relative to changes in surface and groundwater flows into downstream waterbodies. This may have an effect on the aquatic environment which may influence associated species.

The Project will not affect listed or rare species, and will not affect overall biodiversity in the region, nor will it affect caribou populations or other wildlife. The Project is unlikely to contribute measurably to adverse cumulative environmental effects to wildlife, SAR or avifauna in the region.

The development and operation of the Project is not likely to contribute to a reduction in overall air quality or to an increase in noise levels in the area. The Scully Mine in Wabush is operating but not at full capacity. If this facility, or others, become fully operational, there is a potential for cumulative effects to be felt relative to noise and air quality in the area.

It should be noted that a new power transmission line and terminal station is planned for western Labrador that will enable Tata Steel Minerals to offset diesel-fired generation with clean, renewable hydropower, reducing the mine's diesel consumption by up to 40 per cent. This new infrastructure will contribute to lower greenhouse gas emissions in the region and reduce the potential for adverse cumulative effects relative to air quality to be felt in the vicinity of Labrador City or Wabush. In addition, ongoing monitoring has indicated that measured CACs have generally been within Provincial ambient air quality standards. Therefore, the addition of other mining projects to the area may not change the regional air quality to a level above regulatory thresholds.

5.2 Human Environment

The Human Environment includes relevant components of the human and cultural environments, including historic and heritage resources, human health and well-being, land and resource use, community services, communities and the economy.

5.2.1 Construction

5.2.1.1 Historic and Heritage Resources

Historic and heritage resources include sites, objects or other materials of historic and archaeological, paleontological, architectural, cultural and/or spiritual importance. In Newfoundland and Labrador, such resources are protected under provincial legislation and valued by Indigenous and other people in the province. Construction activities and associated ground disturbance have the potential to disturb or destroy archaeological sites and other historic and heritage resources.

AMEC's 2019 report identifies two heritage sites located on IOC property, the Heath Lake site (FgDr-01) and the Drum Lake Camp ethnographic site (23B/15 Ethno). The Heath Lake site is located 3.5 km north of White Lake and contains a portion of a ground slate tool. Due to the imprecision of data related to the site and the fact that a single pre-contact artefact had been identified, the Provincial Archaeology Office (PAO) has listed the site as destroyed.

The Drum Lake ethnographic site, located approximately 2 km to the southeast of White Lake, was identified in a 2012 survey and was determined to be the structural footprint of a post-1960 collapsed camp and various associated debris. The PAO lists this site as unlikely to require further assessment. Thus, neither of these sites are likely to provide important cultural heritage resources (AMEC 2019).

During Project construction however, standard precautionary and reporting procedures will be implemented. Should an accidental discovery of historic resources occur, all work will cease in the immediate area of the discovery until authorization is given for the resumption of the work. Archaeological materials encountered will be reported to the PAO, including information on the nature of the material discovered and the location and date of the find.

5.2.1.2 Land and Resource Use

The Project area is located within IOC's existing mining leases in Labrador City and on IOC mining property. There is no public access to the majority of the Project area. There is public access to White Lake where a recreational fishing does occur. Access to White Lake will be restricted during the development of the White Lake Waste Dump and during development activities for the Project. With the exception of the recreational fishery at White Lake, access to the Project area is restricted so use of the area for hunting, gathering and other activities do not occur. No negative interactions with, or adverse effects upon land and resource use, e.g., municipal, traditional or recreational, in the area are anticipated.

5.2.1.3 Human Health and Well-Being

Since the Project will be located approximately 9 km from residential areas, it is not anticipated that the Project will have adverse effects on human health and well-being for the local communities or elsewhere.

Construction activities will be guided by established practices and applicable sections of the provincial *Occupational Health and Safety Regulations* (OHS). IOC will support requirements relative to ensuring the health of company personnel and contractors working on the Project.

Given the anticipated increase in prosperity in the region, IOC predicts an increase in positive effects on human health and wellbeing as a result of Project operations.

5.2.1.4 Communities and Economy

The Project will contribute in a positive way to the local communities and their economies through direct employment and other procurement opportunities and IOC is confident the Project will have positive socio-economic effects in the region and for the province as a whole for many years to come. This Project will allow IOC to maintain production capacity at its concentrator plant and to continue to positively affect the socioeconomic environment of the region and the province

5.2.2 Operation

5.2.2.1 Historic and Heritage Resources

Once the development and construction of each mining Stage has been completed, there will be no additional ground disturbance. Therefore, the potential for further negative effects to historic and heritage resources are not anticipated. The precautionary and reporting procedures implemented during construction will be maintained throughout the life of the Project, however.

As during Project construction, standard precautionary and reporting procedures will be implemented during the operations period. Should an accidental discovery of historic resources occur, all work will cease in the immediate area of the discovery until authorization is given for the resumption of the work. Archaeological materials encountered will be reported to the PAO, including information on the nature of the material discovered and the location and date of the find.

5.2.2.2 Land and Resource Use

No negative interactions with local, commercial or municipal activities are anticipated during the operations period. Operations activities during Stage 4 will however result in restrictions to accessing White Lake. This will potentially create adverse effects for recreational fishing, berry picking and other recreational activities traditionally carried out in the area.

5.2.2.3 Human Health and Well-Being

Similar to predicted effects during the construction phase, effects on human health and wellbeing during the operation phases will be comparable. The Project will be located approximately 9 km from residential areas, it is not anticipated that the Project will have adverse effects on human health and well-being for the local communities or elsewhere.

Operations activities will be guided by established practices and applicable sections of the provincial *Occupational Health and Safety Regulations* (OHS) and IOC will support requirements relative to ensuring the health of company personnel and contractors working on the Project.

Given the anticipated increase in prosperity in the region, IOC predicts an increase in positive effects on human health and wellbeing as a result of Project operations.

5.2.2.4 Communities and Economy

The Project is a part of IOC's strategy to provide a consistent feed to the IOC mill to maintain critical production targets. Consistent operations at IOC's Labrador City facility provides assurance of job stability and ongoing economic benefits for the region as a whole. Therefore, the Project will make positive contributions to the socioeconomic environment of the region and province.

The operations workforce that will be needed for the Project will be redistributed from IOC's existing operations workforce. In addition, no additional demands on community infrastructure or services are anticipated during the operations period of the Project.

5.2.3 Accidental Events

An accidental event or malfunction during any stage of the Project could affect the Human Environment through, for example, an effect on human health and well-being or through an increased demand for local safety and health services. The probability of such events occurring is low, and potential effects would depend upon the specific nature and magnitude of the event.

IOC has various measures, plans and procedures in place to prevent and respond to fire, explosions or other accidental event at its Labrador City operations.

5.2.4 Summary of Environmental Effects Analyses – Human Environment

Table 27 provides a summary of potential environmental interactions, identified mitigation measures and residual environmental effects of the Project on the Human Environment.

Table 27: Environmental Effects Analyses – Human Environment

Environmental Component	Project Stage & Potential Interaction			Key Considerations and Proposed Mitigations	Residual Effects
	Con	Ops	Potential Interactions		
Historic and Heritage Resources	X		• Ground Disturbance	• Localized and short-term construction activity • Low potential for historic and heritage resources • Standard precautionary and reporting procedures	N
Land and Resource Use	X	X	• Limited access initially to White Lake Recreational fishery • Eventually (Stage 3-4) no access to White Lake recreational fishery	• Most of the site is a restricted area, on IOC mining property • There is public access to White Lake • IOC will complete DFO HADD and carry out compensation work if required	NS
Human Health and Well-Being	X	X	• Possible accidents affecting human health	• At a distance from, and minimal interaction with communities • Accidental event prevention and response plans in place • Will follow provisions of *OHS Regulations* applicable to Project • Will follow all recommendations of the CMO of Health in NL relative to Covid 19	N
			• Increased regional prosperity	• Can contribute to improved sense of wellbeing and higher standard of living	P
Communities and Economy	X	X	• Employment and business opportunities	• Positive effects (direct and indirect)	P

Key:

X	Potential Project Interaction (by Phase)
N	No likely adverse residual environmental effect
NS	No significant adverse residual environmental effect
S	Significant adverse residual environmental effect
P	Positive residual environmental effect

5.2.5 Cumulative Effects Assessment

The CEA relative to the Human Environment can be defined as changes to the socio-economic environment as a result of an action, project or activity in combination with other existing or future projects and activities.

The Project will occur during a recovering economic period in Labrador West. The four major capital projects identified in Table 25 will be completed before the anticipated start-up of this Project. Given the scale and timing of this Project, it is unlikely that the Project will negatively affect the socio-economic environment of the region, rather, it will contribute positively to the local economy by extending the mine life. Nor is it anticipated that additional strain will be added to the health care system or housing availability in the area as a result of the Project.

6.0 Environmental Monitoring & Follow-up

IOC has strong environmental, health and safety management systems and associated plans, practices and procedures in place for their Labrador City operations. Potential environmental or human health effects associated with the Project will be addressed and mitigated through the application of these established practices and procedures. Potential effects can be further addressed through specific permitting requirements and compliance standards and guidelines that will apply to the Project.

Once operational, the Project will be subject to regular inspections and maintenance as required and the existing monitoring, measuring and auditing processes will be extended to include the Project.

As part of its regular and ongoing construction and operations procedures, IOC will conduct ambient air and end of pipe water quality monitoring with programs that are described throughout this Project Registration document.

7.0 Summary & Conclusions

The scope of the Project includes development and operation of nine pits associated with the Project, groundwater extraction system(s), waste rock disposal areas, overburden stockpile areas and haulage roads to connect the pits to an existing transportation system. The transportation system moves ore to the concentrator plant waste rock and overburden to their respective disposal/stockpile areas. The Project does not require additional processing infrastructure as the existing ore processing, tailings management, ore and final product transportation systems and equipment maintenance facilities already exist. The Project will not result in an increase in ore, concentrate, pellet or tailings production, rather it will enable IOC to maintain critical production targets.

The operation of the Project will not result in an increase in the labour force at IOC's Labrador City operations; rather the operational plan will be to redeploy existing equipment and personnel to the Project from other current operational areas.

The Project will be planned and implemented in accordance with IOC's environmental and health and safety policies, plans and practices that promote safe and responsible construction and operation practices. IOC has a comprehensive environmental management system including various associated plans and procedures designed to avoid or reduce negative environmental effects of its activities.

Rio Tinto has a number of established community policies and standards within its Communities and Social Performance Framework that each of its operating companies, including IOC, must follow. As a member of the Mining Association of Canada (MAC), IOC follows MAC's social policies and guidelines, performance measures and protocols.

The Project will be constructed and operated in accordance with applicable provincial and federal legislation and regulations and in compliance with IOC policies, procedures and standards. IOC is committed to complying with all relevant legislation and regulations, and conditions associated with EA release.

The Project should not result in significant adverse effects on the following biophysical and socioeconomic components of the environment:

- Air quality within the community of Labrador City;
- Vegetation and soils;
- Wetlands of the region;
- Wildlife, including SAR;
- Avifauna, including SAR;
- Fish and fish habitat;
- Surface and groundwater resources;
- Historic and heritage resources;
- Communities and economies;
- Human health and well-being; and

- Land and resource use.

IOC will to continue to consult as required with all relevant government, community and Indigenous organizations throughout the EA process, and will continue as required through all stages of mine life.

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Appendix A

Health, Safety, Environment and Quality Policy

Rio Tinto

IOC

Iron Ore Health, Safety, Environment, Communities and Quality Policy

The global Iron Ore group is comprised of mining and processing operations in Australia and Canada with dedicated sales offices in Asia, Canada and Europe and a global marine freight management network.

The business is diverse and covers:
- Operations and expansion projects in the Pilbara, Western Australia and at the Iron Ore Company of Canada
- Rio Tinto Marine
- Service and Support functions in our central offices globally
- Major development opportunity at Orissa

We are an organization that cares about our people's needs both at work and at home, supporting our business's overall goal of achieving zero harm.

We aim to be industry leaders in health, safety, environmental and community performance. Our belief is that quality engagement with contractors, suppliers, customers, communities and government regarding our strategies and plans is essential to building robust relationships and is fundamental to our long term success.

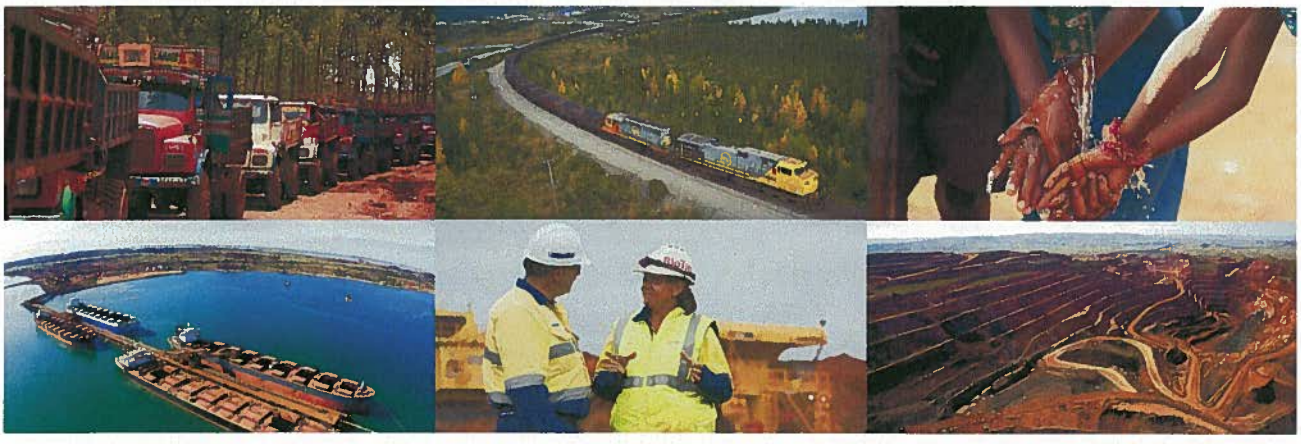
Through effective leadership we continuously strive to improve our HSECQ performance and our success requires shared dedication and active participation by each of us.

Andrew Harding,
Chief executive Iron Ore
20 June 2013

We will endeavour to meet our commitments by:

- Making sure no one is harmed or hurt while they are at work
- Living and working by the standards of conduct defined in The Way We Work"
- Communicating the vision of our business, linked to our annual plan priorities
- Contributing to the health and well-being of local communities
- Being open and transparent with local stakeholders, respecting their culture and diversity and considering their interests in the company's management decisions
- Recognizing our customers' needs with product and pricing options
- Ensuring the service and technical support we are providing to our suppliers and customers is responsive, fair, courteous and timely
- Identifying climate change improvement solutions through dedicated optimization work programmes
- Prioritizing research and implementation programmes through technology to reduce impacts to land, enhancing our contribution to biodiversity and improving our efficiency in water and energy use
- Identifying and managing business risk and fully implementing business resilience capability
- Ensuring leadership encourages effective employee, contractor, supplier and community participation in achieving our goals
- Implementing and improving systems to identify, control and monitor HSECQ risks across the business
- Providing and developing adequate resources and expertise to manage HSECQ performance
- Reporting regularly to all stakeholders on our performance and seek their feedback to further improve HSECQ

This policy shall be communicated to all Iron Ore group employees, service providers and internal and external stakeholders and made available to the public.



Appendix B

Site-Wide Environmental Protection Plan

Iron Ore Company of Canada-Environment Department

Environmental Protection Plan

Centre	**Carol Lake Mine Site**		
Effective Date	September 2018	**Status**	
Version Number	08		

Contents

Section 1 Introduction

Introduction and objective of plan

This environmental protection plan (EPP) outlines the required regulatory requirements and environmental protection procedures for the Operational and Development Sites at Carol Lake Project in Labrador City, owned by Iron Ore Company of Canada (IOC) This EPP satisfies the Department of Fisheries and Oceans expectations prior to issuance of a Section 35(2) Authorization under the *Fisheries Act,* and as a condition of release of the assessment requirements under the *Newfoundland Environmental Protection Act, specifically under the Environmental Assessment Regulations.*

Note: When required, project specific information will annexed to this document.

Objective

This EPP outlines practical procedures required for all project personnel (i.e., IOC employees, contractors and suppliers) to reduce or eliminate the potential environmental effects associated with the operations and decommissioning phases. This EPP also:

- describes how IOC commitment to reduce environmental effects will be met;
- reviews potential environmental concerns and appropriate protection measures;
- provides a reference document for personnel when planning and/or conducting specific activities;
- provides direction for developing contingency plans for accidental events;
- communicates changes in the CR project through the revision process;
- provides a reference to and instructions to understand applicable legal and other requirements;
- includes a quick reference for both project personnel and regulators to monitor compliance and recommend improvements; and
- provides direction at the corporate level for ensuring commitments made in policy statements are implemented and monitored.

Any deviation from the procedures and commitments outlined in the EPP must first be discussed with, and approved by the Manager Environment & Sustainable Development.

Environmental Protection Plan Organization

This EPP has been developed for specific activities to be conducted in support of the Operational and Development Sites. It provides instructions for addressing both planned and unplanned activities/events associated with the project. This EPP contains the following sections:

- **Section 1** provides an introduction to the EPP. It outlines the EPP purpose and organization, roles and responsibilities and environmental orientation.
- **Section 2** provides an overview of the CR Project
- **Section** 3 lists the permits, approvals and authorizations required for the undertaking, and provides an overview of compliance monitoring.
- **Section 4** describes environmental concerns and environmental protection procedures for planned project activities.
- **Section 5** outlines the contingency plans for potential unplanned and accidental events**.**
- **Section 6** describes procedures for making revisions to the EPP**.**
- **Section 7** contains a list of key project and regulatory contacts.
- **Section 8** lists references cited in the EPP, as well as a number of sources of further information.

Roles and Responsibilities

IOC

- provide final approval for the EPP and any subsequent revisions;
- monitor and inspect the work being carried out; and
- liaise with relevant government agencies and community interest groups as required

Designated Environmental Advisor(s)

- ensure the implementation of the EPP;
- be IOC's representative on-site;
- consider revisions requests, and review the EPP on an as-needed basis;
- ensure revisions are distributed to EPP holders;
- maintain document control;
- report to the Senior Environmental Advisor;
- hold an environmental orientation session for the contractor and its personnel, and any other personnel to be involved in the project on an as-needed basis;
- ensure EPP holders and their staff are familiar with the EPP and its procedures;
- ensure that all applicable approvals, authorisations and permits are obtained and adhered to;
- monitor or designate a representative to monitor project work to ensure compliance with the EPP, and all regulatory requirements and commitments; and
- report to the Operational and Development Site Project Managers, Senior Environmental Advisor , and/or appropriate agency all incidents of non-compliance.

Contractor and Site Personnel

- familiarize themselves with the EPP;
- implement the EPP commitments to help reduce pollution;
- ensure all personnel and subcontractors comply with the EPP, all requirements of the contract and with all applicable laws and regulations;
- maintain training records;
- maintain regular contact with the Environmental Advisor, including, but not limited to:
  - -reporting concerns immediately;
  - -reporting any spills or other event that may have an effect on human or environmental health and/or safety;
- obtain all applicable approvals, authorizations and permits;
- ensure the implementation of any conditions outlined in approvals, authorizations and permits; and
- carry out clean-up, reclamation or restorative measures as directed by the Operational

and Development Sites Project Managers, Environmental Advisors and/or appropriate government agency.

EPP Holders (which can be contractors, operations and all relevant stakeholders)

- keep with them the latest copy of the EPP themselves and their personnel with the EPP and any revisions; and
- initiate changes to improve the quality of the plan.

Environmental Orientation

Through orientation and ongoing awareness training throughout the undertaking, IOC will ensure that all project personnel are competent to do their jobs properly. Employees will understand their roles and responsibilities, as well as the potential environmental effects of the overall project and their specific work activities. All workers will receive an environmental orientation prior to the start of any new activity and thereafter on an as-needed basis.

Summary of Important Dates

Contact the environment department for further details.

Critical Bird Nesting Period	May 15 - August 15
Eagle and osprey	May 15 - July 31
Fisheries timing windows	Varies see below
Bank swallow nests, if present, are not impacted	May 15 - end of July

All development activities shall be within the constraints of the original lease agreements. Any extensions to the lease should be recorded.

Fisheries timing windows

To avoid impacts on fish in Newfoundland & Labrador, do not carry out in-water work:

- in tributaries and headwaters of scheduled salmon rivers in Labrador from September 15 to June 15 (spawning, incubating and hatching period)
- in estuaries and the main stems of brown trout rivers from October 1 to November 30 (migrating period)

(taken from DFO website, June 20, 2018 http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html)

Section 2 Project Overview

The IOC mine site represents a continuation of ongoing IOC operations at the Carol Lake Mining Project within its original mining lease. All development activities shall be within the constraints of the original lease agreements. Any extensions to the lease should be recorded.

Planned changes to the mine: It is currently proposed to continue mining using existing methods, infrastructure, and processing facilities, with some modifications to an on-site haulage roads and transmission lines.

Construction

With regards to activities relating to the construction of any Operational Development, this EPP only outlines the environmental protection measures associated with the operations, construction and decommissioning of the project.

Operations

This EPP outlines the environmental protection measures associated with any operational developments at IOC, including site preparation activities (e.g., clearing of trees, earth moving, dewatering, etc.) and mining activities.

Ongoing Site Preparation Activities

Ongoing site preparation activities and development work (i.e. preparation for material removal) include those activities required to support the continued mining of any Operational Development such as extension of roads, power lines, construction of physical features and environmental assessments. Operational Development areas that require tree clearing prior to any development activities, should reference procedures in Section 4 of Environmental Protection Plan.

Where required give examples, an environmental assessment shall be conducted at the planned Operational and Development Sites, by IOC Environment Department. Any obsolete

infrastructure and utilities (ie. disengaged power lines, poles, dewatering pipes) shall be removed prior to any operational development activity.

Overburden and Waste Rock Removal

Unconsolidated material or overburden that covers the Operational Development area will be removed to the hard rock surface in preparation for mining.

Overburden will be placed in designated storage areas as determined by IOC, which is managed by the mine planners

Site preparation also involves:

1. The development of terraces within the operational development area by drilling and blasting the sloped natural ground to specified bench elevations in 13.7 m increments for IOC production equipment.
2. Waste rock dumped at waste rock dumps located at IOC Mine Site, with the exception of those quantities is to be used as construction material. This material may be used to upgrade the existing network or on-site haul roads.
3. Alternatively, waste rock could be placed in the pits using conventional backfill techniques.
4. Waste rock and overburden piles will be sloped and bermed to prevent pooling of surface water.
5. Structures such as silt fences will be used as a means of sediment control as required, and collection ditches and settling ponds will be used as required to manage surface runoff and any groundwater flows.

Please refer to Rio Tinto E13- Chemically Reactive Mineral Waste Control Standard.

Roadways

Operational Development areas will require both new road construction and upgrading of existing roads. All roads will require grading, culvert installation, adequate drainage, dust control, and maintenance, all of which are subject to specific guidelines and regulations. The location and extent of these roads will be finalized at the detailed design stage.

Marshalling and Storage Areas

Marshalling areas will be located at various locations on the project site to facilitate the receiving and storage of materials and equipment such as piping and culverts. Marshalling areas cannot be used to contain spills. ¨

Proper spill control must be applied including drip pans. Existing facilities at the Carol Mining Project will be used wherever possible.

Associated Facilities and Infrastructure

- Maintenance facilities, equipment and processing facilities will be used during the operational phase. If required, transmission lines will generally follow road rights-of-way.
- Lunchroom/washroom facilities shall be used at the workforce area.
- Maintenance facilities, equipment and processing facilities will be used during the operational phase. If required, transmission lines will generally follow road rights-of-way.
- Lunchroom/washroom facilities shall be used at the workforce area.

Mining Activities at IOC

- Mining activities at IOC will proceed from the highest bench elevation to the lowermost planned bench. The nominal bench height will be 13.7 m.

- Bench accesses will initially be developed using waste rock as mining proceeds downwards. The haulage pit ramps will be 40 m wide, with a maximum gradient of 8%

- The bench face angle will be 35 to 90 degrees, and the overall pit slope angle will be 30 to 58 degrees.
-

Decommissioning

A rehabilitation and closure plan has been developed in accordance with the *Newfoundland Mining Act*. A sustainable closure configuration will be implemented throughout the operational life as appropriate.

In general, the reclamation systems and abandonment facilities will be designed for long term stability, allowing for gradual erosion and deformation at a geomorphic rate comparable to that of the natural environment. Structures will be designed to remain functional for the long term (+1,000 years).

Progressive Reclamation: this means reclaiming land and revegetating inactive areas as soon as possible, not waiting until the end-of-life of the mine. This reclamation of the mine area will be staged over the life of the facility, resulting in minimal reclamation investment at the end of the mine life. Progressive reclamation activities will include contouring and re-vegetating inactive mine areas.

Decommissioning: The primary decommissioning criterion is to ensure a maintenance-free facility after mine closure

Section 3 Regulatory Requirements and Commitments

Approvals, Authorizations and Permits

The approvals, authorizations and permits required for development activities are listed in Table 1 below.

If you are unsure ask your environmental advisor.

Table 1: Regulatory Requirements Summary – Permits and Authorizations

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
1. Activities that may affect fish habitat	Authorization pursuant to Section 35(2) of the *Fisheries Act*	*Fisheries Act (Federal)*	Habitat Management, DFO	A Fish Habitat Compensation Plan has to be approved by DFO. A monitoring program shall be implemented to measure the program's effectiveness. Other activities having potential impact should be reviewed with Area Habitat office in GooseBay.
2. Any development activity	Release from the *Environmental Protection Act*	*Environmental Assessment Regulations (NL Govt)*	Environmental Assessment Division, Dept of Municipal Affairs & Environment	
3. Drawdown of a lake, pond.	Certificate of Approval for drawdown of Development Area Waterbody.	*Water Resources Act (NL Govt)*	Water Resources Division, Dept of Municipal Affairs & Environment	A Certificate of Approval must be obtained.
4. Construction and operation	Certificate of approval	*Environmental Assessment*	*Pollution Prevention Division*	A Certificate of Approval must be obtained.

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
		Regulations (NL Govt)		
5. Presence of eggs, nest, migratory bird or activities that may affect areas frequented by migratory birds And Removal of abandoned nests	Compliance standard; no permit required	*Wildlife Regulations* pursuant to the *Wildlife Act (NL Govt)*	Wildlife Division, Department of Tourism, Culture and Recreation	It is unlawful to take or destroy the eggs or nest of any wild bird. IOC and contractor personnel will not harass or disturb wildlife, or remove or destroy nests or eggs. Clearing of vegetation may result in the loss of nests.
	Permit required Raptor and Corvids Nest Removal Permit or Permit required for removal of abandoned or relocation of nests on IOC Structures	*Migratory Bird Act Section 6 of the Migratory Bird Regulations (Federal)*	Environment and Climate Change Canada	It is forbidden or a take a nest or egg of a migratory bird or to be in possession of a live migratory bird, or its carcass, nest of egg
6. Water crossing (fording, culvert [cleaning-maintenance-installation] or bridges)	Water resources permit A permit is required to meet conditions in minimizing downstream impacts	*Water Resources Act (NL Govt)*	Department of Municipal Affairs and Environment	
7. Operating of mill	Mill Licence	*Mining Act (NL Govt)*	Department of Fisheries and Land Resources	Operating a mill requires a mill licence for a term of 5 years or longer.
8. Land disturbance, Mining Leases	Mineral Rights	*Minerals Act (NL Govt)*	Department of Municipal Affairs and Environment	A mining lease shall be filed with government within 6 months of date of application.
9. Indigenous groups: Minimization of any potential adverse impacts	Procedural and financial obligations	*Aboriginal Consultation Policy (NL Govt)*	Intergovernmental and Indigenous Affairs Secretariat	Consultation and accommodation with associated aboriginal groups

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
of projects and developments on the asserted rights of indigenous groups				
10. Infilling of water body	Permit to Infill	*Water Resources Act (NL Govt)*	Department of Municipal Affairs and Environment	A permit is required to infill a body of water.
11. Activities that have the potential to affect wetlands	Permit to Alter a Body of Water. A permit is required to develop near wetlands requiring special conditions and alterations.	*Water Resources Act (NL Govt)*	Department of Municipal Affairs and Environment	
	If wetland will be affected due to mining an offset must be established to remedy the difference	*Federal Policy on Wetland Conservation (Federal)*	Environment Climate Change Canada	
12. Any activity that may affect and endangered or threatened species	Compliance standard	*Endangered Species Act (NL Govt)* *Possibly Species at risk Act (Federal)*	Department of Municipal Affairs and Environment	Provide protection to endangered and threatened species and protection of their habitats
13. Fish habitat compensation provisions : Monitoring to verify the effectiveness of the compensation plan		*Fisheries Act*, Section 35(2), Harmful Alteration, Disruption, or Destruction of Fish Habitat	Department of Fisheries and Oceans	Monitoring requirements and schedule are detailed in the Fish Habitat Compensation Agreement that is attached to the authorization issued by the Minister.

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
		(Federal)		
14. Any run-off from the project site being discharged to receiving waters (freshwater or marine).		*Fisheries Act*, Section 36(3), Deleterious Substances *(Federal)*	Department of Fisheries and Oceans	Any deposited substance or discharge must not be deleterious (i.e., must be acutely non-lethal). Liquid effluents that enter freshwater or marine waters must comply with the Act.
15. Mortality of migratory birds, and endangered species and any species under federal authority.		*Migratory Birds Convention Act* and Regulations (Federal)	Canadian Wildlife Service (CWS), Environment Canada	CWS should be notified about the mortality of any migratory bird in the project area, including passerine (songbirds), seabird and waterfowl species. Harmful substances (e.g., oil, wastes, etc.) that are harmful to migratory birds must not be deposited into waters that are frequented by them. Nests, eggs, nest shelters, eider duck shelters or duck boxes of migratory birds must not be disturbed or destroyed. Notice should also be given about the mortality of any species known to be endangered or under federal authority
16. Handling and transporting of dangerous goods.	If the materials are transported and handled fully in compliance with the regulations, a permit is not required. A Permit of Equivalent Level of Safety is required if a	*Transportation of Dangerous Goods Act* and Regulations *(Federal) and*	Transport Canada And Environment Climate	

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
	variance from the regulations is necessary.	Interprovincial Movement of Hazardous Waste (Federal)	Change Canada	
17. Transporting fuel to the site.		*Transportation of Dangerous Goods Act* and *Regulations* *(NL Govt)*	Department of Works, Services and Transportation	Transporting goods considered dangerous to public safety must comply with regulations.
18. Activities that have the potential to interact with the environment and human health.		*Canadian Environmental Protection Act (CEPA) (Federal)*	Environment Climate Change Canada	CEPA provides a framework for setting environmental quality objectives, guidelines and codes of practice, pollution prevention plans, regulation of toxic substances, controlling pollution of other wastes and environmental emergency plans.
19. Activities surrounding blasting using explosives		*Explosives Act (Federal)*	Environment Climate Change Canada	Must comply with the storage and use of all explosives on site as per regulations.
		Fire Protection Services Act (NL Govt)	Fire and Emergency Services	
20. Any Development Operation.		*Waste Material Disposal Act (NL Govt)*	Pollution Prevention Division, Dept of Municipal Affairs & Environment	All waste material shall be considered prior to disposal, for reuse, resale or recycling. All waste materials associated with the construction and operation, shall be disposed at an

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
				approved waste disposal site.
21. Day to day work activities	Various internal permits depending on the work performed (i.e. ground disturbance etc.)	*Occupational Health and Safety Act* *(NL Govt)*	Workplace Health and Safety, Department of Labour	Outlines minimum requirements for workplace health and safety. Workers have the right to refuse dangerous work and must be informed of potential hazards they may be exposed to during work. All workers must be provided with and use appropriate personal protective equipment.
22. Storage, handling and disposal of gasoline and other fuels.	Registration required for all fuel storage tank system other than those connected to a heating appliance of a capacity of 2,500 L or less	*Storage and Handling of Gasoline and Associated Products Regulations* *(NL Govt)*	Pollution Prevention Division, Dept of Municipal Affairs & Environment	A spill contingency plan should be developed that includes emergency response contacts/support and access to spill response equipment.
23. Handling and storage of hazardous materials.		*Workplace Hazardous Materials Information System,* under the *Occupational Health and Safety Act (NL Govt)* *(NL Govt)*	Operations Division, Department of Government Services	Outlines procedures for handling hazardous materials and provides details on various hazardous materials.
24. General project activities.		*Historic Resources Act* *(NL Govt)*	Cultural Heritage, Department of Tourism,	All archaeology sites and artefacts are considered to be the property of the Crown and must not be disturbed. Any

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
			Culture and Recreation	archaeology materials encountered must be reported to the Provincial Archaeology Office.* (see section 5.f for contingency plan)
25. Cutting or Removal of Timber	Permit from IOC environment department	*Cutting of Timber Regulations* *(NL Govt)*	Department of Natural Resources.	Cutting and removal of timber shall be approved by the IOC Environment Department.
26. Activities that have the potential to interact with wildlife		*Wildlife Act* *(NL Govt)*	Department of Municipal Affairs and Environment	Sighting of any wildlife in the area. For removal of any wildlife, contact the environment department who will advise the Dept. of Natural Resources
27. Activities that have the potential to interact with wildlife		*Endangered Species Act* *(NL Govt)*	Department of Fisheries and Land Resources	Provides special protection for plant and animal species considered to be endangered, threatened, or vulnerable.
28. Air quality: Maintain good air quality levels as prescribed in regulations		*Air Pollution Control Regulations* *And Halocarbon Regulations* *(NL Govt)*	Department of Municipal Affairs and Environment	Burning is prohibited for certain materials listed in Schedule E of the regulations and the main site permit, see Table below for prohibited items. In addition, certain fuels are prohibited as well. Check with Environment Advisor for specific halocarbon management protocols (refrigerants etc.)
29. Discharging sewage and other materials into a body of water or public		*Water Resources Act* *Environmental Control*	Department of Municipal Affairs and Environment	Effluent samples and receiving water samples using analytical procedures.

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
sewer shall comply with standards, condition and provisions in these regulations		*Water & Sewage Regulations* *(NL Govt)*		
30. Established the province's land use planning system		*Urban & Rural Planning Act* *(NL Govt)*	Department of Municipal Affairs and Environment	Consultation with public and municipal governments so that development decisions can be subjected to independent reviews.
31. Monitor and record all emissions related to GHG		*Management of Greenhouse Gas Act* *(NL Govt)*	Department of Municipal Affairs and Environment	Submission of an annual report regarding the greenhouse gas emissions released with 3rd party verification.

*Should any archaeological remains be encountered, such as stone, bone or iron tools, concentrations of bone, charcoal or burned rock, fireplaces, house pits and/or foundations, activity in the area of the find must cease immediately and contact should be made with the environmental advisor who will then call with the Provincial Archaeologist in St. John's as soon as possible (see section 5.f for contingency plan).

Compliance/Conformance Monitoring

Compliance monitoring at the mine is related to applicable laws, contracts relevant permits, approvals, commitments and authorizations.

Conformance monitoring is related to all applicable to this plan, procedures, policies and other requirements.

Monitoring activities should ensure that all development project activities comply with applicable regulatory and other requirements and that mitigation measures are being employed effectively.

The Environment Department is responsible for environmental compliance/conformance monitoring on-site; and on the environment-related general, special and technical clauses to be implemented as part of the contracts.

Reporting Environmental Issues

Internal Communication

Environmental performance and issues at any Operational and Development Site or area will be communicated internally as required. The Operational and Development Site Project Managers are responsible for communicating IOC policies and procedures and legal and other requirements to project personnel. Project personnel will communicate all environmental incidents and near misses to the Environmental Advisors as per CR-E-E-PRO Environmental Reporting.

External Communication

When required, the IOC Environment Department will report on environmental issues relating to the development site to the Newfoundland and Labrador Department of Municipal Affairs and Environment (MAE). Issues which may be communicated include but are not necessarily limited to:

- Stream crossings;
- Burrow Sites;
- Dust;
- Erosion;
- Historic resources;
- Wildlife encounters; and
- Permits and authorizations.

Any spills of petroleum products or other hazardous materials will be reported to **IOC Emergency Services and Security (709) 944-8400, ext. 8320**, who will report the incident to the IOC Environment Department.

Any activity having the potential environmental impact to fish and fish habitat outside the realm of the compensation agreement (such as stream crossings and culvert installations) should be forwarded to the IOC Environment Department, who will consult the Fisheries and Oceans Area Habitat office in Goose Bay for review and subsequent issuance of appropriate Letters of Advice.

Other compliance reporting required by permits or through compliance requirements not listed above will also be submitted to the IOC Department of Environment, or appropriate departments at IOC.

Section 4 Environmental concerns and environmental protection procedures for planned project activities.

This Section provides a description of environmental protection procedures for the following anticipated project-related activities:

1. Marshalling and Storage Areas
2. Clearing Vegetation
3. Grubbing and Overburden Removal
4. Erosion Prevention and Siltation Controls
5. Buffer Zones
6. Drilling
7. Blasting
8. Water Course Crossings
9. Dewatering Work Areas and Site Drainage
10. Equipment Use and Maintenance
11. Handling and Transfer of Fuel and Other Hazardous Material
12. Solid Waste Disposal
13. Mineral Waste Rock and Overburden
14. Vehicle Traffic
15. Dust Control
16. Hazardous Waste Disposal
17. Road Maintenance
18. Trenching
19. Surveying
20. Public Traffic and Activity

When required, this EPP will be revised to include new or amended environmental protection procedures to ensure that activities conducted at the developing site are completed properly and that the site's significant environmental aspects are well managed.

1. Marshalling and Storage Areas

Environmental Concerns

Areas were equipment and supplies are stored and maintained through the development and operational phases of the Carol Lake Project.

Concerns include:

- Vegetation and soil disturbance may cause erosion and run-off of sediment into nearby water bodies.
- Spills/leaks of hydrocarbons from storing and maintenance activities
- Noise
- Biodiversity issues such as bird nests, dens
- Open containers full of oil/water: this presents a danger to wildlife

Environmental Protection Procedures

1. Existing marshalling and storage areas will be used outside the development site, where feasible.

2. Any new marshalling, maintenance or storage areas required for the project will only be established within the IOC Labrador City property.

3. Establishing any new marshalling or storage areas will follow the procedures for vegetation clearing, grubbing and overburden removal, and erosion prevention (see specific sections of this EPP for details on the later)

4. Any marshalling or storage areas shall be located at least 100 m from a waterbody

5. External storage areas will be placed on level terrain and kept free of ponding or run-off.

6. Drainage from areas of exposed fill will be controlled by grade or ditching and directing run-off away from water bodies.

7. Any maintenance work completed on equipment must have the appropriate spill material available and dip pans must be used

8. Secondary containment required where hazardous products are stored. The size of the containment should be a minimum 110% of the material volume.

9. Marshalling and storage areas not required during operations will be rehabilitated under the environment department's supervision. The environment department will inspect the area before the site is abandoned to ensure it is clear of contamination.

10. Derelict vehicles, scrapped equipment and other debris is not to be stored on site. This material must disposed of at an approved waste disposal site or scrap yard on a regular basis, with the prior approval of the site owner/operator.

2. Clearing Vegetation

Environmental Concerns

Vegetation clearing (e.g., trees, shrubs, etc.) will be required in advance of site preparation activities. Concerns include habitat loss, biodiversity disturbance such as impact to nesting birds, erosion and sedimentation into vegetative areas and waterbodies, uncontrolled burning of slash, impact to historical/archeological sites, and stockpiling vegetation in or near watercourses.

Environmental Protection Procedures

Before clearing begins

1. Verify the requirements of all applicable permits. **A Site Clearance Permit must be** completed and submitted to the Environment Department.

2. Clearing or removal of trees will be restricted to only those areas designated by IOC.

3. Project footprint should be minimized wherever possible and clearing limits and work areas must be clearly marked

4. Avoid ecologically sensitive areas such as hardwoods and aquatic habitats wherever possible and practical. Consult with the environmental team to ensure that there are no ecologically sensitive areas and aquatic habitats

During clearing

1. Clearing will consist of cutting to within 15 cm of the ground and disposing of all standing trees, as well as removing all shrubs, debris and other perishable materials from the area indicated on the engineering/survey drawings.

2. Where practical, vegetation will be stored and protected so that it can be later used as a seed source, moisture retention aid, and shade for new growth during reclamation.

3. Reasonable effort will be made to dispose of usable timber by either using it in project related construction, or by providing the timber for local use off-site. Otherwise, timber will be mulched and mixed with the overburden.

4. Slash and any other construction material or debris will not be permitted to enter any watercourse, and will be piled above spring flood levels. No burning is permitted on-site unless proper approvals acquired.

5. Trees will be either sawed or mulched using mechanized cutting /mulching equipment. The use of mechanical clearing methods, such as bulldozers, will not occur except where it can be demonstrated that there is no merchantable timber, and where the resulting terrain disturbance and erosion will not result in the loss of topsoil or the sedimentation of water bodies.

6. A **100 m buffer zone of undisturbed vegetation will be maintained between all water bodies and watercourses on the Carol Project.** If this buffer cannot be maintained, the Environment Department must be consulted to determine the appropriate buffer requirement and approve additional mitigations.

7. Timber shall be felled inward toward the work area to avoid damaging any standing trees within the immediate work area.

8. Workers will not destroy or disturb any features indicative of a cultural or archaeological site. Such features should be avoided until a report has been made to the Provincial Archaeology Office and clearance to proceed has been received (see specific section of this EPP).

9. IOC is aware of the value of wetlands and will attempt to avoid such disturbance of wetlands outside of the work areas where feasible.

10. All equipment used will be handled and maintained according to the procedures in Section xxx

11. Firefighting tools and water delivery systems must be available

12. Where feasible, vegetation clearing will be scheduled to avoid disturbance during the critical nesting period, from May to August.

13. **If clearing is scheduled between May and August, nest surveys must be conducted in advance of vegetation clearing to avoid active nests during breeding season**.

14. **No clearing shall take place within 800 m of an active raptor nest between May 15 and July 31**. If a nest is encountered during clearing activities, the area is to be demarcated and clearing is to be avoided until the Environmental Department determines that work may continue in consultation with the NL Wildlife Division.

15. Should additional nests/dens be identified during clearing activities, work must stop and the Environmental Advisor contacted immediately to establish buffer zones.

16. If identified during construction, IOC will relocate any Species at Risk (SAR) or Species of Conservation Concern (SCC).

17. In addition, no clearing activity is to occur 200 metres near a nesting area.All hardwoods within 30 metres of a body of water occupied by a beaver are to be left standing. For known waterfowl staging areas, a minimum 30 metre buffer from the water's edge with at least 20 metres of forest will be established. These areas will be identified by the Canadian Wildlife Service. (ref. *Enviromental Guidelines for Construction and Mineral Exploration Companies)*

3. Grubbing and Overburden Removal

Environmental Concerns

The principle concerns associated with grubbing and disposal of related debris are the potential adverse effects on freshwater ecosystems and water quality through the release of sediment into watercourses, as well as the potential for disturbing historic resources.

Environmental Protection Procedures

1. Grubbing of the organic material and/or the upper soil horizons will be restricted to the minimum area required. The organic material must be removed separately from the upper soil horizon material.

2. The organic vegetation material and upper soil horizon material that has been grubbed will be spread in a manner to cover inactive exposed areas.

3. Any surplus of such material will be stored or stockpiled for site rehabilitation and re-vegetation purposes. Organic material will be stockpiled separately from the upper soil horizon material. The location of the stockpiles will be recorded and accessible for future rehabilitation purposes.

4. If stockpiled material is to be disturbed, the site is to be inspected by the Environmental Advisor to ensure that bank swallow nests, if present, are not impacted (May 15 to July 31)

5. Measures will be implemented to reduce and control runoff of sediment-laden water during grubbing, and the re-spreading and stockpiling of grubbed materials. Where grubbed materials are re-spread or stockpiled, as many stumps and roots as possible will be left on the ground surface to maintain soil cohesion, dissipate the energy of runoff and promote natural re-vegetation.

6. Runoff of sediment laden water during grubbing will be minimized by using such measures as settling ponds, ditch blocks, interception ditches and filter fabrics. Erosion control measures such as rip rap, filter fabrics, drainage channels and gravel, hay bales or wood chip mulches will be implemented in areas prone to soil loss.

7. Where erosion into a water body is a concern, the length of time that inactive grubbed areas will be left exposed to the natural elements will be minimized to prevent unnecessary

erosion.

8. Grubbing activities will adhere to the buffer zone requirements outlined in Section 5.

9. During grubbing, care will be taken to ensure that grubbed material will not be pushed into areas that are to be left undisturbed. Grubbing material will be mixed with the overburden for future rehabilitation.

10. Discovery of historic resources will be handled according to the procedures outlined in Section 6.

11. IOC is aware of the value of wetlands and will attempt to avoid such disturbance of wetlands outside of the work areas where feasible.

12. All equipment used will be handled and maintained according to the procedures in Section 10.

13. There should be avoidance of grubbing in high slope areas near water bodies.

14. Dust control is to be provided during clearing and grubbing operations as outlined in Section 15.

4. Erosion Prevention and Siltation Controls

Environmental Concerns

Eroded material may alter drainage patterns, increase stream velocities, cause siltation in water bodies and, subsequently, decrease suitable habitat for aquatic and terrestrial animals.

Before the start of any major works (such as a change in drainage patterns), an erosion plan shall be reviewed and approved by an environmental advisor and engineers.

Environmental Protection Procedures

1. All work in the vicinity of the developing site, will be conducted according to the conditions set out in the permits and/or approvals and authorizations from the Newfoundland and Labrador Municipal Affairs & Environment (NL MAE), and DFO.

2. Areas to be disturbed should be minimized where possible and practical. Vegetative buffers will be maintained around waterbodies and sensitive areas.

3. Drainage ditches will be stabilized (e.g., lining with vegetation or rock, terracing, interceptor swales, installation of rock check dams) to reduce soil erosion. Any such measures will be properly maintained following installation.

4. Excavation, embankment construction and grading in the vicinity of stream crossings will be done in a manner that avoids or reduces erosion and sedimentation of watercourses or bodies.

5. All areas of exposed erodible soil will be stabilized by back-blading, grading and/or compacting to meet engineered slope requirements. Roughening slopes with horizontal depressions will also reduce the risk of erosion.

6. Where there is potential for erosion along exposed erodible slopes and a natural vegetation buffer of less than 20 m from the high water mark exists between erodible areas and water bodies, a settling pond or silt fence will be constructed to control silt runoff. Engineering requirements will vary depending on the locations of the silt fence and will take into consideration such factors as drainage/surface area of exposed soil and time of year that the silt fences are used.

Silt fences are not the only tool to control erosion and if installed improperly they are useless. See Appendix D section on erosion control (also consult Alberta Transportation Erosion Control Manual link provided in Appendix D)

7. If an environmental inspection reveals that silt is entering a watercourse, immediate actions need to be implemented. The necessary or appropriate measures will be determined in the field with the support of the environment team.
   Erosion control measures should anticipated before you start with the erosion plan. If there are siltation problems the plan will be reviewed and amended. All necessary measures will be determined in the field with the support of the environment team.
8. All stream bank sections that contain loose or erodible materials will be stabilized.
9. All areas will be monitored for erosion and appropriate repair action taken as necessary.
10. Existing or new siltation control structures used in this work will be monitored regularly by the Environmental Advisors for excessive accumulation of sediment. Accumulated sediment from control structures will be removed as necessary to ensure the effectiveness of the systems.
11. Remove excess water from siltation control systems prior to excavation of sediment. Trucks will be equipped with liners when required to prevent loss of wet sediment during transport.

5. Buffer Zones

Environmental Concerns

Buffer zones are vegetated boundaries maintained along water bodies. Without adequate buffer zone vegetation, streams, ponds and lakes can become laden with silt from run-off. Vegetation also provides cover for fish and habitat for various mammals and birds. Streamside vegetation may:

- provide shade thereby helping to regulate water temperature;
- provide stream bank stability thereby preventing erosion and subsequent introduction of sediment into the water;
- intercept precipitation, and through evaporation and transpiration, regulate the amount of water discharged into the stream;
- provide insect drop which is a food source for fish;
- provide habitat for birds and mammals; and
- introduce leaf litter and decaying vegetative matter into the stream which provides food for aquatic organisms on which fish feed.

Environmental Protection Procedures

- A minimum buffer zone of 100 m of undisturbed natural vegetation is to be maintained and clearly marked between work areas and all water bodies and sensitive areas. (Where buffer zones
- If this buffer zone, as prescribed in Table 2 below, cannot be maintained, the buffer requirement will be discussed and determined in consultation with the Environmental Advisor.

Any work within 15 m of a water body will require a permit under the Water Resources Act.

6. Sediment control structures are to be placed outside of the buffer requirements, and should be part of the erosion /sediment control plan
7. Bulk fuel storage will maintain a minimum buffer zone of 100 m from high water marks of waterbodies and ecologically sensitive areas and provincial and municipal protected watersheds (see section 11 Storage, Handling and Transfer of Fuel and Other Hazardous Material)

Table 2 Water Body Width of Buffer Zone

Water body	Buffer Zone
Intake pond/lake/reservoir	minimum of 150 m
River intake	minimum of 150 m for 1 km upstream and 100 m downstream
Main river channel	minimum of 75 m
Major tributaries/lakes/ponds	minimum of 50 m
Other water bodies	minimum of 30 m

6. Drilling

Environmental Concerns

Drilling for both development and production has the potential to impact the environment. The environmental concerns associated with drilling are:

- disposal of drilling fluids and cuttings;
- generation of dust & noise;
- destruction of historic resources;
- impacts on air quality, and
- impacts to aquatic ecosystems.

No person shall deposit or permit deposition of oil, oil wastes or any other substance harmful to fish or migratory birds in any waters or areas frequented by fish or migratory birds. It is a reportable offense to the authorities.

Environmental Protection Procedures

1. Due to the nature of drilling activities (quicksnaps, couplings) oil drops and leaks may occur. The area shall be cleaned up at every opportunity and all rigs shall be equipped with spill kits and be well maintained (In the event of a hose rupture or loss of hydraulic fluid, the sites Environmental Contingency Plan shall be followed-alert your supervisor)
2. Disposal of all drilling materials and associated solid wastes shall be undertaken in accordance with the procedures
3. Fuel shall be stored, handled and transported according to refer to proper section. Water applications shall be used to control dust.

Water-based drilling dust suppression systems may require anti-freeze in winter months, which shall be approved by the NL government.

The use of water for dust control or coring/wash boring shall be undertaken in a manner that ensures return water does not enter watercourses.

4. Drilling equipment shall have muffled exhaust to minimize noise.

7. Blasting

Environmental Concerns

Blasting will be undertaken in association with a number of the work elements. The principal environmental concerns associated with blasting on land include:

- Destruction of vegetation outside the pit and development area limits;
- Noise disturbances to wildlife;
- Effects to fish and aquatic animals;
- Disturbance of historical/archeological resources;
- Dust and fume generation;
- Water quality; and
- Potential introduction of silt and ammonia into the water column.

Environmental Protection Procedures

1. The immediate area of the site will be surveyed within three hours prior to a blast to ensure no members of the public are within the blast area.

2. All blasting will be done in compliance with the appropriate permits and approvals. All blasters will have a Blasters Safety Certificate. All magazines for explosive storage have the appropriate approvals.

The handling, transportation, storage and use of explosives and all other hazardous materials will be conducted in compliance with all applicable laws, regulations, and orders of the Newfoundland and Labrador *Fire Protection Services Act and* Natural Resources Canada *Explosives Act.*

3. Blasting pattern and procedures will be used which reduce shock or instantaneous peak noise levels.

4. Time delay blasting cycles will be used if necessary, to control the scatter of blasted material.

5. Blasting will not occur in the vicinity of fuel storage facilities.

6. Use of explosives will be restricted to authorized personnel who have been trained in their use.

7. There are separate magazines on site; a magazine for explosives and a smaller cap magazine for dynamite blasting caps.

8. All personnel must comply with the safe blasting procedures established by IOC as described in the Mine Orientation training course.

Historical resources and features will not be disturbed during blasting. Any historic discoveries will advise your supervisor immediately who will ensure that the environmental advisor reports that an historical resource has been found and alert to the relevant government agencies.

On Land

Wildlife: The immediate area of the site will be surveyed within three hours prior to a blast and operations will be curtailed if sensitive animals (e.g. black bears, caribou, moose) are observed within 100 m. Any other animal sightings will be reported to the Environmental Advisor. Blasting may be delayed in such circumstances until wildlife have been allowed to leave the area.

In Close Proximity to Water

In order to reduce the potential effect of blasting operations on the aquatic environment, blasting within 150 m of a water body will only occur in situations where such operations are deemed necessary and will comply with the following:

1. When blasting operations are within 200 m of a waterbody occupied by fish, the operations shall be carried out in accordance with DFO guidelines.
2. Drilling and blasting activities will be done in a manner that ensures that the magnitude of explosions is limited to that which is absolutely necessary.
3. Three hours prior to any blasting within 150 m of a water body, a visual reconnaissance of the area will be undertaken to ensure that there are no waterfowl or aquatic furbearers present.
4. Blasting will be delayed in such circumstances until they have been allowed to leave the area of their own accord. Under no circumstances will noise or other devices be used to harass or otherwise disturb these animals to encourage them to leave the area of the proposed blast.

8. Watercourse Crossings

Environmental Concerns

The project will involve upgrading of existing roads and on-site trails.

The environmental concerns associated with stream crossings and culvert installations include:

- erosion/siltation;
- disturbance of waterfowl;
- potential mortality of fish, and
- loss of fish habitat.

All watercourses and water bodies will be examined on a site-specific basis in order to evaluate the specific mitigations required.

When fish are, or potentially present at a proposed watercourse crossing, and habitat assessment shall be conducted by a qualified Environmental Advisor. Information such as photos, the nature (water depth, flow, and substrate type) and quantity of fish habitat at the site will be noted and reported. The type of crossing (fording, culvert, or bridge) and design will also be noted by the monitor for the purpose of establishing regulatory requirements.
Approval is required by the Water Resource Division of the DMAE.

Also, an evaluation of soil erosion potential will be conducted at each of the stream crossings. This assessment of erosion risk will assist in the development of specific erosion stabilization methods and effective sedimentation control practices on a site-specific basis.

Proposed crossing of a watercourse visible on a 1:50,000 topographic map shall require a permit from NL MAE. Appropriate protection is still required for streams greater than 1.0 m in width (at its narrowest point from the high water mark) not found on the 1:50,000 topographic map (from NL Environmental Protection Guidelines for Ecologically Based Forest Resource Management). The Environment Department should be consulted on all crossings to ensure proper permits and mitigations are established prior to conducting any work. (check buffer zones in section 5)

The NL Forest Service on alienated Crown land and the appropriate company on leased, licenced, private or charter land will provide the operator with a map indicating the harvesting area and no-cut treed buffer zones, and will ensure that the operator is familiar with the boundaries.

No forestry activities are permitted within the buffer zones:

Environmental Protection Procedures

Stream crossings will be constructed in compliance with the required Culvert Approval and Letters of Advice from the NL MAE, and DFO, respectively. IOC will consult with DFO to develop mitigation strategies to reduce effects of in-stream work during sensitive periods.

The following measures will be implemented to reduce the potential effects of stream crossings:

1. If fish are present at a stream crossing, construction activities between September 1 and June 15 will be undertaken under the direct supervision of the Environmental Advisor.

2. Work will be performed in such a way as to ensure deleterious substances including, but not limited to, materials such as sediment, fuel and oil do not enter watercourses and water bodies.

3. The number of water crossings will be minimized.

4. Procedures for buffer zones that are outlined in Section 5 will be followed.

Culverts

In those locations where culverts are required, application will be made to the NL MEA, and DFO. The culverts used will be sized to handle a minimum
1 in 10 year return period flood (check with engineering) and will be constructed in accordance with all provincial requirements.

A **culvert will not be installed before site specific information is gathered before the work begins,** information such as localized stream gradient, fish habitat type and species present have been evaluated.

Culverts are to be installed according to DFO guidelines which are listed below:

Maintenance (debris removal)

- Gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment and fish stranding can be avoided;
- Time work in water to respect timing windows;
- Relevant measures to avoid harm are followed.

Repairs

- No temporary or permanent increase in existing footprint below the high water mark;
- No new temporary or permanent fill placed below the high water mark;
- Relevant measures to avoid harm are followed;
- Channel realignment is not required;
- No narrowing of the channel;
- Any obstruction to fish passage will respect timing windows;
- Provides for fish passage;
- Work can be done in isolation of flowing water;
- Species at Risk where SARA-listed aquatic species occur, no culvert repairs will take place.

Removal

- No temporary or permanent increase in existing footprint below the high water mark;
- Relevant measures to avoid harm are followed;
- Channel realignment is not required;
- No narrowing of the channel;
- Any obstruction to fish passage will respect timing windows;
- Work can be done in isolation of flowing water;
- The banks and bed of the waterbody are restored to replicate conditions upstream and downstream of the work area and provide for fish passage

- Species at Risk (SARA)

1. where critical habitat or residences of SARA-listed aquatic species occur, or endangered or threatened shellfish occur, no dredging or excavation of the

waterbody will take place except where exempted in the recovery strategy for that species.

1. where SARA-listed aquatic species, their residences or critical habitat occur:

    - No permanent increase in existing footprint above the high water mark if the riparian area is identified as part of the critical habitat of an aquatic listed species at risk
    - No removal of riparian vegetation if the riparian area is identified as part of the critical habitat of an aquatic listed species at risk

(Taken from DFO Working near water June 2018 http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html)

In addition, the following measures will also be implemented:

1. Install culvert(s) in accordance with **best** engineering and environmental practices.

2. Unless otherwise indicated, all work should take place in dry conditions, either by the use of cofferdams or by diverting the stream.

3. In the event of fish being present, installation of cylindrical culverts shall be counter sunk such that the culvert bottom is 15% the diameter below the streambed (for culverts greater than 2000 mm in diameter), and 300 mm for culverts up to 2000 mm in diameter.

4. In multiple (gang) culvert installations, install one culvert at an elevation lower than the others.

5. Ensure that the natural low flow regime of the watercourse is not altered.

6. Use riprap outlets and inlets to prevent erosion of fill slopes.

7. Use culverts of sufficient length to extend a short distance (minimum of 300 mm) beyond the toe of the fill material.

8. Use backfilling material which is of a texture that shall support the culvert and limit seepage and subsequent washing out.

9. Align culverts such that the original direction of stream flow is not significantly altered.

10. Remove fill and construction debris from the culvert area to a location above the peak flow level to prevent its entry into the stream.

11. Confine construction activity to the immediate area of the culvert.

12. Fill material shall not be removed from streambeds or banks except when installing a culvert when removal of material is necessary to ensure a flat foundation.

13. Limit and restrict the use of heavy equipment in and near watercourses; an excavator will be used from shore rather than a bulldozer in the watercourse. Where it is absolutely necessary to do so, in-stream work will be performed by rubber tired vehicles only, and will only be done in compliance with approvals from the NL MEA, and DFO, respectively.

14. As required, cofferdams of non-erodible material shall be used to separate work areas from the watercourse when excavating for culverts and footings.

    Cofferdams shall be removed upon completion of construction and the streambed returned as closely as possible to its original condition.

Fording

If a place where a river or other body of water is shallow enough to be crossed by wading, fording of watercourses will be avoided as much as possible and where necessary will be limited to situations of a single round trip (i.e., multiple use of a site will be facilitated by a temporary bridge). When fording any watercourse, all relevant guidelines/regulations will be adhered to including the NL MAE Environmental Guidelines for Fording.

The following will be applied to any fording activity:

1. In the unlikely event that fording is required in fish-bearing water, areas of spawning habitat will be avoided.

2. Crossings shall be restricted to a single location and crossings made at right angles to the watercourse.

3. Equipment activity within the watercourse shall be reduced by limiting the number of crossings.

4. Ensure that all equipment is mechanically sound to avoid leaks of oil, gasoline and hydraulic fluids.

5. Stabilize the entire fording area using vegetation mats, corduroy roads or coarse material (125 mm diameter or greater) when such material is available from a reasonably close location within the right-of-way, and the ford area is not natural bedrock, or is easily disturbed by fording. When the substrate of the ford area is not subject to easy disturbance by fording, or coarse material is not easily available within the right-of-way, then fording under existing substrate conditions may occur under the direction of the Environmental Advisors.

6. Ensure that fording activities are halted during high flow periods.

7. Stabilize all bank sections which contain loose or erodible materials. If banks must be sloped for stabilization, no material shall be deposited within the watercourse. Sloping shall be accomplished by back-blading and the material removed shall be deposited above the high water mark of the watercourse.

8. Fording activities shall not decrease the depth of the watercourses to less than 20 cm. Where the existing depth is less than 20 cm, that depth shall be maintained.

9. All fording activities will comply with the required approvals from the NL MEA and DFO.

9. Dewatering Work and Site Drainage

Please note an environmental assessment of the water body at the developing site is required prior to discharging.

Environmental Concerns

The major concerns associated with site dewatering and the drainage of any water body at a developing site are potential siltation and direct fish mortality and/or habitat destruction for freshwater species.

Environmental Protection Procedures

1. Filtration or other erosion control best management practices, such as settling ponds, silt fences and dykes, will be used to remove silt from, and reduce the turbidity of water pumped from work areas before discharging.

2. Site water may be discharged to vegetated work areas to further reduce any potential effects on watercourses, provided that this not create new erosion problems.

3. The area of settling ponds will be gauged to accommodate the anticipated volume of discharged water.

4. Discharged water needs to follow natural surface drainage patterns as much as possible.

   Perform water treatment and quality monitoring prior to discharge to the environment, in compliance with applicable federal and provincial regulatory requirements. Consult environment department for proper treatment / monitoring protocols.

5. **For fish relocation:** Use methods for live capture of fish that are established and recognized in NL and documented in a Fish Removal Plan (to be developed on case by case basis).

10. Equipment Use and Maintenance

Environmental Concerns

A variety of vehicles and heavy equipment will be used throughout the project, as well as in accompanying support and supply facilities and activities. Environmental concerns associated with operating and using such equipment includes noise, air emissions, accidental spills, artificial lighting and leaks that may contaminate on-site water bodies or sensitive receptors.

Environmental Protection Procedure

1. Pre-use inspections are to be completed on all equipment. All equipment shall be regularly maintained and inspected. If problems are identified the equipment will be serviced to prevent the risk of a spill/leak.

Any leaking equipment brought on site will be refused entry to the work area and put as non-conformance to company policies.

2. Construction equipment will be on good operating condition, free of leaks and with all appropriate emission filters.

3. All pieces of equipment will have exhaust systems that are regularly inspected and properly functioning to manufacturers specifications.

4. Spill kits will be strategically located on site, clearly labelled and regularly maintained.

5. Drip pans will be placed and maintained underneath pumps or any other equipment which can leak

6. Hoses and connections on equipment will be inspected routinely for leaks and drips, and will be disposed of immediately in a proper container free of leaks not on the ground.

7. Equipment maintenance and fuelling activities will be performed at sites designated by the Environmental Advisor and in compliance with applicable regulations.

8. All maintenance on the mobile fleet (e.g., haul trucks) will be performed at the Mine Maintenance Facility or at a designated area.

9. Only minor repairs and maintenance (e.g., lubrication) of 'non-mobile' equipment, such as the shovel or drilling equipment, will be performed on-site. All major repairs are to be performed at the Mine Maintenance Facility.

10. All leaks will be repaired and reported immediately to Security, who will notify the Environmental Department.

11. All fuel and other hazardous materials will be handled according to the procedures in Section 11.

12. Vehicles and equipment will be stored at designated areas a minimum of 100 m from water bodies when not in use.

13. All equipment (e.g. diesel generator, etc.) shall meet requirements of the NL Air Pollution Control Regulations under the Environmental Protection Act, as required.

11. Storage, Handling and Transfer of Fuel and Other Hazardous Material

Typical hazardous substances that may be used on site include, but are not necessarily limited to:

- chlorinated and non-chlorinated solvents (*e.g.*, cleaner-degreasers);
- flammable gases (*e.g.*, acetylene);
- waste petroleum products (*e.g.*, used engine oil);
- corrosives (*e.g.*, battery acid);
- glycol (*e.g.*, antifreeze);
- ozone-depleting gases (*e.g.*, freon); and
- petroleum, oil and lubricants

Environmental Concerns

The primary concern with using hazardous substances is that there may be an uncontrolled release to the environment through spillage, and subsequent adverse effects on terrestrial and aquatic habitat and species, soil, groundwater quality, and human health and safety.

Environmental Protection Procedures

1. The *Workplace Hazardous Materials Information System (WHMIS) Regulations* under the *Occupational Health and Safety Act* will apply to all handling and storage of hazardous materials. All relevant current Safety Data Sheets (SDS) will be readily available on site.

   All necessary precautions will be taken to prevent and reduce the spillage, misplacement or loss of fuels and other hazardous materials. In the event of a spill on-land or in the freshwater environment, contact your Supervisor who will then call Security (709) 944-8400, ext. 8320.

2. Satellite fuel storage tanks (and associated fuelling equipment) will largely be replaced with a mobile fuelling truck, which will be responsible for re-fuelling mobile equipment. Personnel transferring fuel from tank trucks to mobile units will inspect transfer equipment prior to product transfer and will be in attendance for the duration of refuelling operations.

3. All fuel storage systems will be registered and comply with the *Storage and Handling of Gasoline and Associated Products (GAP) Regulations*. Verification of the storage tank approval will be retained for IOC.

4. Only persons who are qualified and trained in handling these materials as stated in the manufacturer's instructions and government laws and regulations will handle fuel and other hazardous materials.

5. Fuel and other hazardous materials will be stored at least 100 m from any surface water.

6. Handling and fuelling procedures will comply with the *GAP Regulations* and any additional requirements put forth by the NL MAE in order to limit potential contamination of soil or water.

7. Appropriate fuel spill control and clean up material must be available during fueling activities.

8. Any above-ground fuel container, with the exception of those exempted under the *GAP Regulations*, will be surrounded by an impervious dyke of sufficient height (minimum height 0.6 m) to contain:

    - where a dyked area contains only one storage tank, the dyked area shall retain not less than 110% of the capacity of the tank

    - where a dyked area contains more than one storage tank, the dyked area shall retain not less than 110% of the capacity of the largest tank or 100% of the capacity of the largest tank plus 10% of the aggregate capacity of all the other tanks whichever is greater. Otherwise approved self-dyked storage tanks will be used where required.

    - all dykes of earthwork construction will have a flat top not less than 0.6 m wide, and be constructed and maintained to be liquid tight to a permeability of 25 $L/m^2/day$. The distance between a storage tank shell and the centre line of a dyke will be at least one half the tank height.

    drain dykes often with vac truck or other means before they overflow

9. Fuel storage areas and non-portable transfer lines will be clearly marked or barricaded to ensure that they are not damaged by moving vehicles. The markers will be visible under

all weather conditions. Barriers will be constructed in compliance with the *GAP Regulations*.

10. Waste oils, lubricants, and other used oil will be retained in a tank or closed container, and disposed of in accordance with the *Waste Material Disposal Act and the Used Oil Control Regulations.*

11. Any soil contaminated by small leaks of oil or grease from equipment will be disposed of according to Pollution and Prevention Act.

12. All storage tank systems will be inspected on a regular basis by the Environmental Advisor as per Section 18 of the *GAP Regulations*. This involves, but is not limited to, gauging or dipping, reconciliation of records, and the proper maintenance of reconciliation records for a period of two years.

13. Contracted fuel suppliers will, before transporting or positioning fuel or oil, have on file at IOC a copy of their fuel and hazardous material spills contingency plan which is required under *GAP Regulations* and which is acceptable to IOC. The fuel and hazardous material spills contingency plan for IOC is provided in Section 5.c

14. Transportation of hazardous and dangerous materials shall be conducted in accordance with provincial, territorial and federal transportation regulations. Transportation documents shall be retained in a retrievable filing system and stored for the duration of the undertaking.

15. Smoking is prohibited within 10 m of a fuel storage area.

16. Fuelling or servicing of mobile equipment is to be conducted in designated areas.

17. Drum storage areas will not be located within 100 m of a water body.

18. Drums containing hydrocarbon or other hazardous materials will be transported, stored, handled and disposed of such that spillage or leakage does not occur.

19. Drums will be tightly sealed against corrosion and rust and surrounded by an impermeable barrier in a dry building with an impermeable floor. The location of drum storage areas must be approved by IOC.

20. Small quantities of hazardous material (drums, cans and other containers under 20 L volume) will be stored in a secure location protected from weather and freezing, as well as vehicular traffic.

21. Where hazardous materials are to be stored outdoors, a designated area will be established, graded and fitted with an impermeable membrane covered with local soil and surrounded by an earth berm.

22. Within thirty (30) days of decommissioning of a storage tank system, the system will be emptied of all products, the tank and associated piping will be removed (including any contaminated soil) and the area will be cleaned of contamination ?the tank marked empty and the site restored.

23. Decommissioning of any temporary storage tank system will be conducted according to the *Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products* (CCME 1994).

24. Bulk fuel storage facilities will be dipped on a weekly basis in order to accurately gauge fuel consumption. These consumption rates will allow for visually undetectable sources of contamination to be identified and corrected. Records of these dips shall be made available upon request.

25. If required, a hazardous waste storage area will be constructed in compliance with all applicable federal and provincial legislation.

26. All petroleum and chemicals must be stored on a secondary containment.

12. Solid Waste Disposal

Environmental Concerns

Solid waste (e.g., domestic and industrial wastes, paper, cardboard and wood), if not properly controlled and disposed of, will be unsightly and could cause human safety and health concerns. It could also attract wildlife leading to the potential for human-wildlife conflicts.

Environmental Protection Procedures

1. All solid waste will be handled according to the provincial *Waste Material Disposal Act*.

2. Solid waste produced by site personnel and operations will be regularly collected and disposed of at the IOC Landfill (refer to IOC Landfill Operation and Maintenance procedure)

3. Waste accumulated on site prior to disposal will be confined so that it does not pose an environmental or health hazard.

4. Work areas will be kept clear of waste and litter to reduce the potential for attracting wildlife and reducing potential interactions with wildlife (see procedures in Section 5.d for handling wildlife encounters).

5. Any waste that may attract animals (i.e., food) will be stored in covered, wildlife-proof containers.

****IT IS STRICKLY FORBIDDEN TO FEED OR ENTICE ANY WILDLIFE****

6. Burning of waste is not permitted.

7. All hazardous wastes generated, as a result of the treatment alternatives, will be handled according to the procedures for handling fuel and hazardous materials (Section 11).

13. Mineral Waste Rock and Overburden

Environmental Concerns

The principal concern associated with the placement of waste mineral rock and overburden is siltation of the aquatic environment, pertaining to water quality and substrate, as well as loss of habitat and displacement of wildlife. Potential for dust generation from exposed soil/rock may also be a concern.

Environmental Protection Procedures

1. Waste rock and overburden storage areas will be located at least 100 meters from a water body.

2. Overburden and separate organic stockpile locations and volumes will be recorded from salvage to placement.

3. Structures such as silt fences will be used as a means of sediment control, and collection ditches and settling ponds will be used to manage surface runoff and any groundwater flows.

4. Waste rock and overburden piles will be sloped and bermed to prevent pooling of surface water.

5. Waste rock and overburden storage areas will be secured as appropriate and marked with signs to ensure the safety of employees and the public.

6. Stabilize stockpiles with vegetative cover or temporary covers of mulch or similar until vegetative cover can be established in order to reduce erosion and dust generation.

7. Implement progressive rehabilitation measures when areas are available.

14. Vehicle Traffic

Environmental Concerns

Vehicular traffic can result in interactions with wildlife, fugitive dust emissions, noise and historical resources. IOC is committed to the proper operation and maintenance of its vehicles to reduce environmental effects.

Environmental Protection Procedures

1. All vehicle and equipment use, including use of all-terrain vehicles, will be restricted to designated routes within and between work, marshalling, maintenance and storage areas.

2. All vehicles and equipment will be properly maintained to meet emissions standards.

3. Travel in areas outside designated work areas will not be permitted.

4. All vehicles and equipment will yield to wildlife (see procedures in Section 5.d. for handling wildlife encounters).

5. Chasing and/or harassing wildlife with vehicles and equipment will not be permitted.

6. Maintaining and refuelling vehicles will be restricted to designated areas (See Section 10).

7. Heavy equipment (e.g., dump trucks and front-end loaders) will only be used in work areas.

    a) Site roads will be monitored for signs of erosion and appropriate action will be taken to repair roads, when necessary.

    b) All personnel driving in the pit are required to have a valid pit permit. Personnel must comply with the requirements dictated in the Pit Permit training course.

15. Dust Control

Environmental Concern

The environmental concerns associated with dust include human health effects and potential effects on aquatic ecosystems and vegetation.

Environmental Protection Procedures

1. Plan activities to minimize dust emissions and implement dust control procedures.

2. Dust from operating activities will be controlled using water. In the event of excessive dust, water will be applied to travel and work surfaces. Waste oil will not be used for dust control, but other agents such as calcium chloride may be used with the approval of the appropriate regulatory agencies.

3. Dust suppression on site roads will be done by watering the roads as part of IOC's ongoing fugitive dust reduction measures.

4. Dust will be controlled by retaining trees and shrubs to act as windbreaks and natural erosion prevention. The amount of vegetation to be cleared will be minimized.

5. Confinement of vehicular traffic to established access routes and lower speed limits will be implemented to reduce dust generation.

6. Re-vegetation of inactive exposed areas to be completed as directed by the Environment Department.

7. Use damp feed when crushing rock for road aggregate.

8. Drills must utilize appropriate dust suppression equipment to prevent dust generation.

16. Hazardous Waste Disposal

Environmental Concerns

The primary concern with disposing of hazardous substances is that there may be an uncontrolled release to the environment through leakage or accidental spillage, and subsequent adverse effects on terrestrial and aquatic habitat and species, soil, groundwater quality, and human health and safety.

Environmental Protection Procedures

1. All hazardous waste will be handled according to the provincial *Waste Material Disposal Act*. Waste classified as “hazardous” or “special” that cannot be disposed of in regular landfill sites will be sent for disposal at an approved hazardous waste management company.

2. All necessary precautions will be taken to prevent and reduce the spillage, misplacement or loss of fuels and other hazardous materials.

3. Hazardous waste materials will only be handled by persons who are qualified and trained in handling these materials as stipulated in government laws and regulations.

4. Waste accumulated on site prior to disposal will be confined so that it does not pose an environmental or health hazard.

5. Waste material will not be disposed of on-site or in a body of water.

6. Burning of waste is not permitted.

7. Where hazardous waste materials are to be stored outdoors, a designated area will be established, graded and fitted with an impermeable membrane covered with local soil and surrounded by an earth berm.

8. Waste oils, lubricants, and other used oil will be retained in a tank or closed container, and disposed of in accordance with the *Waste Material Disposal Act*.

9. Any soil contaminated by small leaks of oil or grease from equipment will be disposed of according to the *Waste Material Disposal Act*.

10. All hazardous wastes generated, as a result of the treatment alternatives, will be handled according to the procedures for handling fuel and hazardous materials (Section 11).

17. Road Maintenance

Environmental Concern

Routine grading and maintenance of the haulage and development roads may result in material entering roadside ditches, diversions and culvert areas.

Environmental Protection Procedures

1. All grader operators and loader operators involved in road maintenance are to be informed of proper road maintenance techniques.

2. All culverts crossing roadways must be clearly marked. Grading or pushing material in these areas is strictly forbidden.

3. The diversion channel parallel to the main haulage road must also be clearly marked to prevent accidental in-filling from grading operations.

18. Trenching

Environmental Concerns

Environmental concerns associated with trenching include potential runoff of sediment-laden water, which could affect freshwater fish habitat and water quality, lower the quality of water and destroy historic resources.

Environmental Protection Procedures

1. Topsoil and excavated overburden will be stored in stockpiles for later use during rehabilitation.

2. Any unsuitable material will be disposed of in a disposal area approved by the Environmental Advisor.

3. Excavators and backhoes should be used to excavate trenches in areas around overburden and waste rock stockpiles to minimize land disturbance. The use of bulldozers should be avoided.

4. If required, dewatering of trenches will make use of measures to reduce and control the release of sediment laden water with filtration through erosion control devices, settling ponds, straw bales, geotextiles or other devices.

5. When feasible, trenches should be backfilled and the finished grade is to be level with the surrounding surface.

6. If a historic/archeological site is encountered, all work must cease in the area and the Environment Department will consult with the relevant regulatory agencies to determine buffer requirements.

19. Surveying

Environmental Concerns

Surveying activities may disturb wildlife species, vegetation and historic resources.

Environmental Protection Procedures

1. Width of survey lines will be limited to that which is necessary for line of sight and unobstructed passage.

2. Whenever possible, cutting lines to the boundary between trees and open areas will be avoided.

3. Cutting of survey lines will be kept to a minimum. Where possible, alternate areas not requiring cut lines will be used.

4. All trees not exactly on transit lines shall be left standing.

5. When surveying the development area limit, areas that will be cleared require a modified adherence to the above, except trees, shrubs and areas to be saved or left natural as noted on the plans or marked in the field.

6. No attempt to harass or disturb wildlife will be made by any person (refer to Section 5.d.).

7. Vehicles will yield the right-of-way to wildlife

Traversing

1. Access by heavy equipment to sensitive areas such as wetlands will only be through established right-of-ways.

2. All-terrain vehicles (ATVs) will not be allowed off the right-of-way except as approved by the on site manager/supervisor. The use of ATVs will be restricted to designated trails, thus minimizing ground disturbance. ATV use will comply with the Motorized Snow Mobile and All-Terrain Vehicle Regulations, 1996 under the Motorized Snow Mobile and All-Terrain Vehicle Act and the Environmental Guidelines for Stream Crossings by All-Terrain Vehicles issued by Municipal Affairs & Environment.

3. No motorized vehicles will enter the areas designated as sensitive without notification and approval of the Site Manager, for establishing targets, permanent benchmarks and transponder locations.

4. In normal ground conditions a 15 mm x 400 mm long rebar is driven approximately 350mm into the surface with an 8-lb sledgehammer. When bedrock or a large boulder is encountered less than 300 mm below the ground surface, a 15 mm x 150 mm long rebar is cemented in a in a hole drilled in the rock. The rebar will be set into the rock a minimum distance of 80 mm.

20. Public Traffic and Activity

Environmental Concerns

Development activities, such as quarry mining, exploration, surveying, drilling and blasting, or activities that involve the clearing or removal of the existing land, may affect the public (ie. private roads, private cabins, etc) in and around the developing areas.

Environmental Protection Procedures

- all operating activities will comply with federal and provincial regulations;
- public notice will identify the schedule and nature of activities and to recommend precautions; and
- development Area boundaries will be clearly marked.

Section 5 Contingency Plans

Contingency plans to address accidents and unplanned situations have been developed, and will be modified as required throughout the project. Notwithstanding the existence of these contingency plans, a policy to implement preventative measures as the first line of defence against the possibility of accidents will be adopted.

Refer to the latest plans on Mine to Port website

a. Culvert Failure

The two main causes for failure of a properly installed culvert are a blockage or exceptionally high discharges. Regular inspection and maintenance will avoid blockages, by debris or ice. Failure due to exceptionally high flows cannot be avoided once the culvert is installed and sustained high flows will often limit the ability to mitigate a failure.

Environmental Concerns

The environmental effects of culvert failure are usually a massive release of suspended fine sediment and larger substrate material into the stream. The suspended and finer materials can be transported for considerable distances downstream where fish habitat and fish eggs may be covered and smothered while fish fry and food organisms may be smothered, disturbed, or displaced from their habitat. Introduced coarse substrate may fill pools, disturb spawning gravel, and change or deflect flows, which may lead to additional erosion downstream.

Preventative

1. All culvert installation will comply with federal and provincial regulations (Section 6.11, Watercourse Crossings). All necessary permits and authorization will be obtained for culvert installation.

2. Culverts that are installed will be sized appropriately to reduce the risk of washout due to high flows.

3. Culverts will be inspected regularly and measures will be taken to ensure stability of the installation, remove debris, and prevent ice blockage.

Response Measures

1. There is often little that can safely be done to address culvert failure from high flow once the failure begins. However, high flows are often episodic and short-lived, so it is appropriate to prepare for remedial measures that can be done when flow subsides.

2. Following a culvert failure, measures will be taken to stabilize the roadbed and stream bank to reduce the risk of additional erosion.

3. As soon as high flow subsides and it is safe to do so, large debris such as concrete, culvert pipe or newly fallen trees will be removed from the stream and placed where there is no risk of reintroduction into the stream.

4. Provincial and federal authorities are to be notified (Section 7.0 Contact List) and further remedial work in the stream will only proceed following consultation with DFO.

5. All necessary provincial and federal permits and authorizations will be obtained prior to conducting any additional in-stream work to restore the stream channel or fish habitat.

b. Road Washout

Road washout can occur due to flooding, poorly installed culverts, poorly installed and maintained ditches, or failure of the shoulder or roadbed.

Environmental Concerns

The environmental effects of road washout are the same as for culvert failure. This usually includes a massive release of suspended fine sediment and larger substrate material into the stream. The suspended and finer materials can be transported for considerable distances downstream where fish habitat and fish eggs may be covered and smothered while fish fry and food organisms may be smothered, disturbed, or displaced from their habitat. Introduced coarse substrate may fill pools, disturb spawning gravel, and change or deflect flows, which may lead to additional erosion downstream.

Prevention

Ditching and site drainage will be inspected regularly and measures will be taken to ensure stability of the installations, remove debris, and prevent ice blockage.

Response Measures

1. There is often little that can safely be done to address a road washout from high flow once the failure begins. However, high flows are often episodic and short-lived, so it is appropriate to prepare for remedial measures that can be taken when flow subsides.

2. Following a road washout, measures will be taken to stabilize the roadbed and adjacent stream banks to reduce the risk of additional erosion.

3. As soon as high flow subsides and it is safe to do so, large debris such as guard-rails, concrete footings, culvert pipe or newly fallen trees will be removed from the stream and placed where there is no risk of reintroduction into the stream.

4. Provincial and federal authorities are to be notified (Section 7 Contact List) and further remedial work in the stream will only proceed following consultation with DFO.

5. All necessary provincial and federal permits and authorizations will be obtained prior to conducting any additional instream work to restore the stream channel or fish habitat.

c. Fuel and Hazardous Material Spills

Environmental Concerns

Fuel and hazardous materials can be damaging to vegetation, soil, surface water, ground water, wildlife, aquatic organisms, historic resources and human health and safety.

Response Measures

1. All spills are to be immediately reported to Security, who will contact the Coast Guard see contingency plans

2. Spills are to be immediately confined and cleaned up as per CR-E-E-PRO Spill Response & Reporting.

3. All contaminated material is to be transported to the IOC Waste Transfer Building for off-site disposal as per the Waste Material Disposal Act.

d. Wildlife Encounters

Environmental Concerns

Wildlife encounters pose a risk for stress or injury to both the wildlife and site personnel. Control measures and environmental protection procedures have been put in place to reduce this risk to wildlife and humans. As a protection measure, hunting, trapping or fishing by project personnel is not permitted at the site.

Prevention

The following procedures are to be implemented in order to prevent wildlife encounters:

a) Site and working areas will be kept clean of food scraps and garbage.

b) Waste will be collected for disposal in wildlife/bear-resistant containers. Waste will be transferred to the on-site landfill routinely as needed.

Response Measures

All project personnel will abide by the following rules in the case of wildlife encounters:

1. No attempt will be made by any person at the project site to chase, catch, divert, follow or otherwise harass wildlife by vehicle or on foot.

2. Equipment and vehicles will yield the right-of-way to wildlife.

3. No personal pets, domestic or wild, will be allowed on the site.

4. All personnel should be aware of the potential for encounters with wildlife (black bears, wolves, foxes, etc.) and instructed to immediately report all sightings to Security. At their discretion, the IOC Environmental Department will notify the Newfoundland and Labrador Department of Natural Resources (DNR).

5. When nuisance animals (e.g. black bear) are identified in the project area, the Environmental Advisor will be responsible for all subsequent actions. Responsive actions will also be the responsibility of the Environmental Advisor, who may consult with Department of Forest Resources and Agrifoods (DFRA). All actions must comply with Wildlife Division regulations and permits.

6. The Environmental Advisor will authorize the use of deterrent measures for wildlife.

7. All incidents that result in the displacement or killing of wildlife must be reported to Security.

8. Under provincial wildlife regulations, the displacement and release of any animal is the sole jurisdiction of NL DFRA and is to be undertaken only under appropriate supervision.

9. If the nest of any raptor or other bird is encountered during development, activity in the vicinity of the nest is to be curtailed until NL DFRA is contacted and appropriate mitigation is applied.

e. Forest Fires

Environmental Concerns

Activities related to the project could result in a fire, which could spread to the surrounding area. Such events could be damaging to vegetation and wildlife, as well as human health and safety.

Response Measures

IOC or the contractor will take all precautions necessary to prevent fire hazards when working at the site. These include but are not limited to:

1. Disposal of all flammable waste on a regular basis.

2. Smoking will be permitted in designated areas only.

3. IOC or the contractor making available, in proper operating condition, sufficient firefighting equipment to suit its labour force and fire hazards. Such equipment will comply with, and be maintained to the manufacturer's standards and personnel are to be trained in the use of such equipment.

4. In the event of a forest fire, IOC or the contractor will take immediate steps to contain or extinguish the fire.

5. IOC will appoint a supervisory staff member as On-Scene-Commander for the purpose of fighting any forest fires.

6. Fires shall be reported immediately to Security, the Wabush Forestry office (709) 282-6881 and ultimately to the Forest Management Unit office in Corner Brook (709) 637-2408. The following information will be provided:
    - name of the reporter and phone number;

- time of detection of the fire;
- size of the fire;
- location of the fire; and
- The police will also be notified immediately at (709) 944-7602.

f. Discovery of Historic Resources or Archeological Sites

Environmental Concerns

Historic resource material that is disturbed, destroyed or improperly removed from a site represents a cultural loss of information and history that could otherwise be handled and interpreted in an efficient and appropriate manner.

Response Measures

In case of a suspected discovery of historic or archeological sites, the following procedures shall apply:

1. Stop all work in the immediate area of the discovery until authorized personnel from IOC, having consulted with the Provincial Archaeologist, permit resumption of the work.

2. Report the find immediately to the Environmental Advisor.

3. The Environmental Advisor will report the find with the following information to the Provincial Archaeology Office, Historic Resources Division, Department of Tourism and Culture, St. John's, and comply with the instruction provided:

    i) nature of the find;

    ii) precise descriptive and map location and the time of the find;

    iii) nature of the activity resulting in the find;

    iv) identity of the person(s) making the find;

    v) present location of the material, if moved, and any protective measures initiated for the material and the site; and,

    vi) any extenuating circumstances.

Under the Historic Resources Act, RSNL 1990 c.H-4, all archeological sites and artefacts are the property of the Crown, and shall not be disturbed.

Mark the site's visible boundaries. Personnel will not move or remove any artifacts or associated material unless the integrity of the material is threatened.

Section 6 Environmental Protection Plan Control Revisions

Holders of controlled copies (i.e., those versions which contain all of the up-to-date procedures) of the EPP are included in Appendix B.

EPPs are revised as necessary to reflect site-specific environmental protection requirements, and allow updates as work progresses. All EPP holders may initiate revisions by forwarding proposed revisions to the Environmental Advisor. The following information will be provided on the Revision Request Form (see Appendix C) for all revision requests:

- section to be revised;
- nature of the revision;
- rationale for the revision (*i.e.,* environment/worker safety); and
- who submitted the revision request.

The Environmental Advisors will seek approval for revisions from the Manager Environment & Sustainable Development. When the Environmental Advisor receives approval for the revision request, details of the revision will be distributed to all EPP holders and will be documented in the Revision History Log (Appendix D). Each revision will be accompanied by:

- revision instructions;
- list of sections being superseded; and
- an updated Table of Contents indicating the current status of each section in the EPP.

When EPP Holders receive a revision, they will, within two working days:

- read the text of the revision;
- check the control sheet to ensure that all the listed pages have been received;
- remove and destroy the superseded pages from their copy of the EPP;
- insert the revised pages in the proper place in their copy of the EPP;
- page check the EPP, using the updated table of contents to ensure the EPP is complete and current;
- enter the revision number and date entered on the Revision Control Record;
- incorporate the revision into the area of responsibility, as appropriate; and
- ensure that their personnel are familiar with the revisions.

Section 7 Contact List

IRON ORE COMPANY OF CANADA

Patrick Lauziere

Manager Environment & Sustainable Development

Labrador City, Newfoundland

Tel: (418) 968-7400 ext 7513

Cell: (418) 960-4331

ENVIRONMENT & CLIMATE CHANGE CANADA – Canadian Coast Guard

Newfoundland and Labrador Regional Office

Tel: (709) 772-2083 or 1-800-563-9089

FISHERIES AND OCEANS CANADA

Happy Valley Goose Bay, NL

Tel. (709) 896-6150

Fax: (709) 896-8419

GOVERNMENT SERVICES CENTRE

Happy Valley-Goose Bay, Labrador

Tel. (709) 896-5428

Fax. (709) 896-4340

ROYAL NEWFOUNDLAND CONSTABULARY

417 Booth Street

Labrador City, NL

Tel: (709) 944-7602

DEPARTMENT OF NATURAL RESOURCES – FORESTRY SERVICES

District Office

Wabush, NL

Tel: (709) 282-6881

DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

Wildlife Division

General Enquiries

T: (709) 637-2025

Section 8 Reference Material

Canadian Council of Ministers of the Environment. 1994. Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products.

Department of Municipal Affairs and Environment. 1994. Water Resources Management Division. Chapter 3A. Environmental Guidelines for Stream Crossings by All-Terrain Vehicles.

Department of Municipal Affairs and Environment. RSN1990 C W-4 Waste Material Disposal Act.

Department of Municipal Affairs and Environment. 2003. Storage and Handling of Gasoline and Associated Products Regulations.

Department of Municipal Affairs and Environment. RSNL 1990 c.H-4 Historic Resources Act

Department of Municipal Affairs and Environment. SNL2002 C W-4.01 Water Resources Act

Government of Alberta, Alberta Transportation, June 2011, Erosion Control Manual, 444 pp

Services Newfoundland & Labrador. Fisheries and Land Resources. RSNL 1990 Motorized Snow Vehicles and All-Terrain Vehicles Act

NL: Department of Natural Resources. Environmental Guidelines for Construction and Mineral Exploration Companies.

Government of Canada Department of Fisheries and Oceans. Measures to avoid causing harm to fish and fish habitat including aquatic species at risks (website reviewed June 2018 http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html)

Gosse, M.M., A.S. Power, D.E. Hyslop, and S.L. Pierce. 1998. Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador. Fisheries and Oceans, St. John's, NF. X + 105 pp., 2 appendices.

Iron Ore Company of Canada. CR-E-E-PRO Spill Response & Reporting.

Rio Tinto Standards. E13- Chemically Reactive Mineral Waste Control Standard.

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

Appendix A List of Abbreviations and Acronyms

LIST OF ABBREVIATIONS AND ACRONYMS

CCME	–	Canadian Council of Ministers of the Environment
DNR	–	Department of Natural Resources
DFO	–	Department of Fisheries and Oceans
EPP	–	Environmental Protection Plan
GAP	–	Storage and Handling of Gasoline and Associated Products
IOC	–	Iron Ore Company of Canada
NL MAE	–	Newfoundland & Labrador Municipal Affairs and Environment
SDS	–	Safety Data Sheet
NEAR	–	Newfoundland Environmental Assessment Regulations
WHMIS	–	Workplace Hazardous Materials Information System

Appendix B EPP Copy Distribution List

CONTROLLED COPY DISTRIBUTION LIST

Department or Organization	Individual or Location
Environment Department	Environment N:/ DirectorySystem
Manager Environment & Sustainable Development	Patrick Lauziere
Manager Mine Operation	William Shand
Manager Mine Technical Services	Shana Blakeley
Manager Mine Maintenance	Scott Melvin
General Manager, Mine & Ore Delivery	Scott Barney

Appendix C Revision Request Form

REVISION REQUEST FORM

SECTION TO BE REVISED:

NATURE OF REVISION:

RATIONALE FOR REVISION:

(i.e., environment/worker safety, etc.)

SUBMITTED BY:

Please submit request to the Environmental Advisor

Appendix D Erosion and sediment control - best management practices examples

TAKEN FROM ALBERTA TRANSPORTATION MANUAL:
EXCELLENT REFERENCE
HTTP://WWW.TRANSPORTATION.ALBERTA.CA/CONTENT/DOCTYPE372/PRODUCTION/EROSIONCONTROLMANUAL.PDF

HERE ARE A FEW EXCERPTS FROM THE MANUAL

Silt Fence Sediment Control	B.M.P. #1

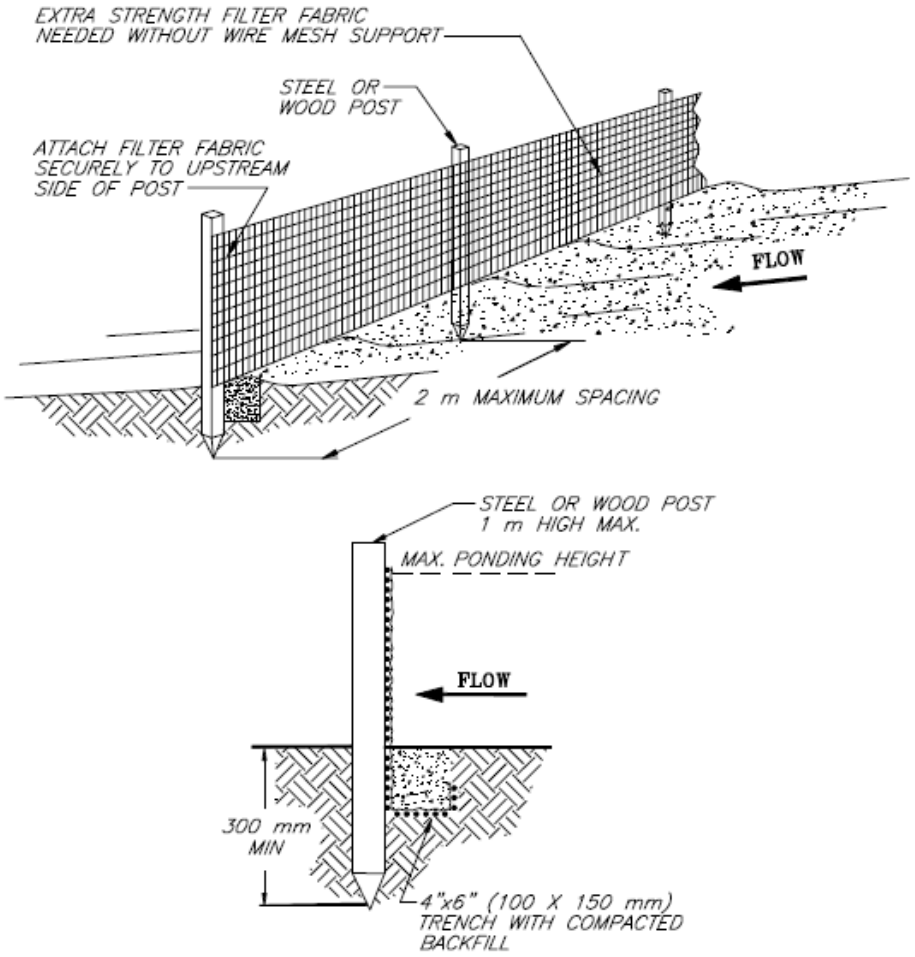
- Sediment build up should be removed once it accumulates to a depth of 0.2 m
- Remove fence after vegetation is established
- Deactivate fabric by cutting-off top portion of fabric above ground; bottom trenched-in portion of fence fabric can be left in-ground thus minimizing ground disturbance

Similar Measures

- Straw Bales
- Rock Barrier
- Permeable/Synthetic Barriers

Design Considerations

- For a silt fence system to work as a system, the following factors should be considered:
  a) quantity – adequate number and frequency of fence for efficient ponding and sedimentation
  b) installation – workmanship
  c) compaction – backfill and trenching of fabric
  d) support – posts adequately embedded, appropriate selection of post material and spacing
  e) attachment – secure fabric to post
- Install silt fences in a 'J' hook or 'smile' configuration



TRENCH METHOD DETAIL

NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE DAILY AND AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED SILT REACHES 200 mm.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA WILL NOT CONTRIBUTE SEDIMENT OFF-SITE.
4. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

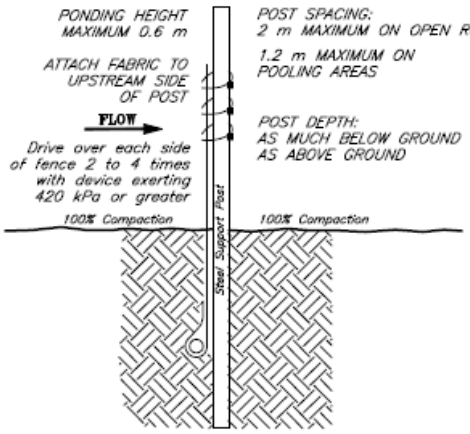
SILT FENCE

(TRENCH METHOD)

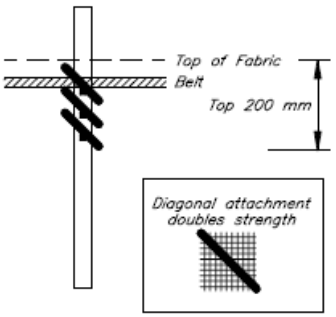
FILE: SILTFENC

Government of Alberta ■
Transportation

B.M.P. #1
Typical Section



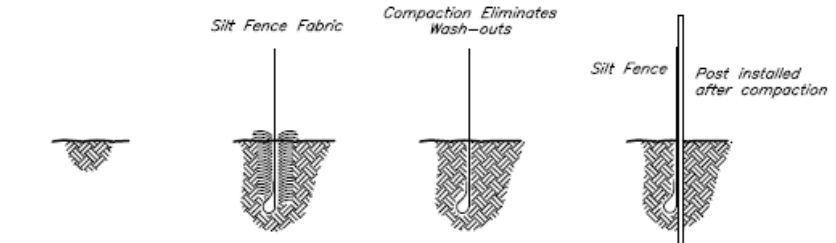
NO MORE THAN 0.6 m OF A 0.9 m FABRIC
IS ALLOWED ABOVE GROUND



ATTACHMENT DETAILS:

- Gather fabric at posts, if needed.
- Utilize three ties per post, all within top 200 mm of fabric.
- Position each tie diagonally, puncturing holes vertically a minimum of 25 mm apart.
- Hang each tie on a post nipple and tighten securely.
- Use cable ties (50 lbs) or soft wire.

MECHANICAL (SLICING) METHOD



a) Before Installation

b) During fabric insertion. Disrupted soil.

c) After Compaction. Greater stability.

d) Completed Installation

MECHANICAL (SLICING) METHOD INSTALLATION SEQUENCE

NOTES:

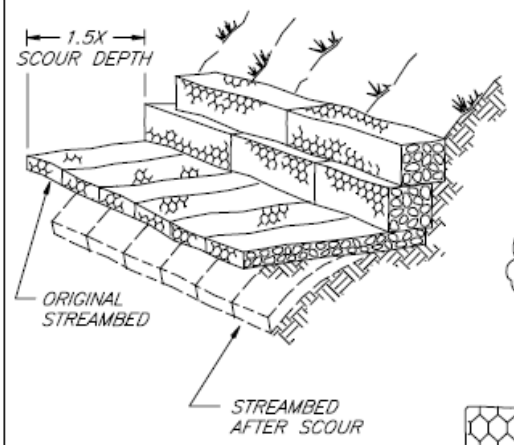
1. INSTALLATION MACHINE MUST ALLOW CONTINUOUS SLICING AND EMBEDMENT OF GEOTEXTILE INTO GROUND WITH MINOR GROUND DISTURBANCE.
2. INSTALLATION MACHINE TYPES WILL VARY WITH MANUFACTURER.
3. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

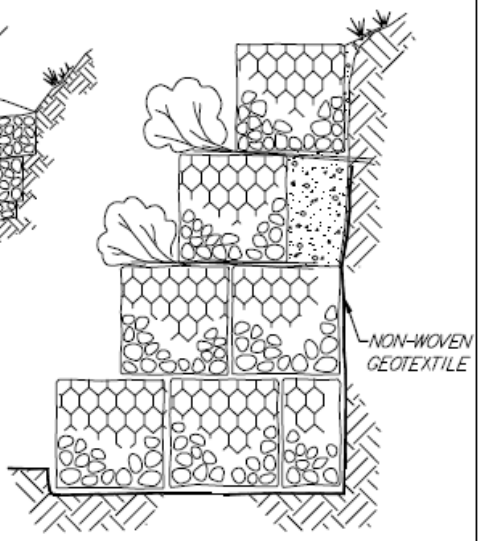
SILT FENCE

(MECHANICAL METHOD)

SOURCE: CARPENTER T. 2000

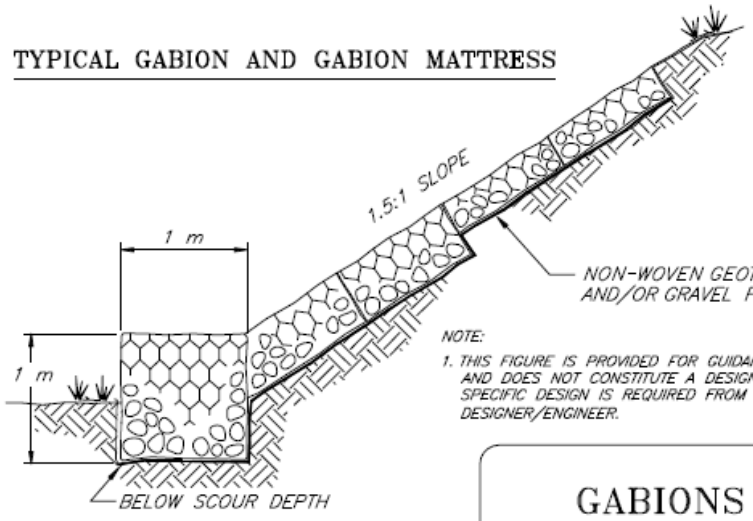


TYPICAL GABION APRON



TYPICAL VEGETATED ROCK GABION

TYPICAL GABION AND GABION MATTRESS



NOTE:
1. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

GABIONS
(SLOPE AND BANK)

FILE: GABIONS

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B.M.P. #2a
Typical Section

Appendix E Revision History Log

Version	Date Issued	Name of Last Issuer	Revision Notes
Version	**Date Issued**	**Name of Last Issuer**	**Revision Notes**
0.1	June 9, 2003	Lee Preziosi	Draft EPP (Version 0.1) for review
0.2	July 4, 2003	Lee Preziosi	Draft EPP (Version 0.2) for review
01	July 4, 2003	Lee Preziosi	Final EPP (Version 01) Issued
02	February 16, 2004	Lee Preziosi	Revised taking into consideration DFO's Regional Habitat Co-ordinator's comments. Changes made are in bold.
03	May 16, 2005	Sonya Flynn	Revised with new ESH Policy, removed Call-out procedure, new IOC Logo added, update of names, Note on Draining of Hakim Lake
04	July 31, 2007	Jody Clark	Annual review; revised Environmental Administrator to Environment Advisor.
05	April 1, 2008	Garry Greene	Annual review. Revised Garry Greene to Primary Ore Environmental Advisor. In Appendix B changed Arn Do to Kresho Galovich. Revised Department of Forestry Resources and Agrifoods to Department of Natural Resources Forestry and Wildlife Division. Revised Jody Clark Environment Manager to Patrick Lauziere Superintendent Environment.
06	October 28, 2010	Garry Greene	Consolidated all three EPP's., (Luce, Sherwood, Plateau Quarry) into general EPP that covers the entire IOC Labrador City Operations.
07	July 21, 2017	Danielle Kinsman	Review and update of EPP for the Sherwood North Development Project

Version	Date Issued	Name of Last Issuer	Revision Notes
08	June 20, 2018	Denise Cormier Tina Cassel	Update EPP to include comments from Sherwood, added culvert cleaning info, updated reference material, and regulatory information, added BMP appendix and project specific Appendix

Appendix F Project Specific Information

Appendix C

List of Vascular Vegetation Identified in the BASA

Vascular Plants Identified during Rare Flora Survey (S-ranks from the ACCDC).

Latin Name	Common Name	S-Rank
Abies balsamea	Balsam fir	S5
Achillea millefolium	Common yarrow	SNA
Actaea rubra	Red baneberry	S4S5
Agrostis scabra	Rough bentgrass	S5
Alnus incana	Speckled alder	S4S5
Alnus viridis	Green alder	S5
Amelanchier bartramiana	Bartram shadbush	S4S5
Anaphalis margaritacea	Pearly everlasting	S5
Antennaria rosea	Rosy pussytoes	SU
Arctous alpina	Alpine bearberry	S5
Athyrium filix-femina	Lady-fern	S4S5
Betula glandulosa	Tundra dwarf birch	S5
Betula minor	Dwarf white birch	S4S5
Betula papyrifera	Paper birch	S4S5
Botrychium lunaria	Moonwort grape-fern	S3S4
Calamagrostis canadensis	Blue-joint reedgrass	S5
Callitriche palustris	Vernal water starwort	S4S5
Carex atratiformis	Black sedge	S3S5
Carex bigelowii	Bigelow sedge	S4S5
Carex brunnescens	Brownish sedge	S5
Carex buxbaumii	Buxbaum's sedge	S3
Carex canescens	Hoary sedge	S3S5
Carex disperma	Softleaf sedge	S3S5
Carex echinata	Little prickly sedge	S3S5
Carex exilis	Coast sedge	S3S5
Carex flava	Yellow sedge	S3S4
Carex gynocrates	Northern bog sedge	S3S4
Carex leptalea	Bristly-stalk sedge	S3S5
Carex limosa	Mud sedge	S5
Carex magellanica	A sedge	S5
Carex nigra	Black sedge	S3S4
Carex oligosperma	Few-Seeded sedge	S5
Carex pauciflora	Few-Flowered sedge	S4S5
Carex rariflora	Loose-Flowered sedge	S4S5
Carex scirpoidea	Bulrush sedge	S3S5
Carex trisperma	Three-seed sedge	S4S5
Carex vaginata	Sheathed sedge	S3S4
Carex vesicaria	Inflated sedge	S4S5

Castilleja septentrionalis	Labrador indian-paintbrush	S4S5
Chamaedaphne calyculata	Leatherleaf	S5
Chamerion angustifolium	Fireweed	S5
Clintonia borealis	Clinton lily	S5
Comarum palustre	Marsh cinquefoil	S4S5
Coptis trifolia	Goldthread	S5
Cornus canadensis	Dwarf dogwood	S5
Cornus suecica	Swedish dwarf dogwood	S4S5
Dasiphora fruticosa	Golden-hardhack	S5
Deschampsia cespitosa	Tufted hairgrass	S3S5
Descurainia incana	Richardson tansy-mustard	SNA
Diphasiastrum complanatum	Northern running-pine, groundcedar	S5
Diphasiastrum sitchense	Sitka clubmoss, tufted groundceder	S3S4
Drosera rotundifolia	Roundleaf sundew	S5
Dryopteris campyloptera	Mountain wood-fern	S4
Dryopteris carthusiana	Spinulose shield fern	S4
Empetrum nigrum	Black crowberry	S5
Epilobium ciliatum	Hairy willow-herb	S5
Epilobium ciliatum	Northern willow-herb	S5
Epilobium palustre	Marsh willow-herb	S5
Equisetum fluviatile	Water horsetail	S3S4
Equisetum sylvaticum	Woodland horsetail	S5
Eriophorum vaginatum	Tussock cottongrass	S5
Eriophorum viridicarinatum	Green keeled cottongrass	S3S4
Eurybia radula	Rough-leaved aster	S4S5
Fragaria virginiana	Virginia strawberry	S3S4
Galium trifidum ssp. trifidum	Threepetalled bedstraw	S4S5
Galium triflorum	Sweet-scent bedstraw	S4S5
Gaultheria hispidula	Creeping snowberry	S5
Geocaulon lividum	Northern comandra	S5
Geum rivale	Purple avens	S3S4
Gymnocarpium dryopteris	Northern oak fern	S5
Hieracium spp.	Hawkweed spp.	N/A
Huperzia selago	Fir flubmoss	SU
Juncus arcticus	Baltic rush	S4
Juncus filiformis	Thread rush	S5
Juniperus communis	Ground juniper	S4S5
Kalmia polifolia	Pale laurel	S5
Larix laricina	American larch	S5
Linnaea borealis	Twinflower	S5
Lonicera villosa	Mountain fly-honeysuckle	S5

Luzula parviflora	Small-flowered wood-rush	S5
Lycopodium annotinum	Stiff clubmoss	S5
Lycopodium dendroideum	Treelike clubmoss	S4
Lycopodium lagopus	One-cone ground-pine	S4S5
Maianthemum canadense	Wild lily-of-the-valley	S5
Menyanthes trifoliata	Bog buckbean	S5
Mitella nuda	Naked bishop's-cap	S4S5
Moneses uniflora	One-flower wintergreen	S4S5
Muhlenbergia uniflora	Fall dropseed muhly	S2S3
Myrica gale	Sweet bayberry	S5
Neottia cordata	Heartleaf twayblade	S4S5
Nuphar variegata	Yellow Cowlily	S5
Omalotheca norvegica	Norwegian cudweed	S2S3
Orthilia secunda	One-side wintergreen	S5
Parnassia parviflora	Small-flower grass-of-parnassus	S2
Petasites frigidus	Arctic butter-Bur	S4S5
Phegopteris connectilis	Northern beech fern	S5
Phyllodoce caerulea	Mountain-heath	S4S5
Picea glauca	White spruce	S5
Picea mariana	Black spruce	S5
Platanthera dilatata	Leafy white orchis	S4S5
Platanthera obtusata	Small northern bog-orchid	S4
Potamogeton alpinus	Northern pondweed	S2S4
Potemageton spp	Pondweed spp.	N/A
Pyrola asarifolia	Pink wintergreen	S3S4
Ranunculus aquatilis	White water buttercup	S4S5
Rhododendron groenlandicum	Labrador tea	S5
Ribes glandulosum	Skunk currant	S5
Rubus chamaemorus	Cloudberry	S5
Rubus idaeus	Red raspberry	S4S5
Rubus pubescens	Dwarf red raspberry	S5
Salix humilis	Prairie willow	S4S5
Salix pedicellaris	Bog willow	S4
Salix pyrifolia	Balsam willow	S4S5
Salix vestita	Rock willow	S4
Sanguisorba canadensis	Canada burnet	S4S5
Scheuchzeria palustris	Pod grass	S4S5
Schizachne purpurascens	Purple oat	S3S5
Scirpus atrocinctus	Black-girdle bulrush	S3S5
Sibbaldia tridentata	Three-toothed-cinquefoil	S5
Solidago macrophylla	Large-leaf goldenrod	S5

Solidago uliginosa	Bog goldenrod	S5
Sorbus decora	Northern mountain-ash	S4S5
Sparganium natans	Small bur-reed	S2S4
Spiranthes romanzoffiana	Hooded ladies'-tresses	S3S4
Stellaria borealis	Northern stitchwort	S5
Streptopus amplexifolius	Clasping twisted-stalk	S5
Symphyotrichum novi-belgii	New Belgium American-aster	S4S5
Symphyotrichum puniceum	Swamp aster	S4
Tofieldia pusilla	Scotch false-asphodel	S4S5
Triantha glutinosa	Sticky false-asphodel	S3S4
Trichophorum alpinum	Alpine cotton-grass	S3S5
Trichophorum cespitosum	Deergrass	S5
Trientalis borealis	Northern starflower	S5
Triglochin palustris	Slender bog arrow-grass	S4S5
Vaccinium angustifolium	Late lowbush blueberry	S5
Vaccinium boreale	Northern blueberry	S4S5
Vaccinium caespitosum	Dwarf blueberry	S4S5
Vaccinium myrtilloides	Velvetleaf blueberry	S4
Vaccinium oxycoccos	Small cranberry	S5
Vaccinium uliginosum	Alpine blueberry	S5
Vaccinium vitis-idaea	Mountain cranberry	S5
Vahlodea atropurpurea	Mountain hairgrass	S3S4
Veratrum viride	American false-hellebore	S2
Viburnum edule	Squashberry	S5
Viola renifolia	Kidney-leaf white violet	S2S4