

IRON ORE COMPANY OF CANADA SMALLWOOD NORTH EXTENSION PROJECT, LABRADOR CITY

Environmental Assessment Registration

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

Submitted by:

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List of Acronyms

ABA	Acid Base Accounting
ACCDC	Atlantic Canada Conservation Data Centre
ACOA	Atlantic Canada Opportunities Agency
AGL	Above Ground Level
AMEC	AMEC Environment & Infrastructure
ARDML	Acid Rock Drainage Metal Leaching
ATO	Automatic Train Operation
BACT	Best Available Control Technology
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
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
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
EMS	Environmental Management System
EPP	Environmental Protection Plan
EPR	Environmental Preview Report
ERRP	Emergency Response and Reporting Plan
GEDP	Gender, Equity and Diversity 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 meters
kg	Kilogram
km	Kilometer
km/h	Kilometers 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	Meters Above Sea Level
MBCA	Migratory Birds Convention Act
m	Meter
m²	Square meters
m³/d	Cubic meters per day
MBCA	Migratory Birds Convention Act
mbgs	Meters Below Ground Surface
MGGA	Management of Greenhouse Gas Act
MGGR	Management of Greenhouse Gas Regulations
MIF	Middle Iron Ore Formation
mm	Millimeter
MDMER	Metal and Diamond Mining Effluent Regulations
Mm³	Million Cubic Meters
mRL	Meters Relative Level
Mtpa	Million tonnes per annum
Mt	Million tons
MW	Megawatt
N₂O	Nitrous oxide
NAG	Non-acid generating
NCC	NunatuKavut Community Council
NL	Newfoundland and Labrador
NLDECC	NL Department of Environment and Climate Change
NLDFFA	NL Department of Fisheries, Forestry and Agriculture
NLDIET	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
PM_{2.5}	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
SO₂	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: Smallwood North 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 the boundaries of the existing Smallwood Pit to support its ongoing operations in Labrador City. The proposed Smallwood North Extension Project (SNEP or the 'Project') will be an extension of the existing Smallwood North pit and is located just north of the Smallwood Pit, which was mined from 1962 to the early 1990s (Figure 1).

The Project is situated within IOC's existing mining leases and encompasses approximately 160 hectares (ha) of land. The Project comprises an extension of the Smallwood North pit to the north, the development of a new waste dump, construction of new power lines, construction of new pit dewatering well(s) and the development of surface water handling systems.

Activities associated with the Project include 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 open pit mining operations for the Project will be carried out using IOC's existing mining practices. IOC will use ore mined from the Project pit to maintain concentrator feed, supplementing feed sourced from other areas of its operations. The footprint of the Project represents less than 2 % 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 SNEP 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.

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, QC H3B 0E3 Tel: (418) 968-7400
Operations Address:	2 Avalon Drive, Labrador City, NL A2V 2Y6
President and CEO:	Mr. Donald Tremblay
Principal Contact for the Purposes of EA:	Mr. Patrick Lauzière Environment Business Partner 1 Retty Street, Sept-Îles, QC 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), one that is under development (Humphrey South) and two that are currently idled (Lorraine South, and Spooks). Note that Magy, Sherwood and Sherwood North are phases or pushbacks of HMWS and Humphrey South (Figure 1). 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.



Figure 1: Project Site Overview

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. Smallwood North is a relatively small, short life pit that will enable IOC to blend feed for its concentrator from multiple sources to:

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

In order to avoid major disruption to the Life of Mine (LOM) Plan, smaller pits such as Smallwood North, with a strip ratio close to the orebody average, are perfect contingency options when other larger and long life pits are delayed. This has been the case recently with the delayed development of the Moss (Wabush 3) pit. With delays to Moss, the Sherwood North Pit was brought online to avoid predicted ore delivery shortfalls.

The Smallwood North pit is located close to loading pocket 3 and based on IOC's current understanding of the resource, this pit should take eight to nine years to be mined out. It is a small pit with a short development time that can be balanced against the larger, longer development pits associated with the Humphrey South Extension pits.

The Project will encompass an area of approximately 53 ha for the pit and approximately 106 ha for the waste dump, i.e., Central West Dump.

The development of the new Central West Dump will help with the establishment of the adjacent backfill of the Humphrey North Pit. The Humphrey Main pit, located to the southwest of the Smallwood Pit, is currently under production and, within the next five years IOC aims to direct waste extracted from this pit to the Humphrey North location.

Strategic backfilling of completed pits is an option of choice as it allows IOC to minimize the final footprint of the disturbed areas of the mine. However, it can be a challenging operational activity and overflow to the Central West Dump will be required as periodic, localized geotechnical issues are encountered while filling the Humphrey North pit.

The current design of Smallwood North Pit contains approximately 60 million tonnes of ore and 75 million tonnes of waste. Planned activity at the pit includes site clearing, removal of overburden (topsoil and glacial till), drilling and blasting of the exposed rock, and construction of haul roads.

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

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

The Project will allow IOC to continue to operate in an efficient manner. Utilization of small, remnant deposits, such as the Smallwood North deposit, also allows IOC to responsibly extract all of the available mineral resource located within its mining leases.

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 development activities.

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) that 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 and Climate Change (DECC) 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 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 to the north-east of the previously mined Smallwood pit and within IOC's existing mining property boundaries. The approximate coordinates of the Project are 53° 03' 06" N latitude and 66° 55' 30" W longitude at an elevation of 640 to 850 meters above sea level (MASL). The area is not road accessible and has been surrounded by mining activities since the early 1960s.

The Project area has a surface area of approximately 159 ha, comprising a mine pit (53 ha) and a waste rock dump (106 ha) (Figure 2). The pit is located in a north-east – south-west trending valley, which drains into Lorraine Lake (Figure 3). The pit is located immediately to the north of Dorothy Lake and overlaps the northern extent of the old Smallwood pit. A short section of haul road will connect the pit with IOC's existing haul road network.

Topsoil and overburden from the Project will be stored in an existing overburden stockpile to the south of the project area.

The waste dump will be built against a prominent quartzite ridge and will be bounded on the east by the existing haul road linking loading pockets 3 and 4. A large basin on the east side of the ridge will be filled with waste rock. Access to the waste dump will be developed from an existing area of waste dump and the new dump will extend over the existing Repeater Hill waste dump located to the east of the Humphrey North pit (Figure 2).

The pit and waste dump may require the relocation of existing high voltage powerlines. Engineering studies will determine which powerlines need to be replaced or relocated and which ones can be removed without being replaced. If relocation of the powerlines is required, there may be a slight variation in Project footprint. The future redesign of the waste dump could also limit potential impacts to powerlines.

The pit will be located in a regional low point and the pit bottom will be approximately 50 m below the water level of Lorraine Lake, and approximately 150 m below the water level of Dorothy Lake. As such, it is likely that ongoing groundwater extraction will be required for efficient mining operations. It is anticipated that at least one dewatering well will be required, and its installation will be completed through the Water Resources Management Division's (WRMD) permitting process.

Surface water from the pit area will be captured via an interception sump at the northern end of the pit during initial pit development. As the pit develops, surface water will be captured in sumps developed within the pit as is the current operating practice. Surface water from the waste dump will flow into the existing surface water drain running beside the haul road between loading pockets 3 and 4, and will be managed by the existing surface water management system.

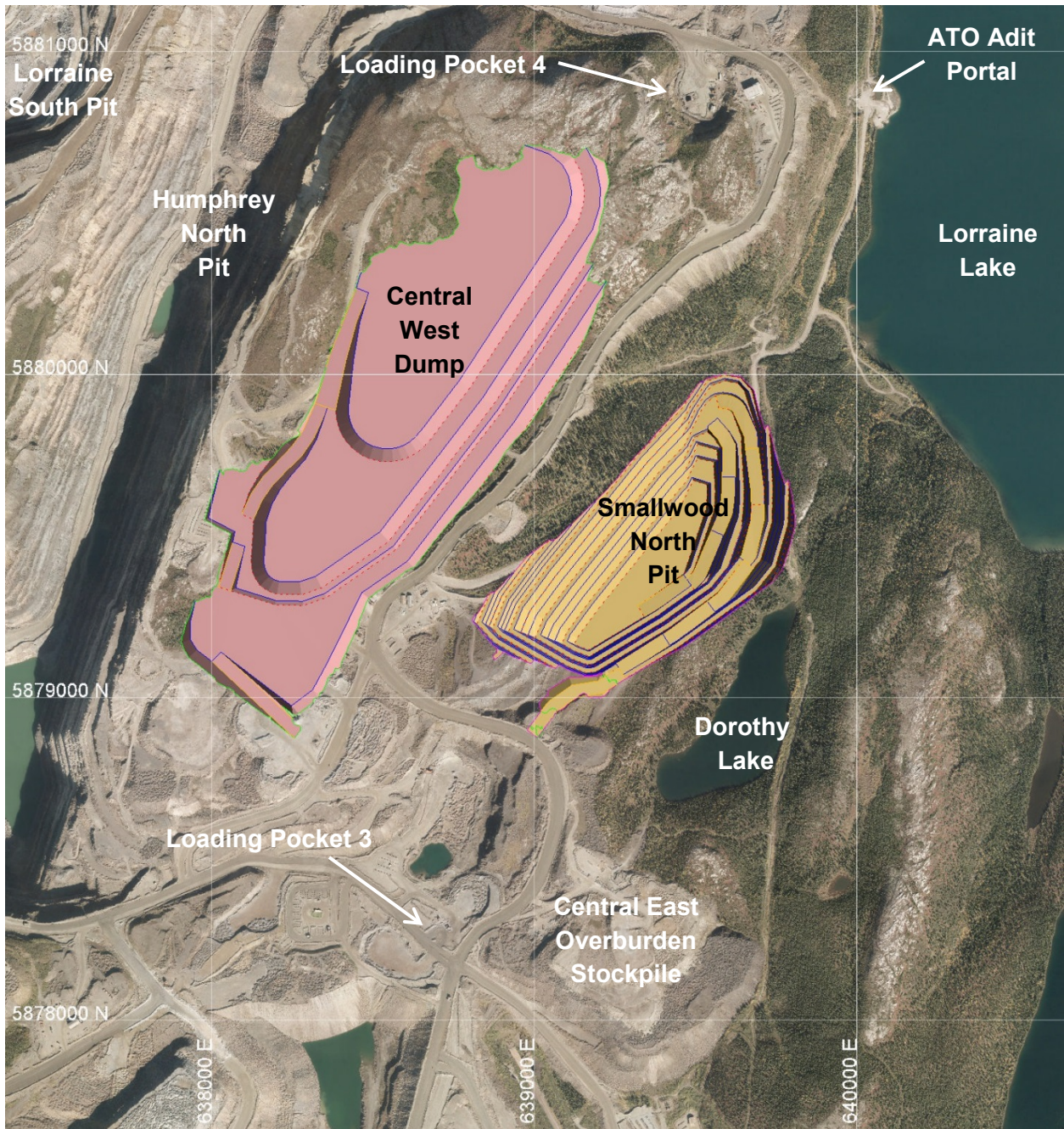
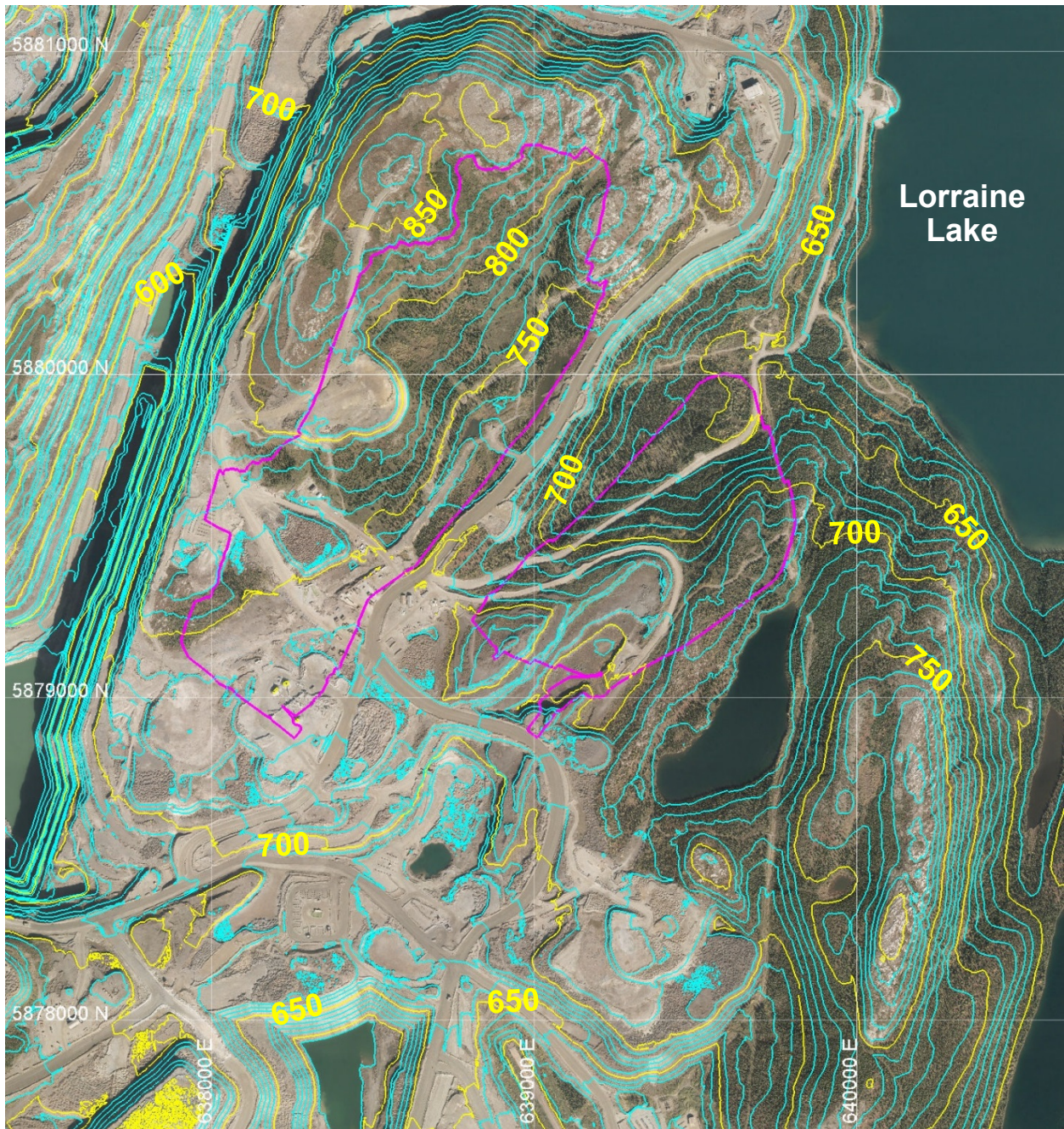


Figure 2: Project Overview



Major Contour Interval 50m; Minor Contour Interval 10m

Figure 3: Project Topography

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 existing mining leases. Mining Lease 12, Block 22-2 encompasses the open pit, haul roads, dewatering infrastructure, power lines, existing overburden stockpile and a portion of the waste dump. Mining Lease 21, Block 64-1 encompasses most of the planned waste dump, and Mining Lease 10, Block 22-1 encompasses a portion of the waste dump (Figure 4). The Labrador Iron Ore Royalty Corporation (LIORC) holds mineral rights over all of these Mining Leases and surface rights over Mining Leases 12 and 21 through a grant of surface rights made in 1960, and surface rights over Mining Lease 10 through a surface lease issued in 1990 and renewed in 2020 (Figure 5). LIORC subleases these mineral and surface rights to IOC.

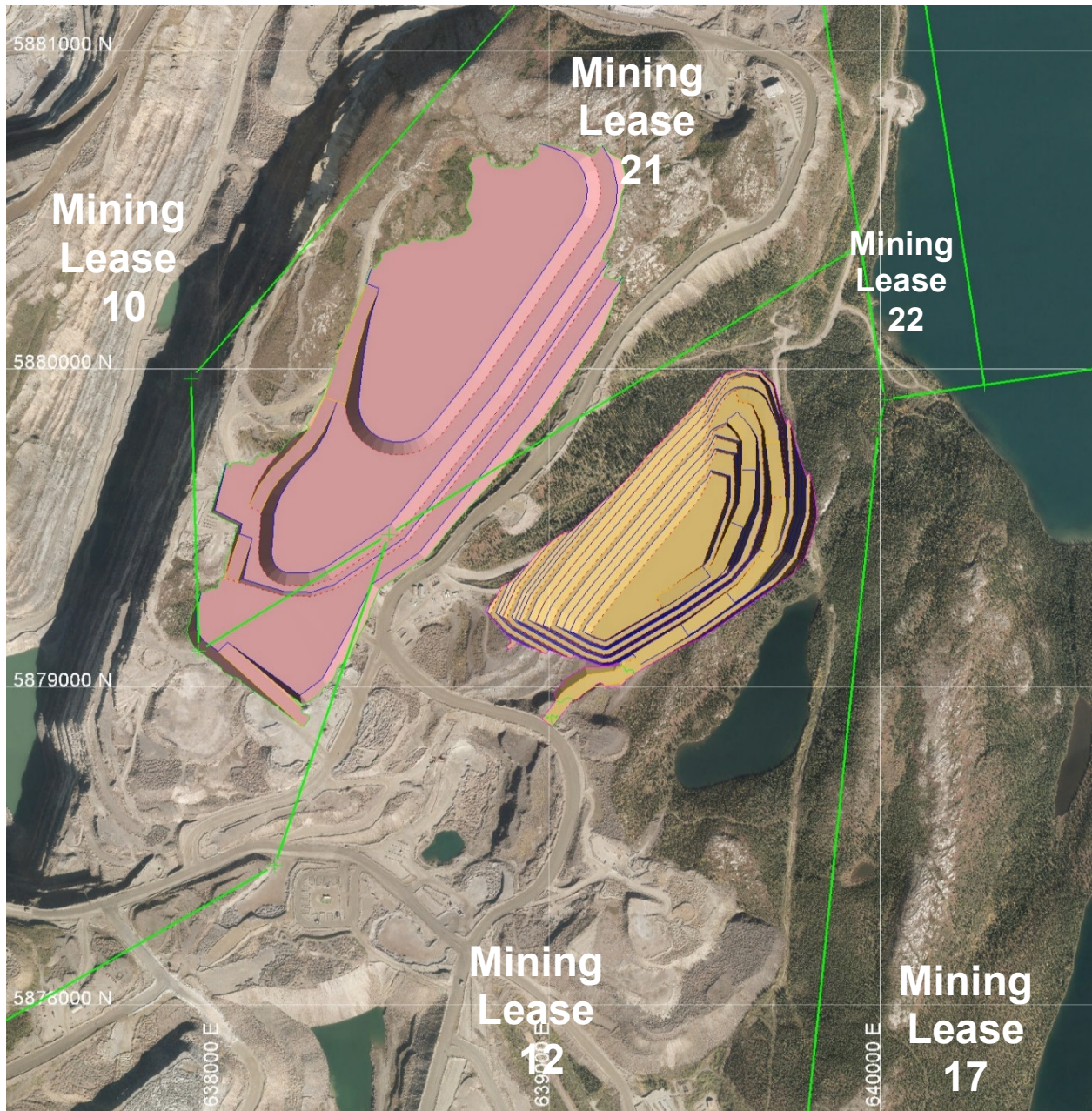


Figure 4: Mineral Tenure – Smallwood North Extension



Figure 5: Surface Rights – Smallwood North Extension

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 the IOC operation after exhausting the existing operating pits; or
- No Project

None of these options are feasible for maintaining IOC's production levels. A delay in the Project may 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.

IOC has a number of alternative deposits that may be developed in the coming years, ranging from large multi-pit developments, with substantial development costs and timelines, to developments in more environmentally and/or community sensitive areas. The Smallwood North Pit does not require significant drilling to confirm mineral resources and can provide ore within a favorable timeframe, unlike a number of alternative deposits. Development decisions on alternative deposits will be made once IOC has clarity on likely development scopes and timelines. IOC believes that the estimated timelines for developing these alternative deposits does not ensure a constant and consistent feed to the concentrator, therefore the Project cannot be replaced.

There is considerable mine life remaining in a number of existing operating pits, but 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. Progressive development of IOC's full resource potential delivers sustained, longer term benefits to both the region and the province.

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 maximizing resource extraction in 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 location. Currently, IOC's main waste dump is the exhausted Smallwood pit. The current Life-of-Mine (LOM) plan calls for the mining of 2,700 Mt of waste rock, of which approximately 2,400 Mt will be placed in exhausted pits. The only exhausted pit in the immediate vicinity of the Smallwood North pit is the Humphrey North pit and the current LOM plan will fill this pit with waste from the Humphrey Main deposit.

Given that most pits at IOC have very long lives and exhausted pits may also be contemplated for future tailings disposal, there is an on-going requirement for a proportion of the waste rock mined to be placed in dumps located outside pit limits. The location of waste dumps outside pit limits are selected based on proximity to the open pit, and preferably in an area already disturbed by mining activity.

2.4 Project Components

The Project involves permitting, construction, operations, closure and rehabilitation, and post-closure monitoring activities. 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 of the Project will include the following physical components (Figure 2 and Figures 6 to 9):

- An open pit;
- Overburden handling;
- A new waste rock storage site (the Central West Dump), to the west of the open pit;
- A short length of haul road (~350 m) to connect the open pit to existing road network, the waste rock storage site, the overburden stockpile area, the existing ore delivery system and the concentrator facilities;
- Realignment of existing power lines which lie within the footprints of the pit and dump;
- Construction of a short length of powerline to connect the pit to the existing power distribution network;
- Groundwater extraction system and associated infrastructure; and
- Mine surface water management system and associated infrastructure.

There is an existing overburden stockpile located south of the planned open pit that will be used. Each of these components are discussed in the following sections.

The Project has been designed for development in a single phase and will be a conventional open pit mine with associated components and activities that are being designed to support flexible ore feed to IOC's existing production facilities. Development of the Project 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.

2.4.1 Open Pit Mine

The Project targets a discrete mineralized zone to the north of the previously mined Smallwood pit. Standard open pit drilling and blasting techniques will be used to break the rock mass and allow excavation and movement of the rock materials. Waste and feed material will be separated at the dig face by the excavators, with waste material being hauled to the new Central West Dump and the ore being taken to ore delivery system loading pockets for transportation to the concentrator for processing.

2.4.2 Overburden Handling and Storage

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

The overburden will be hauled to the existing Central East overburden stockpile and/or to a new stockpile to the east of the existing stockpile. Organic rich material (peat/topsoil) in the pit area will be segregated from the underlying glacial till (soil) and either placed directly onto rehabilitation areas or stockpiled separately from the glacial till soils. The location and design of the overburden stockpiles relative to the pit are shown in Figure 6.

Estimated overburden volumes for both the pit area (till and organics) and the waste dump area (topsoil only) are listed in Table 1. The overall depth of the overburden at the Smallwood North Pit is uncertain. An allowance of 2 m average thickness has been used to estimate overall overburden thickness until measurements can be made. The thickness of the organic rich (topsoil) layer has been assumed to be 0.2 m and is assumed to be included in the above 2 m thickness of overburden. Where feasible, till and topsoil will be placed directly onto areas which are being progressively rehabilitated. If, however, suitable rehabilitation areas are not available during development of the pit and waste dump, the Central East overburden stockpile has sufficient capacity for the above noted till and topsoil volumes. Top soil will be stockpiled separately from till.

Table 1: Estimated Overburden Volumes and Tonnages

	Till/ Sediments	Organics/ Topsoil	Total
	m ³	m ³	m ³
Pit	624,000	69,000	693,000
Waste Dump		128,000	128,000
Total	624,000	197,000	821,000

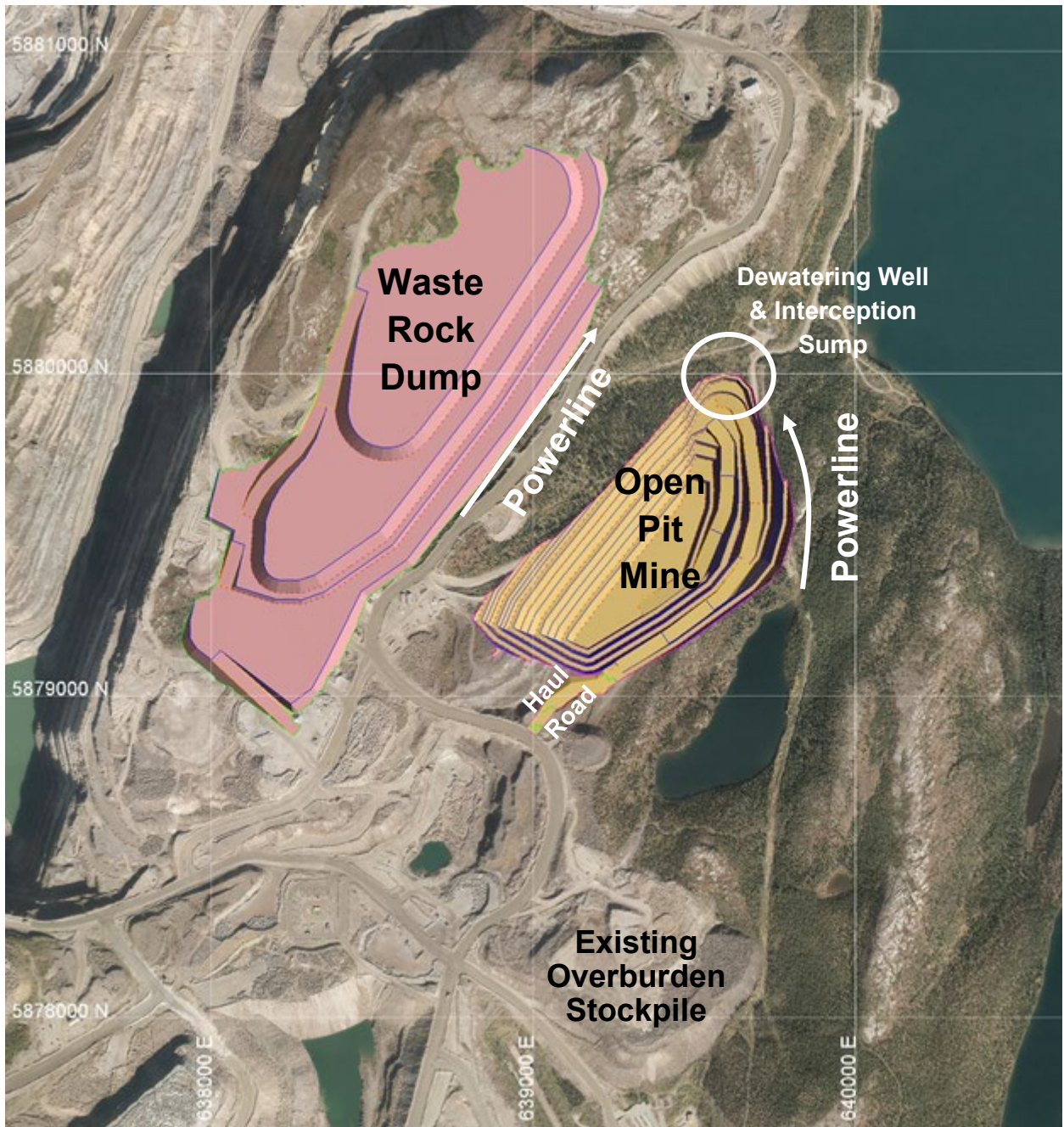


Figure 6: Project Components

2.4.3 Waste Rock Storage

Estimated waste rock volumes and tonnages for the Project are listed in Table 2. The waste rock will be placed in the Central West Dump, to be developed to the north of the pit. The waste rock storage area will be developed using lift heights less than 30 m with berms left between lifts. Berms will be sufficiently wide to allow rehabilitation of the dump to a 20 degree slope angle, to facilitate revegetation of the entire dump. The Central West Dump has a volume capacity of 31.9Mm³.

Table 2: Estimated Waste Rock Volumes and Tonnages

Mined Waste		Dumped Waste (25% swell)
Mm ³	Mt	Mm ³
23.8	75.5	29.8

It has been assumed that the waste rock increases in volume (“swells”) by approximately 25% when excavated.

Pit development may require realignment of the access road for 4-Adit and possible relocation of the sewage treatment plant. These are operational adjustments and although the final design of any realignment or relocation isn’t known, these potential changes will fall within areas already disturbed, or slated for development as part of the Project. Any required permits and approvals will be obtained from appropriate regulators following EA release, and prior to initiation of realignment or relocation activity.

2.4.3.1. Waste Dump Interaction with the Humphrey North Backfill

The proposed Central West Dump is adjacent to the Humphrey North slot. This former pit has been identified as a good location for waste dumping from the Humphrey main deposit. Waste from Humphrey Main pit can be directly hauled to the bottom of the Humphrey North pit. However, as new phases will develop, the best option will be to backfill the Humphrey North pit by tipping waste from the Humphrey East Wall. The Central West Dump will be an overflow option for the Humphrey North Backfill if dumping is disrupted by geotechnical concerns with Humphrey North (Figures 7-9).

Waste from Humphrey Main is tipped into Humphrey North from the Humphrey west wall. During geotechnical interruptions, some waste will be diverted to the Central West Dump.

All waste from Humphrey North will be used for backfilling the Humphrey North slot. Waste from the Smallwood North pit will be directed to the Central West Dump.

Eventually the Central West Dump and the Humphrey North backfill could be combined to be one single waste dump (Figure 9).



Figure 7: Waste Dump Interactions 1

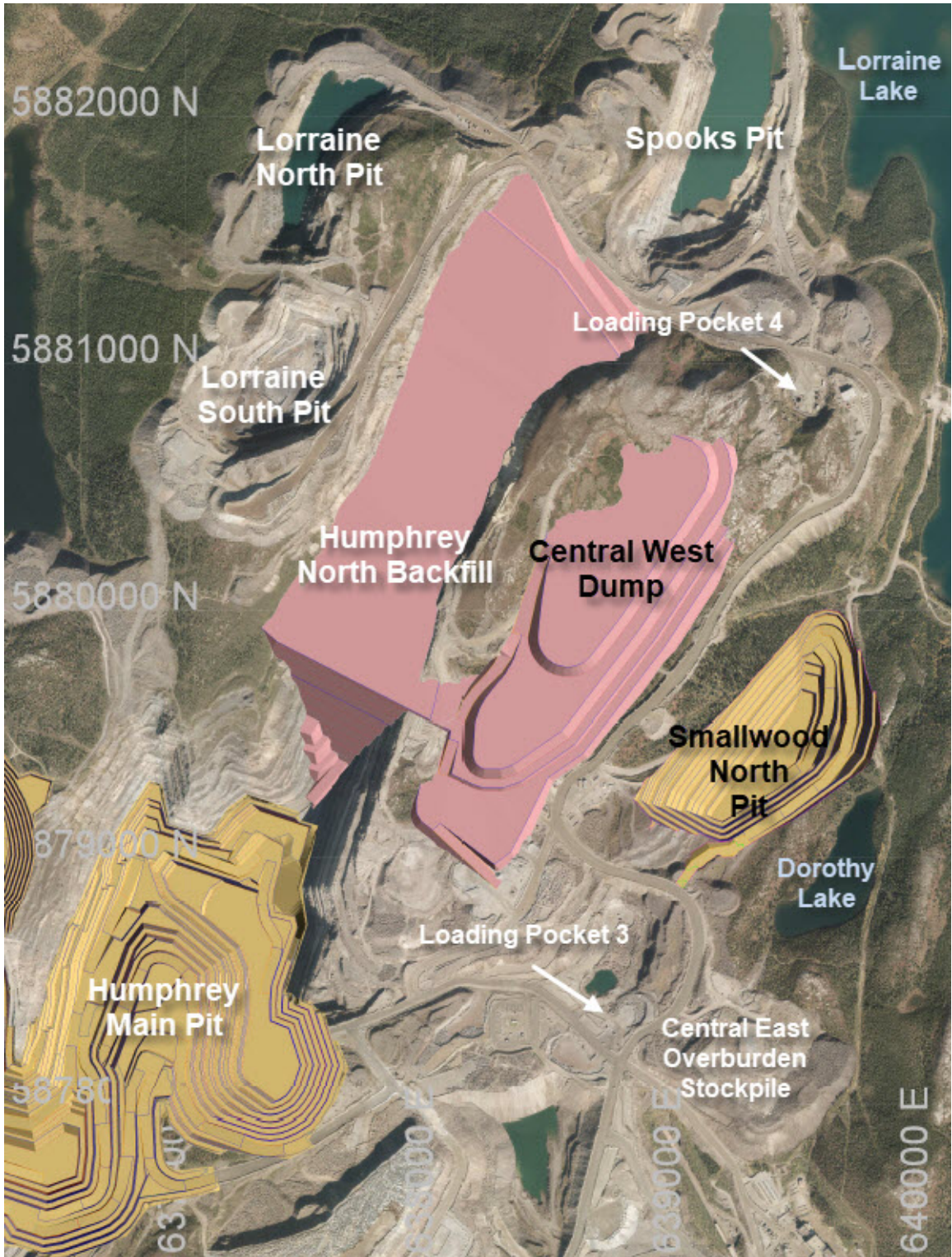


Figure 8: Waste Dump Interactions 2

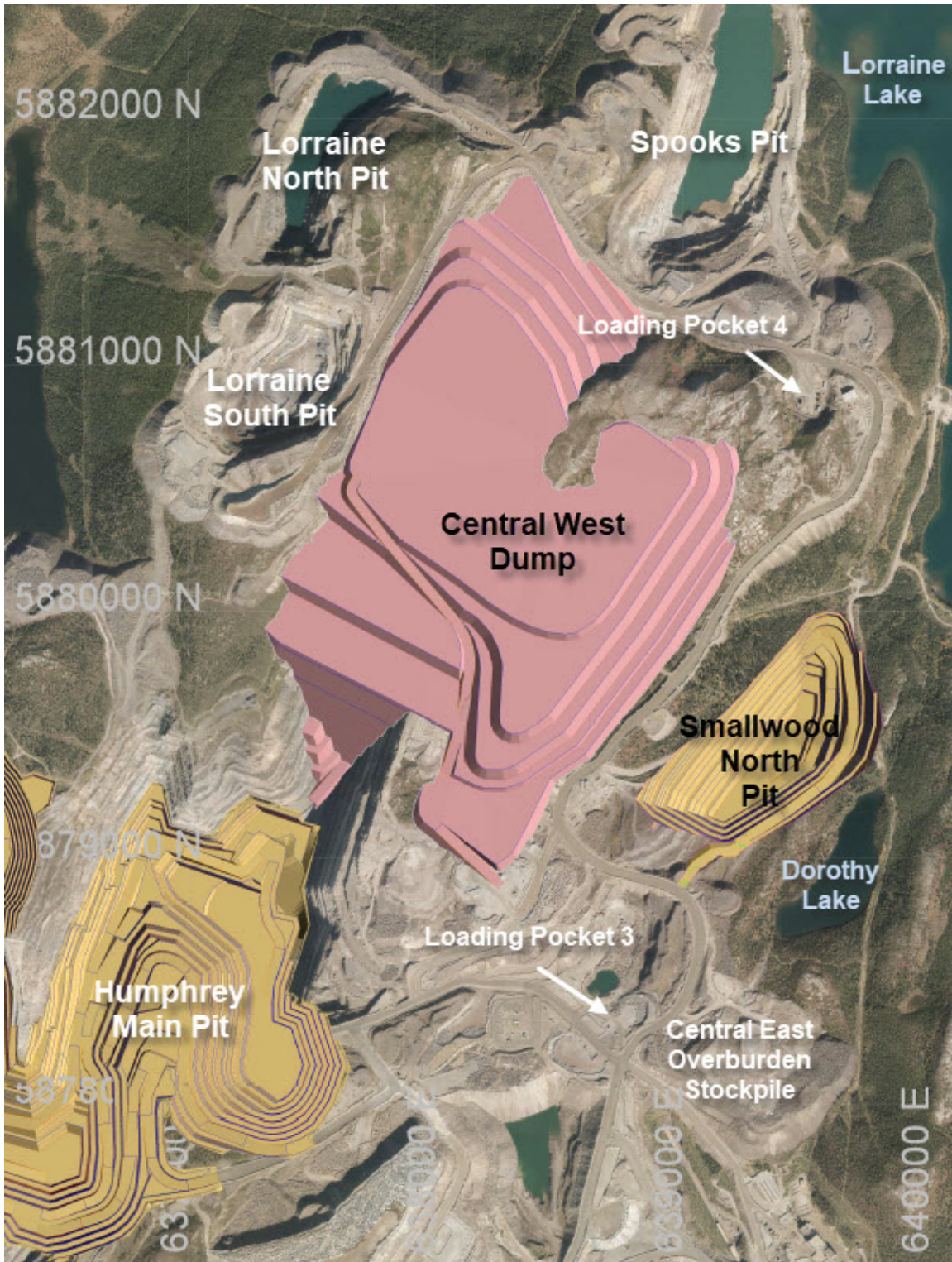


Figure 9: Waste Dump Interactions 3

2.4.4 Ex-Pit Haul Roads

A short (~350 m) haul road will be built from mine waste rock to connect the Smallwood North pit to IOC's existing haul road network (Figure 6). This haul road will be built at an 8% gradient. IOC will mitigate the risk of collision between pieces of heavy equipment and light vehicles by maintaining conservative road widths and by designing intersections to provide good visibility to all vehicles. Where practical, light vehicles will use roadways that are physically segregated from the heavy equipment haul roads.

2.4.5 Power Lines

Figure 10 shows the network of powerlines and the facilities they supply in the Project area. Powerlines run through both the pit and the waste dump areas. Some of these powerlines will need to be realigned outside the pit and dump footprints. Further engineering studies are required to finalise details of the required power network.

A short branch line is likely to be required to connect the existing high voltage network to the Smallwood North pit. The existing earthing grid is suitable for Project use.



Figure 10: Power Line Network

2.4.6 Groundwater Management

As previously noted, the planned pit will be located in a regional low point and the pit bottom will be approximately 50 m below the water level of Lorraine Lake, and approximately 150 m below the water level of Dorothy Lake. To better understanding groundwater conditions and dewatering requirements at the pit, various investigations and models have been considered. A permeable, limonite altered zone of broken ground has been identified at the northern end of the Smallwood North deposit (Figure 11). Based upon previous experience in other pits where mining has proceeded below the water table, it is likely that this area will provide a suitable target for the construction of one (or more) deep dewatering well(s) to advance-dewater the material at depth, which is expected to be saturated. This will allow drilling, blasting, and digging to be conducted under dry conditions. Groundwater extraction rates and the infrastructure required to establish and maintain adequately dewatered conditions at depth within the pit are not fully understood.

In consideration of the above, an investigation borehole was drilled and constructed as a piezometer late in 2018. The location of this borehole is toward the northern end of the proposed pit limit and was drilled to a full depth of 166 m below ground level (Figure 11). As expected, an extensive thickness of limonitic material was encountered. Due to hole-stability issues, the borehole could not be hydraulically tested. However the confirmed thickness of the limonitic sequence strongly indicates good permeability and hydraulic connectivity in the area. The location itself would be a good potential well target.

Prior to pit development, a test well will be constructed at the same location as the investigation borehole referred to above, and a long term pumping test undertaken to inform future advance dewatering requirements so sub-surface saturated material can be dewatered prior to drilling and blasting. At this location, a depth to groundwater has shown seasonal variation of between 10 – 20 m below ground level (over the short period of record). There is likely to be hydraulic connection with Lorraine Lake to the north. As such, and given the relative close proximity of the planned pit to the lake, ongoing and more than one dewatering well is likely to be required for efficient mining operations; although further hydrogeological investigation will be necessary to quantify the extent of dewatering that will be necessary.

In addition to the test well discussed above, additional piezometers will be installed in the Project area prior to construction of the test well. This will allow IOC to establish baseline (greenfield) groundwater conditions, and better understand aquifer characteristics in the area. These piezometers will also serve as key data points for the long term pumping test analyses. Subsequent to the commencement of pit development and deep water well pumping, they will allow the progress of dewatering to be monitored. If groundwater monitoring indicates that one well will not provide sufficient draw down of the water table within the mine plan timeframe, additional dewatering infrastructure will be developed. Timing of the first installation of dewatering infrastructure is likely to occur well in advance of the planned timing of mining activity to drill, blast, and dig the currently saturated material.

Groundwater discharge points will be located and designed to minimize or prevent erosion. It is intended that the two discharge points (i.e., for ground water and surface water) will be located near each other to facilitate the on-going efficient monitoring of both discharges. Clean groundwater extracted from wells located outside active mining areas will be discharged directly to Lorraine Lake, or into an 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 waterbodies, but will be discharged into areas of undisturbed forest. Water quality will be routinely monitored, in accordance with existing permits and practices.

Prior to setting up discharge locations in areas of undisturbed forest, IOC investigates the locations to ensure they are suitable, i.e., adequate buffer zones can be established and there are no waterbodies in the immediate vicinity. A rock pad is typically established to dissipate energy and limit the erosion potential. In this way no vegetation is directly impacted at the discharge locations. Inspections are performed at these locations regularly and to date, no discharge pipes have needed to be moved and no channelling or erosion have been observed at these sites. This indicates that these discharge scenarios are working and that discharge is dissipating into the soil as anticipated. No adverse impacts have been noted to the forested areas, water bodies or wildlife species.

2.4.6.1. Dorothy Lake

Dorothy Lake is a small headwater pond, approximately 250 m by 700 m, and its shoreline is in close proximity to, but outside, the proposed final boundary of the pit. The lake has a single known natural surface discharge point located at its north end that drains into Lorraine Lake, approximately 850 m to the northeast.

The groundwater investigation borehole constructed in 2018 situated within the proposed pit, is located within half km of the shoreline of Dorothy Lake. Data and observations from the 2018 borehole are not sufficient to comment conclusively on potential hydraulic connection between the proposed pit and the Lake. Groundwater monitoring infrastructure will be installed in the future and, when combined with data from the 2018 borehole, definitive conclusions will be able to be made.

Further and ongoing investigation will be required to determine what level of hydraulic connectivity exists between Dorothy Lake and the proposed pit. This investigation will be incorporated into IOC's annual hydrogeology drilling/investigation program and as yearly data is acquired and evaluated, it will be possible to determine if health and safety concerns suggest the partial or full removal of Dorothy Lake. If data indicates there is a strong hydraulic connectivity in the 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 understands that discussions with various regulators will be required and that public and Indigenous consultation will be required relative to potential authorizations and/or approvals that will be issued for this work.

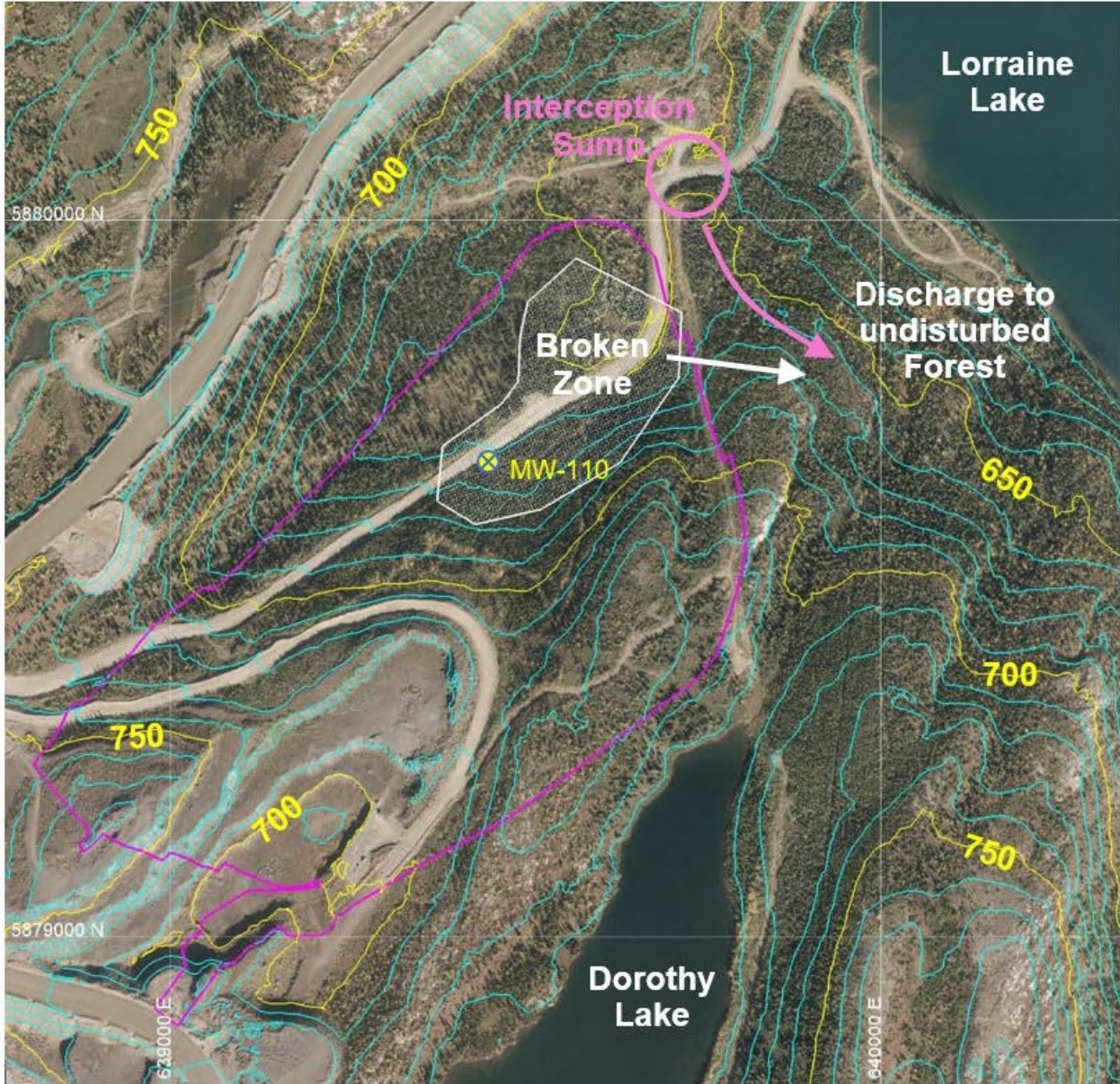


Figure 11: Planned Dewatering Well

2.4.7 Surface Water Management

Surface run-off from the Smallwood North pit area will flow down the natural valley toward Lorraine Lake. To prevent discharge of mine effluent into the lake, an interception sump will be excavated below the pit area prior to the commencement of mine development. Mine run-off collected in the sump will be pumped to a discharge point in an adjacent area of undisturbed vegetation. After the pit has developed below the level of the interception sump, surface run-off will be collected in in-pit sumps and pumped to the same discharge point.

Prior to setting up sump discharge location(s) in areas of undisturbed forest, IOC investigates the locations to ensure they are suitable, i.e., adequate buffer zones can be established and there are no waterbodies in the immediate vicinity. A rock pad is typically established to dissipate energy and limit the erosion potential. In this way no vegetation is directly impacted at the discharge locations. Inspections are performed at these locations regularly and to date, no discharge pipes have needed to be moved and no channelling or erosion have been observed at these sites. This indicates that these discharge scenarios are working and that discharge is dissipating into the soil as anticipated. No adverse impacts have been noted to the forested areas, water bodies or wildlife species.

Discharges to forested areas are sampled four (4) times a year as per provincial water quality requirements. No exceedances have been reported to date.

IOC has an Emergency Response Plan built around ensuring compliance with the Metal and Diamond Mining Effluent Regulations (MDMER) that provides mitigation controls in the event that discharge criteria relative to total suspended solids (TSS) are not met.

Minimal in-pit groundwater ingress is anticipated as a consequence of the planned development of advance dewatering infrastructure, as indicated above. Surface run-off from the Central West Dump will flow to the existing road-side drain beside the main haul road connecting loading pockets 3 and 4 (Figure 9). From there it will be managed by the existing mine water handling system. The Project will use established surface water management infrastructure (e.g., sump, pumps, pipelines & discharge points) to the extent feasible.

2.5 Construction

Construction activities are currently planned to commence by 2024, subject to release from EA, and once all other regulatory approvals and permits are in place. Construction of the new Central Waste Dump will be completed first. Construction activities associated with the Project include the following:

- Vegetation clearing and grubbing;
- Haulage road construction;
- Overburden removal and storage;
- Central Waste Dump construction;
- Waste rock removal and storage to gain access to the first mining bench;
- Power line installation (if required);
- Installation of a dewatering well; and
- Installation of surface water management facilities (sumps, pumps and pipelines).

The Project will be developed in the same manner as all of IOC's existing pits and waste dumps. Contractors will be used to clear vegetation (Figure 12), 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 waste to develop access to the initial mining benches.

Trees in the area of the pit and the waste dump will be mulched. Topsoil and till from the pit area and topsoil from the waste dump area will be stockpiled on the existing Central East overburden stockpile.

Approximately 63 ha will be cleared and stripped in the waste dump footprint and 35 ha will be cleared and stripped in the pit footprint. The remaining area, (42 ha in the dump and 18 ha in the pit) was previously disturbed.

Pit development drilling and blasting will follow overburden stripping in the pit area and will be carried out by a mine contractor. Access to the top mining bench will be excavated by the contractor fleet.

Initial development volumes are listed in Table 3. The clearing area listed is the total undeveloped area of the pit and dump. Some of this area, particularly in the waste dump, has little or no vegetation or topsoil due to rock outcrops so the actual clearing area and topsoil volume will be somewhat less than listed below.

Table 3: Development Volumes

Facility	Total Area	Clearing Area	Previously Disturbed Area	Topsoil	Till	Total Material Stripped	Dev't Drill & Blast
	ha	ha	ha	kbcm	kbcm	kbcm	kbcm
Central West Dump	106.1	64.0	42.1	128		128	
Smallwood North Pit	53.2	34.7	18.5	69	624	693	3644
Total	159.3	98.7	60.6	197	624	821	3644

2.6 Operations and Maintenance

Once the Project has received all required approvals and construction activities have been completed, operations activities will begin. The Project will be operated in the same manner as all of IOC's existing open pits. Once the 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 pit will be hauled to IOC's Automatic Train Operation (ATO) for transportation to the concentrator.

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 Environmental Protection Plan (EPP) (Appendix B) with policies and procedures that 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

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. On May 6, 2020 IOC submitted a new update to this plan that incorporates NL government comments from the previous submission. 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 rehabilitation and closure 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 preserves local biodiversity. 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 is usually completed by either broadcast/drill seeding or hydroseeding methods. 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 operations at Project site, ongoing water management will be conducted as required by any regulatory requirement. The rehabilitation of the Project area will be added to 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 the NL DIET.

The incremental rehabilitation plan for the Project 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 the abandoned pit;
- Revegetation of disturbed areas, as per the approved RCP; and
- Progressive reshaping and revegetating of waste dumps where feasible.

It is anticipated that surface and groundwater flows into the completed Smallwood North pit may result in the development of a pit lake, with a stable water level.

The above rehabilitation activities are consistent with IOC's current site-wide RCP submitted to the NL DIET in May 2020. Figure 13 shows the conceptual rehabilitated Project area.

Depending on the relative timing of Project operations and mining of IOC's other deposits, there could be an opportunity to partially or completely backfill the Smallwood North pit with waste from other mining areas. This will be incorporated into the closure plan when detailed scheduling confirms an opportunity.



Figure 13: 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 impact from the environment on the Project is water inflow into the pit. No specific or special mitigation measures, beyond normal water management strategies (e.g., advance dewatering), are proposed relative to the possible effects of the environment on the Project.

Further groundwater investigations are warranted to gain a better understanding of the hydrogeological regime in the area. Ongoing groundwater monitoring programs will provide substantial amounts of data that can inform conditions at the Project site. This data will enable IOC to accurately predict whether the level of hydraulic connectivity between the proposed pit and Dorothy Lake will require any dewatering of Dorothy Lake. Dewatering will only be considered if the health and safety of workers is deemed to be at risk during planned mining in the Project area. If data indicates there is a strong hydraulic connectivity between the proposed pit and the Lake, 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 understands that discussions with various regulators will be required and 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 Schedule

IOC plans to begin Project construction in the summer of 2024 with the development of the Central West Dump (Table 4). Construction activities associated with the development of the open pit are planned to follow in 2029 and 2030 (Table 5). Open pit mining operations would begin as soon as pit construction activities are completed, assuming release from EA and the receipt of all other required environmental approvals and permits. The development of the open pit could be required at a much earlier date if any major operating pits experience delays or ore shortfalls due to unforeseen reasons, e.g., geological, geotechnical, dewatering.

Table 4: Indicative Development Schedule – Central West Dump

Activity Name	2024					
	Jul	Aug	Sep	Oct	Nov	Dec
Contractor mobilisation						
Tree Clearing / Mulching						
Topsoil Stripping						
Contractor demobilisation						

Table 5: Indicative Development Schedule – Smallwood North Pit

Activity Name	2029												2030								
	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Contractor mobilisation																					
Interception Sump																					
Tree Clearing / Mulching																					
Overburden Stripping																					
Development Drill and Blast																					
Road Building																					
Dewatering commencement																					
Aquifer Testing/Dewatering																					
Powerline Construction																					
Contractor demobilisation																					
Mine production																					

2.11 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 6 provides a list of existing environmental plans at IOC’s 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 6: 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)

2.11.1 Environmental Protection Plan

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 for this 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.

2.11.2 Emergency Response and Reporting Plan

IOC proactively identifies potential emergency situations and develops Emergency Response and Reporting Plans (ERRP), the purpose of which are to identify responsibilities and procedures in the event of an unplanned incident. This can include incidents that may affect human health or safety, or the accidental release of hazardous material, and the ERRP provides 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 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 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 that 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.

2.12 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 northern 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.

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 descriptions of their existing conditions are 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 °C in January to +13.7 °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 7 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 between 640-840 MASL, is located approximately 10 km northwest of the Wabush Airport, 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 7: 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	° C	-	-	-	-4.3	4.0	10.3	13.8	12.5	7.6	0.5	-8.2	-	-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 (SO₂), nitrogen oxides (NO_x), and carbon monoxide (CO). Table 8 provides a list of typical sources of CAC emissions from iron ore operations.

Table 8: 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 14). Data from these monitoring stations is compiled by the NLDECC 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 SO₂, NO_x, PM_{2.5} 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 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 14).

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, which has led to reductions of fugitive dust. Some minor revegetation also occurs within the mining area at berms and other small areas no longer in use.

In 2015-2016, IOC installed a new dust suppression system in the pellet plant loadout area. This is a very effective system that is operational on a 24 hour basis. A dedicated water supply provides water that is mixed with a dust suppressing product stored in an above ground tank located in the screen house of the pellet plant. The solution is applied to the pellets at several transfer points along the belt systems that move the pellets from different locations inside the pellet plant to the boom stackers in the loadout yard. Once the pellets are coated in the chemical mixture, the amount of dust generated as the pellets move within the plant and outside to the loadout yard is greatly reduced. The system is inspected on a weekly and bi-weekly basis and if any issues are identified, they are addressed immediately by the responsible contractor. The dust suppression solution applied to the pellets within the pellet plant are also effective during loading and train shipment to Sept Isles. There are no health and safety issues associated with the product used in the dust suppression system.

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 14: Air Quality Monitoring Locations

3.1.1.2.1. Greenhouse Gas Emissions

Greenhouse gas emissions (GHGs), including carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), can be emitted from a number of natural and anthropogenic sources and processes. The principal GHG emissions generated from diesel fuel combustion are CO₂, CH₄, and N₂O. The 2018 total NL GHGs expressed as carbon dioxide equivalent (CO₂ eq) was 11.0 Mt CO₂ 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 CO₂ eq annually, which account for approximately 10% of the CO₂ 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 engages regularly with officials from the Pollution Prevention Division (PPD) of the NL DECC 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 carbon tax provisions of the RAA and *Regulations*.

The 2018 total Canada GHGs were 729 megatonnes of carbon dioxide equivalent (Mt CO₂ 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 CO₂ 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 CO₂ eq emissions for Canada with CO₂ eq emissions from the existing IOC operations indicates that IOC emissions represent approximately 0.14 % of the CO₂ eq emissions for Canada.

IOC is measuring performance and evaluating various improvement projects that will help achieve GHG reduction targets set by the province. IOC's target is to reduce their baseline GHG emissions by 12% by 2022 and no targets are set after this date. Subject matter experts from cross functional teams will evaluate potential GHG reduction projects on site to determine appropriate investments in an effort to achieve these targets.

Table 9 lists the various sources of GHG emissions from IOC's Labrador City operations. 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. Ore identified to be mined in the current Project will displace other ore sources and as such, the annual GHG emissions will not change as there will be no new sources.

Table 9: Sources of GHG Emissions at IOC's Labrador City Operations

GHG Emission Sources from Mining	
Explosives	Diesel used in blasting
Fuels	Diesel used in mobile equipment (haul trucks, loaders, etc.)
GHG Emission Sources from Pelletizing	
Inputs (Minerals)	Total emissions from Limestone & Dolomite inputs
Inputs (Concentrate)	Total emissions from Concentrate inputs
Furnace (Bunker)	Bunker C used in induration machines
Furnace (Coke)	Coke used in pelletizing process
Steam Production	Bunker C used in Pellet Plant & Heating Plant for pelletizing process
GHG Emission Sources from Concentrator	
Diesel (Furnace)	Furnace used for heat, steam & air for concentrator
Bunker C	Furnace used for heat, steam & air for concentrator

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, usually June 1.

3.1.1.2.2. 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 15). 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 (Figure 16), it is unlikely that adverse effects will be felt at these locations as a result of activities at the Project site.



Figure 15: Noise and Vibration Monitor Locations



Figure 16: Smallwood North Pit Relative to the Town of Labrador City

3.1.2 Habitat Classification

The Project area lies within the Mid Subarctic Forest or Michikamau ecoregion. This ecoregion encompasses the upland plateaus of central and western Labrador. This region has a continental climate characterized by short summers and long winters. Black spruce is the dominant tree species, except in the most northern areas, where white spruce dominates, as is the case on the Project site. Open lichen woodlands and extensive ribbed fen-string bog complexes are characteristic of this ecoregion; however, these vegetation types are not present on the Project site (Fisheries and Land Resources 2017).

The habitat classification work for the Project area was completed late in the year, October 2017, and there was some snow on the ground. Biologists were able to classify the habitat into ecotypes but a detailed inventory of vascular flora was not possible. Previous work on the site did note the presence of *Verratum viride*, considered an S2 plant on the Island of Newfoundland but found in abundance throughout many open areas, wetlands and meadows across IOC's property in Labrador City. The Project area is located in proximity to the Humphrey South Extension Project (HSEP), submitted for EA review in December 2020, and IOC assumes that comparable ecotypes and proximity to the Project area is indicative of a similar suite of flora.

Vegetation typing was carried out to delineate habitat types at a fine scale. Many species, especially rare and uncommon species, have specific habitat associations. Habitat types can be used to determine if there is an elevated potential for occurrence for these species. Vegetation typing was completed by an experienced vegetation specialist using ArcGIS mapping software to derive vegetation cover polygons within the Project boundary. Initial vegetation line work was interpreted at a scale of 1:5,000 using high resolution digital imagery and information gathered in the field. Information was captured consistently based on a static zoom level (1:5,000) with the interpreter defining homogeneous regions for each targeted ecotype. The typing line work was supplemented by a point file within ArcGIS that was populated with attribute information related to each vegetation polygon. This point data was entered based on the interpreter's field experience and familiarity with regional ecotypes and information collected in the field.

The Canadian Wetland Classification System (CWCS 1997) was used to classify wetlands to class and type. Wetland form is difficult to infer through photo interpretation because the attributes that are required to identify wetlands to this level, such as peat depth and land form, cannot be readily assessed. However, it was possible to describe wetlands to form and type based on information collected in the field.

The vegetation mapping for the ELC Study Area identified seven primary ecotypes among a total of 21 polygons. These include White spruce/fir feathernoss, Open spruce/fir feathernoss, Mixedwood, Rocky outcrop, Alpine shrub, Wetland, and Pond. Ecotype distribution and areas are shown on Figure 17 and Table 10, and their characteristics are described below.

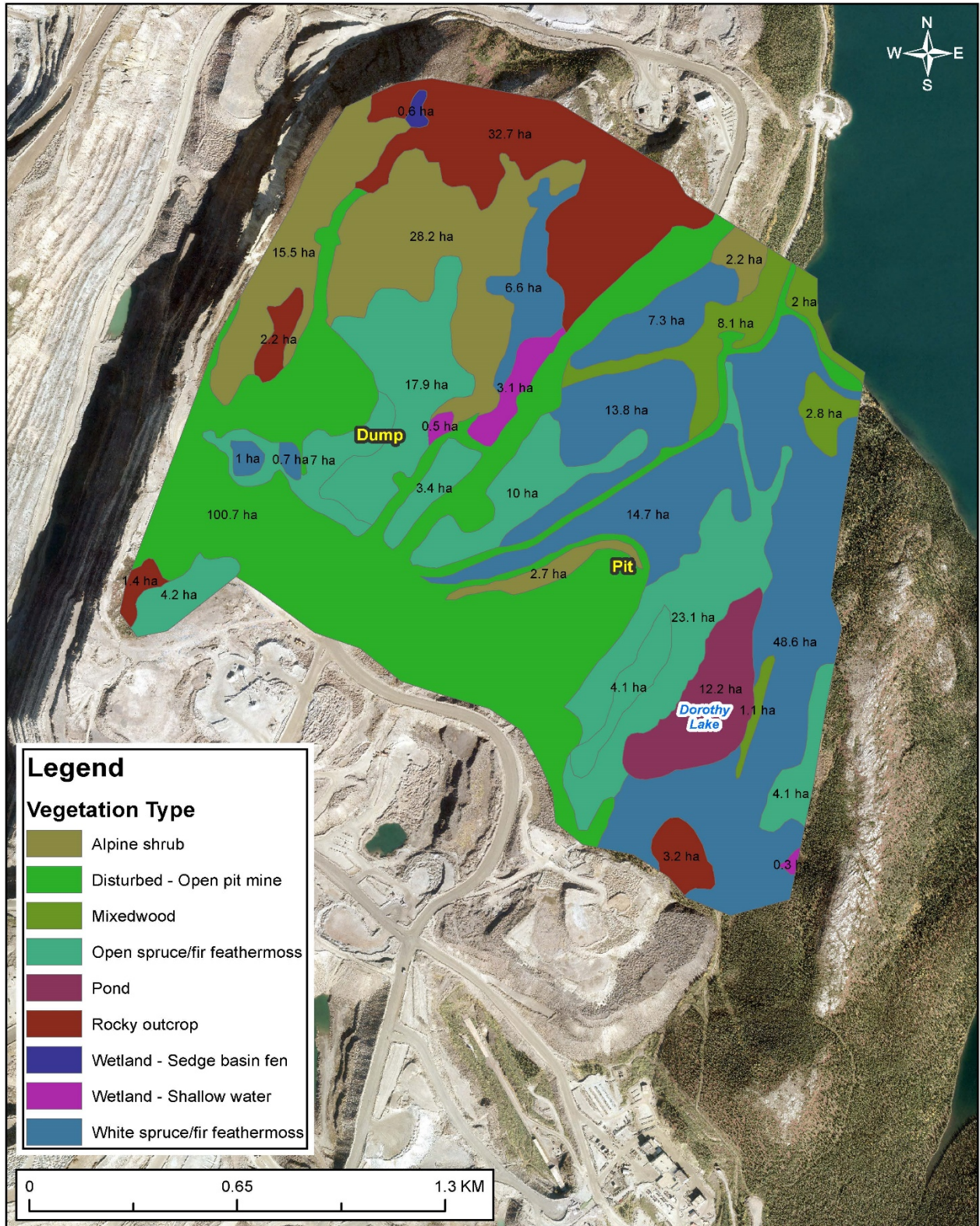


Figure 17: Ecotypes Noted in the Study Area

Table 10: Area of Ecotypes in Study Area

Ecotype	Abbrev.	No. Sections	Area (ha)
White spruce/fir feathermoss	WSFF	7	92.7
Open spruce/fir feathermoss	OSFF	8	73.8
Mixedwood	MXD	4	14.0
Rocky outcrop	RO	4	39.5
Alpine shrub	AS	4	48.6
Wetland - Sedge basin fen	WL	1	0.6
Wetland - Shallow water	WL	3	3.9
Pond	Pond	1	12.2
Disturbed - Open pit mine	DB	1	100.7

3.1.2.1. White spruce/fir feathermoss

White spruce/fir feathermoss (WSFF) forest is the most abundant ecotype in the Study Area. White spruce (*Picea glauca*) and balsam fir (*Abies balsamea*) make up a significant proportion of the tree stratum of this ecotype although black spruce (*Picea mariana*) and sphagnum moss occur as a transitional habitat between coniferous dominated forest and wetland ecotypes. The shrub layer typically consists of low shrub species such as; Labrador tea (*Ledum groenlandicum*) and lowbush blueberry (*Vaccinium angustifolium*). Herbaceous vegetation consists of bunchberry (*Cornus canadensis*), wild lily of the valley (*Maianthemum canadense*), twinflower (*Linnaea borealis*), stiff clubmoss (*Lycopodium annotinum*) and Clinton lily (*Clintonia borealis*). Ground cover consists of a continuous layer of feathermoss species, especially Scheber's moss (*Pleurozium schreberi*).

3.1.2.2. Open spruce/fir feathermoss

Open spruce/fir feathermoss (OSFF) ecotype is a sub-type of WSFF. OSFF is characterized by an open canopied forest of white spruce, black spruce and balsam fir in various stages of development. Reindeer lichen (*Cladonia rangiferina*) and caribou lichen (*Cladonia stelleris*) tend to be more prevalent due to xeric conditions. The shrub layer is similar to the WSFF, however the density of low shrubs is higher. OSFF is generally topographically confined to ridge tops or areas where soils are thin and water availability is low.

3.1.2.3. Mixedwood

Mixedwood (MXD) ecotype is dominated by white spruce, balsam fir and white birch. It may transition to WSFF over time as the white birch component dies. The shrub and herbaceous layers are similar to that found in WSFF.

3.1.2.4. Rocky outcrop

Rocky outcrop (RO) ecotype is windswept with a thin surface layer that is comprised of bedrock, exposed soil, stone and boulders. The shrub layer is composed mainly of ericaceous shrubs. Ground cover consists of grasses, lichens, mosses and smaller berry plants such as black crowberry.

3.1.2.5. Alpine shrub

Alpine shrub (AS) ecotype is defined as a non-forested, shrub-dominated habitat found on hummocky terrain and may have thin soils with exposed bedrock. Ericaceous shrubs dominate; having relatively high percent cover values. Tree species are always stunted and rarely grow above the shrub layer. The herb layer, also species-rich, is nearly always dominated by ground lichen and, in particular, reindeer lichen.

3.1.2.6. Wetland

The Wetland (WL) ecotype is comprised of two sub-ecotypes, fen and marsh, respectively. Wetland ecotypes were classified using the CWCS, which divides wetlands into class, form and type. Five classes are recognized under the CWCS; bog, fen, swamp, marsh and shallow water. Forms are differentiated based on surface morphology, pattern, water type and underlying mineral soil. Types are classified according to dominant vegetation.

Of the five wetland classes recognized by the CWCS only two classes were identified in the Project area, fen and shallow water wetland. Fens are characterized by the movement of mineral rich surface water via pools, channels and open water. A single type of fen was identified in the Study Area, sedge basin fen. Shallow water wetlands are characterized by standing or flowing water that is less than 2 m deep during mid-summer. Water levels are seasonally stable and aquatic plants dominate vegetation.

3.1.2.7. Pond

Ponds are waterbodies greater than 2 m deep. Water levels are seasonally stable and vegetation tends to be confined to pond margins. Dorothy Lake is a small oligotrophic waterbody located east of the planned open pit with a surface area of approximately 14 ha and a maximum depth of approximately 19 m near the lake center (Beak 2001). A 2017 fish study estimated fish populations at 329 brook trout (95% confidence interval between 180 to 548 fish) and 534 lake chub (95% confidence interval between 275 to 811 fish) (SEM 2017). The outlet to Dorothy Lake is poorly defined, with more bog than stream. The lower reaches are shallow and have a narrow defined channel with low flows and numerous chutes and drops acting as partial and complete fish barriers. The outflow to Dorothy Lake likely freezes in winter so does not represent rearing, spawning, overwintering or migratory habitat.

3.1.3 Regional Wildlife

The interior of western Labrador, with its myriad forest types and extensive wetlands, provides habitats for a range of wildlife that are typical of boreal forest ecosystems. During the fall of 2017, SEM carried out field surveys within and outside the footprint of the Project area to better understand the habitat types and the wildlife species using them.

Habitat types encountered included WSFF, OSFF, MXD, RO, AS, WL and Pond. The first two types are dominated by balsam fir and white spruce, with black spruce in wetter areas. MXD is primarily found along slopes and is scarce in the Project area. These various habitat types are suitable for a diversity of wildlife species, including terrestrial birds, small and large mammals, and amphibians.

Species at Risk (SAR) in NL are protected at two levels: under the federal *Species at Risk Act* (SARA 2002) and the provincial *Endangered Species Act* (ESA) (GNL 2001). The SARA was created to prevent listed species from disappearing, to facilitate recovery of listed species, and to avoid further declines in species of special concern. This legislation makes it an offence to kill, harm, harass, capture, take, possess, collect, buy, sell or trade an individual, or damage or destroy the residence of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated. The intent of SARA is to protect critical habitat as much as possible through voluntary actions and stewardship measures (SARA 2017). The provincial ESA provides protection for native plant and animal species, sub-species and populations considered to be endangered, threatened, or vulnerable.

3.1.4 Mammals and Species at Risk

To establish baseline information on mammals using or potentially using the Project area, SEM conducted baseline wildlife transect surveys in October 2017, and combined the information with that from literature on occurrence and distribution of mammals in western Labrador. In addition, information was incorporated from previous studies on adjacent IOC properties, the Nature Conservancy, Environment and Climate Change Canada (ECCC), and local ecological knowledge of trappers. Transects were surveyed on foot along routes that traversed various habitat types to ensure adequate coverage and wildlife evidence detection.

Along the transects wildlife biologists recorded all evidence of wildlife, including evidence of small mammals, furbearers, black bear (*Ursus americanus*), ungulates, birds, and amphibians. Evidence of the presence of these animals consisted of observations of tracks, scat and auditory detections by biologists trained and experienced in the identification of animal sign, wildlife habitat, and bird vocalizations. Tracks in close proximity (<50 m) of each other were counted as one track if the age of the track was equivalent. Transect data were combined with information from literature searches to give a comprehensive list of wildlife species that use, or may use, the Project area.

Tracks or evidence of several mammal species were detected during October surveys in the Project area, including American marten (*Martes americana*), American mink (*Mustela vison*), deer mouse (*Peromyscus maniculatus*), ermine (*Mustela erminea*), red fox (*Vulpes vulpes*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), and vole spp. (*Microtus* spp.). Tracks were detected across all the habitat types.

In a previous Registration document for the Sherwood North Project (GEMTEC 2017), a nearby property to the Project area, biologists conducted transect surveys to detect mammals using the area, including small mammals, furbearers, black bear (*Ursus americanus*), and ungulates. Mammal species detected included black bear, Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), moose (*Alces alces*), muskrat (*Ondatra zibethicus*), red fox and red squirrel. Moose, wolf and red squirrel were the most commonly detected mammal species in the Sherwood North area. A survey of the Moss pit area in 2012 produced observations/sign for eight mammal species in the area; red fox, wolf, snowshoe hare, marten, ermine, red squirrel, northern flying squirrel (*Glaucomys sabrinus*) and porcupine (*Erethizon dorsatum*) (AMEC 2012a). In addition, otter (*Lontra canadensis*) and muskrat (*Ondatra zibethicus*) are known to occur in lakes around the IOC properties (SEM 2017, pers. comm.).

Other mammals that may be found in the general area of IOC in Labrador City, but were not detected on previous surveys, include beaver (*Castor canadensis*), cinereus shrew (*Sorex cinereus*), pygmy shrew (*Sorex hoyi*), eastern heather vole (*Phenacomys ungava*), rock vole (*Microtus chrotorrhinus*), least weasel (*Mustela nivalis*), fisher (*Martes pennanti*), little brown bat (*Myotis lucifugus*), meadow jumping mouse (*Zapus hudsonius*), meadow vole (*Microtus pennsylvanicus*), northern bog lemming (*Synaptomys borealis*), southern red-backed vole (*Clethrionomys gapperi*) and star-nosed mole (*Condylura cristata*).

From the 2017 wildlife survey list, it is quite likely that marten, mink, snowshoe hare and some vole and mouse species are residing in the Project area. It is possible that beaver and otter are also using the Project area, specifically Dorothy Lake, which would provide adequate foraging and breeding habitat for either species. All the ecotypes identified for the Project area could be potential habitat for mammal species. Overall, the Project area appears to have abundant wildlife species and diversity, as expected for the ecoregion type in western Labrador.

3.1.4.1. Mammal Species at Risk

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*) (Table 10).

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 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. 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).

Current information indicates that the migratory George River Herd is known to occur to the north and northeast of the Project area. A February 2012 aerial survey completed for IOC by SNC did not produce any caribou observations within a 40 x 40 km (1,600 km²) regional study area that encompassed IOC’s Labrador City operations (SNC 2012).

Wolverine is listed as Endangered in the federal SARA registry and under the provincial ESA. It has not been verified in Labrador since 1950, and there is no evidence to suggest this species exists in the vicinity of the Project or other IOC properties in Labrador City. Wolverines have extremely large home ranges and require relatively pristine and unfragmented habitat.

Table 11: Mammal SAR with Ranges that may extend into the Project Area

Common name	Scientific name	Taxon	SARA status	Provincial Status	Presence at Smallwood
Little brown bat	<i>Myotis lucifugus</i>	Mammals	Endangered	None	Possible
Northern long-eared bat	<i>Myotis septentrionalis</i>	Mammals	Endangered	None	Possible
Boreal woodland caribou	<i>Rangifer tarandus</i>	Mammals	Threatened	Threatened	Possible
Wolverine	<i>Gulo gulo</i>	Mammals	No Status	Endangered	Highly unlikely

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).

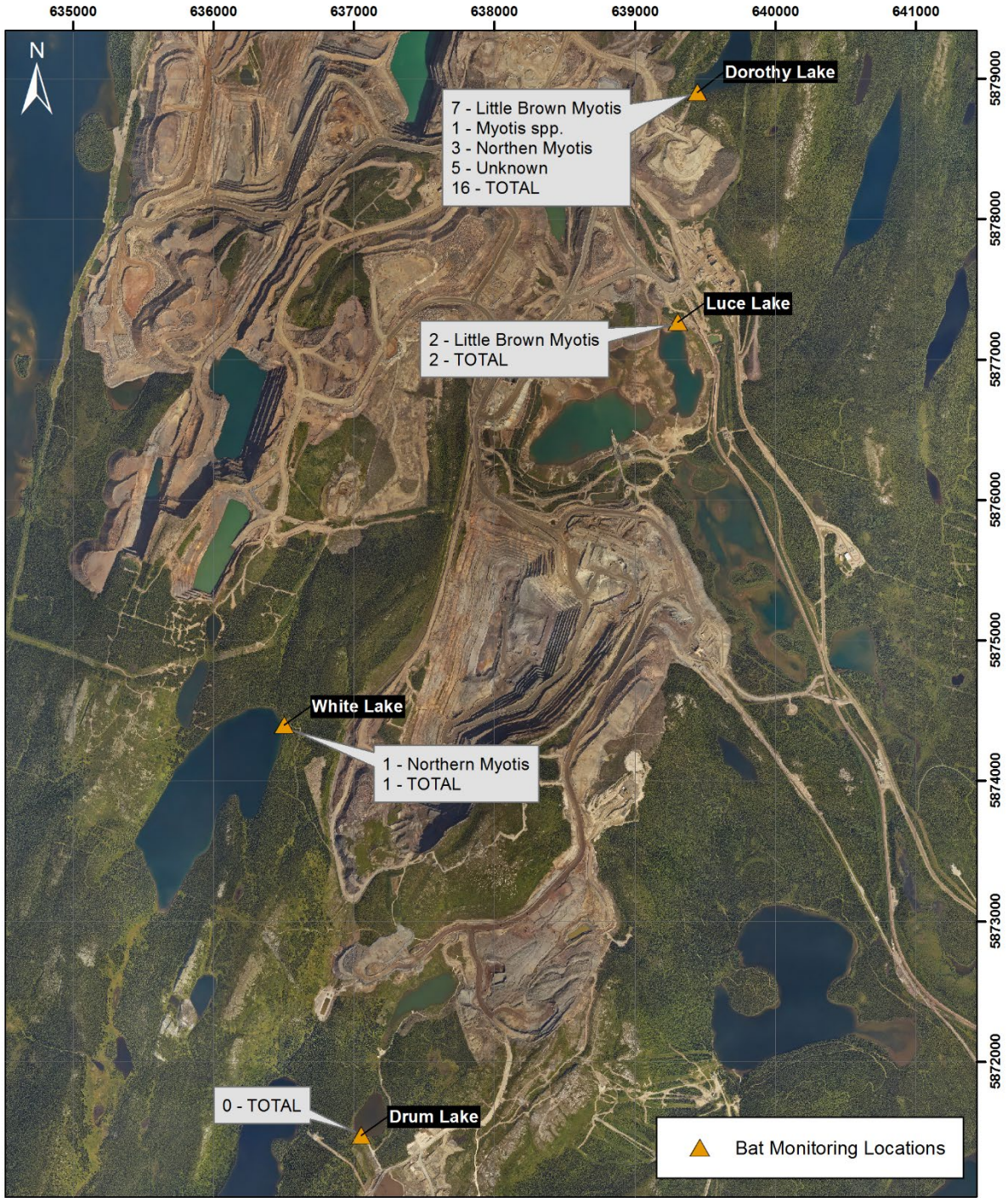
Based on the habitat types identified in the Project area in 2017, SEM identified the little brown bat and the Northern long-eared bat as potentially occurring in the Project area. Open habitats would provide sufficient foraging sites, snags would provide roosting sites and snags and/or large overmature 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 (Table 11). One of the locations was in the Dorothy Lake area (Figure 17). 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. 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 12: *Myotis* spp. Observations on Labrador City Mining Property

Site	Little brown bat	<i>Myotis</i> 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 noted 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.



	2020 Bat Monitoring Program	PAGE NO: 2	PREPARED BY:
	Monitoring Results	COORDINATE SYSTEM: NAD 83 UTM Zone 19	DATE: 18/11/2020

Figure 19: Bat Monitoring Locations

3.1.5 Avifauna and Species at Risk

Common resident and migratory species of birds in the interior of western Labrador include raptors, waterfowl, passerines and upland game birds. There are over 170 species of birds known from the Labrador City area (Audubon and Cornell University, 2017). This total includes all species observed from the area, including those passing through during migration, rarities, and several species for which the Project area would not be considered suitable habitat. The biodiversity of bird species expected for Project area is low to moderate, given the relative homogeneity of forested habitat and data from past surveys on nearby IOC properties, but many of the species would be mature forest specialists.

Many migratory bird species are protected by the *Migratory Birds Convention Act* (MBCA), which states that it is illegal to harass or kill migratory birds, or to destroy or disturb their nests or young. Some bird families, such as Accipitridae (ospreys, eagles, and hawks), Falconidae (falcons), Strigidae (owls), Phasianidae (grouse, ptarmigan and other gamebirds) as well as some species of Icteridae (blackbirds) and Corvidae (jays and crows) are not protected by the MBCA. However, breeding raptors and owls are protected under provincial regulations with the requirement for buffers around nests. For example, clearing of land is not permitted within 800 m of a bald eagle or osprey nest during the nesting season (March 15 to July 31) and not allowed within 200 m during the remainder of the year. The 200 m buffer also applies to all other raptor and owl nests (e.g., northern goshawk (*Accipiter gentilis*), sharp-shinned hawk (*Accipiter striatus*), merlin (*Falco columbarius*), American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*), boreal owl (*Aegolius funereus*) and northern saw-whet owl (*Aegolius acadicus*).

Data from past surveys of the Moss pit area, a nearby IOC property to the south, provide pertinent information to estimate the baseline conditions of the Project area relative to bird diversity. The bird species of the Moss pit area were described in 2012, 2014, and 2017 (AMEC 2012 b and c, AMEC 2014, SEM 2017). Some of the species most frequently detected during breeding season surveys were white-throated sparrow (*Zonotrichia albicollis*), American robin (*Turdus migratorius*), Swainson's thrush (*Catharus ustulatus*), dark-eyed junco (*Junco hyemalis*), fox sparrow (*Passerella iliaca*), hermit thrush (*Catharus guttatus*), yellow-rumped warbler (*Setophaga coronata*), Lincoln's sparrow (*Melospiza lincolnii*), red-breasted nuthatch (*Sitta canadensis*), yellow warbler (*Setophaga petechial*) and common raven (*Corvus corax*). A 2012 fall migration survey produced detections of sixteen bird species, including common raven, gray jay, ruby-crowned kinglet, boreal chickadee, Wilson's snipe, white-throated sparrow, fox sparrow, dark-eyed junco, pine grosbeak, pine siskin (*Spinus pinus*), song sparrow (*Melospiza melodia*) and American pipit (*Anthus rubescens*). A 2012 winter survey of the Moss pit Project site produced detections of spruce grouse (*Falcapennis canadensis*), willow ptarmigan (*Lagopus lagopus*), snow bunting (*Plectrophenax nivalis*), common raven, pine grosbeak (*Pinicola enucleator*), boreal chickadee (*Poecile hudsonicus*) and gray jay (*Perisoreus canadensis*) (AMEC 2012b).

In addition to the surveys above, SEM conducted surveys of the Project area in October 2017, Magy Lake Strike Extension in October 2017, and of Moss in June 2017. The fall Project surveys produced detections of the following species: American robin, common raven, spruce grouse, white-winged crossbill, pine grosbeak, gray jay and pine siskin. Magy Lake Strike Extension surveys produced detections of those same species with the addition of black-backed woodpecker. Moss Project transect surveys covered all habitat types occurring within the Moss pit Project area, most of which also exist within the Project area. Some of the species detected during those surveys included: alder flycatcher, boreal chickadee, brown creeper, common loon, common raven, dark-eyed junco, fox sparrow, gray jay, great-horned owl, hermit thrush, magnolia warbler, northern flicker, northern waterthrush, orange-crowned warbler, ruby-crowned kinglet, solitary sandpiper, spruce grouse, Swainson's thrush, Tennessee warbler, three-toed woodpecker, white-crowned sparrow, Wilson's snipe, Wilson's warbler, white-throated sparrow, yellow-rumped warbler, and yellow warbler. These species are all possible breeders within the boundaries of the Project area.

3.1.5.1. Raptors

Raptors are protected by the NL *Wild Life Act*, which prohibits the hunting, taking, killing, or possessing of any eagle, falcon, hawk, osprey or owl.

There are a number of raptor species that are known to occur in the Labrador City area, including:

- American kestrel (*Falco sparverius*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Boreal owl (*Aegolius funereus*)
- Golden eagle (*Aquila chrysaetos*)
- Great-horned owl (*Bubo virginianus*)
- Merlin (*Falco columbarius*)
- Northern goshawk (*Accipiter gentilis*)
- Northern harrier (*Circus cyaneus*)
- Northern hawk owl (*Surnia ulula*)
- Osprey (*Pandion haliaetus*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Rough-legged hawk (*Buteo lagopus*)
- Short-eared owl (*Asio flammeus*)

SEM conducted avifauna surveys and an aerial raptor survey in June 2017 for the Moss pit area and noted observations of red-tailed hawk, rough-legged hawk, osprey, bald eagle, northern goshawk and American kestrel. No nests were discovered for these species at the Moss pit area. Red-tailed hawk was also observed on July 6, 2017, 50 m west of the IOC main gate, being “mobbed” by common ravens (*Corvus corax*). Additionally, SEM conducted avifauna point count surveys and an aerial raptor survey in early July 2017 on the Sherwood North Project Area. Northern goshawk was the only raptor species detected during avian point count surveys and no raptors were detected during the aerial survey of the Project area.

Other raptor species that may exist in the vicinity of the Project include the sharp-shinned hawk (*Accipiter striatus*) and gyrfalcon (*Falco rusticolis*). The sharp-shinned hawk is on the northern threshold of its range in the Labrador City area and, although not observed, it is a possible breeder in the Project area. The gyrfalcon, the largest of the falcons, and a ptarmigan specialist, is typically a non-breeder in the Labrador City area, preferring more northerly climes above the tree line. It could possibly occur in the Labrador City area but is very unlikely to be found at the Project area given its habitat preferences (open tundra). Similarly, the golden eagle is unlikely to breed in the area of IOC's Labrador City operations given its intolerance for disturbance and development.

3.1.5.2. Waterfowl

Waterfowl species are protected federally by the MBCA. Some of the species known to occur in the Labrador City area include:

- American black duck (*Anas rubripes*)
- Canada goose (*Branta canadensis*)
- Common goldeneye (*Bucephala clangula*)
- Common loon (*Gavia immer*)
- Common merganser (*Mergus merganser*)
- Green-winged teal (*Anas crecca*)
- Northern pintail (*Anas acuta*)
- Red-breasted merganser (*Mergus serrator*)
- Ring-necked duck (*Aythya collaris*)

Waterfowl surveys conducted in 2012 and 2014 by AMEC, (AMEC 2012b, AMEC 2014), noted observations of common goldeneye, ring-necked duck, and red-breasted merganser.

Suitable habitat for waterfowl is very scarce in the Project area, and consists primarily of Dorothy Lake and some marginally suitable wetland areas along the haul road through the center of the Project area. The general region surrounding the Project area has abundant and highly suitable habitat available and, as such, the project is not expected to affect any significant waterfowl habitat.

3.1.5.3. Avifauna Species at Risk

Project planning and assessment for the Project was initiated in the spring, which meant that the field studies were conducted in October 2017. There were no SAR observed in the Project area during the October field surveys and it should be noted this is not the customary temporal window (spring/summer) to optimally detect most SAR. There will however be additional surveys in the future for any development planned for the spring or summer.

Field surveys are just one component of how SAR presence and SAR habitat use are considered for EA purposes. Other components include literature reviews and habitat association assessments. For the Project area, the habitat association assessment was based on site specific information collected using drone technology, which captures highly detailed imagery of the Project area. An experienced vegetation biologist used the imagery collected to create a

vegetation land classification for the entire Project area, and an experienced terrestrial biologist provided an assessment of the likelihood of occurrence of various listed species based on the identified habitat types. In completing this exercise, the number of SAR considered to potentially be using the Project area is conservative. The baseline for potential SAR within the boundaries of the Project area was derived by using the habitat assessment, a literature search and field surveys.

Several SAR are possibly using habitats within the Project area, but most are unlikely given historical data and the landscape context (i.e., the area exists within the matrix of a disturbed landscape with considerable human presence, noise, and machinery use). Table 13 below summarizes the results of the SAR review.

Table 13: Avifauna SAR with Ranges that may extend into the Project Area

Common name	Scientific name	Taxon	SARA status	Provincial Status	Presence at Smallwood
Common nighthawk	<i>Chordeiles minor</i>	Birds	Threatened	Threatened	Possible
Olive-sided flycatcher	<i>Contopus cooperi</i>	Birds	Threatened	Threatened	Possible
Rusty blackbird	<i>Euphagus carolinus</i>	Birds	Special Concern	Vulnerable	Possible
Short-eared owl	<i>Asio flammeus</i>	Birds	Special Concern	Vulnerable	Possible
Bank swallow	<i>Riparia riparia</i>	Birds	Threatened	None	Possible

Note: Several species were omitted from this table based on their distribution, known occurrences, biology, and/or habitat requirements.

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. Both federal and provincial endangered species legislation, SARA and the ESA, the *Migratory Bird Convention Act, 1994*, (MBCA) protects these species and nests during the breeding season.

The ACCDC report 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.

No avian SAR were detected during October wildlife surveys of the Smallwood North area. Given the habitat types present, it is possible that between one and four avian SAR can be found within the Project area. 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 Project area however.

The common nighthawk is listed as Threatened on SARA and the ESA because of large declines across an extensive portion of its range. This brownish-greyish insectivorous bird breeds across Canada, and requires open foraging areas, such as wetlands or fields for hawking insects. Common nighthawk has been observed several times in the Labrador City area (eBird 2017). The cause of the massive Canada-wide decline remains unknown at this time, but possible threats include habitat loss/fragmentation, reduced insect populations, and climate change. Environment Canada (2015) states: “At present, the available information is not adequate to identify the habitat necessary for the survival or recovery of the common nighthawk in Canada.” The Project area contains several wetlands and open areas which would comprise potentially suitable foraging habitat for common nighthawk. These habitats would be identified as WL, RO, and AS ecotypes within the Project area.

The olive-sided flycatcher is also listed as Threatened both federally and provincially. This large flycatcher hawks insects on the wing in open areas like bogs, forest edges, meadows, and burned areas. Declines in this species may be attributed to a widespread loss of wintering habitat in Central America, and because of the rapid decline, the IUCN has classed the species as “Near Threatened” (IUCN 2016). There are three records of this species from the Labrador City area (eBird 2017). There are some wetland and open areas within the Project area, which would comprise suitable foraging and breeding habitat for olive-sided flycatcher. These habitats would be identified as WL, RO and AS shrub ecotypes within the Project area.

Rusty blackbird is listed as Vulnerable under the ESA (and by the IUCN), and as a species of Special Concern under SARA. It has experienced a long-term decline but the decline has accelerated in recent years (IUCN 2017). The males of this medium-sized blackbird have a greenish sheen and a yellow eye, while females are greyish-black and lack the greenish sheen. Rusty blackbird may be found throughout NL during spring/summer, breeding in forest wetlands (mostly bogs), often with dead standing timber. Multiple sightings of this species have been recorded for the Labrador City area (eBird 2017). Marginally suitable wetland habitat exists for rusty blackbird within the Project area but with minimal standing timber, it would be atypical for the rusty blackbird to use these wetlands for breeding.

The short-eared owl, listed as Vulnerable on the ESA list and as a species of Special Concern on the SARA list, is known from several observations in the Wabush and Labrador City areas (Schmelzer 2005, eBird 2017). Short-eared owl was not detected during surveys of the Moss pit area (south of the Smallwood North area) by SEM in 2017 (SEM 2017). This species breeds in open habitats including bogs, tundra, marshes, pastures and grassland. They are highly nomadic, moving around with fluctuations in small mammal densities. It is a difficult species to monitor because of its nomadic nature, and because it is usually difficult to observe except when flying. It is most easily seen at dawn and dusk (i.e., crepuscular activity). In Arctic climates eggs are laid in mid to late June (so Labrador may be slightly ahead of this, but records appear to be non-existent), incubation lasts approximately one month, and nestlings fledge after two weeks in the nest. Accurate estimates of short-eared owl populations have eluded biologists, but according to data from the North American Breeding Bird Survey (Sauer *et al.* 2016), overall populations have remained relatively stable between 1966 and 2015. Habitat loss has been implicated as the major contributor to declining populations of this species (Cornell University 2017). There are some

open habitats within the boundaries of the Project area that would comprise suitable foraging and nesting habitat for this species, in particular the RO and AS ecotypes in the northern sections of the Project area.

Bank swallow has shown a long-term decline of close to 98% (COSEWIC 2013) in recent decades, but the definitive causes of the decline are unclear. Under COSEWIC, the species was designated as Threatened in May 2013, but has not yet been listed under the SARA. With such severe and rapid declines, this listing is likely imminent. Bank swallows nest in vertical banks in a variety of natural and altered environments. These can range from natural banks along rivers, lakes and oceans, but can also include those of aggregate pits, road cuts and stockpiles of soil. These birds are highly social, nesting in colonies of between 10 to 2,000 active nests (BNA Online 2017). This species is widespread across North America and has variable nesting chronology, depending on the region. The period in which these nests are used not only includes incubating eggs and taking care of flightless chicks, but also a period after the chicks learn to fly as they return to the colony to roost. For western Labrador, the maximum duration of nesting for bank swallow would likely encompass May to mid-August. Overburden stockpiles created within the Project area could provide nesting habitat for bank swallows. Bank swallows can establish colonies quickly, over a few days, with constructions reported as quickly as overnight. The Dorothy Lake area would contain suitable foraging habitat for bank swallow, as would the wetland areas within the Project area boundaries.

The other avian SAR that have distribution ranges overlapping the Project area are chimney swift, harlequin duck, peregrine falcon, and Barrow's goldeneye. The harlequin duck's breeding habitat is fast-flowing mountain rivers so it is improbable the species would use the area for anything more than staging habitat. Typical breeding habitat for Barrow's goldeneye are tree cavities near waterbodies, but there are no ACCDC records of this species in the Project area (SEM 2018). Another SAR that is possible but unlikely for the Project area is the Eskimo curlew which is listed as Endangered and is probably extinct.

3.1.6 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 Project area 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*).

There are records for all of these species in western Labrador, except for the northern leopard frog, which is known from the Lake Melville area (NL Nature Atlas 2017, COSEWIC 2009). These species all prefer moist to wet environments, including bogs, marshes, ponds, and streams. Within the Project area, the suitable ecotypes for amphibians would consist primarily of WL and Pond. When SEM conducted wildlife surveys around Sherwood North, an area near the Project in the summer of 2017, two amphibian species were observed: tadpoles of American toad (*Anaxyrus americanus*) and wood frog (*Lithobates sylvaticus*).

3.1.7 Wetlands

Wetlands are defined as areas of land that are saturated or covered by water for some time during the growing season, have poorly drained soils, and host predominantly hydrophytic (i.e., water-loving) vegetation. Wetlands are environmentally significant for several reasons, including: water filtration, water storage (water recharge), flood reduction and control, carbon absorption, erosion control, and wildlife habitat (Nova Scotia Museum 1996).

An October 2017 survey of the area identified several small wetlands within the boundary of the Project area, however none were considered significant wetland habitats (Figures 20 and 21).



Figure 20: Shallow water wetland along the haul road in the Project area



Figure 21: Sedge basin fen in the NW section of the Project area

3.1.8 Geology and Topography

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

The Smallwood North Pit 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, which includes the Project area, 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 Smallwood North deposit lies within the Sokoman Iron formation, which consists of a lower waste unit (LIF), overlain by a middle ore-bearing unit (MIF), which is, in turn, overlain by an upper waste unit (UIF) (Table 14). The MIF unit is also cut by internal waste units of quartz-carbonate, fibre, limonite, and metagabbro. Figure 22 shows the interpreted surface geology of the Project area. The pit footprint is covered almost entirely by Sokoman Formation and the waste dump footprint is mostly over an outcrop of Attikamagen Formation, with some areas of Wishart quartzite and lower iron formation.

The various strata in the Smallwood North area are intensely folded, with the waste dump lying over an anticline and the pit exploiting a syncline. Dips of the fold limbs and fold axis vary locally between 30 and 50 degrees.

Table 14: 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 hematite-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-carbonate-magnetite, and/or quartz-carbonate-silicate, and/or quartz-carbonate-silicate-magnetite, and/or quartz-magnetite-specular 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

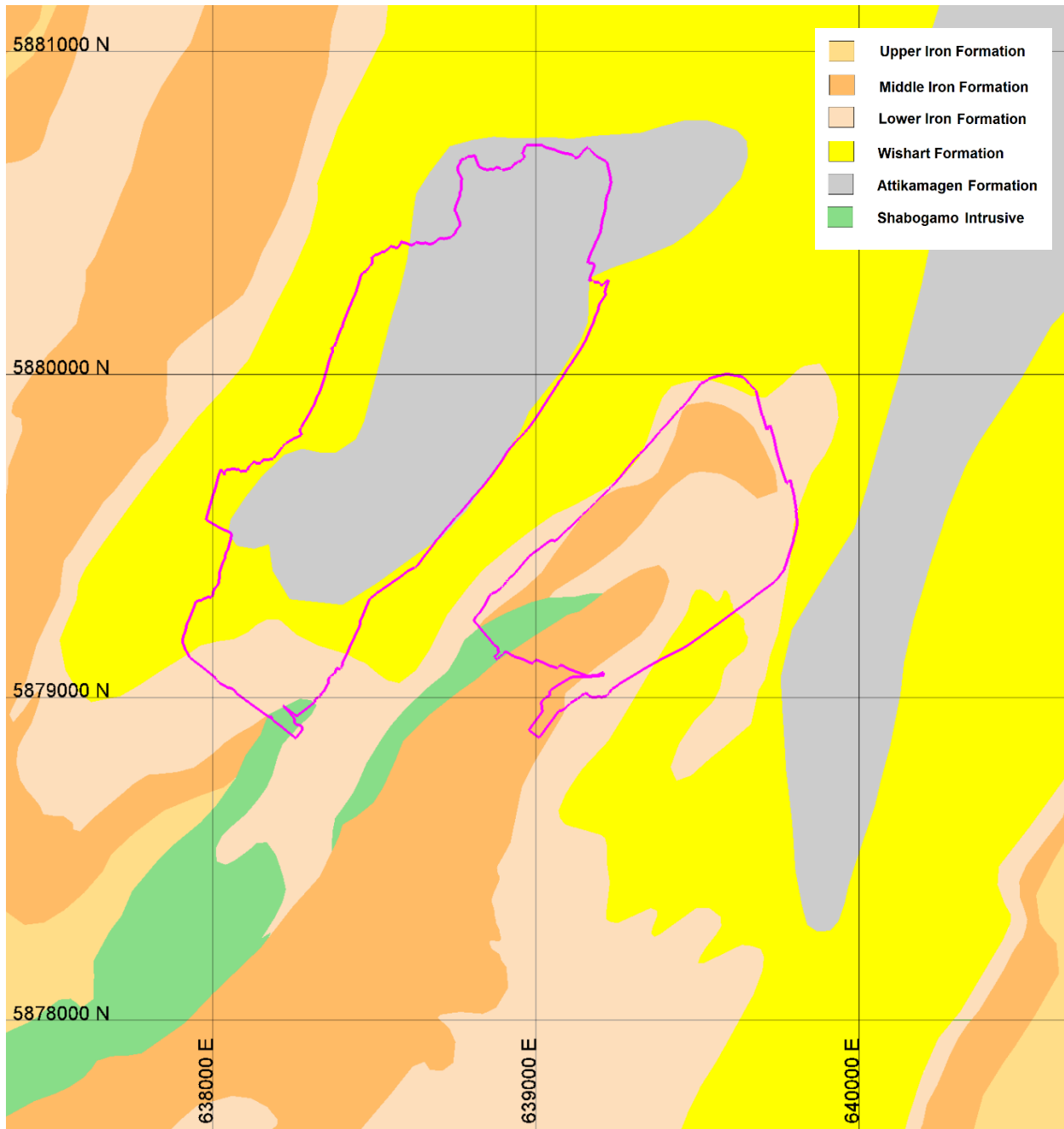


Figure 22: Surface Geology of Project Area

3.1.9 Acid Rock Drainage Metal Leaching (ARDML) Potential

Acid rock drainage (ARD) 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 ARD has been observed in any of IOC's operations in its 55 years of operations.

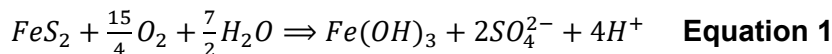
Recent studies have indicated however the potential for acid generation from low sulphide material in the Shabogamo intrusive unit (~0.15% S) and in limonitically altered iron formation (~0.04% S).

The Smallwood North pit is expected to contain both Shabogamo intrusives and limonitic alteration, so both drill core and grade control samples will be assessed for acid generating potential, using a simple Acid-Base Analysis (ABA). ARD risk will be managed by either encapsulating the potentially acid generating waste with high carbonate waste, or ensuring good mixing of acid generating and acid neutralising wastes.

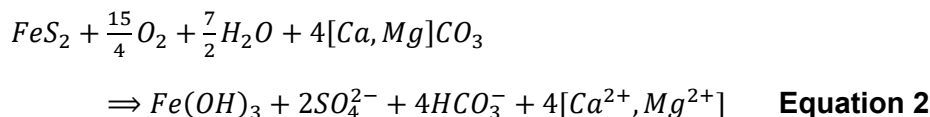
IOC currently logs all blast holes for lithology and approximately 16% of blast holes in ore units and gabbro intrusions (every second hole on every third row) and approximately 11% of holes in other waste types (every third hole on every third row) for chemistry.

3.1.9.1. ARD Fundamentals

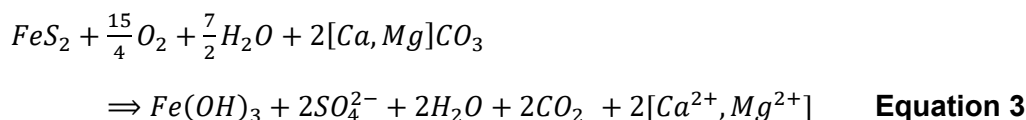
Acid Rock Drainage (ARD) is caused by the oxidation of sulphide minerals, leading to the generation of sulphuric acid (Price 2009 and Lorax 2018a). For pyrite, the reaction is:



Acid generated from oxidation of sulphides can be neutralized, either partially or 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 (CaCO₃ or MgCO₃) to neutralize the acid produced from each mole of pyrite:



In more acidic conditions (pH < 6.3), the carbonates react to CO₂ and H₂O. This reaction only requires 2 moles of carbonate to neutralize the acid produced from each mole of pyrite:



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.

3.1.9.2. 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 CaCO₃. For simplicity, the AP is also expressed as the kg/t of CaCO₃ 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:

$$NPR = \frac{NP}{AP} \quad \text{Equation 4}$$

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 (%CO₂), 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 CO₂ 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 CaCO₃:

$$AP = \%S \times 31.25 \quad \text{Equation 5}$$

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

For all rock types except the gabbro, the equivalent CO₂ grade to be used in the above equation is derived from the CaO and MgO grades using the following equation:

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

In equation 7 above, 44.01 is the molecular weight of CO₂, 56.08 is the molecular weight of CaO and 40.30 is the molecular weight of MgO.

3.1.9.3. ARD Assessment of Drill Core

An ABA has been carried out on the sample database for the Smallwood North deposit. This analysis used assayed sulphur and carbon dioxide grades from all diamond drill holes in the deposit. This analysis indicates that approximately 10% of the material in the Smallwood North deposit is potentially acid generating, although at a very low sulphur grade (0.034%). 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 15 compares the ARD potential of the Smallwood North deposit with a number of other IOC deposits. The proportion of potential acid generating (PAG) material in the Smallwood North deposit is slightly higher than in the Luce deposit, but lower than in the other large deposits (i.e., Moss and Humphrey South). The ARD risk in the Smallwood North 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 (90% 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 has also undertaken an external ARD assessment of the deposit using a geochemist qualified in ARD assessment. Results from that assessment are expected soon.

Table 15: 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
Smallwood North	433	10%	0.03	0.04	0.10	4.99

3.1.9.4. 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 23 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 encapsulation of the PAG waste.

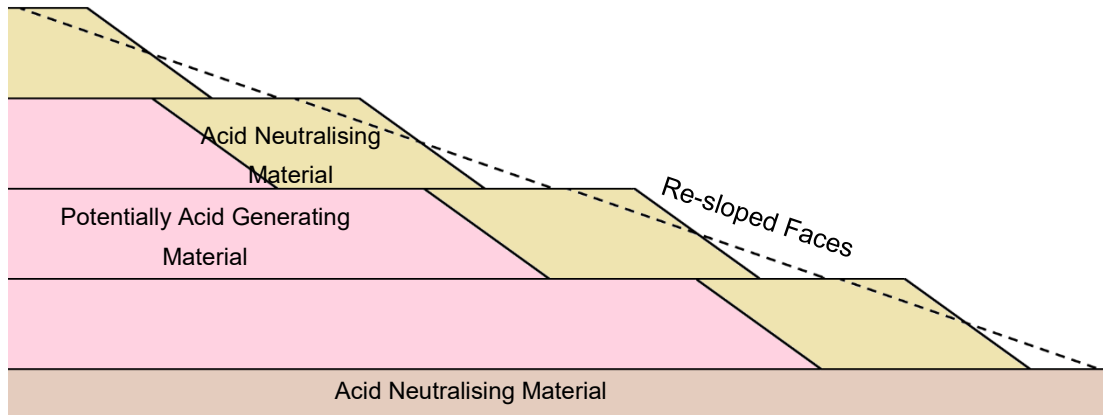


Figure 23: Conceptual Encapsulation of Acid Generating Material

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.

3.1.10 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 Project area will be captured via sumps and either pumped or gravity fed via ditches to ensure runoff reports directly to vegetated areas and does not flow directly to any waterbodies (e.g., Lorraine Lake). The discharge point for any surface water collected will be in a vegetated area more than 100 m from a waterbody or stream.

Prior to setting up discharge locations in undisturbed areas, IOC investigates the locations to ensure they are suitable, i.e., adequate buffer zones can be established and there are no waterbodies in the immediate vicinity. A rock pad is typically established to dissipate energy and limit the erosion potential. In this way no vegetation is directly impacted at the discharge locations.

Inspections are performed at these locations regularly to monitor for sediment buildup, pooling and/or soil saturation. To date, no discharge pipes have needed to be moved and no channelling or erosion have been observed at these sites. This indicates that these discharge scenarios are

working and that discharge is dissipating into the soil as anticipated. No adverse impacts have been noted to the forested/vegetated areas, water bodies or wildlife species.

Discharges are sampled four (4) times a year as per provincial water quality requirements. No exceedances have been reported to date.

3.1.11 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 weathering that occurs at depths of 100 meters below ground surface (mbgs). According to Piteau (2002), the most permeable hydrostratigraphic unit is the LIF, which has the highest content of carbonate materials. The relatively high hydraulic conductivity of this unit is caused by weathering associated with leaching of silica and carbonate and/or oxidation of iron minerals (magnetite and specularite) to goethite and limonite. The weathering is noted to be strong along fractures in the LIF and is more prevalent in open pits operating at lower elevation (e.g., Humphrey Main) where the weathering has not been removed by glacial action. The hydraulic conductivities of the weathered zones are noted as being as high as 1×10^{-4} to 1×10^{-3} m/s, which suggests that the LIF and possibly the base of the MIF is a reasonable aquifer capable of providing baseflow to local streams/rivers and supporting flows to lakes. In addition to the relatively highly permeable weathered strata commonly found in the Carol Lake project area, fracture dominated groundwater flow has also been noted which, depending upon the location and setting, can show reasonably permeable characteristics.

Open pit mines experience groundwater ingress as they extend below the water table and where advance dewatering has not been undertaken. Previous hydrogeological investigations (Piteau 2002) of IOC's open pits estimated groundwater seepage into each pit for mitigation purposes. Estimates of groundwater ingress ranged in value from as low as 80 USGPM ($\sim 440 \text{ m}^3/\text{d}$) for Humphrey South Pit up to 1,000 USGPM ($\sim 5,400 \text{ m}^3/\text{d}$) for the Humphrey Main Pit. At Spooks Pit groundwater ingress has been estimated at 1,740 USGPM ($\sim 9,500 \text{ m}^3/\text{d}$) associated with seepage through the weathered eastern face from Lake Lorraine (Piteau 2002).

Further hydrogeological investigations will be undertaken prior to pit development to better define and understand groundwater occurrence in the North Smallwood area, establish hydrogeological baseline conditions, and better define and quantify future dewatering requirements. Piezometers installed during these investigations – together with the piezometer constructed in 2018 will be the source of a growing data set used to better understand groundwater occurrence in the North Smallwood area.

3.2 Socioeconomic Environment

The Labrador West region includes the communities of Labrador City (38.83 km²) and Wabush (46.25 km²), 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 social, cultural and economic 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.

3.2.1 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 NL, 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 2019 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 24). One site was identified in the general area of the Smallwood North pit, the Heath Lake site, located approximately 1.5 km southwest of the Project area. The 2019 report noted the Heath Lake site was a 1960s spot-find of a portion of a ground slate tool. The report goes on to note that given the “imprecision of data related to the site and the fact that a single pre-contact artefact had been identified, the PAO has listed the site as destroyed” (Wood 2019).

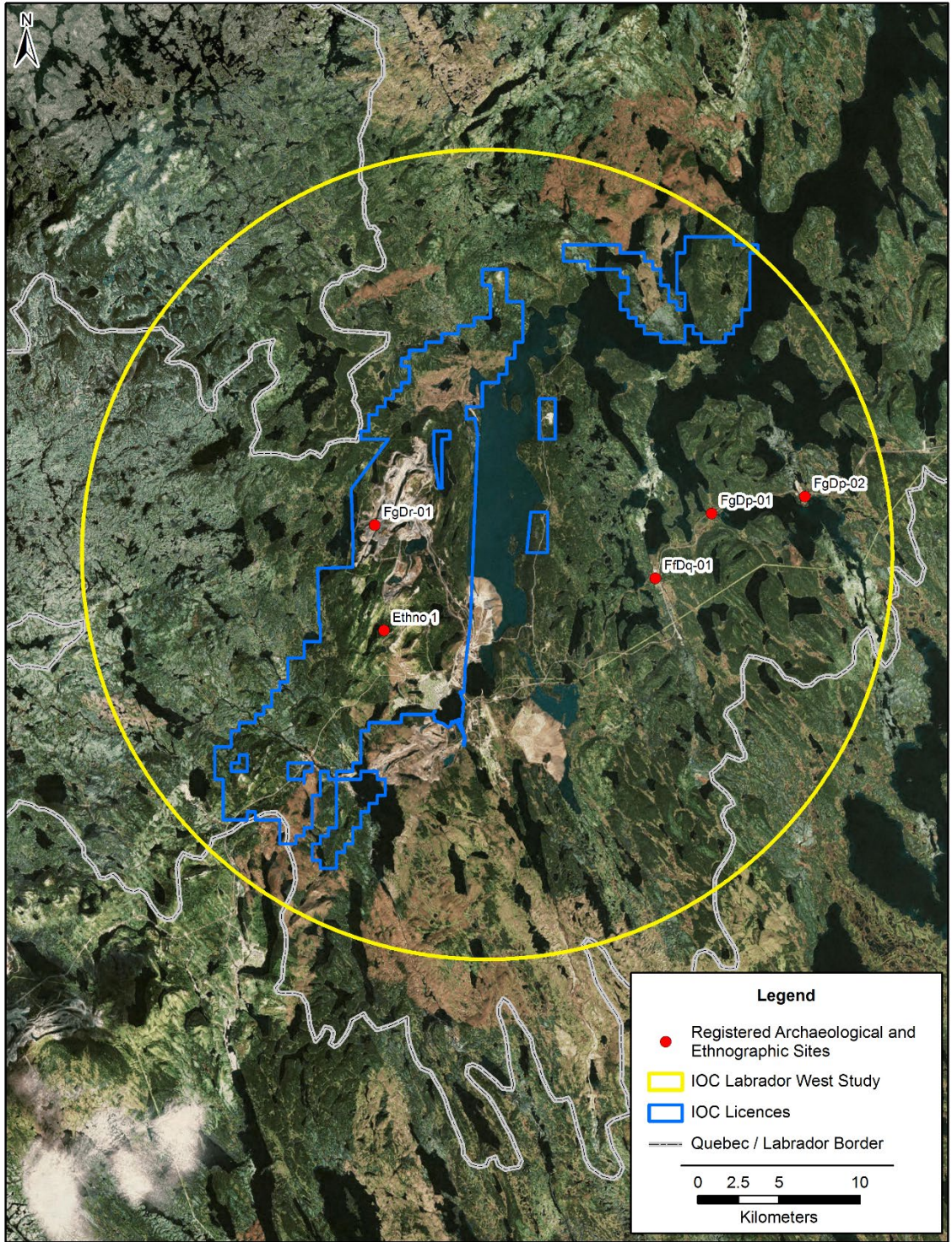


Figure 24: Registered Historic Resources in the Labrador West Study Area (Wood 2019)

The Project site is predominantly a wooded landscape on elevated points of ground and is greater than 100m from shorelines of the area's principal waterbodies. Past archaeological research conducted in the interior of Labrador and Quebec has shown that it is the shorelines of lakes and rivers where occupation would typically be expected to occur, and not at a considerable distance in the forest away from the water's edge. As a result, this segment of the area would not have been well-suited for past human settlement by small groups of Indigenous hunters/gatherers or non-Indigenous peoples. These landscape attributes render the site as having low potential for historic or archaeological resources.

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 (PAO), including information on the nature of the material discovered and the location and date of the find.

3.2.2 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 addictions services in all of Labrador has increased steadily from 2008-2018 which may indicate an increase in access to services.

3.2.3 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 16) (Wood 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).

Table 16: 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)

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 17) (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 17: 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.

3.2.4 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 25). Public and private fitness facilities offer equipment and programs for various programs (Wood 2019).

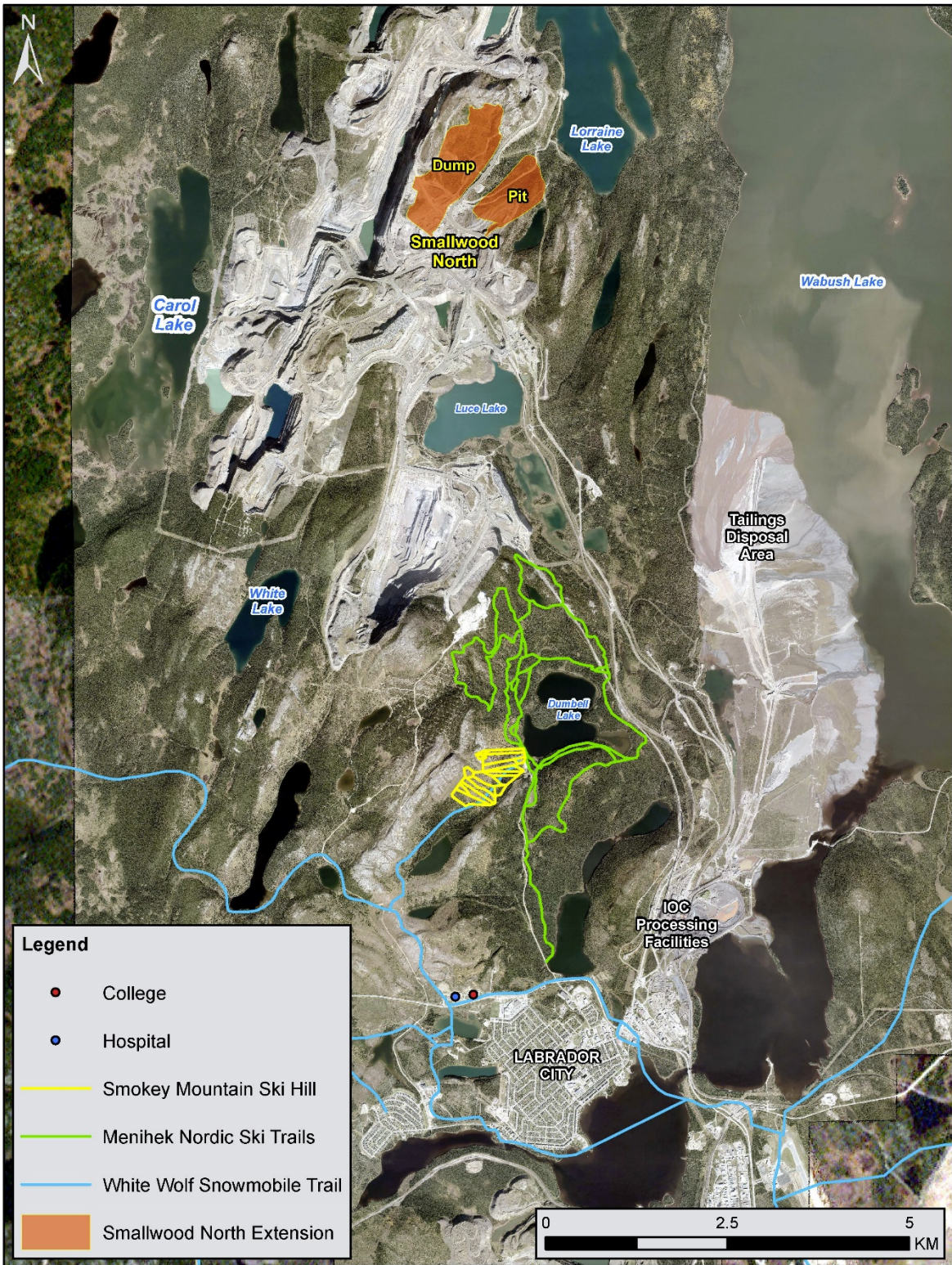


Figure 25: Recreational Facilities in the Project Area

3.2.5 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 km² 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 km² 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 DECC 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. Public access to the Project site is restricted.

3.2.6 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 26). IOC Indigenous Implementation committees have been established for four of the identified Indigenous organizations, and meet on a regular 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.

Please note that the information that follows is general and is not meant to diminish the significance or scope of Indigenous land and resource use. IOC has not completed specific land use and occupancy studies of Indigenous organizations' land use practices for this specific Project Registration. The generality applied in the Registration document reflects the fact that contemporary land use in the Project area has been limited to mining activities as access to the site is restricted for public safety purposes.

3.2.6.1. 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.

3.2.6.2. 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).

3.2.6.1. 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 GNL (NL Intergovernmental and Indigenous Affairs Secretariat, 2019).

3.2.6.1.1. 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 km², and the Lac John Reserve is approximately 0.23 km² 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).

3.2.6.1.2. 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 km²) is located on the western outskirts of Sept-Îles and Mani-Utenam (5.27 km²) 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).

3.2.6.1.3. 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 Kawawachikamach. 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 NNK 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).

No specific Land Use and Occupancy Study of the Nation's land use practices was conducted as part of this assessment. The generality applied in the EA Registration document is reflective of the fact that contemporary land use in the project specific area has been limited to mining uses as access to the site is restricted for public safety purposes. NNK may utilize other means of transport than identified in the EA Registration document and that this use may extend well beyond road and rail routes.

3.2.6.2. Summary and Existing Agreements

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.

Uashat mak Mani-utenam and Matimekush-Lac John Innu Communities

In 2020, IOC and the Uashat mak Mani-utenam and Matimekush-Lac John Innu communities signed a reconciliation and collaboration agreement. The life of mine agreement, titled USSINIUN (“Renewal”), lays the groundwork for a mutually beneficial relationship based on dialogue, collaboration and trust between the Company and the two communities over the coming decades. Among other things, it will facilitate greater participation in activities such as training and development, employment, environmental projects, procurement opportunities and other benefits.

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 NL DECC 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 DECC 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 initially submitted this Project to the EA Division for review in September 2018. Following discussion with the EA Division, IOC withdrew the Project from the EA review process in August 2019 as the timeline for development was not imminent. Given currently planned development dates, this Registration document has been updated to reflect revised planning. IOC will continue to consult with government officials during the EA review process. It is understood the 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 DECC 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. 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 and soils, wetlands, avifauna, wildlife, species at risk and water resources.

5.1.1 Construction

Project construction will involve site clearing activities covering an overall area of approximately 100 ha. 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 from receptors and the 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 period of the Project. 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. Vegetation clearing and other ground disturbance activities will be confined to those areas where it is required and limits of clearing will be marked in advance. Clearing will be completed in compliance with relevant permits and regulations and merchantable timber will be salvaged. As noted in section 3.1.2, *Veratrum viride*, considered a rare plant (S2) on the Island of Newfoundland, is known to occur in the Project area, but given its prevalence throughout many open areas, wetlands and meadows across IOC's property in Labrador City, no special mitigation measures are proposed.

5.1.1.4. Wetlands

The wetlands that exist within the boundary of the Project area may be removed during the construction phase. The wetlands are small and occur in proximity to mining operations and within a disturbed landscape. As such, the 2017 field surveys concluded they provide marginal quality wildlife habitat. 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 these small wetlands would be considered limiting to wildlife currently living in or moving through the Project area.

5.1.1.5. Avifauna and Species at Risk

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.

IOC anticipates initial clearing of the Project site to begin by mid-2024. IOC will endeavor 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. If clearing within the bird breeding season is required, 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 or 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.

The availability of habitat types used by wildlife species in the Project area is abundant and covers vast regions in western Labrador. The Project area is relatively miniscule in comparison. Any habitat affected by the Project is readily available in nearby areas and it is anticipated wildlife species in the area will have abundant and suitable replacement habitats available.

5.1.1.7. Water Management

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, 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 operation 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, SAR and water resources. Operations will use existing equipment and personnel and will be characterized primarily by the movement of materials to and from the site and associated activities. The activities will not be any noisier, closer to communities nor 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 period of the Project. The 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 Soils

During Project operations, 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 Project area will be cleared during construction and it is expected that wildlife and potentially occurring wildlife SAR 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

The Project area will be cleared during construction and it is expected that avifauna and potentially occurring avifauna SAR 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. Monitoring for SAR will be ongoing during operations and if bank swallows or other avifauna SAR are observed in the area, appropriate mitigations will be determined in consultation with the Wildlife Division.

5.1.2.7. Water Resources

Water management activities during operations will primarily involve dewatering well(s) and in-pit pumps to dewater the pit as necessary. If required, the use of sumps are likely to 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 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.

An initial dewatering well is likely to be constructed, equipped, tested and operationalized for advance dewatering of saturated material below the water table ahead of drilling, blasting, and digging. A zone of broken ground already identified is likely suitable for the first dewatering well and is discussed in Section 2.4.6.

The proposed edge of the pit lies within 100 m of Dorothy Lake. Seepage from the lake to the pit would be at right angles to the bedding strike direction and no evidence has been identified to date of faulting or alteration between the lake and the pit. Current understanding suggests there is limited hydrogeological connection between the lake and the pit area, and seepage rates from the lake into the pit are therefore expected to be low. This assumption however will be the subject of further and ongoing investigation prior to any development activities. As a result, lake levels are not expected to be adversely impacted by the pit development. IOC will however monitor the level in Dorothy Lake as the Project advances.

Water management activities associated with the operation of the Project are not anticipated to result in significant adverse effects on the natural environment.

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 phases. 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 minimized through adherence to applicable mitigation measures throughout all Project phases. Fuel and other hazardous materials will be securely stored, and vehicles and equipment will be refueled at designated areas. In addition, equipment and vehicles will be inspected and maintained in good working order, and any leaks will be 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 regulatory government permits, 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 Analysis - Natural Environment

A summary of potential environmental interactions, identified mitigation measures, and any residual environmental effects of the Project on the Natural Environment is provided in Table 18.



Table 18: Environmental Effects Analysis – Natural Environment

Environmental Component	Project Phase & Potential Interaction			Key Considerations and Proposed Mitigation	Residual Effects
	Con	Ops	Potential Interactions		
Air Quality	X	X	<ul style="list-style-type: none"> Some temporary additional emissions predicted from either construction or operations activities Construction and operations activities may generate fugitive dust and other particulate matter 	<ul style="list-style-type: none"> 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 EPP Continue with progressive rehabilitation measures such as revegetation Monitors to determine any 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 EPP recommendations QC program in place re blasting program Blast monitors in place No additional site-wide noise predicted Onsite workers will follow OHS requirements re personal protective equipment 	NS



Environmental Component	Project Phase & Potential Interaction			Key Considerations and Proposed Mitigation	Residual Effects
	Con	Ops	Potential Interactions		
Vegetation & rare flora	X		<ul style="list-style-type: none"> Clearing and grubbing required for pit development, other infrastructure Vegetation removal during construction will be a direct loss 	<ul style="list-style-type: none"> 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 Overburden and organics will be stockpiled for rehabilitation purposes Follow EPP Additional plant surveys may be conducted as recommended by regulators 	NS
Wetlands	X		<ul style="list-style-type: none"> Small wetland area to be removed from within Project footprint 	<ul style="list-style-type: none"> The area was surveyed and determined to not represent fish or significant wildlife habitat Obtain necessary permits and consult with GNL Avoid any interaction with wetlands outside the Project area 	NS
Avifauna & Avifauna SAR	X	X	<ul style="list-style-type: none"> 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, rusty blackbird and common nighthawk to use the area 	<ul style="list-style-type: none"> 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



Environmental Component	Project Phase & Potential Interaction			Key Considerations and Proposed Mitigation	Residual Effects
	Con	Ops	Potential Interactions		
Wildlife & Wildlife SAR	X	X	<ul style="list-style-type: none"> 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 and Northern myotis to use the area 	<ul style="list-style-type: none"> Mitigations in place for the Project IOC will monitor all wildlife sightings, including SAR, in or near the Project site Large quantities of suitable habitat available nearby for displaced animals 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
Surface Water	X	X	<ul style="list-style-type: none"> Potential accidental spills Increase in surface area runoff for Lorraine Lake watershed 	<ul style="list-style-type: none"> Follow EPP Compliance with regulated discharge criteria and permits Design and implement appropriate mitigation. E.g., erosion and sediment control plan, spill containment, etc. Accidental event prevention and response procedures and plans in place Water quality monitoring prior to discharge in the environment 	NS
Groundwater Quantity and Quality	X	X	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Follow EPP Compliance with regulations and permits Design and implement appropriate mitigation, e.g., 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 Smallwood North Pit Water level monitoring Water quality monitoring prior to discharge to the environment 	NS



Environmental Component	Project Phase & Potential Interaction			Key Considerations and Proposed Mitigation	Residual Effects
	Con	Ops	Potential Interactions		
Potential ARDML Effects	X	X	<ul style="list-style-type: none"> Potential impacts to surface water and groundwater if ore, waste rock or soil are found to be acid generating or metal leaching 	<ul style="list-style-type: none"> 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 Phase) N No likely adverse residual environmental effect NS Not 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 phase. To decrease the overall mining footprint in the area, IOC will be progressively rehabilitating areas during Project construction and operations phases, where possible. The clearing and excavation activities for the Project will not overlap or interact cumulatively with those of other projects and activities in the area.

Given the relatively short duration and small scope of the clearing and grubbing activity in comparison to daily mine activities, the construction phase for the Project is not considered to contribute to cumulative impacts in the region.

The operation of the Project will not result in an increase in overall production of iron concentrate or pellets and will be part of the overall annual production capacity of 23Mt. As such, 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.

There will not be any new equipment purchased specifically for this Project, rather equipment currently operating at other locations at IOC's Labrador City operations will be relocated to the Project site during its operation. IOC estimates that the Project will increase their overall footprint at the Labrador City site by approximately 7.5%, and a portion of that area occurs within an existing disturbed area.

The water quality of discharges or runoff from the Project will be controlled with treatment systems designed to comply with federal and provincial requirements. Based on similar experiences at IOC's Labrador City mining operation, IOC is expecting the discharges or runoff to not require much treatment beyond Total Suspended Solids (TSS) treatment. Using natural vegetation to disperse the discharged water is the best way to reduce TSS and preserve as much as possible the natural landscape. If an appropriate area is not available, or if this option is not working well, IOC will investigate alternative approaches for further treatment. This may include sediment settling ponds, flocculation, large filter bags or a combination of any two of these options.

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 Socioeconomic Environment

The Socioeconomic Environment includes relevant components of the social, cultural and economic environments, including historic and heritage resources, human health and well-being, land and resource use, community services, employment 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 NL, 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 1.5 km southwest of Smallwood North 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 10 km south of Smallwood North, 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 Project area 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 10 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 Operations

5.2.2.1. Historic and Heritage Resources

Once the development and construction of the Project 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, municipal, traditional or recreational land and resource use activities are anticipated during the operations period.

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 phase will be comparable. The Project will be located approximately 10 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 phase of the Project could affect the Socioeconomic 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, a fire, explosion or other accidental event at its Labrador City operations.

5.2.4 Summary of Environmental Effects Analysis – Socioeconomic Environment

A summary of potential environmental interactions, identified mitigation measures, and residual environmental effects of the Project on the Socioeconomic Environment is provided in Table 19.



Table 19: Environmental Effects Analysis – Socioeconomic Environment

Environmental Component	Project Phase & Potential Interaction			Key Considerations and Environmental Mitigation	Residual Effects
	Con	Ops	Potential Interactions		
Historic and Heritage Resources	X		<ul style="list-style-type: none"> • Ground disturbance 	<ul style="list-style-type: none"> • Low potential for historic and heritage resources • Standard precautionary and reporting procedures • Localized and short-term construction activity 	N
Land and Resource Use	X		<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Currently a restricted area, on IOC property • No public use of the site 	N
Human Health and Well-Being	X	X	<ul style="list-style-type: none"> • Possible accidents affecting human health 	<ul style="list-style-type: none"> • At a distance from, and minimal interaction with communities • Accidental event prevention and response plans in place • Will follow provisions of <i>OHS Regulations</i> applicable to Project • Will follow all recommendations of the CMO of Health in NL relative to Covid 19 	N
			<ul style="list-style-type: none"> • Increased regional prosperity 	<ul style="list-style-type: none"> • Can contribute to improved sense of wellbeing and higher standard of living 	P
Communities and Economy	X	X	<ul style="list-style-type: none"> • Employment and business opportunities 	<ul style="list-style-type: none"> • Positive effects (direct and indirect) 	P
Key: X Potential Project Interaction (by Phase) N No likely adverse residual environmental effect NS Not significant adverse residual environmental effect S Significant adverse residual environmental effect P Positive residual environmental effect					

5.2.1 Cumulative Environmental Effects

The CEA relative to the Socioeconomic 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 and will require a small and temporary construction workforce. IOC will not be hiring additional employees for the operations phase of the Project.

The four major capital projects identified in Table 15 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 which 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 construction and operation of an open pit, a groundwater extraction system, a waste rock disposal area, an overburden stockpile area and haulage roads to connect the mine to an existing transportation system. The transportation system moves ore to the concentrator plant and waste rock and overburden to their respective disposal/stockpile areas. The Project does not require any additional 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 any 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 Smallwood North Pit 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.

IOC will extend the commitments made in the final and approved, Wabush 3 (Moss) Industrial and Employment, and GEDP, to cover the Project construction phases, including the reporting requirements relative to the commitments.

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

- Air quality within the community of Labrador City;
- Noise and vibration levels within the community of Labrador City;
- Water quality;
- Vegetation and soils;
- Wetlands of the region;
- Wildlife, including SAR;
- Avifauna, including SAR;
- Historic and heritage resources;
- Communities and economies;
- Human health and well-being; and
- Land and resource use.

IOC will 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.

8.0 References

- AMEC. 2012a. Baseline Small Mammal and Furbearer Surveys for Proposed Wabush 3 Mine Site and Potential Ski Hill Location, Labrador City, Newfoundland and Labrador. Project No. TF1243033.2008. pp. 27.
- AMEC. 2012b. Baseline Avian Surveys for proposed Wabush 3 Mine Site and Potential Ski Hill Location Labrador City, Newfoundland and Labrador. Project No. TF1243033.2007. pp. 41.
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Appendix A

Health, Safety, Environment and Quality Policy

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



Andrew Harding,
Chief executive Iron Ore
20 June 2013

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.

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 Development and Operational 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

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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 <i>Fisheries Act</i>	<i>Fisheries Act (Federal)</i>	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 <i>Environmental Protection Act</i>	<i>Environmental Assessment Regulations (NL Govt)</i>	Environmental Assessment Division, Dept of Municipal Affairs & Environment	
3. Drawdown of a lake, pond.	Certificate of Approval for drawdown of Development Area Waterbody.	<i>Water Resources Act (NL Govt)</i>	Water Resources Division, Dept of Municipal Affairs & Environment	A Certificate of Approval must be obtained.
4. Construction and operation	Certificate of approval	<i>Environmental Assessment</i>	<i>Pollution Prevention Division</i>	A Certificate of Approval must be obtained.

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
		<i>Regulations (NL Govt)</i>		
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	<i>Wildlife Regulations pursuant to the Wildlife Act (NL Govt)</i>	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	<i>Migratory Bird Act Section 6 of the Migratory Bird Regulations (Federal)</i>	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	<i>Water Resources Act (NL Govt)</i>	Department of Municipal Affairs and Environment	
7. Operating of mill	Mill Licence	<i>Mining Act (NL Govt)</i>	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	<i>Minerals Act (NL Govt)</i>	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	<i>Aboriginal Consultation Policy (NL Govt)</i>	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	<i>Water Resources Act (NL Govt)</i>	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.	<i>Water Resources Act (NL Govt)</i>	Department of Municipal Affairs and Environment	
	If wetland will be affected due to mining an offset must be established to remedy the difference	<i>Federal Policy on Wetland Conservation (Federal)</i>	Environment Climate Change Canada	
12. Any activity that may affect and endangered or threatened species	Compliance standard	<i>Endangered Species Act (NL Govt)</i> <i>Possibly Species at risk Act (Federal)</i>	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		<i>Fisheries Act, Section 35(2), Harmful Alteration, Disruption, or Destruction of Fish Habitat</i>	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
		<i>(Federal)</i>		
14. Any run-off from the project site being discharged to receiving waters (freshwater or marine).		<i>Fisheries Act, Section 36(3), Deleterious Substances (Federal)</i>	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.		<i>Migratory Birds Convention Act and Regulations (Federal)</i>	Canadian Wildlife Service (CWS), Environment Canada	<p>CWS should be notified about the mortality of any migratory bird in the project area, including passerine (songbirds), seabird and waterfowl species.</p> <p>Harmful substances (e.g., oil, wastes, etc.) that are harmful to migratory birds must not be deposited into waters that are frequented by them.</p> <p>Nests, eggs, nest shelters, eider duck shelters or duck boxes of migratory birds must not be disturbed or destroyed.</p> <p>Notice should also be given about the mortality of any species known to be endangered or under federal authority</p>
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	<i>Transportation of Dangerous Goods Act and Regulations (Federal) and</i>	Transport Canada And Environment Climate	

Activity Requiring Compliance	Permit -Approval	Legislation	Responsible Agency	Comments
	variance from the regulations is necessary.	Interprovincia l Movement of Hazardous Waste (Federal)	Change Canada	
17. Transporting fuel to the site.		<i>Transportatio n of Dangerous Goods Act and Regulations (NL Govt)</i>	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.		<i>Canadian Environment al Protection Act (CEPA) (Federal)</i>	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		<i>Explosives Act (Federal)</i>	Environment Climate Change Canada	Must comply with the storage and use of all explosives on site as per regulations.
		<i>Fire Protection Services Act (NL Govt)</i>	Fire and Emergency Services	
20. Any Development Operation.		<i>Waste Material Disposal Act (NL Govt)</i>	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.)	<i>Occupational Health and Safety Act</i> (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	<i>Storage and Handling of Gasoline and Associated Products Regulations</i> (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.		<i>Workplace Hazardous Materials Information System</i> , under the <i>Occupational Health and Safety Act</i> (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.		<i>Historic Resources Act</i> (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	<i>Cutting of Timber Regulations</i> (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		<i>Wildlife Act</i> (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		<i>Endangered Species Act</i> (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		<i>Air Pollution Control Regulations</i> <i>And</i> <i>Halocarbon Regulations</i> (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		<i>Water Resources Act</i> <i>Environmental Control</i>	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		<i>Water & Sewage Regulations</i> (NL Govt)		
30. Established the province's land use planning system		<i>Urban & Rural Planning Act</i> (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		<i>Management of Greenhouse Gas Act</i> (NL Govt)	Department of Municipal Affairs and Environment	Submission of an annual report regarding the greenhouse gas emissions released with 3 rd 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 where 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 be 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. *Environmental 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 be 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).

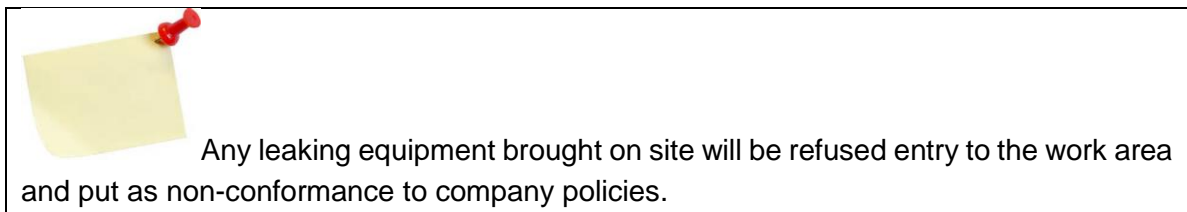
10. Equipment Use and Maintenance

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.



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/m²/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.

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Section 7 Contact List

IRON ORE COMPANY OF CANADA

Patrick Lauziere

Manager Environment & Sustainable Development

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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.

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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/DOCTYPE
372/PRODUCTION/EROSIONCONTROLMANUAL.PDF](http://www.transportation.alberta.ca/content/doctype/372/production/erosioncontrolmanual.pdf)

HERE ARE A FEW EXCERPTS FROM THE MANUAL

Silt Fence Sediment Control	B.M.P. #1
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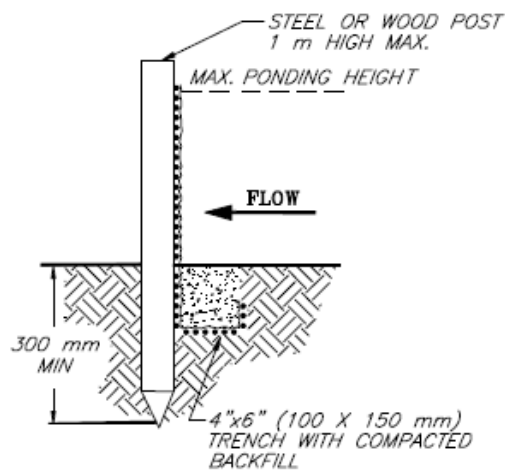
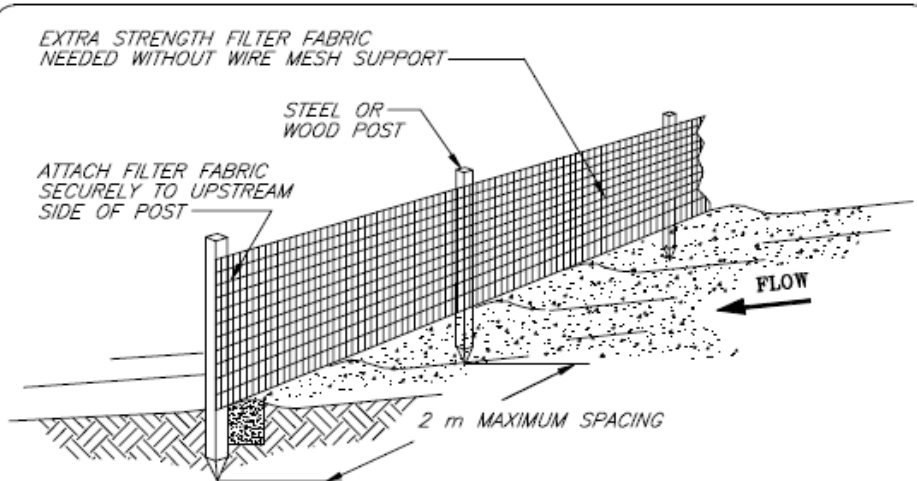
- Sediment build up should be removed once it accumulates to a depth of 0.2 m
- Remove fence after vegetation is established
- Deactivate fabric by cutting-off top portion of fabric above ground; bottom trenched-in portion of fence fabric can be left in-ground thus minimizing ground disturbance

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:

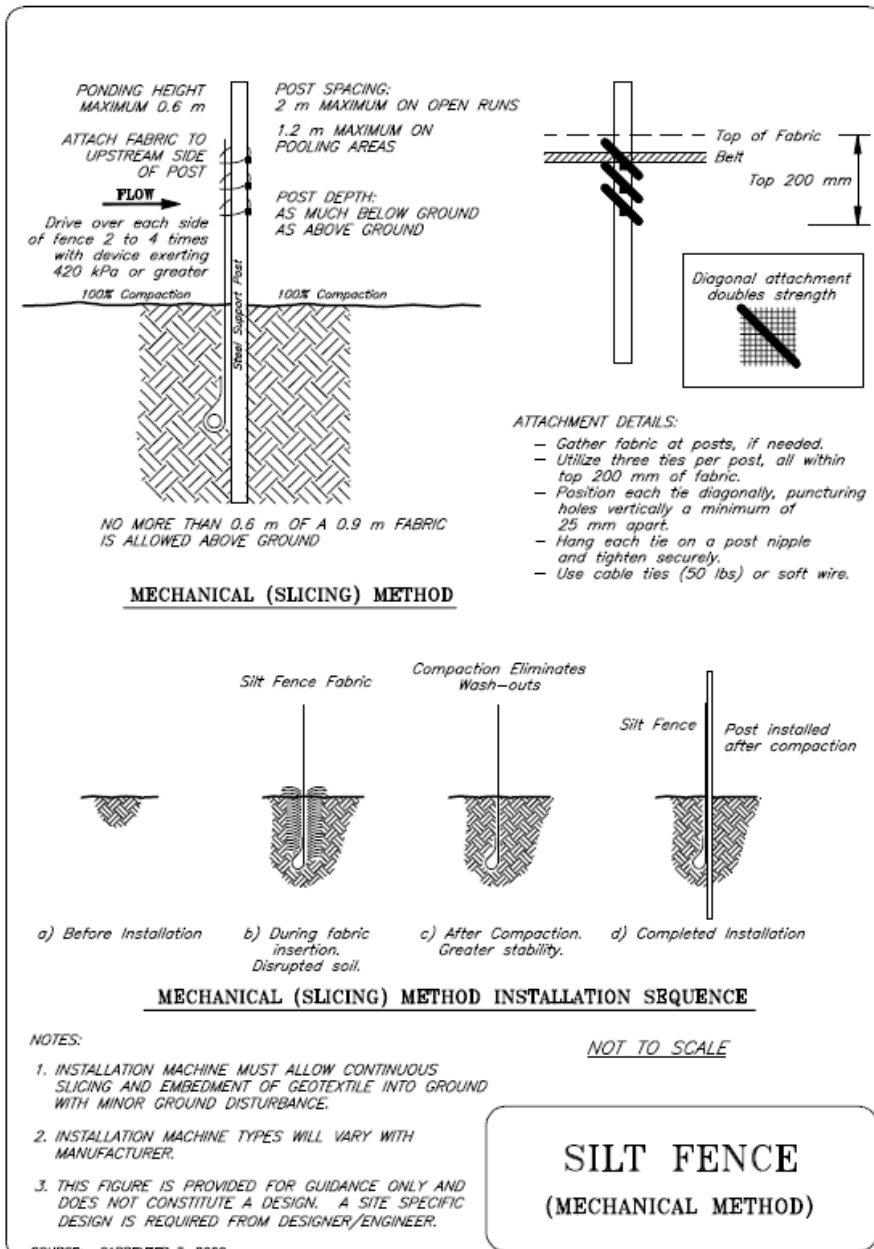
1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE DAILY AND AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED SILT REACHES 200 mm.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA WILL NOT CONTRIBUTE SEDIMENT OFF-SITE.
4. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

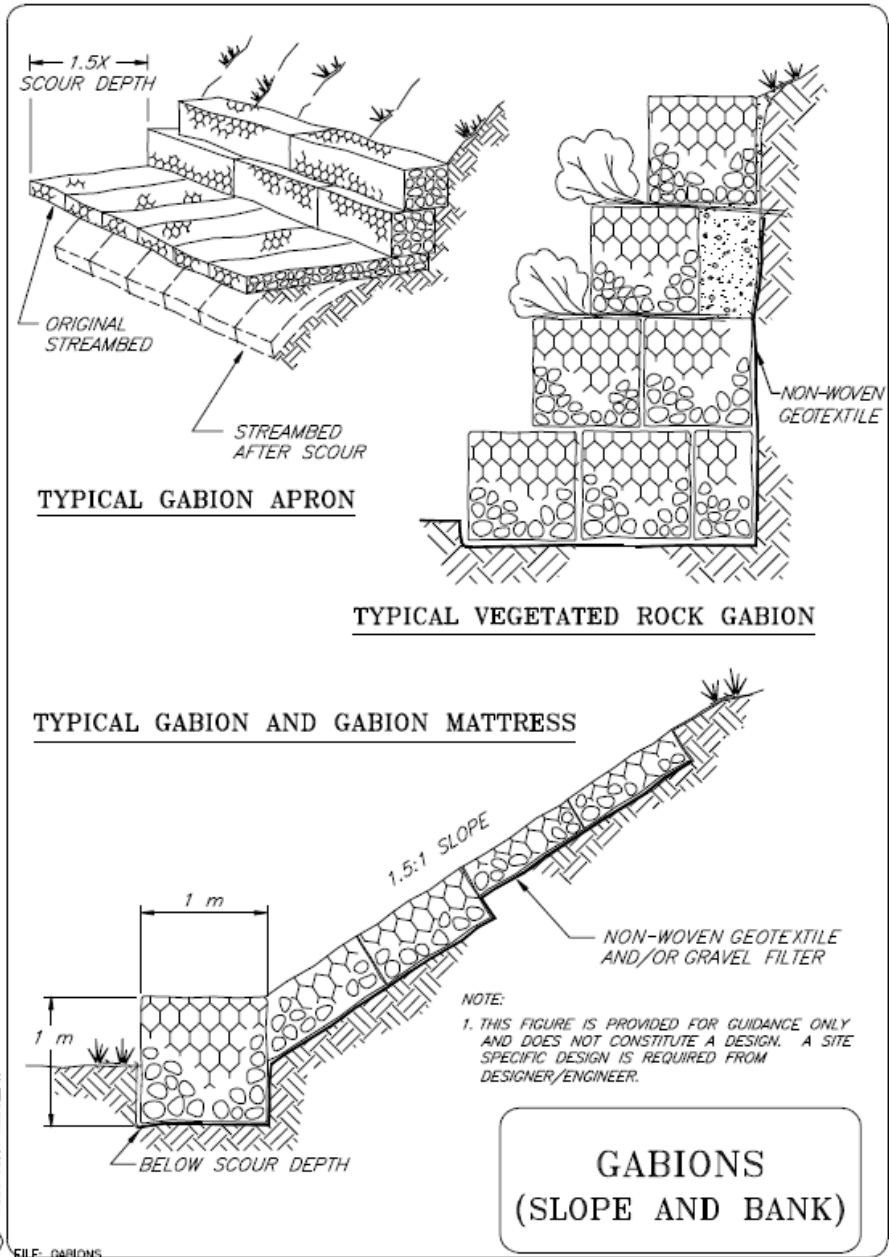
NOT TO SCALE

**SILT FENCE
(TRENCH METHOD)**

© 1994 JOHN McCULLAH
 From: Salt-Applied Earthcare - EROSION DRAW 3.0

FILE: SILTFENC





From: Salix-Applied Earthcare - EROSION DRAW 3.0
 1996 JOHN McCULLAH

FILE: GABIONS

**GABIONS
 (SLOPE AND BANK)**

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