

IRON ORE COMPANY OF CANADA DIVERSION AND DEWATERING OF LUCE LAKE NORTH, LABRADOR WEST

Environmental Assessment Registration

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

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1.0 INTRODUCTION

Project Name: *Diversion and Dewatering of Luce Lake North, Labrador West*

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

IOC is proposing to divert inflows to and dewater Luce Lake North, directly adjacent to Luce Pit, at its Labrador West mine site. This will be done by constructing diversion channels and a low dam and pumping down the lake. This *Environmental Assessment Registration* has been prepared in relation to the proposed Project by IOC, with assistance from Amec Foster Wheeler Environment & Infrastructure.

1.1 Nature of and Rationale for the Undertaking

Luce Lake North is located directly adjacent to Luce Pit. Development of Luce Pit began in 1999 and the Life of Mine (LOM) is planned to extend until 2043. Upwelling groundwater flow impacting mining progress was first observed at the north end of Luce Pit starting in late 2006 when the pit floor dropped below the water table. A series of interceptor wells were installed (deep perimeter ("ex-pit") pumping wells, shallow in-pit pumping wells, and in-pit sumps) to pump the water into Luce Lake North (Figure 1-1). Due to operational challenges (power outages, pump failures, freezing conditions) IOC has been unable to achieve continuous, sustained operation of the dewatering equipment. Water levels in the pit rebound quickly when the wells remain inoperable for even a short time.

Geotechnical studies have confirmed that 61 to 89% of the water entering Luce Pit originates from Luce Lake North through a zone of low-strength, high hydraulic conductivity material within the northwest wall of the pillar between the lake and the pit. The presence of Luce Lake directly adjacent to the pit provides an immediate and essentially constant source of water for flow toward the pit (Figure 1-2).

Currently, the rate of groundwater flow through the pillar toward Luce Pit is approximately 0.50 m³/s (8,000 US gallons per minute (gpm)) of which ex-pit dewatering wells capture approximately 0.28 m³/s (4,400 gpm), leaving approximately 0.23 m³/s (3,600 gpm) of groundwater flow that must be removed by in-pit wells. These flows are expected to increase to approximately 0.78 to 0.88 m³/s (12,000 to 14,000 gpm) as the pit deepens over the LOM.

The constant flow of water through this zone has potential to cause internal erosion leading to the formation of a "pipe" through the pillar, uncontrolled drainage into the Pit and even failure of the pillar. The consequences of this would be pit flooding and uncontrolled drainage of Luce Lake North into Luce Pit. The risk of pillar failure increases as the pit is deepened and is magnified by IOC's challenges in maintaining continuous operation of the dewatering equipment; when water levels in the pit rise, pore pressures in the low-strength zone of the pillar increase, thereby increasing the risk of piping and pillar failure.



Figure 1-1 Locations of Interceptor Wells and Sumps for Luce Pit Dewatering

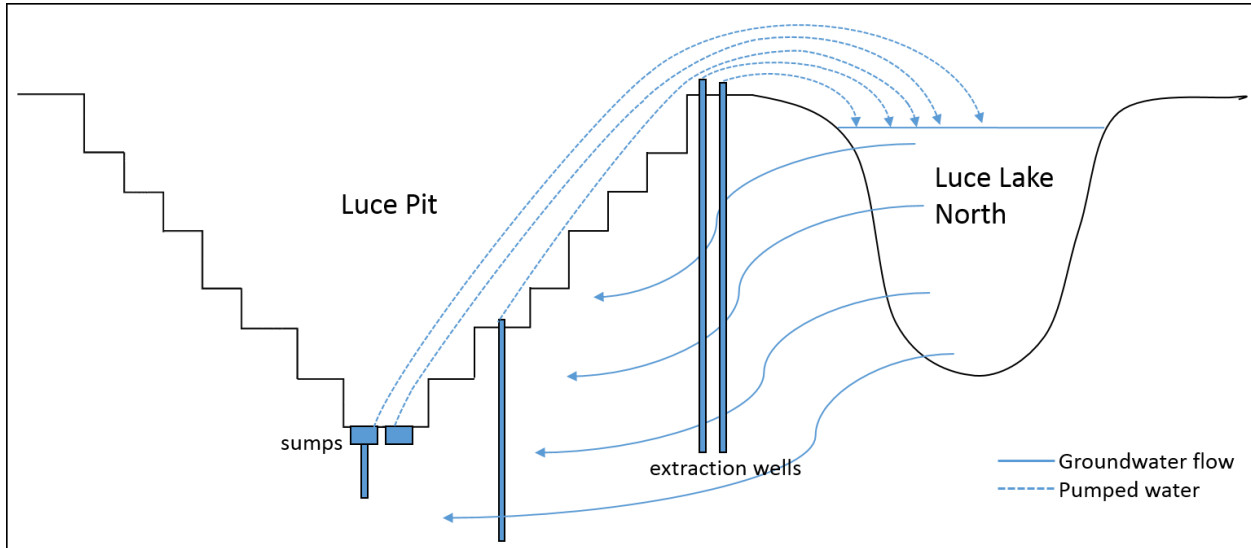


Figure 1-2 Conceptualized Groundwater Flow Between Luce Lake North and Luce Pit.

A pillar failure or piping event would have repercussions for both upstream and downstream water bodies. Upstream effects may include increased flow rates towards Luce Lake North/Luce Pit, resulting in changes to surface hydrology, aquatic habitat, and the groundwater table. Downstream effects could include decreased flow rates and loss of aquatic habitat throughout the watershed between Luce Lake North and its outflow into Wabush Lake.

In addition to the environmental risks to upstream and downstream aquatic habitat, failure of the pillar would result in safety risks to workers, economic losses in equipment and the inability to access the ore in Luce Pit. Maintaining the pillar between Luce Lake and Luce Pit also means the ore in the pillar cannot be accessed (i.e., sterilization of resources). At this time, procedures and monitoring plans are in place in Luce Pit to prevent or detect a catastrophic event. Nonetheless, loss of equipment and effort required to dewater the pit after a piping event or pillar failure could jeopardize the future of IOC's operations in Labrador City since the majority of the mineral extracted now and for the coming years is from Luce Pit.

IOC has evaluated potential strategies to mitigate the risks described above (see section 2.3), and has determined that the complete dewatering and diversion of inflows away from Luce Lake North is the best option to improve Luce Pit dewatering, minimize potential effects on downstream aquatic habitat, and minimize safety and operational risks for continued mining in Luce Pit.

1.2 Identification of the Proponent

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

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IOC currently operates open pit mines, a concentrator and a pellet plant in Labrador West, and transports its products along a 418 km railway to its port facilities in Sept-Îles, Quebec on the St Lawrence Seaway. Approximately 2,500 persons are employed at its mining, processing, rail and port operations.

The company's existing mining operations in Labrador West consist of five active open pits (Luce, Sherwood, Humphrey Main, Humphrey South and Lorraine South), one existing pit to be reactivated (Spooks), and is in the early development stages of a new open pit (Wabush 3) (see Figure 1-3). IOC's Labrador West properties also contain significant quantities of additional iron ore reserves for future development.



Figure 1-3 IOC Mine Property Showing the Location of Luce Lake

IOC's concentrator has an annual production capacity of approximately 23 million tonnes of iron ore concentrate, which is a 5 million tonne increase since the recent completion of the Concentrator Expansion Program. Of that amount, approximately 9 to 13 million tonnes are pelletized and the balance is sold directly as 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's major shareholder and operator is the Rio Tinto Group (59 percent), with remaining shares owned by Mitsubishi Corporation (26 percent) and Labrador Iron Ore Royalty Corporation (15 percent). The company is led by its Corporate Officers: Kelly Sanders (President & CEO), Jean-Claude Lalumiere (Vice President – Human Resources), Maurice McClure (Vice President – Finance and Strategy), Mike Wickersham (Vice President – Northern Operations), Thierry Martel (Vice President – Technical Services), and Louis Cyrenne (Vice President – Southern Operations).

The proposed Project will be implemented as part of on-going work programs associated with IOC's Labrador City Operations. It will be constructed and operated in accordance with applicable legislation and regulations, including the environmental protection and planning measures defined through this EA review, and in compliance with IOC policies, procedures and standards.

The company has a comprehensive Health, Safety and Environmental 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 IOC'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. As part of its HSEQ MS, IOC has a comprehensive environmental management system (EMS) certified to the ISO 14001-2004 Environmental Standard, including various associated plans and procedures designed to avoid or reduce the environmental effects of its activities. Associated with its HSEQ MS, IOC has a very rigorous internal and external auditing process which annually evaluates the management systems' performance with the objective of continuous improvement. Rio Tinto's *Iron Ore Health, Safety, Environment and Quality Policy* is provided in Appendix A of this report.

The Project, as it develops through its various phases from conception to closure, will be evaluated to ensure that it fully conforms to internal standards and complies with all applicable legislation. Risk evaluation is required through each phase of the Project and mitigative measures are identified and implemented to minimize or eliminate risks. IOC's major shareholder and operator, Rio Tinto, has developed world class standards in the area of health, safety, environment and community relations, described in Appendix B, which will be applied to the Project so that it aligns with IOC's current operation.

1.3 Environmental Assessment Process and Requirements

The Newfoundland and Labrador Environmental Protection Act (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” (emphasis added).

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:

“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.”

Other aspects of a proposed project may also be relevant for EA purposes, and the Minister of Environment and Conservation may also require EA registration and review for projects that are not listed or otherwise specified in regulation.

Following public and governmental review of this EA Registration, the Minister of Environment and Conservation will determine whether the Project may proceed, subject to any terms and conditions and other applicable legislation, or whether further assessment is required.

The *Canadian Environmental Assessment Act (CEAA 2012)* is the legislative basis for federal EA in Canada. As per Section 5 of CEAA 2012, a federal environmental assessment focuses on potential adverse environmental effects that are within federal jurisdiction, including on

- fish and fish habitat,
- other aquatic species,
- migratory birds,
- federal lands,
- effects that cross provincial or international boundaries,
- effects that impact on Aboriginal peoples, such as their use of lands and resources for traditional purposes, and
- changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project.

The Minister of the Environment may also designate a project that is not currently listed in these Regulations if there is the potential for environmental effects in areas of federal jurisdiction or public concerns about such effects.



A description of the proposed Project was provided to CEAA for review. On August 19, 2015 CEAA informed IOC that the Project is not a designated project under the Regulations and that submission of a project description under the *Regulations Designating Physical Activities* is not required.

2.0 PROJECT DESCRIPTION

The following section provides greater detail on the Project area, components and phases.

2.1 Geographic Location and Site Layout

Luce Lake North is located adjacent to Luce Pit in Western Labrador within IOC's existing property boundaries and is entirely within the mine operating site (Figure 1-3). The approximate coordinates are 53.0218°N 66.9295°W. The area is not accessible to the public and has been surrounded by mining activities since the early 1960s.

Luce Lake has a surface area of 152 ha and consists of two basins. The northern basin (Luce Lake North) has a surface area of 102 ha and a maximum depth of 21 m (Figure 2-1). The volume of Luce Lake North is approximately 8,439,287 m³. The shallower southern basin, Lower Luce Lake has a maximum depth of approximately 1.5 m and contains submerged vegetation and a center island.

Luce Lake North is bounded on the north by a waste rock dump, by Luce Pit and Lower Luce Lake to the south, and by the Main Mine Road and the Automatic Train Operation (ATO) railway on the east. The western side of Luce Lake North is surrounded by low-lying vegetation and a haul road (Figure 2-1).

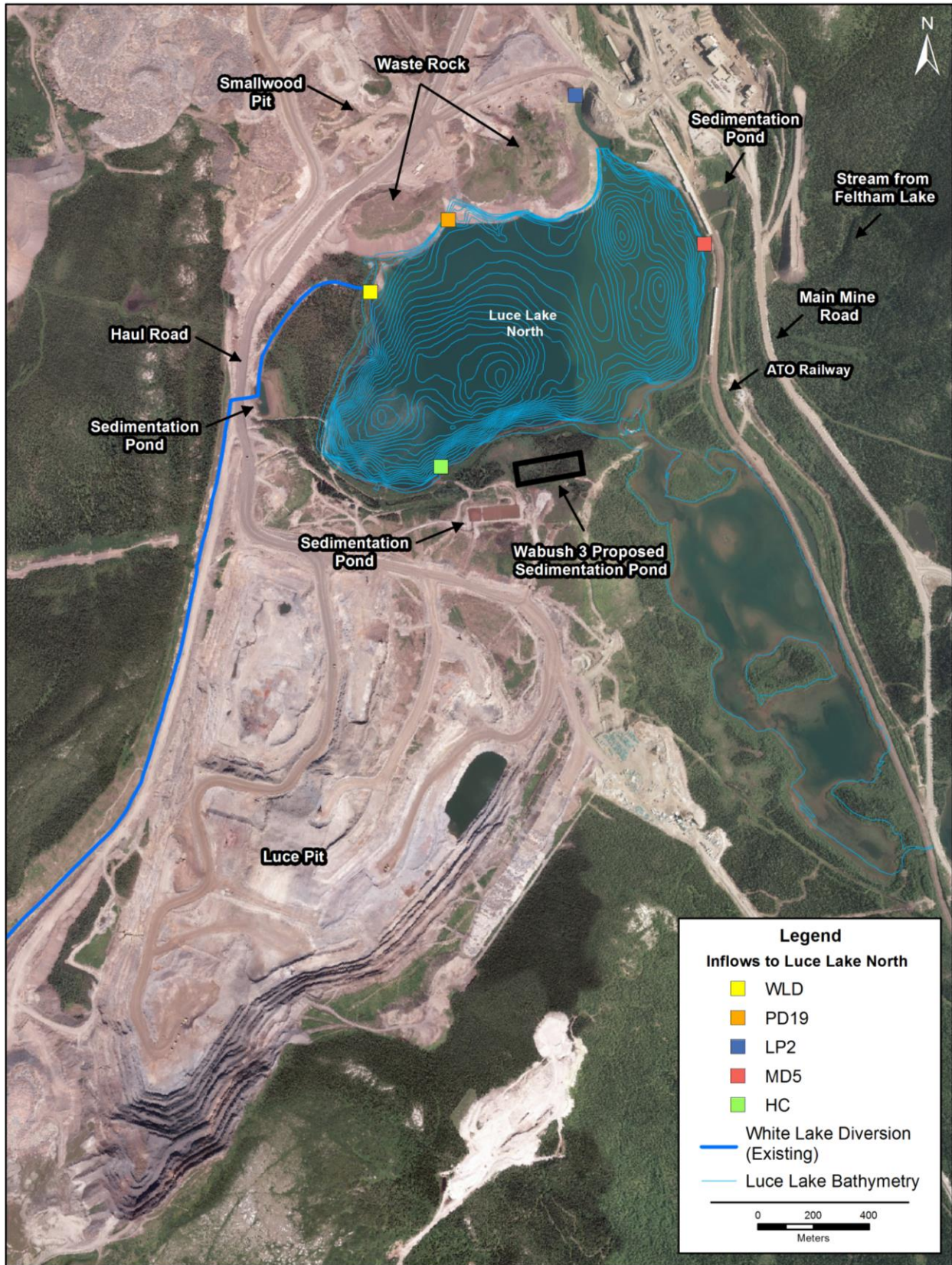


Figure 2-1 Project Site Layout

Inflows to Luce Lake North have been observed at the following locations:

- WLD: The outlet of the White Lake Diversion, which flows through a sedimentation pond on the west side of Luce Lake North (WLD Sedimentation Pond). This includes surface waters from White Lake that previously flowed into Hakim Lake but were diverted when Hakim Lake was removed during the development of Luce Pit;
- PD19: Discharge point of water from Smallwood Pit near the Jean Goulet Building, which percolates through the waste rock pile before reaching Luce Lake North;
- LP2: Inflow near Loading Pocket 2, mainly from groundwater discharge in the ATO railway tunnel;
- MD5: Mine Discharge Point #5 downstream of the Mine Maintenance Facility (MMF), which includes water from the ditch along the road that runs alongside the ATO, the oil/water separator pond and the Fire Water Tank, collectively referred to as MD5 Settling Ponds, and;
- HC: Combined discharges from Luce Pit dewatering wells through Hakim Culvert. The discharges from the Luce pit sumps and the shallow in-pit wells flow through the Luce Pit sedimentation pond prior to release through Hakim Culvert. The discharges from the ex-pit wells and the deep in-pit wells do not require treatment and are pumped directly into the channel below Hakim Culvert.

Historically, Feltham Lake flowed into Luce Lake North through a small stream. Infilling of the lower reach of this stream with waste rock has covered over this previous surface drainage route and made the discharge location difficult to visually confirm (see Figure 2-1). An aerial survey did not allow visual detection of a connection from the downstream flow of Feltham Lake to Luce Lake. A dye tracer test revealed that there is flow connectivity from the end point of the stream on the east side of the Main Mine road to a ditch along the eastern ATO service road and ultimately through to MD5.

The greatest inflow rates to Luce Lake North are from the Luce Pit dewatering wells and sumps (HC) with a combined flow rate of approximately 0.5 m³/s. The White Lake Diversion is the other significant inflow to Luce Lake North with an average flow rate of 0.17 m³/s. A future inflow to the Luce Lake system of approximately 0.03 m³/s will be the dewatering discharge from the Wabush 3 open pit to a new sedimentation pond near Luce Lake North (Figure 2-1). The final design will determine whether the new Wabush 3 sedimentation pond will discharge into the White Lake diversion extension or directly to Lower Luce Lake (see Section 2.4.1).

Flow out of Luce Lake North is to Lower Luce Lake through a shallow channel approximately 15 m wide (Figure 3-6). Lower Luce Lake discharges from its southeast corner to Luce Brook, which flows into Little Luce Lake and Patterson's Pond. Patterson's Pond discharges to Wabush Lake via Tinto Creek, a man-made stream that flows over the tailings at the edge of Wabush Lake (Figure 3-3).

2.2 Land Ownership

The project area is located entirely within the mine operating site and the project is taking place on land that is covered by a mining lease, which was issued in the early 1960s and re-issued for an additional 30 year term in the 1990s. IOC also currently holds surface rights for the planned footprint of the project.

2.3 Alternatives to the Project

Several options for dewatering Luce Pit were explored:

1. Continue the current dewatering strategy (use of ex-pit and in-pit dewatering wells, pit sumps);
2. Divert and dewater a portion of Luce Lake North;
3. Install a hydraulic barrier (grout wall) between Luce Lake North and Luce Pit; and
4. Divert and dewater the entire Luce Lake North basin and divert flows around Luce Lake North.

The relative benefits and risk reduction of each option were assessed and predictive groundwater modelling was conducted for each of the four options to predict the effects on water levels and flows down gradient of Luce Lake as well as dewatering requirements and associated operating risks and costs. The four options are described below.

1. Continuing the current dewatering strategy

Continuing the current dewatering strategy carries high safety, environmental, and operational risks and costs due to the increasing dewatering requirements as the pit deepens and the progressively increasing risk of pillar failure. Based on model-predicted flow rates and water levels relative to existing wells, five high yield wells will need to be added to the current system (one in 2016, three in 2017, and one in 2040), along with four new low yield wells added in 2015. High yield wells have a maximum pumping capacity of 0.06 m³/s (1,000 gpm) and low yield wells have an approximate maximum pumping capacity of 0.01 m³/s (150 gpm). The dewatering requirements are predicted to increase to approximately 0.63 m³/s (10,000 gpm) by 2018 and up to 0.88 m³/s (14,000 gpm) in 30 years. Despite ongoing and planned improvements in the dewatering capacity in Luce Pit (i.e., additional equipment purchased and installed), it is unlikely this strategy will be able to provide a permanent and reliable solution for the lifetime of the pit. In terms of cost, the current strategy has the lowest net present cost, but the operating costs for this option are substantially higher than all other options due to higher relative dewatering rates.

2. Divert and dewater a portion of Luce Lake North

This option involves draining a portion of Luce Lake North by constructing a dam across the lake to allow dewatering of the southern portion, thereby separating it from the pillar area containing the high hydraulic conductivity material. This option has the highest costs due to the need to 1) conduct site investigations to determine the occurrence and distribution of high hydraulic conductivity material under the lake, 2) construct a dam to separate the lake from the pillar area, which would take two years to install and require additional pumping wells during construction, and 3) replace fish habitat. The benefits in terms of dewatering rate reduction would be similar to diverting the complete Luce Lake North, but a risk would remain that high hydraulic conductivity material may still exist beneath the remaining portion of Luce Lake North and high dewatering rates may still be necessary even after spending significant capital to build the dam and isolate the lake. Even with detailed site investigation (diamond drilling), it is still possible that a zone of higher hydraulic conductivity material could be missed, resulting in higher flows than predicted and the risk of pillar failure remaining.

3. Install a grout wall between Luce Lake North and Luce Pit

Installing a hydraulic barrier via grout injection across the known extent of the high hydraulic conductivity zone would result in substantially lower rates than the current dewatering strategy but only if the grout injection results in essentially a 100% effective barrier. Given the nature of the high hydraulic conductivity zone in the pillar area (i.e., poor rock strength, potential for erosion and piping, and presence of large

fractures), it may not be possible to install an effective or “impermeable” barrier via grout injection. If the barrier is not effective, relatively high dewatering rates would still be required in Luce Pit (approximately 60-70% of that required for the current dewatering strategy), the risk of pillar failure or piping would remain, and substantial capital costs would be incurred with only very modest benefit. This option has the second highest overall cost due to the relatively high capital costs for site investigation and grout wall construction.

4. Divert and dewater the entire Luce Lake North basin

The diversion and dewatering of Luce Lake North has relatively high construction costs but the lowest long term operating costs due to lower dewatering requirements in Luce Pit. Groundwater flow through the pillar would drop substantially, with a predicted pumping rate after 5 years of 0.17 m³/s (2,700 gpm), as opposed to 0.63 m³/s (10,000 gpm) with the current strategy, and 0.25 m³/s (4,000 gpm) with the grout wall option. Most importantly, this is the only option that would fully mitigate the safety, environmental, and operating risks posed by the potential failure of the pillar separating Luce Pit from Luce Lake North.

Following the initial evaluation, an updated study was conducted focussing on the best two options – continue current dewatering strategy and Luce Lake North removal – to determine the effects on downstream water resources (Luce Brook and Dumbell Lake). Modelling predictions assumed that the Wabush 3 project moves forward with mining planned to extend until 2063 with associated dewatering. Although Dumbell Lake flows into Luce Brook downstream of Little Luce Lake and is not connected hydrologically to Luce Lake North, it was included in the modelling because it is currently identified as the Town of Labrador City’s backup water supply and it is part of the greater Luce Lake/Dumbell Lake/Patterson’s Pond watershed area (Figure 3-3). The key finding of this study is that the removal of Luce Lake North does not impact downstream water resources (Dumbell Lake and Luce Brook), with no predicted changes to groundwater levels near Dumbell Lake and Luce Brook and only slight reductions in groundwater flow predicted. Additionally, Luce Lake North removal has no additional impact on water resources compared to the current dewatering strategy.

In summary, the options to minimize safety, environmental, and operating risks associated with the high hydraulic conductivity zone between Luce Pit and Luce Lake North range significantly in cost and produce variable dewatering rates and associated risk reduction. The current dewatering does not address the risk of pillar failure, is unreliable due to operating challenges, and will result in increasing risk of pillar failure as mining in Luce Pit continues. Partial diversion and dewatering of Luce Lake North and installation of a hydraulic barrier (grout wall) produce less benefit, lower risk reduction, higher cost, and have inherent implementation risks.

Completely diverting and dewatering Luce Lake North provides the greatest mitigation of the geotechnical, operational and environmental risks, as groundwater flow through the pillar would be greatly reduced. Since Luce Pit is the main source of mineral extraction for the next few years, the mitigation of these risks is essential for IOC’s continued operations in Labrador City and for the local economy.

2.4 Project Components

The diversion and dewatering of Luce Lake North includes the following components:

- 1) Construction of three diversion channels around Luce Lake North to reduce surface water inflows to Luce Lake North;

- 2) Construction of a dam to isolate Luce Lake North from Lower Luce Lake;
- 3) Relocation of fish from Luce Lake North;
- 4) Completion of measures to offset any serious harm to fish and fish habitat due to the diversion and dewatering of Luce Lake North;
- 5) Relocation of groundwater discharges from Luce Pit that are currently pumped to Luce Lake North;
- 6) Controlled dewatering of Luce Lake North; and
- 7) Installation and maintenance of a sump pump system in the Luce Lake North basin to manage groundwater infiltration, surface water inflows, and snowmelt runoff.

2.4.1 Diversion Channels

According to the current level of engineering that has been carried out, the most probable solution for diverting flows away from Luce Lake North will consist of three diversion channels, to redirect water from the southwest, west and east sides of Luce Lake North (Figure 2-2).

Along the south side of Luce Lake North, a discharge channel will be constructed from the WLD Sedimentation Pond to Lower Luce Lake. This channel, referred to as the WLD Extension, will pick up flows from the White Lake Diversion (via the WLD Sedimentation Pond), the dewatering discharges from Luce Pit, and the future discharge from the new Wabush 3 Sedimentation Pond. At the same time, the existing discharge channel for the Luce Pit dewatering at Hakim Culvert will be infilled/blocked off.

A second diversion channel, referred to as Luce North Diversion (West), will be constructed on the west side of the haul road that runs along the west side of Luce Lake. This channel will collect surface runoff from the west side of the watershed and discharge into the existing WLD Sedimentation Pond.

To accommodate these two new diversion channels, the WLD Sedimentation Pond will be cleaned out and reshaped. At the same time, the WLD Sedimentation Pond discharge channel to its outlet at Luce Lake North will be infilled to prevent flows from entering the lake.

Surface inflows from the eastern side of Luce Lake North will be collected in a third diversion channel, referred to as Luce North Diversion (East), along the east side of the ATO. There is an existing ditch along the eastern ATO service road that will be regraded for this purpose. The East diversion channel will collect the flows from the MD5 Settling Ponds and will intercept any runoff from the eastern side of the lake, including the flows from Feltham Lake. The existing MD5 outfall to Luce Lake North will be reconfigured to discharge into this new diversion channel. The Luce North Diversion (East) discharges at its southern end into a small pond adjacent to and separated from Lower Luce Lake by the ATO Railway. During preliminary field investigations, no discharge pipe from this small pond to Lower Luce Lake was found, so this would need to be investigated further or a new discharge pipe would need to be installed.

It is not practical to construct a diversion channel along the north side of the lake due to the large waste rock piles located there. Surface water entering Luce Lake North through the waste rock piles will flow into the lake basin and be removed by a sump pump system (see Section 2.4.7).

The diversion channels will be constructed by standard means and have a typical trapezoidal shape section. The channels will operate via gravity and will have varying grades to best fit the existing



topography. The final design will incorporate anticipated annual flows and daily variations to ensure there will be no disruption to downstream fish passage. Furthermore, since fish have been observed on occasion in the existing White Lake Diversion channel, the WLD Extension will be constructed such that it will contain sufficient water to allow for fish passage even under low flow conditions. If geotechnical information determines that it requires a lining to remain impermeable, a lining will typically be placed between fine till/clay layers. Based on the existing material along the channel route, geotechnical surveys may recommend construction during March/April when ground conditions are frozen, thereby reducing potential sedimentation issues.

To prepare for an event during which the diversion channels become inundated to the point where they are at capacity, a series of weirs will be constructed along their edges to allow overflowing waters to enter Luce Lake North in a controlled, dispersed manner. This will prevent scouring and erosion of the adjacent ground.

The exact location and detailed design of the diversion channels has not been completed at this stage. Detailed design will be done later and provided with Certificate of Approval applications.

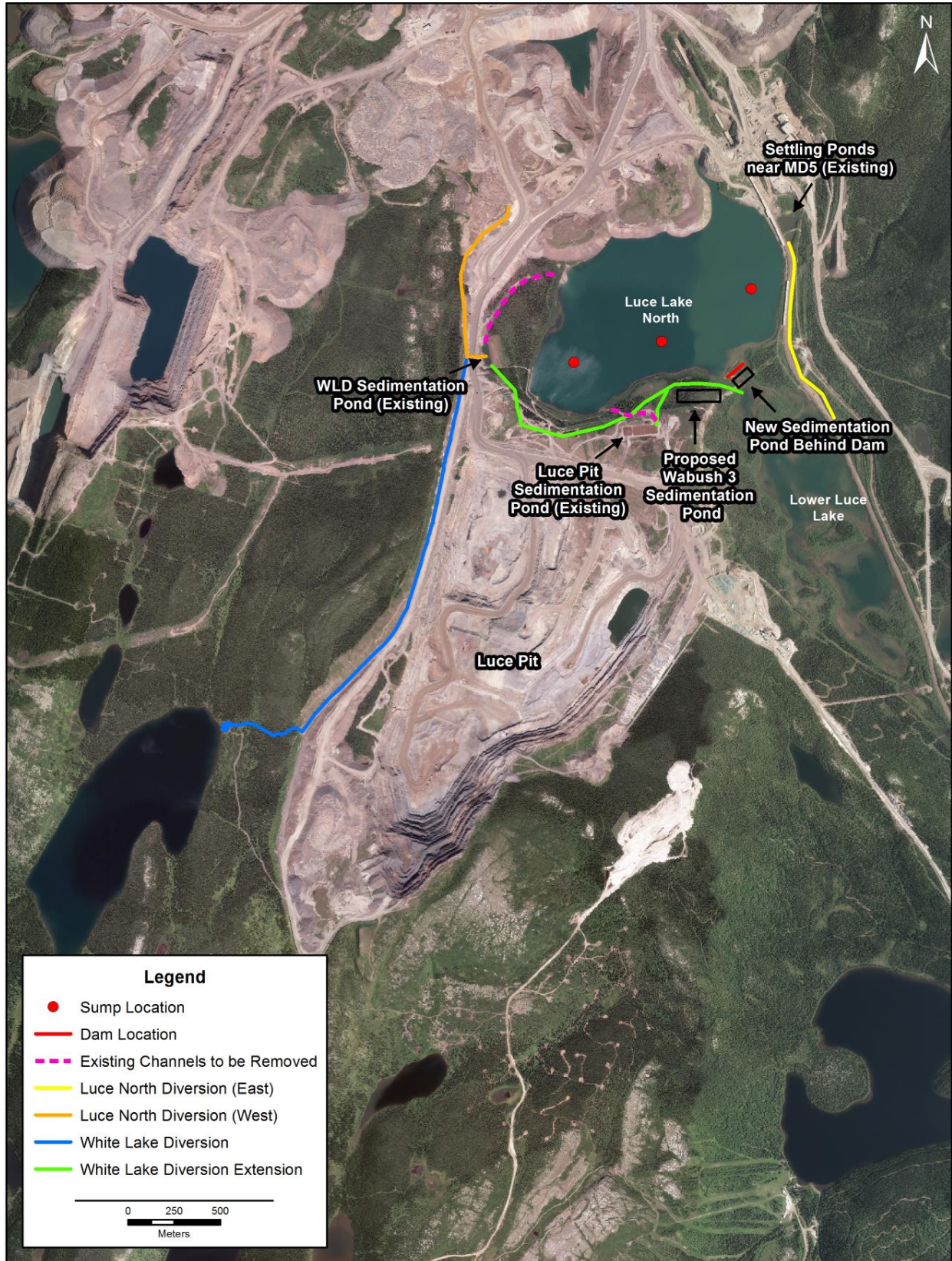


Figure 2-2 Proposed diversion channels and proposed sump locations

2.4.2 Dam between Luce Lake North and Lower Luce Lake

A low earthen dam will be required to prevent backflow into Luce Lake North from Lower Luce Lake once dewatering of Luce Lake North has commenced. The dam will be located at the narrowest point between the two water bodies. It is anticipated that it will be constructed with adjacent native materials and that the depression resulting from the excavation of those materials can be converted into a sedimentation pond for pumped waters from Luce Lake North (see Figure 2-2 – New Sedimentation Pond Behind Dam). The design of the dam is conceptual at this stage. A geotechnical study is required to plan construction of the dam.

2.4.3 Fish Relocation

Luce Lake is known to contain brook trout, lake trout, round whitefish, longnose sucker, burbot and lake chub (see section 3.1.5). Prior to draining Luce Lake North, fish capture and relocation programs will be carried out so as to minimize serious harm to fish. A Fish Relocation Plan is under development as part of the Offset Plan required for Authorization under Section 35(2) of the *Fisheries Act*. The federal Department of Fisheries and Oceans (DFO) has been involved in the development of the offset and relocation plans.

The plan will include the live capture and relocation of fish from Luce Lake North to another water body within the same system and with the same species composition (i.e., no introduction of new species to an area). Since the carrying capacity of Lower Luce Lake is not great enough to support the entire Luce Lake North fish population, it is likely that all fish will be released within Wabush Lake. All relocated fish will be identified to species and an estimate of length recorded before release. Relocation activities will generally continue until capture rates are very reduced and/or construction/dewatering activities become unsafe. The target capture rate for cessation is generally site-dependent and will be finalized with DFO.

2.4.4 Fish Habitat Compensation

The *Fisheries Act* allows the Minister of Fisheries and Oceans Canada (DFO) to issue an Authorization under Section 35 (2) which will permit work, an undertaking or an activity to occur that results in “the serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or serious, permanent change to ecosystem productivity that support such a fishery”. The issuance of an Authorization is at the discretion of the Minister; however, the process for issuing an Authorization is well established. Authorization under Section 35 (2) will be issued only with the acceptance of an appropriate Offsetting Plan which offsets any serious harm to fish or serious, permanent change to ecosystem productivity that support a fishery. An Authorization must be issued before any action can be taken that would result in serious harm.

While Luce Lake is wholly within IOC property and has not been subject to commercial, recreational, or Aboriginal fisheries since at least 1957, IOC recognizes the importance of fisheries in the Labrador West area and supports offsetting the removal of Luce Lake North from the Luce Lake watershed. An Offsetting Plan has been developed to provide productivity offsets to local species that support a recreational fishery. The offset plan has been designed to provide increased fish production related to local recreational fisheries as described by local stakeholders; primarily for brook trout. The overall offset is

based on fish productivity and the habitat's relative contribution to existing fisheries, in contrast to previous approaches that focused on the spatial extent of the affected lacustrine habitat. The offset plan has also been developed with the input and contribution of local cabin owners and anglers so that maximum benefits to recreational fisheries are provided.

DFO has been consulted in the development of the offset plan. The required offsets will be provided through increases in overall existing riverine habitat suitability in an area severely affected by forest fires, known locally as the Blueberry Hill area. It also includes specific physical habitat offset measures to increase spawning suitability and hence increase the overall potential for production. All offsetting measures have been directed toward habitat suitabilities for species that support a recreational fishery; however, it should be noted that most fish species in the area would find the habitat criteria within the described offsetting measures suitable. As a result of the offset plan, no serious harm is anticipated.

2.4.5 Relocation of Luce Pit Dewatering Wells Discharges

The Luce Pit dewatering wells contribute the greatest inflow to Luce Lake North as discussed in section 2.1. Given that 55 to 70% of that water originates from Luce Lake North, most of the draw down in Luce Lake North will occur when the discharge of the Luce Pit dewatering wells is redirected toward Lower Luce Lake, thereby ending the continuous recycling of Luce Lake North water. Some considerations for the relocation of these flows include:

1. Quality of the discharged water

There are currently two types of discharges from dewatering Luce Pit. Discharges from the deep groundwater wells (ex-pit and in-pit) are not in contact with mining activities and do not require treatment prior to discharge; these flows are currently discharged directly to Luce Lake North via pipes below Hakim Culvert. Redirecting these flows may be as simple as rerouting the discharge pipes to the WLD Extension or extending them directly to Lower Luce Lake. Luce Pit sump water and shallow well water (in-pit wells) require treatment prior to discharge; these flows would continue to be treated in the Luce Pit Sedimentation Pond and monitored prior to discharge into the new WLD Extension (see Figure 2-2). Further details will be available when the detailed design and scheduling are carried out and will be provided with Certificate of Approval applications.

2. Individual extraction well flow rates / Maximum permissible downstream pumping rates

The Luce Pit extraction wells have variable pumping rates. While the sump and in-pit wells will continue to be discharged as a single source from the Luce Pit Sedimentation Pond as described above, the deep groundwater wells (in-pit and ex-pit) can be redirected from Luce Lake North to the WLD Extension individually based on their flow rates, the capacity in the WLD Extension, and the maximum permissible downstream pumping rates.

A detailed analysis of the current pumping system configuration and the individual pumping rates will allow a diversion schedule to be developed to ensure that the total diverted flows do not exceed the maximum permissible monthly pumping rates specified in the pump down plan (see section 2.4.6). This may mean that only some of the Luce Pit dewatering wells may be redirected during a given time frame.



3. Capacity of WLD Extension

The design of the WLD Extension will take into account the relocation plan for the Luce Pit dewatering wells discharges and vice versa as well as the expected flow contributions of the WLD Sedimentation Pond, the Luce Pit Sedimentation Pond, the future Wabush 3 Sedimentation Pond and runoff and precipitation. A preliminary hydraulic analysis has been conducted to generate preliminary design parameters. This will be refined at the detailed design stage.

2.4.6 **Controlled Dewatering of Luce Lake North**

Maximum permissible pumping rates based on downstream fish habitat and life cycles have been developed and are listed in Table 2-1. The process included identifying the most sensitive life-stage(s) of the most sensitive species in the Luce Lake North watershed throughout the possible pump down timeframe, identifying the predicted habitat characteristics associated with increased flows due to pump down, and developing acceptable pumping ranges that will maintain habitat integrity and life-stage(s) protection. Since the exact timing of pump down is not known at this time, habitat range criteria have been identified throughout a typical year. During each time increment (month), the limiting or most sensitive life cycle stage in terms of sensitivity to changes in habitat characteristics was identified. Table 2-1 shows the monthly pumping volume limits that have been calculated to ensure protection of the most sensitive life-stage(s), and by implication all other life-stages.

Table 2-1 Pumping Limits for Luce Lake North

Month	Total Allowable Flow ^a (m ³ /hr) (1)	Typical Monthly Flow ^b (m ³ /hr) (2)	Typical Available for Pumping ^c (m ³ /hr)	Velocity Criteria ^d (m/s)	Limiting Habitat Protection/Biological Criteria
January	<5,256	1,548	3,708	0.70	Habitat protection and good spawning/overwinter
February	<5,256	1,440	3,816	0.70	Habitat protection and good spawning/overwinter
March	<5,256	1,188	4,068	0.70	Habitat protection and good spawning/overwinter
April	<4,752	1,746	3,006	0.19	Good hatching/rearing
May	<4,752	4,752	0	0.19	No pumping due to spring runoff
June	<4,752	4,680	0	0.19	No pumping due to spring runoff
July	<4,752	3,960	1,062	0.19	Good spawning/hatching/rearing
August	<4,752	3,456	1,296	0.19	Good hatching/rearing
September ^e	<5,256	3,420	1,836	0.70	Habitat protection and good spawning
October ^e	<5,256	3,204	2,052	0.70	Habitat protection and good spawning
November ^e	<5,256	2,700	2,556	0.70	Habitat protection and good spawning
December	<5,256	2,052	3,204	0.70	Habitat protection and good spawning

^a Calculated as maximum flow through Luce Brook system while meeting habitat protection/biological criteria (i.e., for velocity)

^b Measured at Luce Brook Station (see Figure 3-3)

^c Volume available for pumping derived by subtracting column (2) from column (1)

^d Maximum velocity within Luce Brook (e.g., to ensure that gravel substrates remain stable, allow good spawning, etc.)

^e Pumped discharge to remain constant (±30%) through September to November.

As mentioned earlier, diverting the Luce Pit dewatering wells discharges away from Luce Lake North will cause the lake to draw down. It is anticipated that a supplemental dewatering system may be used to augment the pump down rate. This system would consist of two land based pumps with floating intake lines similar to the system shown in Figure 2-3.



Figure 2-3 Example of Shore Based Pumping System with Floating Intake (Cornell Pump Company)

Initially, the two pumps would be located next to the dam and discharge over the dam and into Lower Luce Lake via the adjacent sedimentation pond, as shown in Figure 2-4.

The available bathymetry for Luce Lake North indicates that a distinct ridge will appear and two separate pools of water will be created (North Pool and South Pool) when the water level decreases to approximately 7 to 8 meters below the current lake level. Once this ridge is fully exposed the supplemental pumps would be relocated to the ridge and floating pipes would extend from the pumps into each pool. Separate discharge pipes would run from each pump up and over the dam and into Lower Luce Lake via the new sedimentation pond (see Figure 2-5).

Once the water level decreases to approximately 12 meters below the current lake level, the North Pool will separate into two smaller basins. At this point, the final dewatering of the North Pool would be completed using smaller submersible style pumps.

For the South Pool, the surface pumping unit would be used to a depth of about 14 meters below the current water level. At this depth, the bathymetric data indicates a distinct level area will be present. The pump would then be relocated to this level and pumping would continue to approximately 20 meters below the current water level. Once the -20 meter level has been achieved, the final dewatering would be completed using submersible pumps.

2.4.7 Ongoing Maintenance Dewatering

Ongoing dewatering of surface runoff from the northern shore, precipitation, snowmelt runoff and groundwater infiltration will be carried out using a sump pumping system situated in the three low points in the Luce Lake North basin as shown in Figure 2-6.



The sump pumping system will discharge over the dam and into the adjacent new sedimentation pond and then into Lower Luce Lake. Water quality will be monitored and further treatment will be carried out, if necessary. An engineering evaluation will be carried out to determine the optimal location(s) of the sumps and discharge location(s) as well as the configuration of the sump pumping system. As with all pumping activities, the maximum allowable pumping rates must be adhered to.

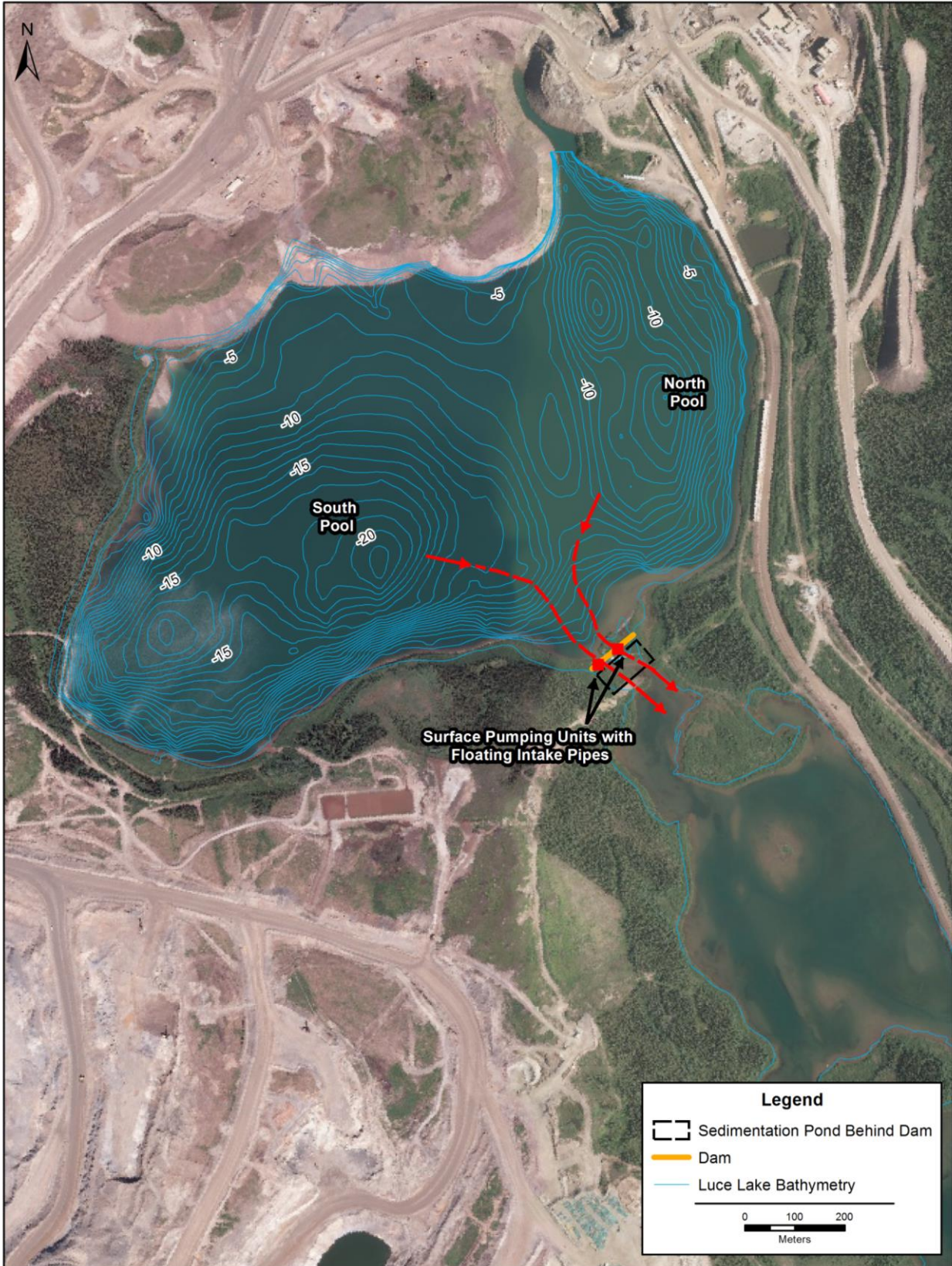


Figure 2-4 Supplemental Dewatering System

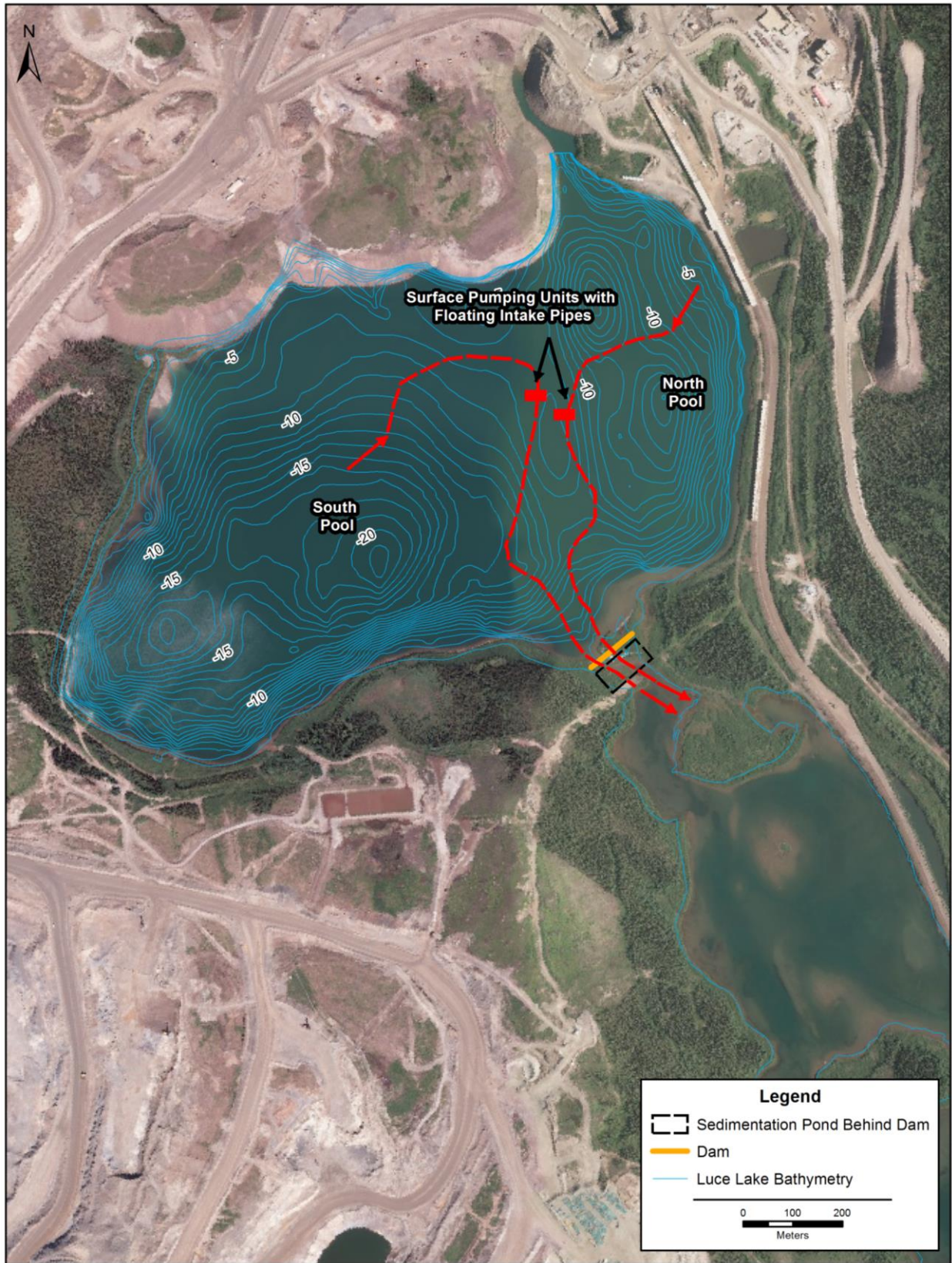


Figure 2-5 Supplemental Pumping System Relocated to Exposed Ridge

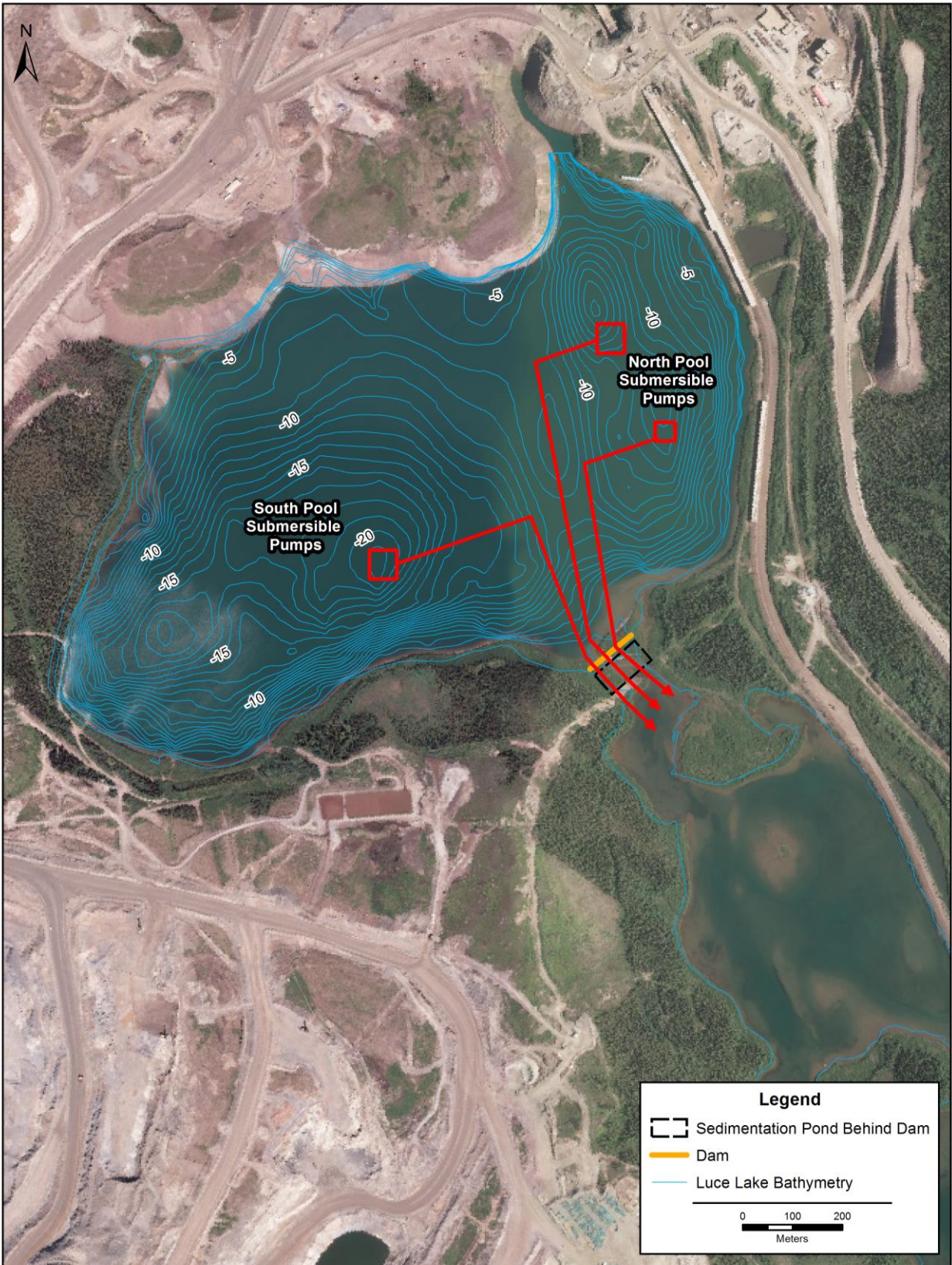


Figure 2-6 Sump Pumping System for Ongoing Maintenance Dewatering

2.5 Construction

The planned date for construction activities to commence is 2016, depending on the timing of release from the provincial EA process, and the receipt of formal corporate approval and all other required regulatory approvals and permits. Construction activities will be designed to minimize disruption of existing mining operations. Construction activities include:

- Construction of diversion channels to redirect flow around Luce Lake North;
- Construction of dam to isolate Luce Lake North and prevent backflow from Lower Luce Lake;
- Completion of measures to offset any serious harm to fish and fish habitat; and
- Installation of sump pump system in low points of Luce Lake North.

Standard construction methods and best practices will be used and all work will be carried out in accordance with environmental regulations, permits and applicable standards. Whenever possible, work will be constructed in the dry and all efforts made to minimize disruption to the local environment.

2.6 Operations and Maintenance

Once Luce Lake has been diverted and dewatered, ongoing low volume dewatering will be required to manage groundwater infiltration, precipitation, snow melt runoff and surface runoff not captured by the diversion channel(s). The maintenance dewatering system described in section 2.4.7 will be used.

2.7 Possible Accidents and Malfunctions

In the construction, operation and maintenance of the Project, an accidental or other unplanned event is an unlikely, but unfortunately possible, outcome. Some of the potential accidental events or malfunctions that may be associated with the Project and which are relevant for EA purposes include:

- an accidental spill of chemicals, fuels or other deleterious substances into the terrestrial and/or aquatic environments, and
- a fire or explosion of equipment, potentially extending into adjacent areas.

Human health and safety and environmental protection will be paramount considerations by IOC in the planning and detailed design of the Luce Lake North diversion and dewatering project. IOC has significant and long-term experience in all facets of iron ore mining and processing in Labrador West, dating back to the early 1960s. There are comprehensive Health, Safety and Environmental Management Systems and associated plans and procedures in place. These will be adopted and updated as required for the Project, which will be designed, constructed and operated in compliance with relevant legislation, regulations, standards and guidelines.

As noted previously, a key rationale for the Project is to address the serious safety, environmental, and operational risks presented by the potential failure of the pillar separating Luce Lake North from Luce Pit. Dewatering Luce Lake North to remove the hydrostatic pressure in the high hydraulic conductivity low-strength zone of the pillar is the safest way to mitigate these risks while allowing mining to continue in Luce Pit.

2.8 Closure and Decommissioning

The life of the Project is anticipated to coincide with the life of the Luce Pit mine, which is now estimated to close in 2043 or later. Upon closure of the Luce Pit operations, dewatering of the Luce Lake North basin will cease. The actual requirements for water level controls for the Luce Lake basin will be dependent on any future mining activities in the general area. Future mining plans for post-Luce Pit have not been determined and exploration activities will likely be conducted before decisions are made. In any case, the rehabilitation of Luce Lake North will be added to the Rehabilitation and Closure Plan for IOC in Labrador City. The estimated rehabilitation costs will be calculated and appropriate financial assurances will be put in place.

2.9 Effects of the Environment on the Project

Topographic features, climatic conditions, upstream and downstream water bodies, hydrogeological conditions and other environmental factors have influenced the design of the project. Due to the harsh winter climate in Labrador West, most construction activities will be limited to the non-winter months. The rate of dewatering of Luce Lake North will be limited by the ecosystem carrying capacity as described in section 2.4.5 and by spring snowmelt volumes. No additional or specific mitigation measures are required or proposed in relation to the possible effects of the environment on the Project.

2.10 Labour Force and Occupations

The Project, through its construction and operations phases, will result in positive economic effects. The Project will create employment opportunities in a variety of occupations. Over its nearly two year construction phase, the Project will require an estimated 85 workers, including the occupations listed in Table 2.2.

Project construction will be carried out on a contractual basis, with workers hired at the discretion of IOC and the contractor and in accordance with its own hiring practices and policies. IOC supports employment and gender equity in its hiring and contracting practices, and is committed to maximizing the use of the local workforce and Newfoundland and Labrador companies to the extent possible.

Once commissioned and during Project operations, the Project will not require any additional workers in long-term positions. The offset plan monitoring will require experienced biologists/ecologists for the monitoring period required by DFO associated with the Offset Plan. . These positions will likely be filled contractually, as with the White Lake Diversion monitoring.



Table 2-2 Occupations Likely to be represented in the Engineering and Construction Work Force

Occupation	Estimated Number	Relevant NOC Code
Engineering Phase		
Civil Engineer	1	2131
Mechanical Engineer	1	2132
Project Manager	1	0711
Geotechnical Engineer	1	2144
Land Surveyor	1	2154
Hydrogeologist	1	2113
Hydrologist	1	2113
Safety Officer	1	2263
Biologist/Ecologist	2	2121
<i>Total</i>	10	
Construction Phase		
Land Surveyor	2	2154
Geotechnical Engineer	1	2144
Geotechnical Technician	1	2212
Hydrogeologist	1	2113
Hydrologist	1	2113
Civil Engineer	1	2131
Superintendent	2	7205
Chainsaw Operator	4	8421
Truck Driver	4	7411
Heavy Equipment Operator	4	7421
Mechanic	1	7312
Drafting Technologist	1	2253
Civil Engineer	1	2131
Mechanical Engineer	1	2132
Electrical Engineer	1	2133
Electrical technician	1	2241
Cost Controller	1	1411
Project Manager	2	0711
Site Engineer	2	2131
Foreman	4	7205
Labourers	20	7611
Concrete Mason	2	7282
Pipe Fitter	2	7252
Welder	2	7265
Crane Operator	2	7371
Safety Officer	2	2263
Biologist/Ecologist	2	2121
<i>Total</i>	68	
Fish Relocation		
Project Manager	1	0711
Site Engineer	1	2131
Safety Officer	1	2263
Biologist/Ecologist	4	2121
<i>Total</i>	7	
TOTAL (Engineering, Construction and Fish Relocation)	85	



2.11 Project Documents

As part of this Project, a series of geotechnical, hydrogeological, and field studies were conducted to prepare for the Project. These unpublished reports are included as references in this document.

2.12 Project Schedule

Subsequent to release from the EA process, and the receipt of formal corporate approval and all other required environmental approvals and permits, construction activities are planned to commence in the spring of 2016 with completion planned for mid-2017.

2.13 Project Schedule

Subsequent to release from the EA process, and the receipt of formal corporate approval and all other required environmental approvals and permits, construction activities are planned to commence in the spring of 2016 with completion planned for mid-2017.

The construction of the diversion channel(s) would begin in early 2016 as soon as the snow has melted (anticipated start period is May) since construction can be completed in isolation of any existing water management structures and can be done in dry conditions. At this time, it has not been decided whether a second diversion channel along the ATO will be constructed. Fish relocation activities will be carried out around this time as well. Once the WLD Extension is complete, diversion of existing inflows to Luce Lake North from the White Lake diversion and Luce Pit pumps can begin, in accordance with the pumping limits that have been established (see section 2.4.6). This is expected to begin in the late summer and fall of 2016. Construction of the dam separating Lower Luce Lake from Luce Lake North will occur concurrently.

Since the flows from the Luce Pit dewatering wells comprise the majority of inflows to Luce Lake North, drawdown in Luce Lake North will begin to happen once these flows are relocated. The dewatering of Luce Lake North can be completed within one year (i.e., active pumping from August to December) if the maximum permissible pumping rates based on the biological criteria for protection of sensitive species are adhered to. Realistically, it is likely that pumping will cease during the winter months and restart the following spring after the snowmelt runoff. The installation of the sump pumping system in the Luce lake North basin to complete the final draw-down and carry out maintenance dewatering is planned for the spring of 2017. A sequence of construction activities has been developed based on potential field work activities, inflow rates to Luce Lake North and the biological pump down criteria (AMEC 2014) (see Table 2-3).



Table 2-3 Schedule of Diversion and Pump Down Activities

Month	Typical Available Pumping (m ³ /s) ^a	Activity	Potential Flow Increase in Luce Brook (m ³ /s)
May	0	Build surface water diversion channels	
June	0	Build surface water diversion channels Fish out Luce Lake North	
July	0.30	Build dam Connect diversion channels to Lower Luce Lake	0.227
August	0.36		0.227
September	0.51	Relocate groundwater discharges from dewatering pumps to Lower Luce Lake diversion	0.505
October	0.57	Start additional pump down using sumps	0.57
November	0.71	Increase pumping from sumps	0.71
December	0.89		0.89
January	1.03		1.03
February	1.06		1.06
March	1.13	Continue pumping sumps as needed	1.13
April	0.84		0.84

^a Volume available for pumping derived by subtracting mean monthly existing flow during a typical flow year from total allowable flow based on habitat and life stages protection criteria.

The safety, environmental, and operational risks posed by the flow of water through the pillar separating Luce Pit and Luce Lake North are critical and IOC will make every effort to collaborate with regulators to ensure that the planned project schedule is met. To this effect, IOC has completed and planned environmental and engineering studies in anticipation of project-related impacts and activities to meet or exceed regulatory requirements. These unpublished reports are included as references in this document.

2.14 Project Cost and Funding

The estimated cost of the Project, based on the current stage of engineering design and planning, is approximately \$15 million. Of that amount, approximately \$14 million is for construction costs (diversion channel(s), dam, sump pumping system) and \$1 million is for offsetting measures (fish capture and relocation, enhancement of habitat in the Blueberry Hill area, six years of monitoring). The costs of ongoing monitoring and maintenance dewatering of Luce Lake North basin will be included in IOC’s operational costs and are expected to be balanced by the reduced dewatering costs for Luce Pit. The Project will be privately funded. Government financial assistance is not required nor requested.

2.15 Environmental Management and Protection

The proposed Project would be constructed and operated as part of on-going and long-standing work programs associated with IOC’s Labrador West operations. The company has in place a comprehensive Health, Safety and Environmental Management System 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 its corporate Health, Safety, Environment and Quality Policy (Appendix A), other relevant corporate requirements and guidelines, and with a view to meeting, and seeking to surpass, the provisions of applicable legislation and regulations.

As part of its existing systems and processes, IOC has in place a comprehensive environmental management system (EMS) certified to the ISO 14001 Environmental Standard, including various associated plans and procedures designed to avoid or reduce the environmental effects of its activities. The proposed Project will be constructed and operated in accordance with applicable legislation and regulations, including the environmental protection and planning measures defined through this EA review, and in compliance with IOC policies, procedures and standards.

Table 2-4 provides a list of some of IOC’s existing environmental and other plans for its Labrador West development activities and operations. A review and updating of these and other existing procedures will be carried out as Project planning and implementation progress, including the incorporation of Project activities into IOC’s overall integrated management system.

Table 2-4 Select IOC Environmental Management Plans

Title
Contaminated Soil Management SOP-EM-702E
IOC Labrador City - Contingency Plan for Environmental Releases
Environmental Reporting SOP-EM-807E
IOC Lab City – Operational and Development Environmental Protection Plan
Hazardous Materials and Contamination Control Management Plan
Non-Mineral Waste Management Plan
Water Use and Quality Control Management Plan
Land and Watercourse Disturbance- Site Clearance Permits SOP-EM-701E
Land Disturbance- Vegetation Clearing and Grubbing SOP-EM-700E
Spill Response and Reporting SOP-EM-808E

2.15.1 Environmental Protection Plan(s)

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

An Environmental Protection Plan (EPP) is an important tool for consolidating project-specific environmental information and procedures in a format that provides sufficient detail for the implementation of environmental protection measures in the field. An EPP provides concise instructions to personnel regarding protection procedures and descriptions of techniques to reduce potential environmental effects associated with a specific construction or operations activity.



IOC has developed and implemented EPPs for its Labrador West development activities, and these will be updated and expanded as required to address the components and activities associated with this Project.

Activity-specific and/or Project-specific EPPs will be prepared and implemented for the construction phase of the Project. As appropriate, each EPP will include procedures and measures relating to such activities as vegetation clearing, grubbing, storage and handling of fuel, blasting, quarrying, dust control, waste and sewage disposal, work in or near water, contingency plans for unplanned events such as spills, rehabilitation and compliance monitoring.

An outline of IOC’s current operational EPP is provided below, for illustration and general information.

IOC Labrador City – Operational Development: Environmental Protection Plan	
1.0	Introduction
1.1	Purpose of the Environmental Protection Plan
1.2	Environmental Protection Plan Organization
1.3	Roles and Responsibilities
1.4	Environmental Orientation
2.0	Project Overview
2.1	Construction
2.2	Operations
2.2.1	Ongoing Site Preparation Activities
2.2.2	Mining Activities at IOC (typical)
2.3	Decommissioning
3.0	Regulatory Requirements and Commitments
3.1	Approvals, Authorizations and Permits
3.2	Compliance Monitoring
3.3	Reporting
3.3.1	Internal Communication
3.3.2	External Communication
4.0	Environmental Protection Procedures
4.1	Marshalling and Storage Areas
4.2	Clearing Vegetation
4.3	Grubbing and Disposal of Related Debris
4.4	Erosion Prevention and Siltation Controls
4.5	Buffer Zones
4.6	Blasting
4.7	Watercourse Crossings
4.8	Development Site Water Body Discharge.
4.9	Equipment Use and Maintenance
4.10	Storage, Handling and Transfer of Fuel and Other Hazardous Material
4.11	Solid Waste Disposal
4.12	Mineral Waste Rock and Overburden
4.13	Vehicle Traffic
4.14	Dust Control
4.15	ATV and Snowmobile Traffic
4.16	Hazardous Waste Disposal

4.17 Road Maintenance
4.18 Trenching
4.19 Surveying
4.20 Public Traffic and Activities
5.0 Contingency Plans
5.1 Culvert Failure
5.2 Road Washout
5.3 Fuel and Hazardous Material Spills
5.4 Wildlife Encounters
5.5 Forest Fires
5.6 Discovery of Historic Resources
6.0 Environmental Protection Plan Control Revisions
7.0 Contact List
8.0 Reference Material
Appendix A List of Abbreviations and Acronyms
Appendix B Controlled Copy Distribution List
Appendix C Revision Request Form
Appendix D Revision History Log
Appendix E DFO Fact Sheets for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador

2.15.2 Emergency Response and Reporting Plan(s)

IOC proactively identifies potential emergency situations and develops Emergency Response and Reporting Plans, the purposes of which are to identify responsibilities and procedures in the event of an unplanned incident, such as an incident that may affect human health or safety, or the accidental release of hazardous material, and to provide the information and procedures required for the effective response and reporting of such an incident. An outline of IOC's current Contingency Plan For Environmental Releases is provided below, for illustration and general information.

IOC Labrador City - Contingency Plan For Environmental Releases

IOC Health, Safety and Environment Policy
 Appendices
 Purpose
 1.0 Definitions
 2.0 Potential Spill Types
 3.0 Petroleum Based Products
 3.1 Land Based Spills
 3.1.1 Response, Reporting and Follow-up
 3.2 Spills Occurred on Water
 3.2.1 Response, Reporting and Follow-up
 4.0 Chemicals and Dangerous Goods
 4.1 Poly-chlorinated biphenyls (PCBs)
 4.1.1 Response, Reporting and Follow-up
 4.2 Other Chemicals
 4.2.1 Response, Reporting and Follow-up

Appendix A External Emergency Contacts
 Appendix B Emergency Call-out Procedure
 Appendix C Hazardous Waste Collection Points
 Appendix D Revision History
 Appendix E Plan Holders

There are comprehensive incident prevention, response and reporting plans and procedures in place for IOC's overall Labrador West mining operations, as well as activity specific plans and processes related to work in and around a water body. Plans specific to the diversion and dewatering of Luce Lake North will be developed prior to construction for the construction activities and as part of IOC standards for Management of Change on site for the ongoing pumping operations. All plans will be carried out in compliance with relevant legislation, regulations, standards and guidelines.

IOC has established a Business Resilience and Recovery Program (BRRP) that has identified high emergency risks and has developed detailed plans to mitigate. The BRRP is to ensure that the appropriate resources and incident response plans are prepared, practiced and available. The plans provide an effective response for the mitigation, control and recovery from incidents which can affect or disrupt the business at IOC. Activities associated with the Project will be evaluated under BRRP. The BRRP is routinely tested and audited to ensure it meets the ongoing needs of IOC.

2.16 Other Required Environmental Approvals

In addition to approval under the provincial EA process, the proposed Project will require a number of other permits and authorizations. A listing of some of the main permits, licences, approvals and other authorizations that may be required for the Project is provided as Appendix C.



3.0 EXISTING ENVIRONMENT

The following provides an overview of the existing environmental setting for the proposed Project, including a description of relevant components of the biophysical and socioeconomic environments.

3.1 Natural Environment

The area around Luce Lake is a heavily used area and has been affected by mining operations for the past five decades. Many components of the natural environment have been altered or affected to varying extents. Figure 3-1 shows the current existing land uses in the Luce Lake drainage area. Currently 29% of the drainage area is modified from its natural state, either by mining, industrial, or waste rock placement activities.

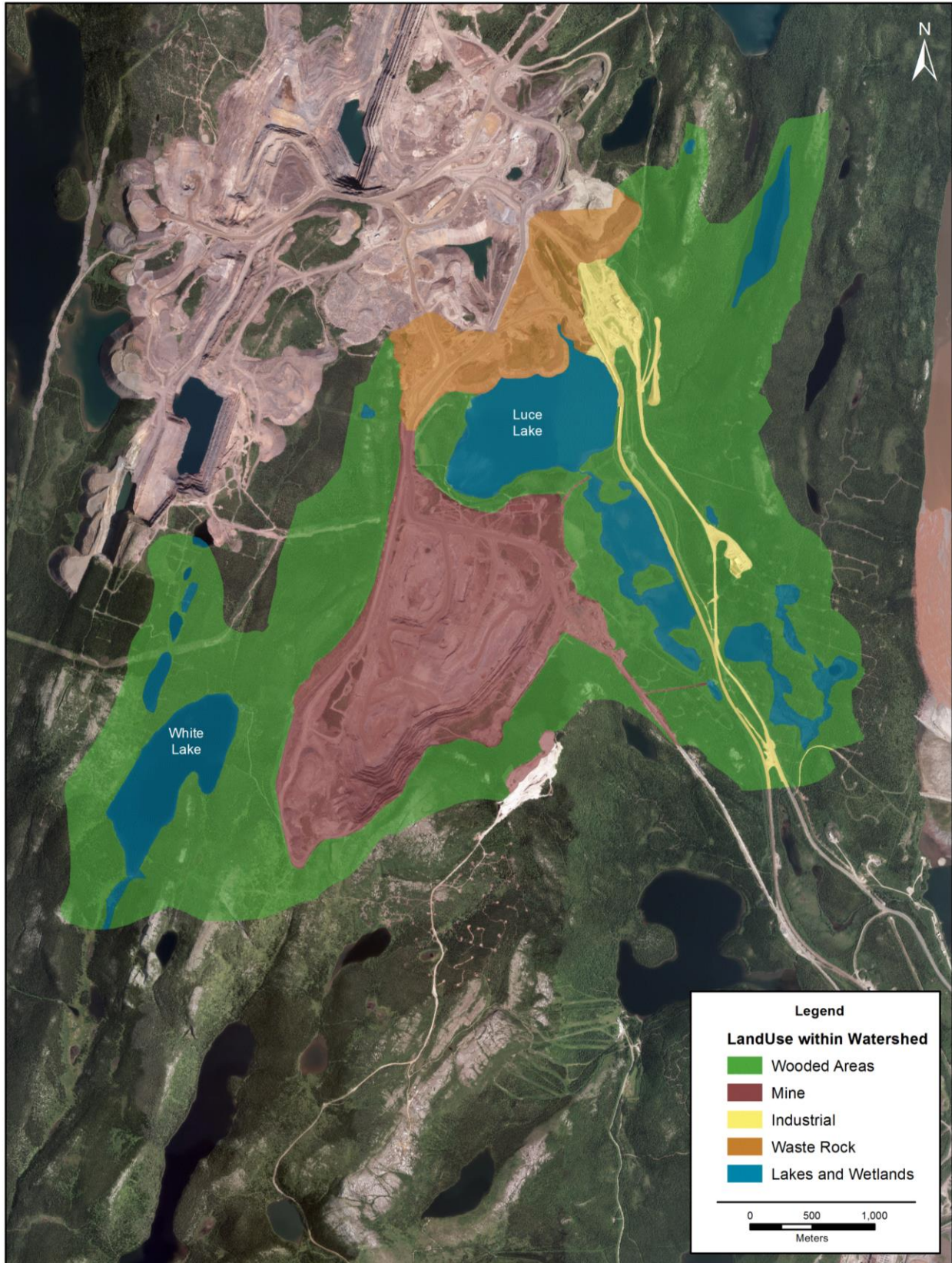


Figure 3-1 Land Uses in the Luce Lake Watershed

3.1.1 Climate

Luce Lake North is located in Western Labrador, within IOC's existing Labrador City Operations mining site. 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, severe, cold winters. At Wabush Lake, 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).

3.1.2 Geology and Topography

The area of Luce Lake North is situated in the Labrador Trough, which comprises a thick Proterozoic sedimentary sequence. As part of the Grenville Orogeny the area 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. All mapped geological units within the area fall within the Knob Lake Group, of which the Middle Iron Formation of the Sokomon Formation (Wabush Iron Formation) is the primary unit of economic interest. The topography of the Luce Lake North area is typical of the larger, surrounding region, and is largely bedrock controlled and somewhat rugged with rolling hills and valleys.

3.1.3 Vegetation and Soils

Black spruce is the dominant tree species in the area, with intermittent hardwoods and open lichen woodlands being common and characteristic of this region. The area around Luce Lake itself has been impacted by mining-related activities since the 1960s and is characterized by patches of mixed wood forest interspersed with areas of moss, lichen cover and exposed rock and earth, with roads, trails and other previously disturbed and developed areas being present throughout the area (Figure 3-2). There are no listed or rare plant species that are known to occur.



Figure 3-2 Environmental Setting (Typical Site Vegetation and Ground Cover)

3.1.4 Hydrology and Hydrogeology

The Luce Lake watershed is located within the greater Luce Lake/Dumbell Lake/Patterson's Pond watershed area (Figure 3-3). The Luce Lake/Dumbell Lake/Patterson's Pond watershed area is approximately 43.4 km² and mainly consists of granular till with some bedrock outcrop. Flow out of Luce Lake North is to Lower Luce Lake, which discharges from its southeast corner to Luce Brook. Luce Brook flows into Little Luce Lake and Patterson's Pond. Patterson's Pond discharges to Wabush Lake via Tinto Creek, a man-made stream that flows over the tailings at the edge of Wabush Lake. Dumbell Lake, which is currently identified as the Town of Labrador City's backup water supply, flows into Luce Brook downstream of Little Luce Lake.

Environment Canada has an established gauging station on Luce Brook near the outflow of Patterson's Pond (Station ID: 03OA012). This station has been used to collect hourly discharge data since 2002 and represents conservative, typical seasonal flows that would be encountered throughout Luce Brook below Lower Luce Lake in combination with flows from Dumbell Lake. Mean daily discharges range between 0.147m³/s during April to 3.37m³/s during the spring thaws (May).

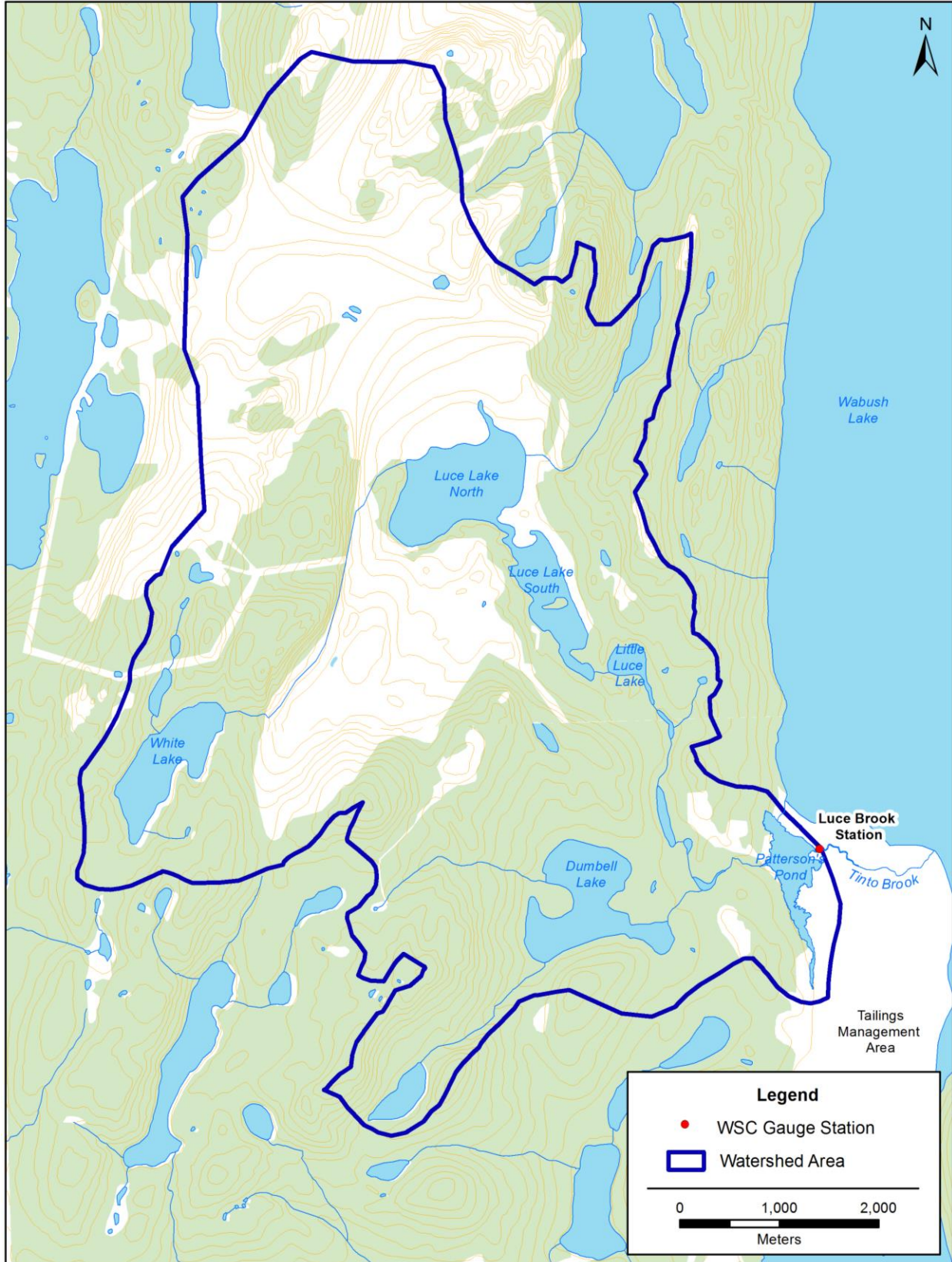


Figure 3-3 General Location of Luce Lake/Dumbell Lake/Patterson's Pond Watershed, Labrador West

3.1.5 Fish and Fish Habitat

The area of fish habitat that is relevant to the Project includes Luce Lake (North and South) and all upstream and downstream water bodies that could potentially provide fish passage to/from Luce Lake (Figure 3-3). Therefore, the upstream area under consideration includes White Lake and White Lake diversion channel. Although Feltham Lake is also upstream of Luce Lake North, there is no surface connection to Luce Lake and therefore no possibility of fish passage between the two water bodies. The downstream water bodies under consideration are connected by Luce Brook and include Lower Luce Lake, Little Luce Lake, and Patterson's Pond. As mentioned previously, Patterson's Pond flows into Wabush Lake via Tinto Brook, which is a man-made stream that flows over the tailings at the edge of Wabush Lake. Dumbell Lake, which is currently identified as the Town of Labrador City's backup water supply, flows into Luce Brook downstream of Little Luce Lake.

3.1.5.1 Upstream of Luce Lake North

White Lake supports populations of brook trout and lake chub. The White Lake fish habitat is isolated and the populations of fish in White Lake are self-sustaining; they were introduced when the White Lake diversion channel was constructed in 2002 (Ecometrix 2010). White Lake contains a man-made spawning channel and a fish control weir to deter fish from moving downstream into the White Lake diversion channel (Figure 3-4). In 2008, a step pool system was constructed at the downstream end of the fish weir to allow the rare few downstream migrant fish to return to White Lake.



Figure 3-4 White Lake Spawning Channel and Fish Control Weir (far right) (from Ecometrix 2004)

The White Lake diversion channel does not provide fish habitat and is not a natural watercourse. It was constructed when Hakim Lake, previously located between White Lake and Luce Lake, was drained to allow mining of Luce Pit. The White Lake diversion channel is lined with local shot rock materials from pit blasting operations and a woven, permeable geotextile (Calder 2013) (Figure 3-5)



Figure 3-5 White Lake Diversion Channel (Courtesy of IOC, 2014)

3.1.5.2 Luce Lake

Luce Lake has a surface area of 152 ha and consists of two basins. The northern basin (Luce Lake North) has a surface area of 102 ha, a maximum depth of 21 m and a volume of approximately 8,439,287 m³. The southern basin, Lower Luce Lake has a total calculated surface area of 50 ha, is less than 1.5 m deep, and contains submerged vegetation and a center island. The channel connecting Luce Lake North to Lower Luce Lake is approximately 11 wide and less than 0.5 m deep (Figure 3-6).



Figure 3-6 Channel connecting Luce Lake North to Lower Luce Lake

A 2014 population estimate found that Luce Lake provides habitat for six species of fish. Of these, lake chub and burbot were by far the most populous (Table 3-1).

Table 3-1 Luce Lake North 2014 Baseline Population Estimates

Species	Population Estimate
Brook Trout	218
Round Whitefish	11
Lake Chub	155,670
Lake Trout	1
Longnose Sucker	6
Burbot	7,259

The fish habitat zones in Luce Lake can be defined as littoral (near shore) or profundal (below the range of effective light penetration). Both zones are required for fish species depending on their life-stages. Luce Lake North is primarily profundal, with depths up to 21 m while Lower Luce Lake is entirely littoral, with a maximum depth around 1.5 m.

Figure 3-7 shows the substrate distribution of Luce Lake North. The near shore area is comprised of a majority of boulder, rubble, cobble, gravel, sand and silt with the deeper zones comprised of silt. The overall composition of each substrate type (m²) for Luce Lake North is outlined in Table 3-2:



Table 3-2 Substrate Distribution of Luce Lake North

Substrate Type	Littoral (m²)	Profundal (m²)
Boulder	54,856.22	
Rubble	15,101.18	
Cobble	96,555.33	
Gravel	97,223.88	
Sand	151,889.44	
Silt	188,865.60	415,908.35
Total	604,491.65	415,908.35

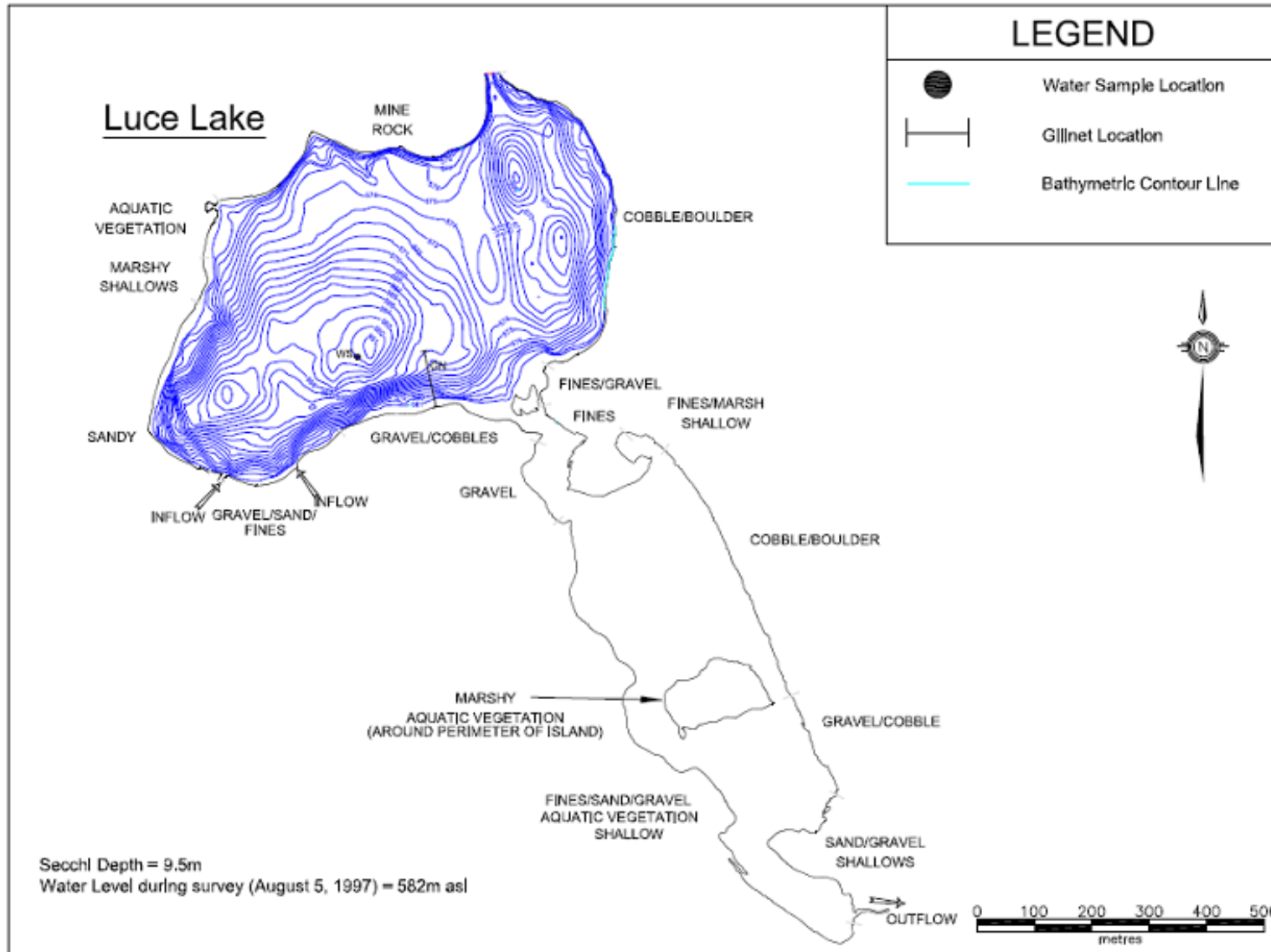


Figure 3-7 Luce Lake Bathymetry (reproduced from JWEL 1997)

3.1.5.3 Downstream of Luce Lake

The downstream fish habitat between Lower Luce Lake and Wabush Lake is a combination of natural and man-made habitat with several barriers to fish passage, both man-made and natural. Luce Brook from Wabush to Lake Lower Luce Lake is approximately 3,600 m in length and can be generally sub-divided into five smaller sections, as shown in Figure 3-8.



Figure 3-8 Fish Habitat between Lower Luce Lake and Wabush Lake, subdivided into five sections

Section One, from Wabush Lake to Patterson's Pond, flows through a small man-made section of stream called "Tinto Brook". Tinto Brook was reconstructed in 2005 to create habitat and spawning grounds for resident fish in Patterson's Pond and Wabush Lake. The channel consists of 710 m of channel containing riffles, runs and pools incorporating spawning habitat requirements (EcoMetrix 2007). The channel was built entirely on deposited tailings from the IOC mill process. The deposited tailings are typical of highly compacted medium sand interlaced with fine sands and silt (Figure 3-9).



Figure 3-9 Typical section of Tinto Brook

Section Two flows between Patterson's Pond and the first main upriver road crossing. This area has a moderate gradient and is generally 4-5 m wide, creating fast flowing reaches. Substrate is primarily cobble and boulders. Thick overhead cover is provided by alders in many reaches. This section contains several barriers to upstream fish movement including three submerged culverts that run under an old rail line, a series of small falls, a larger set of falls, a 4.2 m high man-made weir, and some additional culverts that may be considered partial obstructions.

Section Three flows between the first main upriver road crossing and the second road crossing along Luce Brook and is characterized by alternating reaches of wider (150-200 m) pond areas and narrower (4-5 m) stream areas. The inlet from Dumbell Lake is located along this stretch. There are no barriers to upstream fish movement in the lower section of the stream. However, at the second road crossing there are three culverts that could be a partial barrier.



Figure 3-10 Wider pond area observed within Section Three of Luce Lake Brook



Figure 3-11 Run/riffle habitat observed within Section Three of Luce Lake Brook

Section Four flows from Little Luce Lake to a second road crossing. This section includes a relatively slow section about 50-75 m wide with spawning substrates, a faster section 4-5 m wide that appears to have been channelized in the past, and a deep pool just upriver from the road crossing (Figure 3-12). There were no obstructions to limit access to or from Little Luce Lake.



Figure 3-12 Deep pool upstream of the second location where the mine site access road crosses Luce Brook

Section Five from Little Luce Lake to Lower Luce Lake is approximately 250 m in length and includes passage through two culverts and a box bridge (Figure 3-13). There are no obstructions between Lower Luce Lake and Little Luce Lake.



Figure 3-13 Luce Brook looking downstream approximately 75m from Luce Lake outlet (from JWEL 1997)

3.1.6 Wildlife

The interior of Western Labrador, with its open, stunted forests and extensive wetlands, provides habitats for a range of wildlife that are typical of boreal forest ecosystems. Wildlife species that are known or likely to occur in the general region include muskrat, beaver, red fox, marten, voles, porcupine, lynx, wolf, moose and black bear.

Although individuals from the migratory George River caribou herd have occasionally and sporadically entered the region in past years, the Project site is not accessible to the herd. The area is also outside the range of the threatened Lac Joseph woodland caribou herd (Schmelzer et al, 2004), as confirmed through an aerial census conducted by the provincial government in March 2009 (Schmelzer 2010). A February 2012 aerial survey completed by IOC likewise did not find any caribou throughout a 40 x 40 km regional study area that encompassed the Project site.

The presence of large-scale mining activity in and around the Project area for the past five decades has limited the use of the site by most wildlife.

3.1.7 Avifauna

Common resident and migratory species of birds in the interior of Western Labrador include raptors, waterfowl, passerines and upland game birds. Any birds residing in the Luce Lake North area would be somewhat accustomed to noise associated with mining, such as from blasting activities and loud machinery.

In 2012 and 2014, AMEC conducted avifauna surveys on a number of occasions in the general project area (AMEC 2012, AMEC 2014). Primary targets for these surveys were: winter surveys, breeding surveys, and fall migration. Aerial surveys for raptors and waterfowl within the general area were also conducted.

A winter survey of avifauna in the area found few wintering bird species (seen or heard), and no avian species at risk. Common raven, pine grosbeak, boreal chickadee, spruce grouse and grey jay were the most commonly observed winter species.

Breeding bird surveys detected a total of 48 species seen or heard during the surveys, and breeding evidence was observed for 46 of those species (AMEC 2012). Species most frequently detected during the breeding surveys were white-throated sparrow, American robin, Swainson's thrush, dark-eyed junco, fox sparrow, hermit thrush, yellow-rumped warbler, lincoln's sparrow, red-breasted nuthatch, yellow warbler and common raven.

Fall migration bird surveys identified sixteen bird species. During the fall surveys, boreal chickadee, common raven, dark-eyed junco, American pipit, ruby-crowned kinglet and American robin were the species observed most frequently in the study area.

Aerial surveys for raptors and waterfowl found nests of two raptor species near Dumbell Lake, southeast of Luce Lake. An osprey nest was found during the aerial survey approximately 800 m northeast of the Wabush 3 site, and a red-tailed hawk nest was encountered during the July survey approximately 250 m



east of the site Wabush 3 site (AMEC 2012.) Neither of these is close to Luce Lake and would not be affected by the project footprint.

3.2 Human 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 9,228 residents and 3,751 residences in 2011 (Statistics Canada 2012).

Mining and mineral processing, together with related support industries, are the main economic focus of the region (Labrador West 2012). In 2006 the region had a total labour force of 5,310 workers, of which 2,215 (42 percent) worked in “resource-based industries”. In that year, the region had a labour force participation rate of 73 percent, an unemployment rate of 9 percent (less than half the provincial rate), and over 85 percent of total income in the region came from employment earnings (Statistics Canada 2006). The average family income in these communities in 2007 was approximately \$109,000, which was over 45 percent higher than that for the province as a whole that year (NL Community Accounts 2012).

In terms of human health and well-being, in 2009-2010, 12.4 percent of persons age 12 and over in Western Labrador rated their health status as excellent and 54.6 percent rated their health status as very good. This compares to 14.2 percent and 49.2 percent in Labrador as a whole, respectively, and 16.2 percent and 43.9 percent for all of Newfoundland and Labrador (NL Community Accounts 2012).

Luce Lake North is located within IOC’s existing mining project site. Public access to the site is therefore restricted and land and resource uses and other public activities do not currently take place in the immediate area (Figure 3-14).

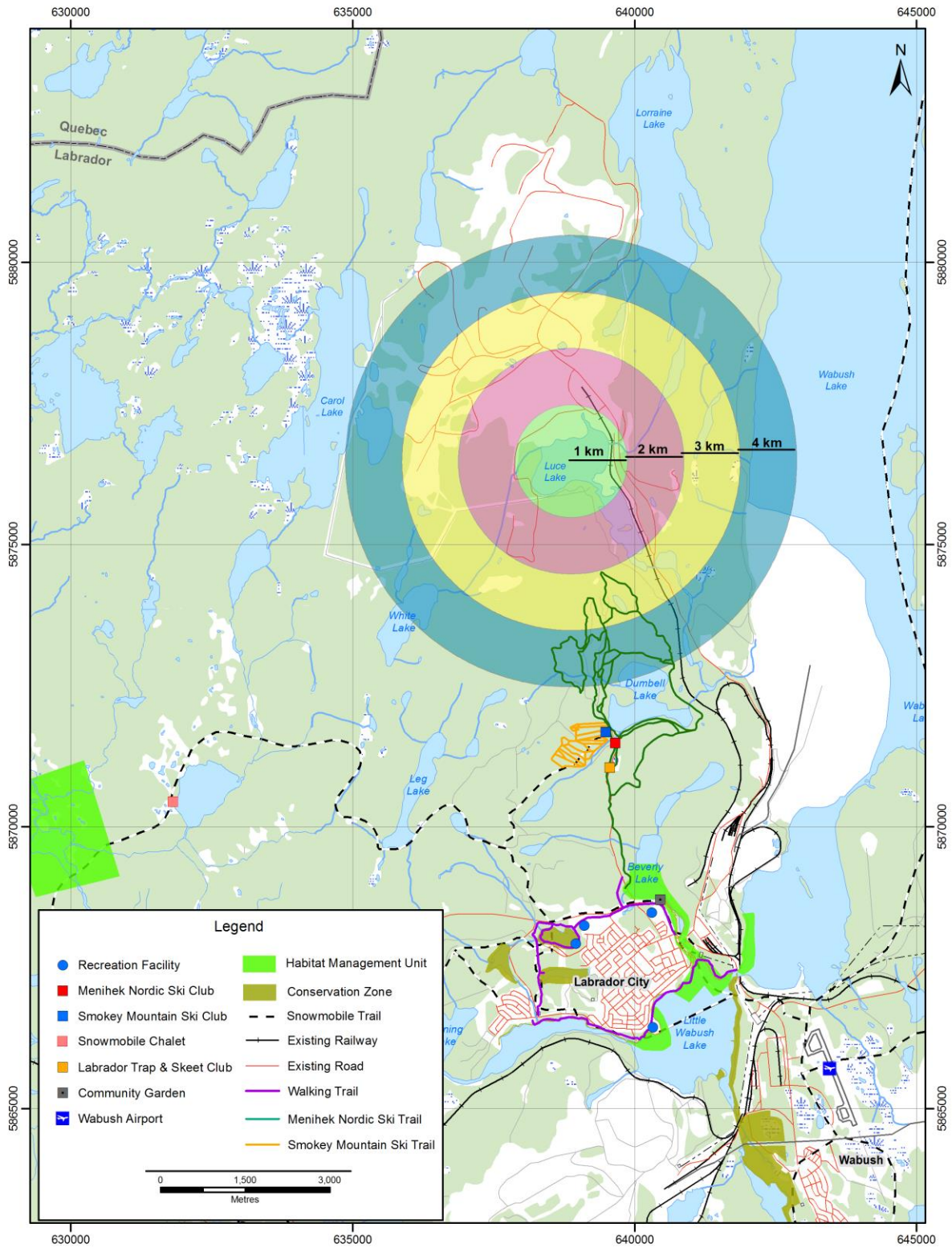


Figure 3-14 Existing (Regional) Socioeconomic Environment



A number of Aboriginal groups have asserted land claims to areas in Western Labrador. These land claims are at varying stages of acceptance, negotiation and settlement.

The Labrador Innu currently number about 2,500 and reside primarily in two communities - Sheshatshiu in Central Labrador and Natuashish on the Labrador North Coast. The Innu Nation has an asserted land claim which has been accepted for negotiation by both the federal and the provincial governments, and which extends to Western Labrador. The provincial and federal governments and Innu Nation have completed detailed agreements on these matters, including a tripartite Innu Land Rights Agreement-in-Principle, which was ratified by the Innu on June 30, 2011, and signed by the three parties on November 18, 2011 (AANDC 2011).

The NunatuKavut Community Council (NCC) is an organization that reports a membership of over 6,000 members who reside primarily in Southern and Central Labrador. Originally established as the Labrador Métis Association in 1985, the NCC has asserted a land claim that covers much of Central, Western and Southeastern Labrador.

In addition to Aboriginal communities in Labrador, there are also Aboriginal groups in Quebec who have asserted claims in areas in Western Labrador, including the Matimekush Lac John First Nation, the Naskapi Nation of Kawawachikamach and the Uashat mak Mani-Utenam First Nation.

4.0 CONSULTATION

Consultation is a cornerstone of the EA process, and a key aspect of IOC's approach to its planning and development activities. A number of consultation activities have been, and will continue to be, undertaken in relation to the proposed Project. These include the provision of information to, and discussions with, relevant government departments and agencies, Aboriginal groups and regional stakeholder groups.

4.1 Regulatory Consultation

IOC will provide Project overview information to, and correspond and meet with, provincial and federal governments. All relevant government departments and agencies will participate in the formal review of this EA Registration and associated regulatory decisions.

The Project will require a range of environmental permits and other authorizations (see section 2.16 and Appendix C). The post-EA permitting process will provide the opportunity for relevant regulatory departments and agencies to receive and review additional Project design information, and to establish specific terms and conditions to avoid or reduce environmental effects. IOC and/or its contractors will identify, apply for and adhere to all required permits and other authorizations that are required for Project construction and/or operations.

4.2 Aboriginal Consultation

IOC recognises that this EA Report will be made available to all interested stakeholders, including relevant Aboriginal groups, for their information, review and comment as part of the EA process. IOC will make



every effort to communicate with relevant Aboriginal groups after filing of the EA Registration, to answer relevant questions with respect to the Project, to gather any comments and concerns they may have about the Project and to exchange information as required. IOC will inform appropriate governmental agencies about its efforts to consult with such Aboriginal groups. IOC will follow the Government of NL guidelines on Aboriginal consultation.

4.3 Stakeholder and Public Consultation

IOC has been operating in Labrador West since the early 1960s, and is a long-standing participant in the local communities and overall region. The company currently has a number of established consultative forums in place, through which it regularly communicates and discusses ongoing business objectives 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. CAP meets quarterly to discuss issues of common interest in the region. IOC also established the establishment of a Labrador West Regional Task Force during 2011 as pressure in the region reached a peak with rapid growth. The RTF's mandate is to bring mining companies operating in the trough together with senior level provincial and local government local representatives to discuss ongoing and future mining operations and to identify and seek to address key associated socioeconomic challenges.

IOC will continue to consult with local communities, Aboriginal groups and stakeholders on its operations, including the proposed Project, through these and other forums. For example, IOC has met with local cabin owners and anglers to discuss potential offset measures related to *Fisheries Act* Authorization. The information gathered from stakeholders has been incorporated into the offset development.

Again, the EA registration and review process also provide opportunities for interested parties to bring forward their comments, concerns and ask questions about a Project, for consideration in governmental (regulatory) review and decision-making.

5.0 ENVIRONMENTAL ISSUES AND THEIR MANAGEMENT

The following sections provide the results of an environmental effects analysis for the proposed Project, including each of its associated components and activities. The analysis focuses upon, and is organized according to, the following themes:

- 1) Atmospheric and Acoustic Environment
- 2) Terrestrial Environment
- 3) Freshwater Environment
- 4) Socioeconomic Environment

The analysis for each includes a discussion and description of the likely environmental issues (adverse and

positive) that may be associated with the Project. Environmental planning and mitigation measures to avoid or reduce environmental effects are identified and considered integrally with the analyses.

The assessment also includes possible accidental events and malfunctions that could potentially occur during each phase (construction, operations) of the Project. The potential cumulative environmental effects of the Project in combination with other projects and activities that have been or will be carried out are also assessed and evaluated. This is followed by a summary and evaluation of the likely residual (after mitigation) environmental effects of the Project.

The environmental analysis concludes with an overview of the environmental monitoring and follow-up that may be required during the life of the Project.

5.1 Atmospheric and Acoustic Environment

The environmental analysis for the Atmospheric and Acoustic Environment includes consideration of any likely implications of the Project on air quality and noise levels within and around the Project area and nearby communities.

IOC has carried out extensive ambient air monitoring in Western Labrador for a number of years, which includes sampling on a 6 day NAPS schedule for total suspended particulate matter (TSP), particulate matter less than 2.5 microns (PM_{2.5}) and sulfur dioxide (SO₂) at four locations throughout Labrador City. In late 2010, IOC began a major upgrade of this network which included monitoring for more pollutants on a continuous basis, the addition of several new monitoring locations and the relocation of existing ones. The upgraded program also includes monitoring for NO_x and the collection of meteorological information from two new stations. Government regulators have real-time access to the air monitoring data to ensure compliance with air quality standards.

Since Luce Lake North is located inside the working area of the mine site and adjacent to an open pit where mining activities are ongoing, the Project is not expected to contribute significant noise or atmospheric emissions above what is already being generated at the site. The site is not near any residential receptors or communities; therefore, atmospheric emissions or noise will not impact the public.

5.1.1 Construction

The main potential interactions between the Project and the Atmospheric and Acoustic Environment relate to the use of vehicles and equipment, primarily during construction of the diversion channels and the dam, which will result in some minor, temporary and localized noise and air emissions due to project-related dust and emissions from vehicles and equipment.

Project construction will therefore be characterized by standard and routine activities and practices, and will occur within a localized area over a relatively short period. It will take place within an area that has been previously developed, is subject to on-going mining activity, and is within IOC's property and several kilometres from local communities. Project-related vehicles and equipment will be maintained in good repair and inspected regularly and any associated air emissions from equipment and vehicles will conform



to applicable regulations and guidelines. Fugitive dust from construction activities will be controlled as necessary using dust control agents such as water.

Any potential emissions or interactions with the Atmospheric and Acoustic Environment during Project construction are therefore likely to be negligible (and within existing regulations or standards), localized and short-term (intermittent over the construction period).

5.1.2 **Operation/Maintenance**

Once the construction phase is complete, the nature and degree of on-site activity will be considerably less, and will be characterized primarily by the pumping of infiltrated water and surface runoff from the Luce Lake North basin to one of the diversion channels, sedimentation ponds, or to a water treatment facility.

5.1.3 **Potential Accidents and Malfunctions**

The potential accidental events or malfunctions during Project construction and/or operations that would be most relevant to the Atmospheric or Acoustic Environments would be a machine malfunction resulting in a fire or spill of hydrocarbons.

As described earlier, IOC currently has in place various measures, plans and procedures to prevent fires, explosions or other associated events at its Labrador West mining operations, as well as to respond to such an accidental event should one occur. These measures will also be further defined and reinforced through the eventual federal and provincial government permits and other approvals that will be required for the Project implementation.

5.1.4 **Cumulative Environmental Effects**

As previously mentioned, the proposed Project will occur on IOC property, within the area of its on-going mining operations in Labrador West. As noted above, air quality issues have been a key consideration and priority for IOC in relation to its existing and on-going mining activities, and the company has an extensive air quality monitoring program in place for its Labrador West operations. The diversion and dewatering of Luce Lake North and long term maintenance dewatering are not likely to contribute measurably to overall air quality or noise levels in the area.

5.1.5 **Environmental Effects Summary and Evaluation**

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



Table 5-1 Environmental Effects Assessment Summary: Atmospheric and Acoustic Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation	Residual Effects
	Construction	Operations	Issues / Interactions		
Air Quality	•		<ul style="list-style-type: none"> ▪ Equipment use (vehicles, fuel consumption, boilers) ▪ Possible accidental event (fire) 	<ul style="list-style-type: none"> ▪ Localized and short-term construction activity. ▪ Standard construction practices and equipment maintenance. ▪ Project operations have little or no air emissions or detectable noise, similar to existing activities. 	NS
Noise Levels	•	•	<ul style="list-style-type: none"> ▪ Operation of equipment (vehicles, boilers, dewatering pumps) ▪ Possible accidental event (fire, explosion) 	<ul style="list-style-type: none"> ▪ Location is on an existing mine site. ▪ Accidental event prevention and response. 	NS
Key: <ul style="list-style-type: none"> • 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 					

The proposed Project is not likely to result in significant adverse environmental effects on the Atmospheric and Acoustic Environment.

5.2 Terrestrial Environment

The Terrestrial Environment is comprised of relevant components of the “on-land” biophysical environment which may interact with the Project, including vegetation, soils, landforms and wildlife.

5.2.1 Construction

Project construction will involve site preparation activities, covering an overall area of approximately 1.5 km². The Project area itself is characterized by patches of mixed wood forest interspersed with areas of moss, lichen cover and exposed rock and earth, with roads, trails, a railway and other previously disturbed and developed areas being present throughout the area. There are no listed or rare plant species that are known to occur within or near the proposed Project area.

The proposed project area is characterized by a relatively small footprint compared to IOC’s overall Labrador City Operations, and the area has been subject to previous development and disturbance. Vegetation clearing and other ground disturbance activities will be confined to only those areas where it is absolutely necessary, such as the diversion channel construction. Limits of clearing will be marked in advance, and only designated areas will be cleared. Clearing will be completed in compliance with relevant permits and regulations, and any merchantable timber will be salvaged.

Given the presence of mining activity within and around the Project area for the past five decades, the Project site likely provides limited or no wildlife habitat at present. Recent studies have confirmed that the area is not within the current range of the migratory and sedentary caribou populations which occur in Western and Central Labrador. Any wildlife (such as avifauna) that use the area have likely habituated somewhat to on-going human activity. The potential for interactions between the Project and wildlife is therefore limited. There are no listed species that are known to occur within or near the proposed Project area.

The following measures will be implemented during this phase of the Project to further reduce the potential for interactions between construction activities and any wildlife that may occur in the area:

- 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
- equipment and vehicles will yield the right-of-way to wildlife
- any nuisance animals will be dealt with in consultation with the NL Inland Fish and Wildlife Division

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 proposed 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.

Any hazardous wastes will be stored in sealed, labelled containers and disposed of according to applicable regulations and IOC practice. These 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. There will therefore be no adverse interaction between construction waste materials and the environment.

5.2.2 Operation/Maintenance

During the operations phase of the project there will be no additional soil or vegetation disturbance, and therefore, little or no potential for further effects to these aspects of the terrestrial environment. The banks of the diversion channel(s) will be hydro seeded with a native plant mix to encourage vegetation growth and prevent runoff and erosion.



No interactions with or adverse effects on the Terrestrial Environment are therefore anticipated during this phase of the Project.

5.2.3 Potential Accidents and Malfunctions

Potential accidental events or malfunctions during Project construction and/or operations such as a fire or a spill of fuel or other chemicals or a breach in a water diversion or retention structure could affect vegetation, soils and/or other aspects of the Terrestrial Environment in or around the Project area. The resulting environmental effects of such an incident would clearly depend upon 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 to (and refined as required for) the Project, and will be further reinforced through the various federal and provincial government permits, other authorizations and regulations, and compliance standards that will be relevant to the construction and operation of the Project.

5.2.4 Cumulative Environmental Effects

Although the Project will have some effect on vegetation and soils within the construction “footprint” as a result of associated clearing and excavation activities during the construction phase of the development, any such disturbances will not overlap or interact cumulatively with those of other projects and activities in the area. The Project will also not affect listed or rare species, and will therefore not have any effect on overall biodiversity in the region, nor will it affect caribou populations or other wildlife. The diversion and dewatering of Luce Lake North is not likely to contribute measurably to any overall, cumulative environmental effects to the Terrestrial Environment in the region.

5.2.5 Environmental Effects Summary and Evaluation

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



Table 5-2 Environmental Effects Assessment Summary: Terrestrial Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation	Residual Effects
	Construction	Operations	Issues / Interactions		
Vegetation	•		<ul style="list-style-type: none"> ▪ Ground disturbance 	<ul style="list-style-type: none"> ▪ Localized and small project “footprint” ▪ Compliance with regulations and permits ▪ Accidental event prevention and response 	NS
Soils	•				NS
Wildlife				<ul style="list-style-type: none"> ▪ Existing mining activity ▪ Negligible use by wildlife 	N
Terrestrial Species at Risk				<ul style="list-style-type: none"> ▪ None known to occur in or near Project area 	N
<p>Key:</p> <ul style="list-style-type: none"> • 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 					

The proposed Project is not likely to result in significant adverse environmental effects on the Terrestrial Environment.

5.3 Freshwater Environment

The Freshwater Environment includes surface and groundwater (quantity and quality) and fish and fish habitat which may interact with the Project.

As mentioned previously, detailed groundwater modelling has shown that the diversion and dewatering of Luce Lake North will not affect water levels in downstream water resources, with no predicted changes to groundwater levels near Lower Luce Lake and Luce Brook and only slight reductions in groundwater flow. In addition, groundwater modelling has shown that the diversion of Luce Lake North has no incremental impact on water resources compared to the current dewatering strategy.

There are no anticipated changes in the existing flow or water quality characteristics downstream of Luce Lake North due to the diversion and dewatering of Luce Lake North. Surface flow rates to Lower Luce Lake, and subsequently Luce Creek, Patterson’s Pond, and Tinto Brook will not change as a result of the Project because the diversions around Luce Lake North will allow existing flows to continue into Lower Luce Lake.

It should also be noted that the overall inflow contribution into Wabush Lake from the Luce Lake system is minimal. The Luce Lake system is one of 17 watersheds contributing to Wabush Lake and based on GIS analysis of watershed sizes, assuming that the typical flows from a watershed/drainage basin is related to watershed size, the Luce Lake system contributes about 1.4% of all inflow to Wabush Lake. Therefore, any slight deviation in flow due to diversion or pump down would have minimal effect on Wabush Lake.

As previously discussed, the Wabush 3 project is expected to discharge pit dewatering water to a

sedimentation pond near Luce Lake. The location for this sedimentation pond has not yet been finalized. Flow rates from the Wabush 3 project will be considered in diversion and dewatering plan for Luce Lake North and will be controlled to ensure there are no detrimental effects on the Luce Lake watershed.

5.3.1 Construction

Activities associated with the construction of the diversion channels, the dam between Luce Lake and Lower Luce Lake, and the controlled dewatering of Luce Lake North into Lower Luce Lake involve interactions with the freshwater environment. Adverse effects will be minimized at every stage of construction.

Site drainage will be managed as required to prevent water containing sediment and/or other substances from entering adjacent water bodies and watercourses. Silt-laden water will be discharged to a vegetated area or a sedimentation basin prior to release into a watercourse or water body. A clearly marked buffer zone in accordance with any required permits will be maintained between any areas of ground disturbance and watercourses. A pump down plan for Luce Lake North has been developed in a manner that protects downstream fish and fish habitat from excess erosion, damage, and displacement by restricting maximum pumping rates (see section 2.4.5).

Any watercourse structures will be installed in the dry by diverting or pumping water around the construction area. Precautions will be taken, to ensure that fish are not left stranded in the work area, and any fish recovered from the work area will be returned unharmed to the watercourse as directed by DFO officials. Erosion control measures (e.g. sediment traps and filter fabric) will be put in place during construction as appropriate to minimize erosion and siltation of water bodies used by fish.

Any in-stream work will be undertaken in compliance with government regulations, permits, and applicable IOC and DFO guidelines. To avoid sensitive periods for fish, any such activity will be conducted between June 15 and September 15, unless otherwise approved.

Six freshwater fish species have been identified and quantified in the Project site. They will be relocated prior to dewatering Luce Lake North as per a Fish Relocation Plan that will be required for Section 35(2) Authorization under the *Fisheries Act*.

While Luce Lake is wholly within IOC property and has not been subject to commercial, recreational, or Aboriginal fisheries since at least 1957, IOC has recognized the importance of fisheries in the Labrador West area and supports offsetting the diversion and dewatering of Luce Lake North from the Luce Lake watershed. An Offsetting Plan has been developed to provide productivity offsets to local species that support a recreational fishery. The offset plan has been designed to provide increased fish production related to local recreational fisheries as described by local stakeholders, primarily brook trout. The overall offset is based on fish productivity and its relative contribution to existing fisheries and not aerial extent of the affected lacustrine habitat. The offset plan has also been developed with the input and contribution of local cabin owners and anglers so that maximum benefits to recreational fisheries are provided.

The required offsets will be provided through increases in overall existing riverine habitat suitability in an area severely affected by forest fires; known locally as the Blueberry Hill area. It also includes specific

physical habitat offset measures to increase spawning suitability and hence increase the overall productivity potential. All offsetting measures have been directed toward habitat suitabilities for species that support a recreational fishery; however it should be noted that most fish species in the area would find the habitat criteria within the described offsetting measures suitable. As a result of the offset plan and associated monitoring, no serious harm is anticipated.

Work will be performed in a manner ensuring that no deleterious substances, such as (but not limited to) sediment, fuel and oil, enter water bodies. Tools and equipment will not be washed in any body of water, and wash water will not be discharged directly into any water body. A designated cleaning area for tools will be established.

5.3.2 Operation/Maintenance

During the operations phase of the project there will be no additional, direct interactions with the Freshwater Environment. The diversion channels and dams established during the construction period will continue to be used and maintained/repaired as required, and site drainage will be controlled as necessary. Pumps will continue to be used to convey water out of the Luce Pit basin. Each of these activities will occur in compliance with relevant regulations and permits.

As previously mentioned, the removal of Luce Lake North will not cause any changes to the existing flow or downstream water quality characteristics and therefore no additional interactions or adverse effects to the Freshwater Environment are therefore anticipated during this phase of the Project.

5.3.3 Potential Accidents and Malfunctions

A spill of chemicals or fuel or other accidental events during Project construction and/or operations may affect water resources and/or fish and fish habitat in or around the Project area. Again, the resulting environmental effects of such an incident would depend upon the nature and magnitude of the event.

Failure of the dam separating Luce Lake North from Lower Luce Lake may result in back seepage into Luce Lake. Any structure(s) controlling water levels within IOC property will be included in regular inspections and testing to ensure compliance with all applicable regulations and certifications. Given the relatively low water levels within Lower Luce Lake (maximum water depths of 1-2 m) and the natural direction of the flow at the outlet of Luce Lake North, the pressure on the structure would be minimal. Any identified issues during inspections would be corrected as required.

IOC has various measures, plans and procedures in place to prevent a spill or other associated event at its existing explosives facility and overall Labrador West operations, as well as to respond to such an accident should one occur. These measures will be applied to (and refined as required for) the dewatering and diversion of Luce Lake North, as well as further reinforced through the various federal and provincial government permits that will be required for the construction and operation of the Project.

5.3.4 Cumulative Environmental Effects

Water resources as well as fish and fish habitat in the Luce Lake area have been affected by previous



development projects and activities in the region and may continue to be affected as mining continues. Currently, 29% of the Luce Lake watershed area is affected by development projects (mine, waste rock, industrial). After Luce Lake has been diverted and dewatered, 34% of the watershed area will be affected. The planned Wabush 3 development will also affect the Luce Lake Watershed since dewatering flows are anticipated to discharge to Lower Luce Lake. These developments have been and will continue to be subject to applicable legislation, regulations and guidelines designed to protect these aspects of the environment. Aside from the fish habitat offset work in the Blueberry Hill area, any effects resulting from the Luce Lake diversion and dewatering project are localized, and will not likely interact or accumulate with those of other projects or activities in the area.

Luce Lake is wholly within IOC property and has not been subject to commercial, recreational, or Aboriginal fisheries since at least 1957; however, the habitat within Luce Lake North will be lost to future fish production and IOC has recognized the importance of fisheries in the Labrador West area and supports offsetting the removal of Luce Lake North from the Luce Lake watershed. An Offsetting Plan has been developed to provide productivity offsets to local species that support a recreational fishery. The offset plan has been designed to provide increased fish production related to local recreational fisheries as described by local stakeholders; primarily brook trout. Offsets such as these reduce cumulative effects by limiting a net loss of fish production. The construction of additional fish habitat will offset the removal of Luce Lake habitat and therefore the project is not likely to result in significant adverse environmental effects on the regional Freshwater Environment.

In addition, it is important to note that if the diversion and dewatering of Luce Lake North is not carried out, the ongoing risk of a piping event in the northwest wall of Luce Pit could mean that that portion of the watershed may gradually or rapidly flood Luce Pit in the foreseeable future. Adverse environmental effects to downstream components of the watershed from an accidental drawdown of Luce Lake North would affect the watershed integrity more than the proposed diversion and dewatering project, which aims to secure natural flows all the way to Wabush Lake.

5.3.5 Environmental Effects Summary and Evaluation

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



Table 5-3 Environmental Effects Assessment Summary: Freshwater Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation	Residual Effects
	Construction	Operations	Issues / Interactions		
Surface Water (Quantity and Quality)	•	•	<ul style="list-style-type: none"> ▪ Construction / maintenance of diversion channels and dam ▪ Pumping rate into Lower Luce Lake ▪ Potential accidental spills 	<ul style="list-style-type: none"> ▪ Compliance with regulations and permits ▪ Design mitigation (erosion and sediment control plan, spill containment, etc.) ▪ Accidental event prevention and response 	NS
Groundwater (Quantity and Quality)	•	•	<ul style="list-style-type: none"> ▪ Pumping rate ▪ Potential accidental spills 	<ul style="list-style-type: none"> ▪ Compliance with regulations and permits ▪ Design mitigation (pump down plan, spill containment, controlled pumping rate, etc.) ▪ Accidental event prevention and response 	NS
Fish and Fish Habitat	•	•	<ul style="list-style-type: none"> ▪ Removal of Luce Lake habitat and relocation of fish ▪ Construction / maintenance of diversion channels and dam ▪ Construction / monitoring of new fish habitat ▪ Potential accidental spills 	<ul style="list-style-type: none"> ▪ Compliance with regulations and permits ▪ Design mitigation (pump down plan, habitat offset plan, spill containment, etc.) ▪ Accidental event prevention and response 	N
Freshwater Species at Risk				<ul style="list-style-type: none"> ▪ None known to occur in or near Project area 	N
<p>Key:</p> <ul style="list-style-type: none"> • 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 					

The proposed Project is not likely to result in significant adverse environmental effects on the Freshwater Environment.

5.4 Socioeconomic Environment



The Socioeconomic Environment includes relevant components of the human and cultural environments, including historic and heritage resources, land and resource use (commercial, municipal, traditional, recreational), human health and well-being, community services and infrastructure, and economy.

5.4.1 Construction

Historic and heritage resources include sites, objects or other materials of historic and archaeological, paleontological, architectural, cultural and/or spiritual importance. In Newfoundland and Labrador, such resources are protected under provincial legislation and valued by Aboriginal 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.

There are no known historic and heritage resources within the project area. The site has already been heavily impacted, and is located within an area that has been subject to on-going mining activity for the past five decades. It is therefore unlikely that the area contains, or that the Project will result in the disturbance or destruction of, historic and heritage resources.

During project construction, standard precautionary and reporting procedures will, however, 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. Any archaeological materials encountered will be reported to the Provincial Archaeology Office, including information on the nature of the material discovered and the location and date of the find.

The proposed Project area is located amidst IOC's existing mining project site Western Labrador, on IOC property. Public access to the site is restricted, and land and resource uses and other activities therefore do not currently take place in the area (Figure 3-14). No interactions with, or adverse effects upon, commercial, municipal, traditional or recreational activities in the area are therefore anticipated.

In addition, given that Project construction will be characterized by fairly standard and routine activities and practices, will occur within a localized area over a relatively short period, and will take place within an area that has been previously developed and is subject to on-going mining activity, and is within IOC's property and several kilometres from local communities, the Project is not expected to have any negative implications for human health and well-being in local communities or elsewhere.

As stated previously, the removal of Luce Lake will mitigate serious safety, environmental, and operational risks posed by the potential failure of the pillar separating Luce Pit from Luce Lake. The Project will provide assurance that Luce Pit can be safely mined for the life of the mine, which will continue to provide benefits to Labrador West's mining sector. Therefore, the Project will make a positive contribution to the socioeconomic environment as a result, as described in section 2.10.



5.4.2 Operation/Maintenance

Once construction of the project has been completed, there will be no additional ground disturbance, and therefore, little or no potential for effects to historic and heritage resources. The precautionary and reporting procedures implemented for construction will, however, continue to be in place throughout the life of the Project.

Again, given the nature and locations of the Project and its operational activities, no interactions with local commercial, municipal, traditional or recreational land and resource use activities are anticipated, nor will there be any implications for human health and well-being.

The operations workforce that will be needed to operate the dewatering pumps in the Luce basin will be redistributed from IOC's existing capacity since dewatering efforts would be lessened in Luce Pit. No significant, additional demands on community infrastructure and services will therefore occur during this phase of the Project.

5.4.3 Potential Accidents and Malfunctions

An accidental event or malfunction during either phase of the Project, such as a fire or spill, could affect the Socioeconomic Environment through, for example, an effect on human health and well-being and an increased demand for local safety and health services. As described earlier, the probability of such an event occurring is low, and any potential effects would depend upon the specific nature and magnitude of the event.

IOC has various measures, plans and procedures in place to prevent a fire, explosion or other associated event at its overall Labrador West operations, as well as to respond to such an accident should one occur. These measures will be applied to (and refined as required for) the diversion and dewatering of Luce Lake North, as well as further reinforced through the various federal and provincial government permits that will be required for the Project.

It should be noted again that the presence of Luce Lake North poses a much greater risk to worker health and safety than its removal.

5.4.4 Cumulative Environmental Effects

The proposed Project will take place at a time when there are considerable proposed and potential mining developments, expansions and other projects and activities in Labrador West, which will, in different ways and to varying degrees, affect the existing environment of this region.

As described above, however, given the nature, scale and timing of this Project it will likely not affect most aspects of the socioeconomic environment, and any effects it does have will be primarily positive, particularly in terms of the economic benefits and opportunities it will create. The Project is not likely to contribute measurably to the overall, cumulative adverse effects of any past, on-going and future projects and activities in the region.



5.4.5 Environmental Effects Summary and Evaluation

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

Table 5-4 Environmental Effects Assessment Summary: Socioeconomic Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation	Residual Effects
	Construction	Operations	Issues / Interactions		
Historic and Heritage Resources	•		<ul style="list-style-type: none"> ▪ Ground disturbance 	<ul style="list-style-type: none"> ▪ Localized and short-term construction activity ▪ Low potential for historic and heritage resources ▪ Standard precautionary and reporting procedures 	N
Land and Resource Use				<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	•		<ul style="list-style-type: none"> ▪ Possible accident affecting human health 	<ul style="list-style-type: none"> ▪ Distance from and minimal interaction with communities ▪ Accidental event prevention and response ▪ Potential positive effect due to safer operating conditions in Luce Pit 	N P
Community Services and Infrastructure				<ul style="list-style-type: none"> ▪ Timing and scale of Project activities ▪ Distance from and minimal interaction with communities 	N
Economy	•	•	<ul style="list-style-type: none"> ▪ Employment and business opportunities ▪ Infrastructure for future growth ▪ Ability to mine the ore in the pillar 	<ul style="list-style-type: none"> ▪ Positive effects (direct and indirect) 	P
<p>Key:</p> <ul style="list-style-type: none"> • 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 					

The proposed Project is not likely to result in significant adverse environmental effects on the Socioeconomic Environment.



5.5 Environmental Monitoring and Follow-up

Any environmental issues which may be associated with the Project can be addressed and mitigated through the use of good construction and operational practices and procedures, supported by IOC's existing environmental and health and safety management system and associated plans and procedures. These will be further addressed through the specific environmental permitting requirements and compliance standards and guidelines which will apply to the Project.

Once construction is complete, the Project will be subject to regular inspections and maintenance as required. As IOC is ISO14001 certified, the existing monitoring, measuring and auditing processes will be extended to include the Project. IOC is committed to obtaining all required authorizations for the Project, and to complying with the monitoring requirements associated with all applicable federal and provincial regulations.

6.0 SUMMARY AND CONCLUSION

IOC is a major producer of iron ore in Canada, and a leading global supplier of iron ore pellets and concentrates. The company has been operating in Labrador West since the early 1960s.

As part of its on-going operations IOC is proposing to divert upstream inflows to, and dewater the contents of, Luce Lake North at its mine site in Labrador West. The Project is intended to address the serious safety, environmental, and operational risks associated with the potential failure of the pillar separating Luce Lake North from Luce Pit.

The Project will be planned and implemented so as to avoid or reduce potential adverse environmental effects and to optimize socioeconomic benefits. It will be undertaken in accordance with IOC's environmental and health and safety policies, plans and practices, to help ensure that it is constructed and operated in a safe and environmentally-responsible manner. IOC has in place a comprehensive environmental management system certified to the ISO 14001 Environmental Standard, including various associated plans and procedures designed to avoid or reduce the environmental effects of its activities.

The proposed Project will be constructed and operated in accordance with applicable legislation and regulations, including the environmental protection and planning measures defined in this document, and in compliance with IOC policies, procedures and standards. IOC is committed to complying with all relevant legislation and regulations, and the conditions of these required approvals.

In addition to EA review, the Project will eventually require a range of additional environmental permits and other authorizations from federal and provincial government departments and agencies. The post-EA permitting process will provide the opportunity for relevant regulatory departments and agencies to receive and review additional Project design information, and to establish specific terms and conditions to avoid or reduce environmental effects. IOC and/or its contractors will identify, apply for and adhere to all required permits and other authorizations that are required for Project construction and/or operations.

By mitigating safety, operational, and environmental risks, the Project will secure the opportunity to



continue mining in Luce Pit for the LOM and will therefore contribute to the continued well-being of Labrador West's mining sector and overall economy. Detailed planning and implementation of environmental protection and planning measures at every stage of project execution will ensure that the Project will not result in any significant environmental effects.

31 August 2015
Date

A handwritten signature in blue ink that reads 'Patrick Lauziere'. The signature is written in a cursive style with a horizontal line underneath.

Patrick Lauziere
Manager of Environment and Sustainable Development
Iron Ore Company of Canada

7.0 REFERENCES

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APPENDIX A

Rio Tinto Iron Ore 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

“The Way We Work” – Rio Tinto’s global code of business

Rio Tinto's overall corporate values are outlined in *The Way We Work*, its global code of business conduct which focuses on economic prosperity, social well-being, environmental stewardship and corporate governance (Rio Tinto 2009). Rio Tinto policies and standards ensure consistent application of sustainability goals beyond local policies and regulations that may apply to its mining operations. These principles are reflected in the preamble to this global code of conduct document, which states that (excerpts):

Rio Tinto is a world leader in finding, mining and processing the Earth's mineral resources.

The Group's objective is to maximise total shareholder return by sustainably finding, developing, mining and processing natural resources. Our strategy is to invest in and operate large, long term, cost competitive mines and businesses, driven not by choice of commodity but rather by the quality of each opportunity.

Wherever Rio Tinto operates, the health and safety of our employees, a contribution to sustainable development and conducting business with integrity are key priorities. We work closely with host countries and communities, respecting their laws and customs and ensuring a fair share of benefits and opportunities.

Rio Tinto also has in place a comprehensive and progressive *Sustainable Development Policy* that applies to all of its operations and activities worldwide, which states that:

- Rio Tinto businesses, projects, operations and products should contribute constructively to the global transition to sustainable development.
- We contribute to sustainable development by helping to satisfy global and community needs and aspirations, whether economic, social or environmental. This means making sustainable development considerations an integral part of our business plans and decision making processes.
- By focusing on people, the environment, resource stewardship and management systems, we can better manage risk, create business options, reduce costs, attract the best employees, gain access to new markets and resources and deliver a better product to our customers.
- In practice, this depends on the active awareness of and support for Rio Tinto's principles and policies by each of us as individuals.
- Wherever possible we prevent, or otherwise minimise, mitigate and remediate, harmful effects of the Group's operations on the environment.

IOC and Rio Tinto have a variety of relevant policies, plans and procedures in place that apply to their mining activities across the globe, as well as extensive guidance notes that have been developed to address specific elements of its operations. These are intended to help avoid or reduce the adverse environmental and social implications of its development activities, as well as to optimize the benefits of same for local persons and communities.



APPENDIX C

List of Potentially Applicable Permits and Authorizations



List of Potentially Applicable Permits and Authorizations (Provincial, Federal, Municipal)

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
Government of Newfoundland and Labrador				
Certificate of Approval for any Alteration to a Body of Water	<i>Water Resources Act</i>	Any activities which may alter a water body	Water Resources Division, Department of Environment and Conservation	Permits are required for construction activities within 15 m of the high watermark of any water body. An application form is required for each alteration.
Certificates of Approval for any Instream Activity (including Culvert Installation, Bridges and Forging a Watercourse)	<i>Water Resources Act</i>	Any in-stream activity	Water Resources Division, Department of Environment and Conservation	Approval is required for any in-stream activity, including culvert installations and fording activities, before undertaking the work. This also includes any development within 15 m of the high watermark of any water body.
Certificate of Approval for Construction Site Drainage	<i>Water Resources Act</i>	Any run-off from the project site being discharged to receiving waters	Water Resources Division, Department of Environment and Conservation	Approval is required for any run-off from the project site being discharged to receiving waters.
Application for Permit for Constructing a Non-Domestic Well	<i>Water Resources Act</i>	Establishment of a water well	Water Resources Division, Department of Environment and Conservation	A licence is required to establish a non-domestic water well in Newfoundland and Labrador.
Policy Directives	<i>Water Resources Act</i>	Project activities	Water Resources Division, Department of Environment and Conservation	The Department has a number of potentially applicable policy directives in place, including those related to: Infilling Bodies of Water; Use of Creosote Treated Wood in Fresh Water; Treated Utility Poles in Water Supply Areas; Land and Water Developments in Protected Water Supply Areas; Development in Shore Water Zones; and Development in Wetlands.
License to Occupy Crown Land	<i>Land Act</i>	Any development on Crown Lands	Lands Division, Department of Environment and Conservation	Approval is required for Project activities and infrastructure on Crown Land.
Quarry Permit	<i>Quarry Materials Act and Regulations</i>	Extracting borrow material	Mineral Lands Division, Department of	A permit is required to dig for, excavate, remove and dispose of any Crown quarry



Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
			Natural Resources	material.
Cutting Permit Operating Permit	<i>Forestry Act and Cutting of Timber Regulations</i>	Clearing land areas for the construction of diversion channels	Department of Natural Resources	A permit is required for the commercial or domestic cutting of timber on crown land.
Certificate of Approval for Storing and Handling Gasoline and Associated Products	<i>Environmental Protection Act, and Storage and Handling of Gasoline and Associated Products Regulations</i>	Storing and handling gasoline and associated products	Engineering Services Division, Service NL	A Certificate of Approval is required for storing and handling gasoline and associated products.
Permit for Storage, Handling, Use or Sale of Flammable and Combustible Liquids	<i>Fire Prevention Act, and Fire Prevention Flammable and Combustible Liquids Regulations</i>	Storing and handling flammable liquids	Engineering Services Division, Service NL	This permit is issued on behalf of the Office of the Fire Commissioner. Approval is based on a review of information provided for the Certificate of Approval for Storing and Handling Gasoline and Associated Products.
Compliance Standard	<i>Dangerous Goods Transportation Act and Regulations</i>	Storing, handling and transporting fuel, oil and lubricants and other dangerous goods	Department of Transportation and Works	If the materials are transported, handled and stored fully in compliance with the regulations, a permit is not required. A Permit of Equivalent Level of Safety is required if a variance from the regulations is necessary. Transporting goods considered dangerous to public safety must comply with regulations.
Certificate of Approval for Installation of a Sewage System	<i>Sanitation Regulations, under the Health and Community Services Act</i>	Sewage disposal and treatment	Department of Health and Community Services	Sewage disposal systems designed, constructed or installed to service a private dwelling or a commercial or other building with a daily sewage flow less than 4,546 L must be approved by an inspector before installation.
Certificate of Approval for Septic Systems > 4,546 L per day and Well Approval	<i>Environmental Protection Act</i>	Sewage disposal and treatment	Engineering Services Division, Service NL	A Certificate of Approval is required for commercial septic systems and wells in an unserved area, not covered by a municipality.
Certificate of Approval for a Water Withdrawal System of	<i>Water Resources Act</i>	Water supply for use in construction or operations activities	Water Resources Division, Department of	Certificate of Approval is required for any private water withdrawal system of



Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
≥ 4,500 L per day			Environment and Conservation	4,500 L/day or greater.
Certificate of Approval for Installation of Water Supply System	<i>Sanitation Regulations, under the Health and Community Services Act</i>	Water supply for use in construction or operations activities	Department of Health and Community Services	Water supply systems designed, constructed or installed to service a private dwelling or a commercial or other building, including systems not governed by a municipal council, local service district or local water committee, must be approved by an inspector before installation.
Compliance Standard	<i>Fire Prevention Act, and Fire Prevention Regulations</i>	On-site structures (temporary or permanent)	Engineering Services Division, Service NL	All structures must comply with fire prevention standards.
Compliance Standard	<i>Environmental Control Water and Sewage Regulation under the Water Resources Act</i>	Any waters discharged from the project	Pollution Prevention Division, Department of Environment and Conservation	A person discharging sewage and other materials into a body of water must comply with the standards, conditions and provisions prescribed in these regulations for the constituents, contents or description of the discharged materials.
Compliance Standard	<i>Sanitation Regulations, under the Health and Community Services Act</i>	Sewage and waste disposal	Department of Health and Community Services	Outlines standards for sewage and waste disposal.
Compliance Standard	<i>Occupational Health and Safety Act and Regulations</i>	Project-related occupations	Service NL	Outlines minimum requirements for workplace health and safety. Workers have the right to refuse dangerous work. Proponents must notify Minister of start of construction for any project greater than 30 days in duration.
Compliance Standard	<i>Workplace Hazardous Materials Information System (WHMIS) Regulations, under the Occupational Health and Safety Act</i>	Handling and storage of hazardous materials	Operations Division, Service NL	Outlines procedures for handling hazardous materials and provides details on various hazardous materials.
Certificate of Operating Approval	<i>Environmental Protection Act and associated Regulations</i>	Project operations	Pollution Prevention Division, Department of Environment and	Certificate of Approval (CofA) pursuant to the NL Environmental Protection Act (2002)



Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
			Conservation	
Government of Canada				
Authorization or Letter of Advice for Works or Undertakings Affecting Fish Habitat	<i>Fisheries Act</i>	Construction of watercourse crossings, etc	Department of Fisheries and Oceans	Application must be made if fish habitat may be affected. Where potential for harmful effects to fish habitat can be prevented, a Letter of Advice will be issued outlining appropriate mitigation procedures or conditions to be followed. Authorizations will only be issued where there will be a loss of fish habitat that cannot be avoided by mitigation measures. The authorization requires a habitat compensation plan to be developed and agreed to by DFO and proponent before the authorization is given.
Permit for Construction Within Navigable Waters	<i>Navigable Waters Protection Act and Regulations</i>	Construction of watercourse crossings,	Transport Canada	A permit is required for any works or construction activity located below the high water mark, either over, under, through or across any navigable waters. This could include any structure, device or thing that may interfere with navigation. An application must be submitted for each alteration to a navigable waterway.
Compliance Standard	<i>Fisheries Act</i> , Section 36(3), Deleterious Substances	Any run-off from the project site being discharged to receiving waters	Environment Canada Department of Fisheries and Oceans	Environment Canada is responsible for Section 36(3) of the <i>Fisheries Act</i> . However, DFO is responsible for matters dealing with sedimentation. Discharge must not be deleterious and must be acutely non-lethal.
Compliance Standard; Permit may be required.	<i>Migratory Birds Convention Act and Regulations</i>	Any activities which could result in the mortality of migratory birds and endangered species and any species under federal authority	Canadian Wildlife Service, Environment Canada	Prohibits the deposit of oil, oily wastes or any other substances harmful to migratory birds in any waters or any area frequented by migratory birds. The Canadian Wildlife Service should be notified about the mortality of any migratory



Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
				bird in the project area, including passerine (songbirds) and waterfowl species. Prohibits disturbing, destroying or taking a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, and possessing a live migratory bird, carcass, skin, nest or egg, except when authorized by a hunting permit.
Policy	Federal Policy on Wetland Conservation	Any disruption of wetland habitat	Environment Canada	The goals of this policy should be considered where a project could affect wetland habitat.
Compliance standards; permits may be required.	National Fire Code	On-site structures (temporary or permanent)	Service NL	Approval is required for fire prevention systems in all approved buildings.
Compliance standards; permits may be required.	National Building Code	On-site structures (temporary or permanent)	Service NL	Approval is required for all building plans.
Municipalities				
Development or Building Permit	<i>Urban and Rural Planning Act, 2000</i> , and Relevant Municipal Plan and Development Regulations	Development within municipal boundary	Community Council	A permit is required for any development or building within municipal boundaries.
Approval for Waste Disposal	<i>Urban and Rural Planning Act, 2000</i> , and Relevant Municipal Plan and Development Regulations	Waste disposal	Community Council	The use of a community waste disposal site in Newfoundland and Labrador by proponents/contractors to dispose of waste requires municipal approval. Restrictions may be in place as to what items can be disposed of a municipal disposal site.