St. Lawrence Fluorspar Marine Shipping Terminal Project

PROJECT DESCRIPTION

PURSUANT TO
THE CANADIAN ENVIRONMENTAL ASSESSMENT ACT, 2012

PROJECT REGISTRATION

PURSUANT TO
THE NEWFOUNDLAND AND LABRADOR
ENVIRONMENTAL PROTECTION ACT

Submitted to:

The Canadian Environmental Assessment Agency

and

NL Department of Municipal Affairs and Environment, Environmental Assessment Division

Submitted by:

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MAY 31, 2019

Environmental Assessment Registration Document / Project Description

St. Lawrence Fluorspar - Marine Shipping Terminal Project

Little Lawn Harbour, St. Lawrence, NL

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EXECUTIVE SUMMARY

INTRODUCTION – BACKGROUND

Canada Fluorspar (NL) Inc. (CFI), the Proponent, plans to build and operate a dedicated Marine Shipping Terminal to export acid-grade fluorspar concentrate and construction aggregate from its St. Lawrence AGS Fluorspar Mine. The new proposed location of the shipping wharf is near Mine Cove in Little Lawn Harbour, along the western border of the Town of St. Lawrence, in the province of Newfoundland and Labrador (NL). A dedicated marine shipping facility near the current mine and mill operation is vital to CFI's AGS Mine operation and sustainability.

The Project (the undertaking) includes construction, operation, and rehabilitation and closure of the proposed marine terminal facilities. This undertaking represents an **alternative location** to the one formerly proposed at Blue Beach Cove in Great St. Lawrence Harbour. The Blue Beach location was previously approved and released in October 2010 (*i.e., St. Lawrence Fluorspar Mine Reactivation, Registration #1418*) and again in November 2015 (*St. Lawrence AGS Vein Fluorspar Mine (2015 Environmental Assessment* [EA]*), Registration # 1794*).

The proposed new location is much closer to the operating mine (and its waste rock storage). Since the AGS Mine operation began last August 2018, fluorspar concentrate has been trucked about 45 km to Mortier Bay (Marystown) for export. This temporary measure was implemented for CFI to evaluate other more viable export options for its products.

Federal EA is regulated under the *Canadian Environmental Assessment Act (*2012*)*. Submission of a Project Description to the Canadian Environmental Assessment Agency (CEA Agency) is required for all projects designated in the *Regulations Designating Physical Activities*. This Marine Terminal Project is considered a "designated physical activity" under Section 24(C) of the regulations, and therefore will be subject to the CEAA process.

In accordance with the NL *Environmental Assessment Regulations*, *2003* the Project must be registered pursuant to the *NL Environmental Protection Act* (EPA*)*. The EA process for the Project is initiated via submission of an EA Project Registration to the EA Division of the NL Department of Municipal Affairs and Environment (DMAE).

This document represents CFI's official submission of a combined **Project Description** (PD) to the CEA Agency and **Registration Document** (RD) to the NL DMAE.

RATIONALE & NEED FOR THE UNDERTAKING

The Fluorspar deposits of St. Lawrence are recognized for their accessibility, high grades (acid-grade) and absence of impurities. The location of the Project, with an ice-free deep-water harbour close to major North Atlantic shipping routes provides additional strategic advantage.

CFI has carried out a feasibility study for evaluating the export of its concentrate to foreign markets (e.g., China), and larger quantities of high-quality construction aggregate to North American markets. The previously approved 'east option' of the marine terminal at Blue Beach is an uneconomical option for the AGS Mine if both products are to be exported. Accordingly, the interim solution was to allow CFI to truck only fluorspar concentrate (in small batches) to Marystown and use the existing facilities there until a permanent solution could be found.

There are economic and environmental costs associated with trucking product to Marystown, in addition to a shortage of storage and ship size limitations at the Mortier Bay wharf. There are also public safety considerations due to the large number of trucks on the highway and town roads (approximately one 25-tonne truck each hour, every day of the year), as well as the significant carbon footprint of this operation.

The proposed Mine Cove option solves these logistical issues: it significantly reduces trucking emissions (significant reduction of carbon footprint), improves public safety, puts global markets within reach (e.g., enables use of larger vessels), expands product offerings (aggregate as well as concentrate), and prolongs CFI's mine operations by 10 years or more, thus extending employment and adding to the local and the region's economic viability. In addition, the proposed Marine Terminal Project provides a number of synergies with the current fluorspar mine operation, including consumption of waste rock, hauling/loading costs, sharing mine infrastructure and equipment, sharing of management, administration and supervision.

THE MARINE SHIPPING TERMINAL PROJECT SCOPE

The Project includes the following primary components:

- Concentrate storage and load out building;
- Waste rock crushing plant, radial arm stockpiling system, and aggregate stockpiles;
- Access and haul roads;
- Conveyor (fluorspar concentrate and aggregate transfer system);
- Wharf and Ship-Loader; and
- Rock-filled Breakwater (~350 m long).

The marine shipping terminal design capacity will be as follows:

- Fluorspar Concentrate: 200,000 tonnes/annum (Total two million tonnes over the life of the open pit mine);
- Construction Aggregate: 2,000,000 tonnes/annum (total estimated volume of 35 million tonnes of waste rock, plus two million tonnes of Dense Media Separation (DMS) Floats (a by-product aggregate of milling) over Project lifespan;
- Berthing vessels up to 72,000 Deadweight Tonnage (DWT), i.e., Panamax bulk carriers;
- Required water depth at the face of the wharf is 16 m; and
- Breakwater constructed from ~1.4 million tonnes of rock (~350 m long).

PROJECT DESCRIPTION

Several alternatives and layout options for the proposed marine terminal have been considered as part of the feasibility study carried out by CFI, and the most technically and economically viable, environmentally responsible, and socially and economically sustainable option has been selected. The Project's main physical features (infrastructure) are briefly described below:

Concentrate Storage Building: will be located at the aggregate processing and stockpiling area, which was selected to minimize interference with other mining activities and enhance logistics of material handling/ship loading.

Aggregate Processing (Crushing and Stockpiling): including primary and secondary crushers, screens, conveyors, waterlines and pumps, and mobile mining equipment including excavators, loaders and haul trucks. The plant design capacity is two million tonnes per annum. The aggregate will be stockpiled via portable radial stackers into separate piles. The reclaim operation will involve front-end loaders feeding aggregate material to infeed hopper into the overland conveyor system that feeds the aggregate to the shiploader at the berth.

Concentrate/Aggregate Transfer System (Covered Conveyor): an overland pile-supported conveyor system will transport both the fluorspar concentrate and aggregate materials from their respective storage/stockpiles to the ship loader. The conveyor will be elevated and suitably sloped. Each tower support will consist of concrete foundations anchored to the underlying bedrock. The conveyor belt cleaning (washing) will be required before products (e.g., concentrate or aggregate) are switched.

Water Management and Drainage: will focus on stormwater runoff in the Project area, water used by the Project for processing aggregate, conveyor belt washing, and wastewater generated at the concentrate building to dewater the slurry (should the pipeline option be selected).

Power: electrical power for local operations will be obtained from the Newfoundland Power electrical grid. The substation and metering station built in recent years at the mill site will be the connecting point for the Project's new electrical transmission line.

MARINE BERTH AND BREAKWATER

Based on engineering activities carried out to date, a number of locations and configurations of the berth and breakwater have been considered and evaluated. The preferred location and structural configuration of the marine berth (the shipping wharf) and a rubble stone breakwater were selected.

The selected wharf structure consists of a steel-pile supported structure (breasting and mooring dolphins, ship loader support structure, access trestle to the wharf (for supporting the conveyor gallery, operations and maintenance) and walkways between dolphins, and a radial shiploader).

The breakwater (lined with both filterstone and armourstone) will extend ~350 m from shore and will provide protection to the berth from predominately west-south-west waves. The marine infrastructure is designed to withstand severe weather and sea state conditions (1-in-100-year return period design criteria). The design will be resilient to climate change (i.e., sea level rise and storm surges, climate vulnerability risk assessment).

The berth will be located in 16 m of water at the berth face to accommodate Panamax bulk carriers up to 72,0000 DWT. Smaller vessels (e.g., 20,000 DWT) will be utilized for the export of fluorspar concentrate. A radial shiploader installed on the wharf will be designed to reach three (3) hatches on the Panamax class vessel and therefore warping of the vessel will be required to load all hatches. Loading rates will vary up to 2500 tonnes per hour.

The berth will be equipped with a variety of hardware and equipment such as: navigation aids; high energy absorbing fenders; bollards and quick release hooks; Berth lighting (downward directed for night operations); safety ladders; power supply; fire protection; security, and Environmental Emergency Response equipment.

PROJECT FOOTPRINT AREA

Land Side (up to the high water mark): the direct area affected included the footprint of the waste rock pile, aggregate processing plant and stockpiles, concentrate storage building, conveyor gallery and power line routes, access and hauling roads, and temporary layout area, etc. The estimated area is ~200,000 m^2 (20 hectares [ha]).

Marine Side: based on the current design, the footprint of the marine infrastructure (breakwater, wharf, dolphins, trestle, walkways, etc.) is ~38,000 m^2 (3.8 ha).

For the purpose of this EA analysis, we have made a conservative assumption of the area that may be or likely to be affected by the Project activities (i.e., *Project Boundary*) to be much bigger than the above calculated footprint. For the land side, the analysis was based on an estimated 98 ha on land plus 2 ha of coastline. For marine side, which includes the breakwater and wharf infrastructures footprint, plus berthing area, turning basin, safety zone, port access navigation channel and shipping lane, an area of ~100 ha, which makes the total Project area of 200 ha (2 km^2) used in the EA analyses (Sections 4.0 and 7.0).

PROJECT SCHEDULE

CFI intends to start the construction phase of the Project immediately after the Project is released from EA, and upon receipt of all required approvals, permits, and authorizations. The Project will be undertaken in four specific phases: Phase 1 - Pre-construction (currently on going); Phase 2 - Construction an estimated 14 months; Phase 3 - Operations (estimated Project life of 18 years) to 2039; and Phase 4 - Rehabilitation and Closure (estimated 1–2 years). The pre-construction phase is currently ongoing and includes various activities such as baseline investigations/studies, engineering and feasibility studies, Project Registration, EA process and regulatory permitting. CFI anticipates initiating onshore construction activities in the spring of year 2020. Figure ES-1 provides a high-level schedule of the construction, operation, and rehabilitation and closure of the proposed Marine Terminal Project.

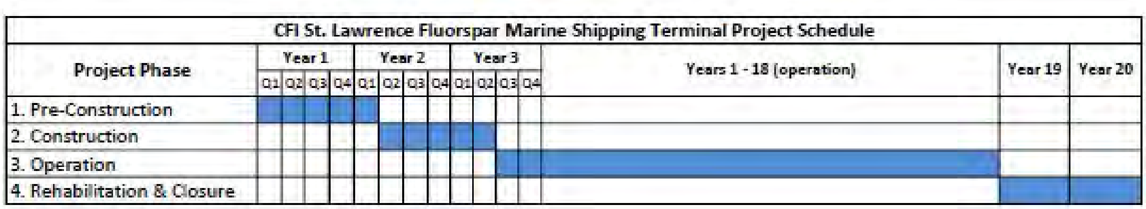

Figure ES-1: Project Schedule

CONSULTATION WITH REGULATORY AND PUBLIC STAKEHOLDERS

CFI has carried out an extensive public consultations (issue scoping) with those who may be affected and/or interested stakeholders from several groups including the Town of St. Lawrence and adjacent municipalities, regulatory agencies (both provincial and federal), economic development agencies, education and training institutes, environmental and recreation associations, Non-Governmental Organizations (NGOs) and special interest groups, and most importantly local residents and communities in the Project area.

Previous research for the 2015 AGS Mine EA has found that there are no designated Indigenous lands in the St. Lawrence Project region. CFI is not aware of any Indigenous fishing activities in the Project area, Little Lawn Harbour or its approaches. However, several Indigenous communities hold licences from DFO that could allow fishing in Placentia Bay: while none has occurred to date, CFI has contacted each of the identified Indigenous communities about the Project and the EA and requested their input. In addition, CFI has initiated contact with DFO to ascertain if any Indigenous groups on the east coast outside this province may have licences that could bring them into the Project area: if so, CFI will contact them regarding the Project.

Public Information Session

The Public Information Session held in St. Lawrence on 25 April 2019 was an important source of information for CFI to aid their understanding of residents' interests, concerns, questions and reaction to the proposed alternate location of the marine shipping terminal, especially what they see as advantages or disadvantages over the previous location at Blue Beach closer to the community centre and current trucking activities to transfer fluorspar concentrate to Marystown. The signup sheet had 76 people signatures and a total of 62 exit surveys were submitted. Summary of the responses to selected survey questions are summarized below (see Section 5.0 for details).

As shown in Figure ES-2, the majority of participants reside in St. Lawrence (55.7%). While Marystown was well represented (almost 10%), over 21% of participants indicated they live in communities mainly on the Burin Peninsula.

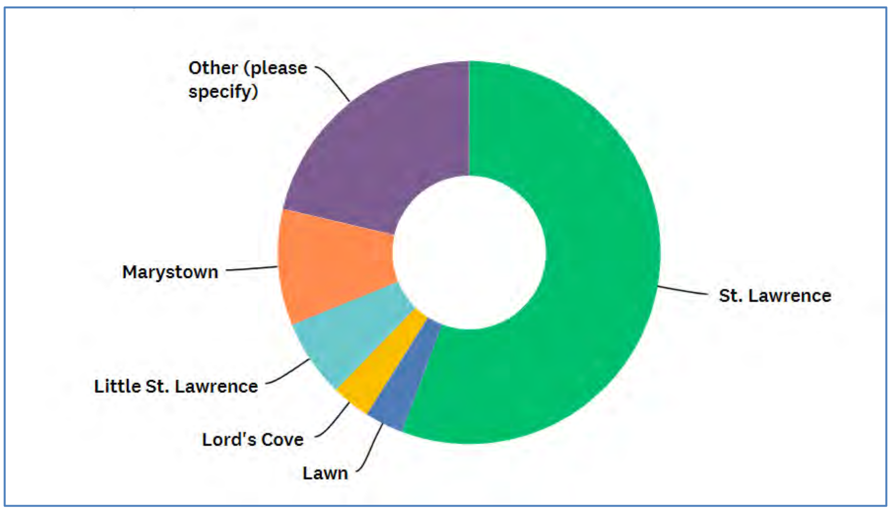

Figure ES-2: Responses to Question: "Which Community Do You Reside In?"

In response to a question: *do you support the proposed Marine Shipping Terminal on the west side of the mine?* 96.4% were in support.

Question nine was to understand what area residents believe is the most important aspect of the Project; they are asked to rank five different aspects: Health and safety; jobs/employment; environment; local benefits; and 'other' (Figure ES-3). The overwhelming interest is in health and safety, which was ranked as number one priority and almost twice as important to participants as employment. There were only three who selected other as a response, and they indicated economic benefits for the community, infrastructure and education.

Figure ES-3: Response to Question on "Most Important Aspect of The Project to Participants"

In question 10, the survey asked respondents what they see as the advantages or disadvantages of the proposed new western location for the marine facility. Responses mainly identified advantages (38 of 48 responses), in particular reduced trucking/traffic on community and public roads. Other advantages mentioned include the possibility of additional opportunities (e.g., exporting aggregate); the benefit to the environment of reduced air emissions with decrease in trucking; and the shorter distance to move the material as an economic benefit. A couple of respondents identified the challenges of maintaining a breakwater in heavy sea conditions. Four comments mentioned the introduction of large vessels in the area used by small fishing boats and one expressed concern for effects on the lobster fishery in Little Lawn Harbour.

Question 11 was open ended, asking respondents to provide any additional comments or questions. Several supportive comments were added, e.g., '...*a very positive project development for the community*' and '*great project for town and region*', '*good project for long-term viability*. The caution raised by some of the fish harvesters regarding the wave and wind forces and breakwater design was reiterated and there was encouragement to continue to work with the area fish harvesters regarding potential for displacement from fishing areas.

ENVIRONMENTAL EFFECTS ANALYSIS METHODOLOGY

The approach and methodology used in this document are based on accepted EA practice and federal and provincial guidelines, focusing on environmental and socio-economic issues of greatest concern. It is generally acknowledged that EA is a planning tool and should focus on those components of the environment that are valued by society and/or serve as indicators for environmental change. These components are known as Valued Components (VCs) and include physical, environmental and socio-economic components. In general, the analysis involved the following steps:

- Determining the VCs that may interact with Project activities;
- Describing and studying the existing environmental setting in which the Project will be constructed and operated;
- Conducting a preliminary identification of likely Project-environment interactions;
- Establishing the temporal and spatial boundaries of the Project-VCs interactions;
- Assessing Project-specific effects, including the likelihood of Project effects and recommended mitigation measures; and
- Describing the likely cumulative effects for the Project in combination with other physical activities that have been or will be carried out in the Project region.

The following VCs were identified and assessed based on government guidance, consultation with stakeholders, and understanding of the Project interaction with the environment:

- Physical Environment (Soil and Geology);
- Atmospheric Environment (Climate, Air and Noise);
- Water Resources (Groundwater, Surface Water and Freshwater Fish and Fish Habitat);
- Terrestrial Environment (Vegetation, Habitat Types, Wetlands, and Species at Risk);
- Wildlife (flora and fauna, including Birds [Terrestrial and Marine] and Species at Risk);
- Marine Environment (Fish and Fish Habitat, Marine Mammals, and Species at Risk); and
- Socio-economic Environment (Health and Safety, Economy, Employment and Business, Community Services and Infrastructure, Historic Resources, Navigation, and Commercial, Recreational and Indigenous Fisheries).

The existing environmental settings include physical and biological environmental and socio-economic elements that were considered when determining likely effects that could occur as a result of the Project. Environmental baseline studies, describing the existing environment and socio-economic elements, were the basis for determining potential changes and likely environmental and socio-economic effects associated with the Project. The analytical methods and existing environmental and socio-economic settings are described in Section 6.0, in which the identified VCs are described, and those identified as having possible interactions with the Project are included in the Environment Effects Analysis (Section 7.0).

Temporal and spatial boundaries encompass those periods and areas within which the VCs are likely to interact with, or be influenced by, the Project. Temporal boundaries are generally limited to the duration of, and for a period of time after the Project activities, which in this case include the entire lifetime of the Project including decommissioning and rehabilitation activities (20 years). Temporal boundaries also address other temporal issues such as seasonal sensitivities (e.g., fish spawning and bird breeding).

Spatial boundaries are generally limited to the immediate Project area, unless otherwise noted. For the purpose of this assessment, the Project area (i.e., Project physical boundary, including the infrastructure footprint and other areas that may be affected by Project activities) was assumed to cover ~2 km^2 (~200 ha).

However, Project larger area of influence may include the AGS mine and mill and associated infrastructures, the Town of St. Lawrence and the surrounding environment. Some spatial boundaries may extend beyond the Project physical area (e.g., Water Resources, Terrestrial, Wildlife, and Socio-Economic Environment).

The Project-specific effects analysis evaluates the environmental and socio-economic effects of the Construction, Operation and Maintenance, and Decommissioning, Rehabilitation and Closure Phases of the Project.

Development of mitigation measures to reduce or avoid likely effects on VCs begins with the engineering design phase, and continues throughout the Project planning, public consultation, and the EA analysis. In addition to the analysis of environmental or socio-economic effects of the Project by itself, the analysis also considers the environmental effects of the Project in combination with those from other projects and activities that have been, or will be, carried out in the foreseeable future, and which may interact with the Project activities.

ENVIRONMENTAL EFFECTS ANALYSIS SUMMARY

A description of likely environmental effects is provided for each VC at each Project phase: construction, operation, and rehabilitation and closure. Mitigation measures and monitoring procedures that are designed to result in the avoidance or reduction of likely adverse environmental effects are outlined. The effects analysis also considered the implications of accidental and malfunction events, and cumulative effects.

PHYSICAL ENVIRONMENT

Based on the preliminary identification of likely Project-environment interactions, it is likely that the Project will affect the Physical Environment VC during all phases of the Project. The majority of the effects are associated with Project construction (i.e., stripping and removal of vegetation, excavation and blasting), where the majority of soil disturbance will occur within the Project footprint.

The analysis showed that the expected residual environmental effect of the Project on the physical environment is minor or negligible, when mitigations measures listed in this document are considered.

ATMOSPHERIC ENVIRONMENT

The Atmospheric Environment VC includes consideration of air quality and noise. Several sources of atmospheric emissions will result from the proposed Project including noise and air emissions, e.g., greenhouse gases (GHGs) from fuel burning vehicles, equipment and electrical energy use, and emissions (dust) generated from waste rock (aggregate) processing, material handling and transportation.

During the Project's construction and operation phases the estimated GHG emission totals for one year are: 4.954 kt CO2e during construction; and 8.764 kt CO2e during operation. The estimate includes primary and indirect sources, the latter related to electricity consumption. Operations sources include marine vessel emissions while loading at the wharf, but not other off-site emissions.

Based on the analysis/assessment, it is likely that the expected residual environmental effects of the Project on the Atmospheric Environment VC to be minor or negligible, when mitigations measures listed in this document are considered.

TERRESTRIAL ENVIRONMENT

The Terrestrial Environment VC includes wetlands, vegetation communities, and provincially and federally listed vegetation species under the NL *Endangered Species Act* (ESA)*, Species at Risk Act (*SARA) and Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The extent of the Project area used to identify likely effects of the Project on the Terrestrial Environment VC was defined by the area of potential physical disturbance (Project footprint) and extends to include the potential zone of influence resulting from either potential interactions with infrastructure or activities during each Project phase. There are no wetlands within the Project footprint. An Ecological Land Classification (ELC) product and desktop review was used to identify unique land classes and their potential presence of listed plant species. Given that Project activities causing the alteration or loss of vegetation communities may occur in both the construction and the operation phase of the Project, the total surface area for the complete Project footprint is used.

The result of this analysis indicated that the area affected by the Project activities would be ~1 % of the total ELC study area; therefore, the Project effect on vegetation (plant species) is negligible. No vegetation species at risk are known to occur within the Project footprint or were identified within the desktop review.

WILDLIFE

The Wildlife VC considers birds, both terrestrial and marine, and terrestrial wildlife and species at risk. The Project-related interactions and likely effects on the Wildlife VC, along with the mitigation measures to minimize or avoid these effects, were considered. It is noted that birds and wildlife, in general, exhibit similar interactions and likely effects with the Project as birds and wildlife species considered to be at risk and/or of conservation concern. Based on the preliminary identification of potential Project-environment interactions, it is likely that the Project will affect wildlife during all phases of the Project. Based on the results of the ELC study, the Project footprint will result in the alteration or loss of ~1% of the total area encompassed in the ELC study area, and no habitat type will be completely lost. Wildlife species will have the opportunity to relocate to other similar habitat types in the region.

In summary, the expected residual environmental effects of the Project on Wildlife VC (including migratory birds and aquatic species) are minor or negligible.

MARINE ENVIRONMENT

The Marine Environment VC includes marine fish and fish habitat, marine mammals, sea turtles and marine species at risk that could potentially be affected by the Project. The Project-related interactions and likely effects on the Marine Environment VC, along with the mitigation measures to reduce or avoid these effects, are described. Based on the preliminary identification of likely Project-environment interactions, the Project will interact with the marine environment during all phases of the Project. Most of the potential effects on the marine environment are associated with the construction of the wharf and breakwater.

The fish and fish habitat survey was conducted at the Project site in an area with water depths ranging from intertidal to about 30 m. The surficial substrate in the survey area is predominantly hard, consisting of varying proportions of bedrock, boulder, rubble, cobble and gravel. The substrate of the portion of the survey area closest to shore (i.e., ≤10 m depth) is generally characterized by bedrock, boulder and rubble with patches of cobble and gravel. The surficial substrate of the remainder of the survey area is generally characterized by cobble and gravel with patches of rubble and occasional boulders.

The flora and fauna observed are typical of inshore marine areas in Newfoundland characterized by hard substrate. Flora observed during the fish and fish habitat survey included brown kelp (e.g., *Laminaria digitata*, *Alaria esculenta, Agarum* sp.), filamentous brown algae *Desmarestia* sp.), Irish moss *Chondrus crispus*, and coralline algae. Fauna observed during the survey were dominated by sea urchins (*Strongylocentrotus droebachiensis*). Other observed fauna include sea anemones, sea stars, jellyfish, ctenophores, toad crab (*Hyas* sp.), various gastropods, brittle stars, mussels, Atlantic wolffish (*Anarhichas lupus*), flatfish (most likely winter flounder *Pseudopleuronectes americanus*), and cunner (*Tautogolabrus adspersus*). No lobster were observed during the survey which is not surprising given that they are primarily nocturnal, and the survey was conducted during daylight hours.

The data collected during the marine fish and fish habitat survey will be presented to Fisheries and Oceans Canada (DFO) in the Request for Review during CFI's application for *Fisheries Act* paragraph 35(2)(b) Authorization to proceed with the work.

The design of the breakwater includes the installation of various sized stone (armour stone, filter stone) to protect against wave damage. The armour stone and filter stone will create marine habitat that is suitable for colonization by a variety of marine invertebrates. It is anticipated that the installation of the various stone types will provide offset for the marine habitat that is altered or lost as a result of the breakwater footprint.

In summary, the expected residual environmental effect of the Project on the Marine Environment (including fish and fish habitat, and fisheries) would be moderate, when mitigations measures listed in this document are considered.

SOCIO-ECONOMIC ENVIRONMENT

This section presents an analysis of the most likely key Project effects on the Socio-Economic VC and proposed mitigation measures to reduce or avoid adverse effects during construction and operations, and to enhance positive effects. The Project has the potential to extend the life of open pit mining at the AGS site for an additional 10 years or more (due to aggregate production /export), which added to the current estimated 8–10 years (life of the mine), enables anticipation of an ongoing need for a 200-person workforce or more for over 20 years. The prospect of continuity of employment provides opportunities for residents who wish to remain on the Burin Peninsula or return from living and/or working away and may well help address the decline in population.

Construction has been part of activities at the AGS site since 2016, employing close to 375 direct hire workers mostly from the local area; a similar situation is anticipated for the construction of the marine terminal Project, an estimated workforce of 150 persons during the construction period.

The Burin Peninsula has a wide range of community services and infrastructure, much of it put in place to serve a larger population. The services and infrastructure were able to accommodate the construction workforce required for the CFI's current needs. The increased employment over the longer time period anticipated with the Project will increase the tax basis to support community infrastructure.

CFI has had initial discussions with the commercial fishers who typically use Little Lawn Harbour for lobster fishing (and some cod) and the deep-water areas outside the harbour for crab and cod. The harvesters are concerned about possible Project effects on lobster habitat and loss of area to set gear. The Project will also result in large bulk carriers travelling to and from Little Lawn Harbour, an area used by relatively small, open fishing boats. The need for a designated vessel traffic lane will be investigated with fishers and relevant regulatory agencies. There will be follow-up discussions between CFI and the harvesters as to how best to minimize or avoid Project effects during construction and operation.

Breakwaters can provide new fish and shellfish habitat. DFO has published guidance re breakwater design to meet habitat needs of lobster of varying age/size. The harvesters have had a lobster research program ongoing for some time in Little Lawn Harbour, and CFI is working with Fish, Food and Allied Workers (FFAW) and DFO to access this information. CFI has recently conducted a marine fish and fish habitat survey in Little Lawn Harbour and will be able to provide specific information on the existing seabed conditions and associated habitat.

The overall effects of the Project will be to provide steady employment for a work force ~10% greater than at present and for a longer time period as well as short-term employment during the Construction phase of the Project. CFI's commitments in the Benefits Plan toward local employment, training, gender equality and diversity, and local suppliers during the project phases will have positive effects on the local and regional economy. The residual socio-economic effects of the Project will be positive.

There are no Indigenous communities in the Project area and there is no record of current or historical use of Project lands for traditional purposes. As well, there is no record of structures or sites within the Project area that are of historical, archaeological, paleontological or architectural significance to communities within the study area. Therefore, there is no change to the environment as a result of the Project that would affect the Indigenous communities in NL or other Atlantic Provinces. More specifically, the Project will not have effect on the health and socio-economic conditions, physical and cultural heritage or current use of lands for traditional purposes of the Indigenous communities in the region.

ACCIDENTS AND MALFUNCTIONS

Accidents and malfunctions could occur during Project activities, particularly construction, operation. Potential accidents and malfunctions associated with the Project include marine terminal failure; stockpile slope failure; vehicle and vessel accidents/collisions; small terrestrial or marine spills of deleterious substances (e.g., fuels, lubricants); large marine spills (fluorspar concentrate, oil spill); and fires or explosions. The Project has been designed and will be constructed and operated following applicable high industry standards, industry best management practices, precautionary approach, and effective mitigation measures, emergency preparedness and response in accordance with CFI's Environmental, Health and Safety Management System (EHSMS).

As part of CFI's EHSMS, an Emergency Response Plan (ERP) is in place for the current mine and mill operations, which will be updated to include the Marine Terminal Project-specific activities and will be implemented during all phases of the Project. The ERP will provide an appropriate and consistent response to emergency situations that may occur over the life of the Project.

CUMULATIVE EFFECTS ANALYSIS

Cumulative effects can be defined as changes to the environment resulting from an action, project or activity in combination with other existing or future projects or activities. The cumulative effects analysis considers likely environmental effects associated with the Project, after consideration of mitigation measures. The likely environmental effects that have been considered in this analysis are associated with the following VCs:

- Marine environment;
- Atmospheric environment (air quality and noise); and
- Socio-economic environment (community services and infrastructure; employment, economy and business).

Existing and/or future projects located in the Burin Peninsula and north-western Avalon Peninsula have been considered. A total of 10 projects were identified and their cumulative effects were assessed.

Most of these projects are located between 40 km and 300 km from the proposed Project, and therefore, no cumulative biophysical effects, other than cumulative effects on the atmospheric environment and marine shipping may be anticipated.

ACRONYM AND ABREVIATIONS

~	Approximately
AAFC	Agriculture and Agri-Food Canada
AAMS	Ambient Air Monitoring Station
AAROM	Aboriginal Aquatic Resource and Oceans Management
ABA	Acid-Base Accounting
ACCDC	Atlantic Canada Conservation Data Centre
AGS	A. Gordon Stollery
ALTRT	Atlantic Leatherback Turtle Recovery Team
AR5	Fifth Assessment Report
ASTM	American Society for Testing and Materials
ATV	All-Terrain Vehicle
BACT	Best Available Control Technologies
BBS	Breeding Bird Surveys
BEHI	B Eid Holdings Inc.
BML	Burin Minerals Limited
BMP	Best Management Practices
BPCC	Burin Peninsula Chamber of Commerce
BPRSB	Burin Peninsula Regional Service Board
CAC	Criteria Air Contaminant
CAD	Canadian Dollars
CAT	Caterpillar
CCME	Canadian Council of Ministers of the Environment
CCRI	Community-Based Coastal Resource Inventory
CD	Chart Datum
CEA Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
CEO	Chief Executive Officer
CFI	Canadian Fluorspar (NL) Inc.

CH_4	Methane
CHS	Canadian Hydrographic Service
CIS	Canadian Ice Service
cm	Centimetres
CNA	College of the North Atlantic
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_3-NP	Carbonate-Neutralization Potential
COA	Certificate of Approval
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPN	Central Pit North
CPUE	Catch-Per-Unit-Effort
CSA	Canadian Standards Association
CSSP	Canadian Shellfish Sanitation Program
CWS	Canada-Canadian Wildlife Service
dB	Decibels
DFLR	Department of Fisheries and Land Resources
DFO	Fisheries and Oceans Canada
DMAE	Department of Municipal Affairs and Environment
DMS	Dense Media Separation
DNR	Department of Natural Resources
DOEC	Department of Environment and Conservation
DWT	Deadweight Tonnage
EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area
ECCC	Environment and Climate Change Canada
ECCC-CWS	Environment and Climate Change Canada-Canadian Wildlife Service
EDMO	Eastern Destination Marketing Organization
EEM	Environmental Effects Monitoring

EHA	Eastern Health Authority
EHJV	Eastern Habitat Joint Venture
EHSMS	Environmental Health and Safety Management System
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
ELW	Extreme Low Water
EMS	Environmental Management System
EOSD	Earth Observation for Sustainable Development
EPA	*Environmental Protection Act*
EP-MU	Environmental Protection-Management Unit
EPP	Environmental Protection Plan
EPR	Environmental Preview Report
ERP	Emergency Response Plan
ESA	*Endangered Species Act*
FFAW	Fish, Food and Allied Workers
FSC	Food, Social and Ceremonial
GHG	Greenhouse Gases
GMSL	Global Mean Sea Level
GODAE	Global Ocean Data Assimilation Experiment
GWP	Global Warming Potential
ha	Hectare
HHWLT	Higher High-Water Large Tide
HHWMT	Higher High Water Mean Tide
HYCOM	Hybrid Coordinate Ocean Model
Hz	Hertz
IBA	Important Bird Area
ICS	Incident Command System
IDF	Intensity-Duration-Frequency
IMO	International Maritime Organization

IPCC	Intergovernmental Panel on Climate Change
JBC	Jewer Bailey Consultants Limited
JWEL	Jacques Whitford Environmental Limited
kg	Kilogram
km	Kilometre
kV	Kilovolt
kW	Kilowatt
L	Litres
LEK	Local Ecological Knowledge
LFA	Lobster Fishing Area
LGL	LGL Limited, environmental research associates
LHD	Load Haul Dump
LiPF6	Lithium Hexafluorophosphate
LLWLT	Lower Low Water Large Tide
LLWMT	Lower Low Water Mean Tide
LNG	Liquefied Natural Gas
LTO	Licence to Occupy
MAE	Municipal Affairs and Environment
MAMKA	Mi'kmaq Alsumk Mowimskik Koqoey Association
MCTS	Marine Communications and Traffic Services
MFN	Miawpukek First Nation
mg/L	Milligrams Per Liter
mm	Millimetres
MSC	Meteorological Services Canada
MU	Management Unit
MUN	Memorial University of Newfoundland
MW	Megawatts
MWAI	M.W. & Associates Inc.
MWL	Mean Water Level

N_2O	Nitrous Oxide
NAFO	Northwest Atlantic Fisheries Organization
NAICS	North American Industrial Classification System
NARR	North American Regional Reanalysis
NGO	Non-Governmental Organizations
NGSWG	National General Status Working Group
NHS	National Household Survey
NIC	National Ice Center
NL	Newfoundland and Labrador
NLEECD	Newfoundland and Labrador Education and Early Childhood Development
NLESD	Newfoundland and Labrador English School District
NLHC	Newfoundland and Labrador Housing Corporation
NLRC	Newfoundland and Labrador Refining Corporation
NLSA	Newfoundland and Labrador Statistics Agency
NLWIS	National Land and Water Information Service
nm	Nautical Miles
NMCA	National Marine Conservation Areas
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
Non-PAG	Non-Potentially Acid Generating
NOPP	National Ocean Partnership Program
NO_x	Nitrogen Oxides
NPR	Neutralization Potential Ratio
OBIS	Ocean Biogeographic Information System
OCI	Ocean Choice International
OH&S	Occupational Health & Safety
OSTIA	Operational Sea Surface Temperature and Sea Ice Analysis
PAIR	Pre-Arrival Information Report
PAO	Provincial Archaeology Office

PD	Project Description
PR	Icing Predictor Index
RCMP	Royal Canadian Mounted Police
RD	Registration Document
RD/PD	Registration Document/Project Description
RMA	Representative Marine Areas
RPA	Roscoe Postle Associates
RSL	Regional Sea Level
RV	Recreational Vehicle
SAEN	Salmonid Association of Eastern Newfoundland
SAM	Stewardship Association of Municipalities
SAR	Species at Risk
SARA	*Species at Risk Act*
SCH	Small Craft Harbours
SEM	Sikumiut Environmental Management
SLR	Sea Level Rise
SO_2	Sulfur Dioxides
SPL	Sound Pressure Level
SSAC	Species Status Advisory Committee
SST	Sea Surface Temperature
SZ	Stewardship Zones
TAC	Total Allowable Catch
TCH	Trans-Canada Highway
TCII	Tourism, Culture, Industry and Innovation
TMF	Tailings Management Facility
TPM	Total Particulate Matter
TSS	Total Suspended Solids
UK	United Kingdom
US	United States

USGPM	US Gallons per Minute
V	Volt
VC	Valued Component
VEC	Valued Environmental Component
VTS	Vessel Traffic Services
WHMIS	Workplace Hazardous Materials Information System
WMP	Water Management Plan
WOH&S	Workers Occupational Health and Safety
WWF	World Wildlife Fund

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TABLE OF CONCORDANCE

Federal Table of Concordance (CEAA)

Concordance with Schedule 1 of the *Prescribed Information for the Description of a Designated Project Regulations* (SOR/2012-148) under the *CANADIAN ENVIRONMENTAL ASSESSMENT ACT, 2012.*

CEAA Project Description Requirements		Corresponding Section in this Document
	GENERAL INFORMATION	
1	The project's name, nature and proposed location.	1.0 (Introduction)
2	The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project.	1.1 (Proponent Information)
3	A description of and the results of any consultations undertaken with any jurisdictions and other parties including Indigenous peoples and the public.	5.0 (Consultation and Issues Scoping)
4	The environmental assessment and regulatory requirements of other jurisdictions.	1.4 (Approval of the Undertaking – Regulatory Framework)
4.1	A description of any environmental study that is being or has been conducted of the region where the project is to be carried out.	1.6 (Other Relevant Information – Regional Projects)
	Project Information	
5	A description of the project's context and objectives.	1.2 (Project Overview) & 3.1 (Project Purpose)
6	The provisions in the schedule to the *Regulations Designating Physical Activities* describing the project in whole or in part.	**TO BE ADDED**
7	A description of the physical works that are related to the project including their purpose, size and capacity.	2.0 (Project Description)
8	The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures.	1.2 (Project Overview) & 2.0 (Project Description)
9	A description of all activities to be performed in relation to the project.	2.3 (Construction Activities), 2.4 (Operation Activities) & 2.5 (Rehabilitation and Closure)
10	A description of any waste that is likely to be generated during any phase of the project and of a plan to manage that waste.	2.8 (Emissions, Discharges and Waste Management)
11	A description of the anticipated phases of and the schedule for the project's construction, operation, decommissioning and abandonment.	2.3 (Construction Activities), 2.4 (Operation Activities), 2.5 (Rehabilitation and Closure), & 1.5 (Project Schedule)
	Project Location Information	
12	A description of the project's location, including	2.1 (Project Location)
(a)	its geographic coordinates;	2.1 (Project Location)
(b)	site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of the project components;	Figure 1-3 (in Section 1.2) & Figure 2-4 (in Section 2.2)
(c)	the legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot;	2.1.2 (Land Title)
(d)	the project's proximity to any permanent, seasonal or temporary residences;	7.1.1 (Construction)
(e)	the project's proximity to reserves, traditional territories	5.3 (Proponent Engagement and Consultation with

	as well as lands and resources currently used for traditional purposes by Indigenous peoples; and	Indigenous Groups)
(f)	the project's proximity to any federal lands.	8.0 (Funding and Federal Involvement)
	Federal Involvement	
13	A description of any financial support that federal authorities are, or may be, providing to the project.	8.0 (Funding and Federal Involvement)
14	A description of any federal land that may be used for the purpose of carrying out the project.	8.0 (Funding and Federal Involvement)
15	A list of the permits, licences or other authorizations that may be required under any Act of Parliament to carry out the project.	1.4 (Approval of the Undertaking – Regulatory Framework)
	Environmental Effects	
16	A description of the physical and biological setting.	6.0 (Existing Environment)
17	A description of any changes that may be caused, as a result of carrying out the project, to	7.0 (Environmental Effects Analysis)
(a)	fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act*;	6.43 (Freshwater Fish and Fish Habitat) & 6.6.1 (Marine Fish and Fish Habitat)
(b)	aquatic species, as defined in subsection 2(1) of the *Species at Risk Act*; and	6.4.1.2 (Vegetation Species at Risk), 6.5.2 (Wildlife Species at Risk) & 6.6.3 (Marine Species at Risk).
(c)	migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*.	7.5.1 (Birds)
18	A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada.	7.0 (Environmental Effects Analysis)
19	Information on the effects on Indigenous peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	7.7 (Socio-Economic – Fisheries)
	Summary	
20	A summary of the information required under sections 1 to 19.	In English and French: provided as separate documents to this Project Description

Provincial Table of Concordance (DMAE)

Concordance with the registration format (Appendix 1) of the Department of Municipal Affairs and Environment's document entitled *ENVIRONMENTAL ASSESSMENT ... A Guide to the Process.*

Registration Document Requirements		Corresponding Section in this Document
Name of Undertaking		
	The project's name, nature and proposed location.	1.0 (Introduction)
Proponent		
	(i) Name of Corporate Body: (ii) Address: (iii) Chief Executive Officer: Name: Official Title: Address: Telephone No: (iv) Principal Contact Person for purposes of environmental assessment: Name: Official Title: Address: Telephone No.:	1.1 (Proponent Information)
The Undertaking		
	(i) Name of the Undertaking:	1.0 (Introduction)
	(ii) Purpose/Rationale/Need for the Undertaking:	1.2 (Project Overview) & 3.1 (Project Purpose)
Description of the Undertaking		
Under Sections (i), (ii), (iii) and (iv) below, the proponent shall provide complete information concerning the preferred choice of location, design, etc., together with additional information on any alternatives which may have been considered and rejected, but which may still be regarded as viable. Reasons for the rejection of those alternatives should be included.		3.0 (Project Rationale and Alternatives Assessment)
	(i) Geographical Location: - provide a description of the proposed site, including boundaries if possible. - attach large scale (e.g., 1:12,500) original base map(s) and/or recent air photos clearly indicating the site location relative to existing communities and transportation facilities and showing the proposed route of access. The National Topographic Survey edition should be affixed to the map(s).	1.2 & 2.1 (Project Location), Figures 1-1,1-2,1-3 & 1-4 (in Section 1.2) and Figures 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, & 2-7 (in Section 2.0)
	(ii) Physical Features: - describe the major physical features of the undertaking, including buildings, other large structures, roads, pipelines, transmission lines, marine facilities, etc. - provide the size of the area to be affected by the undertaking. - attach an artist's conceptual drawing, if available. - describe the physical and biological environments within the area potentially affected by the project, e.g., topography, water bodies, vegetation, wildlife species, fish etc.	2.0 (Project Description) & 6.0 (Existing Environment)
	(iii) Construction (if applicable): - provide the approximate total construction period (if staged, please list each stage and its approximate duration).	2.0 (Project Description)

	- proposed date of first physical construction related activity on site. - describe the potential sources of pollutants during the construction period(s) including airborne emissions, liquid effluents and solid waste materials. - describe any potential causes of resource conflicts.	
	(iv) Operation: - describe how the undertaking will operate. - estimated period of operation, if not a permanent facility. - describe all potential sources of pollutants during the operating period, including airborne emissions, liquid effluents and solid waste materials. - describe any potential causes of resource conflicts.	2.0 (Project Description)
	(v) Occupations: - estimate the number of employees required for the construction and operation of the project as well as the expected duration of employment. - provide an enumeration and breakdown of occupations anticipated for this undertaking according to the National Occupational Classification 2006 (http://www23.hrdc-drhc.gc.ca/2001/e/generic/welcome.shtml). This information is used to determine if any hazardous occupations are involved. - identify what work will be carried out by direct hiring and/or contracting out. - identify how employment equity will be addressed relative to age and gender. - for further information on gender equity, contact the Women's Policy Office at 709-729-5009 or visit the website at www.gov.nl.ca/exec/wpo	2.6 (Occupations)
	(vi) Project Related Documents: - provide a bibliography of all project-related documents already generated by or for the proponent. - provide one copy of any reports on environmental work already performed by or for the proponent.	9.0 (Project Related Documents)
Approval of the Undertaking		
	List the main permits, licences, approvals and other forms of authorization required for the undertaking, together with the names of the authorities responsible for issuing them (e.g., federal government department, provincial government department, municipal council, etc.)	1.4 (Approval of the Undertaking – Regulatory Framework)
Schedule		
	Indicate the earliest and latest dates when project construction could commence (assuming all approvals are in place). Briefly state the reasons for the selection of these dates.	1.5 & 2.7 (Schedule)
Funding		
	If this project depends upon a grant or loan of capital funds from a government agency (federal, provincial or otherwise) provide the name and address of the department or agency from which funds have been requested. To determine whether cost recovery is applicable in accordance with the Cost Recovery policy, provide an estimate of the capital costs of the project. Projects having capital costs in excess of $5 million will be subject to applicable cost recovery fees.	Section 8.0 (Funding and Federal Involvement)
Signature of Signing Authority and Date		
	Date, Signature of Chief Executive Officer	Section 8.0 (Funding and Federal Involvement)

1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. (CFI) plans to build and operate a dedicated marine shipping terminal to export its acid-grade fluorspar concentrate and construction aggregate. The terminal's proposed location is near Mine Cove in Little Lawn Harbour, along the western border of the Town of St. Lawrence, in the province of NL.

CFI carried out two EAs in recent years: one in 2010 to reactivate two underground mines, focused on the Tarefare and Blue Beach North veins. These fluorspar deposits are situated in the central and eastern part of the broad peninsula[1] within the municipality of St. Lawrence in which CFI holds the majority of mining/surface leases and mineral licenses. The second EA, in 2015, focused on mining/milling the AGS vein, the peninsula's westernmost fluorspar deposit.

The marine terminal's original planned location was in Blue Beach Cove, within Great St. Lawrence Harbour. This is on the eastern side of the St. Lawrence peninsula, and close to the former mill, which in the 2010 EA was to be upgraded as part of the underground mine reactivation project.

The AGS Mine, which began operating in August 2018, is located on the western side of the St. Lawrence peninsula and close to Mine Cove. With its shift to the west, the marine terminal's proposed new location is therefore much closer to the operating mine: ~0.5 km away, as opposed to Blue Beach Cove, which is ~8 km to the east.

Since mining began last August, fluorspar concentrate has been trucked about 45 km to Mortier Bay (Marystown) for export. This temporary measure was implemented for CFI to evaluate other, more viable export options for its products.

The Project (or Undertaking) includes construction, operation, rehabilitation and closure of the St. Lawrence Fluorspar Marine Shipping Terminal near Mine Cove (also referred to as the "western" option). This undertaking represents an **alternative location** to Blue Beach Cove (the "eastern" option), which was approved and released from EA in October 2010 (*i.e., St. Lawrence Fluorspar Mine Reactivation, Registration #1418*) and in November 2015 (*St. Lawrence AGS Vein Fluorspar Mine (2015 EA), Registration # 1794*).

The Project is subject to provincial and federal EA processes. Under provincial EA legislation (i.e., *Environmental Assessment Regulations*, *2003* pursuant to the NL EPA), and the federal *Canadian Environmental Assessment Act* (CEAA 2012), the Project must be registered/described. This requires formal submission of a **Registration Document** (RD) to the NL DMAE and a **Project Description** (PD) to the CEA Agency.

This document represents CFI's official submission of a combined RD/PD to the provincial EA Division of the DMAE and the CEA Agency.

[1] This peninsula is bounded by Little Lawn Harbour in the west and Great St. Lawrence Harbour in the east.

1.1 Proponent Information

1.1.1 Name of the Designated Project

St. Lawrence Fluorspar Marine Shipping Terminal Project

1.1.2 Name and Address of the Proponent

Canada Fluorspar (NL) Inc is majority-owned by investment funds affiliated with Golden Gate Capital of San Francisco, California, USA. CFI was registered as a corporation in NL in 2009.

Canada Fluorspar (NL) Inc.
P.O. Box 337,
St. Lawrence, NL, Canada
A0E 2V0
Tel: 709-873-3331
Fax: 709-873-3335

1.1.3 Chief Executive Officer

Bill Dobbs
President and CEO
PO Box 337
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A0E 2V0
Tel: (709) 873-3331
Fax: (709) 873-3335
info@canadafluorspar.com

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Owner's Representative
(Primary Representative for Project Description)
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EA Team Leader
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Cell:(709)770-9200
Ray.bailey@jewerbailey.com

1.2 Project Overview

CFI plans to build and operate a dedicated marine shipping terminal near Mine Cove on the west side of the mine, i.e., the west shipping facility (Figure 1.1). The facility will serve as an export wharf for CFI's acid-grade fluorspar concentrate, and an additional product: construction aggregate. A dedicated marine shipping facility is vital to CFI's mining operations and sustainability.

The Project includes construction, operation, decommissioning, rehabilitation and closure of the proposed marine shipping terminal, as described in this document.

The Project's land-based infrastructure is situated entirely within the municipal boundaries of the Town of St. Lawrence, on the southern tip of the Burin Peninsula, NL. The Project is located partly on land currently and historically used for mining, and partly in a new area, on the coastline and adjacent waters.

The Project includes the following primary components:

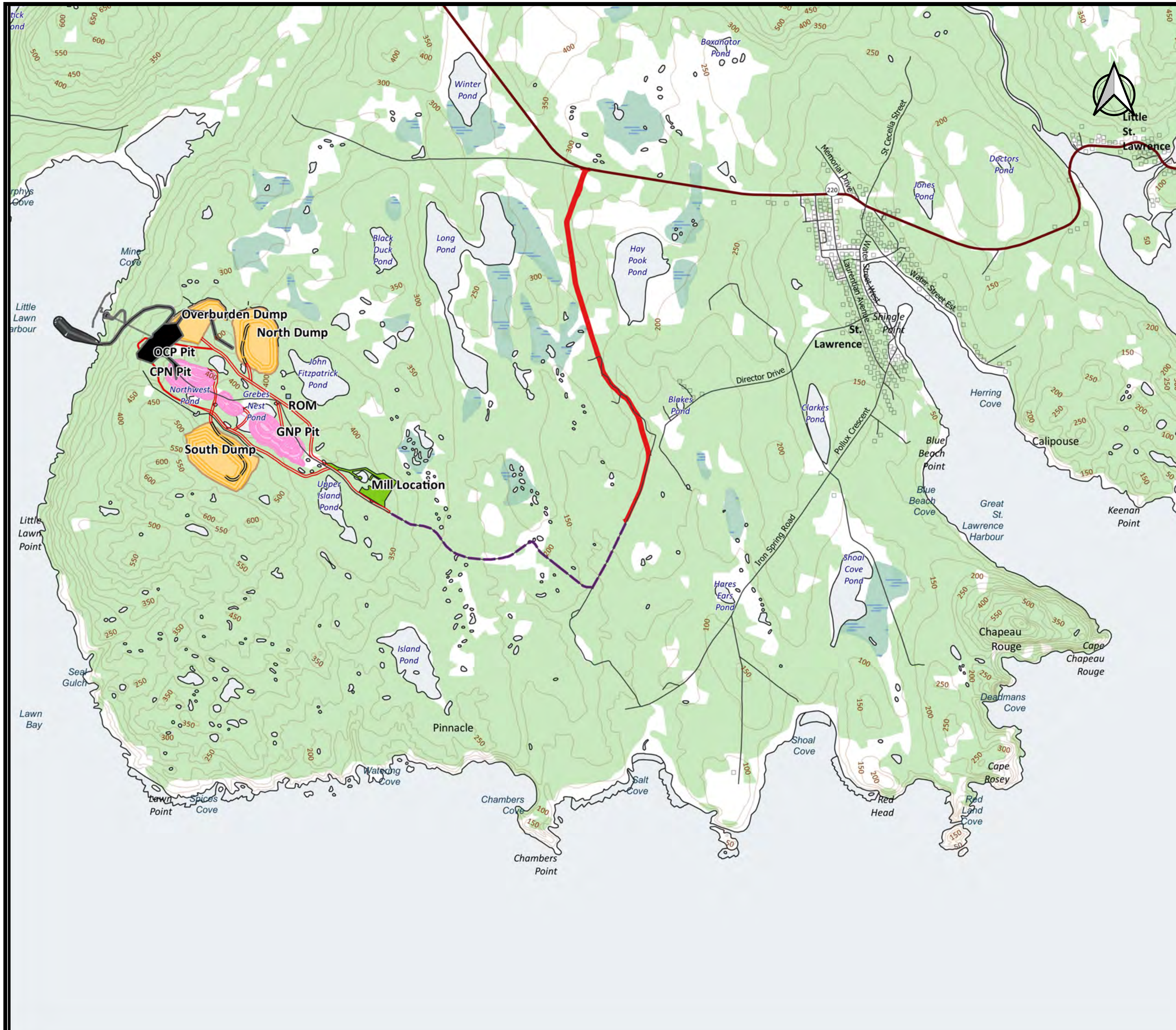
- Waste rock crushing plant, radial arm stockpiling system, and aggregate stockpiles;
- Concentrate storage building;
- Access and haul roads;
- Wharf;
- Conveyor (fluorspar concentrate and aggregate transfer system);
- Ship-loading system; and
- Rock-filled breakwater.

The marine shipping terminal design capacity will be as follows:

- Fluorspar concentrate: 200,000 tonnes/annum;
- Construction aggregate: 2,000,000 tonnes/annum;
- Berthing vessels up to 72,000 DWT, i.e., Panamax bulk carriers;
- Required water depth at the face of the wharf: 16 m; and
- Breakwater constructed from ~1.4 million tonnes of rock (~350 m long).

Figure 1-2 illustrates previous project EAs. The AGS Vein, the focus of CFI's current mining activity, was released from the provincial EA process in 2015. The Newspar project (EA release in 2010) focused on the Tarefare/Blue Beach North underground mine reactivation. Both EAs identified the eastern option for a proposed wharf. The Project described in this RD/PD is the western option near Mine Cove, located near the AGS Mine as shown on Figure 1-2.

Figure 1-3 shows the Project's alternative marine terminal locations, and part of the 45 km highway route leading to the wharf at Mortier Bay (Marystown) where fluorspar concentrate is now being loaded onto relatively small ships for export to market. CFI has constructed a new road through the peninsula to connect to the existing public road system to avoid travel through communities as much as possible.



LEGEND

- New Access Road Route

MARINE TERMINAL SITE

- Site Footprint

AGS MINE SITE

- Road
- Proposed Upgraded Road
- Mine Dump Options
- Pit

TOPOGRAPHY

- Building
- Highway
- Existing Road
- Contour Line (interval: 50ft)
- Watercourse
- Waterbody
- Wetland

0 1 2 3 km

1:35000

REFERENCE SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC & CANVEC+, 1:50 000 SCALE, NRCAN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
PROJECT AREA

CONSULTANT
JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-29
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE 1-1

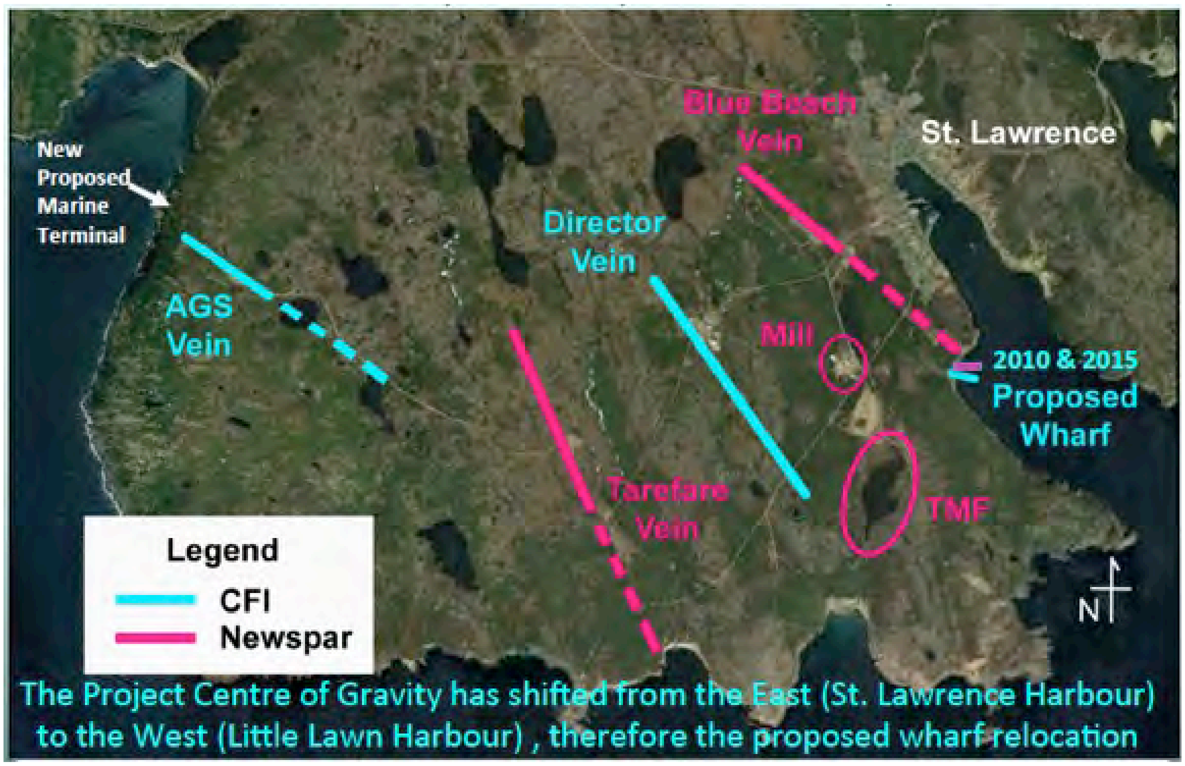


Figure 1-2: Site Location Map – Proposed Marine Terminal Locations Considered

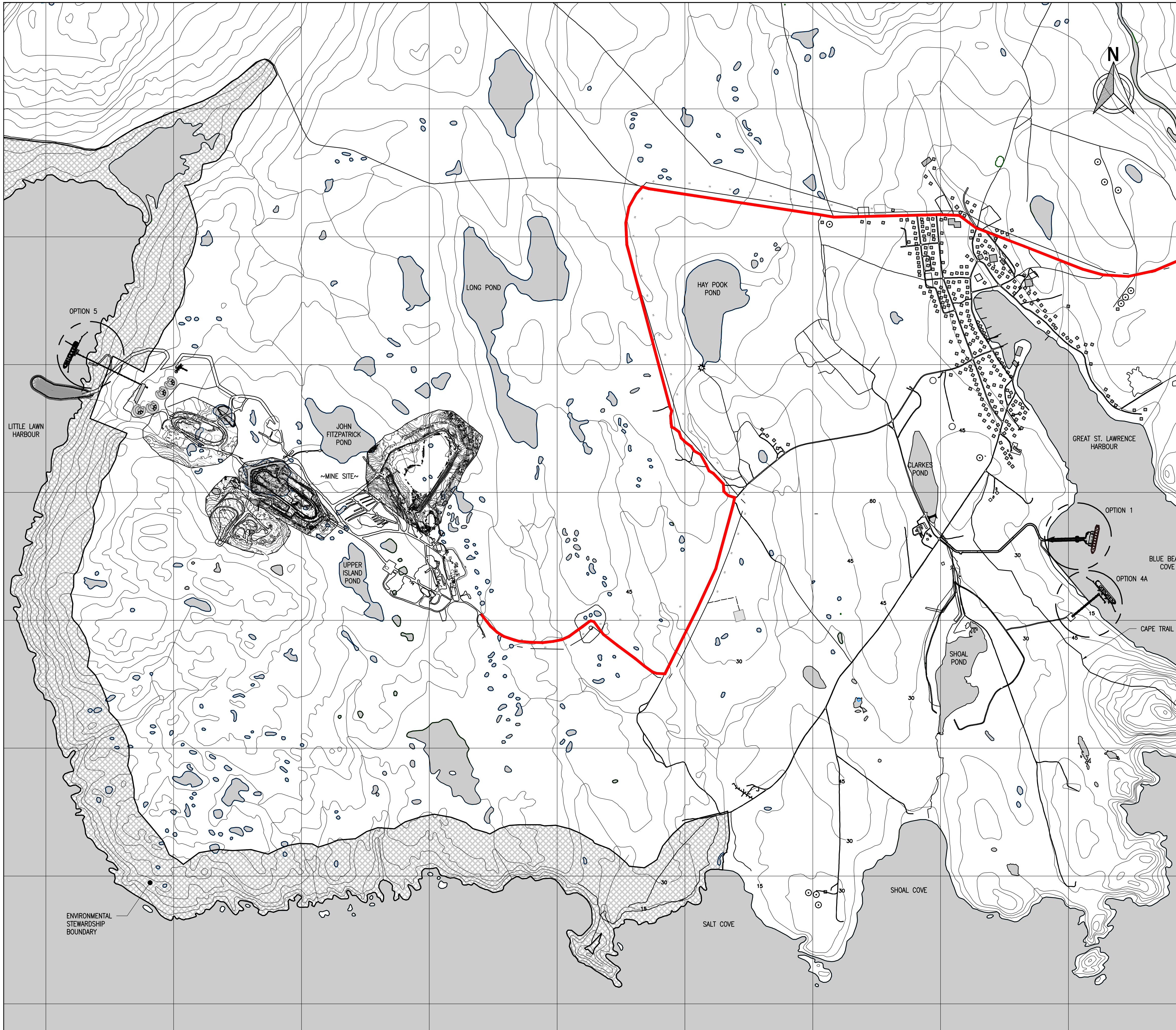
1.2.1 The Need for the Undertaking

CFI's intent has always been to construct a dedicated marine terminal in St. Lawrence to export its fluorspar concentrate. Relatively small quantities of aggregate by-product generated at the mill, known as DMS Floats, were also considered as a product to be sold, but only to the local market.

CFI's current feasibility study is now evaluating the export of its concentrate to foreign markets and larger quantities of high quality construction aggregate to North American markets: 200,000 tonnes/yr of fluorspar concentrate; and two million tonnes/yr of construction aggregate (produced mainly from crushing waste rock [meta-sedimentary and rhyolite rock], with a smaller proportion represented by DMS Floats).

The east option of the marine terminal is an uneconomical one for the AGS Mine if both products are to be exported. Accordingly, the interim solution agreed upon by DMAE was to allow CFI to truck only concentrate to Marystown and use the existing facilities there until a permanent solution could be found.

There are economic and environmental costs associated with trucking product to Marystown, and storage and ship size limitations at the Mortier Bay wharf. There are also public safety considerations due to the large number of trucks on the highway and town roads (approximately one 25-tonne truck of fluorspar concentrate each hour, every day of the year), as well as the significant carbon footprint of such an operation. The proposed Mine Cove (west) option solves this logistics issue: it significantly reduces trucking emissions, improves public safety, puts global markets within reach (i.e., enables use of larger vessels), and expands product offerings (aggregate as well as concentrate).



LEGEND

- ROAD ROUTE TO MARYSTOWN

0 600m 1200m

1 : 30000

REFERENCE SOURCE(S):

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

CFI CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE

ALTERNATIVES

CONSULTANT

JBC JEWER BAILEY CONSULTANTS
STRUCTURAL · MECHANICAL · ELECTRICAL

YYYY-MM-DD:	2019-05-28
DESIGN	MW
DRAWN	GM
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023

REV: 0

FIGURE 1-3

Therefore, CFI's proposed Project near Mine Cove is critical for:

- Reducing CFI's carbon footprint;
- Reducing safety risk and decreasing wear on transportation infrastructure;
- Increasing the reach of CFI's fluorspar sales to foreign markets;
- Marketing aggregate products to East Coast of USA, Maritimes and Eastern Canada markets;
- Prolonging AGS Mine operations by a further 10 years or more;
- Extending employment for the workforce and adding to the region's economic viability; and
- Increasing the potential of a more favourable economic basis for future operations when the AGS Mine closes.

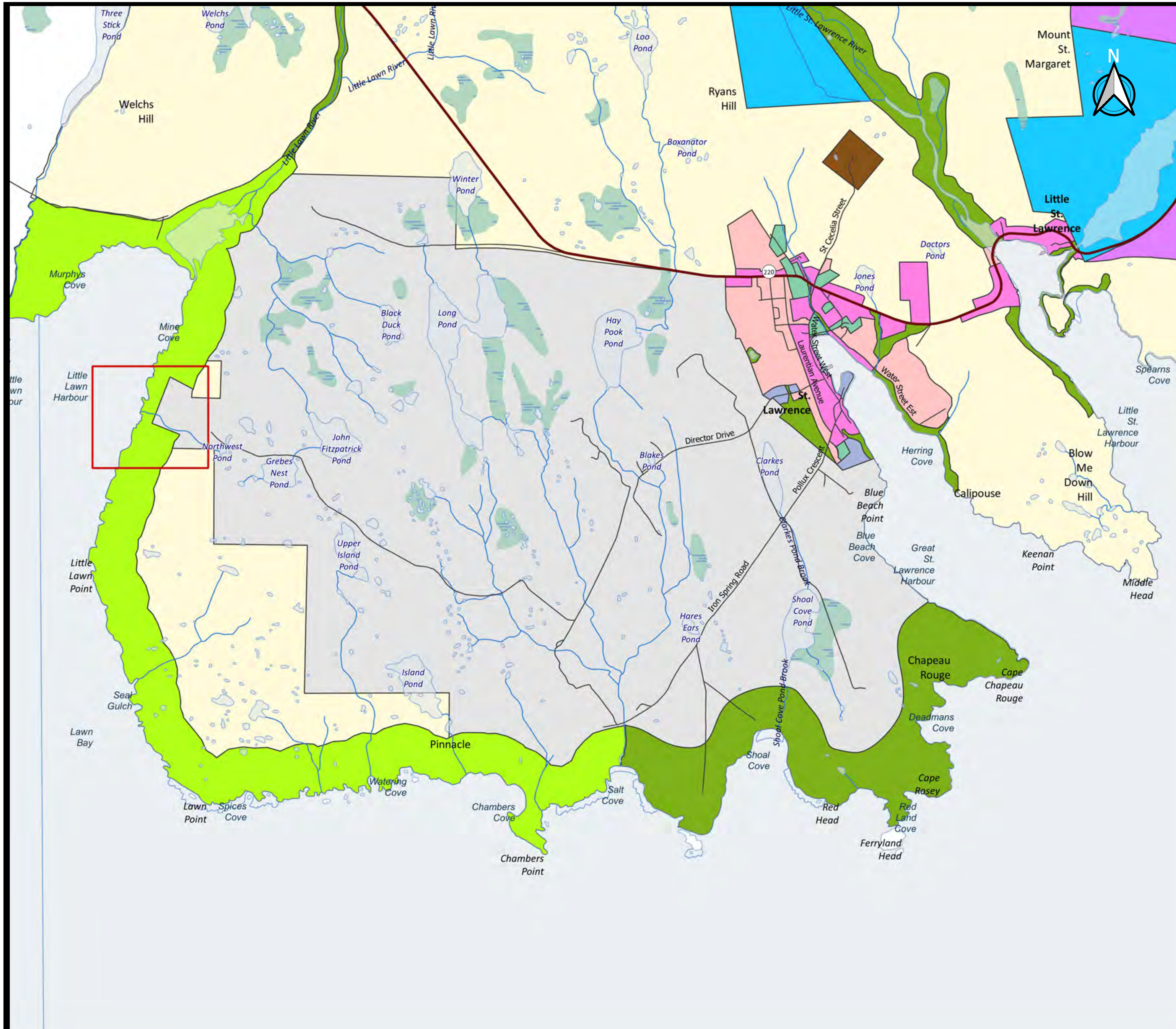
There are two approved layouts at Blue Beach Cove (referred to as the north and south layouts, see Figure 1-3); however, they are both relatively far from the existing mine and mill where the concentrate and aggregate products are made. For example, concentrate and DMS Floats (aggregate) would require hauling by truck about 6 km from the mill. Waste rock aggregate would need to be hauled even further, ~8 km from the waste rock dump. This is too far to be economical. Therefore, the east wharf option at Blue Beach Cove could only be used for exporting concentrate, which is sold at much higher cost than aggregate. That said, one drawback to the proposed west option near Mine Cove is its exposure to large south-westerly waves, which could require a costly breakwater for protection. Nevertheless, initial results of CFI's current feasibility study favour this western alternative because of its proximity to the mine.

1.2.2 Scope and Objectives

The Project's on-land footprint is located entirely within the municipal boundaries of the Town of St. Lawrence, and to the west of the community. With the exception of the Environmental Protection-Management Unit (EP-MU) zone, shown on Figure 1-4 and discussed in Section 1.4.3.1, the Project site is within an area zoned for mining and located in close proximity to the AGS mine and mill (Town of St. Lawrence *Development Regulations 2012*).

The Project includes the following primary components:

- Concentrate storage building;
- Waste rock crushing plant;
- Radial arm stockpiling system;
- Aggregate stockpiles;
- Conveyor and conveyor gallery transfer system;
- Access and haul roads;
- Wharf;
- Ship-loading system; and
- Rock-filled breakwater.



LEGEND

Marine Shipping Terminal Site

MUNICIPAL ZONING

- Residential
- Mixed Development
- Public
- Solid Waste Disposal
- Rural
- Industrial
- Mining
- Environmental Protection
- Environmental Protection Management Unit
- Watershed Conservation
- Protected Public Water Supply

TOPOGRAPHY

- Building
- Highway
- Existing Road
- Watercourse
- Waterbody
- Wetland

0 1 2 3 km

1:40000

REFERENCE

SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC+, 1:50 000 SCALE, NRCAN; GOOGLE TERRAIN.

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT

EA REGISTRATION

TITLE

ST. LAWRENCE MUNICIPAL ZONING - 2011 DEVELOPMENT REGULATIONS

CONSULTANT

JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-29
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE **1-4**

There are compelling arguments in favour of the proposed Project with respect to its location, environmental sustainability and economic benefits, including the following:

- Given the economic challenges faced by the AGS Mine associated with exporting its concentrate, CFI has been evaluating the feasibility of processing the mine's waste rock (~70% metasediment and ~30% rhyolite or granite) into aggregate for sale along North America's eastern seaboard. Not only would this enhance the mine's economic outlook, but also recycling this waste into a high-quality construction aggregate and selling it abroad would reduce the size, and may altogether eliminate, the waste rock dumps when mining ceases. Estimated at around 35 million tonnes generated during the AGS Mine life, the dump, if allowed to grow, would otherwise become a permanent and prominent feature on the landscape. A western marine terminal near Mine Cove would make this "recycling" initiative feasible. Conversely, trucking aggregate to Marystown or even Blue Beach Cove would be cost-prohibitive.
- The project provides a number of synergies with the mine and fluorspar operations, including consumption of waste rock, hauling and loading cost reductions, sharing of mine infrastructure and equipment, and sharing of management, administration and supervision.
- DMS Floats are a by-product of milling and generated in similar quantities to that of fluorspar concentrate. During the AGS Mine life, roughly two million tonnes of DMS Floats will be produced. It too has potential to be marketed as a high-quality aggregate material and could be exported together with the waste rock aggregate, further reducing the size of the waste rock dump.
- The current transport of concentrate 45 km to Marystown generates more GHG than the quantity that would be produced when hauling to a wharf near Mine Cove. Even if a wharf existed at Blue Beach Cove, 6 km from the mill, the carbon footprint tied to transporting concentrate there would be significantly greater than hauling to Mine Cove. This is in addition to the disturbance of more areas at Blue Beach Cove for storage and handling of such products.
- In addition to GHG, air emissions (from vehicle exhaust and gravel road dust) related to hauling concentrate to Marystown or Blue Beach Cove would be greater than those associated with a wharf near Mine Cove.

1.3 Background

St. Lawrence has a long mining history. The area's mineral potential was recognized in the 1840s, when a reference to fluorspar was recorded by Joseph Jukes, a renowned British geologist, who noted a small vein containing "flurate of lime". In 1928, the Black Duck vein was rediscovered and in 1933 the first producing fluorspar mine was established. With the exception of a 12-year break (1978–1989), mining continued under several different operators until 1991.

Four EAs were completed since the mid-1990s to support fluorspar mine reactivation in the St. Lawrence area (Table 1-1).

Table 1-1: List of Previous Environmental Assessments

Project	Regulatory Body	EA Process	Dates
AGS Mine	Department of Environment and Conservation (DOEC)	Provincial Environmental Preview	2015
Reactivation of the St. Lawrence Fluorspar Mine – Water Diversion Structure, Clarkes Pond, St. Lawrence	CEA Agency	Screening (amendment to the 2009–2010 federal EA)	2011–2012
Reactivation of the St. Lawrence Fluorspar Mine	DOEC and CEA Agency	Provincial Environmental Preview Report (EPR) and federal Screening	2009–2010
St. Lawrence Tailings Management Facility	DOEC	Environmental Preview Report	1995–1996

In 2010, CFI (then, Burin Minerals Ltd./Newspar) concluded a provincial and federal EA process for the proposed reactivation of two underground mines (Blue Beach North and Tarefare), and construction of associated infrastructure, all within and bordering the Town of St. Lawrence. Although that project was not developed, it included a new marine terminal at Blue Beach Cove in Great St. Lawrence Harbour (see Figure 1-2 and Figure 1-3); CFI still holds a valid permit issued by Transport Canada to construct a wharf at this location.

In 2015, CFI registered the AGS fluorspar mine development and was released later that year from the provincial EA process. Release conditions and market conditions resulted in CFI evaluating alternative strategies for developing the AGS Mine – including shipping.

Resulting from that evaluation, in 2016, CFI and the NL government agreed to allow the concentrate to be trucked to a facility at Mortier Bay (in Marystown) for loading onto marine vessels. This was an interim measure during which CFI would evaluate more economically viable options for getting its product to market.

After satisfying various release conditions and securing the required permits, development began on the AGS Mine, leading to the start of operations in August 2018 with fluorspar concentrate shipments continuing through Marystown.

CFI is now studying the feasibility of a western alternative for the needed marine terminal and associated infrastructure, near Mine Cove in Little Lawn Harbour. Currently underway are studies to evaluate the commercial feasibility of exporting aggregate (including conceptual and preliminary engineering design of the marine terminal), and environmental and socio-economic baseline conditions. Preparation of the EA documentation, including this RD/PD, has been informed by a program of stakeholder engagement through public consultations, meetings with federal and provincial regulatory staff, and discussions with the St. Lawrence Town Council and other local and regional stakeholders.

In the past, authorizations and approvals were issued by federal agencies to CFI and its predecessors (Burin Minerals Limited [BML] and Newspar). Still valid today, these include the following:

- *Fisheries Act* authorization: authorization issued by DFO in 1997 and Fish Habitat Compensation Agreement signed to ensure no net loss of fish habitat of Shoal Cove Pond, Shoal Cove Brook and Clarkes Pond Brook;
- *Navigable Waters Protection Act* approval (Transport Canada), issued in 2012 for the cut-off wall at Clarkes Pond; and
- *Navigation Protection Act* approval: approval for the marine terminal (at Blue Beach Cove) issued by Transport Canada in 2012 under the *Navigable Waters Protection Act* and reissued in 2015 under the *Navigation Protection Act*.

1.3.1 Preliminary Consultation with Regulatory and Public Stakeholders

CFI's public participant list includes potentially affected and/or interested stakeholders from several groups including municipalities, regulatory agencies (both provincial and federal), economic development agencies, education and training institutes, and environmental and recreation associations, NGOs and special interest groups.

Several meetings/discussions have taken place between CFI and St. Lawrence Town Council, other municipalities and regulatory agencies, and NGOs to provide an update on the Project, discuss the EA process and answer questions. In addition, a public information session was held during preparation of this RD/PD. Details of public consultations and issues raised by the public and government departments are presented in Section 5.0.

There are no designated Indigenous lands in the St. Lawrence region and Project activities are not likely to affect Indigenous or First Nations groups within the province. However, five Indigenous groups with fishing licences that enable access to Placentia Bay have been contacted about the Project and invited to review the information provided and reminded of the opportunity to comment during the public review period for the RD/PD. Most have indicated that they will review the information, even if their actual activity in Placentia Bay or Little Lawn Harbour is unlikely.

The existing environmental setting of the Project is presented in Section 6.0, which includes the environmental or socio-economic elements that were considered when determining likely effects that could occur as a result of the Project. The environmental baseline, describing the existing environment and socio-economic elements considered in the previous AGS Mine EA are updated here, and new additional baseline studies as related to the Project have been completed or are currently underway. This information will be the basis for determining potential environmental and socio-economic effects associated with the Project.

Information from the following sources was obtained/reviewed and used to describe the existing environment:

- Publicly available topographic and resource maps, aerial imagery, databases, scientific papers, technical reports, government websites, interactive websites, information letters, and fact sheets;
- Project-specific field investigations (bathymetry, geotechnical, fish and fish habitat surveys, and Met-Ocean investigation);

- Previous environmental applications prepared for the proposed reactivation of the Blue Beach North/Tarefare Mines and the development of the new AGS Mine;
- Environmental applications prepared for other projects in the area; and
- Communication with local land users; communities; representatives from local and regional governments; municipal, provincial and federal regulators; the general public; etc.

In addition to the above, an ELC was completed to describe the vegetation and wildlife habitat at the local level, and biophysical field surveys were conducted to compliment available information. The results of these surveys are included in this RD/PD to the extent that they were available (together with meaningful analysis and interpretation) during the document's preparation.

The timing, scheduling, and coordination of field surveys conducted to date, and those to be completed in support of detailed Project planning and other approvals, is subject to certain limitations and considerations, including: preferred and optimal season and timing window for various surveys (e.g., fish and fish habitat assessment); and weather.

A scoping exercise is being undertaken to confirm an appropriate list of VCs upon which to focus the environmental and socio-economic assessment. VCs were established based on government guidance, consultation with stakeholders, and understanding of the proposed Project. Following this process, the following VCs were considered for analysis:

- Marine Environment (Fish and Fish Habitat, Marine Mammals and Species at Risk);
- Physical Environment (Soil and Geology);
- Met-Ocean Environment (Site-specific);
- Atmospheric Environment (Climate, Air and Noise);
- Water Resources (Surface Water and Freshwater Fish and Fish Habitat);
- Terrestrial Environment (Vegetation Communities and Habitat Types, Avifauna, Wetlands and Species at Risk);
- Wildlife (Birds [Coastal and Marine] and Species at Risk); and
- Socio-economic Environment (Health and Safety; Economy, Employment and Business; Community Services and Infrastructure; and Commercial, Recreational and Indigenous fisheries.

1.4 Approval of the Undertaking – Regulatory Framework

CFI will require approvals and permits from federal, provincial, and municipal governments for all stages of the proposed Project. The anticipated regulatory framework for the EA process is described in the following sections. Following conclusion of the EA process, specific permits and approvals will be obtained from federal, provincial and municipal governments, as appropriate. A preliminary list of the anticipated permit requirements from each level of government is provided in the following subsections.

1.4.1 Federal Approval

Federal EAs are regulated under the *Canadian Environmental Assessment Act (*CEAA 2012*)*. Submission of a PD to the CEA Agency is required for all projects designated in the *Regulations Designating Physical Activities*. Upon review of the designated activities and through discussions with the CEA Agency, it was determined that the St. Lawrence Fluorspar Marine Shipping Terminal Project is considered a "designated physical activity" under Section 24(C) of the regulations and will therefore be subject to the CEAA process.

Federal approvals and authorizations that may be required are outlined in Table 1-2.

Table 1-2: Potentially Applicable Federal Permits, Approvals and Authorizations

Agency	Permit, Authorization, Approval	Act/Regulation
Transport Canada	Transportation of Dangerous Goods – Explosives	*Canada Transportation Act*
	Approval for the marine terminal	*Navigation Protection Act*
Natural Resources Canada	Magazine Licence Application	*Explosives Act* (obtained as part of the AGS mine project)
	Application for Permit to Transport using a Flatbed Trailer	*Explosives Act* (obtained as part of the AGS mine project)
	Application for Authorization of Explosives	*Explosives Act* (obtained as part of the AGS mine project)
Fisheries and Oceans Canada	Request for Project Review	*Fisheries Act*
	Application for Authorization	*Fisheries Act*
Environment Canada	Compliance with *Canadian Environmental Act*	*Canadian Environmental Act*
	Compliance with the *Wastewater Systems Effluent Regulations*	*Fisheries Act*
Canadian Wildlife Service	Scientific Permit	*Migratory Birds Convention Act*
Industry Canada	Communications Licence	*Radio Communication Act* (obtained as part of the AGS mine project)
	Radio Station Licence	

1.4.2 Provincial Process

In accordance with the NL *Environmental Assessment Regulations*, *2003* the Project must be registered pursuant to the NL EPA, since it involves the construction of a breakwater structure where the breakwater will be more than 100 m in length in addition to other land-based activities.

The EA process for the Project is initiated via submission of a RD to the EA Division of the NL DMAE, who administers the process by:

- Consulting with interested government departments and receiving public comments during the review process;
- Reviewing and evaluating submissions by proponents and reviewers;
- Advising the Minister of potential environmental effects prior to decisions; and
- Monitoring released projects to ensure compliance and effectiveness of mitigation.

Following submission of a RD by the proponent, DMAE circulates the document to other government agencies and posts it on their website for a 35-day government and public review period. At the conclusion of this period, the Minister advises the proponent, within 45 days following EA registration, whether the undertaking is released from the EA process, or whether more information is required, either through an EPR or Environmental Impact Statement (EIS). Once the provincial EA process is completed, provincial permits and approvals must be secured for all activities associated with the project from site preparation to closure.

While CFI has several provincial approvals in place for mining the AGS vein, these approvals do not apply to the proposed marine terminal Project. Specific permits, approvals, and authorizations and will need to be acquired and management plans approved following EA release of the Project, including:

- Certificate of Approval (COA) for construction and operation;
- Environmental Protection Plan (EPP) (update to AGS Mine's existing plan);
- Environmental Effects Monitoring (EEM) (update to AGS Mine's existing plan);
- Gender Equity and Diversity Plan (update to AGS Mine's existing plan);
- Rehabilitation and Closure Plan (update to the existing plan); and
- Other provincial permits and approvals that may be required prior to start of construction are listed in Table 1-3.

Table 1-3: Potentially Applicable Provincial Permits and Approvals

Agency	Permit, Authorization, Approval	Applicable Act/Regulations
DMAE – Water Resources Division	Alteration to a Body of Water	*Water Resources Act*
	Application for Permit for Constructing a Non-Domestic Well	*Water Resources Act*
	Water and Sewage Works	*Water Resources Act*
	Application for Water Use Licence	*Water Resources Act*
DMAE – Pollution Prevention Division	Certificates of Approval for Construction and Operation	*Environmental Protection Act*
	Certificate of Approval –Waste Disposal Facility	*Environmental Protection Act*
Department of Fisheries and Land Resources (DFLR) – Wildlife Division	Permit to Destroy Animal Problems	*Wildlife Act*
	Compliance Standard	*Endangered Species Act*
DFLR – Forestry Services Branch	Commercial Cutting/Operating Permit	*Forestry Act*
	Burning Permit	*Forestry Act*
	License to Occupy Crown Lands	*Crown Lands Act*
Department of Natural Resources (DNR) – Mineral Lands Division	Approval for Development Plan, Closure Plan and Financial Assurance	*Mining Act*
DNR – Mineral Lands Division	Surface Lease	*Mining Act*
	Mining Lease	*Mining Act*
	Quarry Permit	*Quarry Materials Act*
Service NL	Certificate of Approval- Storage and Handling of Gasoline and Associated Products	*Environmental Protection Act*
	Permit for Flammable and Combustible Liquid Storing and Dispensing (Above or Below Ground) and for Bulk Storage (Above Ground Only)	*Environmental Protection Act*
	Storage Tank System	*Environmental Protection Act*

Agency	Permit, Authorization, Approval	Applicable Act/Regulations
	Building Accessibility Exemption	*Buildings Accessibility Act*
	Statutory Declaration for Registration of Boiler and Pressure Vessel Fittings Fabricated in NL	*Public Safety Act*
	Certificate of Plant Registration for Power, Heat, Refrigeration, Compressed Gas or Combined Plant	*Public Safety Act*
	Contractor's Licence- Pressure Piping System	*Public Safety Act*
	Examination and Certification of Propane System Installers	*Public Safety Act*
	Compliance Standard- Storing, Handling and Transporting Dangerous Goods	*Dangerous Goods Transportation Act*
	Compliance Standard- Occupational Health and Safety	*Occupational Health and Safety Regulations*
Department of Tourism, Culture, Industry and Innovation (TCII)	Compliance Standard- *Historic Resources Act*	*Historic Resources Act*

1.4.3 Municipal

The Project is located within the municipal boundaries of the Town of St. Lawrence and as such will abide by all the bylaws and regulations of the town. The Project site is within land use zones reserved for mining, as outlined in the Town of St. Lawrence Municipal Plan (Town of St. Lawrence 2012).

The potential municipal approval required for the Project is a Development Permit for Site Development—Quarry and Soil Removal. In addition, CFI will comply with the following municipal regulations, and any other applicable bylaws and regulations:

- Schedule C – Mixed Development Zone – Town of St. Lawrence *Development Regulations 2012*;
- Schedule C – Mining – Town of St. Lawrence *Development Regulations 2012*; and
- Municipal/Provincial Stewardship Agreement.

1.4.3.1 Municipal Habitat Stewardship Agreement

On 8 October 2013 the Town of St. Lawrence entered into a ***Municipal Habitat Stewardship Agreement*** with the NL government as part of the provincial Wildlife Habitat Stewardship Program. This program represents NL's primary contribution to the Eastern Habitat Joint Venture (EHJV) as one of its provincial partners. By signing, municipalities commit to good stewardship of their natural resources. Through this partnership EHJV resources are made available to develop a conservation plan for wetlands, to assist in restoration of degraded wetlands, to provide for educational opportunities, and to promote local resident participation in resource use and protection.

Through this Agreement, the Town has set aside 1542 acres of coastline to conserve within an area defined as the Town's "EP-MU Zone". According to the *Town of St. Lawrence Development Regulations 2012*, all development in this zone is subject to the approval of the DFLR, Wildlife Division. Part of the proposed Project footprint crosses this zone, which extends roughly 100–150 m inland from the shoreline. The Town of St. Lawrence supports CFI's proposal to build a western marine terminal near Mine Cove.

Accordingly, on 20 March 2019, the Town formally requested that DFLR amend the Agreement to accommodate the Project by allowing an easement of ~750 m in the boundary as shown in the Municipal Zoning Plan. In return, CFI has agreed to significantly increase the area of the EP-MU by extending it from Salt Cove to Cape Chapeau Rouge over their Mineral License area (see Figure 1-4).

CFI understands that DFLR has responded to the Town, indicating that an amendment at this time is premature as the Project is currently undergoing an EA.

1.5 Project Schedule

CFI anticipates starting the construction phase of the Project in 2020. The Project will be undertaken in four specific phases (Figure 1-5):

- Pre-construction: ongoing;
- Construction: Q1 2020 (pending regulatory approvals) to Q1–Q2 2021 (estimated construction period of 14 months);
- Operations: 2021–2040 (estimated Project life of 18–19 years, with aggregate production); and
- Rehabilitation and Closure: 2040 (estimated 1–2 years).

Figure 1-5: Project Schedule

The pre-construction phase is currently ongoing and includes various activities such as baseline investigations/studies, engineering and feasibility studies, EA process and regulatory permitting. CFI's objective is to initiate onshore construction activities in early 2020, contingent on receipt of all required regulatory approvals, permits, and authorizations. The construction phase is expected to last ~14 months and will be followed by an operation phase projected to last 18–19 years. The length of the operation phase is based on the current resource estimate, aggregate production/export, and may be lengthened should additional resources be identified in the AGS Vein and/or extended to underground mining. A high-level Project schedule is shown in Figure 1-5. See also Section 2.7 for more details.

1.6 Other Relevant Information – Regional Projects

As described previously, the currently operating AGS Mine has undergone EA and was released in 2015 from the provincial EA process. A marine terminal at Blue Beach Cove has been approved. The AGS mine and mill has been in operation since August 2018.

A number of other projects have also undergone environmental studies and assessments in the region, including the following:

- Newfoundland and Labrador Refining Corporation (NLRC) – NL Refinery Project EIS (2007). This greenfield crude oil refinery with capacity of 300,000 Barrels/Day, was to be located at the head of Placentia Bay, NL, and had undergone full provincial environmental and socio-economic impact assessment and federal (CEA Agency) Comprehensive Study. The EA process concluded in 2009. Economic conditions have not supported construction of the refinery.
- Grieg NL Placentia Bay Aquaculture Project, 2018: a major hatchery and open-pen salmon aquaculture project for five sites within Placentia Bay was assessed and released from the provincial EA process in 2018. Construction of the hatchery and final siting of the cage locations have commenced.
- Long Harbour Nickel Processing Plant: owned and operated by Vale Limited, the plant is a nickel concentrate processing facility located in Long Harbour, Placentia Bay, with a marine shipping terminal to receive raw material and export finished product. The construction on the plant started in April 2009 and operations began in 2014. Construction costs were in excess of CAD $4.25 billion. Construction involved over 3200 workers generating ~3000 person-years of employment. Operation of the plant requires ~475 workers at peak production. Production began in 2014, with its first major shipment from Vale’s Labrador mine in Voisey's Bay in May 2015. Using hydrometallurgical processing technology, the plant is designed to produce 50,000 tonnes per year of finished nickel product, together with associated cobalt and copper products.
- Whiffen Head Crude Oil Transshipment Terminal - Hebron Expansion Project (2014): Owned and operated by Newfoundland Transshipment Limited. This project was assessed and released in April 2014. Baseline environmental and socio-economic baseline studies were carried out with a focus on marine safety and commercial fisheries. Operations are underway.
- Grassy Point (Placentia Bay) Liquefied Natural Gas (LNG) Transshipment Terminal: Proponent: Newfoundland LNG Ltd. The LNG Transshipment Terminal was to be located near the head of Placentia Bay at Grassy Point, Arnold ’s Cove. The transshipment terminal was to provide storage and offloading for larger LNG vessels for transfer to smaller LNG carriers for distribution to Northeastern US and Canada. The undertaking was registered November 2006 and was released in January 2007. Economic conditions have not supported construction of the facility.

2.0 PROJECT DESCRIPTION

This section defines the Project components and activities, including construction, operation, rehabilitation and closure.

2.1 Project Location

The proposed Project is located near Mine Cove in Little Lawn Harbour at the western boundary of CFI's mining lease in close proximity to the AGS fluorspar vein that is currently being mined. The geographic coordinates are approximately 46°55' N 55° 29' W. The on-land Project footprint is located entirely within the municipal boundaries of the Town of St. Lawrence, on the southern tip of the Burin Peninsula in the Province of NL (Figure 2-1). The Project is ~350 km by road from St. John's, Newfoundland, and next to the community of St. Lawrence. Access to the Project site is by Provincial Highway 220 to St. Lawrence, followed by ~8 km of gravel road to the AGS Mine site. The Project is west of the St. Lawrence Harbour, which is ice-free year-round.

The coastline located in the study area consists of a number of bold headlands, bordering open coves to the west of St. Lawrence Harbour. Prominent natural features include, from west to east, Little Lawn Harbour, Lawn Point, Chamber Cove, Salt Cove, Hares Ears, Shoal Cove, Red Head, Ferryland Head, Deadmans Cove and Cape Chapeau Rouge (Figure 2-2). This is a rugged shoreline that is open to the sea (BML 2009).

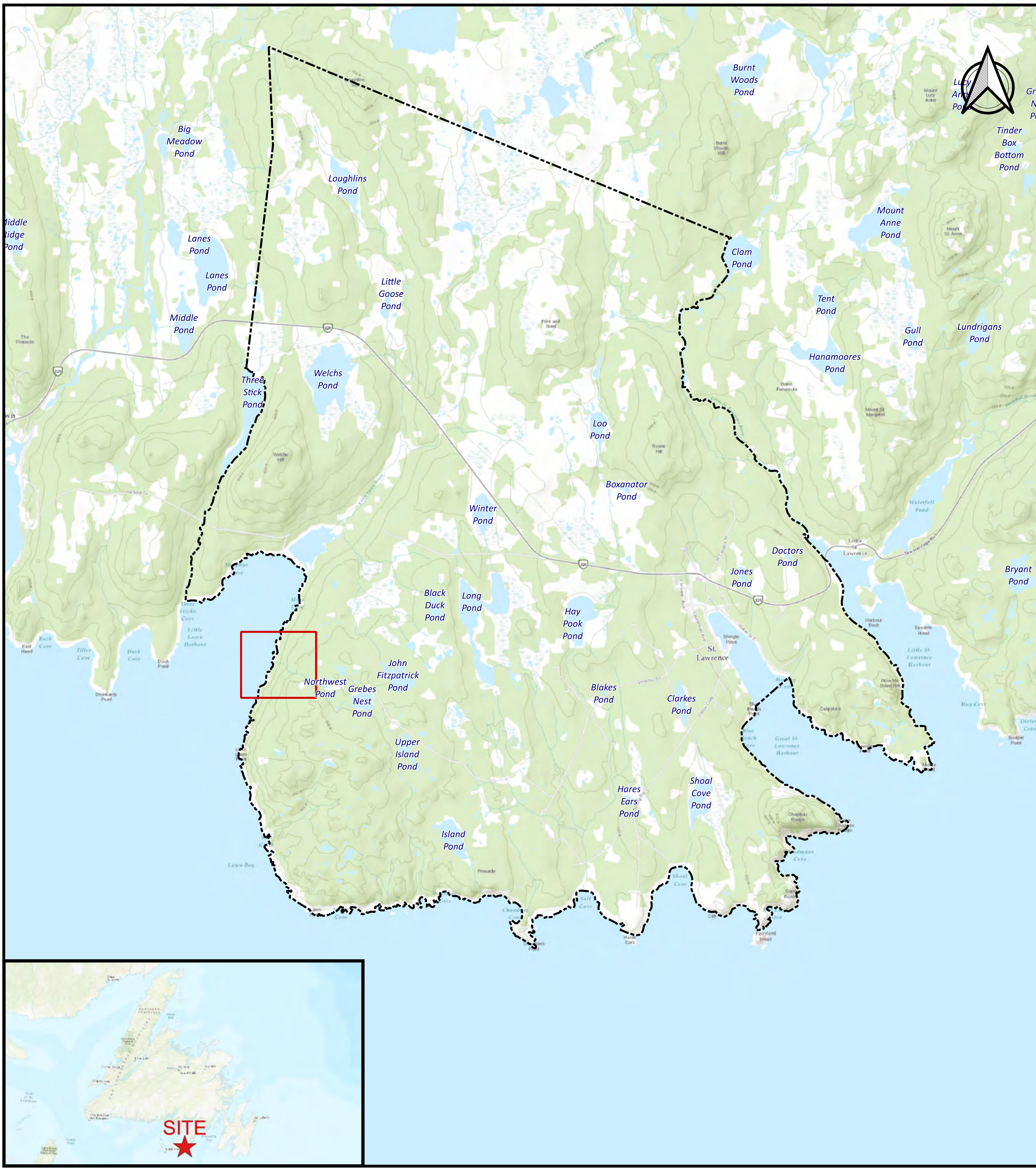
Little Lawn Harbour, within which the Project's breakwater and wharf will be situated, is an inlet, which receives freshwater from Lawn River.

2.1.1 Land Use Zoning

Most of the proposed on-land infrastructure of the Project is located in an area designated for mining as per the 2013 Development Regulations for St. Lawrence (see Figure 1-4). CFI has confirmed through exploratory drilling activities that there are no mineral resources within the Project footprint. The marine infrastructure, however, is adjacent to but outside the municipal boundaries of the Town of St. Lawrence. The portion of the Project area located within the marine environment and outside of the Town's municipal boundaries will require a water lot lease.

The on-land portion of the Project footprint rests on land that is currently zoned as Mining and EP-MU (see Figure 1-4) as per the Town of St. Lawrence's *Development Regulations 2012*.

The Mining designation is applied to CFI's lands and facilities associated with the mining, processing and transhipment of fluorspar, along with other compatible activities. As other areas are to be developed for mining and mining related activities, then these also shall be designated and zoned Mining. All development in this designation is subject to the approval of the Town along with the DNR, and where applicable, the DFLR, and other relevant authorities. Permitted uses in this designation are Antenna, Conservation, General Industry, Hazardous Industry, Light Industry, Mineral Exploration, Mineral Working, Mining, Office and Transportation. Discretionary uses in this designation are General Industry, Light Industry, Recreational Open Space, and Utilities.



LEGEND

Municipal Boundary

Project Location

0 1 2 3 4 km

1:65000

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT EA REGISTRATION

TITLE

PROJECT LOCATION AND TOWN OF ST. LAWRENCE MUNICIPAL BOUNDARY

CONSULTANT

JEWER BAILEY CONSULTANTS

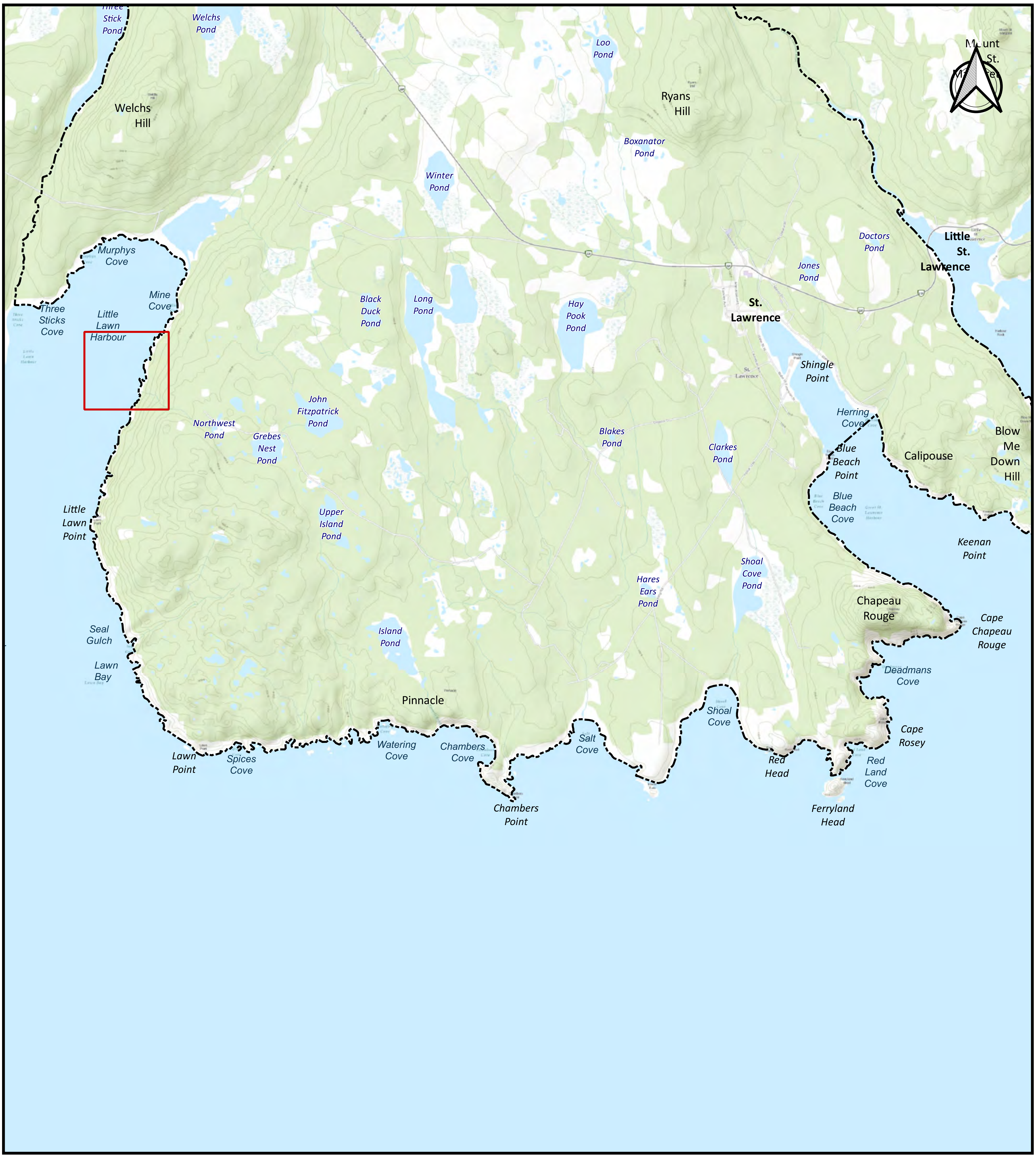
YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023

REV: 0

FIGURE **2-1**

REFERENCE SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC+, 1:50 000 SCALE, NRCAN; ESRI TOPOGRAPHY.
PROJECTION: NAD 83 MTM ZONE 2.



LEGEND

Municipal Boundary

Project Location

0 1 2 km

1:45000

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT EA REGISTRATION

TITLE

PROJECT LOCATION AND COASTAL NAMES

CONSULTANT

YYYY-MM-DD:	2019-05-31
DESIGN	MW
GIS	
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023

REV: 0

FIGURE **2-2**

REFERENCE SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC+, 1:50 000 SCALE, NRCAN; ESRI TOPOGRAPHY.
PROJECTION: NAD 83 MTM ZONE 2.

The EP-MU designation is applied to areas where it is deemed necessary to achieve a very high level of protection against development in order to protect environmentally sensitive areas and in particular areas which are deemed to have significance for the conservation of certain animal and plant species as set out under the Municipal Habitat Stewardship Agreement and in accordance with a Habitat Management Plan that is developed by the Town and the Minister of Fisheries and Land Resources. DFLR, Wildlife Division, shall approve development in this designation. The only use permitted under this designation is Conservation. The only discretionary use permitted under this designation is Recreational Open Space.

With respect to the EP-MU zone, the Town of St. Lawrence has on 20 March 2019 requested DFLR to amend the Municipal Habitat Stewardship Agreement to allow CFI to develop its Project infrastructure within a 750 m-long portion of the protected area. DFLR indicated that an amendment to the Agreement is premature at this time, as the proposed Project is currently undergoing an EA.

2.1.2 Land Title

CFI holds a number of mine leases, surface leases, and mineral licenses within the municipal boundaries of the Town of St. Lawrence. These are listed in Tables 2-1 and 2-2 and shown on Figure 2-3.

Table 2-1: Mine and Surface Leases Belonging to CFI

Location	ID	Ownership	Area (ha)	Due Date	Validity Period (years)	Expiry Date
Mine Leases						
Tarefare	213	CFI	185.5081	27/05/2012	25	27/05/2037
Blue Beach	214	CFI	106.2397	27/05/2012	25	27/05/2037
Grebes Nest	150	CFI	5.4866	01/08/1997	25	01/08/2022
Director	212	CFI	177.9326	05/05/2012	25	05/05/2037
AGS	236	CFI	107.9555	01/04/2016	10	01/04/2026
Surface Leases						
Tarefare	130	CFI	153.2161	27/03/2012	25	27/03/2037
Blue Beach	131	CFI	95.9658	27/03/2012	25	27/03/2037
Mill Site	E-11024 Parcel B	CFI	20.0074	13/08/2097	50	13/08/2047
TMF (SCP)	133	CFI	97.0978	05/03/2012	25	05/03/2037
Grebes Nest	127	CFI	5.4875	01/03/2012	10	01/03/2022
Director	126	CFI	167.8562	05/03/2012	25	05/03/2037
BB Wharf WL	128	CFI	16.24	05/03/2012	25	05/03/2037
BB Wharf OS	129	CFI	18.28	05/03/2012	25	05/03/2037
AGS	148	CFI	433.1408	01/04/2016	10	01/04/2026
Haul Road 1	149	CFI	8.7218	01/04/2016	10	01/04/2026
Haul Road 2	150	CFI	10.8579	01/04/2016	10	01/04/2026
Haul Road 3	151	CFI	6.6705	01/04/2016	10	01/04/2026
By-Pass Road 1	153	CFI	15.6186	01/04/2016	10	01/04/2026
By-Pass Road 2	154	CFI	4.5647	01/04/2016	10	01/04/2026
By-Pass Road 3	155	CFI	7.2391	01/04/2016	10	01/04/2026
John Fitzpatrick Pond	152	CFI	59.8491	01/04/2016	10	01/04/2026
Blue Beach Surface	158	CFI	50.4357	01/04/2019	7	01/04/2026
Blue Beach Water Lot	159	CFI	24.7639	01/04/2019	7	01/04/2026
Explosives Road	161	CFI	13.0917	01/04/2019	7	01/04/2026

Table 2-2: Mineral Licences Belonging to CFI

License No.	No. Claims	Area (ha)	NTS Map Sheet	Issuance Date
018023M	8	200	01L/14	21/10/2010
022721M	27	675	01L/14	19/02/2017
024837M	47	1175	01L/14	09/12/2010
023139M	81	2025	01L/14	18/05/1995
023140M	37	925	01L/14	18/05/1995
021055M[1]	27	675	01L/14	19/02/2007
021479M[1]	19	475	01L/14	11/01/2010
022121M[1]	11	275	01L/14	20/02/2007

Note:
1 Option Agreement with Newfoundland Fluorspar Exploration Ltd.

CFI's interest in the land does not include the Reservation of Shoreline along the eastern shore of Little Lawn Harbour. CFI will also need to apply to DFLR (Lands Branch) to secure rights to develop and use this area as part of the Project's infrastructure and activities.

Likewise, CFI will need to apply to DFLR to lease the waterlot within which will be situated the Project's breakwater and wharf.

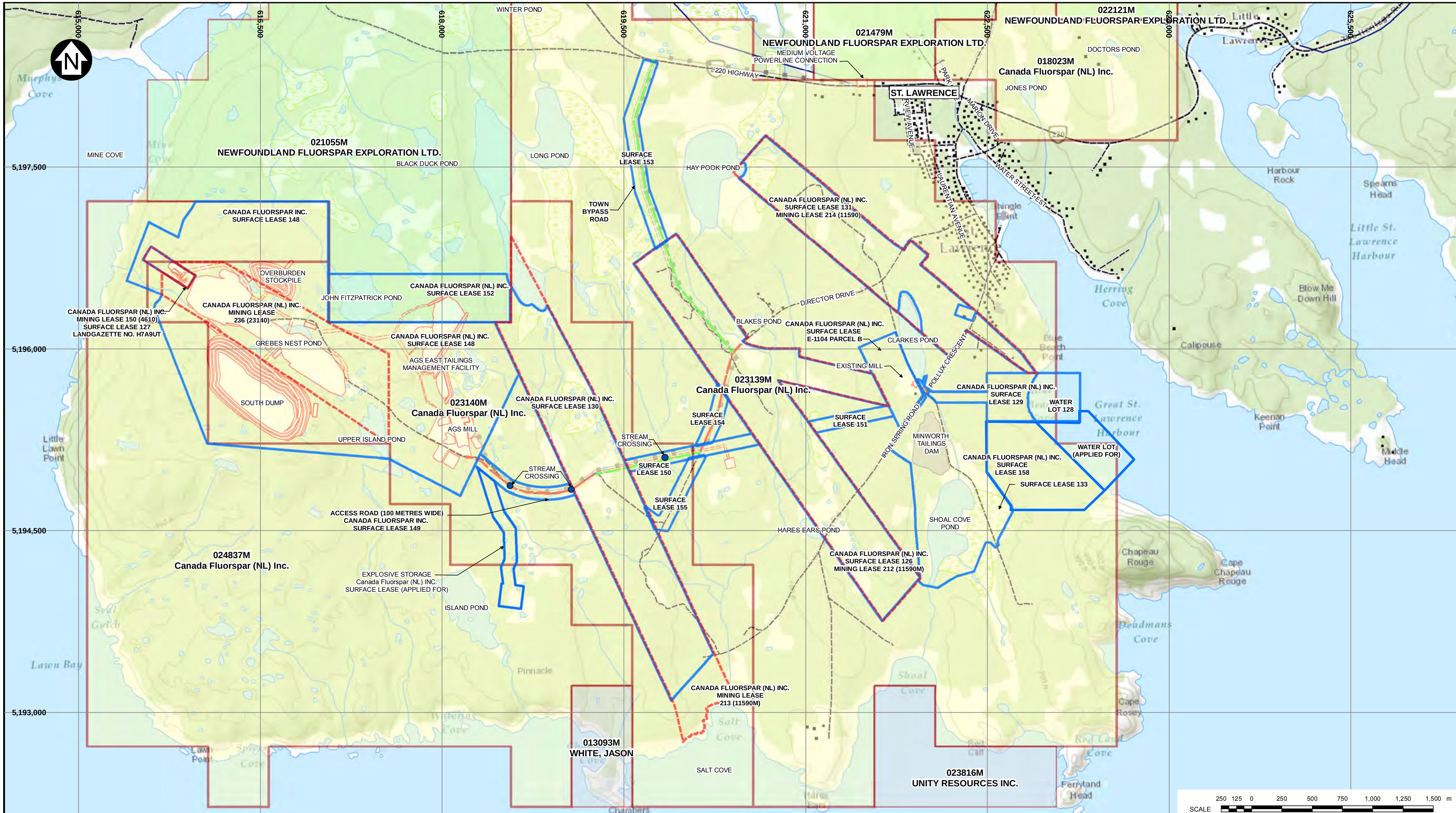
2.2 Project Components

The main physical features proposed for the Project are shown on Figure 2-4. These Project components are listed below, and described in the following subsections:

- Concentrate storage building;
- Access and haul roads;
- Potential slurry pipeline;
- Aggregate processing, stockpiling, and handling area;
- Water management facilities and general site drainage;
- Concentrate/aggregate conveyor transfer system;
- wharf; and
- Breakwater.

2.2.1 Aggregate Processing/Stockpiling and Concentrate Storage Building

A concentrate storage building will be constructed at the aggregate processing/stockpiling area, shown on Figure 2-4. The preferred location for this is near the AGS Mine, within proximity of the waste rock dump. Alternative locations in the general area were reviewed by CFI, and this area was selected to minimize interference with other mining activities and enhance logistics of the material handling operation. The decision to site and orient the concentrate storage building was also made to optimize material handling during ship loading.



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LEGEND:

- EXISTING BUILDINGS
- STREAM CROSSING
- EXISTING ROAD
- PROPOSED TOWN BY-PASS ROAD
- PROPOSED POWERLINE
- UPGRADED ACCESS ROAD
- TOWN BY-PASS ROAD
- PROPOSED INFRASTRUCTURE
- WATER
- WETLAND
- STAKED CLAIMS - CANADA FLUORSPAR (NL) INC.
- STAKED CLAIMS - NEWFOUNDLAND FLUORSPAR EXPLORATION LTD.
- STAKED CLAIMS - OTHER
- MINING LEASES (OWNED OR APPLIED)
- SURFACE LEASES (OWNER OR APPLIED)

NOTES:

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 21N.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009). ALL RIGHTS RESERVED.
3. CONTOUR INTERVAL IS 20 METRES.
4. PLAN BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 2, 2015. PLANT SITE, PORT LOCATIONS, PROPOSED ROADS BASED ON INFORMATION PROVIDED BY LYCOPODIUM, DECEMBER 30, 2015. DUMPS AND PITS BASED ON INFORMATION PROVIDED BY AGP JANUARY 15, 2016.
5. GEOSCIENCE ATLAS ONLINE 2016, DEPARTMENT OF NATURAL RESOURCES (GEOATLAS.GOVNL.CA).
6. SURFACE LEASE BOUNDARIES PROVIDED BY CANADA FLUORSPAR (NL) INC., MARCH 30, 2016.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
1	04MAR'19	ADDED EXISTING MILL S.L. LABEL	JAM	CJV	SRA
0	01MAR'19	ISSUED WITH TRANSMITTAL (NB19-00171)	JAM	CJV	SRA

CANADA FLUORSPAR (NL) INC.

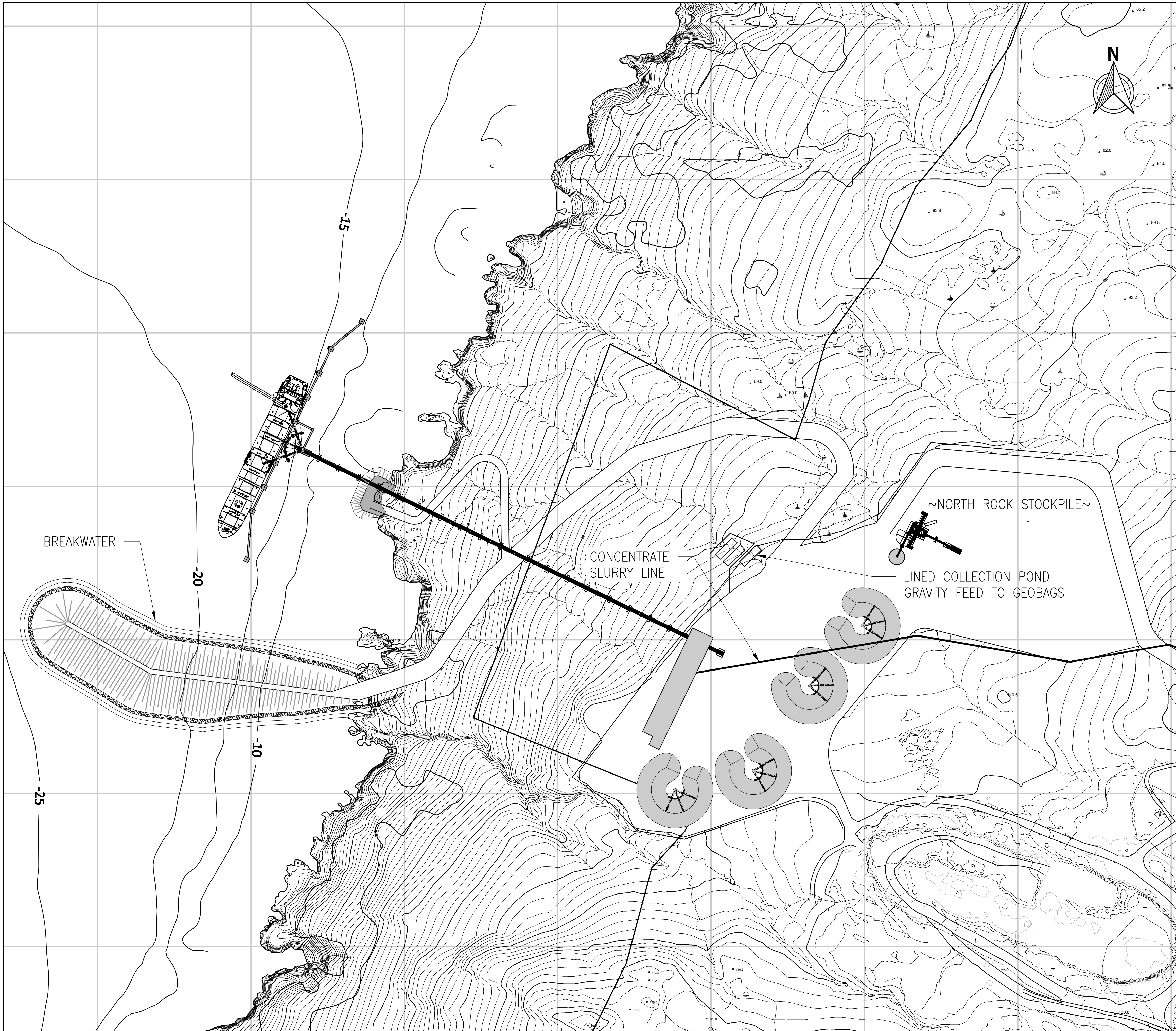
ST. LAWRENCE FLUORSPAR PROJECT

LAND TENURE

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-642/26	NB19-00177

FIGURE 1 REV 1



LEGEND

- AGGREGATE CRUSHING PLANT
- AGGREGATE STOCK PILE
- CONCENTRATE STORAGE BUILDING

0 100m 200m

1 : 5000

REFERENCE SOURCE(S):

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE

PROJECT SITE PLAN

CONSULTANT

JEWER BAILEY CONSULTANTS
STRUCTURAL · MECHANICAL · ELECTRICAL

YYYY-MM-DD:	2019-05-28
DESIGN	MW
DRAWN	GM
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE 2-4

2.2.2 Access and Haul Roads

The existing road linking the mill to the port site was constructed during exploration of the AGS fluorspar vein. The existing road terminates ~400 m from the high water mark. This road will be extended to provide access to the berth, breakwater, concentrate storage building, and aggregate production area. CFI is currently evaluating whether to transport fluorspar concentrate from the mill to the storage building by truck (as filtercake) or by pipeline (as slurry). The proposed routes for both options are shown on Figure 2-5.

Also shown on Figure 2-5 is an access road that leads from the aggregate stockpile/concentrate building area to the breakwater and berth that will be built as part of this project. This road will support breakwater, wharf, and conveyor construction, and allow access for maintenance during operations.

2.2.3 Water Management

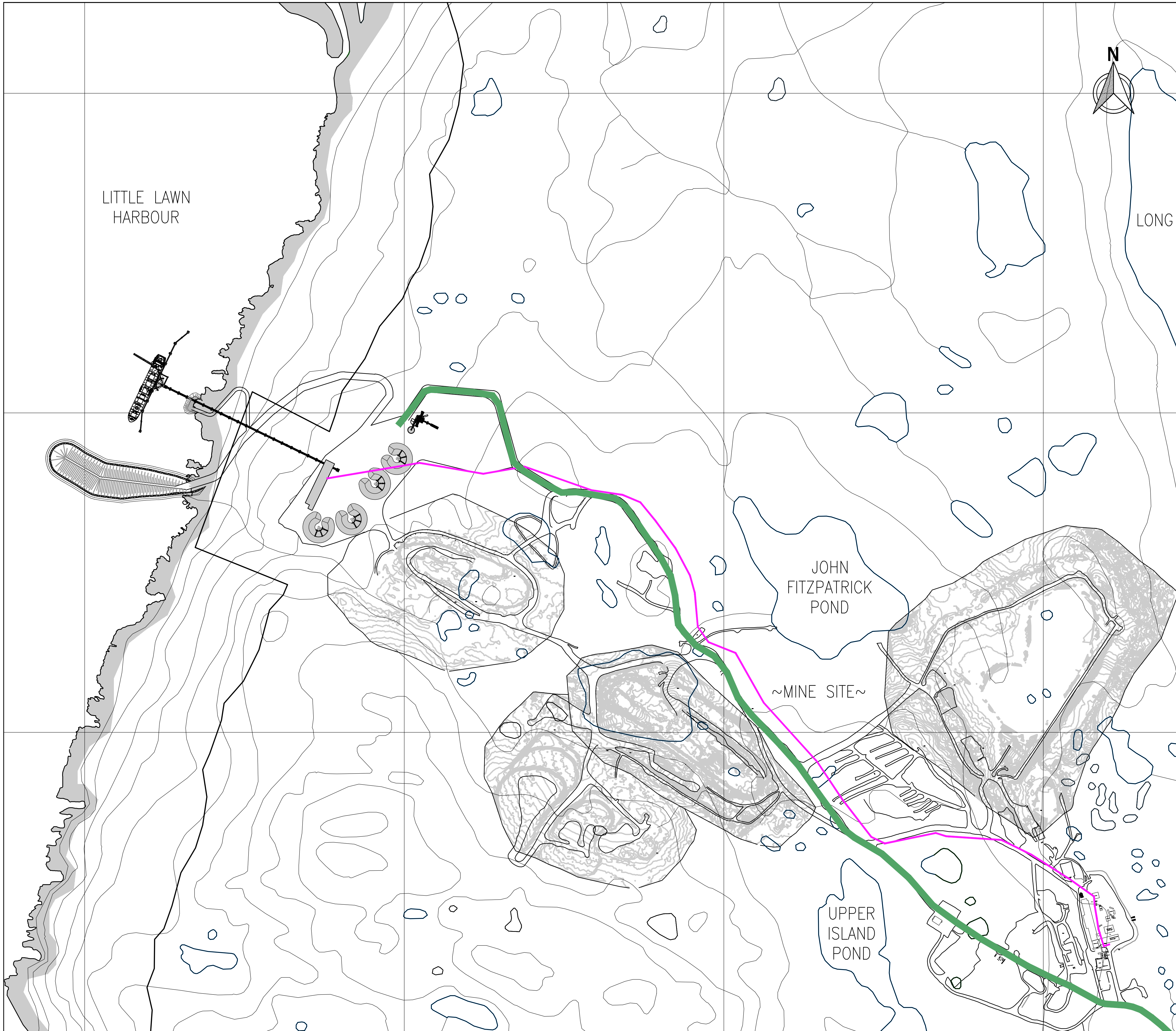
Water management will focus on stormwater runoff in the Project area, water used by the Project for processing aggregate, conveyor belt washing, and wastewater generated at the concentrate building to dewater the slurry, should the pipeline option be selected. Water management of the site will be undertaken in accordance with approved practices and with the objective of preventing drainage-related problems surrounding the site.

A detailed Water Management Plan (WMP) was prepared for the AGS Mine and has been updated to reflect the mine's development. It will be updated to incorporate water management associated with this Project. This Plan will satisfy the following aims:

- Ensure that a reliable, acceptable quantity and quality of water is available to the Project during all phases;
- Reduce the amount of water required by concerted efforts to incorporate conservation during design, construction, and operation phases of the Project;
- Reduce the amount of new water used during construction and operation of the Project through the reuse and recycling of storm water and treated wastewater wherever possible;
- Maintain natural drainage paths, to the extent feasible, and restore them if disrupted once Project activities are completed;
- Separate clean and dirty water by diverting runoff from undisturbed areas around disturbed areas, to minimize runoff over exposed erosion-prone areas and the generation of sediment; and
- Implement appropriate measures to reduce erosion caused by Project activities and to prevent off-site sediment transport.

2.2.4 Existing Infrastructure

The only existing infrastructure (currently serving the AGS Mine) of potential use by the Project is the access road leading from the mill to the port site.



LEGEND

- CONCENTRATE SLURRY LINE
- SITE ACCESS ROAD

0 300m 600m

1 : 12000

REFERENCE SOURCE(S):

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

CFI
CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE

SITE OVERVIEW

CONSULTANT

JBC
JEWER BAILEY CONSULTANTS
STRUCTURAL · MECHANICAL · ELECTRICAL

YYYY-MM-DD:	2019-05-28
DESIGN	MW
DRAWN	GM
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023

REV: 0

FIGURE 2-5

2.2.5 Marine Terminal

Several berth alternatives and layout options for a marine terminal at Blue Beach Cove had been considered under previous EAs and were assessed and subsequently approved. These options are presented in Section 3.3.

Based on engineering activities carried out to date, the preferred configuration of the marine terminal will consist of a steel pile-supported structure in combination with a rubble stone breakwater (Figure 2-6). The breakwater will extend ~350 m from shore and will provide protection to the berth from predominately south-west waves. The major components of the marine terminal are:

- Eight (8) breasting/mooring dolphins;
- Two (2) mooring dolphins;
- Shiploader support structure;
- Access walkways between dolphins;
- Pile supported overhead conveyor system;
- Radial shiploader; and
- Rubble mound breakwater lined with both filterstone and armorstone.

The berth will be located in ~16 m of water to accommodate Panamax bulk carriers in the order of 72,0000 DWT. Smaller vessels in the order of 20,000 DWT will be utilized for the export of fluorspar concentrate. The radial shiploader will be designed to reach at least three hatches on the Panamax class vessel and therefore warping (shifting) of the vessel will be required to load all hatches. Loading rates will vary up to 2500 tonnes/hour.

The berth will be equipped with a variety of hardware and equipment such as:

- Navigation lights as required by Transport Canada/DFO/Canadian Coast Guard regulations;
- High energy absorbing fenders;
- Bollards and quick release hooks;
- Berth lighting (downward directed for night operations);
- Safety ladders;
- Power supply;
- Fire protection; and
- Environmental emergency response equipment.

An overland conveyor system will transport both the fluorspar concentrate and aggregate materials from their respective stockpiles to the shiploader. The conveyor belt will be required to be cleaned of aggregate product prior to loading the fluorspar concentrate.

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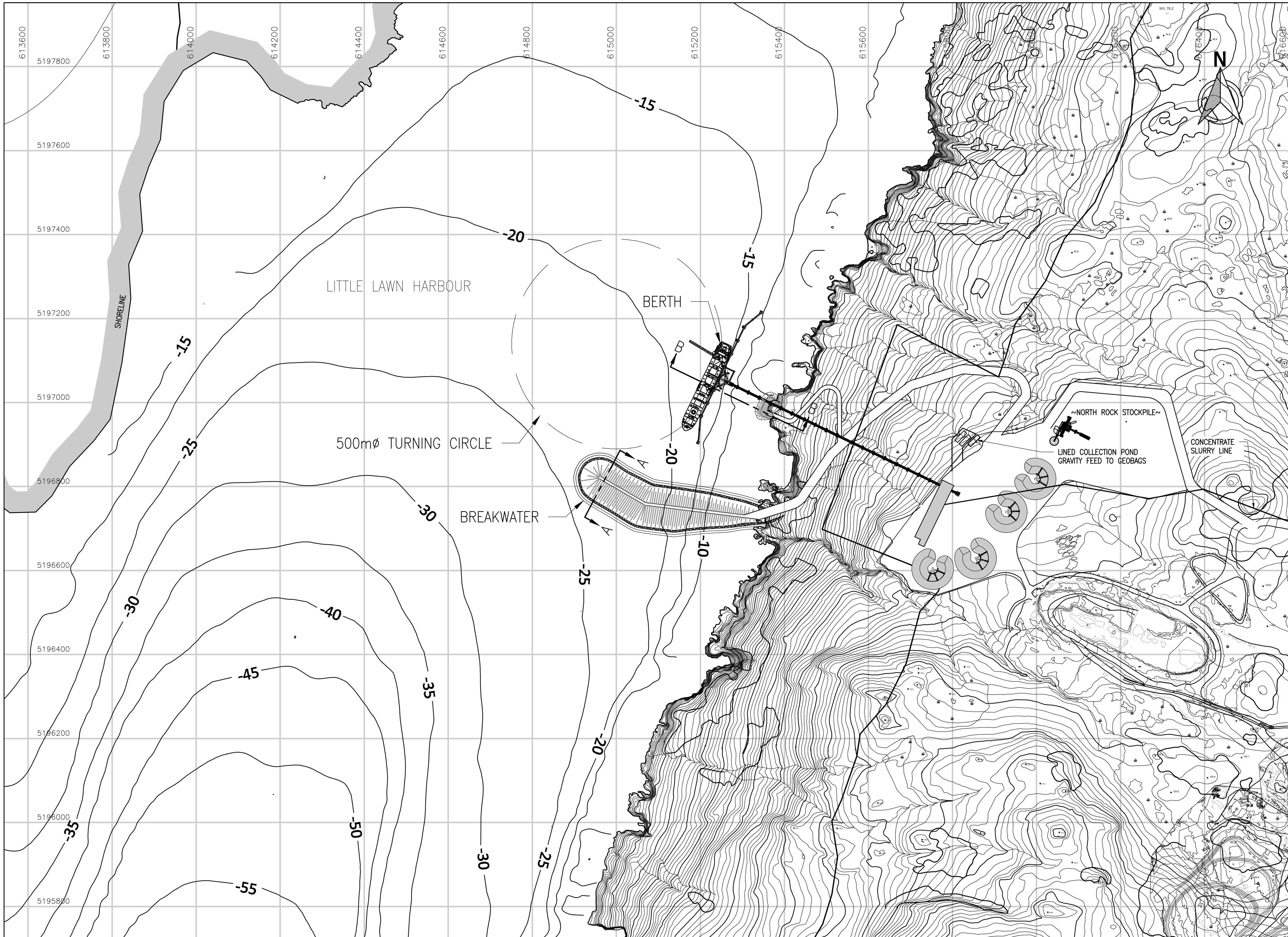
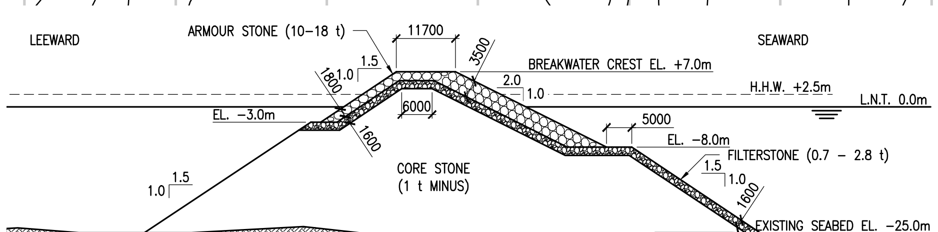
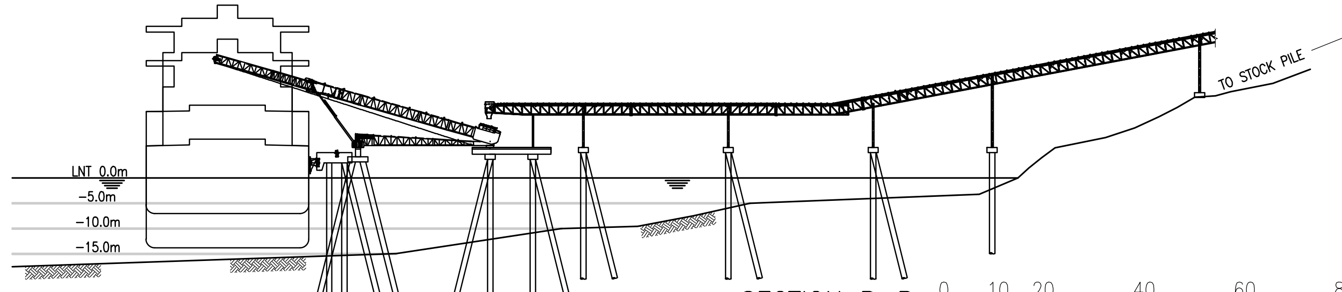




SECTION A–A
1 : 1500

0 10 20 40 60 80



SECTION B–B
1 : 1500

0 10 20 40 60 80

LEGEND

- AGGREGATE CRUSHING PLANT
- AGGREGATE STOCK PILE
- CONCENTRATE STORAGE BUILDING

0 200m 400m

1 : 10000

REFERENCE SOURCE(S):

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

CFI
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
MARINE TERMINAL

CONSULTANT
JEWER BAILEY CONSULTANTS
STRUCTURAL · MECHANICAL · ELECTRICAL

YYYY-MM-DD:	2019-05-28
DESIGN	MW
DRAWN	GM
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023
REV: 0
FIGURE 2-6

2.3 Construction Activities

The Construction phase is anticipated to begin in early 2020 and to be completed in 2021. The main activities to be completed during this phase include:

- site preparation and site access roads;
- construction of infrastructure (concentrate storage building, aggregate crushing plant, overland conveyor);
- construction of a wharf and breakwater;
- installation of utilities;
- restoration of temporary work areas; and
- commissioning.

CFI will execute the proposed works in an environmentally responsible and safe manner and will obtain all necessary regulatory approvals and permits prior to initiating construction.

2.3.1 Site Preparation

Site preparation activities include vegetation clearing, grubbing, topsoil salvage, site grading and excavation. The general areas requiring site preparation will be the aggregate processing/stockpiling area, fluorspar concentrate storage building, overland conveyor, and access road to the berth and breakwater. Land to be occupied by linear features, such as extension to existing roads, pipelines, water diversion ditches, and power lines will also require site preparation. Site preparation is essential to support the safe installation of Project infrastructure. This work will be completed with all necessary sedimentation and erosion control measures. These procedures are detailed in the AGS Mine EPP and will be updated to include construction and operations phases of the Project.

Provincial legislation requires approval for activities associated with site preparation. Pre-construction activities will commence immediately upon receipt of environmental approvals and necessary permits. Clearing and grubbing of the access road and site would begin as soon as possible. A cutting permit will be acquired from Service NL prior to start of tree clearing activities. The wood will be cut and stockpiled next to roads for access by the public for firewood. Any residual slash will be stockpiled in windrows. This provides an enhancement to habitat (e.g., birds and small mammals could use it for protection from predators).

Other early site preparation activities include levelling/infilling and installation of temporary offices with associated services (i.e., power, potable water cooler/storage systems, and temporary sanitary facilities) will commence as soon as upgrades to existing roads are completed to allow equipment and personnel to access the site.

Following conclusion of the EA process, and once all the required government permits have been received, the construction team will mobilize, establish a presence at the Project site and begin constructing the access road. The existing office building will be retained and will serve as headquarters for the construction management team. Mobile offices may be added as the team grows, if required. As part of the earthworks, space at the proposed aggregate processing/stockpiling area will be levelled to provide laydown areas for the staging and storage of construction-related equipment and material.

2.3.1.1 Temporary Sewage Facilities

Sewage generated during site preparation and construction will be collected and transported off-site for treatment and disposal. Portable washrooms and toilets will be used on-site until permanent facilities are completed. Where possible, permanent sewage systems will be installed and maintained to prevent the release of hazardous substances, pathogens and excess nutrients to the environment. All sewage and other wastewaters will be adequately treated prior to release to the environment.

2.3.1.2 Stripping

Grubbing of the organic vegetation mat and/or the upper soil horizons, although they will be kept to a minimum, will be necessary in some areas within the Project footprint. Erosion control techniques and devices will be used to stabilize erosion prone areas. Topsoil and excavated overburden will be stored in separate stockpiles for later use during reclamation. Any material unsuitable for construction purposes will be placed in an approved stockpile area. Runoff of sediment-laden water during grubbing will be minimized by using measures such as settling ponds, ditch blocks, interception ditches and filter fabrics. Erosion control measures such as rip-rap, filter fabrics, drainage channels, and gravel or wood chip mulches will be implemented in areas prone to erosion, as appropriate.

2.3.1.3 Excavation and Blasting

Excavation and blasting related to site development, access roads, and site preparation for the marine terminal will be carried out over approximately four to six months. Mass balance calculations will be performed to minimize the excavation and blasting activities.

Standard earthmoving procedures will be employed at the site (in accordance with the updated AGS Mine EPP), including drilling and blasting, and mechanical excavation. A large portion of the material to be moved on the site consists of rock. There are lesser amounts of till that also need to be excavated. Hard, sound igneous and metamorphic rock, which typically lies beneath the overburden, will require blasting and mechanical force to free it for excavation. Glacial till can be excavated using conventional mechanical means including excavators, loaders and dozers.

During the construction phase, blasting operations are only required during site preparation in accordance with the current permits for the duration of construction. Explosives and auxiliary materials will be stored as stipulated in relevant legislation, CFI Occupational Health and Safety (OH&S) standards, and in compliance with the construction permits. No blasting will take place in the marine environment.

Blasting activities will be co-ordinated and scheduled to minimize the number of blasts required per week. To reduce the seismic effect, blasting procedures will be developed. Time-delay blasting may be used as necessary to control debris scatter. Prior to any blast, the site will be surveyed to identify the presence of any wildlife. Should any wildlife be present, CFI will comply with all applicable regulatory requirements and will follow measures identified in its EPP.

During excavation activities, contractors will be required to limit the footprint of the excavation to the minimum required for the relevant installation.

2.3.1.4 Buildings and Service Roads

Site preparation for building construction will involve the use of compaction equipment, including conventional vibratory rollers. Final site levelling, and service and access road levelling will be done using graders. Concrete trucks will be used to transport concrete to the Project site. Cranes will be used throughout the site for assembling various components.

2.3.1.5 Conveyor System

The overland conveyor will extend from the fluorspar concentrate storage building to the shiploader. The conveyor will be elevated and sloped to follow the nature ground slope. Each tower support will consist of concrete foundations anchored to the underlying bedrock with grouted anchors. Excavation and rock removal will be required at each foundation location.

2.3.1.6 Slurry Pipeline (Optional)

If the slurry pipeline option is selected, its construction will be similar to the overland conveyor. Excavation and rock removal will be required at each pipe support. Excessive material will be removed, and the surrounding area will be graded as required.

2.3.2 Construction of the Breakwater and Wharf

The preferred construction technique for the breakwater will consist of end dumping core rock along the breakwater alignment. Once the breakwater reaches a sufficient height above the water level trucks will travel along its length and continue the end dumping exercise. As the breakwater progresses from shore the core rock will be protected by a layer of filterstone and topped with a suitable size armorstone. Both the filterstone and armorstone will be transported to the breakwater site by trucks (or barges) and placed using excavators or cranes depending on the filterstone/armorstone weight. Silt curtains will be used, if necessary.

The piling associated with the mooring, breasting and shiploader supports will be installed from a conventional marine plant consisting of two barges. One barge will be used as a platform for the crane and other equipment while the second barge will be used to store piling materials. The piles will be installed using pile driving hammers and churn drills and will be anchored to the underlying bedrock. Silt curtains will be used, if necessary.

After installation of the piling the concrete pile caps will be formed and poured in place. Where practical pre-cast pile caps will be used to improve constructability and schedule.

2.3.3 Construction of Port Access and Haul Roads

Vehicle traffic accessing the Project area can enter the site via a by-pass road constructed by CFI off Route 220. The port access road will be built to meet the loading and dimensional requirements of the largest design vehicle expected to use the road. Approximately 1 km of new access road and 1 km of mine roads will be constructed (Table 2-3).

Table 2-3: Mine Roads

Road Type	Road Location	Construction Type	Classification	Design Vehicle	Width (m)	Length (m)
Site Road	Surface- Haul road pit exit to aggregate stockpile	New	Dual Lane Heavy Vehicle	CAT 773G	20	1000
Access Roads	From aggregate stockpile to marine terminal	New	Dual Lane Heavy Vehicle	CAT 773G	20	1000

The development of the wharf and breakwater will be within the marine portion of the Project area. A new access road will be constructed from the aggregate processing/stockpiling area to the breakwater and the conveyor's on-land terminus to accommodate the equipment that will be used to build these facilities and for maintenance during operations.

2.3.4 Power

Electrical power for local operations and the Town of St. Lawrence is obtained from the Newfoundland Power electrical grid, and emergency power is provided by a diesel generator located in the nearby community of Burin. A Newfoundland Power substation is situated on the north side of the study area. A proposed transmission line will run from CFI's mill site to the marine terminal site. The substation and metering station built in recent years at the mill site will be the connecting point for the Project's new electrical transmission line.

2.3.5 Restoration of Temporary Work Areas

Restoration of temporary work areas will be undertaken during the construction phase to rehabilitate sites to a land use capability similar to that which existed prior to disturbance when the work in a given area has been completed.

Temporary facilities required for construction will be removed following completion of construction activities. Portable trailers for office space and for use by workers for dining and sanitation will be removed from service and relocated by contractors for reuse at other project sites. Portable water supply equipment and portable sanitary toilets will also be removed and relocated to other project sites.

Temporary oil and fuel storage tanks will be decommissioned and relocated for use at other project sites. All product and vapours will be removed from the storage tanks, which will then be dismantled and removed from site by the supplier/contractor. Any contaminated material that may exist under or around the tanks will be excavated and removed for treatment and disposal. The site will then be returned to a condition that is compliant with regulatory requirements, such as the *Storage and Handling of Gasoline and Associated Products Regulations* under the provincial EPA.

All construction equipment will be demobilized and removed from the site by the respective contractors for storage or reuse on other projects.

2.3.6 Potential Sources of Pollutants

Well-established, approved construction methods and practices will be used throughout the construction phase. Before work commences, construction methodologies will be developed specific to the activities being undertaken. These will focus on avoiding or mitigating likely adverse environmental effects. The AGS Mine's EPP will be updated and submitted for regulatory approval prior to the start of construction. This document will define roles and responsibilities of Project personnel and those of its contractors, provide methods to monitor compliance, and identify mitigation measures for various construction activities. During the construction period, all site personnel will be responsible to comply with the procedures and mitigation measures outlined in the EPP.

The potential sources of pollutants during the construction phase include noise, suspended solids, and dust, exhaust gases and GHG from heavy machinery, vehicles and blasting activities. The spill of chemicals, including petroleum products, represents potential sources of pollutants, as does the use of portable sanitary toilets.

2.4 Operation Activities

The operation phase is anticipated to last ~15–18 years based on current estimates of waste rock generated by the AGS Mine. Various activities associated with aggregate processing, and aggregate and concentrate transportation are described below.

2.4.1 Processing

Blasted run of mine rock will be loaded by front-end loader into appropriately sized haul trucks and transported to the aggregate production area. The production process consists of run of mine rock being fed into a series of crushers and screens as it proceeds through the aggregate processing circuit and products are extracted via screens and conveyors at various points of the operation. Re-crushing and diversion of unwanted size fractions will be managed and reduced via various processes but as rock is processed and crushed, fines are produced along with the desired size fractions.

The primary crusher would be a 42-inch × 48-inch jaw with a grizzly feeder and rock breaker. The primary crusher would be fed either by direct truck dumping or fed by 12 cubic yard loaders. Primary crusher product would be conveyed to a screen tower with two 8-foot × 20-foot scalping screens to pull out dense graded base (pit fines) and +2-inch material conveyed via stackers to a surge pile.

The secondary crusher product and finer material would be conveyed to two 8-foot × 20-foot triple deck screens to scalp off ¾-inch × ½-inch, ⅜-inch × ¼-inch and screenings (⅛-inch minus) products. The plant would have provisions to divert oversized or excess product material to two tertiary crushers in closed circuit for re-crushing. The plant would include the ability to re-crush unwanted coarser materials into the high value concrete and asphalt aggregate (ASTM 57, 67, 78, 789, etc.) and have the ability to process the excess screenings material (⅛-inch minus) into a manufactured stone sand for use in asphalt pavement and concrete block.

Processing aggregate will require the operation of a variety of equipment including primary crushers (jaw or gyratory), surge piles, screens, cone crushes, conveyors, waterlines, pumps and other mining equipment. Mobile equipment associated with the aggregate productions may include excavators, loaders and haul trucks. The plant will be designed to facilitate incremental expansion as production ramps up to the designated two million tonnes per annum.

The processed rock will be stockpiled via portable radial stackers into separate piles based on product dimensions.

The reclaim operation will involve either front-end loaders feeding aggregate material to the infeed hopper for the overland conveyor or a re-positioning of the radial stackers to feed aggregate material directly to the infeed hopper.

It is anticipated that CFI will conduct aggregate crushing activities year-round. The raw rock feed for the aggregate plant will be exceptionally clean, clay-free rhyolite and metasediment; therefore, it will crush easily and effectively even during harsh winter conditions. The loading of vessels will also take place year-round and any clumps of frozen material will be on the outside of stockpiles as a crust will be removed with excavators and will be manageable by screening before loading if required.

2.4.2 Waste and Water Management

CFI will protect the environment by addressing waste management and water management at all phases of the Project. To prevent harm to the environment, the AGS Mine EPP will be updated and, following regulatory approval, implemented. All employees will be trained to prevent environmental harm during work activities. The Project will also be designed and prepared to respond to environmental emergencies. Environmental monitoring will be concurrent with Project activities to foster continuous environmental consciousness, protection and control.

The AGS Mine's Rehabilitation and Closure Plan will be updated in anticipation of Project decommissioning and abandonment after operation. The Plan will aim to restore the Project site to support a comparable land use capability to what existed prior to the Project.

2.4.2.1 Site Drainage

Surface water throughout the Project area currently drains overland into a system of natural drainage channels and ponds, primarily within the Mine Cove and Northwest Pond watersheds, which are about 1.6 km^2 and 0.6 km^2, in area, respectively (Golder 2015a,c), see Figure 2-7.

The hydrology of the general area has been altered since the start of construction and operation of the AGS Mine. The mine's WMP is used to regulate water flows in the area to maintain pre-development conditions as much as possible and in accordance with regulatory approvals. The Plan will be updated and implemented to ensure that hydrological conditions during the Project's construction and operational phases are managed in accordance with regulatory requirements.

Alteration of natural drainage patterns during the Project life is possible. A Site Grading and Drainage Plan, to be developed during the design phase, will be implemented during construction and operation. The plan will be designed to maintain natural drainage patterns where feasible.

A stormwater management system will be designed to ensure that clean runoff is diverted around Project facilities to minimize potential adverse effects on water resources. Runoff water from the Project site will be intercepted, collected and treated in a manner appropriate to the potential contaminants and sediment loadings, prior to discharge back into the environment.

Where material processing, stockpiling, and handling activities and facilities are located, there will be a system of perimeter cut-off ditches to intercept and divert runoff so that potential adverse effects on surface water resources can be minimized or eliminated. Interceptor ditches near the aggregate processing/stockpile area will carry water to settling ponds, where suspended solids will be allowed to settle-out naturally from the water column, ensuring that only clear water discharges into the receiving environment or is recirculated back for re-use. A buffer of at least 25 m will be maintained between all-natural waterbodies and the processing/stockpiling/handling area to control sedimentation of these waterbodies.

At various facilities, roof drainage will discharge onto the ground via splash pads or directly from eaves. Runoff from the site will be conveyed to main outlets through a combination of subsurface drainage and roadside ditches and stored in the stormwater capture ponds for possible treatment prior to discharge to the environment.

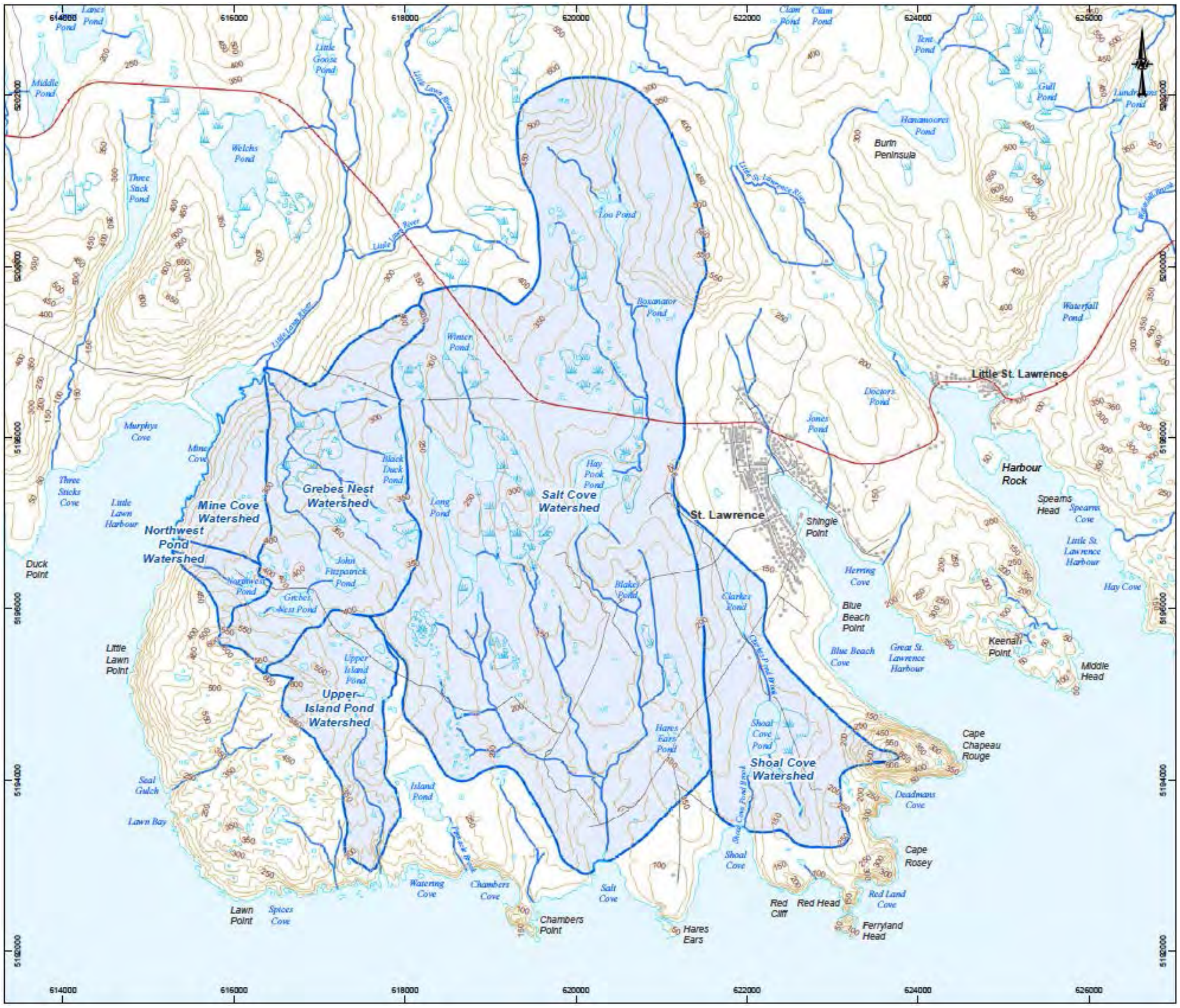


Figure 2-7: Watersheds Boundary and Drainage

2.4.2.2 Dewatering

Should the option be chosen to convey fluorspar concentrate as a slurry by pipeline from mill, then dewatering of the slurry will be required at the fluorspar concentrate building. This will be accomplished by a series of equipment including thickener tanks and drum filters. Wastewater generated by this activity will be returned to the mine's tailings pond.

2.4.2.3 Water Supply

The marine terminal will be supplied with domestic water from the mill site. This water will not be used for drinking purposes but will be treated for use in showers, water closets and lavatories. The drinking water requirements at the marine terminal will likely be served by bottled water brought on site. At this stage in the Project's conceptual development, the firewater supply has not been identified, however it will most likely be a sump pump located at the marine terminal utilizing saltwater.

2.4.3 Power

Power to the marine terminal site will be supplied by the transmission line from the mill site, which is currently connected to the existing grid. A substation will supply power from the main line to supply electrical power to the entire marine terminal site, including the aggregate plant, storage building and shiploader operations.

Total operating power for the marine terminal site has been estimated to be 1.5 megawatts (MW).

At the marine terminal site, a new substation and metering station will be constructed, where the distribution voltage will be stepped down to the required level of utilization for equipment and operations. The power grid will supply 120 kilovolts (kV). This will be stepped down to 12.5 kV for primary redistribution within the marine terminal.

The following distributed voltage level shall be used throughout the process plant:

- Primary distribution level
  - 12.5 kV, 3 phase, 60 hertz (Hz) (resistance grounded)
  - 4.16 kV, 3 phase, 60 Hz (resistance grounded)
- Secondary distribution level
  - 600 volts (V), 3 phase, 60 Hz (solidly grounded)
- Control level
  - 120 V, 1 phase, 60 Hz

The new distribution system will be built to Canadian Standards Association (CSA) and Newfoundland Power standards consisting of overhead aluminium conductors on wooden poles. The conductors will be sized for the power required with contingency for future growth. Wind and ice loading conditions incorporated in the design will be based on geographic and climate criteria and relevant Codes and Standards (B. Keating, pers. comm., 2015). The new overhead distribution lines will likely run adjacent to site roads to minimize tree clearing and facilitate line installation and maintenance. Provision will be made for the attachment of communication lines.

The preliminary electrical load list has indicated the requirement for emergency power for critical equipment at the port site, such as the shiploader and lighting. Emergency power is also required for communications/controls and life safety systems. In the event of a power failure, emergency power will be supplied by diesel generator(s) and will require a total operating load of ~750 kilowatts (kW). The generators will be tied-in to the system via automatic transfer switches, a suitable switching method will be chosen as per Newfoundland Power requirements. Generator sizing and fuel tank capacity will be determined during detailed Project design. Only essential equipment and life safety systems will be connected to the emergency power supply.

It is anticipated that power factor correction equipment would be required for the port to meet Newfoundland Power requirements as well as to reduce energy costs.

2.4.4 Transportation

The Project will require transportation of goods, materials, products, and personnel by road and marine vessels during all Project phases. CFI will update its Traffic Management Plan to accommodate the Project's transportation needs. The current Plan identifies safe corridors on the peninsula for public access to recreational areas, such as Shoal Cove Beach, Chambers Cove, and the trail to Chapeau Rouge. Restricted access to some existing and newly built roads consists of security gates and other features to prevent unauthorized entry. This Plan provides a measure of control intended to protect the general public while maintaining efficient flow of mine traffic.

Road traffic will include commuters, internal traffic, and the delivery of materials and supplies. Given the nature of the port operation, site workers, contractors and visitors will create limited vehicle traffic into the site and within the Project area. Internal traffic will include haul trucks that haul waste rock from the open pit to the aggregate processing/storing area.

Materials delivered to the site and waste shipments from the site will be transported by various types of trucks operating on municipal roads and the provincial highway system. The Transportation of Dangerous Goods will be carried out by properly trained individuals who will follow all related regulations and CFI policies.

During operation, fluorspar concentrate, and construction aggregate will be shipped from the proposed marine terminal. This will result in weekly traffic of marine vessels ranging in size from 10,000–72,000 DWT With respect to construction aggregate, ~30 Panamax-size ships averaging 72,000 DWT would be loaded on an annual basis at the proposed wharf and ~20 ships of 10,000 DTW would be loaded with fluorspar concentrate.

2.4.5 Marine Terminal

Ship loading at the marine terminal will be through a covered conveyor with a loading rate of 2500 tonnes per hour. A feeder will deliver either concentrate or aggregate to the mobile ship loader continuously without the need for an intermediate storage area. Fluorspar concentrate will be fed into a hopper within the concentrate storage building where it is transferred via covered conveyor to the feeder system and ship loader. Aggregate will be fed into a hopper outside of the building and transferred via the same conveyor system and ship loader at the wharf. The delivery system will be thoroughly washed before conveying fluorspar concentrate to ensure no cross-contamination of the product occurs.

2.4.6 Potential Sources of Pollutants

The AGS Mine's EPP will be updated for the Project's construction and operation phases. This document will define the roles and responsibilities of site personnel, provide methods to monitor compliance, and identify mitigation measures for various operation activities. All CFI employees and those of its contractors will be responsible for complying with the provisions of the EPP.

During the operation phase, potential adverse effects may arise from excessive noise, suspended solids in water, dust, exhaust emissions and GHG from heavy machinery, vehicles and blasting activities. Accidental releases of chemicals, including petroleum products, may also occur. The EPP will identify appropriate mitigation measures to avoid or reduce adverse effects on the environment.

2.5 Rehabilitation and Closure

Once the operation phase of the port has ended, the facilities will be properly closed, and rehabilitative measures will be taken to ensure that the site and surrounding areas are returned to an environmentally appropriate condition. This section outlines the basic elements of the existing Rehabilitation and Closure Plan, which is designed to restore, to an acceptable state, the biological, chemical and physical quality of the environment that may have been affected by the Project.

It is not anticipated that the breakwater will be part of the rehabilitation and closure plan. At the time of closure, the marine habitat surrounding the breakwater will be well developed and any closure activity may have potentially harmful effects on the marine life establish within the breakwater limits.

2.5.1 Progressive Rehabilitation

In keeping with its Environmental Health and Safety Policy, CFI is committed to progressive rehabilitation during the Project's operational phase, as demonstrated during development of its recent mining operations. Progressive rehabilitation will form an integral part of the operating plan and will be implemented progressively over the life of the Project. Rehabilitation planning will begin prior to construction when considerations such as delineating and limiting the area of disturbance are incorporated into construction planning. Progressive rehabilitation will be implemented as components or phases of the Project have concluded. For example, at any phase of the Project, disturbed areas no longer required will be reclaimed and re-vegetated.

2.5.2 Decommissioning and Closure

The mine's Rehabilitation and Closure Plan will be updated and submitted to the Government of NL for approval under the *Newfoundland and Labrador Mining Act*. The updated Plan will meet regulatory requirements for rehabilitation and will include closure and rehabilitation of the infrastructure at the marine terminal and associated facilities. The rehabilitative measures have generally been developed at a conceptual level for the purpose of the feasibility study and this RD/PD. The closure plan will evolve through subsequent Project phases, becoming more detailed as the environmental monitoring database is built-up, enabling refinement of the technical basis for the closure design.

Decommissioning, closure and rehabilitation work is anticipated to take up to two years followed by post-closure monitoring activities. The exact length of the monitoring period will be determined at decommissioning and following an assessment of the site, in consultation with the appropriate regulatory authorities.

The Rehabilitation and Closure Plan is part of CFI's Environmental Health and Safety Management System (EHSMS). CFI views the development and implementation of its EHSMS from a life-of-Project perspective, to be revised and updated regularly and on an as-needed basis as the Project moves through the various phases. EHSMS development and implementation is consistent with CFI's commitment to continuous improvement, pollution prevention and stakeholder consultation. This will be accompanied by regular document review, revision and update.

Specific objectives of the Rehabilitation and Closure Plan are:

- Restoration of disturbed slopes to a stable and safe condition, which will protect public health and safety;
- Reduction or elimination of potential adverse environmental effects associated with each phase of the Project;
- Re-establishment of conditions that permit a comparable land use of the Project area, to that which existed prior to the Project; and
- Reduction of the need for long-term monitoring and maintenance by establishing, as quickly as practical, effective physical and chemical stability of disturbed areas, including revegetation.

The decommissioning principles that will guide the overall development and implementation of these objectives include:

- Establishing adequate background information to determine the extent and type of adverse effects resulting from the Project, if present;
- Developing effective strategies and techniques for conducting reclamation; and
- Conducting audits of procedures and documentation of results to satisfy regulatory and corporate requirements.

The Rehabilitation and Closure Plan will be subject to a general review annually and a detailed review every five years. The annual review will be conducted by the facility's next level of management. Revisions will be made based on the results of these reviews.

Upon decommissioning or rehabilitating a site or facility, a final report containing conclusions of the post-reclamation site assessment will be prepared and distributed for review and approval to facility management, corporate legal and corporate Environment Health and Safety departments. CFI will plan and implement reclamation and rehabilitation activities in compliance with all applicable legislation. Provincial and federal statutes and regulations that will guide rehabilitation practices include:

- *Mining Act*;
- *Canadian Environmental Protection Act*;
- Environmental Control Water and Sewage Regulations;
- Waste Management Regulations;
- *NL Environmental Protection Act*;
- *Quarry Materials Act*;
- *The Occupational Health and Safety Act*;
- *Water Protection Act*;
- *Migratory Birds Convention Act*;
- *Fisheries Act*;

- *Lands Act*;
- *Forestry Act*; and
- *Navigation Protection Act*.

Closure and rehabilitation of the Project will include:

- Grading horizontal surfaces for drainage, overburden application and revegetation;
- Removing conveyor and ship loading systems;
- Dismantling of all buildings, and concrete foundation levelling to 1 m below the grade elevation;
- Dismantling of the wharf, including cut-off of piles at the seabed elevation;
- Rehabilitation of new roads, including culvert removal and revegetation;
- Rehabilitation of surface water management infrastructure, including revegetation of settling ponds and ditches;
- Removal of aboveground pipelines;
- Removal and appropriate disposal of all hazardous material, chemicals and fuel;
- Removal and appropriate disposal of all non-hazardous demolition debris;
- Environmental site assessment and implementation of appropriate remediation measures to address contaminated areas identified; and
- Post-closure monitoring.

2.5.3 Post Closure Monitoring

Post-closure monitoring activities will be conducted to determine the effectiveness of decommissioning. Post-closure monitoring activities will include surface and groundwater quality monitoring with testing of standard water quality parameters and metals, treatment of water until quality reaches applicable standards (estimated two years), biophysical monitoring.

The cessation of operation of the marine terminal will bring a change to the workers, their families, and the residents and businesses in nearby local communities. To help those facing change, CFI will work with employees in advance of Closure to identify other employment opportunities.

2.6 Occupations

CFI is committed to maximizing local benefits and hiring locally or provincially as much as possible. The Project's construction and operation phases will generate employment and associated socio-economic benefits. The following sections present an overview of the estimated labour force requirements during the construction and operation phases. CFI is committed to local employment, to maximizing local benefits, both through direct employment, training and by giving assistance and preference to local suppliers.

2.6.1 Construction Employment

The construction of the Project will result in a peak employment of ~87 workers during the construction period (Table 2-4). The construction workforce will include a wide range of occupations which are anticipated to be full-time in nature for each specific project component. During human resource planning for the construction phase consideration will be given to the development and implementation of employment equity, apprenticeship and training, and entry requirement strategies. It is reasonable to assume that a large number of individuals in the general Project area will also benefit from indirect employment.

Table 2-4: Estimated Occupational Requirements for the Construction

Position (NOC Code)	Year 1	Year 2	Year 3
Pipefitter (7252)	0	2	1
Millwright (7311)	0	2	0
Sheet Metal Workers (7261)	0	2	0
Construction Management (0711)	0	2	2
Scheduler (1473)	0	1	1
Construction Trades Helpers and Labourer (7611)	0	10	6
Electrician (7242)	0	2	1
Equipment Operators (7421)	6	8	6
Pipe Welder (7265)	0	2	1
Roofers (7291)	0	2	0
Insulator (7293)	0	2	0
Painter (Industrial) (9496)	0	2	1
Carpenter (7271)	0	2	1
Surveyors (2154)	2	2	1
Plumbers (7251)	0	2	1
Ironworker (7264)	0	8	2
Welder – Structural (7265)	0	4	2
Concrete Finisher (7282)	0	2	0
Drywall Installers (7284)	0	1	0
Heavy Duty Equipment Mechanics (7312)	2	2	1
Crane Operators (7371)	1	2	1
Drillers & Blasters (7372)	3	3	0
Commercial Divers (7382)	0	4	0
Truck Drivers (7411)	4	6	8
Electrical Power Line and Cable Workers (7244)	0	2	0
Telecommunications Line and Cable Workers (7245)	0	2	0
Other Trades and Related Occupations (7383)	0	0	0
Construction Inspectors (2264)	1	1	1

Position (NOC Code)	Year 1	Year 2	Year 3
Engineering Inspectors (2262)	1	1	1
Construction Supervisors – Electrical (7212)	0	1	1
Construction Supervisors – Pipefitters (7213)	0	1	1
Construction Supervisors – Metal Workers (7214)	0	1	1
Construction Supervisors – Carpentry (7215)	0	1	1
Construction Supervisors – Mechanic (7216)	0	1	1
Construction Supervisors – Heavy Construction (7217)	1	1	1
Construction Supervisors – Other Trades (7219)	0	0	0
Total	**21**	**87**	**44**

2.6.2 Operation Employment

Employment during the 18-year aggregate operation will result in the creation of ~24 full-time positions. These positions are anticipated to be direct employees of CFI that will likely work full-time on the Project, although some positions might be hourly while others will be salaried. Table 2-5 provides an estimated average number of operation workers by type of occupation during each year of the operation phase. Human resource planning for operations will occur and consideration will be given to the development and implementation of employment equity, apprenticeship and training, and entry requirement strategies. The Project will result in additional benefits in the area, and the direct-to-indirect labour ratio associated with this Project is estimated to be 1:3.

Table 2-5: Estimated Occupational Requirements for the Operation Phase

Position (NOC Code)	2020–2038
Shiploading (7533)	8
Laboratory Technician (2212)	1
Crushing Operator (9411)	6
Loader Operator (7421)	6
Operations General Foreman (2212)	2
Instrumentation Tech (7242)	1
TOTAL AGGREGATE OPERATIONS	**24**

2.6.3 Rehabilitation and Closure Employment

An estimate for employment during the two-year rehabilitation and closure phase of the Project is not currently available. Following preparation of the Rehabilitation and Closure Plan, it will be possible to estimate the number and type of employment opportunities during this Project phase.

2.7 Project Schedule

Pre-construction activities are currently ongoing and include Project engineering and EA. Construction activities are anticipated to begin in early in 2020. The construction activities, spanning over a 14-month period, would consist of site preparation, construction of site infrastructure such as access roads, site buildings, marine berth and breakwater construction, installation of aggregate plant, installation of utilities and commissioning. Temporary work areas will be rehabilitated throughout the construction phase once activities in a certain area are completed.

Operation is scheduled to start in early-mid 2021. Progressive rehabilitation activities will take place throughout all phases of the Project. Based on the current resource estimate, operation of the aggregate production would be completed by 2039, at which time rehabilitation and closure activities would take place unless additional fluorspar resources are found, and the associated aggregate are processed for export.

2.8 Emissions, Discharge and Waste Management

Information on the main mitigation measures to be implemented to minimize discharges and emissions in the environment is provided in the following sections.

2.8.1 Atmospheric Emissions and Noise

Several sources of atmospheric emissions will result from the proposed Project including exhaust from fuel burning equipment/ships, fugitive emissions from storage tanks, GHG emissions from combustion of fossils fuels and use of electricity, and dust generated during aggregate processing, handling and transport.

During the Project's construction phase, air emissions will be mainly from diesel powered equipment and dust generated during site preparation, building construction, and hauling. Gaseous emissions will be generated by mechanized equipment, and fugitive emissions will be generated from various reagent storage reservoirs and dust. A list of equipment to be used during the operation phase of the Project is provided in Table 2-6.

Table 2-6: Equipment List for Operation Phase

Project Activity	Description	Type	Engine Power kW	Estimated Number of Units
ROM Transportation from open pit to aggregate crushing plant	Rigid Haul Truck	CAT 773G	578	3
	Wheel Loader	CAT 980K	303	1
	Hydraulic Excavator	CAT 320E L	114	1
	Pick Up Truck	4x4 crew cab Chevrolet	150	3
Aggregate transportation from stockpile to marine terminal	Load Conveyor	CAT CT660	269	3
	FEL Concentrate	CAT 980	303	2
Auxiliary	Diesel Emergency Power Generator (Mill)		250	1

Potential sources of air emissions will be identified and controlled through various means (e.g., engineered systems, operational and maintenance controls, and industry best practices that will form the Project's Environmental Management System [EMS]) to ensure that regulatory requirements are met. Mitigation measures will be identified during various Project phases and noted in the AGS Mine's EPP, which will be updated for both Project construction and operation. These measures may include:

- Application of water or water-based dust suppressants on gravel roads;
- Use of manufacturer-recommended dust control equipment in the crushing plant, which CFI will ensure confirms with its Best Available Control Technologies (BACT) Report. Dust control

measures outlined in this report will be reviewed and if practical will be implemented for the Project. These measures include water suppression systems, dust hoods on conveyors with a central baghouse and independent dust collectors on each conveyor;

- Covered-conveyor systems used to deliver aggregate and concentrate from the stockpiles and concentrate storage building, respectively, to the ship loading system and into the ship. Where trucks are used to transport concentrate from the mill to the concentrate storage building, covers will be used on the trucks;
- Proper building ventilation systems, complete with appropriate filters to reduce exhaust emissions; and
- Indoor storage of fine fluorspar concentrate and periodic moistening of concentrate to reduce dust dispersion by wind and over-drying in the storage building.

CFI has begun preparing an air emissions inventory for the Project that includes relevant criteria air contaminants and GHGs. CFI has also commissioned a preliminary noise assessment to predict sound levels at a few of the nearest residential receptors, including cabins. These two studies, when concluded, will inform the mitigation measures to be employed.

Greenhouse Gas (GHG) Emissions

GHGs including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) can be emitted from a number of natural and anthropogenic sources. Emissions from biogenic or other sources generally exhibit little variation from one year to the next and are considered to be nominal when compared to those resulting from the combustion of fossil fuels.

Total GHG emissions are generally reported as CO_2-equivalents (CO_2e). This is accomplished by multiplying the emission rate of each compound by the global warming potential (GWP) relative to CO_2. CO_2e considers the global warming potential of the three main greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

In 2017, the oil and gas sector and transportation sector were the largest GHG emitters in Canada. Together, they accounted for 52% of total emissions. The other Canadian economic sectors each accounted for between 6% and 12% of total GHG emissions in Canada.

The Canada total GHG emissions for the years 1990–2017 are presented graphically in Figure 2-8 (Environment and Climate Change Canada [ECCC] 2019).

Emissions vary significantly by province. The level of emissions depends on factors such as population, energy sources and economic base. Provinces and territories that are the most populated, have economies based on resource extraction or are relying on fossil fuels to generate electricity will tend to have higher emission levels.

In 2017, the top five emitters (Alberta, Ontario, Quebec, Saskatchewan and British Columbia) together released 91% of Canada's national total GHG emissions. Of the top five emitters, GHG emissions were lower in 2017 than in 1990 for Ontario and Quebec.

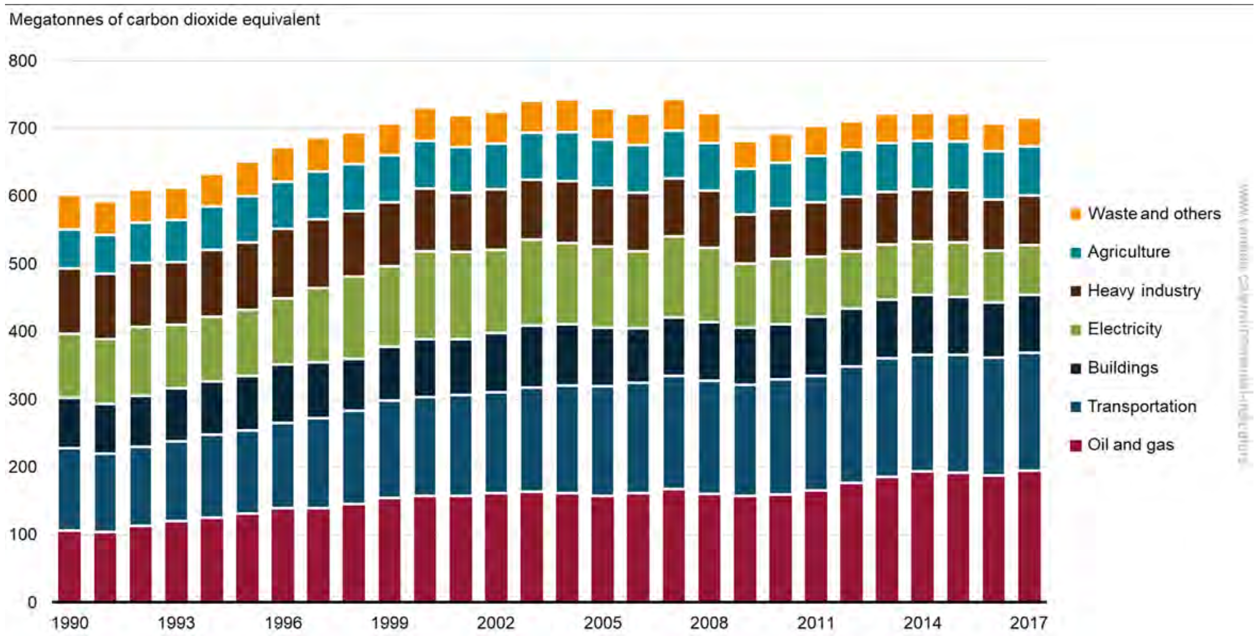


Figure 2-8: Greenhouse Gas Emissions in Canada (ECCC 2019)

In comparison, NL's emissions have increased by 6.9% over this period; however, the province still remains a relatively small contributor to the country's total GHG emissions, with emissions that range from 1.3–1.6% of the Canadian total between 1990 and 2017 (see Figure 2-9 and Table 2-7 below).

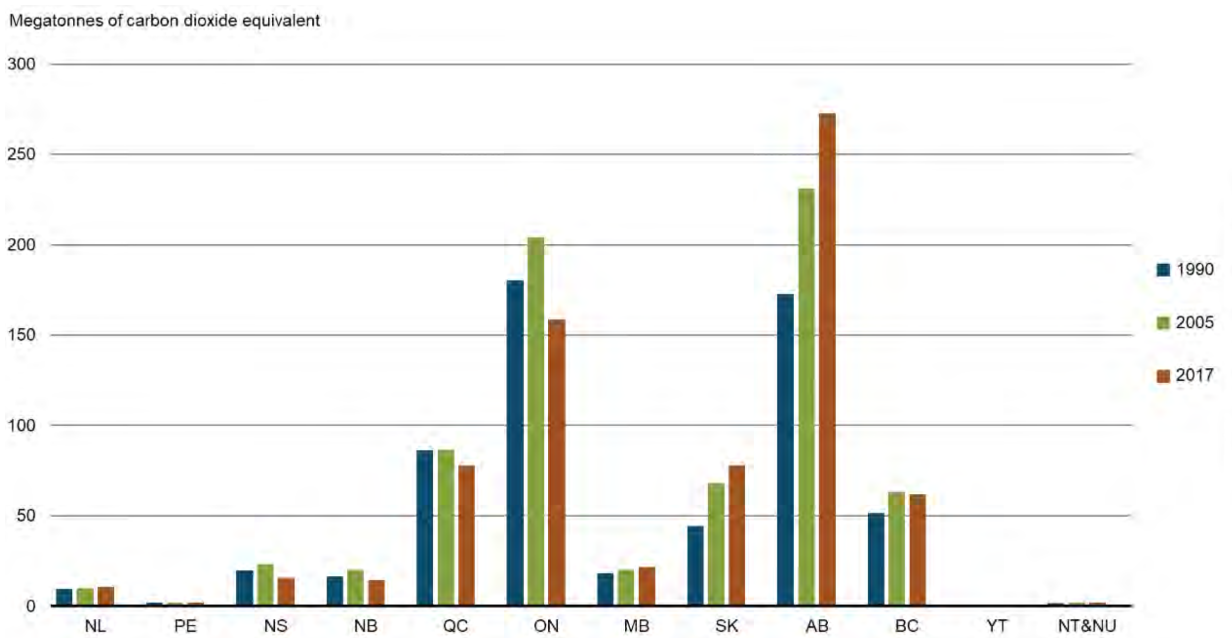


Figure 2-9: Greenhouse Gas Emissions by Province and Territory, Canada, 1990, 2005 and 2017 (ECCC 2019)

Table 2-7: Newfoundland and Labrador's Greenhouse Gas Emissions, Selected Years (Mt CO2 eq)

Province/Territory	1990	2005	2012	2013	2014	2015	2016	2017	Change (%) 2005–2017
Total (Canada)	602	730	711	722	723	722	708	714	-2.0%
NL	9.4	9.9	9.4	9.4	10	11	11	10	6.9%
NL/Canada (%)	1.6%	1.4%	1.3%	1.3%	1.4%	1.5%	1.6%	1.6%	

The total predicted GHG emissions for the Project during construction represents ~0.088% of the total NL, and 0.0012% of the total Canadian, emissions.

During the Project's construction and operations phases the estimated GHG emission totals for one year are presented in Table 2-8. The estimates include primary and indirect sources, the latter related to electricity consumption. Operations sources include marine vessel emissions while loading at the wharf, but not other off-site emissions. This estimate has been calculated conservatively, and will be refined during the EA.

Table 2-8: Estimated Greenhouse Gas Emissions for St. Lawrence Fluorspar Marine Shipping Terminal

Direct and Indirect Project Sources	Total CO_2e (kt/year)
Construction	4.954
Operations	8.764

Work Planned

GHG modelling for each phase of the Project is currently underway. Additional emissions monitoring may be undertaken as part of CFI's St. Lawrence operations. CFI will continue to explore opportunities to reduce GHG emissions over the course of its operations in St. Lawrence, starting with preliminary engineering design currently underway. Potential methods to reduce GHG emissions include:

- The Project is itself an alternative that promises to reduce operational GHG emissions compared to the status quo (i.e., trucking to Marystown) and Blue Beach Cove marine terminal options. The air emissions inventory will compare GHG emissions of all of these options.
- Evaluating two alternatives for transferring concentrate from the mill to the concentrate storage building: one by truck the other by slurry pipeline.
- Design and construction of a marine terminal to handle ships of up to 72,000 DWT. The proposed marine terminal would allow larger ships thus taking advantage of the economy of scale and reducing the number of ship visits. This would reduce fuel consumption and GHG emissions associated with transporting the product to buyers, as the alternative of hiring dedicated, smaller ships would add appreciably to the cost of CFI's product and generate far more GHG per tonne of product delivered.

2.8.2 Process Water

Water will be required for processing the aggregate and conveyor washing between fluorspar and aggregate loadings. The source(s) of this process water will be further investigated during the detailed engineering design phase however the current plan is to pump the water from the existing mill site.

CFI's existing WMP will continue being updated as part of the Project design. This plan will identify how water will be managed on site during the various Project phases and how it will be treated prior to release to the environment. Effluent discharge criteria will be set by DMAE through the issuance of a Certificate of Authorization prior to start of construction. Effluent will be treated prior to being discharged to the receiving environment to comply with all applicable regulatory requirements.

Total requirement for process water is estimated at 17 m^3/hr (75 US Gallons per Minute [USGPM]), with several potential sources of process water being considered.

2.8.3 Site Drainage

Alteration of natural surface drainage patterns may be a consequence Project construction given the required size of the Project footprint. A site grading and drainage plan will be developed during the detailed engineering phase and implemented during construction and operation. All permanent drainage control features will be in place and functioning upon completion of construction. The site engineer will be responsible for ensuring that these features are stabilized and functioning as designed.

Nevertheless, minor rehabilitation of surface drainage patterns may be required upon completion of the construction phase.

The effectiveness and stability of all temporary and permanent ditches, culverts, and other drainage control features will be monitored for one year (i.e., one full seasonal hydrologic cycle) following completion of the construction phase. Repairs, revegetation, revetment, or other corrective measures will be applied as directed by the site engineer.

2.8.4 Waste Management

CFI will update its EMS to guide Project activities and reduce adverse environmental effects. CFI's existing Waste Management Plan will also be updated as part of the EMS and will include procedures to manage the various waste streams generated during all phases of the Project. This plan will be updated prior to the start of construction. The key waste streams include waste rock, sewage, solid waste and hazardous waste.

New sanitary sewage systems will be constructed at the concentrate storage building to collect and treat sanitary wastes from the building. This system will include a septic tank and leaching field. The septic systems will be designed to handle sewage quantities anticipated for projected numbers of Project personnel, and in accordance with government guidelines. Sewage sludge accumulating in the septic tank will be removed periodically and hauled to an off-site treatment/disposal facility by an approved waste disposal contractor. The clarified effluent from the septic tank will be discharged to its septic field for aerobic treatment.

Solid waste will be generated during all phases of the Project. Waste management practices will be established in compliance with all applicable regulatory requirements. During all Project phases, waste management options will be considered to minimize the waste generated by Project activities, and to reuse and/or recycle wastes when feasible. CFI's construction phase waste management plan used during mine construction will be updated prior to the start of Project construction to identify applicable waste management options. This plan will be updated prior to the start of operation and will be further revised during the Project's life to reflect the evolving nature of the region's waste management infrastructure and services.

Hazardous waste generated through Project activities will be managed in compliance with all applicable legislation. Hazardous waste sources and quantities will be identified during detailed design, construction and operation phases. CFI's Waste Management Plan will include a section with procedures identifying appropriate hazardous waste disposal options.

2.9 Accidents, Malfunctions and Emergency Response Planning

The effects of potential accidents and malfunctions on workers, the public and environmental, socio-economic and cultural resources are considered in this RD/PD. Accidents and malfunctions could occur during the construction, operation, and rehabilitation and closure phases. The Project has been designed and will be constructed and operated following applicable standards, industry Best Management Practices (BMP), Project-specific mitigation measures identified in this document, and CFI's EPP. These measures are expected to reduce the risk of an accident or malfunction during Project construction, operation, and rehabilitation and closure.

CFI has a goal of zero accidents. Accident prevention will be given priority within CFI's EHSMS. Anticipating potential accidents and malfunctions, and implementing proactive measures aimed at preventing such incidents will be a guiding principle in CFI's EHSMS. In addition, this system will require that a high level of response capability be maintained throughout all phases of the Project. Mine personnel will maintain constant vigilance, undergo regular safety training, and be thoroughly familiar with the EPP, OH&S Plan, ERP, and all Contingency Plans to prevent and mitigate workplace accidents and malfunctions. Third-party contractors will be screened for compatibility with CFI policies and procedures, and contractors will be required to submit health and safety policies and plans to CFI for review and approval prior to any onsite activities.

Accidental events can be generally categorized as either spills or releases to the environment (e.g., fuel and hazardous materials, concentrate or wastewater), or failure of engineered systems resulting in material spills or releases to the environment. The following list of accidents and malfunctions cover all Project phases (construction, operation, and rehabilitation and closure):

- marine terminal failure (e.g., processes and equipment);
- erosion or sediment control failure;
- conveyor system and pipeline failure;
- stockpile slope failure;
- vehicle and vessel collisions;
- spills or leaks of hazardous substances (terrestrial and marine); and
- fires and explosions.

The accidents and malfunctions that could occur over the life of the Project are described below, including mitigation measures to prevent their occurrence, and response procedures to be implemented in the case of such an event. The potential adverse effects resulting from accidents and malfunctions are analyzed in Section 7.8.

2.9.1 Conveyor System and Pipeline Failure

The conveyor system delivering aggregate or fluorspar concentrate to the ship loader can suffer structural or mechanical damage, resulting in release of material to the terrestrial and/or marine environments, and possibly causing human injury. Likewise, ruptures to the slurry pipeline caused by structural failure, corrosion, or impact from equipment can release concentrate onto land and into freshwater bodies, resulting in adverse effects to plant and animal life. Failures will be mitigated by engineering design following relevant codes and standards, and regular maintenance and inspections during operations. Should release of concentrate occur despite these proactive measures, planned spill contingency measures will be implemented.

2.9.2 Marine Terminal Failure

Structural failure of the shiploader at the marine terminal during Project operation may be the result of improper design or operational procedures or may occur over time as joints loosen or metal becomes worn, weakened or corroded. Marine terminal failures may result in the unplanned release of fluorspar concentrate to the environment (discussed in Section 2.9.6) or possibly human injury. Failures will be prevented by proactive design where possible, as well as maintenance programs and monitoring. Any structure or equipment found to be damaged will be repaired immediately and any other remedial action taken as necessary. Should marine terminal failure occur, corrective measures would be implemented immediately to reduce the extent of the effect.

2.9.3 Erosion or Sediment Control Failure

Failure of erosion and sediment controls could result in silt-laden runoff being released to the environment. Erosion and sediment control measures installed on-site over the life of the Project will be regularly inspected and monitored, particularly during and after extreme precipitation events. Erosion and sediment control structures found to be damaged will be repaired immediately and any other remedial action will be taken as necessary. Fines storage areas will be confined to areas within the site, so that any control failures would not result in an off-site release of material.

2.9.4 Stockpile Slope Failure

Stockpile slope failure could result in materials being released to the environment. Stockpiles will have a maximum height of about 30 m and will be designed with slope angles that promote stability. Stockpiles will be regularly inspected and monitored, particularly during and after extreme precipitation events. Stockpiles found to be in poor condition (e.g., unstable) will be repaired immediately and any other remedial action will be taken as necessary.

2.9.5 Vehicle and Vessel Collisions

Vehicle collisions may occur during any phase of the Project (construction, operation, decommissioning and rehabilitation), with potentially adverse effects on human health. Vehicle collision has little potential to lead to significant environmental damage (e.g., terrestrial small volume spills of fuel or other chemicals). Vehicles operating at the site will primarily be Project-related mining equipment, bulldozers, haul trucks, loaders, service vehicles (pick-up trucks) and workers' cars. Vehicles accessing the site will be required to check-in at the security office. Traffic patterns, speeds, and right-of-way signage will minimize the risk of vehicle collisions. Operators of mobile equipment new to CFI's operations will receive training on safe equipment operation, and spill kits will be provided for all vehicles to recover and contain small spills and leaks.

There is also the potential for Project-related vessel collisions in the marine environment, but the limited amount of marine activity in the area reduces this risk. During Project construction and operation, considerable vessel activity by multiple ships and boats may occur for limited periods of time around the marine terminal. Given this, there is potential for Project-related vessel collisions, primarily between bulk transport ships and either tugs, pilot vessels or nearby recreational or fishing vessels. Other accident types may include collisions with the terminal during bad weather or due to pilot error and grounding of the vessel on submerged rocks. Navigational error, malfunctioning of navigation equipment, engine malfunction and poor weather conditions may all contribute to these incidents.

The management of marine traffic is the responsibility of the Canadian Coast Guard. It is mandatory for large vessels to report to the Coast Guard at specified points and may take local pilots on board. The potential for collisions will be minimized by controlling vessel speed, scheduling and coordinating activities with other marine users, as well as Transport Canada and the Coast Guard, and posting Notices to Mariners, as necessary. The marine terminal will have navigational aids to provide early warning of collision hazards. Weather reports and wind speed information will also be used to monitor changing weather conditions that could increase the risk of collisions during vessel navigation to or from the marine terminal.

Emergency response in the event of a vessel collision is coordinated by the Canadian Coast Guard with support from local land-based emergency responders, as needed. The Coast Guard will be naturally aware of the timing and type of activity associated with Project operation and will be informed of the construction schedule before work begins. CFI's ERP will be updated to contain a section regarding response to incidents at sea; however, the ship's Master is ultimately responsible for the safe operation and emergency response in case of an incident.

2.9.6 Spills and Leaks of Hazardous Substances

Spills and leaks include terrestrial and marine spills and leaks of fuels or other chemicals, and spills and leaks of fluorspar concentrate in the marine environment.

Terrestrial and Marine Spills and Leaks of Fuels or Other Chemicals

All phases of the Project (construction, operation, rehabilitation and closure) will include the use and storage of fuels (e.g., diesel and gasoline), equipment maintenance and use and storage of servicing fluids (e.g., hydraulic oils, oils and lubricants, greases, antifreeze, brake and steering fluids, solvents), and the use and storage of blasting agents. Therefore, the potential for spills and leaks of any of these materials exists during all phases of the Project.

Spills and leaks could result from equipment failure, damage to storage or piping systems, mobile equipment accidents, or failure to follow proper procedures related to fuel and other bulk material transfers or equipment maintenance activities. In the event of a spill or leak of a deleterious substance, the severity of the environmental consequences will depend on the location and volume of the spill/leak, and the time of year. In the event of a large spill or leak, soil, groundwater and surface water contamination may occur. It is unlikely that a spill or leak would adversely affect the quality of habitats and/or result in ingestion or uptake of contaminants by vegetation and/or wildlife, as working areas of the industrial Project site will be largely devoid of vegetation. CFI will take all precautions necessary to prevent spills and leaks of hazardous substances.

In following CFI's current practice, all Project equipment and vehicles will meet industry standard requirements and be safety certified and fit for their intended use. Regular pre-shift inspections and maintenance programs will ensure the continued reliability and integrity of Project equipment. Necessary critical spares will be maintained in the event that change out of parts or equipment is required.

Storage tanks at various on-land locations could fail as a result of spontaneous rupture or explosions; however, the likelihood of any substance escaping to the environment as a result of a tank failure is low. On-site bulk materials will be stored in above ground storage reservoirs with secondary containment in compliance with provincial regulations. Any spillage inside the containment will be recovered and managed in accordance with provincial waste management regulations.

Spills could also result from human error during delivery of materials to the storage tanks (e.g., overfilling, leaving valves open). CFI will continue to enforce strict procedures for the safe transportation and handling of all deleterious (hazardous) materials on-site. Storage tanks and facilities will be designed to conform to the government regulations and guidelines, as required. Workers will use best practices during material transfer operations including monitoring and oversight of the transfer activities and verification to ensure that the receiving container has adequate capacity prior to beginning the transfer procedure. Such spills, in the event that one occurs, would prompt notification, emergency response, and clean-up procedures.

Onshore refueling of mobile equipment will need to be conducted on-site on a regular basis. Refueling will take place in designated areas where any spills can be contained and recovered. Equipment operators will ensure that they remain with the equipment at all times during refueling.

Most spills or leaks would be localized near the source and be addressed by site personnel using available spill response equipment. All deleterious substances will be handled in a manner that minimizes or eliminates the risk of spillage and accidents. Contingency planning will be in place to enable a quick and effective response to a spill/leak. CFI personnel who have not already been trained will receive appropriate training in response measures, and spill response equipment (e.g., absorbents, pads, socks and booms) will be readily available in the event of an accidental spill/leak.

In the case of spill or leak of a deleterious substance, emergency response and clean-up procedures will be implemented. Immediate action will be taken to stop the leak and contain the spilled material. All contaminated material will be collected and stored in an appropriate manner to avoid further release to the environment until such time that it can be transported to an approved treatment/disposal facility. The procedures and requirements of the Workplace Hazardous Materials Information System (WHMIS) program and other applicable government regulations will also be enforced.

The severity of the adverse effects resulting from a spill or leak of a deleterious substance in the marine environment (e.g., damage to a ship's hull sufficient to rupture a fuel tank, bilge water tank, or other ships structure), depends on the spill volume and composition, wave, current and wind conditions, and the promptness and effectiveness of response efforts. In the unlikely event of a large spill or leak, damage to fisheries, effects on aquatic flora, fauna and waterfowl, as well as coastal effects from residual material coating the shoreline may occur.

All shipping and offshore activities will be conducted in compliance with the *Canada Shipping Act* requirements for vessel inspection and certification, and training and appropriate certificates of competency for operators. The risk of a spill or leak of a hazardous substance into the marine environment is limited given that the marine terminal will not be transferring fuel, ballast water, sewage, waste or other materials apart from fluorspar concentrate and aggregate between the shore and the ship. Ships will arrive ballasted and ballast water will be discharged in accordance with the Canadian *Ballast Water Control and Management Regulations* and the International Maritime Organization (IMO) *International Convention for the Control and Management of Ships' Ballast Water and Sediments*.

Collisions between marine vessels are considered unlikely to occur given the paucity of large vessel traffic in the area of the marine terminal, and a collision with a fishing vessel would not likely result in damage severe enough to cause a release. The potential for collisions will be further reduced by using tug and pilot assist for docking at the marine terminal, and ensuring that the marine terminal is properly lit.

All vessels will have spill mitigation and clean-up equipment on board to respond to any deck spills or leaks, including booms, absorbent pads and dry chemicals. These measures will reduce the potential of spilled material entering the water. Spills to the marine environment will be infrequent and are likely to be small in quantity and will disperse rapidly. In the event of a spill, the ERP will be implemented to respond to and investigate the occurrence and follow up with corrective actions to reduce the likelihood of repeat spills.

Marine Spills of Fluorspar Concentrate and Aggregate

Fluorspar concentrate will be transferred from the concentrate storage building by covered conveyor to the ship loader then to marine vessels docked at the marine terminal. In the unlikely event that the conveyor and loading systems are damaged, fluorspar concentrate may be released to the environment. The concentrate would tend to slowly settle to the seabed due to its density. Currents in the area would likely disperse some material from the spill site. The majority of the material would sink in place and remain. Should an accident occur at the loading facility, large quantities of fluorspar concentrate could enter the marine environment, potentially smothering localized benthic communities. However, the loading system is operated by an individual and equipped with an automatic shut-off that would limit the amount of fluorspar concentrate released. Accidental releases of concentrate into the marine environment could also occur along the shipping route, but this is not expected.

Aggregate transfer from the aggregate processing/storing area will be loaded onto the same conveyor and ship loading systems as used for fluorspar concentrate. The loss of aggregate to the marine environment may affect the marine environment in a similar way. Regular maintenance and inspections of the mechanical and structural components of the systems will be carried out to mitigate potential releases of any product to the environment. In all cases, the response will conform to CFI's ERP. The procedures will be designed to reduce, contain, and recover spilled material to ensure that adverse effects are at most short-term and localized.

2.9.7 Fires and Explosions

A fire could occur at the Project site during any phase of the Project, caused by lightning, forest fire, human error or electrical/equipment malfunctions. The extent and duration of a fire depends on meteorological conditions and the success of the response effort. The immediate concern for a fire is human safety and damage of property. As well, in addition to the alteration or loss of habitat or direct loss of wildlife, emissions, particulate matter, and other contaminants may be generated.

Smoke from fires may contain particulate matter, Carbon Dioxide (CO_2), Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulfur Dioxides (SO_2), Volatile Organic Carbons (VOCs), poly-cyclic aromatic hydrocarbons or other contaminants. Total Particulate Matter (TPM) would increase and contribute metals to the aquatic environment. Runoff would contain ash and sediment and increase alkalinity and Total Suspended Solids (TSS). A fire could also increase stream bank erosion and alter the temperature of small waterbodies. A large fire could create air contaminant levels greater than the ambient air quality standard over distances of several kilometres; however, the likelihood of such a large fire is considered low and if such a fire was to occur, the duration would likely be short.

Mitigation and prevention of naturally occurring fires is difficult. CFI has taken and will continue to take all precautions necessary to prevent fire hazards including proper management of fuel and other flammable materials, and through appropriate operational procedures such as industry standard storage, handling and transfer techniques. Contingency plans are currently in place at the mine site and will continue to enable a quick and effective response to an on-site fire. Personnel will be trained in fire prevention and response, and appropriate fire-fighting equipment will be readily available in the event of a fire. This capability will also serve to minimize the environmental effects of fires caused by lightning and other natural phenomena in the vicinity.

Fire protection systems will be installed at the Project site. The ERP will be implemented immediately upon the detection of a fire. Firefighting equipment and an emergency response vehicle equipped with firefighting equipment will be deployed immediately. The appropriate Forest Management Unit office and Royal Canadian Mounted Police (RCMP) office will also be notified immediately, and in the unlikely event of a large fire, local emergency response and firefighting capability will be called to respond, reducing the severity and extent of damage and to protect the safety of workers.

Explosions at the marine terminal or associated infrastructure could result from an accident, failure of process equipment, over-pressure, sabotage, or as the result of a fire. A comprehensive leak and gas detection system will be in place to detect possible sources of ignition. A permit-to-work system will be implemented in all areas and “hot work” will be strictly controlled in areas with a potential to have an ignition source. Site security will continue to control access to the site (i.e., limited to approved personnel). The fire detection and alarm system will be monitored from the central control room to reduce response time so that small fires are detected and extinguished before developing into a major incident.

2.9.8 Emergency Response Plan

As part of CFI’s EHSMS, the current ERP will be updated for implementation during all phases of the Project. The updated ERP will provide an appropriate and consistent response to emergency situations that may occur during the construction, operation, and decommissioning and rehabilitation of the Project.

The main purpose of the ERP is to ensure the protection of life, environment and property/equipment and to identify predetermined courses of action for equipment/systems failure, erosion or sediment control failure, vehicle and vessel collisions, spills or leaks of hazardous substances, fires and explosions, medical emergencies or other emergency situations. This plan defines the responsibility of key personnel and outlines the general procedures to be followed when responding to emergencies in a way that will avoid or reduce health and safety risks, minimize trauma, safety hazards and environmental damage, reduce cleanup cost and minimize property damage.

CFI's ERP applies to all personnel working at the Project site, and describes the emergency procedures that must be implemented immediately upon the discovery of a situation that may endanger:

- safety and/or health of individuals;
- environment; and
- property and/or equipment.

The CSA Emergency Preparedness and Response standard (CAN/CSA-Z731-03; CSA 2014) is used to guide CFI's response planning process. The standard provides advice on planning, administration, training, resource utilization, auditing, and other aspects of emergency preparedness and response. Also, the *Environmental Emergency Regulations* (Government of Canada 2003), pursuant to section 200 of the Canadian EPA will be adhered to.

CFI's Project operation will use an Incident Command System (ICS) structure to organize the response to each emergency situation. For each emergency event, an incident management team will be activated along with an Emergency Operations Centre (or command centre).

2.10 Potential Resource Conflict

Potential interactions between the Project and the environment (both adverse and positive) during construction and operation may include those associated with:

- Fish and Fish Habitat (freshwater and marine);
- Resource Harvesting (fisheries, berry picking);
- Birds and Wildlife;
- Species at Risk (if present in the general area of construction); and
- Socio-Economic Environment.

Potential resource conflicts arising from these interactions are being identified through stakeholder consultations during all Project's planning stages, including the EA process. An analysis of these Project-environment interactions and potential resource conflicts is provided in Section 7.0.

2.11 Sustainability

As stated in its Health, Safety, Environmental and Social Responsibilities Statement (Appendix A) and in CFI's Design, Construction and Operations Guiding Principles (Appendix B), CFI continues to honor its commitment to sustainable development in all phases of the Project through planned integration of environmental, social and economic considerations.

CFI will continue demonstrating good environmental management in all phases of the Project. To reduce or avoid adverse environmental effects during construction and operation of the marine terminal and associated infrastructure, the BACT will be integrated into the Project. All measures will be taken to avoid or reduce adverse environmental effects resulting from Project-related activities.

Environmental management planning provides CFI with the tools to implement environmental protection measures and monitor discharges and emissions to the environment. A sound environmental management strategy and suitable mitigation measures can eliminate or reduce adverse effects on the environment.

CFI continues to honor its commitment to prevent pollution and to continually improve the integration of environmental protection practices in all its activities (i.e., adaptive management). CFI will ensure that Project activities are carried out in full compliance with all applicable environmental, health and safety laws and regulations by applying the best available technologies and highest standards. CFI's commitments and guiding principles for the proposed Project are outlined in their mission statement and guiding principles.

3.0 PROJECT RATIONALE AND ALTERNATIVES ASSESSMENT

The following sections present the Project's purpose and rationale, and describe alternatives to, and alternative means of carrying out, the Project.

3.1 Project Purpose

The Project's purpose is twofold: to improve the economics of CFI's operations during and beyond the AGS Mine's life; and to improve CFI's environmental performance as well as that of the end users of its products. These are described below.

The objective of the Project is to build and operate a dedicated marine shipping facility on the west side of the mine to ship the mine products of fluorspar concentrate as well as construction aggregate to international markets, using large vessels (Panamax bulk carriers).

3.1.1 Operational Economics

CFI's original plan was to ship fluorspar concentrate from a proposed marine terminal at Blue Beach Cove (the east option). However, challenging economic conditions have weighed against this in recent years. Therefore, CFI currently trucks its product to Marystown (about 45 km away from the mine) at high cost and loads it onto relatively small marine vessels for export to market. This began in August 2018 and continues as an interim measure while CFI explores other export options.

Transporting concentrate by truck to Marystown is not efficient; it is a concern to CFI from the point of view of public safety, wear and tear on community roads, and exhaust emissions from the trucks, let alone the costs and logistics.

To improve on the mine's economics, CFI is studying the option of processing its waste rock into construction aggregate and shipping this material in bulk to North America's eastern seaboard and the Caribbean region, where it is in high demand. Providing that long-term contracts can be secured with major North American aggregate buyers, and that the Project can be developed near CFI's mine site (the west option), the improved economics of the Project may help offset CFI's capital and operational costs associated with exporting its primary product, fluorspar concentrate. It would also permit loading larger marine vessels with concentrate, making shipments to China, a dominant fluorspar user, more viable.

The Project, therefore, could help position CFI's operations in St. Lawrence for the long-term after the AGS Mine ceases to produce.

3.1.2 Environmental Performance

CFI's acid-grade fluorspar concentrate (also called acid-spar) is a critical component of environmentally friendly technologies. The latest generation of lithium ion battery materials, Lithium Hexafluorophosphate (LiPF6), contains fluoropolymers produced by CFI's customers. China is the center of the lithium ion battery industry and this production is also spreading to Europe to support European auto manufacturers who have made vehicle electrification their top priority. Chinese LiPF6 producers Minmetals and Dofluoride have both visited CFI in St. Lawrence and would like to buy CFI's acid-spar for their Chinese-based production of LiPF6.

China has historically dominated global fluorspar markets via its exports but has become a net-importer of fluorspar in 2019 and all indications are that this will be the future state of the global fluorspar market.

CFI's acid-spar product is also a critical component of other environmentally friendly technologies, including refrigerants (Figure 3-1). The latest generation of low GWP refrigerants is 'Opteon' patented/manufactured by Chemours, Honeywell and licensed to Arkema. These are CFI's three largest customers.

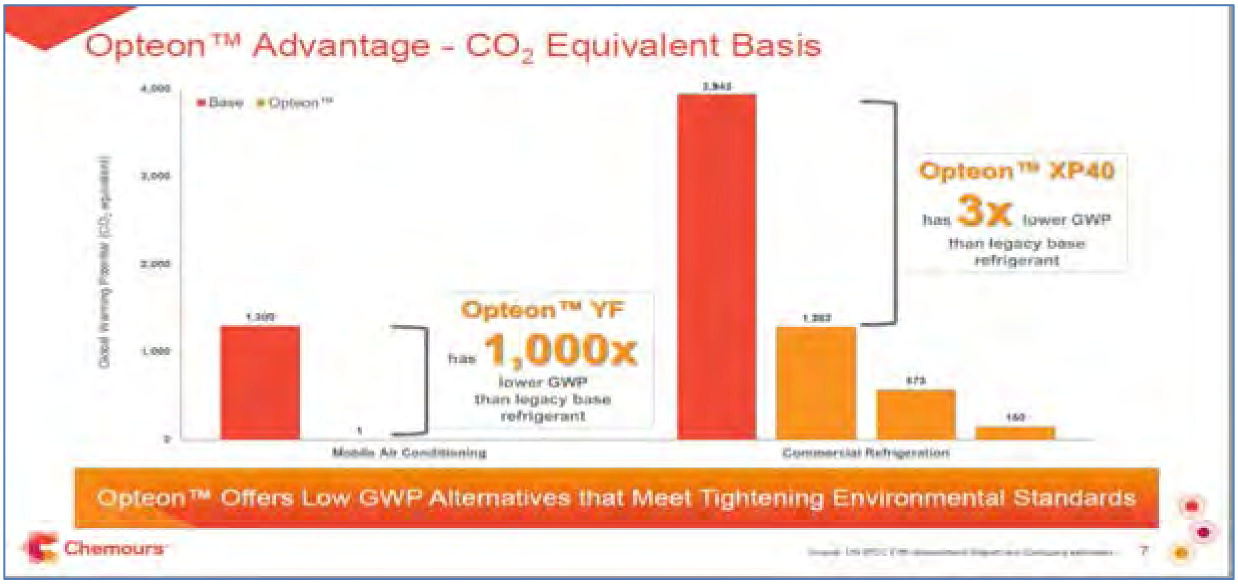


Figure 3-1: The Latest Generation of Refrigerants, Opteon™, has Significantly Lower Greenhouse Warming Potential than Legacy Base Refrigerants

The Project offers other environmental benefits. By having a western port next to the mine site, CFI will lessen its air and GHG emissions by reducing its concentrate trucking distances and using larger marine vessels for bigger bulk shipments, thus reducing the carbon footprint of CFI's operation.

Furthermore, processing its waste rock and exporting it for sale as construction aggregate will diminish the size of the waste rock dump or eliminate it altogether, thereby shrinking the mine's on-land footprint. Finally, converting ~35 million tonnes of waste rock, which requires significant energy to generate and handle, and processing it for bulk export by ship to markets that need it may in fact generate less GHG than the alternative, which may require truck hauling over relatively large distances from quarries in the Appalachian foothills to the coastal plains of the eastern US, where much of the aggregate is required.

3.2 Alternatives to the Project

The alternatives to the Project are:

1. No-go option (status-quo) with continued trucking of concentrate from the mill to Marystown 45 km away;
2. Building a marine terminal at one of two alternative locations in Blue Beach Cove and trucking concentrate (and aggregate) about 6–8 km east of the mine/mill, in addition to constructing storage/laydown areas for the products at the marine terminal site (sufficient for one ship load at any given time); and
3. Constructing and operating a marine terminal near and to the west of the mine near Mine Cove, Little Lawn Harbour (the Undertaking).

For both the Marystown and Blue Beach Cove options, aggregate export would not be feasible because truck hauling over 45 km or even a few kilometres is not economical.

In the case of Marystown, the existing marine facilities can only handle small ships. In addition, the limited to no available storage capacity for fluorspar concentrate requires trucking directly to the ship loader. In contrast, a marine terminal at Blue Beach Cove (the eastern option) or Mine Cove (the western option) can be designed to accommodate larger size vessels (i.e., Panamax bulk carriers of up to 72,000 DWT). Therefore, those latter two options offer greater potential for bigger bulk shipments to China. With respect to aggregate export, the west option near Mine Cove is likely the only feasible alternative from an economic perspective due to the relative proximity of the proposed Project to the AGS mine operation.

A marine terminal near Mine Cove could potentially extend the longevity of operations in St. Lawrence beyond the AGS Mine's 10-year life and add more new jobs.

CFI is currently conducting a feasibility study of these alternatives to assess the Project's viability. The west marine terminal option will be evaluated based on a number of factors, including economic and technical feasibility, predicted environmental and socio-economic effects, and benefits to the local community and region.

Part of AGS Mine's operations includes dumping, over the mine's life, about 35 million tonnes of waste rock into an area dedicated for this purpose. A no-go decision will therefore most likely mean that the waste rock dump will become a permanent feature in the area, as trucking this material, even if processed into construction aggregate, is a low-cost material that cannot be economically hauled over even moderate distances.

3.3 Alternative Means of Carrying out the Project

The following subsections present alternative means of carrying out the Project.

3.3.1 Marine Terminal Alternatives

Two options for the location of the marine terminal were considered for the Project: one on the north side and the other on the south side of Blue Beach Cove. Each wharf location had two variants that were evaluated.

3.3.1.1 North Side of Blue Beach Cove

This option was considered in previous studies and consists of a gravity-based structure with concrete caissons used for the wharf berthing surface. A 310 m long rock fill causeway will connect the wharf structure to the shore. The berthing face comprises four rock-filled concrete caissons, totaling 100.8 m long, with fenders to accommodate berthing loads. Behind the berthing structure is a backfilled area with dimensions of 30.4 m × 80 m which may be used for vehicle turning or as a laydown area. The loading system consists of one Aumund covered ship loading conveyor and one Samson Feeder with a loading rate of 500 tonnes per hour. Fluorspar concentrate is delivered from the storage facilities to the feeder system via direct dumping from trucks.

However, to accommodate larger Panamax vessels additional mooring dolphins would have to be added to the facility and an upgrade to the shiploader would be required to handle aggregate products.

The economics of this site were not in favor of aggregate export due to the trucking distance from the mine site and therefore this location was not given further consideration.

3.3.1.2 South Side of Blue Beach Cove

The location selected on the southern edge of Blue Beach Cove has a steeper gradient on the shoreline resulting in the design depths for the berthing vessels to be obtained closer to shore. This location also allows berthed vessels to take waves bow-on rather than broadside, as they would at the north side location, as the marine terminal line would be perpendicular to the prevailing wave direction. The berthing structure is designed to consist of steel piles.

Similar to the north side option the economics of this site were not in favor of aggregate export due to the trucking distance from the mine site and therefore this location was not given further consideration.

3.3.2 Aggregate Processing Siting Alternatives

The run of mine rock is produced at the open pit mine location and therefore economics dictate that the aggregate plant and associated marine terminal should be located within close proximity to the mine site. Trucking run of mine rock long distances to the aggregate plant and similarly trucking finished aggregate long distances to the port site would diminish the feasibility of producing aggregate products.

No other alternatives for the aggregate plant were considered for these reasons.

3.3.3 Alternative Processing Methods

Aggregate products can only be produced by utilizing a crushing plant consisting of crushers, screens, conveyors etc. While different equipment is available the basic set-up is similar for all aggregate plant operations.

No alternative aggregate processing methods were considered.

4.0 ENVIRONMENTAL EFFECTS ANALYSIS METHODOLOGY

This section describes the approach and methods used to carry out the analysis of environmental and socio-economic effects, which may occur as a result of the Project.

In general, the analysis involved the following steps:

- Determining the VCs (also commonly referred to as Valued Ecosystem Components [VECs]) that may interact with Project activities;
- Describing and studying the existing environmental setting in which the Project will be constructed and operated;
- Conducting a preliminary identification of likely Project-environment interactions;
- Establishing the temporal and spatial boundaries of interactions between the Project and the VCs;
- Identifying the Project-specific effects, including identification of likelihood of Project effects and recommended mitigation measures; and
- Describing the likely cumulative effects for the Project in combination with other physical activities that have been or will be carried out in the Project region.

The approach and methodology used in this document are based on accepted EA practice and federal and provincial guidelines, focusing on environmental and socio-economic issues of greatest concern. It is generally acknowledged that an EA is a planning tool and should focus on those components of the environment that are valued by society and/or serve as indicators for environmental change. These components are known VCs and include physical, environmental and socio-economic components.

The Project components and activities that are considered have been described in Section 2.0 of this document. This description facilitated the identification of key issues and the selection of spatial and temporal boundaries used in the analysis. The following subsections provide more information on the scoping and methodology involved in this analysis.

The scope of this document was determined by the Proponent and its consultants, and is based on proposed Project components and activities (described in Section 2.0), the professional judgment and expert knowledge of the consultant team, consultation with the public and regulatory authorities (Section 5.0), and the results of field studies conducted in support of this study.

4.1 Valued Components (VCs)

This analysis evaluates the likely environmental effects of the proposed Project components and activities, throughout all Project phases, with regard to each VC. By analyzing the likely effects on a given VC within the study boundaries, a meaningful evaluation of project effects on relevant environmental aspects can be achieved. The following VCs were identified based on government guidance, consultation with stakeholders, and understanding of the proposed Project:

1. Physical Environment (Soil and Geology);
2. Atmospheric Environment (Climate, Air and Noise);
3. Water Resources (Groundwater, Surface Water);

4. Terrestrial and Freshwater Biological Environment (Vegetation Communities and Habitat Types, Wetlands, Freshwater Fish and Fish Habitat, and Species at Risk);
5. Wildlife (Birds [Terrestrial and Marine] and Species at Risk);
6. Marine Environment (Fish and Fish Habitat, Marine Mammals, Sea Turtles and Species at Risk); and
7. Socio-economic Environment (Health and Safety, Economy, Employment and Business; Community Service and Infrastructure, Historic Resources, Navigation, Commercial, Recreation and Indigenous Fisheries).

4.2 Existing Environment

The existing environmental setting includes the environmental or socio-economic elements that were considered when determining likely effects that could occur as a result of the Project. The environmental baseline studies, describing the existing environment and socio-economic elements as they are at the time of document preparation, are the basis for determining potential changes and likely environmental and socio-economic effects associated with the Project.

The analytical methods and existing environmental and socio-economic setting in which the Project will be constructed and operated are described in Section 6.0. All elements referred to as VCs in this analysis are also described in that section; however, only those identified as having possible interactions with the Project were scoped into the analysis and discussed in further detail in Section 7.0.

Information from the following sources have been reviewed and used to describe the existing environment:

- Publicly available topographic and resource maps, aerial imagery, databases, scientific papers, technical reports, government websites, interactive websites, information letters, and fact sheets;
- Project-specific field investigations;
- Previous environmental applications prepared for the proposed reactivation of the St. Lawrence Fluorspar Mine;
- Environmental applications prepared for other projects in the area; and
- Communication with local land users; representatives from local and regional governments; local, provincial and federal regulators; and the general public.

An ELC was previously completed (CFI 2015b) to describe the vegetation and wildlife habitat at the local level, and field surveys were conducted and updated for specific resources. Field surveys completed in support of this analysis are summarized in Section 6.0. Additional surveys required to support the Project, and related Project planning and approvals, are described in Section 7.0.

The results of environmental field surveys conducted for the Project have been included in this document to the extent that they were available for meaningful analysis and interpretation at the time of writing. The timing, scheduling, and coordination of field surveys conducted to date, and those to be completed in support of detailed Project planning and other approvals, have been subject to the following limitations and considerations: preferred and optimal season and timing window for various surveys (e.g., fish and fish habitat assessment); and weather.

4.3 Preliminary Identification of Likely Project-Environment Interactions

A preliminary identification of likely Project-environment interactions was undertaken to focus the analysis on the issues of key importance. All relevant Project works or activities were analyzed individually to determine if a plausible mechanism exists for an effect on each VC during normal Project conditions. A detailed description of the undertaking is provided in Section 2.0.

The results are summarized in a matrix illustrating when the Project may interact with each VC and when adverse effects are likely or possible (Table 4-1). The interactions identified in the matrix are used to focus the description of the existing environment (Section 6.0) and the analysis and mitigation of likely effects (Section 7.0).

Table 4-1: Preliminary Project Interactions with Valued Components

Valued Components (VCs)		Project Phase		
		Construction	Operation and Maintenance	Decommissioning and Rehabilitation
Physical Environment	Soil	●	●	●
	Geology[(a)]	—	—	—
Atmospheric Environment	Climate[(b)]	—	—	—
	Air	●	●	●
	Noise	●	●	●
Water Resources	Groundwater	●	●	●
	Surface Water	●	●	●
	Freshwater Fish and Fish Habitat	●	●	●
Terrestrial Environment	Vegetation Communities and Habitat Types	●	●	●
	Wetlands	●	●	●
	Species at Risk	●	—	—
Wildlife	Birds [Terrestrial and Marine]	●	●	●
	Species at Risk	●	●	●
Marine Environment	Fish and Fish Habitat	●	●	●
	Marine Mammals	●	●	●
	Species at Risk	●	●	●
Socio-Economic Environment	Health and Safety	●	●	●
	Economy, Employment and Business	●	●	●
	Community Services and Infrastructure	●	●	●
	Historic Resources	●	●	●
	Navigation	●	●	●
	Commercial, Recreation and Indigenous Fisheries	●	●	●

Note:
(a) Geology is described in Existing Environment Section 6.1.4 & considered in the effects analysis in Section 7.3 Water Resources.
(b) Climate is described in Existing Environment Section 6.1.1 & is considered in the effects analysis in Section 7.2 Air and Noise.
● = A likely Project-environment interaction could result in an environmental or socio-economic effect.
— = No plausible interactions were identified.

4.4 Temporal and Spatial Boundaries

Establishing Project boundaries provides a meaningful and manageable focus for the analysis. Temporal and spatial boundaries encompass those periods and areas within which the VCs are likely to interact with, or be influenced by, the Project.

Temporal boundaries are generally limited to the duration of, and for a period of time after, the Project activities, which in this case include the entire lifetime of the Project including decommissioning and rehabilitation activities (e.g., 18–20 years). Temporal boundaries also address other temporal issues such as seasonal sensitivities (e.g., bird breeding).

Spatial boundaries are generally limited to the immediate Project area, unless otherwise noted. For the purpose of this assessment, the Project area (i.e., Project physical boundary, including the infrastructure footprint and other areas that may be affected by Project activities) was assumed to cover 200 ha (Figure 1-4), which is conservative assumption considering the Project infrastructure footprint area is 23.8 ha. The Project larger area of influence may include the AGS Mine and Mill and associated infrastructures, the Town of St. Lawrence and the surrounding environment. Some spatial boundaries may extend beyond the Project area (e.g., Water Resources, Terrestrial, Wildlife and Socio-Economic Environment).

4.5 Project Effects Analysis

The Project-specific effects analysis evaluates the environmental and socio-economic effects of the construction, operation and maintenance, and decommissioning and rehabilitation phases of the Project. A stepwise process was used to analyse the environmental effects of the Project in a systematic and transparent manner once the relevant Project works and activities, assessment boundaries, and relevant environmental and socio-economic VCs were identified.

The methodology included the following steps: identifying likely environmental and socio-economic effects; and developing technically and economically feasible mitigation. The effects analysis considers the possible interactions between the Project infrastructure components and activities, and the VCs, within the identified spatial and temporal boundaries.

Project interactions may be direct (i.e., as a result of a Project infrastructure component or activity affecting a VC), or indirect (i.e., as a result of a change to one VC affecting another VC). Likely effects of the Project on VCs are determined by comparing the baseline conditions to those that are expected to result from the introduction of the Project.

Project activities that have been considered in this analysis include the following:

1. <u>Construction</u>

- stripping;
- excavation and blasting;
- pile driving;
- aggregate and rock placement (for breakwater construction);
- construction activities and equipment mobilization;

- water management;
- energy consumption;
- transportation;
- waste management; and
- staging and storage of construction-related equipment and materials.

2. **Operation**

- waste rock processing;
- transportation;
- concentrate and aggregate conveyance and ship loading;
- water management;
- energy consumption;
- waste management; and
- site and equipment maintenance.

3. **Rehabilitation and Closure**

- rehabilitation and closure.

Development of mitigation measures to reduce or avoid likely effects on VCs begins with the engineering design phase, and continues throughout Project planning, EA, and consultation activities for the Project. Mitigation is outlined in the effects analysis (Section 7.0) with reference to the Project EPP, Health and Safety Plan, and other industry standard practices and regulatory requirements.

4.6 Cumulative Effects Analysis

In addition to the analysis of environmental or socio-economic effects of the Project by itself, the analysis also considers the environmental effects of the Project in combination with those from other projects and activities that have been, or will be, carried out in the foreseeable future, and which may interact with the likely effects of the Project.

The cumulative effects analysis aims to determine the interaction of these individual developments to determine how a given project will influence not only the Project site or area, but also the cumulative effects study area.

Consideration of other physical facilities or activities that have been or will be carried out within the defined spatial and temporal boundaries must, at a minimum, include the following:

- existing projects and activities; and
- those physical facilities or activities for which formal plans or applications have been made or are likely to occur.

Regarding future projects and activities, attention is focused on those that are certain to proceed (e.g., approved) or is reasonably foreseeable, as well as related future development assumptions.

If Project effects on a VC are predicted, the VC is carried forward into the cumulative effects analysis. For a VC where no Project effects are predicted, the VC is not carried forward for further analysis.

Typically, the likely effects of malfunctions and accidents are not included in the cumulative effects assessment because these events are hypothetical and have a low probability of occurrence.

In this document, cumulative effects are identified, analyzed and assessed in Section 7.9. The method of cumulative effects analysis follows the same general approach used for the Project effects analysis.

5.0 CONSULTATION AND ISSUES SCOPING

CFI started production at the AGS Mine in August 2018. Mine operations had been released from the EA process in 2015. The project assessed at that time included a purpose-built marine shipping facility to be located at Blue Beach Cove, adjacent to the community of St. Lawrence and in the outer St. Lawrence Harbour. However, CFI is now investigating the feasibility of an alternate location in St. Lawrence for the shipping terminal, on the west side of the town's boundaries and the AGS mine, near Mine Cove which is much closer to the active work site. A terminal at this location could make it economically viable to ship not only fluorspar but also aggregate, as a conveyor system would replace almost all of the trucking of materials. With a shipping facility within close proximity, the potential exists to prolong the mine's life by as much as 10 years.

Public consultation is an important part of EA. And while the public had been engaged in the previous assessment of CFI's AGS Mine operations, an alternate location of the shipping facility is a new aspect. CFI believes it warrants further consultation with stakeholders, as new information and interests should be considered, in particular those of the marine community. The focus of this Project and associated consultation addresses only the changes from the 2015 AGS project – the movement of fluorspar concentrate by conveyor to ships at a site different than Blue Beach Cove; the crushing and movement of aggregate to ships by conveyor; a breakwater to shelter the terminal which consists of the closed conveyor system and radial ship loader on the wharf which is supported by a series of piles founded within the sea floor; and mooring and berthing dolphins for a vessel (see Section 2.0 for details).

The initial round of consultation activities by CFI has been completed and feedback received from the community is generally highly supportive. Likewise, discussions with regulatory agencies have also been positive with clear direction as to the information they require. The proposed Project will build on previous relevant environmental studies: earlier studies are being updated and new studies relative to the marine environment in Little Lawn Harbour have been started.

Meaningful and respectful consultation remains important to CFI in building productive relationships with community members and interested stakeholders, and to improve the Project based on their input. CFI has worked to establish open and transparent communication with potentially interested or affected individuals, organizations and regulatory agencies.

Consultation approach and activities conducted to date are outlined in the following section. An overview of the feedback received from consultation activities is also presented.

5.1 Consultation Approach and Activities

CFI has taken a similar approach to the effective consultation carried out for the AGS Mine assessment in 2015, identifying stakeholders and regulatory agencies that would have clear interests and/or permitting roles and ensuring there is an effective communication process, with opportunities for information sharing. With the more focussed project (the marine shipping terminal), the public consultation is also more focussed but the new aspect of the alternate marine site has brought in additional potential stakeholders, i.e., commercial fisher harvesters who use Little Lawn Harbour and approaches, as well as Indigenous communities with fishing licences that can be used in Placentia Bay.

CFI's representatives and/or EA team met with several regulatory agencies regarding specific approvals or processes as well as with municipal representatives in the immediate area of ongoing operations

(St. Lawrence, Lawn, Burin, Marystown). FFAW-Unifor were asked for assistance to identify fish harvesters potentially affected by a terminal near Mine Cove and arranged an introductory meeting for the CFI EA team with fisher harvesters from Lawn and Lord's Cove.

CFI hosted a Public Information Session on 25 April 2019 in St. Lawrence, sending invitations to a wide group of potentially interested stakeholders across the Burin Peninsula (Table 5-1), again building on those invited to the 2015 consultation about the full mine project.

Table 5-1: Stakeholder Groups Invited to the Public Information Session

Stakeholder Category	Stakeholder Group
Municipal	Town of St. Lawrence
	Town of Marystown
	Town of Burin
	Town of Lawn
	Town of Lord's Cove
	Town of Lamaline
	Town of Fortune
	Town of Grand Bank
	Town of Garnish
	Town of Lewin's Cove
	Town of Bay L'Argent
	Town of Frenchman Cove
	Town of St. Bernard's-Jacques Fontaine
	Little St. Lawrence Local Service District
	Town of Point May
	Town of Winterland
Regulatory Agencies	NL Department of Municipal Affairs and Environment
	NL Department of Natural Resources
	Canadian Environmental Assessment (CEA) Agency
	Transport Canada
	Fisheries and Oceans Canada
	Environment Canada
	Canadian Wildlife Services
	Health Canada
Economic Development	Burin Peninsula Chamber of Commerce
	Placentia Bay Traffic Committee
	Fish, Food and Allied Workers-Unifor
	Greater Lamaline Area Development Association
	Burin Peninsula Heritage Tourism Association
	Placentia Bay Integrated Management Committee
Harbour Authorities	St. Lawrence Harbour Authority
	Harbour Authority of Lawn
	Harbour Authority of Lord's Cove

Stakeholder Category	Stakeholder Group
Fire Departments	St. Lawrence Fire Department
	Lawn Fire Department
Education and Training	Keyin College
	St. Lawrence Academy
	College of the North Atlantic (Burin Campus)
Environment and Recreation	Canadian Parks and Wilderness Society
	Ducks Unlimited
	Nature Conservancy Canada
	Little Lawn Memorial Trail Committee
	St. Lawrence Historical Advisory Board
	Salmonid Association of Eastern Newfoundland (SAEN)
	WWF-Canada
Industrial Employers	Grieg NL
	Ocean Choice International

A Public Information Session was held on 25 April 2019 at the St. Lawrence Recreation Centre from 6–9 pm, with a Project presentation at 6:30 pm. Notification for the Public Information Session was provided in the Southern Gazette newspaper on 23 April, and e-mailed to a wide range of stakeholder groups, including those listed in Table 5-1. Notification for the Public Information Session was also posted at the Town Hall and Post Office in St. Lawrence and the communities and public institutions to whom CFI sent the letter of invitation and who have public spaces, were requested to post the notice. CFI also posted the Notice of the Public Information Session on Facebook and other social media as well as the central electronic signboard in Marystown.

It is interesting to note that exit surveys at the Public Information Session identified Facebook as the primary source of the notice (43.6%); friend/word of mouth second in effectiveness (35.5%); and 14.5% learned of the session from ‘other’ (e.g., CFI contacts, Chamber of Commerce, at work) with less than 2% in response to the letter invitation. The newspaper ad attracted 6.5% of the attendees and the notices posted in the communities, almost 10%. For comparison, for the 2015 public information session, the majority (38%) heard about the event through the notices posted in the communities, friends (20%), the newspaper (15%), the letter of invitation (7%) and ‘other’ (20%) and there was no use of social media.

A copy of the Notice as well as the information materials and exit surveys provided at the Public Information Session are provided in Appendix C. The exit surveys have provided useful input to issues scoping and planning.

A total of 76 individuals signed in at the Public Information Session and 62 participants submitted exit surveys. A summary of the comments received, and issues raised during the Public Information Session are provided in Section 5.2 below.

5.2 Issues Scoping

5.2.1 Government: Federal, Provincial, and Municipal

Several meetings occurred with the area municipal leaders (from St. Lawrence, Lawn, Burin, Marystown) and with regulatory agencies to provide a description of the St. Lawrence Fluorspar Marine Shipping

Terminal Project, discuss the EA process and answer questions. A summary of the meeting details and discussion during these meetings is included in Table 5-2.

Table 5-2: Issues Discussed with Government Agencies (Federal, Provincial, Municipal)

Date	Stakeholder	Topic/Issue	Section Where Issue is Addressed
Initial Meetings – Notification of CFI's interest in an alternate location			
6 December 2018	NL DMAE	Clarification of regulatory approvals and process required for possible new marine terminal location	
12 December 2018	CEA Agency; Transport Canada; Environment and Climate Change Canada; NL Municipal Affairs and Environment; NL Fisheries and Land Resources	Notification of CFI's interest in an alternate location in St. Lawrence for the marine shipping terminal	
18 December 2018	Town of St. Lawrence	Notification of CFI's interest in an alternate location in St. Lawrence for the Marine shipping terminal	
Federal Agency meetings to discuss issues			
Date	**Stakeholder / CFI Team**	**Topic/Issue**	**Section Where Issue is Addressed**
12 March 2019	**CEA Agency**, NL Satellite Office: - Jill Adams, Head, - Brent Keeping CEA Agency, Halifax Melanie Smith, Betty Cougle CFI: Frank Pitman, Shelly Adams, Ray Bailey (JBC), Bassem Eid (BEHI), Mike Wawrzkow (MWA)	Presentation by CFI on the proposed Project Clarity regarding EA process	Section 1.4, 1.4.1 Section 5.2.1 following Table 5-2
8 April 2019	**Fisheries & Oceans Canada (DFO):** Julie Diamond, Roger Johnson, Bret Pilgrim, Dwayne Reddick, Kimberly Keats CFI: Frank Pitman, Bassem Eid, Shaun Garland (LGL) John Christian (LGL)	Presentation by CFI on proposed Project and fish/fish habitat research plan Direction from DFO regarding CFI to submit a Request for Review Application DFO will be an Expert Advisor to CEA Agency during the review, Regulatory Authority post EA	Section 6.6.1 Section 7.6.4, Table 7-7
11 April 2019	**Transport Canada**: Glen Rowe, Virginia Drew, Melissa Ginn CFI: Ray Bailey, Bassem Eid, Leslie Grattan	Presentation regarding the Project by CFI Clarification of TC role in CEAA 2012 and under C-69 TC to email the Notice of Works link	Section 5.2.1 following Table 5-2
9 May 2019	**ECCC** (Mount Pearl): Josh Mailhiot, Glen Troke, Jerry Pulchan, Sydney Worthman ECCC (Dartmouth): Maria Dober, Annabel Westell	Presentation regarding the CFI proposed Project Clarification of EA process to be followed	Section 7.5.4, Table 7-6

Date	Stakeholder	Topic/Issue	Section Where Issue is Addressed
	CFI: Colin Jones (LGL)	Inclusion of ECCC-CWS guidelines related to *Migratory Bird Convention Act*	Section 7.5.1 (Birds)
30 April–13 May 2019 (E-mail correspondences)	**Health Canada**: Allison Denning and Lance Richardon-Prager	Elevated radon levels, which have been measured in some institutional & government buildings in St. Lawrence, which was constructed from aggregates generated from the former underground mine. HC's concern related to total uranium concentration (source of Radon) in Project's aggregate that might be used for construction of buildings.	Section 6.1.4.1

Provincial Agency meetings to discuss issues

5 March 2019	NL Department of Natural Resources	Introduce the proposed new terminal location, west side of St. Lawrence	
14 March 2019	NL Municipal Affairs and Environment EA: Susan Squires, Joanne Sweeney, Paul Carter WRM: Ryan Pugh, Leona Hyde Climate Change: Gerald Crane Pollution Prevention: Angela Burridge, Dexter Pittman, Stephen Dyke, Barry Lawrence CFI: Frank Pitman, Shelly Adams, Bassem Eid, Ray Bailey, Michel Wawrzkow	Presentation regarding the CFI proposed Project Clarification of EA process to be followed Inclusion of climate change resiliency in Project	Climate Change Section 6.1.3
20 March 2019 (telephone)	Provincial Archaeology Office: Martha Drake CFI: Michel Wawrzkow	Confirmation that the previous (2015) report by Gerald Penney Associates Limited is still valid	Section 6.7.6
28 March 2019	NL DNR	AGS mine site visit and presentation	
10 April 2019	NL Department of Fisheries and Land Resources: Wayne Barney, Leah Soper, Jonathan Sharpe CFI: Frank Pitman, Bassem Eid, Ray Bailey, Michel Wawrzkow, Leslie Grattan, Marilyn Butland, John Christian (LGL), Colin Jones (LGL), Shaun Garland (LGL)	Presentation on the proposed CFI Project. CFI's plan to register the project for EA. Discussion regarding the request (by the Town of St. Lawrence) to amend the Municipal Habitat Stewardship Agreement, EP-MU zone. Discussion regarding technical matters by the LGL scientists	Section 1.4.3.1

Municipal Agency meetings to discuss issues

27 February 2019	Town of St. Lawrence Council	Meeting with Deputy Mayor and Town Manager regarding possible easement of a section of the Municipal Habitat Stewardship Management zone: agreed to discuss with Council	Section 1.5.3.1

Date	Stakeholder	Topic/Issue	Section Where Issue is Addressed
20 March 2019	Town of St. Lawrence Council	Letter from Council to DFLR requesting amendment of the Agreement to allow the easement	Section 1.4.3.1 and Section 2.1.1
9 May 2019	Town of Marystown: Dennis Kelly, Chief Administrative Officer	New location for CFI terminal	Section 7.7.4
9 May 2019	Town of Burin: Leo Hartson, Town Manager	New location for CFI terminal	Section 7.7.4
17 May 2019	Town of Lawn: Mayor John Strang	New location for the CFI terminal	Section 7.7.4

All agencies were able to provide clear guidance regarding the requirements and timelines for the federal or provincial EA process. While there is no harmonized process, the federal and provincial agencies do coordinate regarding an assessment - a single initial document could suffice as both a federal PD and a provincial RD provided all necessary information is included.

The CEA Agency reminded CFI that if the Project requires an EIS, the federal process could take 300–365 days (not including the time for the proponent to prepare materials). The CEA Agency emphasized the importance of public consultation in the assessment process, including with relevant Indigenous groups.

In the meeting with ECCC-CWS, their primary concerns were related to seabirds and light-attraction at the marine terminal and toward vessel traffic. Specifically, post-breeding pairs and fledgling Leach's Storm-petrels returning to sea from the colony at Middle Lawn Island. (Colony is estimated at 26,000 pairs and protected within Middle Lawn Island IBA/Lawn Islands Provincial Ecological Reserve). Under specific conditions (foggy and high SE wind), storm-petrels could potentially be attracted to light sources on vessels/marine terminal at Little Lawn Harbour on their westward fall migration from large colonies on St. Pierre and Miquelon (100,000+ pairs).

It was strongly suggested that CFI stipulate that reduced lighting will be utilized at the marine terminal facility. Light shielding is the preferable option. The Avian Management Plan should address the following:

- Will the marine terminal be illuminated at night continuously throughout the year?
- What options are available for light reduction mitigations during September and October period?
  - Is there a minimal lighting standard that could be applied to also meet Transport Canada requirements for Hazards to Navigation at the pier site?
  - Will aggregate crusher facility be active beyond daylight periods?
  - How often will vessels be utilizing the port (i.e., once a week, etc.)?
  - Can vessel traffic be deferred during September/October period?

ECCC-CWS also reminded the CFI consultants that standardized search effort is now required and is to be documented for Leach's Storm-petrel searches onboard vessels and at facilities. This requirement could be incorporated into the Avifauna Management Plan.

Land birds were not a specific concern. As per the AGS Mine EA and construction, standard *Migratory Bird Convention Act* guidelines will have to be applied, including:

- Ideally, no clearing during the April–September period.
- Breeding bird surveys/nest searches prior to any stripping/construction activities (10 days prior) within the bird nesting period from 15 April to 15 August, and species-specific set-back (buffer) distances utilized if/when nests located. If surveys are to be completed for any species listed under the ESA as Endangered or Threatened, an ESA permit is required, and survey results are to be submitted to the Wildlife Division.

During the meeting with DFO, the proposed field program was described by a member of CFI's consulting team. DFO recommended addition of salinity measurements to determine the extent of the freshwater outflow into the estuary from Lawn River. DFO also reminded CFI that, even though there are no Indigenous lands or fisheries in the area, this should be confirmed. Note that this effort is underway (see Section 5.3).

Transport Canada stated that they did not see any issues with the new location for the terminal and would be participating in the federal EA process as an Expert Advisor, assuming a direct regulatory role related to approvals and permits.

In discussion with NL DFLR about the requested easement of a small area of the current Municipal Habitat Stewardship Agreement, EP-MU area, it was stated that the Registration must clearly show CFI's awareness of the Agreement and discuss how the potential land use conflict would be mitigated. DFLR also mentioned that CFI has been diligent in their efforts to update/undertake baseline studies at site. In general, NL DFLR did not see any significant issues for the location from the wildlife or land use perspective.

5.2.2 Commercial Fishers

The introductory meeting on 25 April with fish harvesters included about a dozen individuals from Lawn and Lord's Cove, identified by the FFAW as traditionally fishing in Little Lawn Harbour or approaches. FFAW's representative for Placentia Bay and FFAW's Industry Liaison also attended the meeting. Two members of the CFI EA team provided a description of the proposed breakwater and terminal and its location, using schematic drawings and charts.

The main concern of the fisher harvesters is losing access to their usual fishing grounds in Little Lawn Harbour, primarily for lobster, although some cod fishing is also carried out in the harbour. On charts, they indicated that the entire coastline of Little Lawn Harbour is used for lobster fishing. They are not convinced that the breakwater will create new lobster habitat and have concern that the breakwater will alter the natural movement of sediment in the harbour, allowing it to build up and make the area unsuitable for lobster. They pointed out that recent experiences with breakwaters in the area demonstrated the challenge in building them to withstand the force of waves: single pieces of rock weighing five tonnes have reportedly been moved out of position. The breakwater at Point au Gaul (a community near St. Lawrence) failed with heavy seas (G. Crane, NL Office of Climate Change, pers. comm., 14 March 2019). The fisher harvesters advised CFI that the College of the North Atlantic (CNA) had collected data on waves and winds in the area that might be useful to CFI's ongoing Met-Ocean study.

Some of the harvesters also fish cod and crab in the areas of deep water outside Little Lawn Harbour near possible routes for large vessels travelling in Placentia Bay to reach or leave the terminal. Typically, the smaller boats that are in use (e.g., 20 ft - open boats usually used for lobster, and somewhat larger for crab and cod) do not carry radar and could be at risk in foggy conditions. FFAW asked if there would be pilotage in the area (as is done elsewhere in Placentia Bay, e.g., for the Transshipment Terminal at Whiffen Head).

The fishers referenced research that they and FFAW have been doing over the years on small lobster in Little Lawn Harbour, which appears to have an abundance of small lobster, and data on the lobster and environmental conditions has been collected and provided to DFO. One Lawn fish harvester participated in DFO's green crab monitoring program during the summer of 2018.

Several of the harvesters attended the evening Pubic Information Session and were able to continue discussions about the breakwater with the Project Engineer for the CFI project. The fishers agreed that the location chosen for the breakwater and terminal (Red Head, near Mine Cove) was the best in Little Lawn Harbour – 'the smoothest, deepest water', 'it's the right spot', as they said.

5.2.3 Public Information Session

The Public Information Session held in St. Lawrence on 25 April, was an important source of information for CFI to aid their understanding of residents' interests, questions and reaction to the proposed alternate location of the marine shipping terminal, especially what they see as advantages and disadvantages over the previous location at Blue Beach Cove closer to the community centre.

The Public Information Session was held at the St. Lawrence Recreation Centre from 6–9 pm, with a Project presentation at 6:30 pm. Notification for the Public Information Session was provided in the Southern Gazette newspaper on 23 April, and e-mailed to a wide range of stakeholder groups, including those listed in Table 5-1 plus others such as the harbour authorities, regional services boards and associations (Appendix C). Notification for the Public Information Session was also posted at the Town Hall and Post Office in St. Lawrence and the communities and public institutions to whom CFI sent the letter of invitation and who have public spaces, were requested to post the notice in the community and on their respective social media accounts. CFI also posted the Notice of the Public Information Session on Facebook and other social media as well as the central electronic signboard in Marystown.

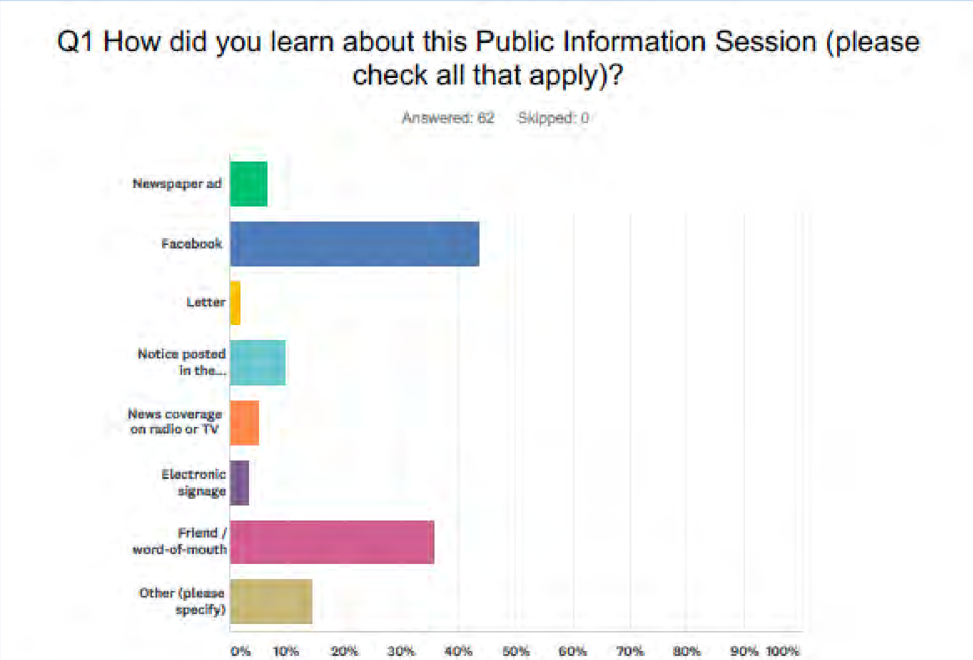
It is interesting to note that exit surveys at the Public Information Session identified Facebook as the primary source of the notice (43.6%); friend/word of mouth second in effectiveness (35.5%); and 14.5% learned of the session from 'other' (e.g., CFI contacts, Chamber of Commerce, at work) with less than 2% in response to the letter invitation. The newspaper ad attracted 6.5% of the attendees and the notices posted in the communities, almost 10%. For comparison, for the 2015 public information session, the majority (38%) heard about the event through the notices posted in the communities, friends (20%), the newspaper (15%), the letter of invitation (7%) and 'other' (20%) and there was no use of social media. A copy of the Notice as well as the information materials and exit surveys provided at the Public Information Session are provided in Appendix C. The exit surveys have provided useful input to issues scoping and planning.

On arrival at the Recreation Centre, participants were invited to sign in and circulate the room where information posters were set up, both before and after the presentation by the CFI President and CEO and the Project Engineer. CFI representatives and technical experts were present to answer questions, and record comments and concerns. Participants were requested to complete the exit survey to provide feedback on the Public Information Session, and the Project itself. The survey also asked for information about both commercial and recreational activities in the Project area.

The signup sheet had 76 people signatures, including four from the consultant team and 10 from CFI. While close to half of those who attended were from St. Lawrence, there were people from as far away as St. John's and Clarenville, and a good number from nearby communities. 62 surveys were submitted, many partially complete. The responses to the 11 questions on the survey are summarized below.

Survey Results

The first question inquired about how the participant learned about the Public Information Session. A graphical representation of the responses is shown in Figure 5-1. The majority heard about the Public Information Session through Facebook (43.5%), followed by friend or word of mouth (35.5%) and other such as mentioned at work/office, contacted by CFI or from the Chamber of Commerce (14.5%).



ANSWER CHOICES	RESPONSES	
Newspaper ad	6.45%	4
Facebook	43.55%	27
Letter	1.61%	1
Notice posted in the community	9.68%	6
News coverage on radio or TV	4.84%	3
Electronic signage	3.23%	2
Friend / word-of-mouth	35.48%	22
Other (please specify)	14.52%	9
Total Respondents: 62		

Figure 5-1: Responses to "How Did You Learn About This Public Information Session?"

The second question related to the community in which the participant resides. A graphical representation of the responses to the second question is shown in Figure 5-2. The majority of participants reside in St. Lawrence (55.7%). While Marystown was well represented (almost 10%), over 21% of participants indicated they live 'other ', naming communities mainly on the Burin Peninsula.

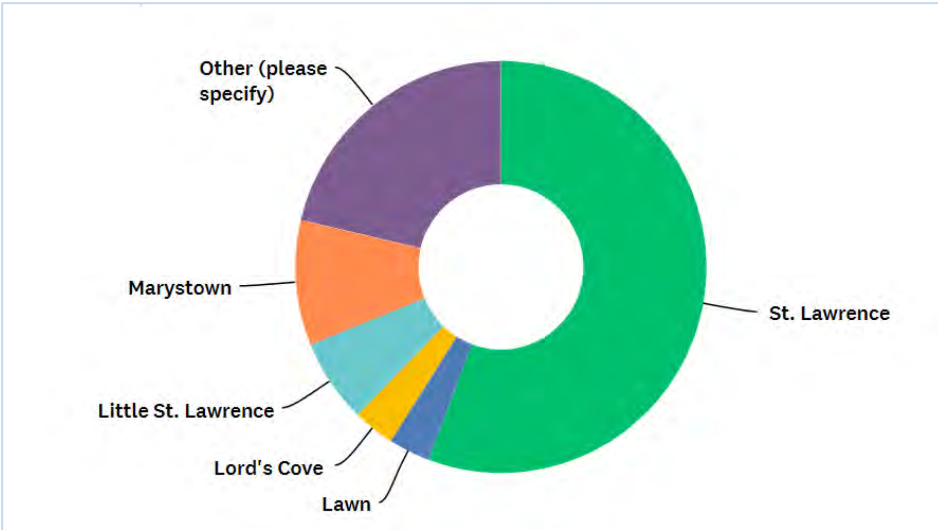


Figure 5-2: Responses to Question, "Which Community Do You Reside In?"

The third question was about the usefulness of the information delivered in the presentation and at the information stations. Responses to the third question are presented graphically in Figure 5-3. Almost 90% of participants found the information presented at this Information Session to be very useful with a lot of new information. No respondents indicated that that the information provided was not useful.

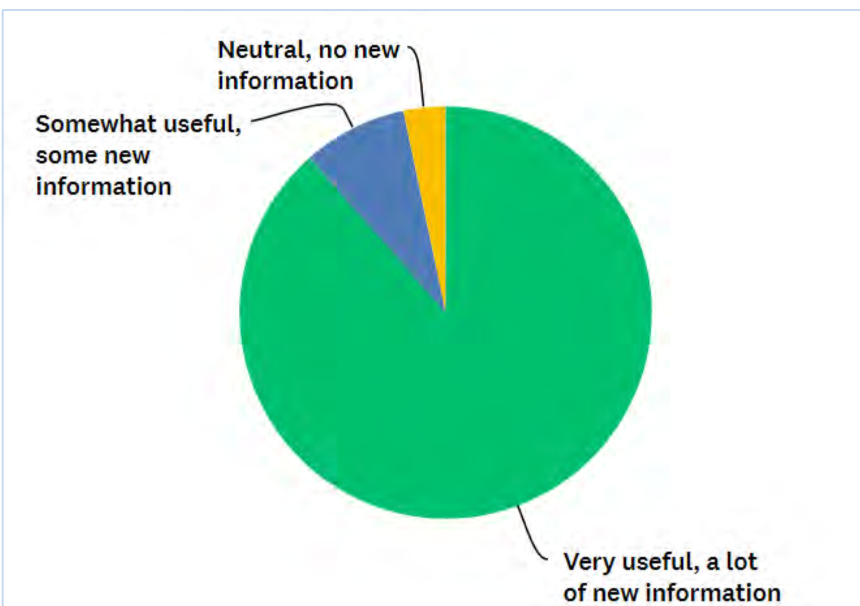


Figure 5-3: Responses to "Was the Information in the Presentation and the Information Stations Useful?"

The fourth question asked respondents if they use any water bodies near the proposed new terminal location for either commercial or recreational fishing. Recreational fishing in the area was identified by 14.8% of respondents and, from the names of locations used, appears to be mainly freshwater fishing. Commercial fishing in Little Lawn Harbour and/or off Lawn Point was identified by 9.8% of respondents.

The fifth question asked respondents what types of activities they participate in, in the area around the proposed marine terminal location. Hiking and walking were identified as the main recreational activities in the area (72.2% of respondents) with trails to Cape Chapeau Rouge and Chambers Cove named. Other activities (25.0%) include the use of All-Terrain Vehicles (ATVs), hunting, fishing, woodcutting and berry picking (Figure 5-4).

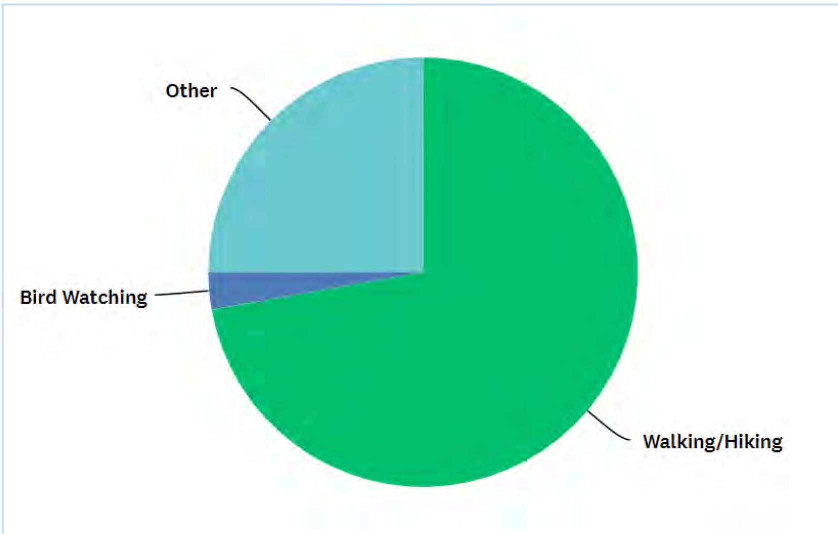


Figure 5-4: Response to "What Types of Activities They Participate In?"

The sixth question asked respondents if they are aware of the St. Lawrence Habitat Stewardship agreement with the provincial government. Almost 68% of respondents indicated yes: this may be a reflection of the importance assigned in question nine to Environment which was ranked first or second in importance by 68% of respondents.

The seventh question gave qualitative information on the level of interest in the project by individuals who are/are not currently involved in some way with CFI. When coupled with the response in question three (how useful is the information in the presentation and posters?), it also provided an indication that CFI is providing Project information to the public as it is developed, in a timely manner. Sixty-one per cent of attendees are either themselves or have family involved with CFI or a contractor or supplier, while 38.9% do not have an association with the mine.

The eighth question is direct – Do you support the Proposed Marine Shipping Terminal on the west side of the mine? The response is clear: 96.4% are in support (Figure 5-5).

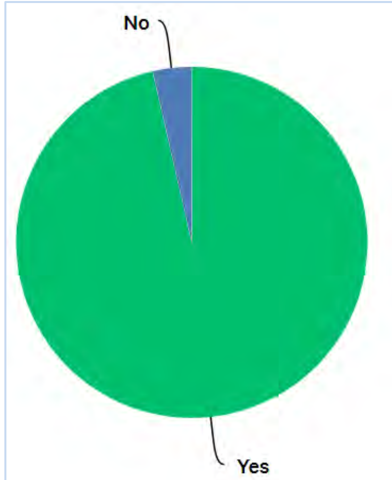


Figure 5-5: Response to "Do You Support The Proposed Marine Shipping Terminal At The Proposed Location?"

The ninth question seeks to understand what area residents believe is the most important aspect of the Project: they are asked to rank five different aspects: Health and safety; jobs/employment; environment; local benefits; and other (Figure 5-6). The overwhelming interest is in health and safety, which was ranked as number one in importance and almost twice as important to participants as employment. There were only three who selected other as a response, and they indicated economic benefits for the community, infrastructure and education.

Figure 5-6: Response to Question on "Most Important Aspect of The Project to Participants"

In question 10, the survey asks respondents what they see as the advantages or disadvantages of the proposed new, western location for the marine shipping terminal. Responses mainly identified advantages (38 of 48 responses), in particular reduced trucking/traffic on community and public roads. Other advantages mentioned include the possibility of additional opportunities (e.g., exporting aggregate); the benefit to the environment of reduced air emissions with decrease in trucking; and the shorter distance to move the material as an economic benefit. A couple of respondents identified the challenges of maintaining a breakwater in heavy sea conditions. Four comments mentioned the introduction of large vessels in the area used by small fishing boats and one expressed concern for effects on the lobster fishery in Little Lawn Harbour. However, there was also a comment 'The people who might object to this location are fishermen but my experience in the area tells me the fishermen should not be concerned.'

Question 11 was open ended, asking respondents to provide any additional comments or questions. Several supportive comments were added, e.g., '...a very positive project development for the community' and 'great project for town and region', 'good project for long term viability'. The caution raised by some of the fish harvesters regarding the wave and wind forces and breakwater design was reiterated and there was encouragement to continue to work with the area fish harvesters regarding potential for displacement from fishing areas.

Verbal comments, questions and concerns from participants were noted during the Public Information Session. Several participants were interested in the EA procedure and took diagrams showing the provincial and federal processes. While Little Lawn Harbour itself has not been identified as an area heavily used for recreation, useful contacts were identified with the two local groups interested in developing and managing historic trails in the local area. Most interest by participants at the Public Information Session was shown in the actual structures proposed, in particular the design and materials to be used for the breakwater near Mine Cove in Little Lawn Harbour.

In summary, there is clear support for the Project. Issues scoping through public consultation has identified two areas of high interest and another two of some interest.

Health and Safety

The primary interest of residents is health and safety. They have identified the reduction or cessation of the heavy truck traffic carrying fluorspar concentrate through communities and on public roads as an advantage of the Project. Shipping the concentrate directly from the mine site will reduce safety risk and reduce the level of air emissions. There is also recognition that open pit mining is safer than underground mining and that the Project will extend this method at the AGS Mine.

Commercial Fishing

At the introductory meeting with the fisher harvesters who use Little Lawn Harbour, they had questions about the potential effects of the Project both on the lobster fishery and on lobster habitat in Little Lawn Harbour. They suggested a baseline for the lobster fishery be established and their concern regarding displacement be further discussed. Area fish harvesters use the deep water off of Little Lawn Harbour for crab and cod fishing: the FFAW representative suggested there may be a need for pilotage in this area. Fish harvesters offered to share their knowledge and experience in the sea conditions of the Project area with CFI. CFI will continue to work with the local fishing community.

A week later, CFI met with the Placentia Bay Traffic Committee to introduce the Project and will continue to keep the Committee Chair informed as the Project progresses.

Employment

A third focus of interest is employment, identified by about 36% of respondents as their highest ranked interest. CFI made it clear in the presentation at the Public Information Session that the western location for the terminal could create a new economic opportunity, the export of aggregate. With this opportunity, the life span of the open pit AGS Mine would be increased by about 10 years. While the Project would increase the workforce by about 10%, the extended life of operations at the mine is the greater benefit, as it would mean longer, more certain employment.

The RD/PD discusses the linked aspects of Economy, Employment and Business. CFI and the Province have a Benefits Agreement in place that addresses both employment and business. While each community has its own specific focus, e.g., Burin's main economic interest is to increase tourism (L. Hartson, Town Manager, Burin, pers. comm., 9 May 2019), there is acknowledgement that there is a shared economy on the Burin Peninsula. Dennis Kelly, Chief Administrative Officer for Marystown spoke to the economic benefits in one community also felt by the others "Towns support each other, great for the economy, great for employment" (D. Kelly, Chief Administrative Officer, Town of Marystown, pers. comm., 9 May 2019).

Environment

A fourth focus of interest is Environment, ranked as first importance by almost 20% of respondents and as second by 48%. Respondents see the reduction in air emissions (by removing trucking of material to Marystown for shipment) as a clear advantage of the Project. Respondents also indicate outdoor activities as part of their recreation, specifically mentioning walking/hiking (72%) as well as fishing, hunting and berry picking. Maintaining the marine environment of Little Lawn Harbour for lobster habitat (and capelin spawning) has been identified as important by fish harvesters.

Summary of the above public information session's feedback, concerns and/or support of the Project is presented in Table 5-3 below.

Table 5-3: Summary of Points Raised by Public Information Session Participants

Category	Issue	Comment Summary	Response and Location in RD/PD
Physical Environment	Breakwater withstanding Met-Ocean conditions	Recent experience with a local new breakwater shows the severity of wind/wave conditions: challenge to withstand.	Breakwater is designed to withstand the 100-year return period wind/wave conditions (Section 2.0).
	Sediment build-up behind the breakwater	The breakwater may interfere with natural movement of sediment causing build up behind the breakwater and on up the harbour.	Comment noted (and is addressed in the Met-Ocean Study).
Socio-Economic Environment	Economy and Employment	38% of respondents identified employment as most important.	Noted. See community support comments, Section 7.7.4
		Respondents strongly support the Project (98%).	Noted.
		While only about 15% of respondents ranked local benefits as their first priority, the Project would bring some economic certainty to the community.	Noted. Economy, Employment and Business are discussed in Section 7.7

Category	Issue	Comment Summary	Response and Location in RD/PD
	Human Health and Safety	Open pit mine is much safer than underground mining. The Project would extend the life of open pit mining by about 10 years.	Safety is a top priority for CFI and a strong emphasis will be placed on safety of workers during all phases of the Project. CFI's Health and Safety plan will be updated for each Project phase. Additional information on health and safety is provided in Section 7.7: Socio-Economic Effects Analysis.
		Heavy trucks on community and public roads are a safety concern.	Noted. Mitigation measures have been taken to avoid or reduce heavy truck traffic on public roads, which is one of the main reason for the proposed marine terminal location; The Project will remove the need for the heavy truck travel between the mine site and Marystown (Section 2.0)
	Current/Historical Land and Resource Use	Little Lawn Memorial Trail Committee has applied to Crown Lands for the right to occupy for a trail along the east coast of Little Lawn Harbour – can this still happen?.	Information on effects on land and resource use activities and proposed mitigation measures is provided in Section 7.7: Socio-Economic Effects Analysis and Section 1.5.3.1.
	Tourism and Recreation	Survey responses showed that there is some use of the land in the general mine area for recreation such as walking, hiking, ATV travel, hunting, fishing, berry picking.	
	Disruption of lobster fishery in Little Lawn Harbour	Fishers are concerned that the breakwater will alter lobster habitat and that some fishers will be displaced	Habitat is discussed in Section 7.6.1 CFI's plans to continue working with fishers to address concerns is in Section 7.7.2
General Project	Project Description	The Marine Shipping Terminal will be contiguous with the Town of St. Lawrence boundary.	Section 2.0

5.3 Proponent Engagement and Consultation with Indigenous Groups

Previous research for the 2015 AGS Mine EA has found that there are no designated Indigenous lands in the St. Lawrence Project region (CFI 2015a) and CFI is not aware of any Indigenous fishing activities in the approaches to or within the Project area in Little Lawn Harbour. However, several Indigenous communities hold licences from DFO that could allow fishing in Placentia Bay: while none has occurred to date, CFI has contacted each of the identified Indigenous communities about the Project and the EA and requested their input. The potentially affected groups are: Miawpukek First Nation (MFN) and Qalipu Mi'kmaq First Nation Band (Qalipu), both based on the Island although distant from the Project location: information about the communities and their fishing licences is given in Section 6.7.5.3. NunatuKavut Community Council, Labrador Innu (Innu Nation) and the Labrador Inuit (Nunatsiavut), all based in Labrador, also hold licences that enable access to the fishery resources in Placentia Bay

CFI's Project Engineer responsible for the feasibility study sent an introductory email to the DFO-identified contact for each of the five Indigenous groups. The email and attached letter introduced the Project and invited input into the EA. The letter indicated the planned timeframe for initiating the assessment and requested confirmation of the appropriate contact for further communication regarding the Project. CFI's socio-economic EA consultant followed up on the letter in telephone conversation(s) and with further information if requested. At the time of writing CFI has been assured by two of the Labrador based communities that they do not plan to fish in the Project area and three of the five, including both Island based groups, have offered to review the Project information provided and the RD/PD as well. MFN indicated they would review the information provided and RD/PD from the point of view of vessel related traffic, noise, pollution, potential accidents as well as the salmon river entering Little Lawn Harbour. CFI has initiated contact with DFO to ascertain if Indigenous groups on the east coast but outside this province have licences that could bring them into Placentia Bay: if so, CFI will contact them regarding the Project.

There are no Indigenous communities in the Project area and there is no record of current or historical use of Project lands for traditional purposes. As well, there is no record of structures or sites within the Project area that are of historical, archaeological, paleontological or architectural significance to communities within the study area. Therefore, there is no change to the environment as a result of the Project that would affect the Indigenous groups in NL or other Atlantic Provinces.

CFI has contacted, by email and telephone, the Indigenous groups in the province identified by DFO as having fishing licences and has invited their input to the Project information and the Project RD/PD. CFI has also requested that each group confirm the appropriate contact for the Project EA. CFI will notify the Indigenous groups when the RD/PD is submitted and provide the web link. CFI is contacting DFO in other east coast regions to determine if there are additional licences held by groups outside the province that give access to NAFO 3PSc: if so, a similar effort to contact them will be made. CFI is committed to a program of engagement with all stakeholders at all stages of the Project and will monitor the effectiveness of the various media used for Project communication.

6.0 EXISTING ENVIRONMENT

The Project area's physical, biological and socio-economic environments are described in the following sections.

6.1 Physical Environment

This section includes an overview of the climate, marine environment (Met-Ocean), soil and geology, surface water, groundwater and air quality.

6.1.1 Climate

The recorded data from the St. Lawrence weather station (Meteorological Services Canada (MSC) # 8403619 Latitude: 46 55' N, Longitude: 55 23'W, Elevation/Altitude: 48 m; years: 1969–2013 (44 years) are used in this study. The Town of St. Lawrence is found on the southeast portion of the Burin Peninsula where the climate is heavily influenced by the ocean. The proposed marine shipping terminal near Mine Cove is ~8 km west of St. Lawrence, and therefore has the same climate as St. Lawrence.

Summers are cool and winters are mild with limited to no snow cover. Fog is frequent all year round along the Burin Peninsula especially during the spring and summer.

The average daily temperature for the area is 4.8° C. Precipitation occurs all year round as rain with some snow in the winter months. Average monthly precipitation ranges from 110.2 mm (July) to 165.9 mm (October); with an annual total of 1617 mm. Average annual potential evapotranspiration is estimated to be 479.2 mm, occurring mainly from June–September.

The following long-term averages, shown in Table 6-1, are based on the analysis of the 1969–2013 monthly climate data for the St. Lawrence meteorological station, which is located less than 8 km east of the Project site.

Table 6-1: 1969–2013 Long-Term Averages for the St. Lawrence Meteorological Station

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Maximum Temperature (°C)[1]	-0.4	-0.7	1.5	5.1	9.6	13.4	17.1	18.4	15.7	11.0	6.5	2.3	8.3
Mean Minimum Temperature (°C)[1]	-7.3	-7.8	-5.2	-1.6	1.8	5.5	9.9	11.3	8.2	4.0	0.3	-4.1	1.3
Total Precipitation (mm)[2]	144.5	131.2	129.3	125.7	123.6	123.0	110.2	120.3	147.9	165.9	154.2	145.2	1617
Rainfall (mm)[2]	73.1	71.5	90.0	107.5	120.0	121.9	109.1	119.2	146.4	163.0	141.1	103.5	1364
Snowfall (cm)[2]	82.8	63.9	40.9	18.5	1.8	0.2	0.0	0.0	0.0	1.0	12.2	44.7	264.9
Potential Evapotranspiration (mm)[3]	0.0	0.0	1.1	15.4	49.1	75.2	102.1	101.0	71.7	43.4	18.4	1.9	479.2

Notes:

1 Missing temperature data for the St. Lawrence meteorological station were estimated by linear regression on temperature data for the Winterland meteorological station.

2 Missing precipitation data were estimated using the normal ratio method from precipitation data for the Westbrook St. Lawrence and Winterland meteorological stations.

3 Potential evapotranspiration data for the St. Lawrence station were estimated using the Thornthwaite equation from temperature data.

6.1.2 Met-Ocean Climate

The Project is located at 46° 55’ N, 55° 29’ W, on the west side of the Little Lawn Harbour about 500 m west of the AGS Mine. Due to its coastal location, the ocean heavily influences the site’s climate.

The Burin Peninsula is situated between Placentia Bay and Fortune Bay, and therefore meteorological and oceanographic (Met-Ocean) conditions of the peninsula are greatly influenced by these water bodies as well as the offshore climate of Newfoundland’s northern Grand Banks (Figure 6-1).

Figure 6-1: Location Map of the Project Site (Showing Data Points Used in the Study) (Google Earth 2019)

A SmartBay meteorological/oceanographic buoy is located at the mouth of Placentia Bay (46° 58.9’ N, 54° 41.1' W), about 60 km from Little Lawn Harbour (see Figure 6-1). This buoy measures real-time data of a variety of atmospheric and surface conditions including, wind speed and direction, air temperature, humidity, dew point, barometric pressure, water temperature, salinity, current speed, current direction, wave height, wave direction and wave period[2]. The Buoy data extends from 1998 to present.

In addition to the measured Met-Ocean data, long-term wind/wave hindcast dataset from MSC, MSC50 Grid Point # M6011164 has been used to provide the Met-Ocean conditions offshore of the Project site. MSC50 wind and wave dataset extends from 1 Jan 1954 to 31 Dec 2015 (62 years).

Most recently, Nalcor Energy has compiled a vast Met-Ocean database of offshore Newfoundland and Labrador which includes bathymetry, wind, wave, current, visibility (fog), vessel icing, sea ice (pack ice) and icebergs (Nalcor Energy (2017): *Met-Ocean Climate Study Offshore Newfoundland and Labrador*, September 2017). This database covers the area from 39.50° to 63° N of the North Atlantic Ocean. The area was divided into 750 grid cells (0.5° Latitude and 1° Latitude). The Project site lies within cell # 394 (with centre point at 46° 45’N, 55° 30’W, ~20 km south of the marine terminal site, as shown in Figure 6-2,

[2] https://www.smartatlantic.ca/PlacentiaBay/

which provides representation of the Met-Ocean climate conditions of Burin Peninsula's coastal and offshore areas.

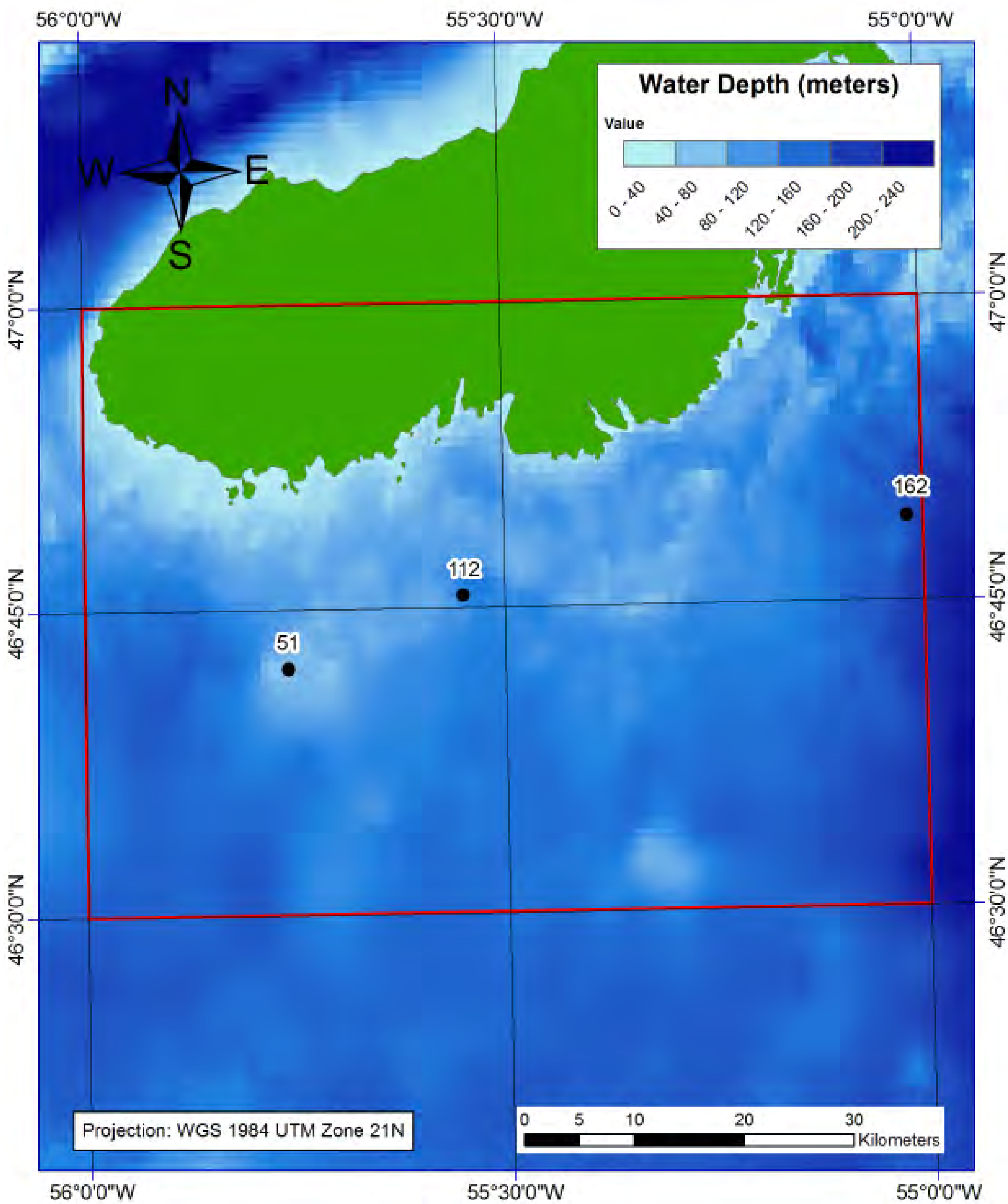


Figure 6-2: Nalcor Energy (2017) Met-Ocean Study Cell # 394 Bathymetry

6.1.2.1 Bathymetry

Canadian Hydrographic Service (CHS) Hydrographical Chart # 4625 shows the bathymetry of the study area (Figure 6-3). A detailed site-specific bathymetric survey has been carried out to obtain the required water depth data at the Project site and its approaches. This is needed for detailed wharf and breakwater design.

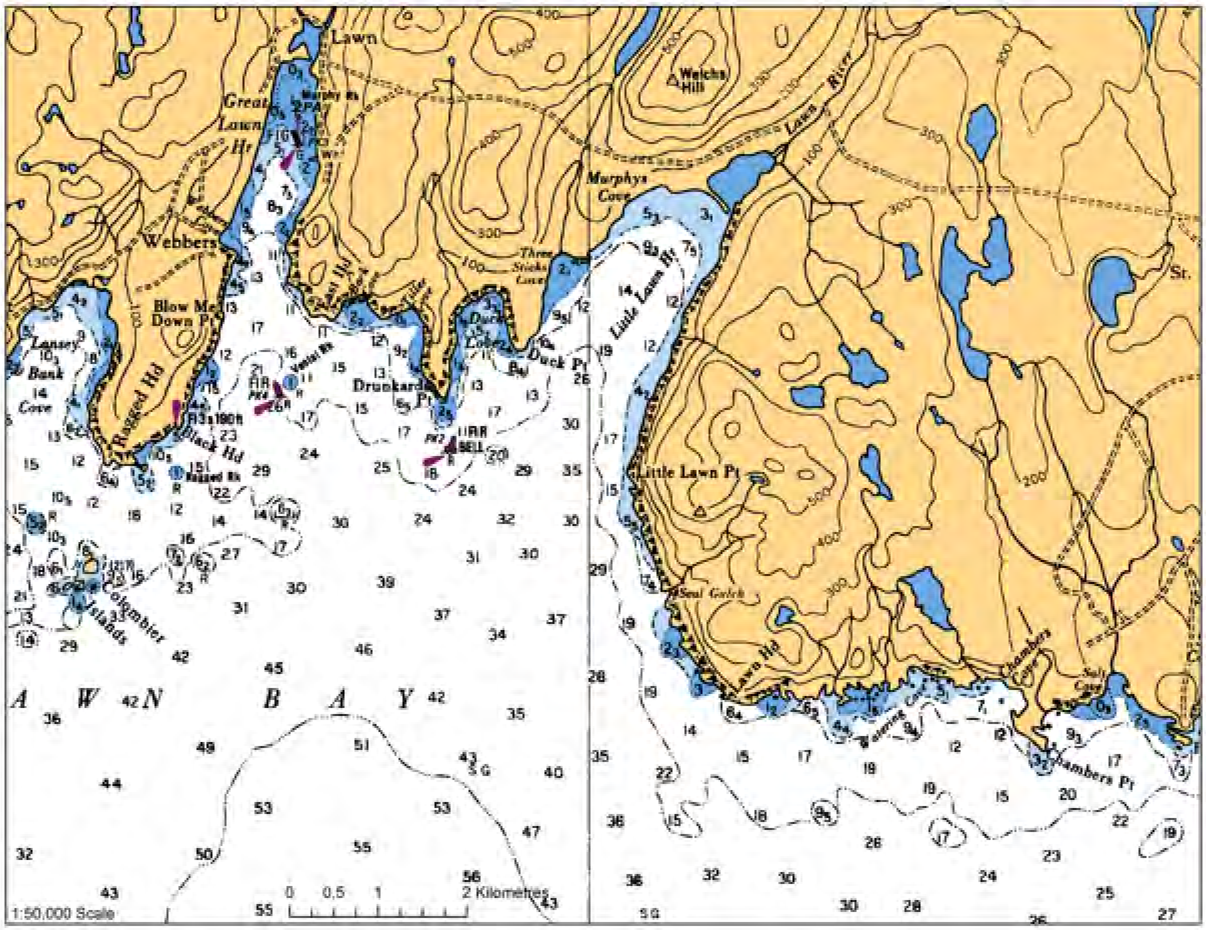


Figure 6-3: CHS Hydrographic Chart of Little Lawn Harbour (Depth in Fathoms Below Chart Datum [CD])

6.1.2.2 Wind Climate

Wind is an important design and operational consideration for the proposed marine shipping facility. It informs the design, and particularly, the operation of infrastructure and the associated materials handling facility. For example, strong winds may result in downtime due to inefficient or unsafe working conditions, (e.g., wind speed >30 knots [15.4 m/s]).

The data sources used in the wind analysis and statistics summary are: recorded dataset from St. Lawrence Meteorological Station (1969 to present); recorded Met-Ocean data from SmartBay (Placentia Bay Buoys) wind and wave, barometric pressure, air and sea-surface temperatures, and surface current velocity at 0.5 m depth; and long-term model dataset (MSC50 wind/wave hindcast from 1954–2015).

Wind Statistics Summary

Wind speed statistical summary is shown in Table 6-2 (note that the wind data presented below represents wind at 10 m above mean sea level). As shown, the highest winds occur in winter (Mean 11.1 m/s; Max 27.2 m/s and the dominant direction is from west-southwest (WSW).

Table 6-2: Wind Speed and Direction Summary Statistics

Cell: 394 46.75°N 55.5°W		Summary Table – Wind Speed												
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Wind Speed (m/s)	Mean	11.1	10.7	9.9	8.5	6.7	6.1	5.7	6.3	7.6	9	9.9	10.8	8.5
	St. Dev.	4.1	4.1	4.1	3.7	3.4	3	2.7	2.9	3.3	3.6	3.8	4	4.1
	Median	10.8	10.4	9.6	8.2	6.4	5.9	5.	6.2	7.3	8.7	9.6	10.6	8.1
	P90	16.6	16.3	15.4	13.6	11.3	10	9.3	10.1	12	13.7	15	16.3	14.1
	Max.	27.2	27.2	29.1	23.2	24.5	23.2	23.3	28.2	28.3	31.7	26.1	28.2	31.7
	Dom. Dir.	285	285	285	235	225	225	225	225	225	265	275	275	235

Source: MSC50; Nalcor Energy (2017)

Wind Rose

In order to quantify the frequency and strength of winds by direction, wind rose plots have been developed. Wind direction is provided as the direction the wind is blowing from. Winds are broken down into 10-degree bins. The radial length of each bin represents the frequency while the distribution of colors on each bar represents the frequency of wind speeds corresponding to the legend. Wind rose plots for the four seasons (Winter, Spring, Summer and Fall) are shown in Figure 6-4.

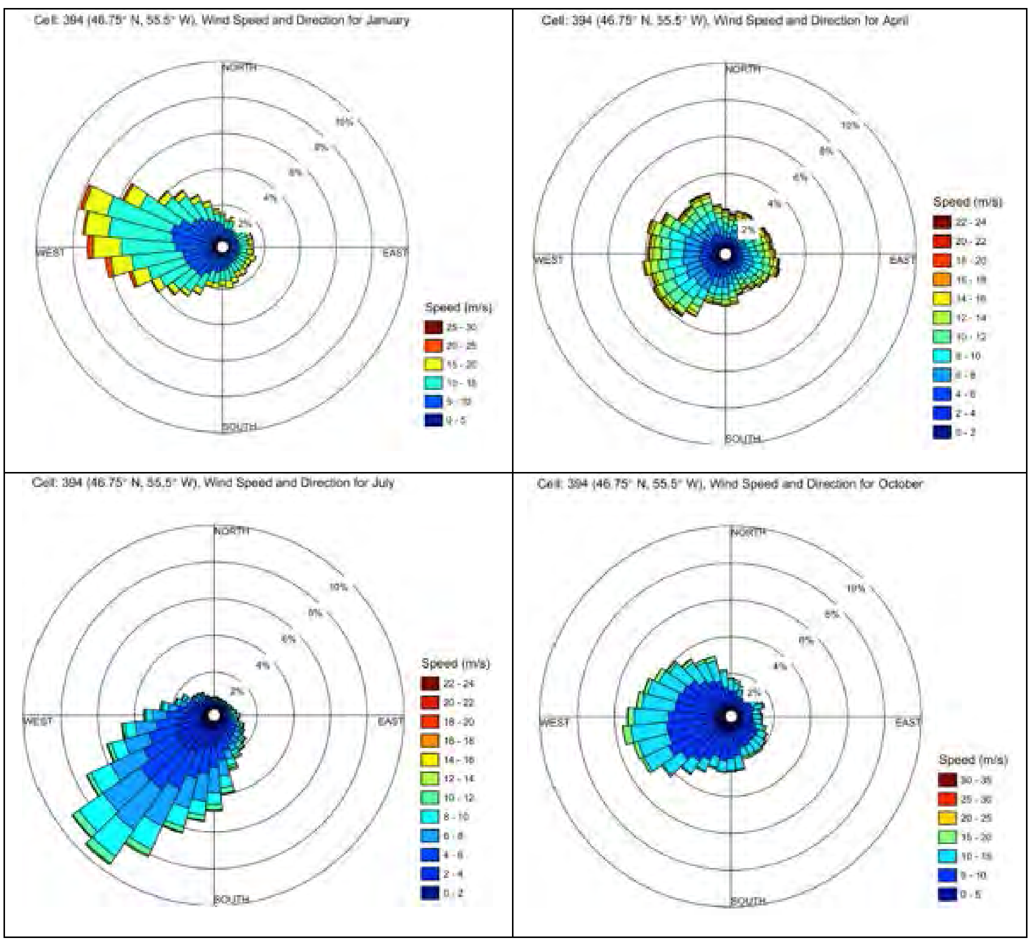


Figure 6-4: Seasonal Offshore Wind Roses (Winter T-L, Spring T-R, Summer B-L and Fall B-R)

As shown, the predominant wind direction is from WNW in winter and SW in summer.

Extreme Analysis (Probability of Exceedance)

The full 62 years of MSC50 hindcast data were used to provide wind speed offshore the study area. The 10, 25, 50, and 100-year return period extreme wind speeds were determined for the most severe storms. Data are broken down by month to account for monthly and seasonal trends. The 10, 25, 50, and 100-year return period values were determined using a peak over threshold extreme value analysis (Weibull distribution). The results are summarized in Table 6-3 for each month and annually. As shown the annual wind speeds for 50-year and 100-year return periods are 31.5 m/s and 30.3 m/s, respectively.

Table 6-3: Extreme Analysis – Wind Speed Extremes by Return Period

Cell: 394 46.75°N 55.5°W		Wind Speed Extremes by Return Period												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Wind Speed (m/s)	10 Year	25	25.1	24.9	21	19.2	17.5	15.6	18.2	22.8	23.8	23	24.7	27.7
	25 Year	26.3	26.4	26.7	21.9	20.9	19.1	16.9	20.5	25.9	26.4	24.2	26	29.2
	50 Year	27.3	27.4	28.1	22.5	22.1	20.3	17.9	22.3	28.3	28.3	25	26.9	30.3
	100 Year	28.2	28.3	29.4	23.1	23.4	21.6	18.9	24.2	30.8	30.3	25.8	27.8	31.5

6.1.2.3 *Offshore Wave Climate*

Data Source and Analysis

The MSC50 database developed by Ocean weather for Environment Canada (Swail et al. 1996) was used to define the offshore wave climate in deep water to the south of the Burin Peninsula. This database is generally recognized as the best available wave climate for the region and provides detailed information on both locally generated seas and remotely generated swells. Data were obtained for three grid points in the study domain south of the Burin Peninsula; two locations about 15 km offshore of the Project site (M6011164 and M6011165), and a third location about 47 km offshore (M6010564) - spectral wave data. In addition, as mentioned above, the Nalcor Met-Ocean Climate Study database (Nalcor Energy 2017) was used to provide the wave summaries offshore the study area (Grid Cell # 394).

Statistical Analysis Summary

Table 6-4 provides a summary of monthly significant wave height statistics for the following parameters: Mean significant wave heights in time series; Standard deviation: Median; 90th percentile (P90); Maximum wave heights (H_{max}); and Dominant Direction.

Table 6-4: Offshore Significant Wave Height Summary

Cell: 394 46.75°N 55.5°W		Summary Table – Wave												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Sig. Wave Height (m)	Mean	2.8	2.7	2.4	2.1	1.7	1.6	1.5	1.6	1.9	2.3	2.6	3	2.2
	St. Dev.	1.7	1.6	1.4	1.1	0.8	0.7	0.6	0.7	0.9	1.1	1.2	1.4	1.3
	Median	2.7	2.5	2.3	2	1.5	1.4	1.4	1.4	1.7	2	2.4	2.7	1.9
	P90	5	4.7	4.2	3.6	2.7	2.4	2.2	2.4	3	3.7	4.3	5	3.8
	Max.	11.4	11.7	12	8	8.6	7.2	7.3	11.4	10.6	11.2	9.9	11	12
	Dom. Dir.	255	255	195	215	195	205	205	215	195	235	245	255	205

Wave severity varies significantly by season, with highest in winter and much lower sea states in summer. As shown, the offshore mean monthly significant wave height varies from 1.5 m (in July) to 3.0 m (in December). The maximum monthly significant wave height varies from 7.3 m (summer) to 12 m (winter).

Wave Rose

In order to quantify the frequency and wave height (significant wave height) by direction, a series of wave rose plots is developed. Wave direction refers to the direction the waves are coming from, clockwise from north in degrees. Wave directions are broken down into 10-degree bins. The radial length of each bin represents the frequency while the distribution of colors on each bar represents the frequency of wave height corresponding to the legend. Wave rose plots are shown in Figure 6-5 for winter (January), spring (April), summer (July) and fall (November). As shown the predominant wave direction is from WSW in winter and SW in summer.

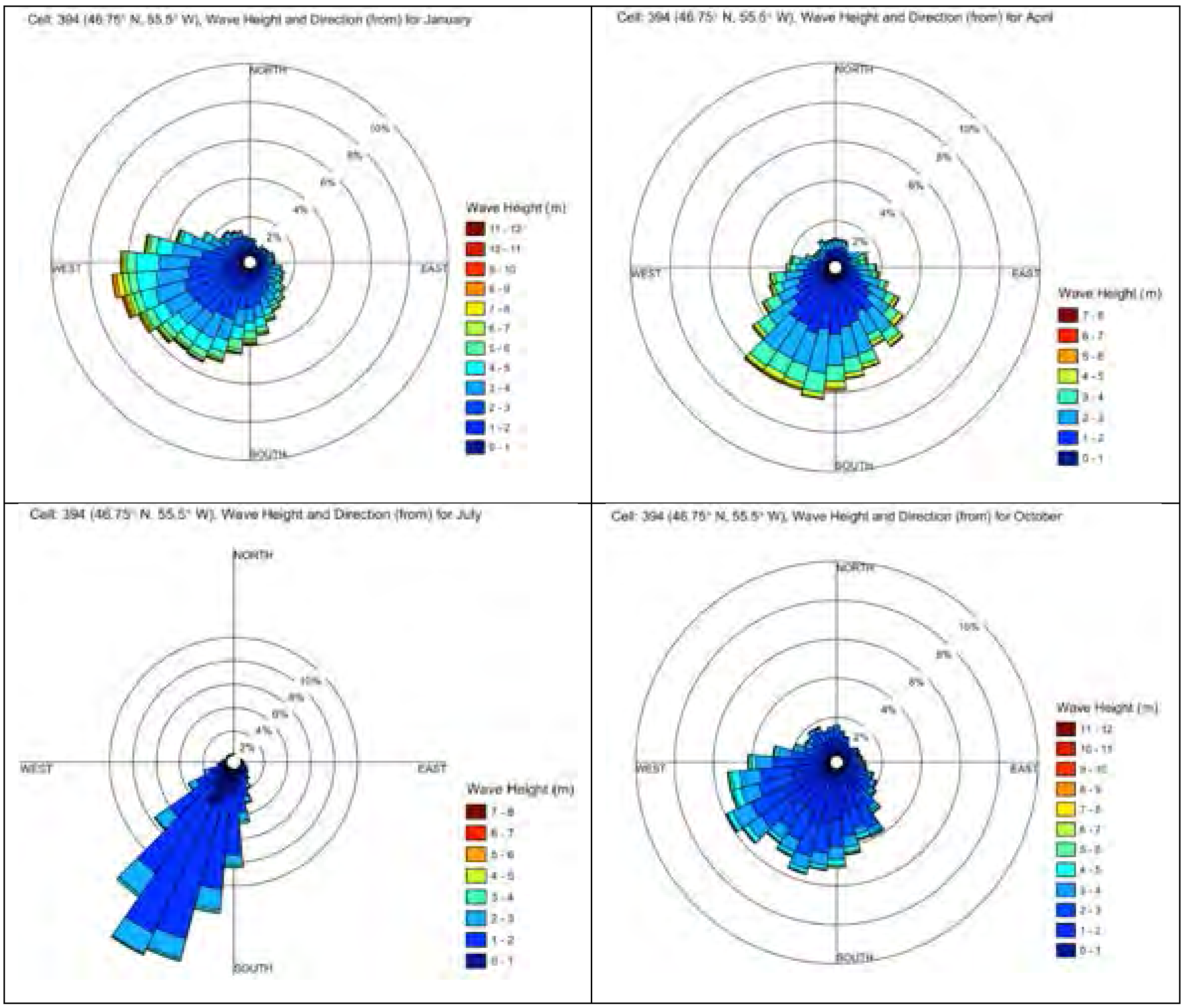


Figure 6-5: Seasonal Offshore Wave Roses (Winter T-L, Spring T-R, Summer B-L, and Fall B-R)

Figure 6-6 presents wave roses (sea and swell) and wave height exceedance curves for combined sea and swell waves for offshore and onshore waves. The offshore seas are associated with winds, and approach Lawn Bay from the SW to W directions. The swells are associated with storms occurring at more distance in the North Atlantic Ocean, and approach Lawn Bay from SSE to SSW.

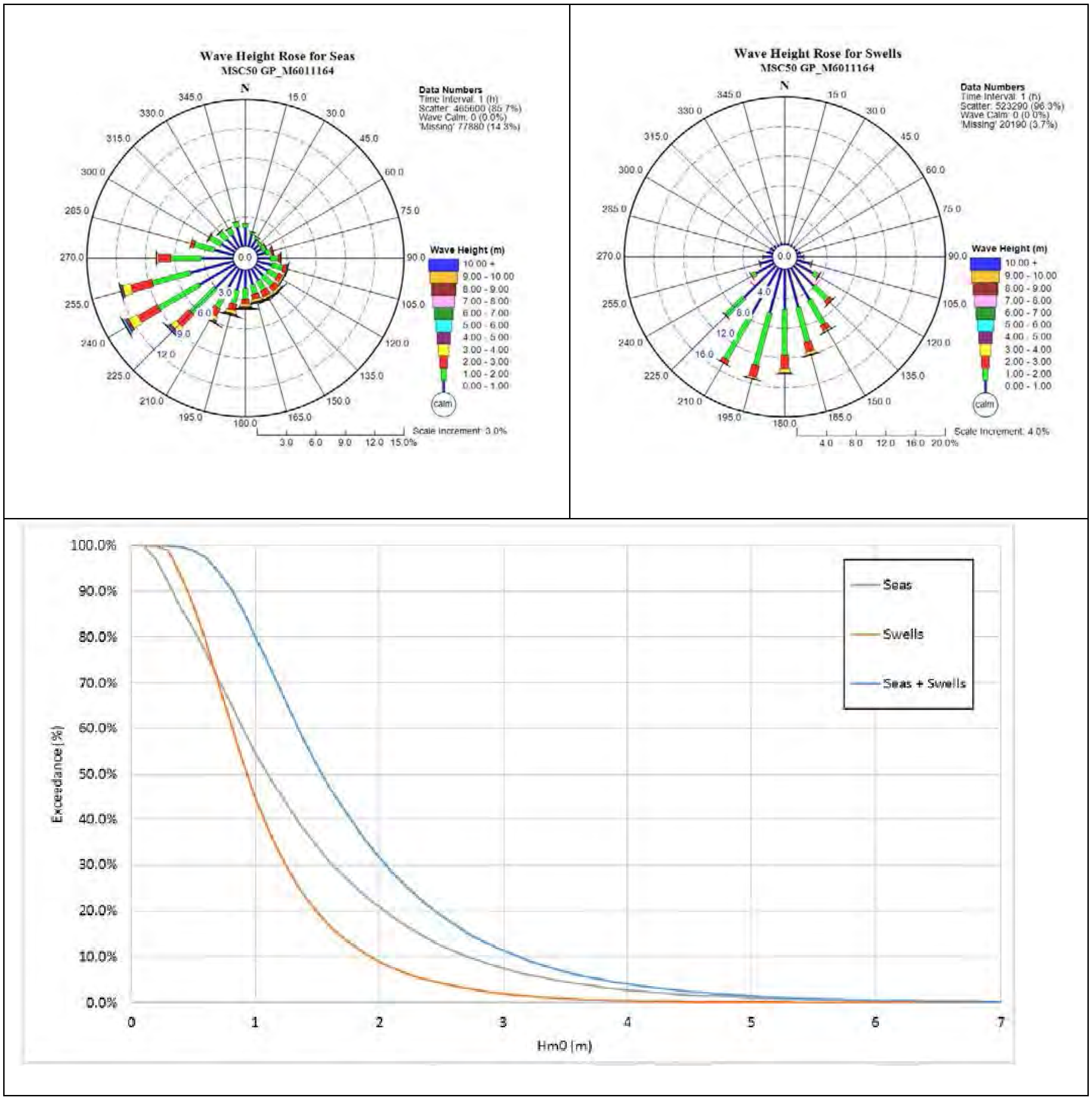


Figure 6-6: Offshore Wave Rose (L-Sea and R-Swell) and Combined Wave Height Exceedance Curves (Annual Average)

Extreme Value Analysis

Extreme Value Analysis of significant wave height for 10, 25, 50, and 100-year return periods were determined using a peak over threshold method for most severe storms over the course of the 62 years. The results are summarised in Table 6-5.

Table 6-5: Extreme Significant Wave Heights by Return Period (Offshore)

Cell: 394 46.75°N 55.5°W		Significant Wave Height Extremes by Return Period												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HS (m)	10 Year	9.8	9.7	8.4	6.6	5.7	5	4.5	5.4	7.4	7.8	8.7	9.6	11
	25 Year	10.8	10.9	9.4	7.3	6.5	5.7	5.1	6.2	8.6	8.9	9.7	10.5	11.8
	50 Year	11.5	11.8	10.1	7.8	7.1	6.2	5.5	6.9	9.5	9.7	10.5	11.3	12.4
	100 Year	12.3	12.7	10.8	8.3	7.7	6.7	5.9	7.5	10.4	10.5	11.3	12	13.1

6.1.2.4 Nearshore Wave Climate

The MIKE21 Spectral Wave (M21SW) model was used to simulate nearshore wave transformations (refraction, shoaling and breaking) as the waves propagate from offshore into Lawn Bay and Little Lawn Harbour (Baird 2019). The model grid incorporated bathymetric data from various sources, including CHS Chart 4625 and supporting field sheets, and a site-specific bathymetric survey within Little Lawn Harbour recently undertaken for CFI. The model grid extended offshore to the location of the M6011164 and M6011165 grid points, as shown in Figure 6-7. The model grid had variable resolution, with a significantly higher grid resolution near the project site.

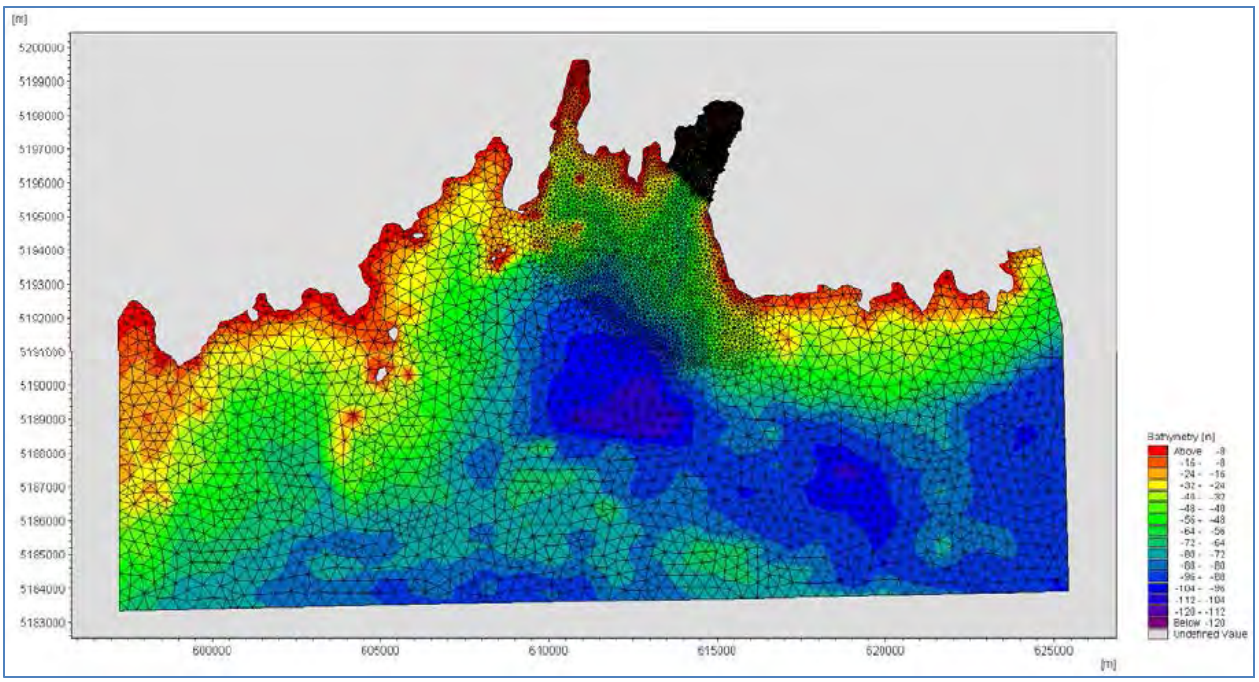
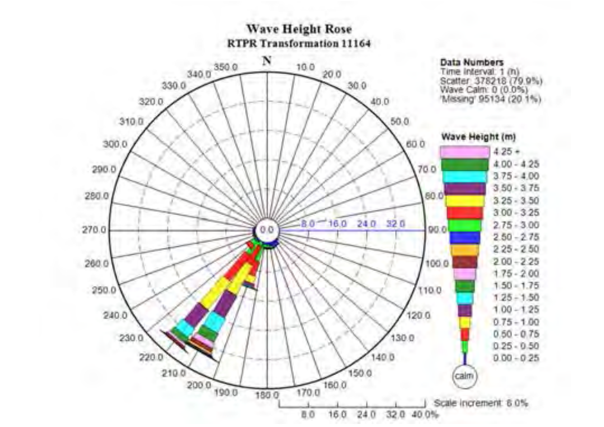
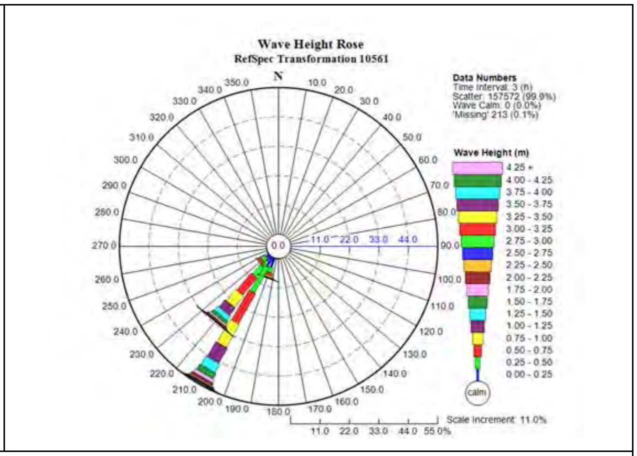


Figure 6-7: M21SW Nearshore Model Grid for Area of Interest

Model simulations were undertaken for the full range in offshore wave heights, periods and directions that may occur at the site, and wave transformation coefficients were defined for selected locations of interest, specifically the proposed location of the berth and the possible end of a breakwater. The wave transformation coefficients were then applied to the offshore wave climate in order to develop an estimate of the nearshore wave climate at each point of interest. Two different methods were used to transform the wave climate: (1) Parametric Transformation (wave transformation coefficients applied to the summary parameters (Hs, Tp, direction) at M6011164); and Spectral Transformation (transformation coefficient applied to the full energy-frequency-direction spectra at the M6010564).

Figure 6-8 presents the nearshore wave roses and wave height exceedance curves at the proposed location of the berth. As shown, significant transformation of the offshore wave conditions occur as waves propagate into Little Lawn Harbour. However, in the absence of site-specific measured data, we recommend that the implications of the more severe conditions suggested by the two approaches be considered in the assessment of the requirement for, and design of, a breakwater to protect the proposed berth. The wave roses indicate that that the predominant wave direction offshore of the proposed location berth is SSW-SW.





Nearshore Wave Roses (L – Spectral Transformation, R - Parametric Transformation,)

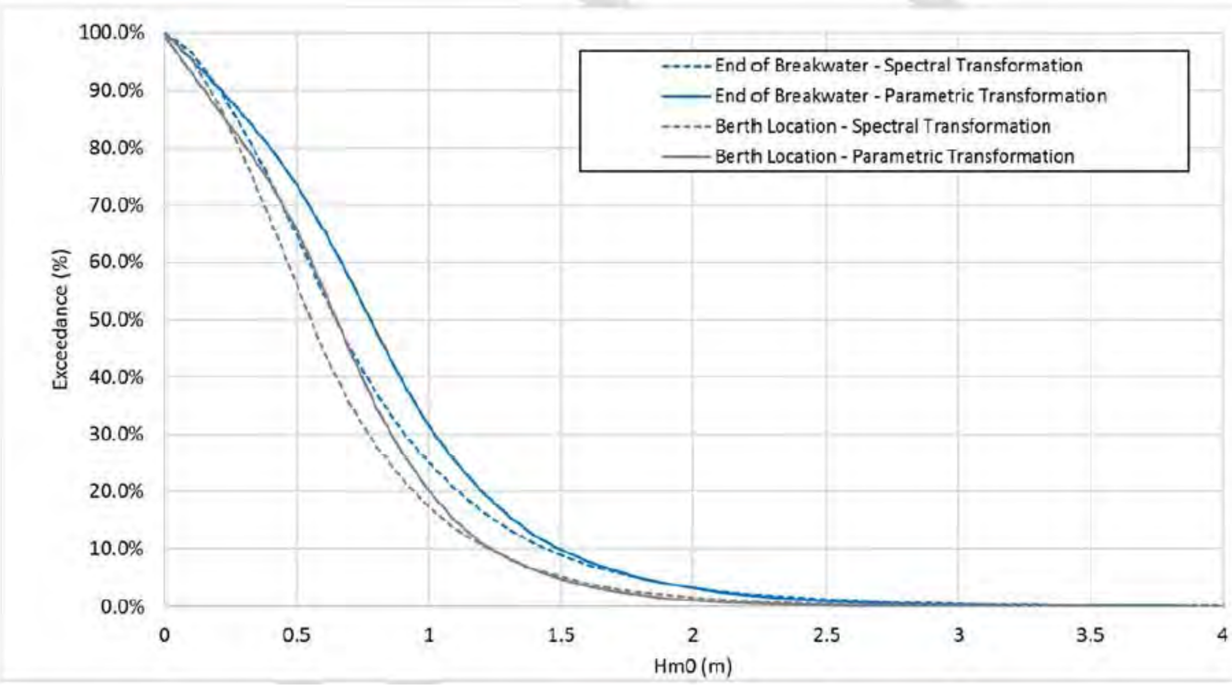


Figure 6-8: Nearshore Spectral Wave Rose (top) and Significant Wave Height Exceedance Curves (bottom)

Extreme Value Analysis of wave height for 10, 20, 50, and 100-year return periods were determined. Table 6-6 presents a summary of the estimated extreme wave heights at the outer end of the breakwater based on the spectral transformation, which suggests marginally higher extremes than the parametric transformation. As shown the preliminary estimate of 100-year return period significant wave height at the end of the breakwater (i.e., design wave height) is 5.5 m and associated peak wave period of 13 seconds. The design breakwater crest elevation = +7.0 m (above CD).

Table 6-6: Extreme Wave Heights at End of Proposed Breakwater for Various Return Periods

Return Period (yr)	Significant Wave Height (m)	90% Confidence Limits (m)	Associated Wave Period (s)
10	4.7	4.5–4.9	12–15
20	5.0	4.7–5.2	13–15
50	5.2	4.9–5.5	13–15
100	5.4	5.1–5.8	13–15

A preliminary estimate of operational downtime due to wind and waves has been developed using the wind and nearshore wave climate database described above. Specifically, the wind and nearshore wave height exceedance curves were used to estimate the frequency of exceedance of typical operational thresholds for similar facilities. The above results were used in the design of the breakwater and safe operations of the berth (downtime).

6.1.2.5 Water Levels

Water levels are an important consideration when designing various components of a marine project, in particular the selection of the dredge depth, wharf deck elevation, crest elevation of the breakwater and other ancillary coastal structures.

Water levels at a marine project site are primarily affected by tides. There is no tide measuring station at Little Lawn Harbour; however, tidal data at St. Lawrence Harbour is similar to what one may expect in Little Lawn Harbour. Summary of tidal heights at St. Lawrence Harbour as defined in CHS's Canadian Tide and Current Tables are shown below (Table 6-7) (these are applicable to Little Lawn Harbour):

Table 6-7: St. Lawrence Harbour Tidal Heights

Description	Elevation (m CD)
Higher High Water Large Tide (HHWLT)	+ 2.50
Higher High Water Mean Tide (HHWMT)	+ 2.10
Mean Water Level (MWL)	+1.30
Lower Low Water Mean Tide (LLWMT)	+ 0.70
Lower Low Water Large Tide (LLWLT)	+ 0.30
Chart Datum (CD)	0.0
Extreme Low Water (ELW)	- 0.3

In addition to the astronomical tidal data, and for the detailed design of the proposed marine structures, consideration is needed of other factors that influence design water levels, including storm surge, and long-term SLR due to climate change.

Climate change effects and climate resilience are addressed in Section 6.2.

6.1.2.6 Currents

The offshore current data were extracted from the Hybrid Coordinate Ocean Model (HYCOM) for Nalcor Cell number 394. The model is provided by National Ocean Partnership Program (NOPP) as part of the U.S. Global Ocean Data Assimilation Experiment (GODAE). The HYCOM model provides seawater velocity components, u and v, in eastward and northward directions. The current data are given in

40 fixed depth levels (z-levels) at each grid point in the model domain. The data analyzed for this study covers a 20-year period from January 1993 to December 2012, with a daily temporal resolution. Current data (daily averaged values) are summarized and presented using depth profile plots (Figure 6-9), time series plots, current rose plots, two tables of Extreme Value Analysis data (10-year and 100-year), and summary table of mean, max, and standard deviations.

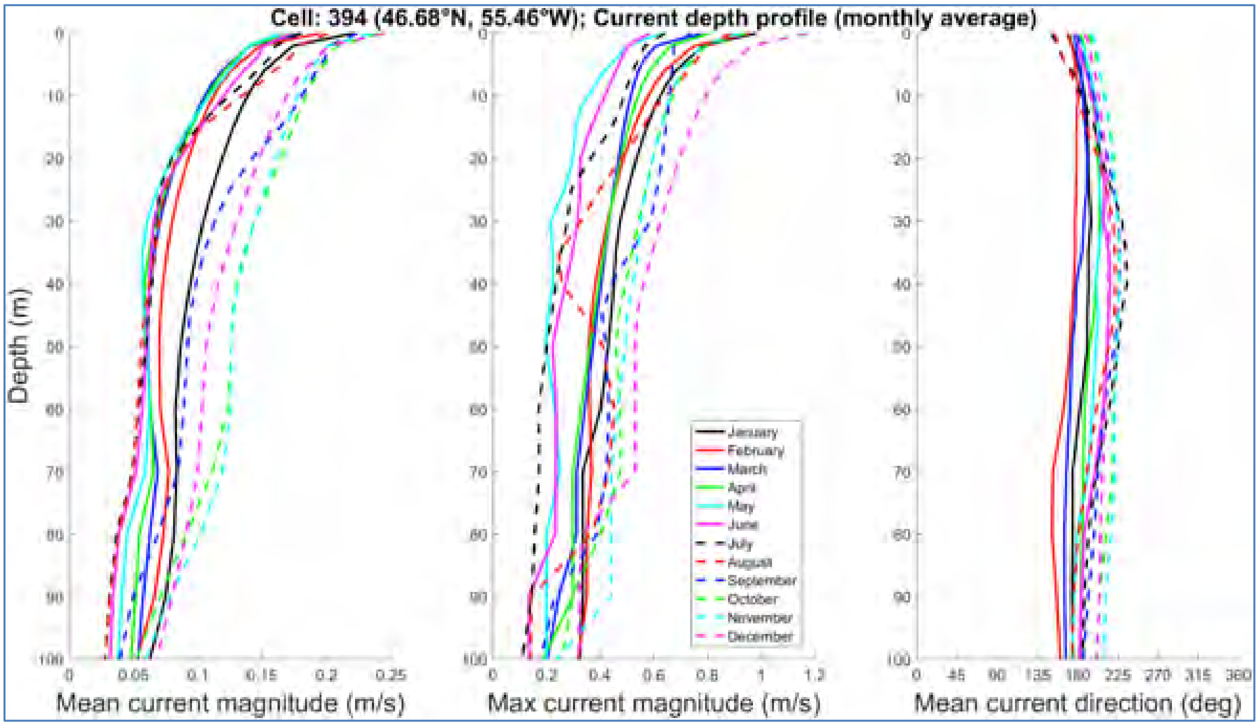


Figure 6-9: Current Depth Profiles: Mean Monthly Magnitude (Left), Max. Monthly Magnitude (Centre), and Mean Direction (Right)

Current Rose: The current rose shows how current speeds and directions are distributed, in this case over a season at each depth. The seasons are defined as: Winter (December, January, February), Spring (March, April, May), Summer (June, July, August), and Fall (September, October, November).

Figure 6-10 shows the current roses for winter and summer seasons at 2 m depth (representing the surface current).

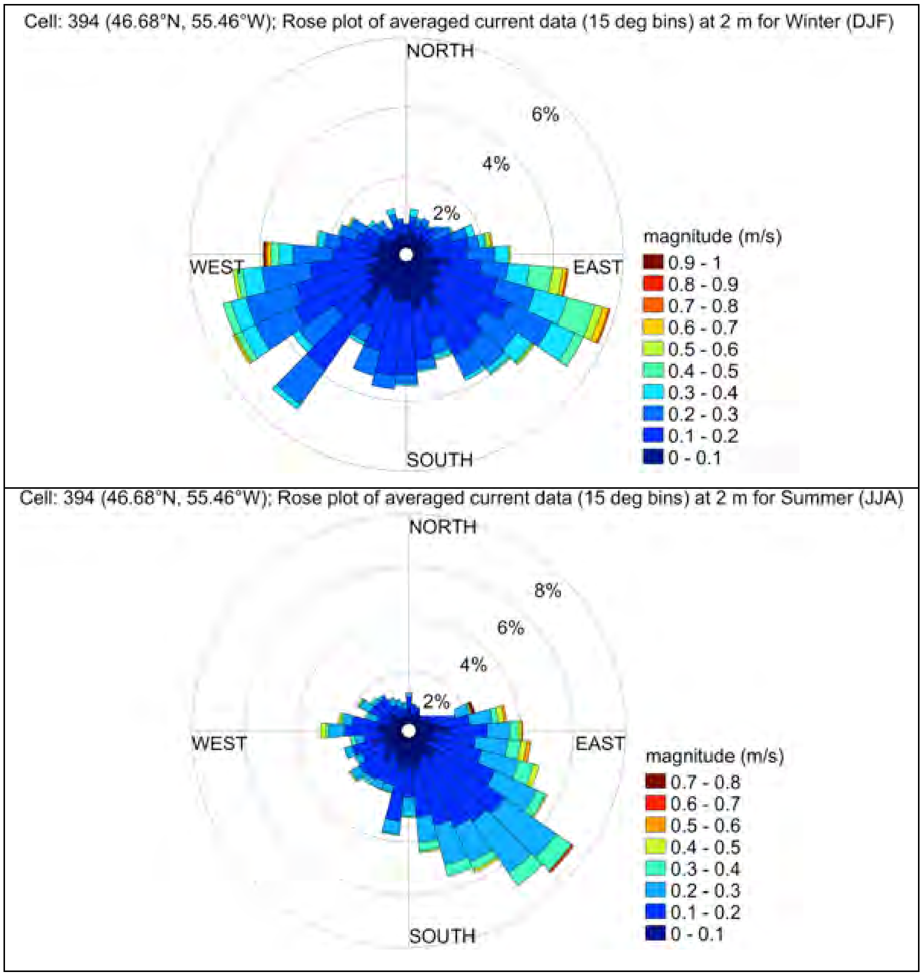


Figure 6-10: Current Rose at 2 m Water Depth for Winter (Top) and Summer (Bottom)

6.1.2.7 Visibility (Fog)

The following data were obtained from Nalcor Energy (2017) for Cell # 394. The occurrence of fog, as a proxy for visibility, was estimated using horizontal visibility data from the North American Regional Reanalysis (NARR) Hindcast Model produced by the National Centers for Environmental Prediction (NCEP) and the US National Oceanographic and Atmospheric Administration (NOAA). Data coverage is from 1979–2016. The standard visibility thresholds used are as follows:

- 1 km (≈0.5 nm): generally taken to represent foggy conditions;
- 2 km (≈1 nm): denoted for certain regions as snowstorm conditions; and
- 5 nm (≈9.25 km): five nautical miles is a limit for which meteorological conditions are specified for various regions.

The results are presented graphically as follows (Figure 6.11 to Figure 6.13):

As shown in Figures 6-11 to 6-13, the lowest visibility occurs from November–February and in July.

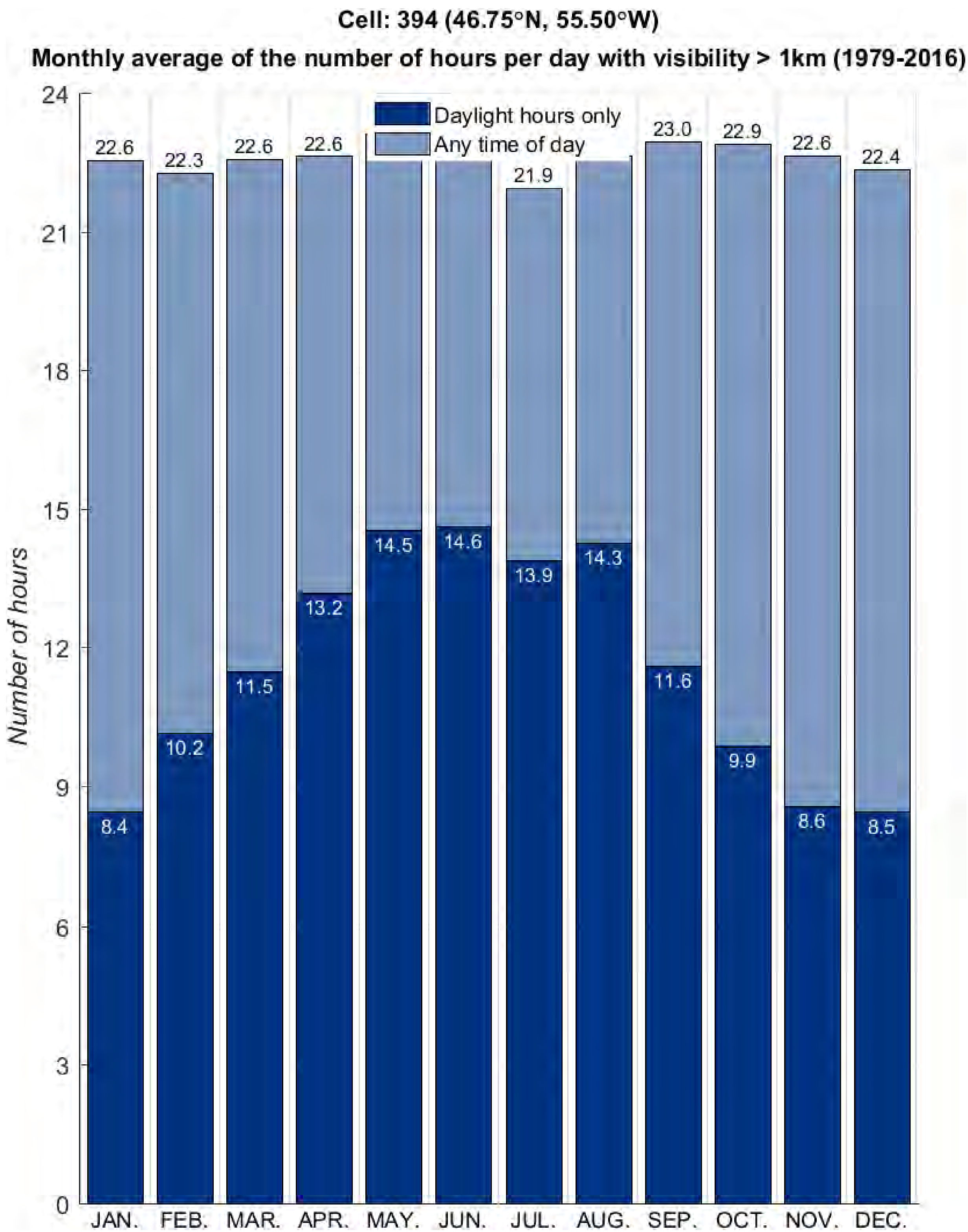


Figure 6-11: Monthly Average Hours Per Day with Visibility Greater than 1 km

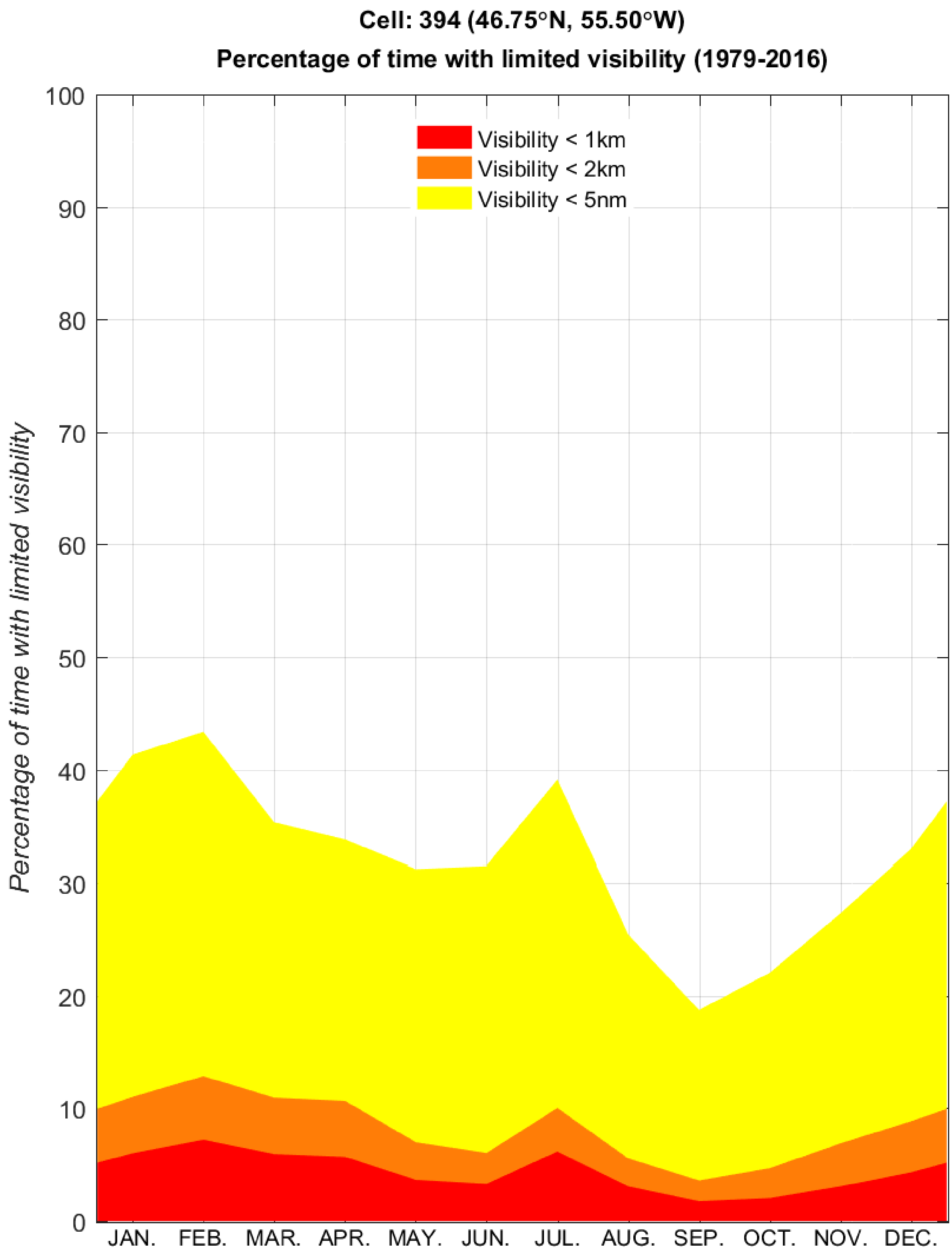


Figure 6-12: Percentage of Time with Limited Visibility (1979–2016)

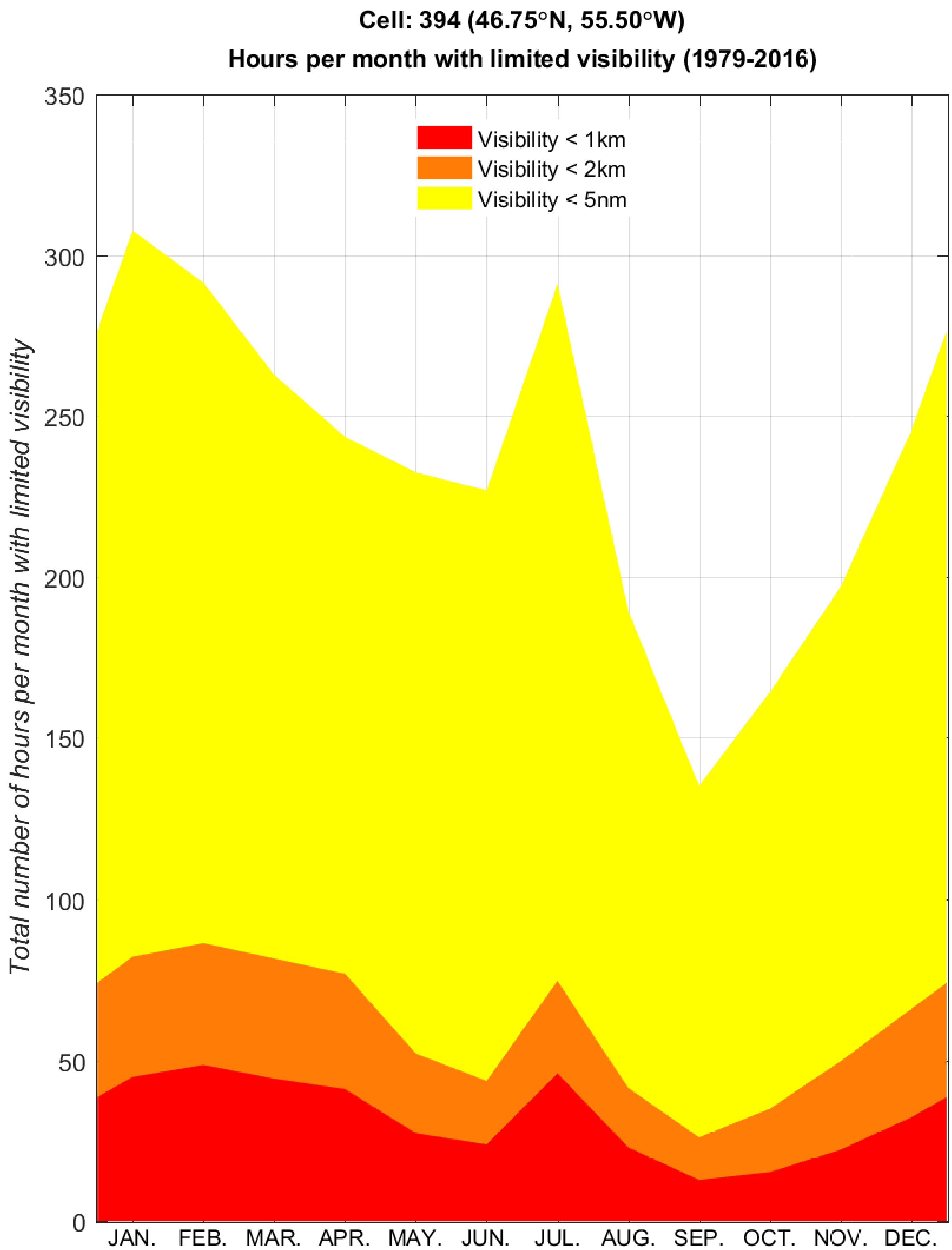


Figure 6-13: Hours Per Month with Limited Visibility (1979–2016)

6.1.2.8 Sea Ice (Pack Ice) and Vessel Icing

The following data were obtained from Nalcor Energy (2017) for Cell # 394, representing sea ice in the study area and icing potential for marine vessels operating within this area.

Sea Ice (Pack Ice)

The summary of pack ice conditions was based on archived ice charts from the Canadian Ice Service (CIS) and National Ice Center (NIC). Archived charts, where available, were analyzed from 1987–2016, providing a 30-year study period. The analysis showed that Little Lawn Harbour is ice-free year-round. Pack ice may occur offshore of the harbour in March–April but will reach the harbour only on rare occasions (1987 and 1990, within the 30-year dataset considered).

Vessel Icing Potential

A simple algorithm (Overland et al. 1986; Overland 1990) has been used to model the severity of sea spray icing events for each grid cell. The computed icing predictor is used as an analogue of the expected icing rate and icing risk class, according to the following categories: (1) no icing, (2) light icing, (3) moderate icing, (4) heavy icing, and (5) extreme icing. An icing predictor index (PR) is used to characterize potential icing rates and the index is predicted from meteorological variables. NOAA produces daily icing predictions using this model for regions prone to icing conditions.

The formulation for PR was used to calculate the expected intensity of sea spray icing events at each grid cell between the years 1985–2016 using reanalysis data. Calculated values of PR are related to the expected icing rate and severity, according to the following categories:

- PR <= 0: no icing
- PR 0 - >22: light icing (icing rate <0.7 cm/hour)
- PR 22 - >53: moderate icing (icing rate between 0.7–2.0 cm/hour)
- PR 53 - >83: heavy icing (icing rate between 2.0–4.0 cm/hour)
- PR >83: extreme icing (icing rate >4.0 cm/hour)

The monthly values of PR (by category: Extreme, Heavy, Moderate and Light) are presented graphically in Figure 6-14. Time series of icing conditions is provided in Figure 6-15. As shown icing potential occurs from early December to end of March.

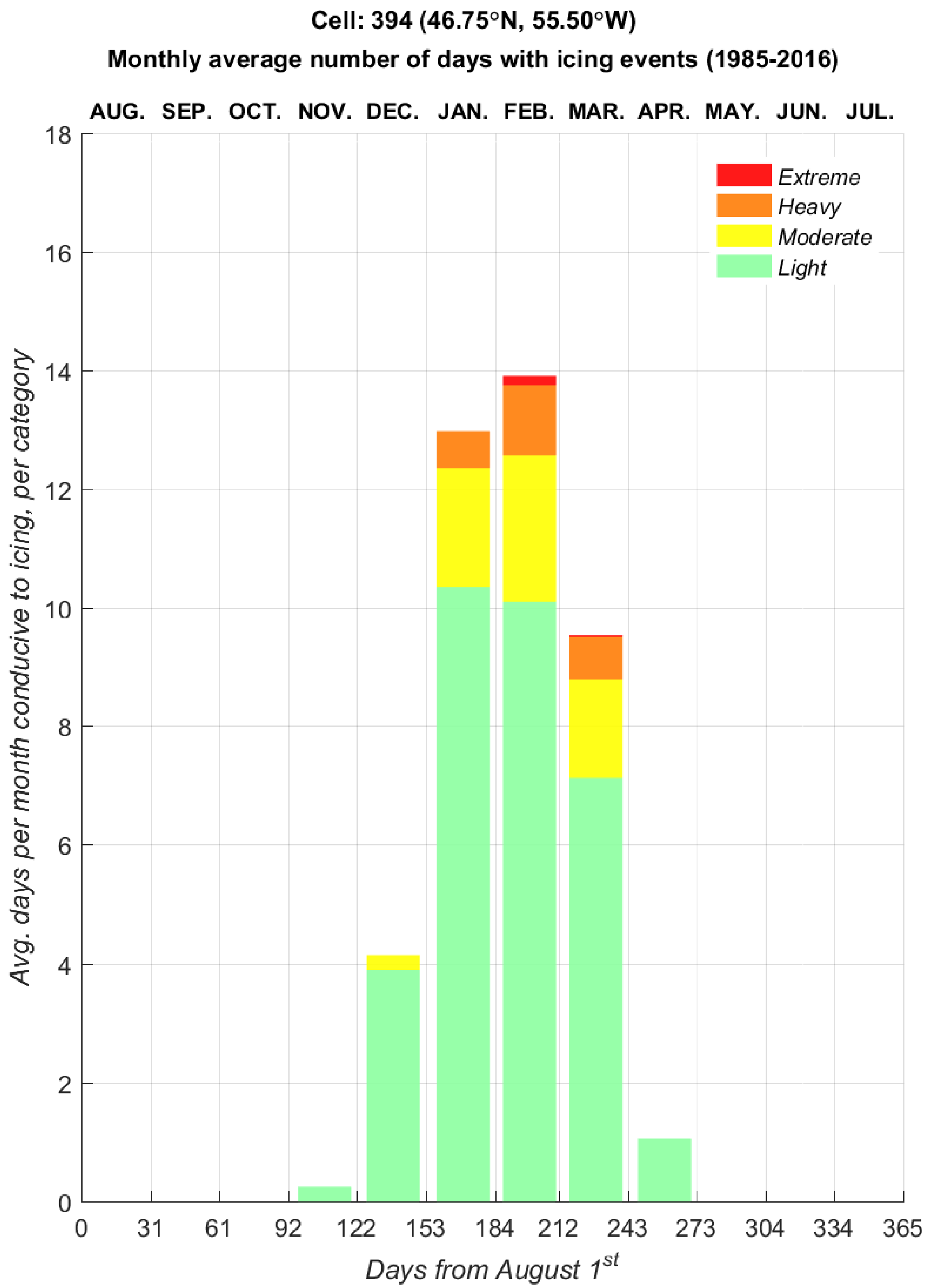


Figure 6-14: Monthly Average Days with Icing Events (1985–2016)

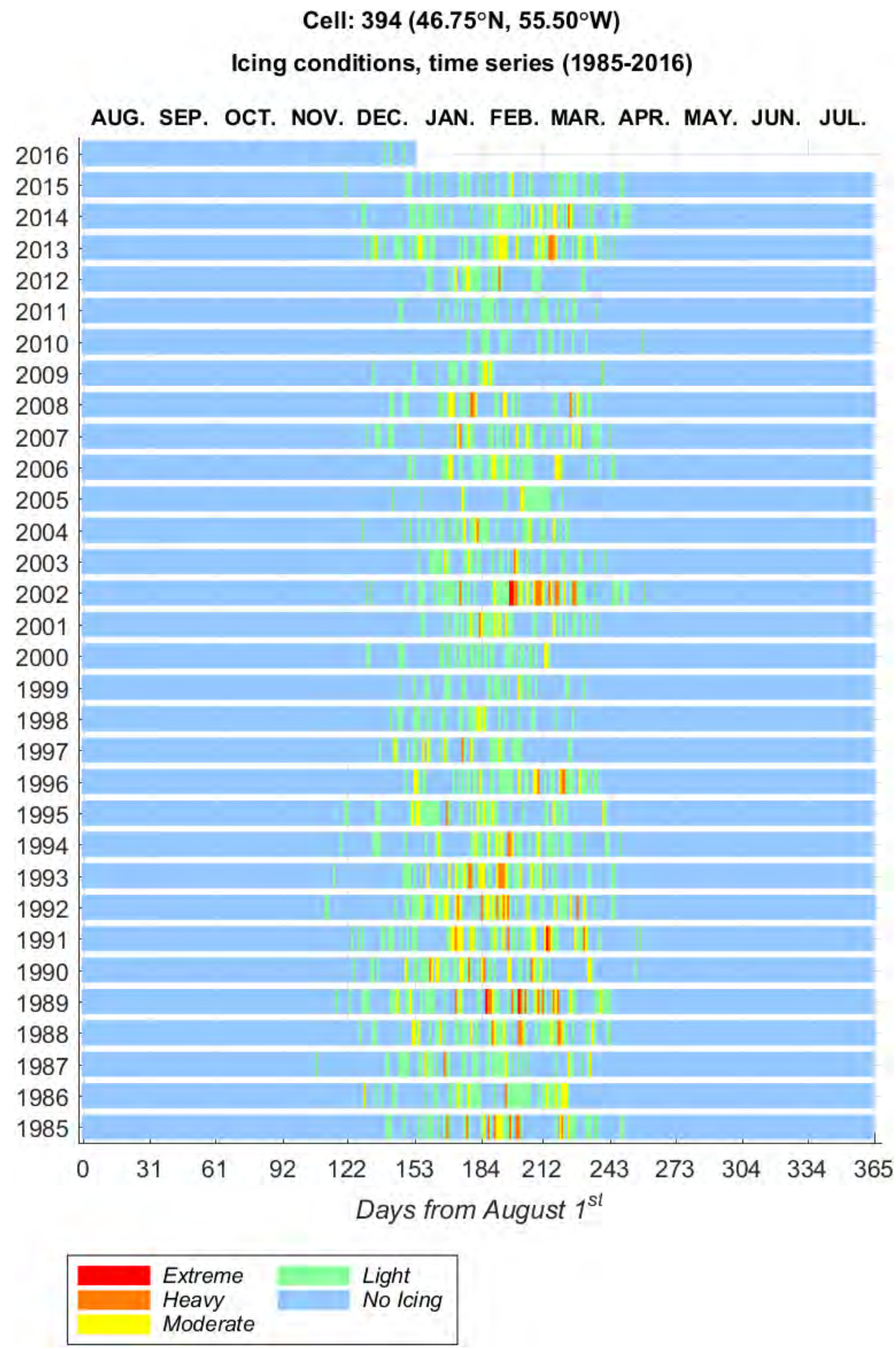


Figure 6-15: Time Series of Icing Conditions (1985–2016)

6.1.2.9 Sea Surface Water Temperature

Sea surface temperature (SST) data from the Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA) system were used. The OSTIA system is run by the Met Office (United Kingdom [UK]) and is available via the MyOcean Project[3]. The system provides gap-free maps of SST at a horizontal resolution of up to 0.05° (~6 km). The data were constructed using in situ sensors and satellite data from both infrared and microwave radiometers. The data analysis presented in this report covered the period from 1985–2016, which provided for the full 32-year period and for each of the last 10-year periods (1987–1996; 1997–2006; and 2007–2016) to show the potential impact of climate change on SST.

The following statistical analysis / time series of SST are presented:

- Time series of monthly daily averages (mean, standard deviation, min/max and 10th and 90th percentiles) for 1985–2016 (Figure 6-16).
- Time series of daily average SST for full period (1987–2016), and 10-year periods: 1987–1996; 1997–2006; 2007–2016. (Figure 6-17).

As shown in Figures 6-16 and 6-17, there is a noticeable increase in SST over the last three decades. The SST is the coldest in February–March and warmest in August.

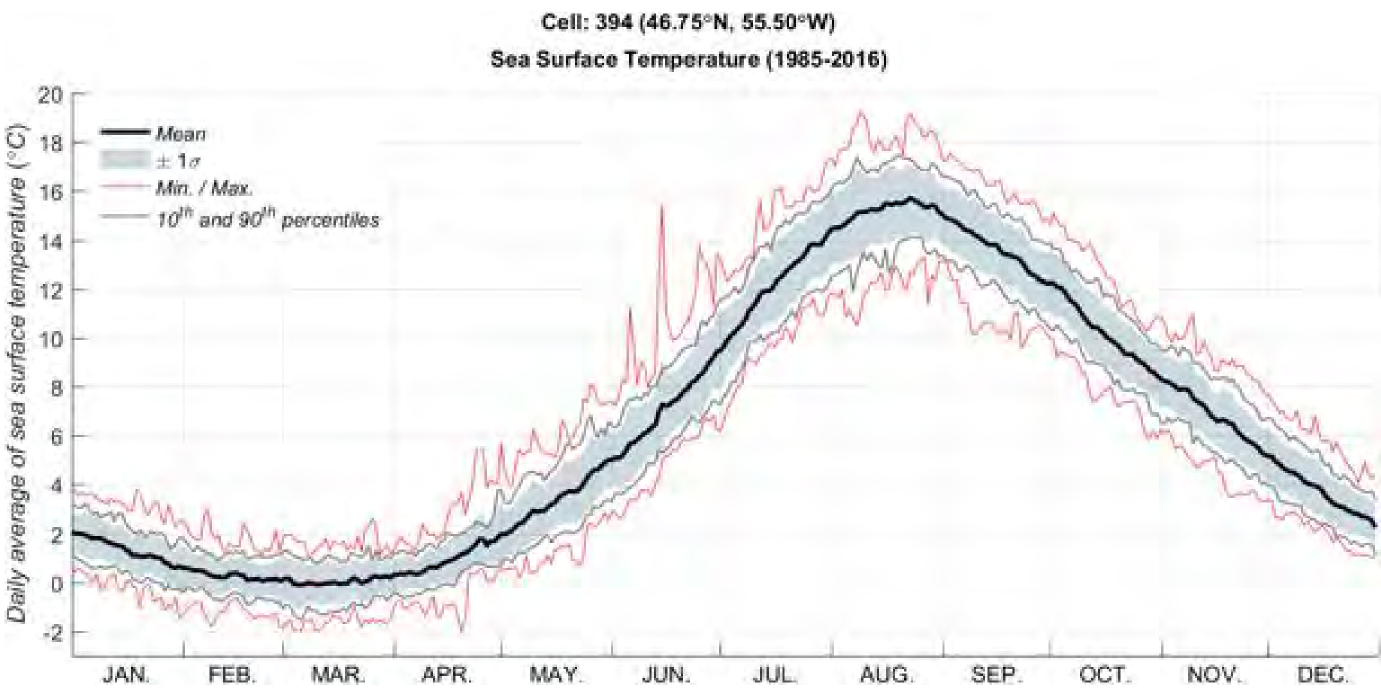


Figure 6-16: Sea Surface Temperature Mean, Minimum and Maximum Values (1985–2016)

[3] http://www.myocean.eu/

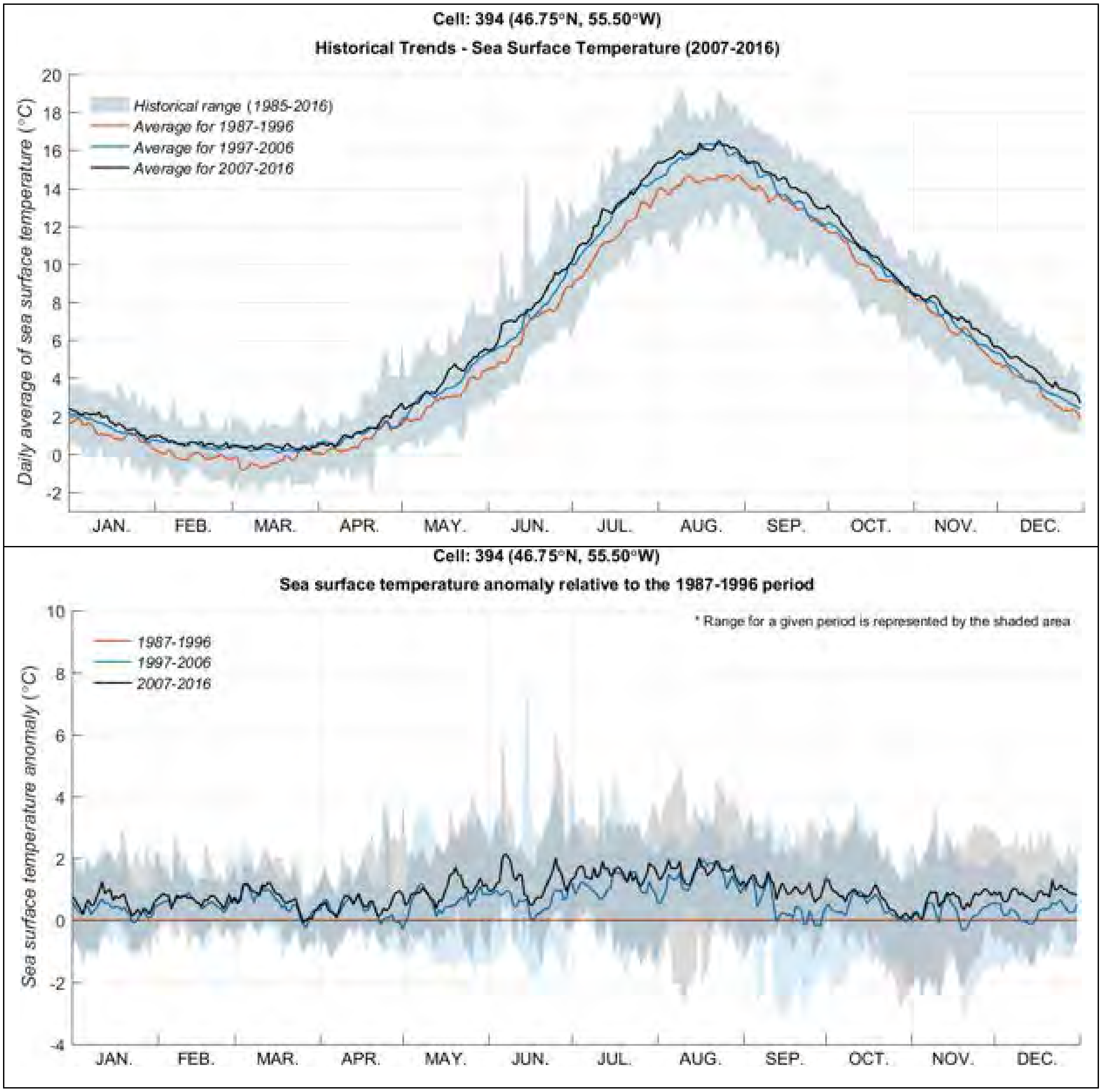


Figure 6-17: Sea Surface Temperature Historical Trend (1987–1996;1997–2006; 2007–2016)

6.1.3 Climate Change Impact/Climate Vulnerability Assessment

Coastal communities are increasingly forced to withstand more frequent and extreme weather events, more climate variability, and changes in climate norms. Infrastructure and property located in coastal areas are particularly vulnerable to coastal flooding caused by sea level rise and storm surge events. These impacts will continue and will likely become more severe, threatening public and private infrastructure and property at great economic cost.

6.1.3.1 Sea Level Rise (SLR)

Several research papers and reports have been published on the impact of climate change on the earth's environment (e.g., Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Coastal, low-lying areas would be the most affected by climate variability. This includes the rise of seawater temperature, SLR, increased erosion, storm surges, flooding and increase in the severity of storm events.

The recent Canadian Technical Report of Hydrography and Ocean Sciences (Zhai et al. 2014) stated that the Global Mean Sea Level (GMSL) has risen at a mean rate of 1.7 (1.5–1.9) mm per year between 1901 and 2010. The rate of sea level rise has increased over the 20th century. Ocean thermal expansion and glacier melting are the dominant contributors to the 20th century GMSL rise. However, regional ocean volume change (steric and dynamical effect) and the effects of glacial isostacy (i.e., vertical land motion) can cause the rate of regional (relative) sea level (RSL) change to be considerably different from that of the GMSL. In East Canada, the rates of observed RSL change show large regional variations, from 2–4 mm yr-1 (above the rate of GMSL rise). The report focuses on estimating sea-level allowances at 56 tide gauge sites along the coasts of Canada and the adjacent United States. Sea-level allowances are computed for each site based on projections of RSL change from the IPCC's AR5 for the medium-low RCP4.5 and highest RCP8.5 scenarios.

Tide gauge data at Argentia (1971–2013) were used in the analysis. Figure 6-18 shows statistics of tides and storm surges for tide gauge at Argentia. Sea level projections and sea-level allowances for Argentia are shown in Table 6-8 (for IPCC RCP4.5 scenario) and Table 6.9 for IPCC RCP8.5 scenario).

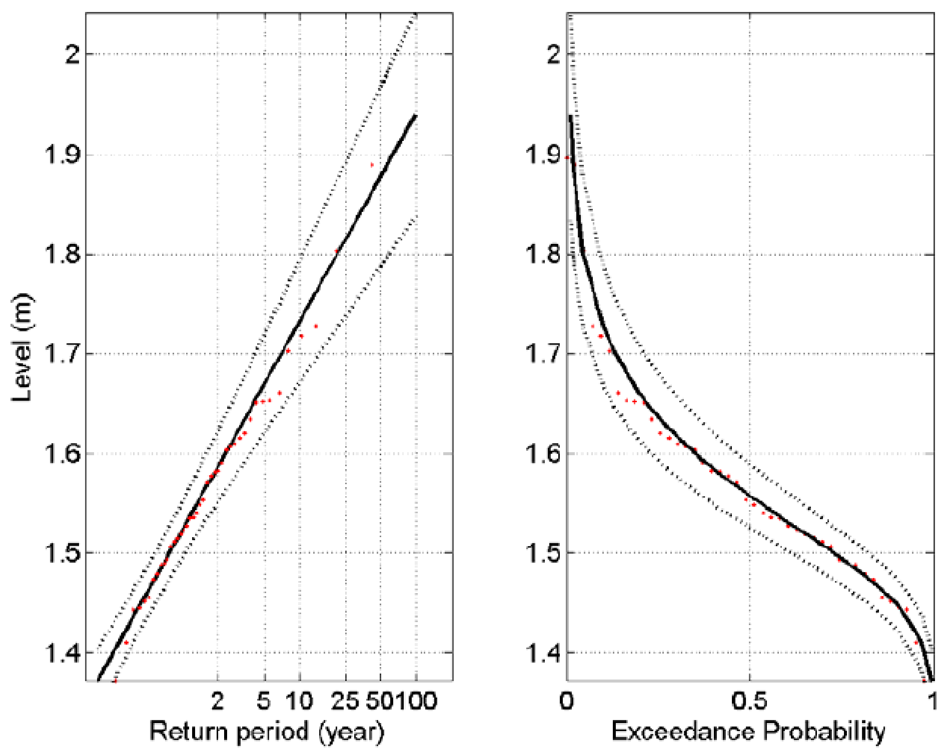


Figure 6-18: Statistics of Tides and Storm Surges for Tide Gauge at Argentia

Table 6-8: Sea-Level Projections and Sea-Level Allowances (IPCC RCP4.5) for Argentia

Year	RCP4.5 Projection (metres)				Allowance (metres)
	Mean	Standard Deviation	5% Percentile	95% Percentile	
2010	0.07	0.02	0.03	0.11	0.07
2020	0.11	0.04	0.05	0.17	0.12
2030	0.17	0.05	0.09	0.25	0.18
2040	0.23	0.06	0.14	0.33	0.25
2050	0.30	0.07	0.18	0.41	0.32
2060	0.36	0.09	0.21	0.50	0.40
2070	0.42	0.11	0.23	0.60	0.48
2080	0.48	0.14	0.25	0.70	0.58
2090	0.53	0.15	0.27	0.78	0.66
2099	0.57	0.17	0.30	0.84	0.72

Table 6-9: Sea-Level Projections and Sea-Level Allowances (IPCC RCP8.5) for Argentia

Year	RCP8.5 Projection (metres)				Allowance (metres)
	Mean	Standard Deviation	5% Percentile	95% Percentile	
2010	0.07	0.02	0.03	0.11	0.08
2020	0.12	0.03	0.07	0.17	0.13
2030	0.19	0.05	0.12	0.27	0.20
2040	0.25	0.06	0.15	0.35	0.27
2050	0.33	0.08	0.19	0.46	0.36
2060	0.42	0.10	0.26	0.58	0.47
2070	0.50	0.13	0.29	0.71	0.59
2080	0.60	0.15	0.35	0.85	0.72
2090	0.70	0.18	0.41	0.99	0.87
2099	0.79	0.21	0.44	1.13	1.03

As shown above the RSL allowance for Argentia varies from 0.32–0.36 m for year 2050 (25-year projection) and from 0.72–1.03 m for year 2099 (100-year projection). It is proposed to use an allowance of 0.35 m for the Project site.

6.1.3.2 Coastal Flooding

As previously described in Section 6.1.3.1, the projected sea levels were generated for the study area for the years 2010, 2040, 2060 and 2070. For each time period, four storm-tide water levels were determined based on return periods of 1-in-10, 1-in-25, 1-in-50 and 1-in-100 events (Figure 6-19). Within the project's time frame the sea level in this area is projected to rise ~0.6 m.

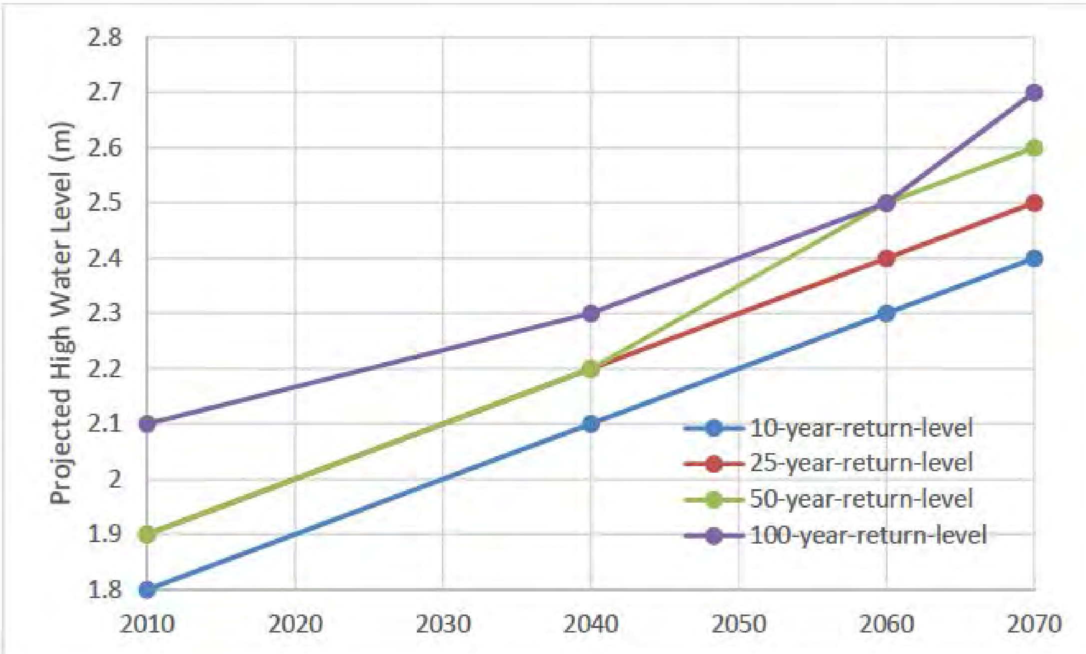


Figure 6-19: Projected High Water Levels During Storm Surge Events for Marystown (Source: Zhai et al. 2014)

Precipitation Projections for St. Lawrence (2011–2014)

Future Climate Projection for short duration rainfall Intensity-Duration-Frequency (IDF) data for St. Lawrence is shown in Table 6-10 for year 2040 and Table 6-11 for future time horizon 2014–2070 for return periods of 2,5,10, 20, 25, 50, and 100 year-return periods.

Table 6-10: Future Climate IDF Curves for St. Lawrence (8403619) – 2011–2040 Time Horizon

Minimum Projected Precipitation Amount (mm)							
Duration	**Return Interval (years)**						
	2	**5**	**10**	**20**	**25**	**50**	**100**
5-min	5.2	6.3	7.1	7.8	8.0	8.7	9.4
10-min	8.2	10.3	11.8	13.1	13.5	14.9	16.2
15-min	10.2	13.3	15.4	17.1	18.0	19.9	21.8
30-min	15.4	20.1	23.2	26.1	27.1	30.0	32.9
1-hr	22.5	28.5	32.5	36.3	37.6	41.3	45.0
2-hr	31.6	39.6	44.9	50.0	51.6	56.6	61.3
6-hr	49.6	61.2	68.8	76.2	78.5	85.7	92.8
12-hr	60.4	72.2	79.9	87.4	89.8	97.0	104.3
24-hr	67.8	82.0	91.4	100.3	103.2	1112.0	120.7
Maximum Projected Precipitation Amount (mm)							
Duration	**Return Interval (years)**						
		5	**10**	**20**	**25**	**50**	**100**
5-min	6.5	8.0	8.9	9.8	10.0	10.9	11.8
10-min	10.6	13.3	15.0	16.7	17.2	18.8	20.5
15-min	13.6	17.4	19.8	22.1	22.8	25.1	27.4
30-min	20.5	26.1	29.6	33.0	34.1	37.5	40.9
1-hr	29.1	36.3	40.7	45.0	46.5	51.1	55.5
2-hr	40.9	50.7	56.9	62.9	64.8	70.9	76.8
6-hr	63.4	78.5	87.9	97.1	100.0	109.2	118.4
12-hr	74.6	90.1	99.8	109.2	112.2	121.7	131.1
24-hr	85.0	104.4	116.5	128.2	131.9	143.6	155.3

Table 6-11: Future Climate IDF Curves for St. Lawrence (8403619) – 2041–2070 Time Horizon

Minimum Projected Precipitation Amount (mm)							
Duration	**Return Interval (years)**						
	2	**5**	**10**	**20**	**25**	**50**	**100**
5-min	5.7	6.9	7.7	8.5	8.7	9.5	10.3
10-min	9.0	11.3	12.9	14.4	14.8	16.3	17.7
15-min	11.4	14.7	16.9	19.0	19.7	21.8	23.8
30-min	17.1	22.1	25.4	28.6	29.6	32.7	35.7
1-hr	24.7	31.1	35.4	39.5	40.8	44.8	48.8
2-hr	34.8	43.4	49.1	54.6	56.3	61.7	67.0
6-hr	54.3	67.1	75.5	83.6	86.2	94.2	102.0
12-hr	65.2	78.3	86.9	95.2	97.8	105.9	114.0
24-hr	73.6	89.6	100.2	110.3	113.6	123.5	133.3
Maximum Projected Precipitation Amount (mm)							
Duration	**Return Interval (years)**						
		5	**10**	**20**	**25**	**50**	**100**
5-min	7.3	9.6	11.3	13.0	13.5	15.2	16.8
10-min	12.0	16.3	19.5	22.6	23.6	26.7	29.8
15-min	15.6	21.5	26.0	30.3	31.7	36.0	40.2
30-min	23.4	32.2	39.0	45.5	47.6	54.0	60.3
1-hr	32.9	44.4	53.1	61.6	64.3	72.6	80.8
2-hr	46.3	62.3	74.5	86.3	90.1	101.7	113.2
6-hr	71.5	95.8	114.3	132.3	138.0	155.5	173.0
12-hr	83.0	108.1	127.1	145.6	151.5	169.6	187.6
24-hr	95.2	126.2	149.5	172.3	179.5	201.8	223.9

6.1.3.3 Coastal Erosion

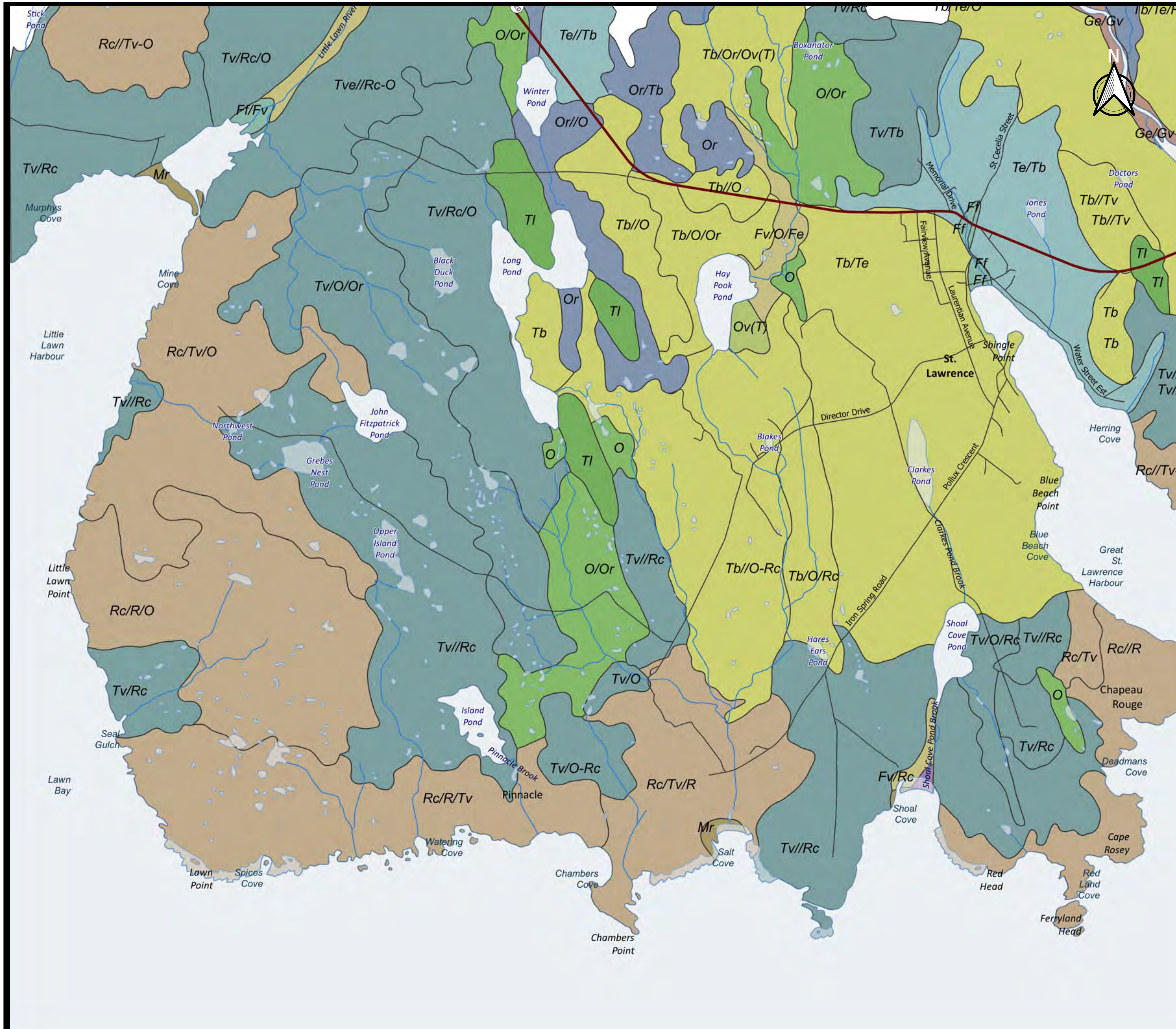
Coastal erosion refers to the movement of sediment (e.g., gravel, sand, mud, etc.) away from the land, or to another part of the coast. Erosion at the bottom of a cliff is caused by waves hitting and undercutting the soil, which weakens the stability of the slope. When the stability of the slope is compromised, the soil mass is prone to failure, typically along a circular failure surface, in response to gravity. This process can reduce the size of a property gradually over time, or substantially in a single storm surge event. Where the coastline is vulnerable to erosion, the buildings and infrastructure close to the edge are also at risk.

The degree of vulnerability of a property to erosion is site specific and is dependent on the exposure and the geomorphology of the location. In an exposed area, waves will have more potential to erode the material than in a sheltered area.

The above should be considered in the site selection and the design of the proposed coastal structures.

6.1.4 Soil and Geology

Based on provincial DNR surficial geology mapping (DNR 2014), soils over much of the study area (i.e., the broad peninsula between St. Lawrence Harbour and Little Lawn Harbour) generally consist of a relatively thin (1.5 m) to thick (15 m) layer of glacial till comprised of silty sand and gravel with varying percentages of cobbles and boulders (Figure 6-20). On higher ground to the northeast, areas of bog are underlain by glacial till that predominates. At the highest topographic levels, such as the hills of Cape Chapeau Rouge and western parts of the study area (near the Project footprint), bedrock is exposed or covered by a thin veneer of till or vegetation.



LEGEND

DETAILED SURFICIAL GEOLOGY

- Aeolian ridge
- Fluvial fan
- Fluvial veneer
- Glacial blanket
- Glacial eroded and dissected
- Glacial lineated
- Glacial veneer
- Glaciofluvial eroded and dissected
- Marine ridge
- Organic
- Organic ridge
- Organic veneer
- Rock concealed by vegetation

HYDROGRAPHY

- Watercourse
- Waterbody
- Wetland

ER	Aeolian ridge
FF	Fluvial fan
FV	Fluvial veneer
GE	Glaciofluvial eroded and dissected
MR	Marine ridge
O	Organic
OR	Organic ridge
OV	Organic veneer
RC	Rock concealed by vegetation
TB	Glacial blanket
TE	Glacial eroded and dissected
TL	Glacial lineated
TV	Glacial veneer

0 500 1000 1500 m

1:32000

REFERENCE SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; GEOSCIENCE ATLAS, GOVERNMENT OF NEWFOUNDLAND AND LABRADOR; CANVEC & CANVEC+, 1:50 000 SCALE, NRCAN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
SURFACE GEOLOGY

CONSULTANT
JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023
REV: 0
FIGURE 6-20

The St. Lawrence area is part of the Avalon Zone of the Appalachian mountain chain in eastern Newfoundland. This Zone is characterized by thick, dominantly subaerial volcanic rocks and marine to terrestrial clastic sedimentary rocks of Late Precambrian age. These rocks are locally overlain by shallow marine sedimentary and minor volcanic rocks of Cambrian age. Both sequences are locally overlain with angular unconformity by Devonian and Carboniferous sedimentary and volcanic rocks. The Avalon Zone is also intruded by several Late Precambrian and Late Devonian to Carboniferous granites (Roscoe Postle Associates (RPA) 2013; Agnerian 2015).

The Project area is underlain by the Late Devonian St. Lawrence Granite and associated porphyritic rocks of similar composition, both of which intrude older host rocks. The porphyritic rocks are locally referred to as rhyolites, and these form sills and dykes within the host metasedimentary rocks, which consist of Late Precambrian to Ordovician argillites and minor metavolcanics of the Inlet Group (Figure 6-21). The metavolcanic rocks include porphyritic andesite, lithic and crystal tuff, and brecciated tuff (RPA 2013; Agnerian 2015).

Exposed along Little Lawn Harbour's shoreline is bedrock belonging to the Bay View Formation: one of the three formations that comprise the Inlet Group. The rocks of this formation, which are generally highly cleaved and schistose, consist of mudstones, shales, limestones, and siltstones. They are highly susceptible to erosion (Strong et al. 1978).

6.1.4.1 Mine Waste Geochemistry

Acid Generating – Metal Leaching Potential

Baseline geochemical testing of AGS Mine wastes (including waste rock and DMS Floats) has been ongoing since 2015 to characterize the acid generating and metal leaching potentials of these materials (Golder 2015b; 2016b; 2017; 2019).

Based on preliminary depletion calculations, results of long-term kinetic testing are consistent with previous acid-base accounting (ABA) results, which indicated that 60 waste rock samples are non-acid generating, based on MEND (2009) neutralization potential ratio (NPR) criteria. Samples of waste rock have an uncertain potential to generate acidic conditions based on carbonate-neutralization potential (CO_3-NP) depleting faster than sulphide; however, there appears to be sufficient bulk neutralization potential in all samples and therefore the waste rock is considered non-Potentially Acid Generating (non-PAG).

Based on results of kinetic testing carried out over 57 weeks on two waste rock samples (Golder 2017), most of the key parameters identified in the baseline report (Golder 2015b) are leaching at concentrations below guideline levels (i.e., *Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life in Canadian Environmental Quality Guidelines* [CCME 2019]) in both humidity cells, with the exception of fluoride, arsenic, silver, lead and zinc. No parameters had concentrations above their respective limits of CFI's COA (No. AA16-045637). Elevated zinc concentrations appear to be the result of ongoing sphalerite weathering as shown by a coinciding increase in both sulphate and zinc concentrations.

LEGEND

DETAILED BEDROCK GEOLOGY

- Plutonic felsic
- Volcanic mafic marine
- Siliciclastic marine shale
- Fluorspar Vein

HYDROGRAPHY

- Watercourse
- Waterbody
- Wetland

0 1 2 3 km

1:35000

REFERENCE

SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; GEOSCIENCE ATLAS, GOVERNMNET OF NEWFOUNDLAND AND LABRADOR; CANVEC & CANVEC+, 1:50 000 SCALE, NRCAN. PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE

BEDROCK GEOLOGY

CONSULTANT

JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE 6-21

Trends in all parameters have become relatively stable; however, kinetic testing has continued at the request of NL DNR throughout December 2018. Based on the depletion calculations, carbonate in the samples has been depleted since the early weeks of testing with no indication of acidic conditions occurring (Golder 2019).

Radon

A Health Canada survey initiated in 2017 found elevated radon levels in some older buildings in the Town of St Lawrence. Certain buildings were constructed in the past using waste rock from the old underground mines, and Health Canada suspected there might be a connection between the waste rock and the anomalous radon levels.

Radon (a natural, ubiquitous, radioactive gas) derives from radioactive decay of uranium and thorium, common elements found in all soils and bedrock. Assuming natural soil gases have normal radon levels, uranium concentrations in waste rock provides a useful proxy for evaluating the potential for the rock to generate elevated radon levels in basements and substructures, should it be used around and beneath buildings during construction.

Health Canada suggests that total uranium concentrations <23 mg/kg (i.e., the residential/parkland land use criterion for uranium in the *Canadian Soil Quality Guidelines* [CCME 2019[4]]), preferably <10 mg/kg, would be acceptable, should the waste rock be used for building construction (L. Richardson-Prager, Health Canada, pers. comm., 7 May 2019).

Whole rock analyses on 62 samples of CFI's mine waste show reported uranium concentrations that are below 23 mg/kg, as shown on Table 6-12 (Golder 2016a). Based on this testing, results indicate that uranium concentrations in aggregate meet Health Canada's acceptance.

Table 6-12: Statistical Summary of Uranium Levels in AGS Mine Waste

		Total Uranium Concentration (mg/kg)			
Mine Waste Type	**No. of Samples**	**Min**	**Median**	**Mean**	**Max**
Metasediment (waste rock)	43	2.0	2.2	2.4	9.3
Rhyolite (waste rock)	17	8.0	10.0	9.9	12.0
DMS Floats	2	2.9		3.4	3.8

6.2 Atmospheric Environment

Large industrial facilities in the province, particularly those using combustion process equipment, must establish ambient air monitoring programs to ensure their air emissions do not exceed regulatory limits of the *Air Pollution Control Regulations, 2004.* The data collected from a facility's monitoring program is used for human health risk assessment, public awareness, ensuring environmental compliance, and validation of compliance modelling.

Atmospheric emissions associated with CFI's AGS Mine project are monitored by an Ambient Air Monitoring Station (AAMS) that was commissioned in December 2016 during the mine's construction phase. Since then, the station has been monitoring emissions resulting from fugitive releases of

[4] http://st-ts.ccme.ca/fr/index.html?chems=225&chapters=4&lang=fr

particulate matter (resulting from material handling and processing, and road dust) and diesel engine exhaust.

The AAMS was installed close to the community of St. Lawrence (UTM coordinates: zone 21T; 5,196,769 m N; 621,787 m E) and downwind of AGS Mine activities. This station is equipped with two beta attenuation monitors to measure particulate matter less than or equal to 2.5 microns ($PM_{2.5}$), and TPM. An API Teledyne T200 analyzer was also installed to measure NO_x. The AAMS was sited based on the dominant wind direction, the location of mining activity, the community's proximity, accessible electrical power, and through consultation with DMAE. The sampling program aids in determining the effects of mining on the ambient air quality.

With respect to the marine terminal Project area, the dominant wind direction is towards the community of St. Lawrence, with predominant winds blowing from the northwest to the southwest and strongest winds generally coming from the west, as discussed earlier in Section 6.1.2.2 and shown on the wind rose diagrams in Figure 6-4.

Since the AAMS was installed and commissioned, there have been no concerns raised by DMAE with respect to CFI's air quality monitoring (S. Adams, pers. comm., 2015). This suggests air quality associated with CFI's current operations is both acceptable and compliant with the *Air Pollution Control Regulations, 2004.* This monitoring also helps establish "baseline" air quality with respect to the proposed western marine shipping terminal Project.

CFI has retained Golder Associates to update CFI's Air Emissions Inventory, which includes GHG and criteria air contaminants (Golder 2016b), and to also update CFI's Preliminary Noise Assessment (CFI 2015a,b) to predict the effects caused by the marine terminal Project, and to compare against CFI's current mining operations. These reports will be supplied to regulatory authorities on request when available.

6.3 Water Resources

6.3.1 Surface Water

The St. Lawrence peninsula has been shaped by glaciation into three broad but elongated southward sloping upland valley troughs separated by rounded ridges that form the main watersheds. The alignment of these features follows the general direction of glacial flow during the Pleistocene (Strong et al. 1978). At the coast, the land drops from an elevation of 300–500 m in the north to about 50–100 m in the south. Topographic gradients in the peninsula are generally low and many shallow ponds of various sizes have formed. Flat areas between ponds are often occupied by heavily saturated upland bogs.

Stream flows in the general area follow a bimodal pattern with a primary peak occurring in April (in response to snowmelt) and a secondary peak in December (due to rainstorms). The lowest flows occur in the summer months of July and August, when evapotranspiration by ground vegetation cover is highest. Average monthly runoff depths range from 58.8 mm (August) to 191.3 mm (April), with an annual total of 1401 mm based on the analysis of the 1966–2005 daily stream flow data for Environment Canada's Garnish River hydrometric station near Garnish, which is located ~35 km north-northeast of the Project area (ECCC 2015a).

CFI has developed a Site Wide WMP and water balance for its mine (Knight Piesold 2017). The strategy set out in the document is focused on achieving the following objectives:

- Ensure all discharge from the mine project complies with the site water quality objectives of its COA;
- Provide sufficient water to support milling operations;
- Minimize impacts on the surrounding watersheds; and
- Provide flexibility and allow for future adaptation to actual conditions.

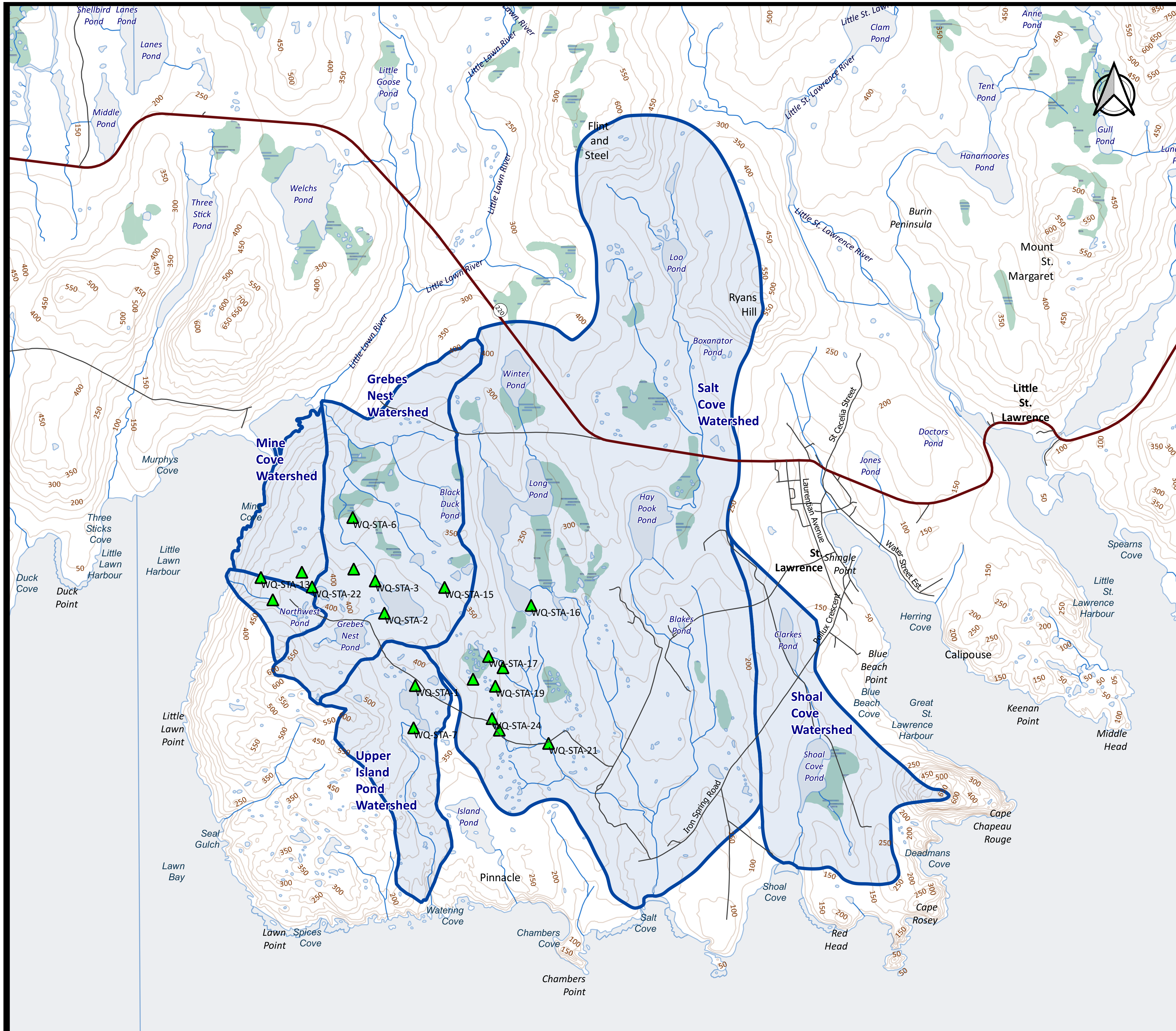
In the vicinity of the AGS Mine, there are five watersheds, as shown on Figure 6-22 (Knight Piesold 2017). Only the Mine Cove Watershed, and possibly the Northwestern Pond Watershed, may be affected by the marine terminal Project. These two are described below.

- **Mine Cove Watershed** - This ~163 ha watershed contains several small creeks that drain towards the west into the marine environment. The creeks range in length from 0.06–1.3 km and are considered to be intermittent or seasonal streams (i.e., flowing only part of the year or immediately after precipitation events). All of the land-based infrastructure and most activities associated with the proposed marine terminal Project will be situated within this watershed. Additional details on Mine Cove Watershed are presented in Section 6.4.3.1.
- **Northwestern Pond Watershed** - This ~38 ha watershed drains towards the west, and outlets at a small cove south of Mine Cove. Part of this watershed may be affected by the marine terminal Project.

Surface water quality analyses have been conducted throughout the study area between 1984 and 2014, and over the past five years sampling and testing has focused on the watersheds to establish baseline conditions in this region, including the Project area. Pre-2015 results are summarized in the AGS Mine EA documentation (CFI 2015a,b) and are briefly discussed below. Regular water quality analyses have taken place since before the AGS Mine began operations in August 2018 as part of the mine's regulatory requirements and environmental effects monitoring program, and these are also presented further in this section.

Within the Mine Cove Watershed, three surface water sampling stations and one groundwater monitoring well have been established to regularly sample and test the water (Figure 6-22). One station (WQ-STA-22) is monitored each week, and the other two (WQ-STA-9 and -13) every three months. Groundwater monitoring well MW14-04 is sampled and tested quarterly.

Groundwater monitoring results for MW14-04 meet AGS Mine's COA. At the three surface water monitoring stations, TSS exceeded the regulatory limit of 30 mg/L during six monitoring events, with reported concentrations ranging from 31–82 mg/L. All other monitored parameters were within the limits established by the COA (CFI 2019a).



LEGEND

▲ Water Monitoring Station

WATERSHED

Watershed Area

TOPOGRAPHY

Building

Highway

Road

Contour Line (interval: 50ft)

Watercourse

Waterbody

Wetland

0 1 2 3 km

1:45000

REFERENCEVSOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; GEOSCIENCE ATLAS, GOVERNMENT OF NEWFOUNDLAND AND LABRADOR, CANVEC & CANVEC+, 1:50 000 SCALE, NRCAN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE

SURFACE WATER

CONSULTANT

JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023

REV: 0

FIGURE 6-22

6.3.2 Hydrogeology

Granite generally has little or no intrinsic permeability but often contains significant fracture zones which give the rock mass a secondary permeability. The overlying glacial till in the study area can act as a shallow aquifer. The occurrence and movement of groundwater in bedrock of the area is controlled by the frequency and degree of interconnectivity of open faults and joints. Groundwater tends to occur in areas where mineralisation occurs, which are in discrete secondary aquifers. Such aquifers also tend to be linear in conformity with the principal direction of faulting. Hydraulic conductivity describes the ease with which groundwater can move through pore spaces or fractures. The hydraulic conductivity of igneous rocks such as granite generally ranges from 10^{-11} m/s to 10^{-3} m/s for unfractured to fractured rocks (Freeze and Cherry 1979). As part of the 2009 EPR, it was conservatively assumed that the hydraulic conductivity of St. Lawrence aquifers was within the range 10^{8} m/s to 10^{-6} m/s and the veins 10^{-1} m/s to 10^{-5} m/s (CFI 2009). Based on pumping tests conducted in 2014 at the exploration boreholes of the AGS Vein, hydraulic conductivities ranging from 10^{-7} m/s to 10^{6} m/s were determined (Golder 2015a). A follow-up hydrogeological investigation involving drilled wells around the AGS Mine site confirmed a geometric mean of hydraulic conductivities in bedrock (determined through packer testing) to be 2.7×10^{7} m/s, with values ranging from 4×10^{-8} m/s to 6×10^{-7} m/s (Golder 2015c).

The faults present in the bedrock provide transmission paths and storage for groundwater, although storage of groundwater in the bedrock is low. The overlying glacial till constitutes a shallow aquifer that also provides storage for groundwater. The lateral extent of the shallow aquifer in the overlying glacial till is limited to the surface catchment or watershed in which it lies. The hydraulic conductivity of the till was estimated at 10^{-5} m/s to 10^{-4} m/s (CFI 2009).

When the 2009 EPR was completed, there was limited groundwater data available to define groundwater levels and flows with certainty. However, groundwater levels were expected to be close to ground surface and water levels of ponds were believed to represent groundwater levels (CFI 2009). Based on field work conducted in 2014 (Golder 2015a), groundwater levels in monitoring wells in the vicinity of the AGS Vein were confirmed to be near ground surface. It was also assumed that shallow bedrock flow directions are the same as surface water flows. It was determined that the shallow aquifer system is largely controlled by surface runoff and local recharge, which makes groundwater levels sensitive to dry periods.

Water quality results in deep bedrock wells showed elevated concentrations of aluminium, iron and total manganese, which is consistent with observations for surface water quality (Golder 2015a).

6.4 Terrestrial and Freshwater Biological Environment

The description of the terrestrial and freshwater biological environment includes an overview of the vegetation, wetlands, freshwater fish and wildlife located in the Project area, including species at risk.

6.4.1 Vegetation

Vegetation communities, habitat types and vegetation species at risk are described in this section.

6.4.1.1 Vegetation Communities and Habitat Types

The proposed Project area occurs within the Eastern Hyper-Oceanic Barrens Ecoregion of NL (Meades 1990). Vegetation in this ecoregion is primarily limited to stunted balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*), low shrubs (e.g., blueberry and bakeapple; *Vaccinium angustifolium* and *Rubus chamaemorus*, respectively) and various species of heath mosses (e.g., *Rhacomitrium* *lanuginosum*). Coastal barrens of heath moss, as well as plateau and blanket bogs are characteristic of the region (Meades 1990).

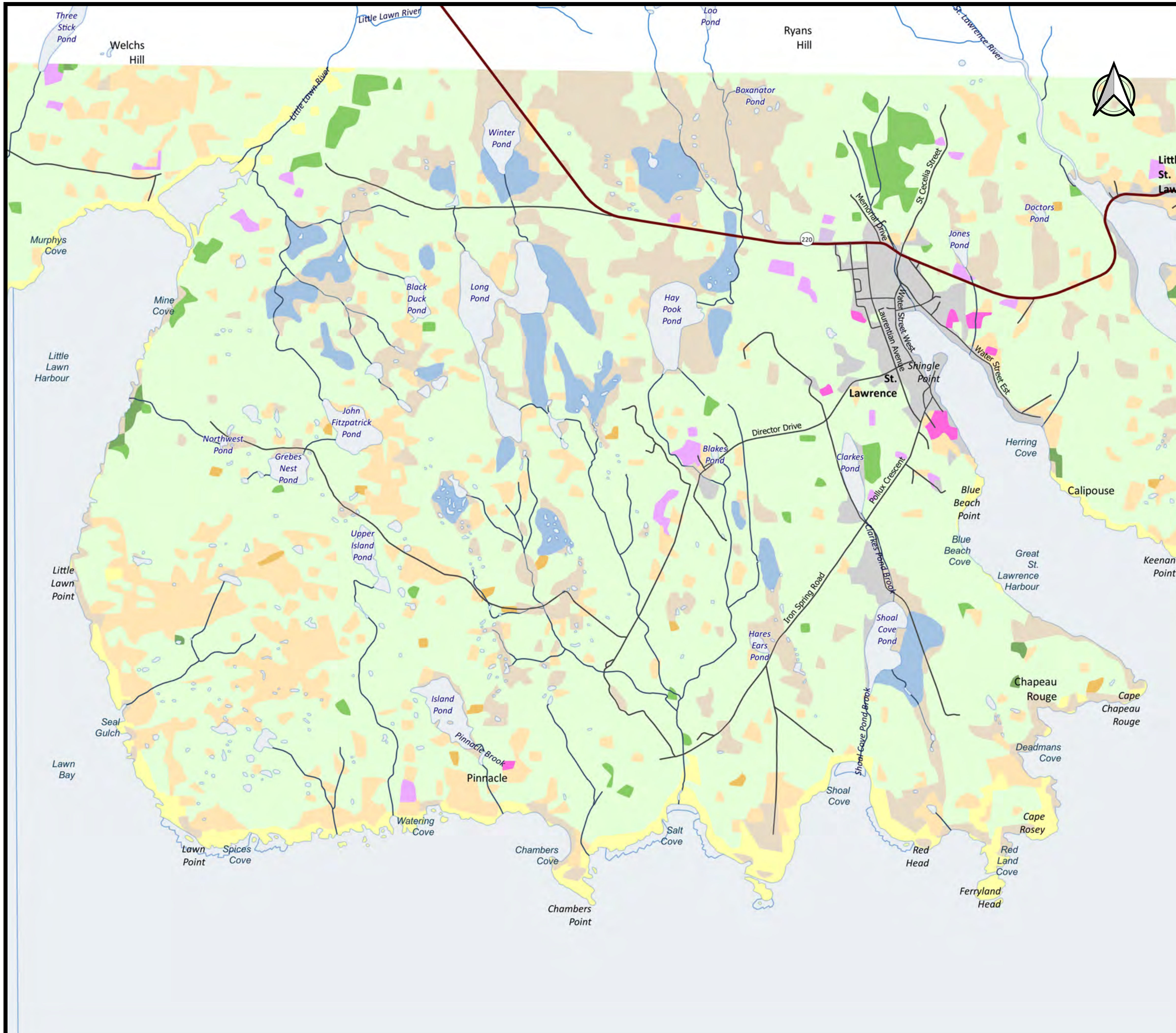
Vegetation communities and habitat types were previously identified via ELC for the AGS Mine Project area (see Figure 6-5 *in* CFI 2015a; Figure 6-23 here). An area of ~10,400 ha was selected for the ELC study area, with coverage extending between Little Lawn Harbor and Little St. Lawrence Harbour (CFI 2015a). The ELC product is based on CanVec+ data provided by the Canada Centre for Mapping and Earth Observation (NRCan 2014). It utilizes topography contours, hydrography (e.g., waterbodies, rivers and reef), disturbances (e.g., roads, clearings and buildings), and remote-sensing metrics to classify land cover. The CanVec+ data characterizes vegetation communities primarily based on signature profiles obtained from remotely sensed imagery obtained from the Canadian Forest Service (Earth Observation for Sustainable Development [EOSD]) and Agriculture and Agri-Food Canada's (AAFC) National Land and Water Information Service (NLWIS).

As shown on Figure 6-23 15 high level ELCs were identified in the ELC study area. Unique ecological land classes represent a particular community of vegetation cover and habitat type and were further subdivided into hierarchical units where data resolution allowed (e.g., Coniferous Dense or Coniferous Open vs. Coniferous Forest classes). Table 6-13 provides a description of each of the identified ELCs within the ELC study area.

For this Project, a subset of the 2015 ELC product was used to assess land cover east of Little Lawn Harbour. Refer to Figure 1-4 for the terrestrial limits of the Project area. This confined terrestrial area of focus (98 ha; 105 ha defined by bounding limits, of which 7 ha is now developed area as a result of the former AGS Mine Project) represents the maximum extent for the proposed Project footprint and contains all of ELCs as identified in Table 6-13, with the exception of:

- Broadleaf Dense
- Mixed Wood Dense
- Mixed Wood Sparse
- Reef
- Wetlands

In 2015, during habitat assessments for wetlands, avifauna and wildlife at risk, it was noted that the upper plateau of the Project area was predominately covered with stunted (tuckamore) balsam fir interspersed with low-lying woody vegetation (LGL 2015). The west-facing slope extending down to Little Lawn Harbour is steep and comprised of a mixture of coniferous forest, barren tracts, and exposed bedrock. Coniferous canopy coverage is most dense mid-slope and in areas that provide natural windbreaks (e.g., adjacent to deeply incised streams).



LEGEND

ECOLOGICAL LAND CLASSIFICATION
- Anthropogenic
- Barren
- Broadleaf Dense
- Coastal
- Coniferous Dense
- Coniferous Open
- Coniferous Sparse
- Mixewood Dense
- Mixewood Sparse
- Shrub Low
- Shrub Tall
- Wetlands
- Body of Fresh Water
- Body of Salt Water

0 1 2 3 km

1:35000

REFERENCE
SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; GEOSCIENCE ATLAS, GOVERNMENT OF NEWFOUNDLAND AND LABRADOR; CANVEC & CANVEC+, 1:50 000 SCALE, NRCAN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT	CANADA FLUORSPAR INC.
PROJECT	ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT EA REGISTRATION
TITLE	ECOLOGICAL LAND CLASSIFICATION
CONSULTANT	JEWER BAILEY CONSULTANTS
YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB
PROJECT:	19-C-023
REV:	0
FIGURE	6-23

Table 6-13: Ecological Land Classes

Class	Description
Barren	Terrestrial habitat representing primarily a coastal area composed of undulating bedrock with many rock outcrops dotted with bryophytes, lichens or moss.
Barren with Wetlands	Terrestrial habitat representing low-lying vegetation dotted with bryophytes, lichens, moss and wetlands such as blanket bogs.
Broadleaf Dense	Terrestrial habitat having more than 60% crown closure where broadleaf trees are 75% or more of total basal area.
Body of Fresh Water	Aquatic habitat consisting of any inland waterbody (lake, pond) or watercourse (river) that contains fresh water.
Body of Salt Water	Aquatic habitat consisting of any coastal waterbody (ocean) or watercourse (fiord) that contains salt water.
Coniferous Dense	Terrestrial habitat representing fairly productive, closed-crown forests having greater than 60% crown closure where coniferous trees are 75% or more of total basal area.
Coniferous Forest	Terrestrial habitat with predominantly coniferous forests or treed area that may include mixed forests and scrubland area.
Coniferous Open	Terrestrial habitat having very little forest cover (26–60% crown closure) where coniferous trees are 75% or more of total basal area.
Disturbance (Buildings or Industrial and Commercial Area	Groups of cleared lots and buildings operated or arranged for human activity that is primarily industrial, commercial, institutional and or considered as brown fields that can include buildings and old mining sites that have been abandoned.
Mixed Wood Dense	Terrestrial habitat composed of mixed coniferous and broadleaf/deciduous forest or treed areas.
Mixed Wood Sparse	Terrestrial habitat having of only 10–25% crown closure where neither coniferous nor broadleaf tree account for 75% or more of total basal area.
Reef	A rock formation that is alternatively covered and uncovered by the tide.
Shrub Low	Terrestrial habitat having at least 20% ground cover which is at least one-third shrub or shrubland vegetation community having an average shrub height less than or equal to 2 m.
Shrub Tall	Terrestrial habitat having at least 20% ground cover which is at least one-third shrub or shrubland vegetation community having an average shrub height greater than or equal to 2 m. Typically in the North, moist to wet erect tall shrub greater than 40 cm forming more than 25% of this vegetation cover. The remaining cover typically consists of graminoids, lichen, dwarf shrubs.
Wetlands	Water saturated habitat where there is little or no drainage and having a minimum size 100 m^2 such as a bog, fen, swamp or marsh.

Source: NRCan 2014

6.4.1.2 Vegetation Species at Risk

Protected species can be designated federally under the SARA, provincially by the NL ESA, or also by the COSEWIC who operate independently of government. Species at risk are defined as any species listed federally as Special Concern, Threatened, Endangered, Extirpated or Extinct by COSEWIC (2018) or under the SARA Registry (Government of Canada 2019), or provincially as Endangered, Threatened or Vulnerable by DFLR under the NL ESA (NL ESA 2001, 2002; designations as of May 2019).

In addition to the species that have been formally designated and protected under provincial or federal legislation (i.e., species at risk), it is important to consider other regionally rare species that could potentially be found in the Project area. These are considered to be species of conservation concern and the following organizations can provide information on species occurrence and distribution:

- COSEWIC is an independent body of experts responsible for identifying and assessing species that are considered to be at risk and for providing information and advice to provincial and federal governments regarding their potential protection. In NL, designations under the NL ESA follow recommendations from COSEWIC and/or the NL Species Status Advisory Committee. Although designations by COSEWIC or other such organizations do not in themselves constitute legal protection (i.e., under SARA or NL ESA), they do provide a general indication of species that may be considered rare, and thus, of some degree of potential conservation concern (COSEWIC 2018).

- The Atlantic Canada Conservation Data Centre (ACCDC) is a non-profit organization that manages the species occurrence and distribution databases for the Wildlife Division of the DFLR, as well as other Atlantic provinces. The ACCDC ranks wildlife species known to occur in the province with consideration of the following factors: population size; number of occurrences; geographic distribution; trends in population; trends in distribution; threats to population; and threats to habitat. These ACCDC S-ranks (provincial rank) and N-ranks (national rank) provide useful and relevant indications of the relative rarity and current status of a species (ACCDC 2019).
- The National General Status Working Group (NGSWG) is a committee within Environment and Climate Change Canada (ECCC) that monitors and reports on the general status of wild species on a five-year cycle. A Wild Species report by the Canadian Endangered Species Conservation Council compiles information on a large number of Canadian wild species to assess the general status of species and species groups. This information can reveal early signs of trouble before species reach a critical condition (ECCC 2016).

A desktop survey was completed to identify vegetation species at risk or of conservation concern that have the potential to be affected by the Project (i.e., NL Range based on the SARA Registry [Government of Canada 2019]). At present there are 30 provincially listed plant, lichen, and moss species under the ESA 11 federally listed species under SARA, and 11 species listed by COSEWIC that are known to occur in NL (NL ESA 2002; Government of Canada 2019; COSEWIC 2018) as presented in Table 6-14.

Table 6-14: Provincially and Federally Listed Vegetation Species in Newfoundland and Labrador

Species	SARA[1]			COSEWIC[2]			ESA[3]		
	E	T	SC	E	T	SC	E	T	V
Alaska rein orchid (*Platanthera foetida*)							X		
Barrens willow (*Salix jejuna*)	S1			X			X		
Bue felt lichen (*Degelia plumbea*)			S1			X			X
Bodin's milkvetch (*Astragalus bodinii*)								X	
Boreal felt lichen (*Erioderma pedicellatum*)			S1			X			X
Crowded wormseed mustard (*Eryrysimum inconspicuum var. coarctatum*)							X		
Cutleaf fleabane (*Erigeron compositus*)							X		
Feathery false Solomon's seal (*Maianthemum racemosum subsp. Racemosum*)							X		
Fernald's braya (*Braya fernaldii*)	S1			X			X		
Fernald's milkvetch (*Astragalus robbinsii var. fernaldiil)*			S1			X			X
Griscom's arnica (*Arnia griscomii ssp. Griscomii*)		S1			X		X		
Gmelin's watercrowfoot (*Ranunculus gmelinii*)							X		
Lindley's aster (*Symphyotrichum ciliolatum*)							X		
Long's braya (*Braya longyi*)	S1			X			X		
Low northern rockcress (*Neotorularia humilis*)							X		
Mackenzie's sweetvetch (*Hedysarum boreale subsp. Mackenzii*)							X		
Mountain bladder fern (*Cystpteris montana*) Newfoundland population							X		

Mountain fern (*Thelypteris quelpaertensis*)									X
Mountain holly fern (*Polystichum scopulinum*)		S1			X				
Northern bog aster (*Symphyotrichum boreale*)							X		
Northern twayblade (*Listera borealis*)							X		
Oval-leaved creeping spearwort (*Ranunculus flammula var. ovalis*)							X		
Porsild's bryum (*Mielichhoferia macrocarpa*)		S1			X			X	
Rattlesnakeroot (*Prenanthes racemose*)							X		
Rock dwelling sedge (*Carex petricosa var. misandroides*)							X		
Sharpleaf aster (*Oclemena acuminate*)								X	
Tradescant's aster (*Symphyotrichum tradescantii*)								X	
Vole ears lichen (*Erioderma mollissimum*)	S1			X			X		
Vreeland's striped coralroot (*Corallorhiza striata var. vreelandii*)							X		
Water pygmyweed (*Tillaea aquatica*)									X
Wooly arnica (*Arnica angustifolia subsp. tomentosa*)							X		
Wrinkled shingle lichen (*Pannaria lurida*)		S1			X				

Notes:
[1] Government of Canada 2019
[2] COSEWIC 2019
[3] NL ESA 2019

For the purposes of this RD/PD, species at risk includes only those designated species that are known to occur, or to have occurred, in the vicinity of the Project area, and not all provincially and federally protected species. None of the 32 species presented in Table 6-14 are known to occur on the Burin Peninsula and are not expected to be located in the Project area.

Historical observations of species at risk or species of conservation concern was obtained for a 5 km radius centred on Grebes Nest Pond (roughly 1.5 km southeast of the proposed marine terminal) from ACCDC in 2015 to facilitate preparation of the AGS Mine project EA Registration (ACCDC 2015). ACCDC has confirmed no new records or ranking changes have occurred within the 5 km search radius since the 2015 data request (A. Durocher, Data Manager, ACCDC, pers. comm., 26 April 2019). Response to that 2015 request identified only one historical occurrence of a plant species of conservation concern. Marsh fern (*Thelypteris palustris var. pubescens*) is ranked as S3 by ACCDC, indicating that this species is considered vulnerable to extirpation. Marsh fern is neither provincially or federally listed and is not considered globally rare outside of NL. In addition, based on the 2015 opinion of species experts within ACCDC, it was considered possible, but unlikely, for boreal felt lichen (*Erioderma pedicellatum*) to occur in the Project area. Additional information on these species, including detailed species descriptions can be found in the 2009 EPR (CFI 2009).

6.4.2 Wetlands

The ELC confirmed that no wetlands (greater than 100 m^2) are located in the proposed marine terminal Project area of focus (98 ha). It is not anticipated that any Project elements will conflict with upland wetlands.

A portion of the Project area encroaches on the existing Town of St. Lawrence's "EP-MU Zone", which extends ~150 m inland from the coastline. This coastal management unit features balsam fir tuckamore, open barrens, and small-scale bogs localized to terrain depressions. Refer to Section 1.4.3.1 for details and history of this *Municipal Habitat Stewardship Agreement*. Essentially, DFLR functions in partnership with the EHJV in NL through the provincial Wildlife Habitat Stewardship Program to "provide a framework within which governments, municipalities, businesses, conservation organizations, and individuals collaborate to secure and improve wetland habitat" (DFLR 2019a).

6.4.3 Freshwater Fish and Fish Habitat

As shown in Figure 1-4 and described in Section 2.1, the Project is located on the eastern shoreline near Mine Cove. The proposed infrastructure is in the general area within Mine Cove Watershed and Northwest Pond Watershed to the south. The largest streams within both watersheds were surveyed and assessed during the mine/mill EA process because their headwaters were within the vicinity of the mine/mill footprint. Because of the location of mine/mill infrastructure and water management, both were also assessed and included in the existing *Fisheries Act* Authorization for the mine/mill and therefore offsetting measures were completed to account for determined Serious Harm. There are several other smaller drainages within the Mine Cove and Northwest Pond watersheds that are not identified on existing 1:50,000 topographic mapping but have been identified during the engineering design as any water drainage requires consideration for such aspects as road layout and culvert design. In terms of viable fish habitat, only the main stream within Mine Cove Watershed (to the north of the Project footprint) is currently considered fish habitat. Provided below is the description of existing habitat for each drainage.

6.4.3.1 Mine Cove Watershed

The main stream within Mine Cove Watershed is located to the west of Fitzpatrick Pond (Figure 6-24). Its watershed occupies a total of 163 ha and contains a small waterbody (Mine Cove Pond) and a main stem stream that flows from Mine Cove to Little Lawn Harbour.

Figure 6-24: Typical Lower Surveyed Stream Reaches of Mine Cove Pond, September 2015

Both Mine Cove Pond and the stream are relatively small. Table 6-15 provides a summary of the stream habitat as described in the CFI application for Authorization under Paragraph 35(2) of the *Fisheries Act* (Amec 2016). Due to the steepness of the lower stream reaches, only the upper 825 m of stream was surveyed (from the outflow of Mine Cove Pond to 825 m downstream). The lower reaches of the surveyed stream sections were very steep and flowed over a vertical drop; the watershed is therefore not considered accessible by anadromous species. The mean wetted width at the time of survey was 0.59 m with mean water depths of 0.10 m (Figures 6-24 and 6-25). Water velocities were variable with a range of 0.00–0.32; with greater velocities flowing over cascades. The outflow of the pond is very small and restricted (Figure 6-26). Mine Cove Pond is 1.7 ha in size and estimated to be ~1–2 m deep (Figure 6-26).

Table 6-15: Stream Habitat Characterization Summary, Mine Cove

Transect #	Section Length (m)	Wetted Width (m)	Area (units)	Bank Height (m)		Average Depth (m)	Average Velocity (m/s)	Slope (%)	Substrate (%)												Classification	
				Left	Right				B	LgB	SmB	R	C	G	S	St	C	D	M	AqV	Beak	New
1	5	-	-	0.00	0.00	-	-	100.00	80	5	5	5	5	0	0	0	0	0	0	0	II	Cascade
2	100	0.5	0.50	0.15	0.50	0.00	0.32	7.00	0	0	0	0	0	0	0	0	0	0	0	0	II	Rapids
3	100	0.6	0.60	0.23	0.24	0.12	0.03	1.70	10	0	10	15	50	5	0	0	0	0	10	0	IV	Riffle
4	100	0.6	0.62	0.21	0.18	0.11	0.14	6.00	5	5	30	30	30	0	0	0	0	0	0	0	I	Rapids
5	100	0.4	0.35	0.23	0.20	0.10	0.10	3.70	5	5	20	45	20	5	0	0	0	0	0	0	IV	Rapids
6	100	0.9	0.90	0.10	0.03	0.07	0.07	3.70	0	0	20	15	30	5	0	0	0	0	30	0	I	Run
7	86	0.8	0.69	0.12	0.10	0.11	0.00	8.00	0	1	4	15	15	5	0	0	0	0	60	0	IV	Cascade
8	-	0.5	-	0.11	0.14	0.09	0.05	1.30	0	0	0	0	0	0	0	0	0	0	0	0	IV	Riffle
9	100	0.5	0.50	0.01	0.01	0.09	0.05	0.55	0	0	1	7	20	2	0	0	0	0	70	0	IV	Pool
10	60	0.7	0.40	0.02	0.02	0.25	0.01	0.70	0	0	2	1	5	2	0	0	0	0	90	0	IV	Pool
11	75	0.5	0.39	0.11	0.08	0.10	0.00	-	0	0	1	1	3	0	0	0	0	0	95	0	IV	Pool

Source: Amec 2016

Figure 6-25: Typical Upper Surveyed Stream Reaches of Mine Cove Pond, September 2015

Figure 6-26: Mine Cove Outflow, September 2015

Fish Species

Due to the small size of the stream and limited water flow, index electrofishing was completed. A total of 300 seconds were completed within an estimated 47.5 m^2 of habitat. A total of four brook trout were observed and captured. Given the overall habitat area characterized as suitable brook trout habitat (i.e., riffle and pool habitat based on Table 6-15), a total of 11 brook trout are estimated within the stream. While this stream is not likely supporting a fishery of any kind, they were conservatively added to the estimate of Serious Harm due to the mine/mill.

Using the overall size of the pond, and the fact that brook trout were identified within the watershed, a population of 36 brook trout was estimated based on a pro-rating from Grebes Nest Pond. While this small pond is not likely supporting a fishery of any kind, they were also conservatively added to the estimate of Serious Harm.

6.4.3.2 Northwest Pond Watershed

The Northwest Pond watershed is a very small drainage (38 ha) that flows from the area of the proposed Central Pit North (CPN) Pit area in a northwesterly direction to the Little Lawn Harbour. Stream surveys indicate a very steep drop at the mouth of the stream at its confluence with no access for fish from the harbour. The stream itself is very small and shallow (Figures 6-27 and 6-28). Surveys completed in October 2015 for fish species presence showed no fish within the drainage. This small watershed is therefore not considered habitat supporting commercial, recreational and Indigenous fish species and was not been considered further in terms of Serious Harm or Authorization.

Figure 6-27: Widest Section of Northwest Pond Stream, September 2015

Figure 6-28: Typical Stream Reach, Northwest Pond Stream, September 2015

6.4.3.3 Sub-watershed Drainages

There is a total of five identifiable drainages between the main stream in Mine Cove Watershed and Northwest Pond Watershed (i.e., within the marine terminal Project footprint). None of them are identified on available 1:50,000 topographic mapping and neither was identified as streams or fish habitat in previous surveys, and none has a standing water body within their drainage. They each appear to primarily offer drainage to very small areas on the steep slopes of Little Lawn Harbour and the upper terrace to the west of the mine/mill infrastructure during heavy precipitation and spring thaws.

The five sub-watershed drainages are numbered sequentially from north to south (WS1-WS5). Table 6-16 provides a summary of existing data regarding each drainage. Their overall watershed sizes are relatively small (all less than 8 ha) relative to Northwest Pond watershed which does not support fish populations. Given the overall size of each, the steep slopes, and lack of headpond or waterbody, it is likely that each drainage does not provide adequate flows during summer or winter to sustain fish populations. It is also evident from the slope of each drainage at their outflow to Little Lawn Harbour, that access by migratory species would not be available and therefore, they are not considered habitat supporting fish populations.

Table 6-16: Summary Information on Sub-Watershed Drainages, Little Lawn Harbour

Identification	Watercourse Length (m)	Drainage Area (ha)	Overall Slope (%)	Slope at Mouth (%)	Likely Fish Habitat?
WS1	356	4.1	20	40+	No
WS2	512	8.2	18	65+	No
WS3	198	2.2	31	90+	No
WS4	367	3.2	21	40+	No
WS5	317	3.5	26	90+	No

To provide additional support for this, field surveys were completed to characterize the habitat within each and to confirm the lack of suitable fish habitat as per DFO recommendation. In addition, index electrofishing will be completed during the summer with other fish habitat surveys to further confirm the lack of fish within each drainage.

6.5 Wildlife

Information on the existing environment pertaining to terrestrial mammals, birds (land and marine) and species at risk is provided in this section.

Terrestrial mammals that may occur in the Project vicinity include moose (*Alces alces*), black bear (*Ursus americanus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes),* lynx (*Lynx canadensis*), ermine (*Mustela erminea*), red squirrel (*Tamiasciurus hudsonicus*), and snowshoe hare (*Lepus americanus*), none of which are species at risk or of conservation concern. In recent years, wildlife sightings by CFI personnel at site have been restricted to distant viewing of moose; no confirmed reports of large mammal or furbearers close to buildings or direct wildlife-human interaction have been made (S. Adams, Environmental Technician, CFI, pers. comm., 2 April 2019).

6.5.1 Birds

Not counting rare and vagrant birds, there are over 175 species reported for insular Newfoundland. In general, these are categorized as residents (year-round), migrant breeders, migratory visitors and vagrants. A list of species common to these groups is provided by Meades (1990).

Historical bird observations are limited for the Little Lawn Harbour terrestrial area of focus, primarily due to its inaccessibility. Information presented here includes the greater St. Lawrence area, essentially the southern Burin Peninsula, from Point May east to Corbin Island. Bird species at risk will be discussed separated in Section 6.5.1. Based on surveys completed in 2002 (Jacques Whitford Environmental Limited [JWEL] 2003), the St. Lawrence area is expected to support 75–100 species of birds. That study investigated 20 survey sites in the St. Lawrence area, four of which were in the vicinity of this Marine Terminal Project area, including north of the barrier beach at the head of Little Lawn Harbour (Little Lawn Harbour Pond). In total, 98 species were identified in the St. Lawrence area of which 24 were seabirds or coastal shorebirds, nine were resident town feeders and three were vagrants (JWEL 2003).

Summer breeding bird surveys (BBS) and autumn shorebird surveys are conducted in the St. Lawrence area every year by Gail and Norman Wilson, who share survey records on an annual basis with regulatory agencies, including the Canadian Wildlife Service (ECCC-CWS) (N. Wilson, pers. comm., May 2019). The annual road-based BBS route (Lord's Cove; Route 57-102, moved to its present location in 2014) covers the 40 km stretch of NL Route 220 between Lawn and Point May, and is typically surveyed the last week of June. Shorebird fall migration surveys are now conducted at Taylor's Bay, as the former Shoal Cove beach site was discontinued in 2018 due to low bird observations attributed to it being a poor feeding/staging area (N. Wilson, pers. comm. May 2019). From 2003–2009, Gail and Norman Wilson recorded 132 bird species in the St. Lawrence area; 50 migratory breeder species of which eight are marine/coastal, 34 migratory species of which 16 are marine/coastal, 33 resident species of which two are marine/coastal, and 15 vagrant species (all of which would be rare in the area) (Table 6 17) (CFI 2009).

Table 6-17: Bird Species Reportedly Observed in St. Lawrence (2003–2009) and Months of Occurrence

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Common loon	*Gavia immer*	R		X	X	X	X	X	X	X	X	X		X
American coot	*Fulica americana*	V					X							
Manx shearwater	*Puffinus puffinus*	MB						X	X	X	X	X		
Northern fulmar	*Fulmaris glacialis*	MB					X	X			X			
Northern gannet	*Morus bassanus*	MB	X	X	X	X	X	X	X	X	X	X	X	
Great cormorant	*Phalacrocorax carbo*	R		X		X		X				X		X
Double-crested cormorant	*Phalacrocorax auritus*	MB	X	X	X	X	X	X	X	X	X	X	X	X
Parasitic jaeger	*Stercorarius parasiticus*	V						X						
Leach's storm petrel	*Oceanodroma leucorhoa*	V									X			
Great blue heron	*Ardea herodias*	M					X			X				
Little blue heron	*Egretta caerulea*	V					X	X						
Yellow-crowned night heron	*Nyctanassa violacea*	V								X				

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
American bittern	*Botaurus lentiginosus*	MB						X	X					
Canada goose	*Branta canadensis*	MB				X	X	X	X	X	X	X	X	
Mallard	*Anas platyrhynchos*	MB/R				X	X	X						
Green-winged teal	*Anas carolinensis*	MB					X	X	X	X				
White-winged scoter	*Melanitta deglandi*	M								X				
American black duck	*Anas rubripes*	MB/R				X	X	X			X		X	
Northern pintail	*Anas acuta*	MB					X	X						
Greater scaup	*Aythya marila*	MB/R					X	X						
Black scoter	*Melanitta americana*	M												
Long-tailed duck	*Clangula hyemalis*	M				X	X						X	
Red-breasted merganser	*Mergus serrator*	R					X							
Northern goshawk	*Accipiter gentilis*	R		X				X						
Sharp-shinned hawk	*Accipiter striatus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Rough-legged hawk	*Buteo lagopus*	R			X			X		X				
Northern harrier	*Circus cyaneus*	MB				X	X	X	X	X				
Osprey	*Pandion haliaetus*	MB					X	X	X	X	X			
Peregrine falcon	*Falco peregrinus*	M					X					X		
Bald eagle	*Haliaeetus leucocephalus*	R	X	X	X	X	X	X	X	X	X	X	X	X
American kestrel	*Falco sparverius*	MB			X			X						
Merlin	*Falco columbarius*	MB					X	X	X					
Great horned owl	*Bubo virginianus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Short-eared owl	*Asio flammeus*	R					X	X	X					
Willow ptarmigan	*Lagopus lagopus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Ruffed grouse	*Bonasa umbellus*	R		X	X	X	X	X						
Black-bellied plover	*Pluvialis squatarola*	M					X			X	X	X		
American golden plover	*Pluvialis dominica*	M								X				
Semipalmated plover	*Charadrius semipalmatus*	MB							X	X	X	X		
Ruddy turnstone	*Arenaria interpres*	M								X	X	X		

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Semipalmated sandpiper	*Calidris pusilla*	MB								X	X	X		
Least sandpiper	*Calidris minutilla*	MB								X				
Greater yellowlegs	*Tringa melanoleuca*	MB				X	X	X	X	X	X	X	X	
Spotted sandpiper	*Actitis macularius*	MB					X	X	X	X	X	X	X	
Sanderling	*Calidris alba*	M					X		X	X	X	X		
Common snipe	*Gallinago gallinago*	MB				X	X	X	X	X	X			
Whimbrel	*Numenius phaeopus*	M								X				
White-rumped sandpiper	*Calidris fuscicollis*	M								X				
Piping plover	*Charadrius melodus*	V									X			
Northern lapwing	*Vanellus vanellus*	V											X	X
Great black-backed gull	*Larus marinus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Herring gull	*Larus argentatus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Ring-billed gull	*Larus delawarensis*	MB	X	X	X	X	X	X	X	X	X	X	X	X
Black-legged kittiwake	*Rissa tridactyla*	MB/R								X				
Iceland gull	*Larus glaucoides*	M	X	X	X	X	X							X
Glaucous gull	*Larus hyperboreus*	M	X											
Black-headed gull	*Chroicocephalus ridibundus*	V		X								X		
Franklin's gull	*Leucophaeus pipixcan*	V						X						
Caspian tern	*Hydroprogne caspia*	MB					X	X	X	X	X			
Common tern	*Sterna hirundo*	MB					X	X	X	X				
Arctic tern	*Sterna paradisaea*	MB							X					
Dovekie (little auk)	*Alle alle*	M	X	X								X	X	X
Common murre	*Uria aalge*	MB/R						X						
Black guillemot	*Cepphus grylle*	R	X	X	X	X	X	X	X	X	X	X	X	X
Rock dove	*Columba livia*	R					X			X				
Mourning dove	*Zenaida macroura*	M	X	X	X	X	X	X	X	X	X	X	X	X
Belted kingfisher	*Megaceryle alcyon*	MB	X	X			X	X	X	X	X	X	X	
Northern flicker	*Colaptes auratus*	R				X	X	X	X	X	X	X	X	

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Eastern kingbird	*Tyrannus tyrannus*	M					X	X						
Yellow-bellied flycatcher	*Empidonax flaviventris*	M						X	X	X	X			
Alder flycatcher	*Empidonax alnorum*	M						X						
Tree swallow	*Tachycineta bicolor*	MB						X	X	X	X	X	X	
Barn swallow	*Hirundo rustica*	M				X	X	X		X		X	X	
Chimney swift	*Chaetura pelagica*	M				X						X	X	
Grey jay	*Perisoreus canadensis*	R	X	X	X	X	X	X	X	X	X	X	X	X
Blue jay	*Cyanocitta cristata*	R	X	X	X	X	X	X	X	X	X	X	X	X
Common raven	*Corvus corax*	R	X	X	X	X	X	X	X	X	X	X	X	X
American crow	*Corvus brachyrhynchos*	R	X	X	X	X	X	X	X	X	X	X	X	X
Black-capped chickadee	*Poecile atricapillus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Boreal chickadee	*Poecile hudsonicus*	R					X	X						X
Red-breasted nuthatch	*Sitta canadensis*	MB				X	X	X					X	
Golden-crowned kinglet	*Regulus satrapa*	R										X		
Ruby-crowned kinglet	*Regulus calendula*	MB					X	X	X	X				
Grey catbird	*Dumetella carolinensis*	M					X	X						
American robin	*Turdus migratorius*	R	X	X	X	X	X	X	X	X	X	X	X	X
Hermit thrush	*Catharus guttatus*	MB					X	X	X	X	X			
Swainson's thrush	*Catharus ustulatus*	MB						X						
Horned lark	*Eremophila alpestris*	MB				X	X	X	X	X				
Northern shrike	*Lanius excubitor*	MB	X											
Water pipit	*Anthus spinoletta*	MB					X	X	X	X	X	X		
Cedar waxwing	*Bombycilla cedrorum*	M							X					
Bohemian waxwing	*Bombycilla garrulus*	V		X										
Starling	*Sturnidae*	R	X	X	X	X	X	X	X	X	X	X	X	X
Yellow warbler	*Setophaga petechia*	MB					X	X	X	X	X	X	X	
Magnolia warbler	*Setophaga magnolia*	M						X						

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yellow-rumped warbler	*Setophaga coronata*	MB			X	X	X	X	X	X	X	X	X	
Black-throated green warbler	*Setophaga virens*	M						X				X		
Palm warbler	*Setophaga palmarum*	M					X				X			
Blackpoll warbler	*Setophaga striata*	MB				X	X	X	X	X	X	X		
Black-and-white warbler	*Mniotilta varia*	MB					X	X	X	X				
Northern waterthrush	*Parkesia noveboracensis*	MB					X	X	X	X				
Mourning warbler	*Geothlypis philadelphia*	MB					X	X	X					
Common yellowthroat	*Geothlypis trichas*	MB					X	X	X	X	X			
Philadelphia vireo	*Vireo philadelphicus*	V						X			X			
Red-winged blackbird	*Agelaius phoeniceus*	M	X	X	X	X							X	X
Brown-headed cowbird	*Molothrus ater*	V							X					
Wilson's warbler	*Cardellina pusilla*	MB					X	X	X	X	X			
Scarlet tanager	*Piranga olivacea*	V					X							
American redstart	*Setophaga ruticilla*	M						X						
American tree sparrow	*Spizella arborea*	M	X	X	X	X	X	X	X					
Chipping sparrow	*Spizella passerina*	V				X								
Savannah sparrow	*Passerculus sandwichensis*	MB	X	X	X	X	X	X	X	X	X	X		
Fox sparrow	*Passerella iliaca*	MB	X	X	X	X	X	X	X	X	X	X	X	X
Song sparrow	*Melospiza melodia*	MB	X	X	X	X	X	X	X	X	X	X	X	X
Swamp sparrow	*Melospiza georgiana*	MB					X	X	X	X	X	X	X	
White-throated sparrow	*Zonotrichia albicollis*	MB	X	X	X	X	X	X	X	X	X	X	X	
Dark-eyed junco	*Junco hyemalis*	R	X	X	X	X	X	X	X	X	X	X	X	X
Snow bunting	*Plectrophenax nivalis*	M										X	X	
White-winged crossbill	*Loxia leucoptera*	R	X	X	X									
Rose-breasted grosbeak	*Pheucticus ludovicianus*	M				X	X							
Indigo bunting	*Passerina cyanea*	M				X		X						

Common Name	Scientific Name	Category	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Purple finch	*Haemorhous purpureus*	R	X	X	X	X	X	X	X	X	X	X		
Rusty blackbird	*Euphagus carolinus*	MB	X	X		X	X	X	X			X		
Common grackle	*Quiscalus quiscula*	R		X	X	X	X	X	X	X	X	X	X	
Pine grosbeak	*Pinicola enucleator*	R	X	X	X	X	X	X	X	X	X	X	X	X
Blue grosbeak	*Passerina caerulea*	V										X		
Common redpoll	*Acanthis flammea*	M		X	X	X	X	X	X	X				
Hoary redpoll	*Carduelis hornemanni*	M				X								
Pine siskin	*Carduelis pinus*	R	X	X	X	X	X	X	X	X	X	X		
American goldfinch	*Spinus tristis*	R	X	X	X	X	X	X	X	X	X	X	X	X
House sparrow	*Passer domesticus*	R	X	X	X	X	X	X	X	X	X	X	X	X
Dickcissel	*Spiza americana*	M	X	X	X									X

Source: CFI 2009; N. Wilson, pers. comm., 2015
Notes:
X = Months When Species May Be Expected. Blank = Does not Occur
M – Migratory
MB – Migratory Breeder
R – Resident
V - Vagrant

6.5.1.1 Land Birds

Additional bird surveys were conducted prior to, and during, construction of the AGS mine and tailings management facility (TMF) as part of CFI's dedicated avifauna management plan (LGL 2015; Amec 2016, N. Wilson, pers. comm., 2017). Overall, land bird species diversity in the greater St. Lawrence area is low but includes a variety of boreal and heathland (subarctic) species. Hence there is an interesting mix of wood warblers, such as yellow-rumped warbler (*Setophaga coronate*), blackpoll warbler (*Setophaga striata*), and northern waterthrush (*Parkesia noveboracensis*) with species such as horned larks (*Eremophila alpestris*) and willow ptarmigan (*Lagopus lagopus*), more typical of the open coastal barrens. The rusty blackbird (*Euphagus carolinus*) is a local breeder along the edges of bogs and wetlands, and red crossbills (*Loxia curvirostra percna)* are recorded irregularly in the general area. Birds of prey in the vicinity of the Project area include resident bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) (migratory breeder), as well as the resident northern goshawk (*Accipiter gentilis*) and great horned owl (*Bubo virginianus*) (CFI 2009). At present, it is still undetermined whether the short-eared owl (*Asio flammeus*) may be a local breeder, however peregrine falcons (*Falco peregrinus*) are now considered irregular fall migrants to the St. Lawrence area. Resident game birds are scarce within the immediate vicinity of the CFI mine site and are limited to occasional sightings of ruffed grouse (*Bonasa umbellus*); willow ptarmigan are generally found north of NL Route 220 and west of Lawn (N. Wilson, pers. comm., May 2019).

6.5.1.2 Marine Birds

Marine birds for the purposes of this RD/PD are those species associated with the coastal and/or pelagic environment. Most species have either a coastal or pelagic distribution (i.e., spend most of their lives at sea) but some species, such as large gulls, spend time in both habitats.

The coastal area of St. Lawrence experiences high to moderate wave energy and bounds the western mouth of the Placentia Bay area, an area rich in marine bird life. In summer, colonies of gannets, cormorants, alcids, gulls and terns nest along cliffs and on numerous islands, archipelagos and adjacent headlands of the area. Table 6-18 includes species of marine birds reported to regularly use the greater St. Lawrence area from the tidal zone to the offshore zone (CFI 2009).

Table 6-18: Marine Birds Known to Occur in Placentia Bay and Months of Occurrence

Common Name	Scientific Name	Abundance[1]	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Canada goose	*Branta canadensis*	Uncommon			X	X	X	X	X	X	X	X	X	X
Gadwall	*Anas strepera*	Rare	X	X	X						X	X	X	X
American wigeon	*Anas americana*	Scarce				X	X				X	X	X	
American black duck	*Anas rubripes*	Common	X	X	X	X	X	X	X	X	X	X	X	X
Mallard	*Anas platyrhynchos*	Scarce	X	X	X	X	X				X	X	X	X
Blue-winged teal	*Anas discors*	Scarce				X	X			X	X	X		
Northern pintail	*Anas acuta*	Uncommon				X	X	X	X	X	X	X	X	
Green-winged teal	*Anas crecca*	Uncommon				X	X	X	X	X	X	X	X	X
Ring-necked duck	*Aythya collaris*	Uncommon				X	X	X	X	X	X	X		
Greater scaup	*Aythya marila*	Uncommon	X	X	X	X	X					X	X	X
Lesser scaup	*Aythya affinis*	Scarce				X	X				X	X	X	X
King eider	*Somateria spectabilis*	Scarce	X	X	X	X	X					X	X	X
Common eider	*Somateria mollissima*	Common	X	X	X	X	X				X	X	X	X
Harlequin duck	*Histrionicus histrionicus*	Scarce	X	X	X	X					X	X	X	X
Surf scoter	*Melanitta perspicillata*	Uncommon	X	X	X	X	X	X	X	X	X	X	X	X
White-winged scoter	*Melanitta fusca*	Uncommon	X	X	X	X	X	X	X	X	X	X	X	X
Black scoter	*Melanitta nigra*	Uncommon	X	X	X	X					X	X	X	X
Long-tailed duck	*Clangula hyemalis*	Common	X	X	X	X						X	X	X
Bufflehead	*Bucephala albeola*	Scarce	X	X	X	X						X	X	X

Common Name	Scientific Name	Abundance[1]	Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Common goldeneye	*Bucephala clangula*	Uncommon	X	X	X	X	X	X	X	X	X	X	X	X
Barrow's goldeneye	*Bucephala islandica*	Rare											X	X
Hooded merganser	*Lophodytes cucullatus*	Rare										X	X	X
Common merganserr	*Mergus merganser*	Uncommon	X	X	X	X	X	X	X	X	X	X	X	X
Red-breasted merganser	*Mergus serrator*	Common	X	X	X	X	X	X	X	X	X	X	X	X
Red-throated loon	*Gavia stellata*	Uncommon									X	X	X	X
Common loon	*Gavia immer*	Common	X	X	X	X	X	X	X	X	X	X	X	X
Horned grebe	*Podiceps auritus*	Scarce	X	X	X							X	X	X
Red-necked grebe	*Podiceps grisegena*	Uncommon	X	X	X	X						X	X	X
Northern fulmar	*Fulmarus glacialis*	Common	X	X	X	X	X	X	X	X	X	X	X	X

Source: CFI 2009
Notes:
X = Months When Species May Be Expected. Blank = Does not Occur.
1: Rare – occurs rarely, usually not present monthly, may be less than annual. Scarce – occurs in very low numbers, may be absent in some months. Uncommon – occurs in low numbers in appropriate habitat and season. Common – occurs in moderate numbers in appropriate habitat and season.

During bird surveys undertaken between 1998 and 2015 in the St. Lawrence area, a total of 33 species of seabirds and shorebirds were observed including but not limited to: northern fulmar (*Fulmaris glacialis*), northern gannet (*Morus bassanus*), Manx shearwater (*Puffinus puffinus*), common eider (*Somateria mollissima*), white-winged scoter (*Melanitta deglandi*), black scoter (*Melanitta americana*), long-tailed duck (*Clangula hyemalis*), double-crested cormorant (*Phalacrocorax auritus*), great cormorants (*Phalacrocorax carbo*), red-breasted mergansers (*Mergus serrator*), common goldeneye (*Bucephala clangula*), common loon (*Gavia immer*), black-bellied plover (*Pluvialis squatarola*), American golden-plover (*Pluvialis dominica*), semipalmated plover (*Charadrius semipalmatus*), sanderling (*Calidris alba*), and greater yellowlegs (*Tringa melanoleuca*) (CFI 2009; JWEL 2003; LGL 2007, 2015). Seasonal surveys conducted in 2002 (JWEL 2003) identified the following species of gulls and terns at the four survey sites at Little Lawn Harbour: herring gull (*Larus smithsonianus*), great black-backed gull (*Larus marinus*), ring-billed gull (*Larus delawarensis*), and Caspian tern (*Hydroprogne caspia*).

Sea ducks, especially common eiders, occur in winter, and seabirds such as Manx shearwaters and Leach's storm-petrels (*Oceanodroma leucorhoa*) breed nearby on offshore islands that are designated as either IBAs or provincial ecological reserve. The great cormorant is a year-round resident and therefore represents both the wintering and breeding components of the life history. Many seabirds rely on fish (cormorants), bottom invertebrates (eiders), and pelagic plankton (petrels) for food, the components of the marine habitat that can be affected by marine anthropogenic activities. Therefore, these species of birds have life stages that occur throughout the habitat (i.e., upper/surface and lower water column, and on bottom substrates) (CFI 2009).

In general, shorebirds rely on invertebrates in the upper sediments of substrates at nutrient-rich sites. Their use of the St. Lawrence area appears to be seasonal either as spring or fall migrants when they feed in tidal areas (see Table 6-17 and JWEL 2003). Purple sandpiper (*Calidris maritima*) is the only shorebird that winters in the Placentia Bay area. They are relatively common and ubiquitous in the general area of the Burin Peninsula and Placentia Bay. Flocks have been observed along the wave wash and intertidal areas where seaweeds were abundant (LGL 2007). Overall, shorebird use within the Project area is anticipated to be minimal given the predominance of exposed bedrock at the intertidal zone; the inner reaches of the harbour north of Mine Cove (i.e., Little Lawn Harbour Pond) would be preferential habitat.

6.5.1.3 Important Bird Areas (IBAs)

Seabird breeding colonies are numerous on headlands and islands along the entire perimeter of the Placentia Bay area, three of which rank as IBAs off the southern Burin Peninsula, including Green Island, Middle Lawn Island and Corbin Island.

The Green Island IBA is ~5.61 km^2, located midway between the St. Pierre and Miquelon Islands and the Burin Peninsula. It is comprised of sedge/grass meadow and coastal cliff/rocky shore (marine) habitat types and is home to a significant number of nesting Leach's storm petrels (i.e., 72,000 pairs). A number of other seabirds have also been recorded nesting on the island including herring gulls, common terns (*Sterna hirundo*) and Arctic terns (*Sterna paradisaea*) (IBA Canada 2019).

The Middle Lawn Island IBA is located ~4 km south of Lord's Cove and is comprised of sedge/grass meadow and coastal cliff/rocky shore (marine) habitat types. This is the closest IBA to the proposed Project area at an approximate distance of 10 km, west-southwest. The island is ~4.17 km^2 and supports the largest and only known active breeding colony of Manx shearwater in North America. In the 1980s, ~100 pairs, plus an additional 300 non-breeding birds were estimated to occur on Middle Lawn Island. This population estimate remains unchanged today; research surveys have documented consistently low productivity over the past 30 years primarily due to a low incidence of breeding success with increasing predation pressure (Robertson 2002; Fraser et al. 2013). Over 26,000 pairs of Leach's storm-petrels also nest on the island, as well as limited numbers of herring gulls, great black-backed gulls, and black guillemots (*Cepphus grille*) (IBA Canada 2019). Additionally, the Lawn Bay Ecological Reserve was granted full ecological reserve status in 2015 by the province (DFLR 2019b). This reserve encompasses Middle Lawn Island (as well as a portion of Middle Lawn Island IBA) and the neighboring islands of Swale Island and Colombier Island for a combined area of 3.8 km^2.

Corbin Island IBA is located ~1 km from the mainland and although little descriptive information is available, the shoreline is likely rocky, and the interior comprised of grasses and low shrubs. The total IBA coverage area is ~5.25 km^2, centered on the small island (0.2 km^2) known to support a globally significant colony of Leach's storm petrels. In the 1970s, 100,000 pairs were estimated to occur on the island. In addition, a large colony of herring gulls (i.e., 5000 pairs) occurs on the island. Other nesting species include black-legged kittiwakes (*Rissa tridactyla*), great black-backed gulls, and black guillemots (IBA Canada 2019).

6.5.2 Wildlife Species at Risk

A desktop survey was conducted to identify wildlife species at risk or of conservation concern with the potential to be affected by the Project (i.e., NL range based on the SARA Registry [Government of

Canada 2019]) (Table 6-19). At present, there are 16 federally listed bird species under SARA, 16 bird species listed by COSEWIC, and 16 provincially listed species known to occur in NL. In addition, there are five federally listed terrestrial mammal species under SARA, six species listed by COSEWIC, and three provincially listed under the NL ESA that are known to occur in NL (based on designations as of May 2019; Government of Canada 2019; COSEWIC 2018; NLESA 2002).

Table 6-19: Provincially and Federally Listed Wildlife Species in Newfoundland and Labrador

Species	SARA[1]			COSEWIC[2]			ESA[3]		
	E	T	SC	E	T	SC	E	T	V
Land birds									
Red crossbill (*Loxia curvirostra percna*) *Percna* subspecies	S1			X			X		
Chimney swift (*Chaetura pelagica*)		S1			X			X	
Peregrine falcon *(Falco peregrinus anatum)*								X	
Peregrine falcon *(Falco peregrinus tundrius)*		S3						X	
Rusty blackbird (*Euphagus carolinus*)			S1			X			X
Short-eared owl (*Asio flammeus*)			S1			X			X
Common nighthawk (*Chordeiles minor*)		S1				X		X	
Grey-cheeked thrush (*Catharus minimus minimus*) Newfoundland population								X	
Olive-sided flycatcher (*Contopus cooperi*)		S1				X		X	
Bank swallow (*Riparia riparia*)		S1			X				
Barn swallow (*Hirundo rustica*)		S1			X				
Bobolink (*Dolichronyx oryzivorus*)		S1			X			X	
Red-necked phalarope (*Phalaropus lobatus*)						X			
Marine Birds									
Piping plover (*Charadrius melodus melodus*) *melodus* subspecies	S1			X			X		
Eskimo curlew (*Numenius borealis*)	S1			X			X		
Red knot (*Calidris canutus rufa*) *rufa* subspecies	S1			X			X		
Harlequin Duck (*Histrionicus histrionicus)* Eastern population			S1			X			X
Barrows Goldeneye (*Bucephala islandica*) Eastern population			S1			X			X
Ivory gull (*Pagophila eburnea*)	S1			X			X		
Mammals									
American marten (*Martes Americana atrata*) Newfoundland population		S1			X			X	
Polar bear (*Ursus maritimus*)			S1			X			X
Wolverine (*Gulo gulo*)			S1			X	X		
Woodland caribou (*Bucephala islandica)* Newfoundland population						X			
Little brown myotis (*Myotis lucifugus*)	S1			X					
Northern myotis (*Myotis septentrionalis*)	S1			X					

Notes:
[1] Government of Canada 2019
[2] COSEWIC 2019
[3] NLESA 2019

For the purposes of this RD/PD, species at risk include only those designated species that are known to occur, or to have occurred, in the vicinity of the Project area and not all federally and provincially protected species. None of the listed mammal species have a known range or are expected to occur in the Project area.

Of the 16 federally and/or provincially listed bird species presented in Table 6-19, nine have a known range that includes the Project area or have potential to occur: red crossbill, chimney swift (*Chaetura pelagica*), peregrine falcon, rusty blackbird, short-eared owl, olive-sided flycatcher (*Contopus cooperi*), grey-cheeked-thrush (*Catharus minimus*), barn swallow (*Hirundo rustica*), and harlequin duck (*Histrionicus histrionicus*). As noted in the previous sections, chimney swift, peregrine falcon, rusty blackbird, short-eared owl and barn swallow were observed in the St. Lawrence area between 2003–2009 by Gail and Norman Wilson. There have been no records of chimney swift, peregrine falcon, or piping plover (*Charadrius melodus*) in the past decade (N. Wilson, pers. comm., May 2019). The piping plover is a provincially and federally listed (Endangered designation) ground-nesting species, preferring open sandy beaches, especially above the tideline and alkalai flats. Given that this habitat type is severely limited in the St. Lawrence area, the individual previously observed in the Town of St. Lawrence was likely a migrant (N. Wilson, pers. comm., May 2019; see Table 6-19).

To date, common nighthawk (*Chordeiles minor*), olive-sided flycatcher, grey-cheeked thrush, red-necked phalarope (*Phalaropus lobatus*), red knot (*Calidris canutus rufa*), Barrow's goldeneye (*Bucephala islandica*), and ivory gull (*Pagophila eburnea*) are not known to have been recorded for the greater St. Lawrence area at any time since 1998, indicating their rarity in the region (Norman Wilson, pers. comm., May 2019). A presumed vagrant Bobolink (*Dolichronyx oryzivorus*) was observed at Little St. Lawrence on 22 May 2017.

The short-eared owl is designated as *special concern* on Schedule 1 of SARA and by COSEWIC, and as *vulnerable* under the provincial ESA. Between 2003–2009, a short-eared owl was observed in the vicinity of the Project area (Little Lawn Harbour), but additional species sightings were most often on the barrens north of Lord's Cove (N. Wilson, pers. comm., cited *in* CFI 2009). Since then, Gail and Norman Wilson have only seen one short-eared owl sighting in the St. Lawrence area. It was observed in the summer of 2015 on the road to Middle Head lighthouse on the eastern side of the entrance to Greater St. Lawrence Harbour (N. Wilson, pers. comm., May 2019).

The only marine bird species at risk with potential to occur in the vicinity of the Project area is the Eastern population of harlequin duck. It is designated as *special concern* on Schedule 1 of SARA and by COSEWIC, and as *vulnerable* under the NL ESA. Within NL, it breeds from Nachvak Fjord to Hopedale, Labrador and on the western coast of the Great Northern Peninsula of Newfoundland (Robertson and Goudie 1999 *in* LGL 2018a). It winters in coastal areas, mostly between Newfoundland and Massachusetts (Robertson and Goudie 1999 *in* LGL 2018a). Cape St. Mary's hosts the largest known wintering population in Newfoundland, including an average of 120 individuals during 1997–2006 (ranging from 51–200 individuals per year) (Audubon 2018 *in* LGL 2018a). The number of wintering individuals increased during recent years, from 242 in 2005 to 636 in 2013 (ECCC 2013b *in* LGL 2018a). Although there are no known wintering locations for this species on the Burin Peninsula (LGL 2018a), there is a low probability that it may occur within or near the Project area (B. Mactavish, Technician, LGL Limited, pers. comm., 18 April 2019). One harlequin duck was observed on 7 November 2017 near Hare's Ears, St. Lawrence, southeast of the Project area, and at least two were observed near the Allan's Island lighthouse near Lamaline, southwest of the Project area (eBird Canada 2019).

ACCDC data received in 2015 identified 15 occurrences of species at risk or species of conservation concern within the 5 km radius, comprised of five bird species (Table 6-20). As mentioned previously, this information holds true as of April 2019. None of the five bird species identified by ACCDC are listed provincially and/or federally and are not considered globally rare outside of the province of NL.

Table 6-20: Atlantic Canada Conservation Data Centre Listed Bird Species in Vicinity of the Project (5 km Radius)

Common Name	Scientific Name	Atlantic Canada Conservation Data Centre (ACCDC) Listed Status	Status Short Definition
American pipit	*Anthus rubescens*	S3B,S5M	Breeding population uncommon in province Migratory population widespread, abundant and demonstrably secure in province
Chipping sparrow	*Spizella passerina*	S2B	Breeding population rare in province
Northern goshawk	*Accipiter gentilis*	S3B	Breeding population uncommon in province
Northern harrier	*Circus cyaneus*	S3B	Breeding population uncommon in province
Sharp-shinned hawk	*Accipiter striatus*	S3B	Breeding population uncommon in province

Source: ACCDC 2015

The majority of the historical occurrences reported by ACCDC occurred outside of the Project area; north of Haypook Pond. All of the ACCDC reported species, with the exception of American pipit (*Anthus rubescens*), were observed in the St. Lawrence area between 2003–2009 by Gail and Norman Wilson (CFI 2009).

6.6 Marine Environment

Information on the existing environment pertaining to marine fish and fish habitat, marine mammals, sea turtles and species at risk is provided in this section.

6.6.1 Fish and Fish Habitat

The fish and fish habitat in the marine portion of the Project area was surveyed with drop camera during 25–26 May 2019. The survey was conducted in an area with water depths ranging from intertidal to about 30 m.

The surficial substrate in the survey area is predominantly hard, consisting of varying proportions of bedrock, boulder, rubble, cobble and gravel. The substrate of the portion of the survey area closest to shore (i.e., ≤10 m depth) is generally characterized by bedrock, boulder and rubble with patches of cobble and gravel (Figures 1 and 2 in Appendix D) The surficial substrate of the remainder of the survey area is generally characterized by cobble and gravel with patches of rubble and occasional boulders (Figures 3 and 4 in Appendix D).

The flora and fauna observed are typical of inshore marine areas in Newfoundland characterized by hard substrate. Flora observed during the fish and fish habitat survey included brown kelp (e.g., *Laminaria digitata*, *Alaria esculenta, Agarum* sp.), filamentous brown algae *Desmarestia* sp.), Irish moss *Chondrus crispus*, and coralline algae. Fauna observed during the survey were dominated by sea urchins (*Strongylocentrotus droebachiensis*). Other observed fauna include sea anemones, sea stars, jellyfish, ctenophores, toad crab (*Hyas* sp.), various gastropods, brittle stars, mussels, Atlantic wolffish (*Anarhichas lupus*), flatfish (most likely winter flounder *Pseudopleuronectes americanus*), and cunner (*Tautogolabrus* *adspersus*). No lobster were observed during the survey which isn't surprising given that they are primarily nocturnal and the survey was conducted during daylight hours.

Based on other information sources in addition to the fish and fish habitat survey results, Table 6-21 presents the invertebrate and fish species that likely occur in Little Lawn Harbour and vicinity. Species marked with an 'x' were observed during the fish and fish habitat survey.

Table 6-21: Marine Invertebrates with Potential to Occur in Blue Beach Cove

Common Name	Scientific Name	Observed During Survey
sand dollar	*Echinarachnius parma*	
green sea urchin	*Strongylocentrotus droebachiensis*	x
sea star	*Asteroidea spp.*	x
purple sunstar	*Solaster endeca*	x
sea anemone	*Anemonia sulcata*	x
rock crab	*Cancer irroratus*	
spider (toad) crab	*Hyas araneus and Hyas coarctatus*	x
American lobster	*Homarus americanus*	
snow crab	*Chionoecetes opilio*	
northern shortfin squid	*Illex illecebrosus*	
longfin inshore squid	*Loligo pealeii*	
winter flounder	*Pseudopleuronectes americanus*	x
sculpins	*Myoxocephalus spp*	
ocean pout	*Macrozoarces americanus*	
wolffishes	*Anarhichas sp.*	x
cunner	*Tautogolabrus adspersus*	
Atlantic herring	*Clupea harengus*	
Atlantic mackerel	*Scomber scombrus*	
capelin	*Mallotus villosus*	
Atlantic cod	*Gadus morhua*	
thorny skate	*Amblyraja radiata*	
lumpfish	*Cyclopterus lumpus*	
witch flounder or greysole	*Glyptocephalus cynoglossus*	
American plaice	*Hippoglossoides platessoides*	

6.6.2 Marine Mammals and Sea Turtles

Marine mammal species that typically occur near the Project area include the following (Templeman 2007; DFO cetacean database; CFI 2015a; OBIS 2019):

- fin whale (*Balaenoptera physalus*);
- sei whale (*Balaenoptera borealis*);
- killer whale (*Orcinus orca*);
- humpback whale (*Megaptera novaeangliae*);
- common minke whale (North Atlantic subspecies; *Balaenoptera acutorostrata acutorostrata*);

- long-finned pilot whale (*Globicephala melas*);
- harbour porpoise (*Phocoena phocoena*);
- Atlantic white-sided dolphin (*Lagenorhynchus acutus*);
- common dolphin (*Delphinus delphis*);
- white-beaked dolphin (*Lagenorhynchus albirostris*);
- otter (*Lutrinae*);
- harbour seal (*Phoca vitulina*); and
- grey seal (*Halichoerus grypus*) (Templeman 2007; DFO cetacean database; CFI 2015a; OBIS 2019).

Blue whales (*Balaenoptera musculus*) have been observed in the Placentia Bay area, including 90 historical sightings (OBIS 2019) and seven sightings in the DFO cetacean database within NAFO Div. 3PSc, the latest during July 2002. Sperm whales (*Physeter macrocephalus*) are also occasionally sighted in the area (OBIS 2019), including three sightings in NAFO Div. 3PSc during September 2002 and 2006 (DFO cetacean database). There is one sighting record each for North Atlantic right whale (*Eubalaena glacialis*) and northern bottlenose whale (*Hyperoodon ampullatus*) within Div. 3PSc in the DFO cetacean database, during August 2005 and 2007, respectively. One narwhal (*Monodon monoceros*) sighting record within NAFO Div. 3PSc in July 1988 is included in the DFO cetacean database. A harp seal (*Pagophilus groenlandicus*) was observed in southwestern Placentia Bay during 2006 (OBIS 2019).

Leatherback sea turtles (*Dermochelys coriacea*) are known to occur in the Placentia Bay region (Templeman 2007). There are 77 sighting records within NAFO Div. 3PSc in the DFO cetacean database, the most recent ones during August and September 2007, September 2008, and June 2014. There is also one sighting record within Placentia Bay during August 2016 in the OBIS database (OBIS 2019). The Project area also occurs within the possible habitat range for loggerhead sea turtles (*Caretta caretta*; COSEWIC 2010) although documented observations of this turtle are rare. One loggerhead sighting was reported in Placentia Bay during January 2008 (OBIS 2019).

The Placentia Bay region is an important feeding area for marine mammals and sea turtles (Templeman 2007). Numerous sea turtles and marine mammals, including female cetaceans with their young, aggregate in the Placentia Bay region during spring to fall months to feed. Some mammals feed in the area year-round, including harbour seals, otters and some other cetaceans (Templeman 2007). Harbour seals haul out and pup in the vicinity of Point May on the southwestern Burin Peninsula, and otters are known to reproduce in the Placentia Bay area (Templeman 2007). The Placentia Bay region is also thought to be part of the migratory route of leatherback sea turtles (Templeman 2007).

6.6.3 Marine Species at Risk

This RD/PD defines species at risk as those designated or listed as endangered, threatened or special concern under Schedule 1 of the SARA and the COSEWIC, and as endangered, threatened or vulnerable under the NL ESA. Only those species designated as either *endangered* or *threatened* under Schedule 1 of SARA have immediate legal implications, such as prohibitions against harm/harassment or the damage/destruction of assigned critical habitat (LGL 2018b). The ESA provides protection for species at risk that are native to NL, excluding marine fishes, bacteria, viruses or introduced species (DFLR 2019b). Species/populations are designated under the ESA following recommendations of independent assessments by COSEWIC and/or the Species Status Advisory Committee (SSAC) (DFLR 2019b).

Marine species at risk that potentially occur in the vicinity of the Project area are provided in Table 6.22. These include five marine fishes, one marine-associated bird, three marine mammals and two sea turtle species.

Table 6-22: Marine Species at Risk with Potential to Occur in the Vicinity of the Project area

Species	SARA[1]			COSEWIC[2]			ESA[3]		
	E	T	SC	E	T	SC	E	T	V
Marine Fishes									
White Shark (*Carcharodon carcharias*) Atlantic population	S1			X					
Spotted wolffish (*Anarhichas minor*)		S1			X				
Northern wolffish (*Anarhichas denticulatus*)		S1			X				
Atlantic wolffish (*Anarhichas lupus*)			S1			X			
Banded Killifish (*Fundulus diaphanus*) Newfoundland populations			S1			X			X
Atlantic cod (*Gadus morhua*) Newfoundland and Labrador population				X					
Laurentian North population				X					
Cusk (*Brosme brosme*)				X					
Porbeagle shark (*Lamna nasus*)				X					
Winter skate (*Leucoraja ocellata*) Eastern Scotian Shelf-Newfoundland population				X					
American Eel (*Anguilla rostrata*)					X				X
Atlantic Sturgeon (*Acipenser oxyrinchus*) Maritimes populations					X				
Acadian redfish (*Sebastes fasciatus*) Atlantic population					X				
White hake (*Urophycis tenuis*) Atlantic and Northern Gulf of St. Lawrence population					X				
Atlantic salmon (*Salmo salar*) South Newfoundland population					X				
Lumpfish (*Cyclopterus lumpus*)					X				
American plaice (*Hippoglossoides platessoides*) Newfoundland and Labrador population					X				
Spiny dogfish (*Squalus acanthias*) Atlantic population						X			
Shortfin mako shark (*Isurus oxyrinchus*) Atlantic population						X			
Basking shark (*Cetorhinus maximus*) Atlantic population						X			
Smooth skate (*Malacoraja senta*) Laurentian-Scotian population						X			
Thorny skate (*Amblyraja radiata*)						X			
Marine Mammals									
Blue Whale (*Balaenoptera musculus*) Atlantic population	S1			X					
North Atlantic Right Whale (*Eubalaena glacialis*)	S1			X					
Fin Whale (*Balaenoptera physalus*)			S1			X			

Atlantic population									
Harbour Porpoise (*Phocoena phocoena*) Northwest Atlantic population						X			
Humpback Whale (*Megaptera novaeangliae*) Western North Atlantic population						X			
Killer Whale (*Orcinus orca*) Northwest Atlantic/Eastern Arctic population						X			
Sea Turtles									
Leatherback Sea Turtle (*Dermochelys coriacea*) Atlantic population	S1			X					
Loggerhead Sea Turtle (*Caretta caretta*)	S1			X					

Note:
E = Endangered; T = Threatened; SC = Special Concern; V = Vulnerable; S = Schedule
[1] SARA website (https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html) accessed April 2019
[2] COSEWIC website (https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html) accessed April 2019
[3] DFLR (2019b)

Species/populations designated as *endangered*, *threatened*, or *extirpated* under Schedule 1 of SARA require the preparation of a Recovery Strategy and accompanying Action Plan. Those designated as *special concern* under Schedule 1 of SARA require a Management Plan. The following species at risk documents are relevant to this project.

- Proposed Recovery Strategy for northern and spotted wolffish (DFO 2018a);
- Proposed Management Plan for Atlantic wolffish (DFO 2018a);
- Management Plan for the Newfoundland population of banded killifish (DFO 2011);
- Management Plan for the Atlantic population of fin whale (DFO 2017a);
- Recovery Strategies for the Northwest Atlantic population of blue whale (Beauchamp et al. 2009), North Atlantic right whale (DFO 2014), and Atlantic population of leatherback sea turtle (ALTRT 2006);
- A more recent Recovery Strategy for the Atlantic population of leatherbacks (DFO 2016b); and
- Proposed Action Plans for the Northwest Atlantic population of blue whale (DFO 2018b), North Atlantic right whale (DFO 2016c), and Atlantic population of leatherback sea turtle (DFO 2018c).

CFI acknowledges that the at-risk status designations of species/groups may change during the life of the Project, and it will monitor and adaptively manage SARA-related issues as they arise. CFI will abide by relevant regulations as per the SARA and species-specific Recovery Strategies, Action Plans and Management Plans, and minimize potential impacts on at-risk species during all Project phases.

At-risk species that may occur in the vicinity of the Project area were described in Sections 6.2.3.4, 6.2.4.2, and 6.3.3 of CFI (2015), and Section 4.2.5.2 of a recent EIS involving the Placentia Bay region (LGL 2018a). These profiles are summarized below.

6.6.3.1 White Shark (Atlantic Population)

The Atlantic population of white shark is designated as *endangered* under Schedule 1 of SARA and COSEWIC. This population typically inhabits inshore and offshore continental shelf waters of the Northwest Atlantic, from just beneath the surface to water depths ≥1280 m (COSEWIC 2006a and LGL 2015 *in* LGL 2018a). White shark is likely a seasonal migrant in Atlantic Canadian waters (COSEWIC 2006a *in* LGL 2018a). An adult male white shark, "Hilton", originally satellite-tagged on 3 March 2017 at Hilton Head, South Carolina, was located near the Burin Peninsula on 8 October 2018, and an adult female, "Lydia", tagged on 3 March 2013 at Jacksonville, Florida, was within Placentia Bay during late-October 2013 (OCEARCH 2019). Beyond Canadian waters, white shark abundance in portions of the Northwest Atlantic has declined by an estimated ~80% (COSEWIC 2006a *in* LGL 2018a). Abundance trend information is not available for the Atlantic population of white shark (COSEWIC 2006a *in* LGL 2018a).

6.6.3.2 Wolffishes

The northern and spotted wolffish are listed as *threatened* and the Atlantic wolffish is listed as *special concern* under SARA Schedule 1 and COSEWIC. These wolffish species have a broad distribution in the Northwest Atlantic, inhabiting the NL shelves and Grand Banks. Atlantic and spotted wolffish are additionally found in the Gulf of St. Lawrence and Scotian Shelf and northern wolffish are commonly found in the Laurentian Channel (DFO 2018a). Wolffish are bathypelagic, found at depths between 150–1000+ m and are benthic predators that feed on molluscs, decapods, echinoderms, and cnidarians (DFO 2018a). Little is known of their life history in Canadian waters (CFI 2009). Critical habitats have been recently proposed for northern and spotted wolffish off eastern Labrador and northeastern, western, and southwestern Newfoundland, well beyond (170+ km) the Project area (DFO 2018a). During 2013–2017, five Atlantic wolffish were caught in NAFO Div. 3PSc during DFO research vessel surveys.

6.6.3.3 Banded Killifish (Newfoundland Population)

The Newfoundland populations of banded killifish are designated as *special concern* on Schedule 1 of SARA and by COSEWIC, and as *vulnerable* under the NL ESA. The Newfoundland populations are isolated from their mainland counterparts and currently under investigation as a possible subspecies (DFLR 2018 *in* LGL 2018a). The Newfoundland populations are scattered, inhabiting fresh and euryhaline waters and occasionally estuaries and marine waters within at least 42 locations throughout the island, including along the Burin Peninsula (C-NLOPB 2010 and COSEWIC 2014 *in* LGL 2018a; DFO 2019a). Spawning in Newfoundland has been reported from late-June–August, unlike mainland populations which spawn during the spring (COSEWIC 2014 *in* LGL 2018a). Although abundance data is limited, there is currently no indication of decline in the number of populations or their abundance within Newfoundland (GNL 2010 and COSEWIC 2014 *in* LGL 2018a).

6.6.3.4 Blue Whale (Atlantic Population)

The Atlantic population of blue whale is designated as *endangered* under Schedule 1 of SARA and by COSEWIC. Blue whales typically inhabit deep water rather than coastal environments, generally in association with areas of upwelling or shelf edges where its prey (mostly euphausiids) may concentrate (LGL 2015 *in* LGL 2018a). Some Atlantic blue whales occupy eastern Canadian waters year-round, although most migrate south for the winter (DFO 2017b *in* LGL 2018a). Blue whales are most frequently sighted off southern Newfoundland during the winter (C-NLOPB 2010 *in* LGL 2018a). Blue whales may live up to 70–80 years of age, reaching maturity around age 6–10 years and reproducing every two to three years thereafter (DFO 2017a *in* LGL 2018a). There are an estimated 400–600 blue whales in the western North Atlantic, with <250 thought to be adults (Waring et al. 2011 and DFO 2017b *in* LGL 2018a). There are 90 records of blue whale sightings during 1927–1944 near the southeast Burin Peninsula in the Ocean Biogeographic Information System (OBIS) database (OBIS 2019). One blue whale sighting record exists near Lord's Cove within the DFO cetacean sightings database for 1975–2017.

6.6.3.5 North Atlantic Right Whale

The North Atlantic right whale is designated as *endangered* under Schedule 1 of SARA and by COSEWIC. This long-lived and slowly reproducing species is one of the world's most critically endangered large whale populations (COSEWIC 2013a *in* LGL 2018a). This species inhabits shallow and deep coastal waters and offshore waters, near dense aggregations of copepods (COSEWIC 2013a *in* LGL 2018a). Females and males usually mature around 5–21 and 15 years of age, respectively, after which females give birth to one calf every three to five years (COSEWIC 2013a *in* LGL 2018a). Although rare, North Atlantic right whales are most commonly found in eastern Canadian waters during the summer and fall, after migrating northwards from their wintering grounds near Florida and Georgia (LGL 2018a). The population has been declining, with an estimated total of 451 individuals, of which only ~100 are reproductive females (Baumgartner et al. 2017, Pace et al. 2017 and Pennisi 2017 *in* LGL 2018a). Calving rates are decreasing and human-caused mortalities are increasing (Kraus et al. 2016 *in* LGL 2018a). Between June 2015 and September 2017, four dead North Atlantic right whales came ashore in western Newfoundland, and five entanglements were reported in the region during summer 2017 (Daoust et al. 2017 *in* LGL 2018a). One right whale observation was reported ~4 km south of the proposed marine terminal location during the collection of Local Ecological Knowledge (LEK) for DFO's Community-Based Coastal Resource Inventory (CCRI) project conducted during fall and winter 1998–1999 (DFO 2000 *in* LGL 2009). There are two recent records of North Atlantic right whale sightings in Placentia Bay in the DFO cetacean database, during August 2005 and September 2017, and right whale calls were detected by DFO using an acoustic recorder within Placentia Bay during summer 2017 (J. Lawson, Research Scientist, DFO, pers. comm., 5 May 2018 *in* LGL 2018a).

6.6.3.6 Fin Whale (Atlantic Population)

The Atlantic population of fin whale is designated as *special concern* under Schedule 1 of SARA and by COSEWIC. Fin whales are regularly observed near NL, mainly during the summer (LGL 2015 *in* LGL 2018a). In the western North Atlantic, fin whales occur from inshore to waters beyond the shelf break (COSEWIC 2005 *in* LGL 2018a), typically in association with concentrations of their main prey organisms, small schooling fish and krill (Borobia et al. 1995 *in* LGL 2018a). After reaching maturity at up to 25 years of age, fin whales are thought to reproduce and calve up to every two years during the winter at low latitudes (COSEWIC 2005 *in* LGL 2018a) and can live up to 100 years (DFO 2016d). There are an estimated 1618 individuals in the western North Atlantic fin whale stock (includes the eastern United States, Nova Scotia, and southeastern Newfoundland) (Hayes et al. 2017 *in* LGL 2018a). There are 575 records of fin whale sightings off the southwestern and southeastern Burin Peninsula in the OBIS database during 1927–1985 (OBIS 2019). There are numerous fin whale sighting records in Placentia Bay in the DFO cetacean database from 1975–2017, one off the southwestern Burin Peninsula (south of Point May), and two near Salmonier/Burin.

6.6.3.7 Leatherback Sea Turtle (Atlantic Population)

The Atlantic population of leatherback sea turtle is designated as *endangered* on Schedule 1 of SARA and by COSEWIC. They are pelagic, highly migratory, and the largest species of sea turtle in the world, and usually inhabit oceanic and coastal shelf waters, foraging on jellyfish between April and December (COSEWIC 2012e *in* LGL 2018a). In Atlantic Canadian waters, leatherbacks are entirely visual predators, feeding during daylight hours mainly within the upper 30 m of the water column (DFO 2016g *in* LGL 2018a). While in Canadian waters, leatherbacks do not nest (COSEWIC 2012e *in* LGL 2018a) or come ashore (DFO 2018d). There are an estimated 29,000–34,000 mature individuals in the Atlantic population of leatherback sea turtles, of which several thousand are thought to make up the seasonal foraging population in Atlantic Canada, possibly the highest density of foraging leatherbacks throughout their range (COSEWIC 2012e and Archibald and James 2016 *in* LGL 2018a). Critical habitat has recently been proposed for leatherbacks within Placentia Bay and near the Burin Peninsula, ~20 km south of the proposed marine terminal (DFO 2016b). There are 10 leatherback sighting records near the southern Burin Peninsula during 1975–2017 in the DFO cetacean database, with two records near Lord's Cove and three South of St. Lawrence being the nearest to the proposed marine terminal.

6.6.3.8 Loggerhead Sea Turtle

Loggerhead sea turtles are designated as *endangered* on Schedule 1 of SARA and by COSEWIC. Loggerheads generally prefer SSTs >20ºC in Atlantic Canadian waters, typically occurring along the shelf break and farther offshore (DFO 2017b). Loggerheads may occur within or near the Project area, although this is considered unlikely since they spend the majority of their lives at sea (LGL 2018a). This species reaches maturity between 16 and 34 years of age, and adult females lay several clutches of ~110 eggs each on subtropical and tropical beaches once every two to three years (DFO 2017b). There are no current population estimates for loggerheads in Atlantic Canada, but the western North Atlantic population estimate includes ~38,334 adult females (COSEWIC 2010 and Richards et al. 2011 *in* LGL 2018a). Since 1999, thousands of loggerheads (mostly immatures) have been by-caught in the eastern Canadian pelagic longline fishery (Brazner and McMillan 2008 and Paul et al. 2020 *in* LGL 2018a). Recently, licence conditions for this fishery were updated to ensure fish harvesters utilize best practices to prevent bycatch and minimize threats to loggerhead recovery due to being handled (DFO 2017b).

6.6.4 Sensitive Habitat

Sensitive habitats that either overlap or occur proximate to the Project area are shown in Figure 6-29, and briefly described in this subsection.

The Project area is located within the Placentia Bay Ecologically and Biologically Significant Area (EBSA). Previously called the 'Placentia Bay Extension' EBSA and described in Templeman (2007) and DFO (2016a), the boundary of the Placentia Bay EBSA was recently modified. The corresponding DFO Research Document that will describe the new Placentia Bay EBSA has been approved but is pending release while it awaits translation (N. Wells, Biologist, Science Branch, DFO, pers. comm., 4 February 2019).

In order to protect representative marine areas that culturally, traditionally, ecologically, and educationally benefit Canadians, Parks Canada establishes National Marine Conservation Areas (NMCAs) (PC 2019). To support this objective, Parks Canada is considering several preliminary representative marine areas (RMAs) near NL (C. Pierce, Ecosystem Geomatics Technician, Protected Areas Establishment Branch, Parks Canada, pers. comm., 28 September 2018), including the Southern Coast of Burin Peninsula RMA within which the Project area is located. A description of this preliminary RMA is not yet available on the Parks Canada website (PC 2019).

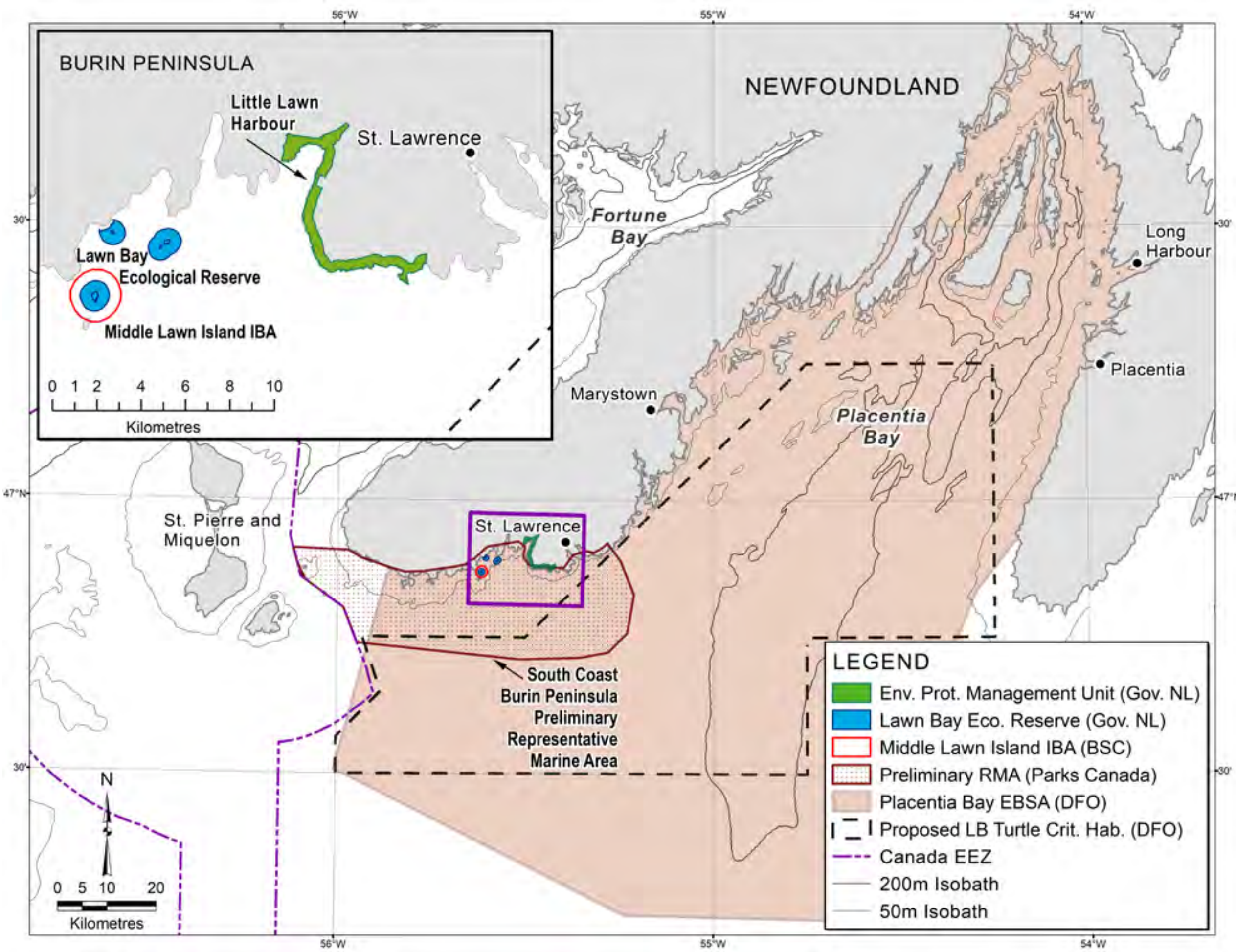


Figure 6-29: Sensitive Habitats that Overlap or are Near the Project Area

The proposed marine terminal is located along the EHJV coastal MU. This MU features balsam fir tuckamore, open barrens, and bogs, and hosts a high abundance of shorebirds, waterfowl, and seabirds from nesting colonies at the nearby Government of NL Lawn Islands Archipelago Ecological Reserve and Middle Lawn Island Important Bird Area (IBA) of Canada, in western Lawn Bay (BSC 2009; DFLR 2018; SAM 2019).

Critical habitat for at-risk leatherback sea turtles has recently been proposed in Placentia Bay (DFO 2016b) (see Figure 6-29). The southern portion of the proposed habitat is ~20 km south of the proposed marine terminal location. This proposed critical habitat features high abundance and quality of the leatherback turtle's gelatinous prey species (e.g., jellyfish), supporting the population's survival (DFO 2016b). See Section 6.6.3.7 for additional information regarding leatherback sea turtles in Atlantic Canadian waters.

6.7 Socio-Economic Environment

The Project is located in St. Lawrence where there has been a history of mining dating back to the early 1930s, a seasonal fish processing facility and a health care facility. The following section provides an overview of the socio-economic environment of the area, including demography, economy, employment, business, community services and infrastructure, as it relates to CFI's proposed marine terminal.

6.7.1 Data Limitations

The most recent census of the Canadian population was completed in 2015, with data released in 2016. The information is therefore somewhat dated, and gaps in the census data prevent a comprehensive view of aspects of the current St. Lawrence socio-economic environment. The area for which information is presented is centred on St. Lawrence, and ranges to include the southern part of the Burin Peninsula or the full Burin Peninsula subject to what is available.

6.7.2 Demography

It is estimated by officials of the Town of St. Lawrence that close to 1400 people live in St. Lawrence in 2019. (Town website; E. Norman, Town of St. Lawrence, May 2019). This is considerably more than reported in the 2016 census profile of the community. The 2016 census indicated that there were 1192 in St. Lawrence, which was a 4.2% decline from the 2011 census (Statistics Canada 2018). And the 2011 census population of 1244 was also down by 7.8% from the previous 2006 census count of 1349 individuals (Statistics Canada 2013).

The population of St. Lawrence has also been aging, in keeping with overall trends in Newfoundland and Labrador – the median age in the province went from 44 in the 2011 census to 46 in 2016. In 2001 the median age in St. Lawrence was 38 years, increasing to 43 years in 2006 and to 47 in 2011. By 2016 it rose to 50.7. The 2016 Census Profile indicated that among the 1192 people reported in the town at that time, 13.4% were ages 14 and younger, 64.3% were aged 15–64, and 22.7% were aged 65 and over. Close to 2% of the population was over the age of 85.

School age children reflect changing demographics; and there was a slight increase in the past two years enrolled in St. Lawrence Academy. In the current school year 2018/2019 there are 167[5] students enrolled in St. Lawrence Academy in all grades from kindergarten to level four. This was a slight increase by four students from last year[6]. Five years ago, however there were 186[7] students (GNL Department of Education 2019).

Burin Peninsula Population

There is a province-wide trend of rural decline, where any noticeable population growth is reported predominantly in urban areas on the Avalon Peninsula. The population of the Burin Peninsula has been declining for the past 15 years. There were 5000 fewer people on the Burin Peninsula in 2016 than in 2001. That 4.6% decline in the Burin Peninsula's population contrasts with the Province's overall increase of +1.0% over the same period (Statistics Canada 2018). More recently, the population of the Burin Peninsula declined 4.6% in 2016 from 21,351 individuals in 2011 to 20,372 (Table 6-23). The trend

[5] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1819/ENR_18_4.pdf

[6] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1718/ENR_17_4.pdf

[7] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1314/ENR_13_4.pdf

continued the earlier decline, when in 2011 there was a drop in population of 3.2% between 2006 and 2011. During that same five-year period, the overall population of the province on the other had increased 1.8% growing from 505,469 to 514,536. (Statistics Canada 2018).

Table 6-23: Population Demographics for the Burin Peninsula and the Province

Community	Population Demographics						
	2011	2016	% Change	Average Age	Average Total Income of Households in 2015	Average Household Size	No. Private Dwellings
Province	514,536	519,716	+1.0	48	$87,392	2.3	265,739
Burin Peninsula	21,351	20,372	- 4.6	46.7	80,949	2.3	11,497
St. Lawrence	1244	1192	- 4.2	46.4	73,192	2.4	601
Marystown	5508	5316	- 3.5	42.6	83,765	2.3	1270
Grand Bank	2415	2310	- 4.3	41	92,764	2.4	1158
Garnish	545	568	+ 4.2	48	85,195	2.3	292
Burin	2424	2315	- 4.5	44.4	89,162	2.3	1145
Fortune	1050	1007	- 4.1	46.9	63,453	2.2	510
Petit Forte	85	57	- 32.9	50.5	N/A*	2.2	25
Baine Harbour	137	124	- 9.5	46	N/A	2.3	61
Parkers Cove	301	248	- 17.6	46.3	N/A	2.3	127
Red Harbour	191	189	- 1.0	44.6	N/A	2.3	83
Rushoon	288	245	- 14.9	48.9	N/A	2.2	127
Terrenceville	530	482	- 9.1	44.8	87,128	2.4	239
Winterland	363	390	+ 7.4	43.1	116,648	2.4	191
Long Harbour	298	185	- 37.9	49.3	N/A	2.2	163

Source: Statistics Canada (2018)
Note:
* Denotes data suppressed (i.e., the volume of responses was too low to utilize without potentially revealing private information)

6.7.3 Economy, Employment and Business

Economy

Traditionally shoreline communities on the Burin Peninsula were sustained by inshore fishing. Independent, self-employed fish harvesters used their own vessels and enterprise licenses to harvest cod, lobster, crab, and other seasonal species. Until the early 1930s, people in St. Lawrence made a traditional living like other coastal communities, relying on the inshore fishery and small-scale farming, with traditional hunting and wood gathering to sustain their families. In the early 1930s there was great hardship – a 1929 tsunami destroyed much of the shoreline infrastructure and family homes, boats, sheds and stages. This exacerbated hard times from the Great Depression and the collapse of saltfish trade. Then in 1931, fluorspar mining became a new industry in St. Lawrence when an American entrepreneur Walter Seibert started the St. Lawrence Corporation of Newfoundland (Heritage NL)[8]. Since then several companies have operated fluorspar operations on and off, within the vagaries and cycles of commodity prices and market demand. CFI is the new operator.

CFI is a strong contributor to the economy, employment and business in the region and in NL. In 2018, CFI made 100% of its more than $20 million expenditure on labour in the province and more than half (53%) of its other expenditures or $30.8 million in the province. In the first three months of 2019 (Q1),

[8] https://www.heritage.nf.ca/articles/economy/st-lawrence-mines.ph

CFI's expenditures on labour have again been 100% spent in the province ($7.2 million) as have 66% of other expenditures ($9.4m million). Percentage-wise, the amount spent in the province is increasing: in Q1 2018, 64% of total CFI expenditures were made in the province while in Q1 2019, 77% of expenditures were made in Newfoundland and Labrador (J. Flood and T.Fleming, Canada Fluorspar (NL) Inc., Procurement, pers. comm., 29 May 2019).

The mining industry is resurging throughout the province[9]. This includes CFI redeveloping the St. Lawrence mine. Construction began in 2016 and fluorspar is now being shipped to market. When fully operational, the mine is expected to provide 230 year-round jobs for at least 10 years. With recent exploration, fluorspar resources are now estimated in excess of 22 million tonnes (CFI 2019b). If feasible, aggregate sales will extend the life of the mine and employment.

In Point May at the southern tip of the Burin peninsula, Puddle Pond Resources, a local mineral exploration company, is determining the mining feasibility of the Heritage Gold and Silver deposit in the area. They recently reported positive drill results completed in December 2018 on the Eagle Zone of its 36,000-acre Heritage Gold and Silver Project. Exploration was scheduled to begin again in May 2019[10]. By late 2017, the company reported a confirmed inventory of 76,000 ounces of gold.

The fishery continues to play a significant role in the regional economy, despite the reduction in processing capacity with plant closures in Marystown and Burin. The largest plants on the peninsula are now Clearwater Seafoods in Grand Bank and Ocean Choice International (OCI) in St. Lawrence. The OCI plant is slated to be the processing plant for the Greig NL salmon farm operation.

Tourism has always been an economic generator for the peninsula. In 2019, the provincial tourism campaign includes an evocative television ad that features much of the Peninsula[11]. As the gateway to the French islands of St. Pierre et Miquelon, which attracts thousands of national and international visitors each year, Burin Peninsula communities benefit, including St. Lawrence, when travelers take the southern route from Fortune through the town to the rest of the province. The Eastern Destination Marketing Organization (EDMO), operating under the tourism brand of Legendary Coasts, includes the Burin Peninsula in its product and market development initiatives. The EDMO has a cooperative arrangement in partnership with the Government of France to increase the number of visitors to the French islands and Burin Peninsula (D. Amb, Tourism Development Officer, Eastern Destination Marketing Organization, pers. comm., 7 February 2018). The Peninsula offers a diverse range of attractions, excellent museums like the St. Lawrence Miner's Museum, spectacular trails and scenery, and fossils of some of the earth's earliest life forms (GNL 2019).

The public service sector on the peninsula includes all levels of government and every type of public service, from policing and the courts to health care, education, social assistance and municipal services. Nearly 1200 people work in public service on the peninsula, providing a healthy contribution to the economy.

[9] http://www.miningnl.com/benefits/mining-exploration

[10] https://www.puddlepondresources.com/archives/3303

[11] https://www.youtube.com/watch?v=dFVQywLgJ9A

Employment

CFI made a commitment in the Benefits Agreement between the Province of NL and CFI, signed 27 September 2018, to provide qualified residents first consideration for employment in relation to the Operations Phase of the Project (Benefits Agreement 2018). CFI will be a major employer for the life of the mine.

While CFI's mine employed ~228 in 2018, the largest employer on the Burin Peninsula was the Eastern Health Authority (EHA), employing over 500 people at 11 facilities, including hospitals, clinics and offices. The English School District employed over 350 people at 18 schools and related offices in communities around Placentia Bay. Franchise private sector employers, including Walmart, Sobeys, McDonalds and Canadian Tire, employed about 325 personnel among their enterprises. Clearwater Seafoods employed close to 200 people at its processing plant in Grand Bank.

The size of the largest workforces on the Peninsula varied over an 18-month period during 2017 and 2018, depending on seasonality and demand. At times during 2017, the number of people employed at select locations included:

- CFI mine in St. Lawrence (228);
- Eastern Regional Integrated Health Authority hospital in Burin, the Bluecrest nursing home in Grand Bank and St. Lawrence's US Memorial health centre (420 employees);
- OCI seafood processing plant in St. Lawrence (208);
- Clearwater Seafoods processing plant in Grand Bank (200);
- Walmart in Marystown (135);
- Kiewit Offshore Services in Marystown (100);
- Motel Mortier in Marystown (80), two English School Board District Schools in Marystown (139 combined); and
- Dynamic Air Shelters Ltd. in Grand Bank (70).

(J. Bradley, Business Development Officer, Canada Business Network, pers. comm., 9 March 2018; Canada Fluorspar Human Resources Department, pers. comm., 24 April 2018; P. Keiley, OCI, pers. comm., 24 April 2018).

Nearby Marystown had been a centre of industry and employment for many residents of St. Lawrence as well, especially during the periods when the mine was closed. Marystown had a long history of shipbuilding, which was a major source of employment for skilled tradespersons in the area. Between 1967 and early 2000s, nearly 60 ships were built in Marystown, including offshore fishing boats, ferries, and coast guard vessels (TM 2018). The Town is home to Mortier Bay, which is one of the deepest, most sheltered ice-free ports in the world. Kiewit Offshore Services purchased the shipyard in 2002 and added a second and larger facility at Cow Head in Mortier Bay to serve the offshore oil industry. Between 2012 and 2015, employment there peaked at 1500 people, mostly for skilled trades, of which 1100 people were employed for the construction of the drilling support module for the topside facility for the Hebron oil project (TM 2018). Numerous local service businesses also benefited from this activity, including CFI which currently transports fluorspar to this facility to ship to markets.

Marystown and surrounding communities, including St. Lawrence, have become accustomed to a boom and bust cycle. Activity at the shipyard rose and fell throughout its lifetime, and it has been dormant since 2015. After the Hebron project was complete in 2015, skilled workers went two years without employment. A new, but smaller, project began at Cow Head in late-2017, employing 90 people. That number will increase to 150, with work continuing until the end of 2019. Overall, fewer construction jobs, and the loss of 140 jobs with the 2011 closure of the local Marystown fish plant had been a blow to all sectors of the regional economy was felt throughout the peninsula (Mayor and Councillors, Town of Marystown, pers. comm., 14 March 2018).

Labour Force

The 2016 census reported that in St. Lawrence there were 960 individuals aged 15 and over available to the labour force. At the time, 440 people were not actively looking for work. Of the 520 who were actively working or looking for work, 420 were employed and 105 were unemployed. The participation rate was therefore 54.2%, the employment rate was 43.8%, and the unemployment rate was 43.8%.

The Statistics Canada report of labour force characteristics by province and economic region with the three-month moving average ending in March 2018 and March 2019 (un-adjusted for seasonality) reported for the broad Newfoundland region of South Coast-Burin Peninsula and Notre Dame – Central Bonavista (Table 6-24)[12]. This reveals a reduction in population and labour force. While the employment rates remained the same in 2019 as the same period in 2018, there are fewer people working in the region.

Table 6-24: Labour Force Characteristics of the Region

South Coast-Burin Peninsula & Notre Dame-Central Bonavista Bay	Population (thousands)	Labour Force (Thousands)	Employment (Thousands)	Un-employment (Thousands)	Participation Rate	Un-employment Rate	Employment Rate
2018	120.8	63.9	49.1	14.8	52.9	23.2	40.6
2019	119.2	59.2	48.1	11.1	49.7	18.8	40.4

In St. Lawrence, key occupations of local labour force in the 2016 census showed trades, transport and equipment operators led employment with close to 28% of individuals in these occupations. There were 19% working in sales and service occupations, 15.5% in occupations related to education, law and social, community and government services with just under 10% in natural resources, and just under 9% in business, finance, administration and health occupations. There was a shift from five years ago. The key occupations of the local labour force in 2011 in St. Lawrence include trades, natural resources related occupations, manufacturing, sales and services, education, and community and government services. According to the National Household Survey (NHS) conducted for the 2011 Census, the distribution of employment by sector in St. Lawrence identified manufacturing as the leading sector with 27% of the

[12] https://www150.statcan.gc.ca/n1/daily-quotidien/190405/t009a-eng.htm_

employment, followed by health care and social assistance (15%), construction (13%) and retail trade (9%). In 2011, only 3% of the workforce in St. Lawrence was employed in the mining sector (Statistics Canada 2013).

A summary in Table 6-25 of the NL labour force, and the Burin Peninsula labour force, confirms the trend of the higher portion of Burin Peninsula workers found in trades, transport and equipment operators and related employment.

Table 6-25: NL Population 15 Years and Over by Occupation, Gender and Labour Force Activity, Province and Burin Peninsula, 2016

Labour Force	Newfoundland & Labrador			Burin Peninsula		
	Total	Male	Female	Total	Male	Female
Labour Force Activity						
Total Population aged 15+	**437,935**	**212,785**	**225,150**	**16,974**	**8404**	**8570**
In the Labour Force	256,855	133,110	123,745	8911	4973	3939
Not in the Labour Force	181,080	79,675	101,405	8062	3431	4631
Participation Rate (%)	58.7	62.6	55.0	52.5	59.2	46.0
Occupation						
All occupations	**251,800**	**130,405**	**121,390**	**8911**	**4973**	**3939**
Management	20,870	11,930	8940	255	153	102
Business, Finance and Administration	32,115	8130	2985	484	56	428
Natural and Applied Sciences	16,780	13,320	3460	200	200	0
Health	18,865	3190	15,675	353	4	349
Social Science, Education, Government and Religion	32,515	8935	23,585	1016	124	892
Art, Culture, Recreation and Sport	4830	2045	2790	2	0	2
Sales and Service	56,205	21,550	34,650	2072	289	1783
Trades, Transport and Equipment Operators and Related	47,890	45,235	2655	3313	3297	16
Natural Resources	11,845	9800	2045	624	497	127
Processing, Manufacturing and Utilities	9885	6270	3615	580	350	230
Occupation – Not Applicable	5055	2705	2350	14	3	11

Source: Statistics Canada (2018)

Compared to the Canadian average, the current Newfoundland and Labrador population appears more focused on skilled trades than university education, likely a reflection of the employment opportunities available in the Province (Statistics Canada 2018).

The percentage of the Burin Peninsula population with trades certificates as their highest education is virtually double the national average, while the rate of university education is just over half the national average (Statistics Canada 2018). These proportions have remained relatively unchanged since the last census profile during 2011 (Statistics Canada 2018). The percentage of people with college diplomas is equivalent to the national average (Statistics Canada 2018). The number of workers with high school diplomas versus those without has recently increased, with 22% of the aged 25–64 provincial population now having high school as their highest-level education, although nearly 16% still have less than a high school diploma (Table 6-26). The Canadian average is 24% with a high school diploma and 9% without (Statistics Canada 2018).

Table 6-26: Population Aged 25–64 Years by Highest Educational Attainment, Province and Burin Peninsula, 2016

Highest Education Level	Newfoundland & Labrador						Burin Peninsula	
	Total		Male		Female		Total	
	Count	%	Count	%	Count	%	Count	%
No certificate, diploma or degree	45,170	16	23,965	17	21,205	14	3186	30
High school diploma or equivalent	65,210	22	30,300	21	34,910	23	1989	19
Apprenticeship or trades certificate or diploma	36,075	12	26,475	19	9605	6	2589	24
College or other non-university certificate or diploma	81,955	28	34,175	24	47,780	32	2180	20
University certificate or diploma below bachelor level	6680	2	2970	2	3710	2	34	0.4
Bachelor's degree	34,555	12	13,960	10	20,595	14	490	4
University certificate, diploma or degree above bachelor level	18,230	6	7800	5	10,430	7	160	1
Total (all education levels)	**287,875**		**139,645**		**148,235**		**10,628**	

Source: Statistics Canada (2018)

Business

CFI made a commitment in the Benefits Agreement between the Province of NL and CFI, signed 27 September 2018, to provide Provincial Suppliers full and fair opportunity to participate on a competitive basis and first consideration for procurement opportunities for services and goods where those services and goods are competitive in terms of fair market price, quality and delivery in relation to the Operations Phase of the Project, and that Suppliers to the same with their suppliers (Benefits Agreement 2018).

Most of the businesses in the province are located in the St. John's metropolitan area on the Avalon Peninsula, which is typically (as per regulated highway speed-limits) a four hour-drive from St. Lawrence. In 2017, just over half (53%) of businesses in the Province were located on the Avalon Peninsula, with 3.2% located on the Burin Peninsula and 5.7% in the nearby Clarenville-Bonavista region (Table 6-27).

Table 6-27: Number of Businesses in the Newfoundland and Eastern Newfoundland Region, 2007 and 2017

No. of Businesses	Province		Clarenville-Bonavista		Burin Peninsula		Avalon Peninsula	
	2007	2017	2007	2017	2007	2017	2007	2017
No. of Businesses	17,610	15,814	1079	907	699	504	8527	8344
% of Businesses in Province	100	100	6.1	5.7	4.0	3.2	46.9	52.8
Difference from 2007–2017	-10.2%		-15.9%		-27.9%		-2.1%	
No. of Businesses with <5 employees	10,206	8239	674	503	479	287	4468	4299
Difference from 2007–2017	-19.3%		-25.3%		-40%		-3.8%	

Source: GNL (2018a)

Businesses in the Clarenville-Bonavista area are primarily located in Clarenville, within a two and a half-hour drive from St. Lawrence. There is another cluster of businesses in the Avalon isthmus area serving primarily oil and gas and mining industrial operations, including North Atlantic Oil Refinery at Come By Chance, Vale's Nickel Processing Plant at Long Harbour, and the Newfoundland Transshipment Terminal (offshore oil) at Whiffen Head. Businesses in this area are also aligned for work with major construction and fabrication contractors at Argentia and the Bull Arm site in Trinity Bay for future offshore developments.

The number of businesses on the Burin Peninsula has declined over the last decade, from 699 in 2007 to 504 by the end of 2017, a decrease of ~28% (Table 6-28). This reflects an overall declining trend in business numbers in rural areas. While Avalon Peninsula businesses only decreased by 2% over the past decade, there was a 10% decline in the number of businesses throughout the Province, from 17,610 in 2007 to 15,814 in 2017 (Table 6-28). In the Clarenville-Bonavista region, the number of businesses decreased by ~16% (see Table 6-27).

Table 6-28: Number of Businesses on the Burin Peninsula by North American Industrial Classification System (NAICS), 2007 and 2017

Industry	Province			Burin Peninsula		
	2007	2017	% of Total (2017)	2007	2017	% of Total (2017)
Agriculture, Forestry, Fishing and Hunting	561	408	2.6	13	18	3.6
Mining and Oil and Gas Extraction	74	82	0.5	-	-	-
Utilities	33	29	0.2	-	-	-
Construction	1812	2221	14.0	38	61	12.1
Manufacturing	529	398	2.5	11	8	1.6
Wholesale Trade	719	620	3.9	18	9	1.8
Retail Trade	2647	2449	15.5	117	82	16.3
Transportation and Warehousing	755	692	4.4	22	25	5
Information and Cultural Industries	142	157	1.0	5	5	1
Finance and Insurance	394	376	2.4	15	13	2.6
Real Estate and Rental Leasing	487	649	4.1	9	18	3.6
Professional, Scientific and Technical Services	973	1182	7.5	21	19	37.7
Management of Companies and Enterprises	144	76	0.5	-	-	-
Admin and Support, Waste Management, and Remediation	553	533	3.4	10	11	2.2
Educational Services	156	153	1.0	-	-	-
Health Care and Social Assistance	2244	1765	11.2	127	62	12.3
Arts, Entertainment and Recreation	374	336	2.1	17	13	2.6
Accommodation and Food Services	1323	1298	8.2	44	33	6.5
Other Services (not Public Administration)	3293	1923	12.2	198	96	19
Public Administration	397	435	2.8	23	25	5
Unknown	-	33	0.2	-	-	-
Total	**17,610**	**15,814**	**100.0**	**699**	**504**	**100**

Source: (GNL 2018b)

The decrease was more drastic (40%) among small businesses on the Burin Peninsula, i.e., those with fewer than five employees. Province-wide, the decline was 19.3% for businesses with fewer than five employees, half that of the Burin Peninsula. On the Avalon, the number of small businesses decreased slightly more than the regional average, with a decline of ~4%; however, in the Clarenville-Bonavista region the number of small businesses decreased by ~25% (see Table 6-27).

Of the 504 businesses registered for the Burin Peninsula in 2017, the majority (37.7%) offered professional, scientific and technical services (see Table 6-28). Other categories included non-government services (19% of total), retail trade (16.3%), health care and social assistance (12.3%) and construction (12.1%) (see Table 6-28; GNL 2018b).

In St. Lawrence in 2015, there were 18 businesses in St. Lawrence and 79 businesses that are members of the Burin Peninsula Chamber of Commerce (BPCC) (Town of St. Lawrence 2015; BPCC 2015). The Marystown-Burin Area Chamber of Commerce was established in 1991 and in 2009 the boundaries of the chamber of commerce were expanded to include the entire Burin Peninsula to serve the entire business community in the region. To reflect this change, the organization was renamed as the BPCC (BPCC 2015). From a regional perspective, the businesses located in the Burin Peninsula represented 3.5% of all businesses in the province (Newfoundland and Labrador Statistics Agency [NLSA] 2014). In 2019, there are 27 businesses listed on the town website, which together with non-profit and volunteer groups, totaled 36 operations.

There is the necessary business capacity in the region to serve the Project. There are opportunities for existing public and private businesses, including hardware supplies; general freight trucking; automobile sales, parts and repair services; industrial equipment rental and leasing for construction and operation; engineering services; commercial banking; petroleum and petroleum products; regulation, licensing and inspection; durable goods; metal work; building materials; surveying and mapping; accommodations and food services; wholesale and retail supplies; real estate and rentals and more. CFI is committed to buy from and support as many of these local businesses as possible.

The typical and expected range of services and supplies requiring procurement from businesses are provided in Table 6-29.

Table 6-29: Project Construction and Terminal Operation Service and Supply Requirements

Construction	Terminal Operation
Earthworks	Wireless Communications
Concrete Supply	
Building Supplies	Environmental Monitoring
Pumps	
	Employee Clothing
	Employee Safety Supplies
	Sanitation Services
	Water Quality Monitoring
	Computer Software and Hardware

Source: CFI, pers. comm., May 2019

6.7.4 Community Services and Infrastructure

St. Lawrence is located mid-way among the other four large towns on the Burin Peninsula - both Grand Bank and Fortune are on the western side of the peninsula, with Burin and Marystown further northeast on the Placentia Bay side. The town is located on Route 220, the Burin Peninsula Highway, which connects to the Trans-Canada Highway (TCH) 184 kms to the northeast. It is located within 32 kms of international shipping lanes to the south.

The socio-economic effects of the Project will most likely be concentrated in the area of St. Lawrence; however, Project-related effects may also be experienced in areas from which goods and services for the Project are sourced (i.e., larger communities, Newfoundland and Canada in general). Located ~25 km from St. Lawrence, the communities of Marystown and Burin are the larger service centres for the region (e.g., licenced childcare, police district offices).

The Town of St. Lawrence owns and manages several services and infrastructure in the area, including paved roads in the town. The town has diverse sport and recreation facilities – a two-sheet curling rink, multi-purpose recreation centre, two tennis courts, a softball field, and two regulation soccer fields. Known as the Soccer Capital of Canada, the St. Lawrence Laurentians soccer club that was founded in 1904 continues to dominate. The senior's men team won close to half of all Newfoundland Challenge Cups since 1967. A developed trail and park system add to the town's leisure and tourism activities. Cape Chapeau Rouge View Park and Trail starts with a centre town lookout and storyboards, with a trail leading to the highest point in town. The 16 km St. Lawrence Nature Walk takes in old mine roads. The Bergeron trail leads to spots along the water's edge. The Chamber Cove Heritage Walk is a 5 km trail that traces the rescue route of the *USS Truxton* and *USS Pollux* ship disasters. The American government built the hospital in gratitude for the rescue of many men aboard the vessels on that stormy February night in 1942. The St. Lawrence Miner's Museum includes photos and materials from the disaster, and artefacts and memorabilia of miners' lives since the early 1930s.

The U.S Memorial Health Centre in St. Lawrence has 40 beds, including 30 long-term care beds and 10 protective care beds to provide nursing care for Level 3 residents and dementia residents who are dependent on the support of nurses and other health-care professionals for most activities of daily living. The Centre accepts admissions for palliative care, respite and convalescence care, and offers a Family Practice Clinic with family physician and nurse practitioner clinics along with emergency services, diagnostic imaging and x-ray, laboratory services and blood collection (Eastern Health 2019).

Many people in St. Lawrence, as well as people from nearby towns and local service districts are employed in St. Lawrence by CFI, OCI, EHA and the NL English School District. Residents of nearby towns and local service districts travel to St. Lawrence for work, health care and commercial services. The OCI plant is the only snow crab facility on Newfoundland's south coast, and where crab, whelk, Greenland halibut, capelin and sea cucumber are also processed. It is also the planned processing facility for Grieg NL's Atlantic salmon aquaculture sea farms in Placentia Bay.

St. Lawrence is one of the five largest communities on the Burin Peninsula, together with Marystown, Burin, Fortune and Grand Bank. All towns on the Peninsula dedicate varying levels of resources to their programs and services, are attuned to their population, and take pride in their distinctive histories, locations, and industries, with a pleasant competitive rivalry in sport. Their councils are active partners and/or volunteers for running most of programs, from fire departments to recreation and economic development. Each of the larger towns are involved in direct economic development, marketing, strategic planning, and applications for funding for infrastructure and programs.

In total, there are 19 towns and 11 Local Service Districts on the Burin Peninsula (Table 6-30). Towns, like St. Lawrence, are municipalities that are governed in accordance with the provincial *Municipalities Act, 1999*, which specifies rules for financial management. Towns must set an annual budget and tax schedule and operate within a sound financial administration. Many towns take on additional responsibilities for services and economic development and supporting communities and families. Local service districts are less structured, community committees that may charge fees for the services they organize. Their services are legally limited to water supply, fire services, garbage collection, street lighting, animal control and maintenance of some of the community roads (GNL 2018c).

Table 6-30: Towns and Local Service Districts on the Burin Peninsula

Community Type	Community Name
Towns / Municipalities	Baine's Harbour, Burin, Fortune, Frenchman's Cove, Garnish, Grand Bank, Lamaline, Lawn, Lewin's Cove, Lord's Cove, Marystown, Parkers Cove, Point Au Gaul, Point May, Red Harbour, Rushoon, St. Lawrence, Terrenceville, Winterland
Local Service Districts	Beau Bois, Garden Cove, Goobies, Petit Forte, Rock Harbour, Jean de Baie, Little St. Lawrence, South East Bight, Spanish Room, Swift Current

There are several regional or peninsula-wide associations and organizations that provide a level of regional cooperation and support for all communities on the peninsula, such as the Burin Peninsula Joint Council, Burin Peninsula Chamber of Commerce, Burin Peninsula Regional Waste Management Council, Burin Peninsula Regional Service Board, Primary Healthcare Advisory Committee, Coalition for Mental Health and Wellness and Heritage Run Tourism Association. In some ways, 'the Burin' operates as an entity, with St. Lawrence mayor and councillors and community volunteers playing an active role.

Transportation

St. Lawrence is accessible via Highway Route 220/210, which is a two-lane highway connecting St. Lawrence with the TCH at Goobies. The Provincial Department of Transportation and Works maintain this highway. There are several paved roads within St. Lawrence and those are the responsibility of the municipality. There are no taxi services in St. Lawrence, but there are several privately-owned transportation companies who can provide service between the Burin Peninsula and St. John's.

There are a number of gravel access roads already in place throughout the Project area, used during historic mining operations. Currently, the access roads in the Project area are occasionally used for recreational purposes by local residents for walking, ATV use and berry picking.

A ferry service between the nearby community of Fortune and the French islands of St. Pierre and Miquelon is available. Additional information regarding marine transportation is provided in Section 6.7.4.

Housing

The communities and residents of the Burin Peninsula, Marystown in particular, have experienced the 'boom and bust' effects of many previous projects, which have frequently required large, temporary work forces, such as a shortage of accommodation and increased rental rates.

The population demographics reveal average household size and the number of private dwellings owned on the Burin Peninsula in 2016 (Table 6-31).

Of the 8375 households and dwellings reported in Statistics Canada 2016 Census estimates and projections for the Burin Peninsula, 86% were owned, and 14% rented (Table 4.56; Statistics Canada 2018). Most (89%) were single detached houses. Row houses comprised only 3% of the total reported dwellings, as did apartment duplexes.

According to the 2016 Census, there were 475 dwellings in St. Lawrence, which was 10 fewer than in 2011. In 2016 there were 460 single-detached houses, 10 semi-detached and five in a row house. The average household-size was 2.4. There were five multiple family households and 105 households with only one person. There were 160 households without children, and 95 with children[13].

[13]https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1002008&Geo2=PR&Code2=10&Data=Count&SearchText=St.%20Lawrence&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=1002008&TABID=1

Table 6-31. Average Household Size and the Number of Private Dwellings Owned on the Burin Peninsula

Community	Population Demographics						
	Population				Average Total Income of Households in 2015	Average Household Size	No. Private Dwellings
	2011	2016	% Change	Average Age			
Province	514,536	519,716	+1.0	48	87,392	2.3	265,739
Burin Peninsula	21,351	20,372	- 4.6	46.7	80,949	2.3	11,497
St. Lawrence	1244	1192	- 4.2	46.4	73,192	2.4	601
Marystown	5508	5316	- 3.5	42.6	83,765	2.3	1270
Grand Bank	2415	2310	- 4.3	41	92,764	2.4	1158
Garnish	545	568	+ 4.2	48	85,195	2.3	292
Burin	2424	2315	- 4.5	44.4	89,162	2.3	1145
Fortune	1050	1007	- 4.1	46.9	63,453	2.2	510
Petit Forte	85	57	- 32.9	50.5	N/A*	2.2	25
Baine Harbour	137	124	- 9.5	46	N/A	2.3	61
Parkers Cove	301	248	- 17.6	46.3	N/A	2.3	127
Red Harbour	191	189	- 1.0	44.6	N/A	2.3	83
Rushoon	288	245	- 14.9	48.9	N/A	2.2	127
Terrenceville	530	482	- 9.1	44.8	87,128	2.4	239
Winterland	363	390	+ 7.4	43.1	116,648	2.4	191

Source: Statistics Canada (2018)
Note:
* Denotes data suppressed (i.e., the volume of responses was too low to utilize without potentially revealing private information)

The 2011 Census showed there were 485 dwellings in St. Lawrence in 2011, including 375 single family households, five multiple family households and 100 non-family households. Approximately 200 of those dwellings were built after 1971 (NLSA 2015).

During 2017, there were 466 homes with some form of public support on the Burin Peninsula, half of which were in Marystown (Newfoundland and Labrador Housing Corporation [NLHC] 2017). The rental housing portfolio for the Peninsula, as reported by the NLHC, included 307 NLHC houses, one house that was provided with a rent supplement, 20 units provided through partner managed housing in affordable housing approved units, 101 provided by the private sector and another 40 by a non-profit organization (Table 6-32; NLHC 2017). The NLHC indicated there is low demand for publicly funded housing in the region. NLHC has been selling properties that have been vacant, many of which are 30–40 years old and require considerable repairs. Many of the houses were built and configured for large families, and with changing demographics to smaller family size and single people, the housing stock is no longer relevant.

In 2015, the private rental market in St. Lawrence was limited and there was some demand for social housing for low income families. The regional supervisor for NL Housing advised that there were 19 social housing units in St. Lawrence and in 2015, there were only two vacancies. There were also six cottage style units for seniors, which were fully occupied in 2015 (J. Cluett, NLHC, pers. comm., 2015).

Table 6-32: Newfoundland and Labrador Housing Corporation Rental Housing Portfolio on the Burin Peninsula, as of 31 March 2017

Community	NL Housing Total	Rent Supplement	Affordable Housing Approved Units		Partner Managed Housing	Co-op	Federal Portfolio	Community Total
			Private Sector	Non-profit				
Bay L'Argent	6	-	-	-	-	-	-	**6**
Burin	52	-	37	-	-	-	-	**89**
Creston	-	-	6	-	-	-	-	**6**
Creston South	-	1	-	-	-	-	-	**0**
Fortune	35	-	10	-	-	-	-	**45**
Garnish	-	-	-	-	8	-	-	**8**
Grand Bank	37	-	10	-	-	-	23	**70**
Lawn	4	-	-	-	-	-	-	**0**
Marystown	148	-	30	12	12	-	32	**234**
St. Lawrence	25	-	-	-	-	-	-	**0**
Winterland	-	-	8	-	-	-	-	**8**
Total	**307**	**1**	**101**	**12**		**0**	**55**	**466**

Source: NLHC (2017)

The primary housing demand in the region is for affordable, single-family homes, which in 2017 cost in the range of $150–200,000 (Table 6-33; C. Janes, Senior Market Analyst, Market Analysis [Atlantic], Canada Mortgage and Housing Corporation, pers. comm., 15 February 2018).

Table 6-33: Cost of Housing on the Burin Peninsula, 2013–2017

Community	Year	Average Sale Price ($CAD)	No. of Sales	Average No. Monthly Active Listings
Burin Peninsula	2013	$143,070	20	19
	2014	$170,527	45	26
	2015	$160,074	42	35
	2016	$164,494	50	78
	2017	$136,604	63	106
Goobies-Terrenceville	2013	$85,000	1	N/A
	2014	$44,500	2	N/A
	2015	$69,000	1	N/A
	2016	$175,000	1	N/A
	2017	-	0	N/A
Little Harbour East-Red Harbour	2013	$35,000	1	N/A
	2014	-	0	N/A
	2015	$113,500	2	N/A
	2016	-	0	N/A
	2017	-	0	N/A
Marystown-Burin Area-Winterland	2013	$176,300	13	10
	2014	$206,752	29	16
	2015	$195,230	27	25
	2016	$193,664	36	55
	2017	$162,231	43	77
St. Lawrence-Point May	2013	-	0	N/A
	2014	$155,000	1	N/A

Community	Year	Average Sale Price ($CAD)	No. of Sales	Average No. Monthly Active Listings
	2015	-	0	N/A
	2016	$134,500	1	N/A
	2017	$114,000	2	N/A
Garnish-Grand Bank-Fortune	2013	$89,900	5	7
	2014	$110,300	13	7
	2015	$96,325	12	6
	2016	$78,608	12	17
	2017	$77,894	18	23

Source: C. Janes, Senior Market Analyst, Market Analysis (Atlantic), Office of the VP, Housing Markets and Indicators, Canada Mortgage and Housing Corporation, pers. comm., 15 February 2018

St. Lawrence has prepared a conceptual plan in anticipation of increased demand for housing associated with the Project. The town submitted an application to the provincial Crown Lands Division of the Department of Municipal and Intergovernmental Affairs to access land for the development of a subdivision intended to accommodate 64 serviced lots for single family dwellings. An area has also been identified for use as a recreational vehicle (RV) park that can accommodate 20 units.

Education and Training Facilities

There is one school located in St. Lawrence; St. Lawrence Academy offers programming from kindergarten to grade 12, or level four. The school was built to accommodate 580 students, but enrolment has been declining. In the current school year 2018/2019 there are 167[14] students enrolled in St. Lawrence Academy in all grades from kindergarten to level four. This was a slight increase by four students from last year[15]. Five years ago, however there were 186[16] students[17] while in 2008 there were 228 students in 2008 (NLSA 2015). The school has capacity to accommodate additional students should there be families with children arriving in St. Lawrence as a result of the Project.

The Newfoundland and Labrador English School District (NLESD) represents all English-speaking students and schools in NL. Schools on the Burin Peninsula are governed within the Central Regional office. Student enrolment from Kindergarten to grade 12 (or level four) has declined steadily on the Burin Peninsula during the past three decades, from ~7500 students during the 1989–1990 school year to 2500 students in 2017 (Figure 6-30; Table 6-34; GNL 2017).

Public education and training are available at two provncial organizations: (1) Memorial University of Newfoundland (MUN), which includes the Fisheries and Marine Institute; and (2) CNA.

The Burin Campus of the CNA offers full-time credit courses and a transition year program for university (Table 6-35). Registration is ~400 students per semester, with another 75 who are registered part-time. Approximately 500 students participate in Continuing Education evening courses (CNA 2018).

[14] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1819/ENR_18_4.pdf

[15] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1718/ENR_17_4.pdf

[16] https://www.ed.gov.nl.ca/edu/publications/k12/stats/1314/ENR_13_4.pdf

[17] https://www.ed.gov.nl.ca/edu/publications/k12/stats/index.html#1819

Source: Community Accounts (2017)

Figure 6-30: Economic Zone 16 Student Enrolment, 1989/1990 to 2016/2017. Vertical Axis is the Number of Students Enrolled, and Horizontal Axis is the School Year

Table 6-34: 2018 Student Enrolment in Burin Peninsula Schools

School	Community	Total No. Students	No. High School Students	Grades
Pearce Junior High School	Burin Bay Arm, NL	229	229	8–9
Lake Academy	Fortune, NL	234	30	K to 7
John Burke High School	Grand Bank, NL	185	185	8–12
St. Joseph's Academy	Lamaline, NL	77	36	K to 12
Marystown Central High School	Marystown, NL	364	364	10–12
Sacred Heart Academy	Marystown, NL	469	63	K to 7
Christ the King School	Rushoon, NL	98	54	K to 12
Donald C. Jamieson Academy	Burin Bay Arm, NL	336	56	K to 7
St. Anne's School	South East Bight, NL	16	3	K to 5, 8–10
Fortune Bay Academy	St. Bernard's - Jacques Font	85	45	K to 12
St. Lawrence Academy	St. Lawrence, NL	165	75	K to 12
St. Joseph's All Grade	Terrenceville, NL	103	53	K to 12
Swift Current Academy	Swift Current, NL	24	7	Mix
Holy Name of Mary Academy	Lawn, NL	80	42	K to 12
Total		**2971**	**1489**	**-**

Source: GNL (2018c)

Keyin College is a private institution with campuses located in St. Lawrence, Burin and Marystown. CFI has entered into an agreement with Keyin College to set up a mining school in St. Lawrence to train mine and mill workers. Keyin College has an interest in continuing to provide customized training for unique applications. For the St. Lawrence Fluorspar Mine Keyin adapted its heavy equipment operator course for haul truck operators at the mine and provided safety training on work sites in St. Lawrence. (L. Lewis, Career Counselor, Keyin College, pers. comm., 13 April 2018).

Table 6-35: Programs Offered at the Burin Campus of the College of the North Atlantic

Level of Achievement	Program	Duration
Certificate	Comprehensive Arts & Science Transfer: College-University	1 year
Certificate	Construction / Industrial Electrician	37 weeks
Certificate	Cook	34 weeks
Certificate	Instrumentation and Control Technician	34 weeks
Certificate	Metal Fabricator (Fitter)	37 weeks
Certificate	Office Administration	1 year
Diploma	Office Administration (Executive)	2 years
Certificate	Sheet Metal Worker	34 weeks
Certificate	Welder	36 weeks
Diploma	Welding Engineering Technician	2 years

Source: CNA (2018d)

Adult basic education and literacy programs are offered in St. Lawrence, and other trades and training programs are offered in Burin and Marystown. Additionally, high-speed internet services are available on the Burin Peninsula, facilitating the delivery of distance learning programs.

Child Care

There are no childcare centres licensed under the provincial regulations in St. Lawrence. There are only two licensed childcare centres on the Burin Peninsula, and they are located in Marystown. The provincial government does not track the number of unlicensed centres as they are not regulated (Newfoundland and Labrador Education and Early Childhood Development [NLEECD] 2015).

The Department of Education and Early Childhood Development is responsible for early childhood learning and development, the K-12 school system and public libraries, with the objective of building an educational community in NL that fosters safe, caring and inclusive learning environments for all children and youth in early childhood settings, regulated child care and family resources centres, and pre-school to grade 12 (GNL 2018d). There is a satellite location in St. Lawrence Academy known as Burin Peninsula Brighter Futures, with similar satellite locations nearby in Burin, Fortune and Lamaline.

Health

The Provincial Department of Health and Community Services leads health and community services programs and policy development for the Province, working in partnership with regional health authorities, community organizations, professional associations, post-secondary educational institutions, unions, consumers and other government departments. Publicly funded health and community services are delivered throughout the province by four regional health authorities.

The EHA is the largest of the four health authorities in the Province, and its jurisdiction includes the Burin Peninsula and Placentia Bay communities. The EHA reports to the Provincial Department of Health and Community Services. The EHA provides a full continuum of health and community services, including public health, long-term care, and acute (hospital) care. Population Health is a priority focus, and Eastern Health has been involved in collaborative partnerships committed to rural health. Three initiatives include the Bonavista Primary Health Care and Burin Peninsula Primary Health Care initiatives, and Downtown Collaborative in St. John's.

Eastern Health partnered with the Government of NL Office of Communication and Public Engagement on 1–3 May 2017 to host a series of Primary Health Care community consultations on the Burin Peninsula. A total of four sessions were held in Grand Bank, St. Lawrence, Burin and St. Bernard's, attended by 144 residents. The purpose of the sessions was to share information about the health status of residents in the area, engage participants in a discussion regarding health and together search for concrete solutions to help transform primary health care on the Burin Peninsula.

As a result of the consultations, the EHA accepted recommendations for changing or improving the Primary Healthcare system on the Burin Peninsula, and is actively working on ways to enhance infrastructure, resources and education as well as communication and collaboration between all stakeholders. The team dedicated to the Burin Primary Healthcare is also working to break down barriers, work better together and improve engagement with specific target groups (Eastern Health 2017). To date, this effort has resulted in the establishment of the Burin Peninsula Initiative (Eastern Health 2018), which provides services at several facilities, training and increased health care access, including St. Lawrence DoorWays Walk-In Sessions, which are offered on Mondays at the U.S. Memorial Health Centre in St. Lawrence. In August 2017, Eastern Health partnered with town councils and community agencies on the Burin Peninsula to form a Coalition for Mental Health and Wellness. The new coalition is intended to foster a healthy community for all citizens, encompassing positive mental health and wellness with a specific focus on suicide awareness, prevention and intervention and post-suicide support. Community partners include representatives of the five largest towns, victim and ambulance services, police, government agencies, school and healthcare employees, and the ministerial association and joint community council. The coalition will be aligned with a Community Advisory Council to guide the recently established Burin Peninsula Primary Health-Care Initiative (Eastern Health 2017).

Eastern Health Authority Facilities

Eastern Health distinguishes its facilities in five categories: (1) hospitals and health care centres; (2) clinics and health offices; (3) long-term care; (4) community services; and (5) administrative offices (Table 6-36).

Table 6-36: Healthcare Facilities on the Burin Peninsula and Around Placentia Bay

Facility	Hospitals and Health Care Centres	Clinics and Health Offices	Long Term Care	Community Services	Administration Offices
Burin Peninsula Health Care Centre – Burin	✔				
U. S Memorial Health Centre – St. Lawrence	✔		✔		
South East Bight Clinic		✔			
Terrenceville Clinic		✔			
Grand Bank Health Centre		✔		✔	✔
Marystown Community Services		✔			✔
Blue Crest Nursing Home – Grand Bank			✔		
Placentia West Medical Clinic, Boat Harbour				✔	

Source: Eastern Health (2016)

Residents and workers in St. Lawrence have access to nearby facilities.

The U.S Memorial Health Centre in St. Lawrence offers a Family Practice Clinic with family physician and nurse practitioner clinics along with emergency services, diagnostic imaging and x-ray, laboratory services and blood collection. The Centre has 40 beds, including 30 long-term care beds and 10 protective care beds to provide nursing care for Level 3 residents and dementia residents who are dependent on the support of nurses and other health-care professionals for most activities of daily living. The Centre accepts admissions for palliative care, respite and convalescence care (Eastern Health 2019).

The Burin Peninsula Health Care Centre in Burin has 41 acute care beds and provides 24-hour emergency, outpatient clinics, day surgery, dialysis, diagnostic imaging and x-ray, blood collection, chemotherapy and laboratory services. Inpatient services include a suite of services from medicine/surgery, pediatrics, intensive care, to palliative care, and gynecology and obstetrics (Eastern Health 2019). Physicians with private practices are located in the Burin Pharmacy Building next door to the Burin Peninsula Health Care Centre, and are available for emergency care, shifts, special procedures, chemotherapy, prenatal and postnatal care and house calls/personal care home visits as needed.

The Grand Bank Health Centre, also known as the Dr. S. Beckley Health Centre, provides primary health care and emergency services, such as continuing care, public health, community health, a district administration office and an emergency department. Family physician clinics are open from 8:30 a.m. to 4:30 p.m. The emergency department offers 24-hour service. Laboratory and diagnostic services are also available (Eastern Health 2018).

The Marystown Community Services Clinic provides primary health care with services for public health, community health, mental health and addictions, community supports programs, speech and language programs, child, youth and family, community corrections, finance and human resources (Eastern Health 2018).

There is also a ten-bed emergency centre house in Marystown, known as Grace Sparkes House, which offers support for a period of six weeks for women and children leaving a violent domestic situation. The organization also operates a six-unit affordable housing complex for women and children in need.

Policing and Fire Services

St. Lawrence is serviced by the RCMP through the Burin Peninsula District which was established in 1997. The RCMP district office is located in Marystown, and there is a satellite office in St. Lawrence with two RCMP resident members (RCMP 2015).

Firefighting services are provided locally in St. Lawrence by a volunteer municipal fire department (Town of St. Lawrence 2019).

Energy

Electrical power in St. Lawrence is obtained from the Newfoundland Power electrical grid. St. Lawrence is the site of a wind farm with nine turbines with a total capacity of 27 MW. The wind farm can produce enough electricity to meet the demands of ~7000 homes. Electricity generated by the nine windmills is being diverted to the provincial power grid.

Waste Management

Historically, St. Lawrence had a municipal waste disposal site which closed following the advancement of the Provincial Solid Waste Management Strategy initiated by the provincial government to modernize waste management across the province by 2020. The Burin Peninsula Regional Service Board (BPRSB), established in 2013, provides municipal waste management services on the Burin Peninsula, including services to St. Lawrence (BPRSB 2015).

Family Life

Families form a large portion of the population in the Burin Peninsula region. There were 6718 families among the nearly 20,000 people living on the Burin Peninsula in 2016, with an average family size of 2.4. Of these, 75% were married couples, 11% were common-law couples and 13% were lone parent families. Among these categories, ~41% were families with children at home (Table 6-37) (Statistics Canada 2018).

Table 6-37: Number of Families and Persons Per Family on the Burin Peninsula as Per a 2016 Statistics Canada Census

Census Family Category	No. Families or Persons	% of Total
2016 Census Families in Private Households	**6718**	-
Married Couples	**5063**	**75**
With No Children at Home	2761	41
With Children at Home	2301	34
Common-Law Couples	**750**	**11**
With No Children at Home	324	5
With Children at Home	426	6
Lone-Parent Families	**905**	**13**
Number of Census Family Persons	17,753	-
Persons Per Census Family (Average)	2.4	-

Source: Statistics Canada (2018)

Recreation and Culture

Recreational facilities in St. Lawrence are maintained by the town. Facilities include two soccer fields, an outdoor swimming pool, curling rink, basketball court, gymnasium in the school, and a recreation centre. There is also an active soccer association; fifteen years ago, St. Lawrence established itself as the soccer capital of Canada.

Outdoors activities are a large part of the recreational activities accessible in the community, through the use of hiking trails to enable excursions to the ocean. Bird watching, berry-picking and camping are other activities that are practiced by community members and visitors. The town has access to sandy beach front at Shoal Cove Beach.

People living on the Burin Peninsula predominantly enjoy a rural Newfoundland outdoor lifestyle of boating for fishing and trips on the bay, cabins and camping, back country snowmobiling, ATV use and trail biking and hiking. This is true for St. Lawrence as indicated in the 26 April 2019 public information session. Many enjoy organized sports and indoor programs for recreation, entertainment and fitness, as well as community and school-based arts and performances (Statistics Canada 2018).

Table 6-38 demonstrates that recreational facilities are core investments in Burin Peninsula communities.

Table 6-38: Recreational Facilities on the Burin Peninsula

Community	Facility	Features/Purposes
St. Lawrence	Soccer Fields (2)	Regulation
	Curling Rink (2 sheets)	
	Multi-purpose Recreation Centre	
	Tennis Courts (2)	
	Softball Field	
	Cape Chapeau Rouge View Park and Trail	Centre town lookout and storyboards; trail to highest point
	Chamber Cove Heritage Walk	5 km trail tracing rescue route of *USS Truxton* and *USS Pollux* ship disasters; old mine
	St. Lawrence Nature Walk	16 km trails on old mine roads
Marystown	YMCA Sports Complex	25 m 6-lane pool; play pool and waterslide; conditioning fitness centre; walking/running track; gymnasium
	Kaetlyn Osmond Arena	Ice surface, dry floor, figure skating; ice and ball hockey; Marystown Minor Hockey; Marystown Ice Crystal Figure Skating Club
	Town Soccer Pitch	Marystown Minor Soccer
	Town Softball Fields (2)	
	Landing Place Pond	1.8 km trail and swimming area
	Jane's Pond	Scenic walking trail
	Town Track and Field Complex	Mariners Athletic Club
Grand Bank	Town Playgrounds	
	Tennis Courts (4)	
	Soccer Field	Men's, ladies' and junior soccer leagues
	Basketball Centre	
	Swimming Pool	
	Fitness Centre	
	Gymnasiums	Senior men's and women's floor hockey Leagues;
	Grand Bank Nature Trail	5 km trail; view salmon ladder
	Grand Bank Marine Hike	7 km to Grand Bank Cape
Fortune	Fortune Arena	Ice surface; dry surface for floor hockey; indoor soccer
	Multi-purpose Field	
	Horse Brook Walking Trail	Ecological park view
Frenchman's Cove	Grand Meadows Golf Course	9-hole golf course next to Frenchman's Cove Park
Burin	Town Playgrounds (5)	
	College of North Atlantic	Gymnasium
	Schools (2)	Gymnasiums; soccer fields; basketball courts
	Town Soccer Field	Regulation soccer field (split in two for minor leagues); Burin Minor Soccer Association; Burin Minor Softball
	Town Softball Field	Regulation softball field
	Cooks Lookout Trail	6 km gravel and boardwalk trail
	Salt Pond Walking Trail	Trail around pond

Source: M. Healey, Director, Healthy Living, Sport and Recreation, Department of Children, Seniors and Social Development, pers. comm., 17 April 2018

Culture and heritage are often the focus of local festivals and events, including Come Home Years, a clear demonstration of community attachment. St. Lawrence Laurentian Days offer community gatherings, and a Provincial Challenge Cup Soccer Game. Throughout the region, there are theatre groups, and venues and auditoriums in several locations, such as in Marystown, Burin and Grand Bank. Heritage associations reach out to both adults and youth to pass on traditional activities, tools, materials and 'way of life' (E. Murphy, Chair, Placentia West Development Association, pers. comm., 21 February 2018).

6.7.5 Commercial, Recreational, and Indigenous Fisheries

Little Lawn Harbour occurs within NAFO Div. 3PSc, which was used as a delimiting boundary for fisheries analyses in the following subsections.

6.7.5.1 Commercial Fisheries

The most recently available (2013–2017) DFO commercial fisheries landings data within NAFO Div. 3PSc were analysed for this RD/PD. In 2011, DFO modified its database such that catches are no longer individually georeferenced with specific catch weights and values. Instead, data are provided in 6' x 6' (latitude x longitude) cells, with catch weights and values provided as annual quartile ranges for species harvested. As the quartile catch weight and value ranges vary between years, inter-annual comparisons are more qualitative whereas quantitative comparisons were possible prior to 2011. This issue is circumvented by calculating the sum of quartile codes (range of 1–4) for catch weight or value for all species and all years combined. The greater the instances of quartile catch weight codes, the greater the overall catch weight for a particular species. For example, five instances of Code 1 (i.e., 5x1) equals a sum of quartile codes of 5, and four instances of Code 4 (i.e., 4x4) equals a sum of quartile codes of 16, for a total of 21 quartile codes for a particular species. Using the methodology, overall trends in commercial fisheries catch weight and value can be mathematically demonstrated.

During 2013–2017, predominant species commercially harvested in NAFO Div. 3PSc included snow crab (62% of total catch weight ranges) and Atlantic cod (23%), followed by American plaice (4%), Atlantic herring (3%) and sea scallop (3%) (Table 6.39). Commercial harvests in Div. 3PSc during 2013–2017 occurred primarily during the April–July period (Figure 6-31), with recent (2016/2017) harvest locations throughout Lawn Bay and Placentia Bay (Figure 6-32). Approximately 88% of the harvest was conducted using fixed fishing gears, including crab pots, gillnets, longlines, and trap nets (see Figure 6-33 for fixed gear harvesting locations). The remaining harvest was conducted using mobile gears, including trawls, seines, baited hand lines, and rods and reels, boat-based dredges, drags, and electric harpoons (see Figure 6-34 for mobile gear harvest locations). Nearly all (>99%) of the catch was taken by fisher harvesters from NL during 2013–2017.

Table 6-39: Commercial Catch Weights and Values in NAFO Div. 3PSc, 2013–2017 (Values Indicate the Sum of Catch Weight Quartile Codes [i.e., 1–4] for Each Species; Derived from DFO Commercial Landings Database, 2013–2017)

Species	Sum of Catch Weight Quartiles [a]					Sum of Catch Value Quartiles [b]				
	1	2	3	4	Total	1	2	3	4	Total[c]
Snow Crab	1067	1624	903	84	3678	851	1716	1275	268	4110
Atlantic Cod	421	546	324	56	1347	603	408	27	-	1038
American Plaice	21	140	57	12	230	65	94	3	-	162
Atlantic Herring	4	-	27	128	159	12	52	21	-	85
Sea Scallop	111	30	3	12	156	120	20	-	-	140
Greenland Halibut	19	64	15	-	98	36	38	3	-	77

Redfish	6	30	6	-	42	16	14	-	-	30
Iceland Scallop	2	16	9	-	27	9	8	-	-	17
Winter Flounder	4	18	-	4	26	10	8	-	-	18
Whelk	7	12	6	-	25	12	4	-	4	20
Atlantic Halibut	10	6	9	-	25	10	12	-	-	22
Pollock	2	8	6	4	20	6	4	3	-	13
Skate	9	10	-	-	19	13	2	-	-	15
Haddock	2	4	3	-	9	4	2	-	-	6
Capelin	-	-	6	-	6	2	-	-	-	2
Bluefin Tuna	2	-	3	-	5	2	2	-	-	4
Yellowtail Flounder	1	-	3	-	4	1	2	-	-	3
White Hake	1	-	3	-	4	1	2	-	-	3
Monkfish	-	-	3	-	3	-	2	-	-	2
Sea Cucumber	-	2	-	-	2	1	-	-	-	1
Atlantic Wolffish	1	-	-	-	1	1	-	-	-	1
Rock Crab	1	-	-	-	1	1	-	-	-	1
Total	**1691**	**2510**	**1386**	**300**	**5887**	**1776**	**2390**	**1332**	**272**	**5770**

[a] Quartile catch ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch weights in a given year, all species combined). Quartile catch ranges are as follows:
2013: 1 = 0 – 2565 kg, 2 = 2566 – 11,872 kg, 3 = 11,873 – 48,585 kg, 4 = ≥ 48,586 kg
2014: 1 = 0 – 2421 kg, 2 = 2422 – 10,786 kg, 3 = 10,787 – 42,872 kg, 4 = ≥ 42,873 kg
2015: 1 = 0 – 2253 kg, 2 = 2254 – 9535 kg, 3 = 9536 – 40,703 kg, 4 = ≥ 40,704 kg
2016: 1 = 0 – 2136 kg; 2 = 2137 – 9436 kg; 3 = 9437 – 39,810 kg; 4 = ≥39,811 kg
2017: 1 = 0 – 1912 kg; 2 = 1913 – 8828 kg; 3 = 8829 – 35,206 kg; 4 = ≥35,207 kg

[b] Quartile value ranges provided by DFO (quartile ranges calculated annually by DFO based on total catch value in a given year, all species combined). Quartile catch ranges are as follows:
2013: 1 = $0 – $8934, 2 = $8395 – $35,699, 3 = $35,700 – $125,728, 4 = ≥ $125,729
2014: 1 = $0 – $8851, 2 = $8852 – $38,076, 3 = $38,077 – $140,695, 4 = ≥ $140,696
2015: 1 = $0 – $9539, 2 = $9540 – $37,526, 3 = $37,527 – $134,094, 4 = ≥ $134,095
2016: 1 = $0 – $9428, 2 = $9429 – $41,474, 3 = $41,475 – 154,669$, 4 = ≥ $154,670
2017: 1 = $0 – $9811, 2 = $9812 – $43,514, 3 = $43,515 – $166,502, 4 = ≥ $166,503

[c] Includes total sum of quartile catch codes for ranges 1–4, combined.

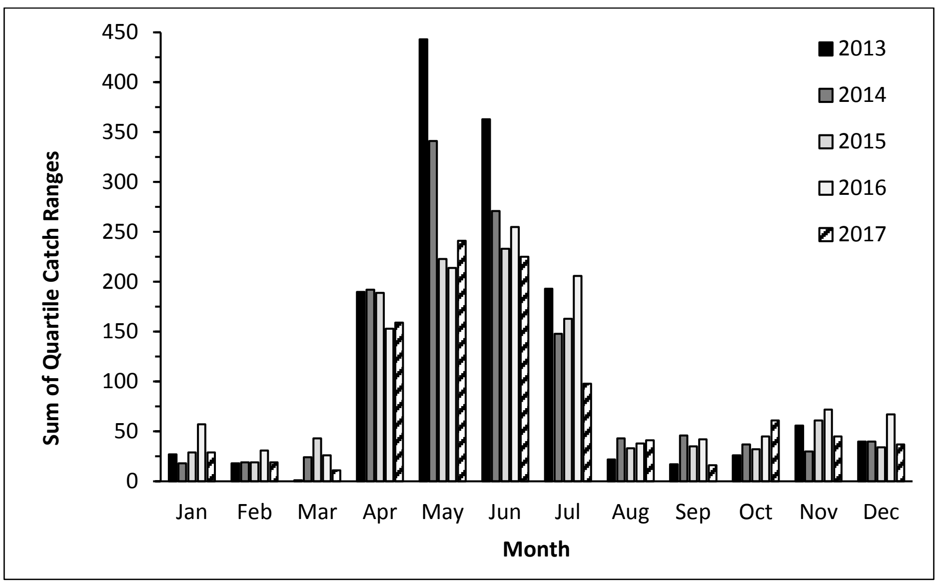


Figure 6-31: Total Monthly Catch Weight Quartile Codes, 2013–2017, All Species Combined (Derived from DFO Commercial Landings Database, 2013–2017

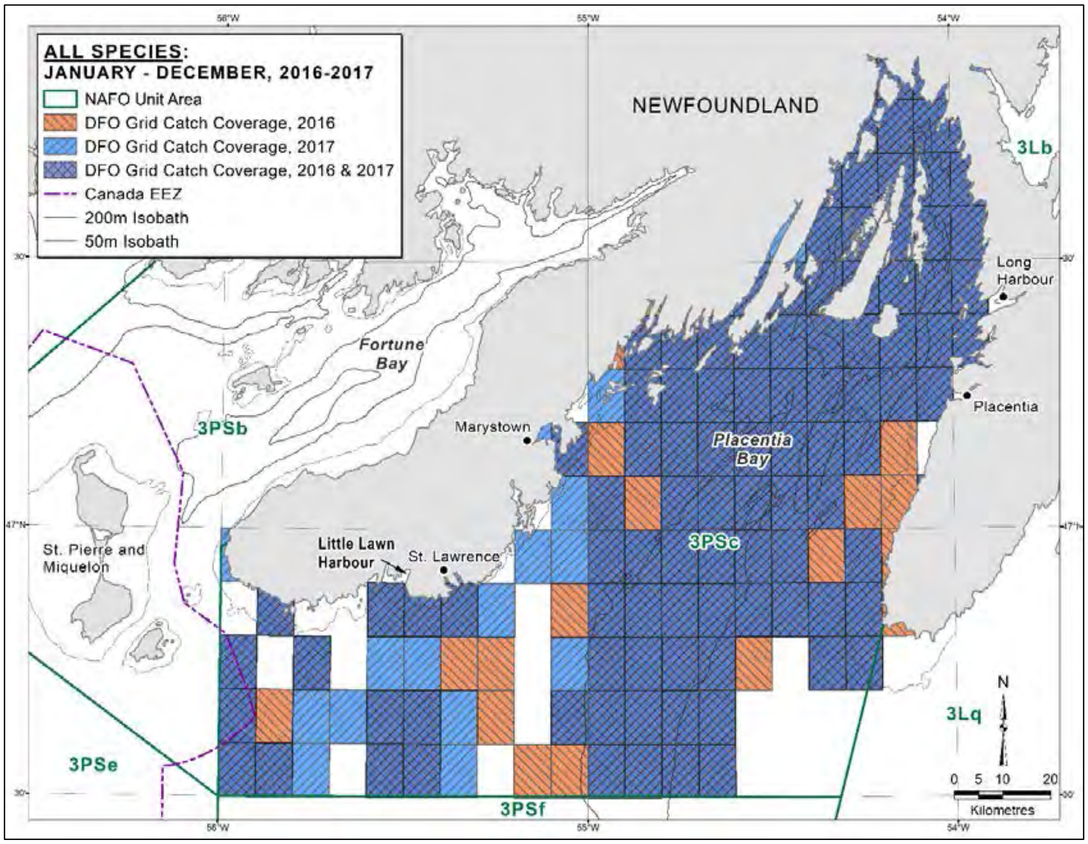


Figure 6-32: Harvest Locations within NAFO Div. 3PSc, 2016–2017, All Species Combined (Derived from DFO Commercial Landings Database, 2016–2017)

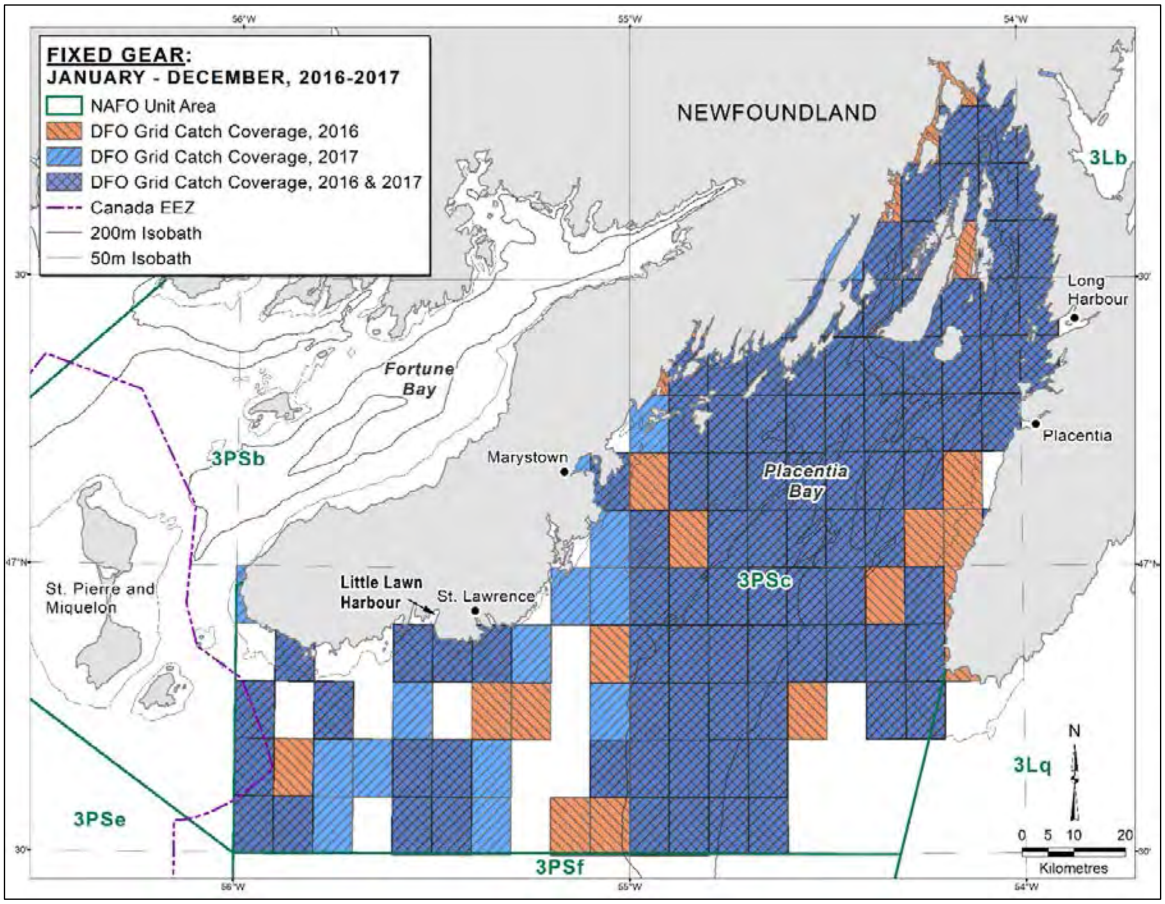


Figure 6-33: Fixed Gear Harvesting Locations in NAFO Div. 3PSc, 2016–2017, All Species Combined (Derived from DFO Commercial Landings Database, 2016–2017)

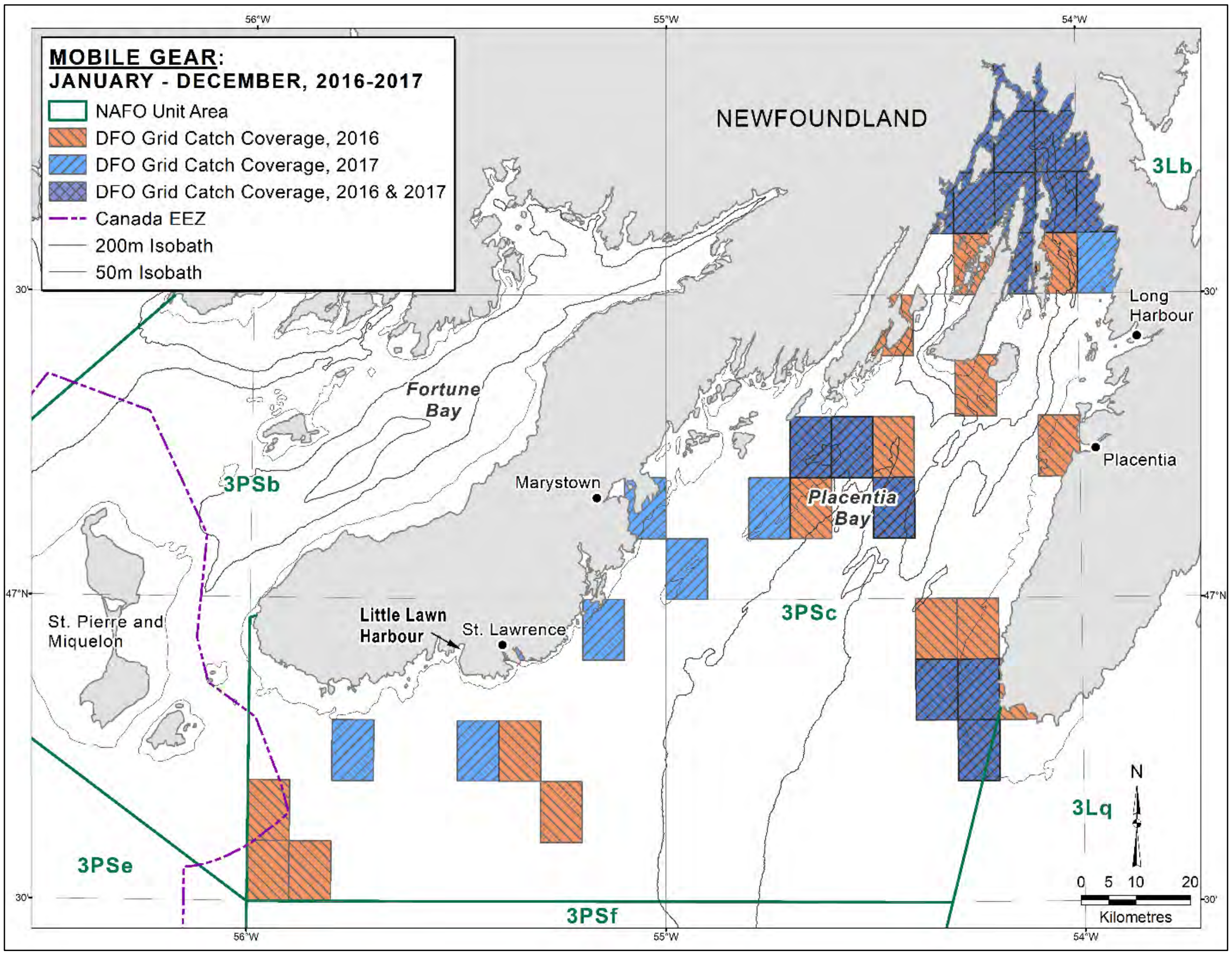


Figure 6-34: Mobile Gear Harvesting Locations in NAFO Div. 3PSc, 2016–2017, All Species Combined (Derived from DFO Commercial Landings Database, 2016–2017)

Principal Fisheries within NAFO Unit Area 3PSc

Principal commercial fisheries species were described in Section 4.2.3.1 of a recent EIS that included Placentia Bay (LGL 2018a). Harvest location and timing for principal fisheries species within NAFO Div. 3PSc during 2013–2017 are provided below.

Snow Crab

Snow crab were harvested within Lawn Bay, off the southern Burin Peninsula, and throughout Placentia Bay within Div. 3PSc during 2016–2017 (Figure 6-35). Snow crab were only harvested during April–July during 2013–2017 (Figure 6-36). Overall, snow crab harvests steadily decreased in NAFO Div. 3PSc from 2013–2017, with approximately half the catches during 2017 relative to 2013 (Figure 6-37). The Total Allowable Catch (TAC) for snow crab in Div. 3PSc during 2019 is 2649 mt (DFO 2019b). The nearest LEK harvest locations to the proposed marine terminal location were reported south of Black Head for DFO's CCRI program (DFO 2006).

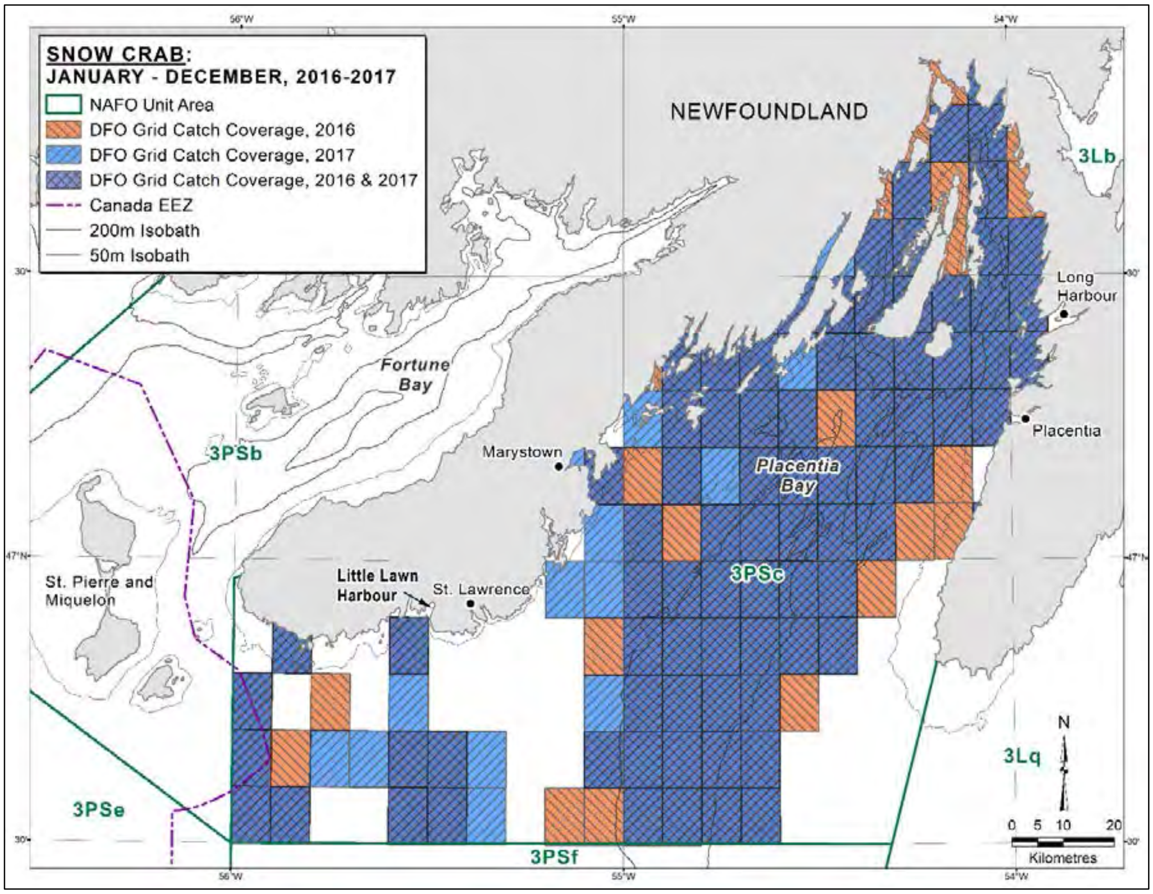


Figure 6-35: Snow Crab Harvest Locations in NAFO Div. 3PSc, 2016–2017 (Derived from DFO Commercial Landings Database, 2016–2017)

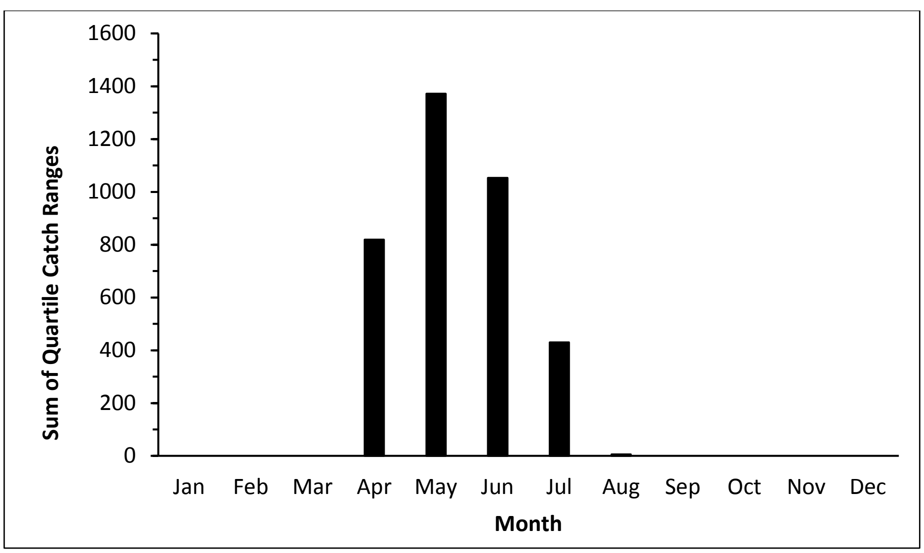


Figure 6-36: Total Monthly Snow Crab Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

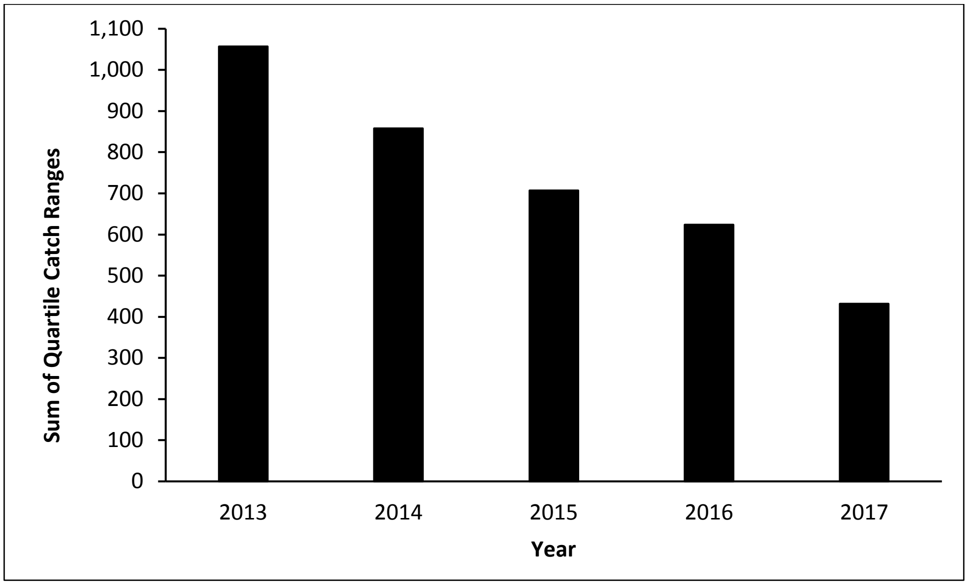


Figure 6-37: Total Annual Snow Crab Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

Atlantic Cod

During 2016–2017, Atlantic cod were harvested within southeastern Lawn Bay, variably along the southwestern and southeastern Burin Peninsula, and within northern and southeastern Placentia Bay within Div. 3PSc (Figure 6-38). Harvests occurred during June–December 2013–2017 (Figure 6-39). Overall, Atlantic cod harvests increased in NAFO Div. 3PSc from 2013–2014 to 2016–2017 (Figure 6-40). The 2019 TAC for Atlantic cod in Div. 3PSc is 5980 mt (DFO 2019b). Atlantic cod LEK harvest locations were reported in southwestern and eastern Lawn Bay for DFO's CCRI project, east of Lord's Cove and south of Lawn Head, respectively (DFO 2006).

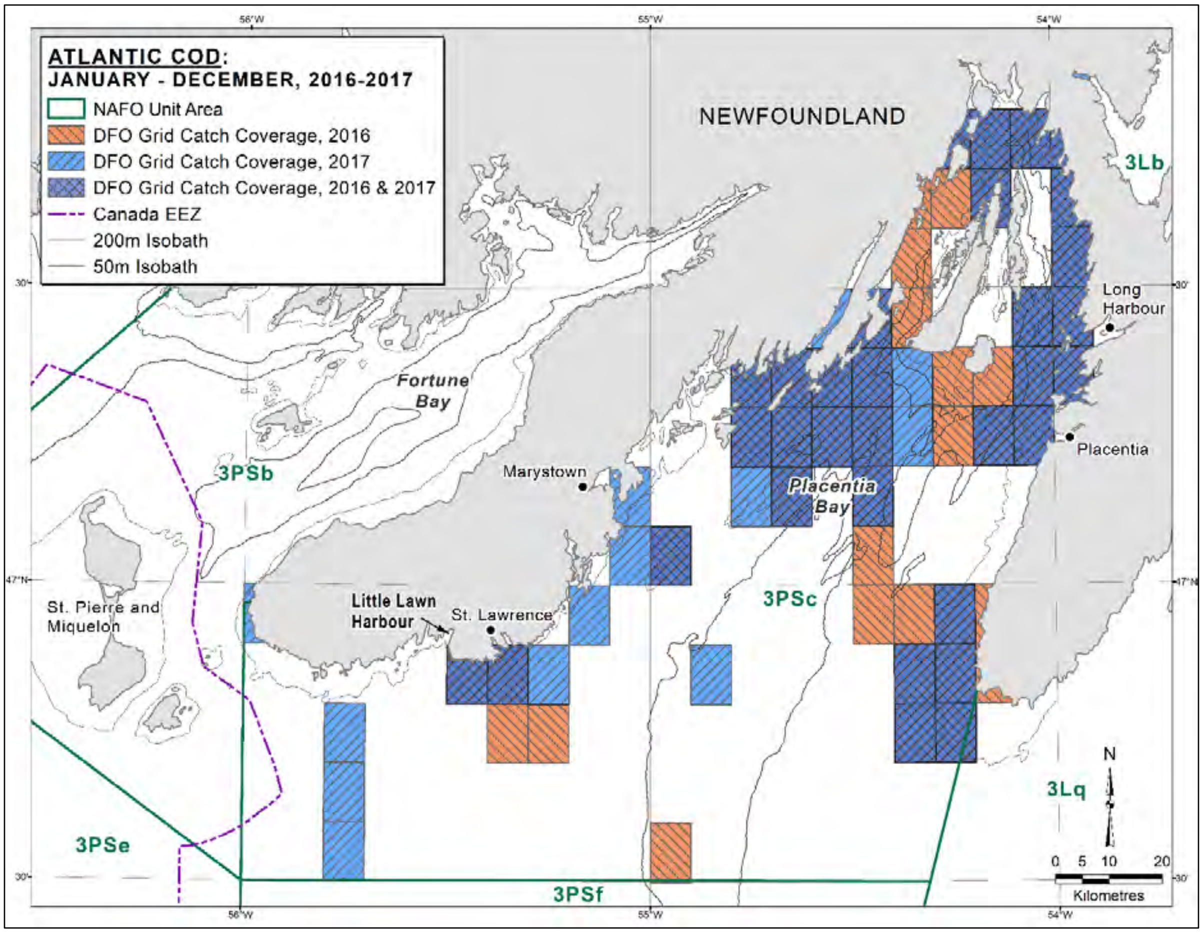


Figure 6-38: Atlantic Cod Harvest Locations in NAFO Div. 3PSc, 2016–2017 (Derived from DFO Commercial Landings Database, 2016–2017)

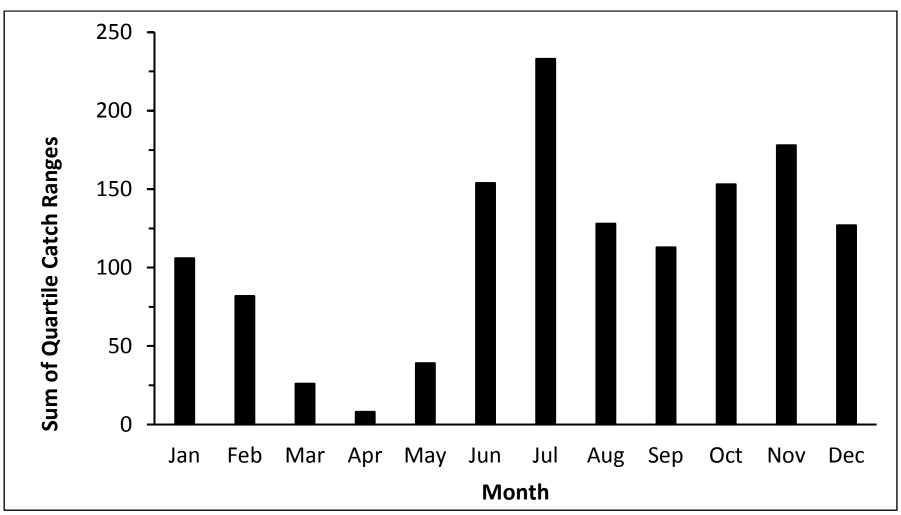


Figure 6-39: Total Monthly Atlantic Cod Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

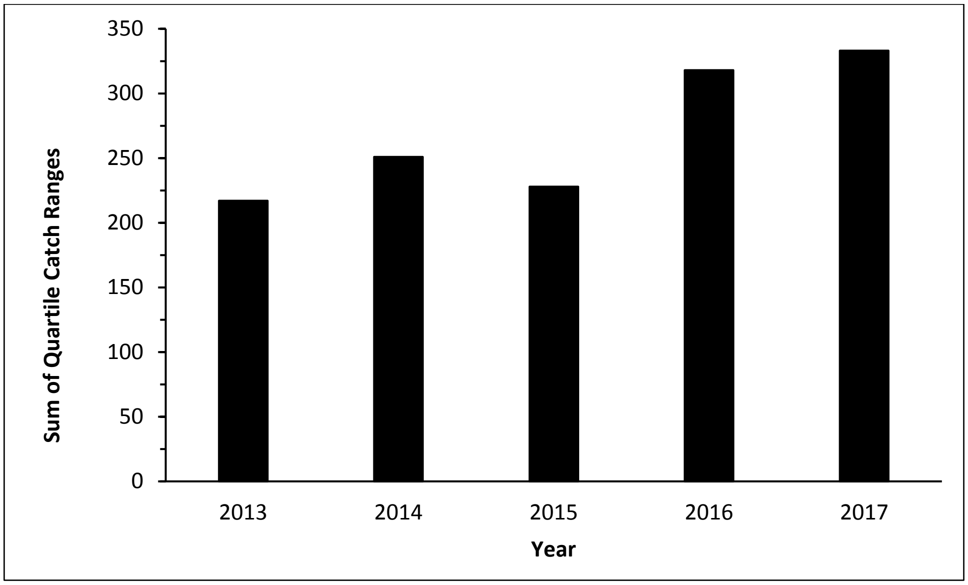


Figure 6-40: Total Annual Atlantic Cod Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

American Plaice

During 2016–2017, American plaice were predominantly caught near the southeastern Burin Peninsula, including eastern Lawn Bay, and northern Placentia Bay within Div. 3PSc (Figure 6-41). American plaice were harvested during June and July 2013–2017 (Figure 6-42). American plaice catches more than doubled from 2013–2015 to 2016–2017 in NAFO Div. 3PSc (Figure 6-43). American plaice are taken as bycatch in the Project area, as there is a fishing moratorium on American plaice in Div. 3Ps (DFO 2019b).

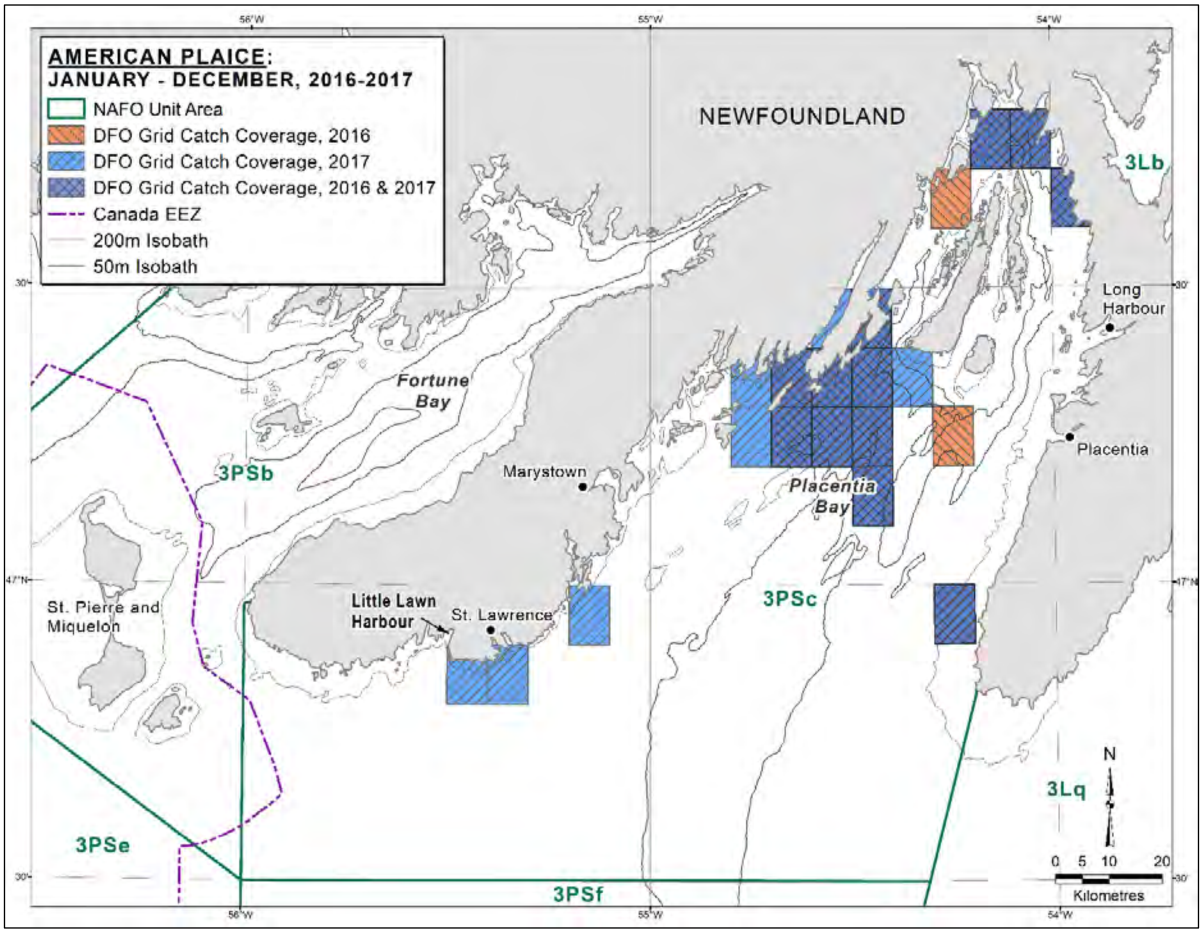


Figure 6-41: American Plaice Harvest Locations in NAFO Div. 3PSc, 2016–2017 (Derived from DFO Commercial Landings Database, 2016–2017)

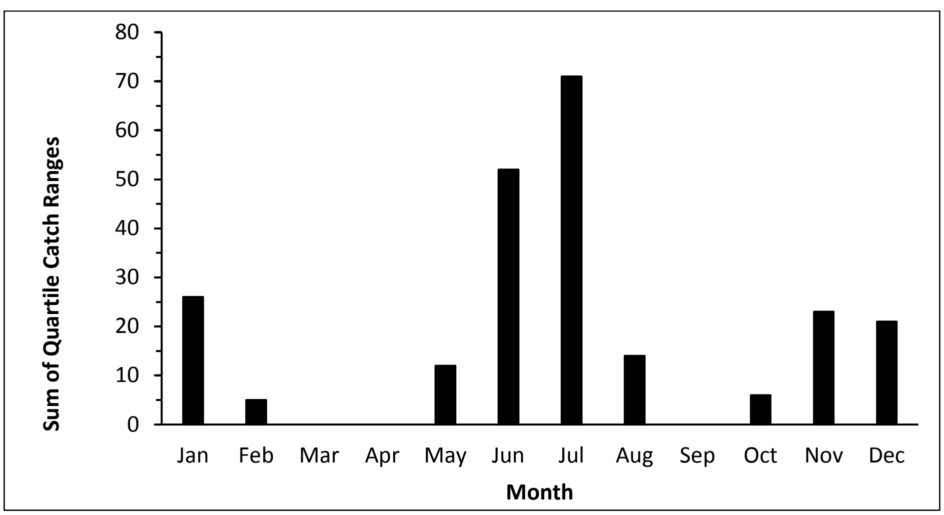


Figure 6-42: Total Monthly American Plaice Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

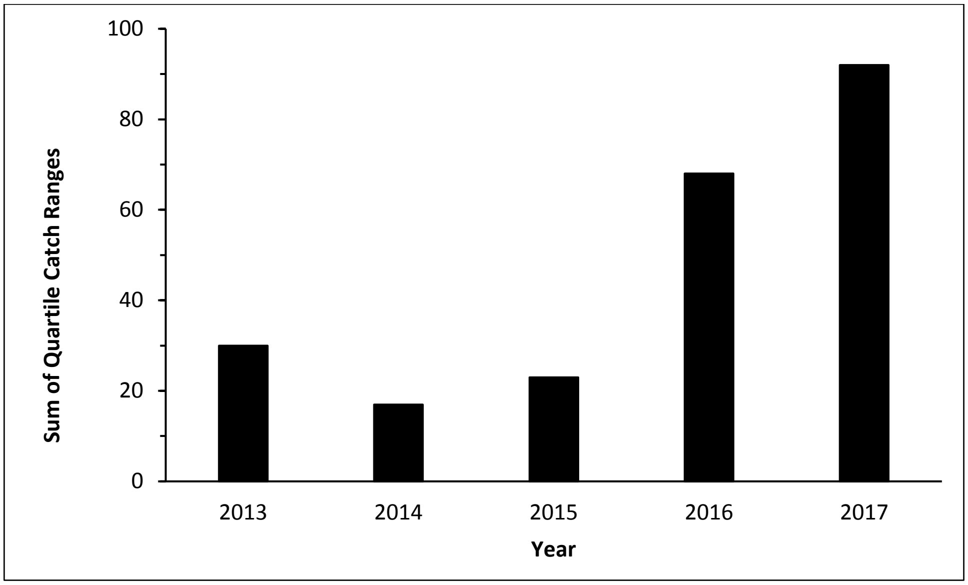


Figure 6-43: Total Annual American Plaice Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

Atlantic Herring

During 2016–2017, the nearest Atlantic herring catch locations to the proposed marine terminal were off Marystown; herring were otherwise caught in northern Placentia Bay within Div. 3PSc (Figure 6-44). Atlantic herring were harvested during March–May and December 2013–2017 (Figure 6-45). There were no catches during February or June–November. Overall, Atlantic herring harvests increased by over 80% in NAFO Div. 3PSc from 2013–2017 (Figure 6-46). The 2017–2018 TACs for Atlantic herring in St. Mary's Bay/Placentia Bay and Fortune Bay were 2100 mt and 789 mt, respectively (DFO 2019b). Herring LEK harvest locations were reported on the southwestern Burin Peninsula for DFO's CCRI project, west of Allan's Island (DFO 2006).

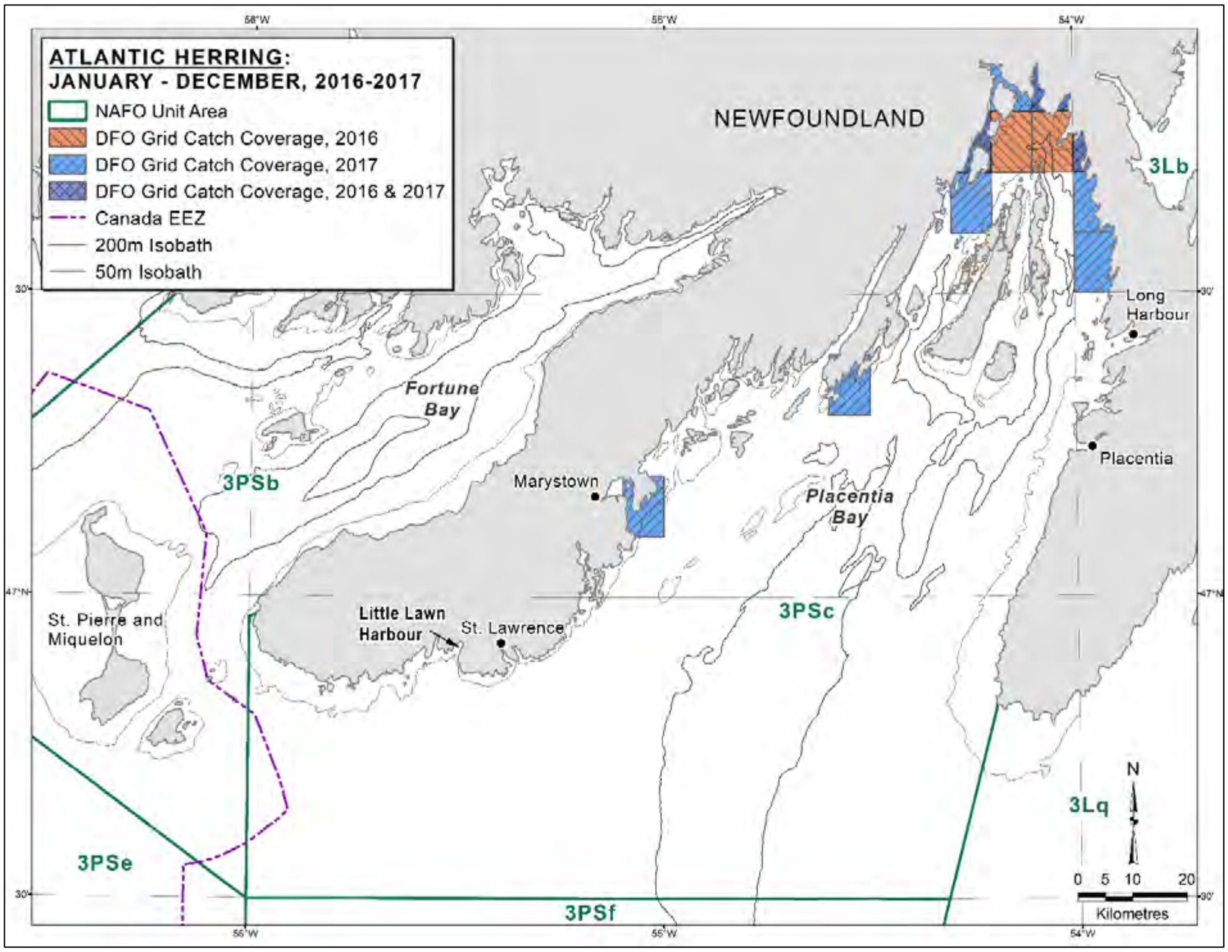


Figure 6-44: Atlantic Herring Harvest Locations in NAFO Div. 3PSc, 2016–2017 (Derived from DFO Commercial Landings Database, 2016–2017)

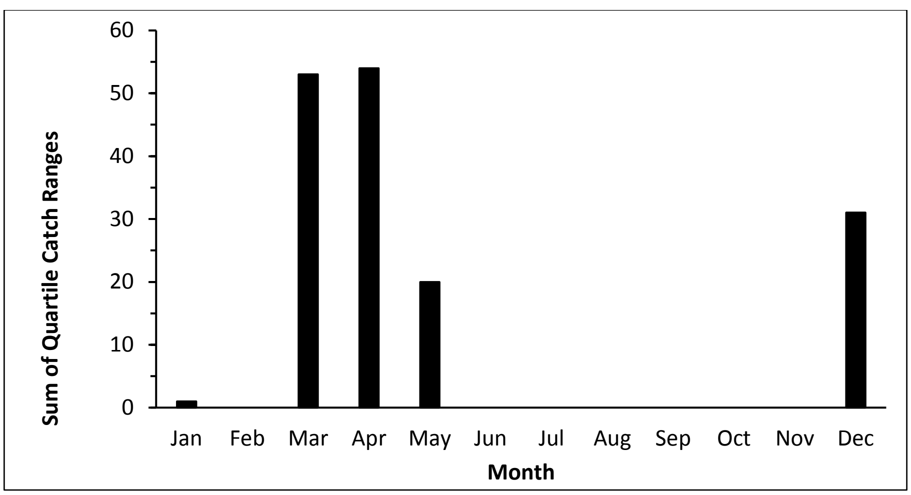


Figure 6-45: Total Monthly Atlantic Herring Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

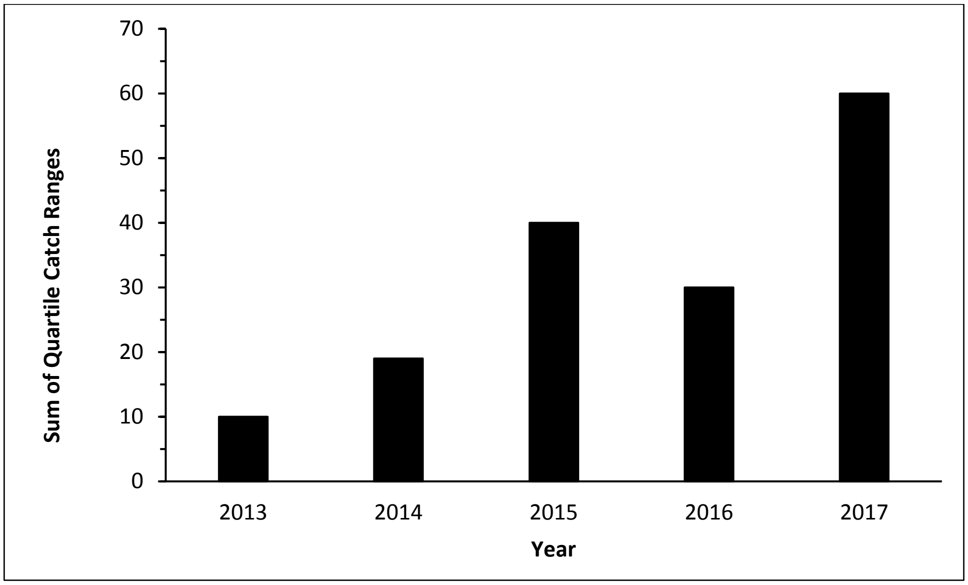


Figure 6-46: Total Annual Atlantic Herring Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

Sea Scallop

During 2016–2017, no sea scallops were harvested nearshore along the Burin Peninsula. Offshore harvests occurred within the southwestern portion of Div. 3PSc and nearshore catch locations were within northern Placentia Bay during 2016–2017 (Figure 6-47). Sea scallops were harvested during September–November 2013–2017 (Figure 6-48). Sea scallop harvests roughly doubled in NAFO Div. 3PSc from 2013–2016, followed by a relatively drastic decrease during 2017 (Figure 6-49). The Project area is within Scallop Fishing Area 10, for which the offshore 2019 TAC (combined with Scallop Fishing Area 11 south of 46º12'1'1" N and Area 12) is 100 mt or 33 meats per 500 g (DFO 2019b). No nearshore LEK harvest locations were reported for DFO's CCRI project; LEK harvest locations near the southern Burin Peninsula were indicated as being south of 46'50' N (DFO 2006).

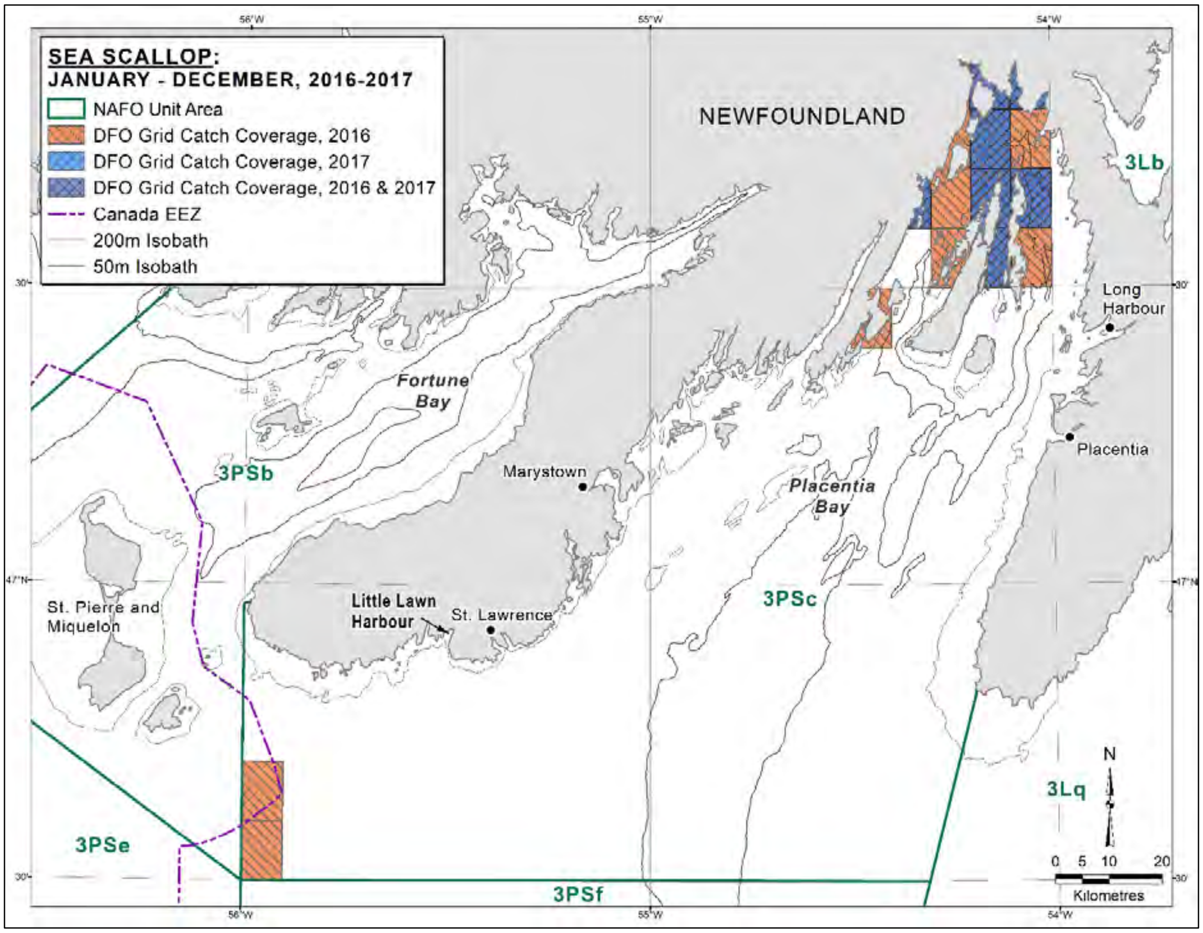


Figure 6-47: Sea Scallop Harvest Locations in NAFO Div. 3PSc, 2016–2017 (Derived from DFO commercial Landings Database, 2016–2017)

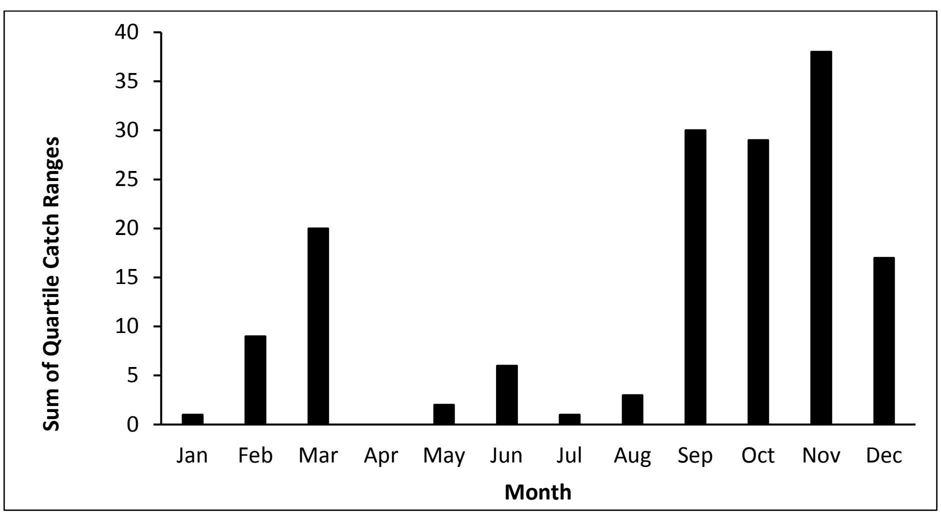


Figure 6-48: Total Monthly Sea Scallop Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

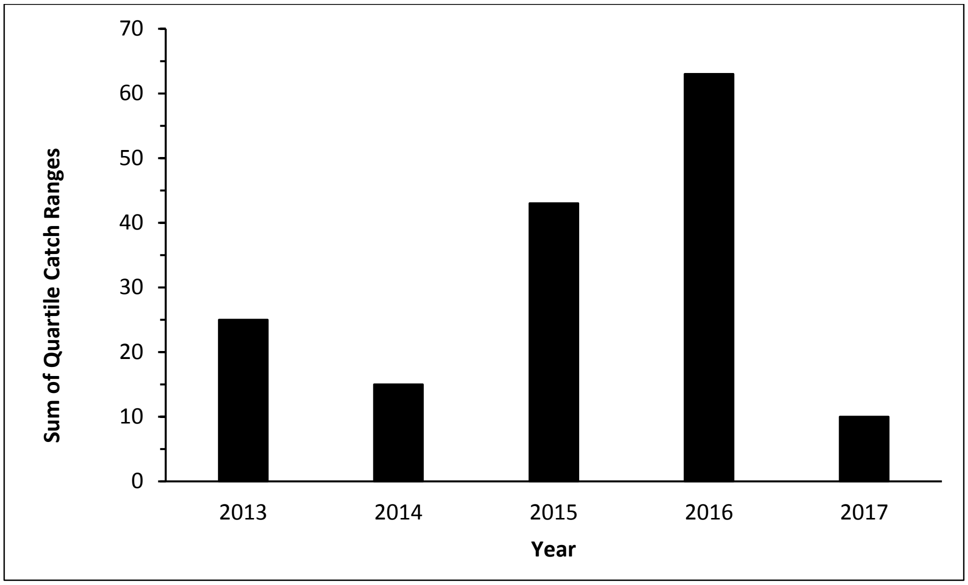


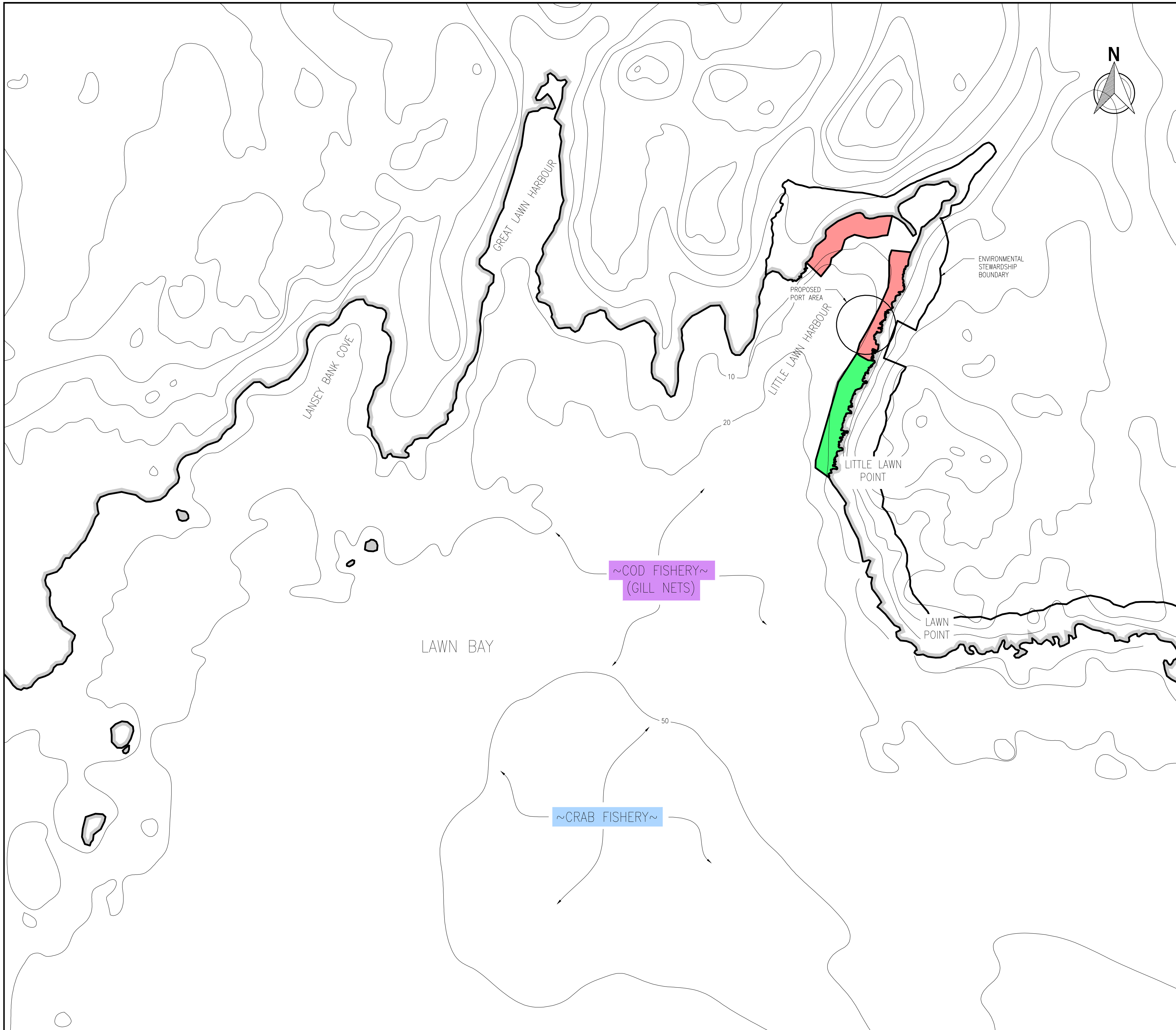
Figure 6-49: Total Annual Sea Scallop Catch Weight Quartile Ranges in NAFO Div. 3PSc, 2013–2017 (Derived from DFO Commercial Landings Database, 2013–2017)

Lobster

The proposed western marine terminal location is within Lobster Fishing Area (LFA) 10. During 2016, 263 lobster licences were held by fish harvesters in LFA 10, of which 74 were active (DFO 2019c). By 2017, the number of issued licences increased to 293 (DFO 2019c). Commercial fishery lobster licence holders within NAFO Div. 3Ps (and elsewhere throughout NL) are restricted to their homeport or historical fishing area(s) (DFO 2019c). The MFN holds a Communal-Commercial licence for bait within a licence holder's area of home port or LFA 10 (D. Ball, Resource Management, DFO, pers. comm., 19 April 2019). The NL lobster fishery within LFAs 3–14C is mainly conducted by vessels <40' in overall length, close to shore with traditional wooden lobster traps and, to a lesser extent, wire mesh traps (DFO 2019c). During 2019, the lobster fishery within LFA 10 will be open for 10 weeks, from 1 May to 9 July (DFO 2019d). Within LFA 10, once the fishery is open harvesters are prohibited from retrieving gear or processing lobsters within the initial 48-h gear-setting period or between 21:00 on Saturdays to 05:00 on Mondays (DFO 2019d). During 2017, unless a fisher's lobster licence specifically stated otherwise, harvesters could set a maximum of 200 traps in LFA 10 (DFO 2019c). There is no recreational lobster fishery within NL (DFO 2019c).

Principal Fisheries in Little Lawn Harbour

Based on the consultation meeting with fish harvesters from Lawn and Lord's Cove on 25 April 2019, the principal fisheries being conducted in Little Lawn Harbour and/or the deep waters immediately outside the harbour include those for lobster, cod and snow crab (Figure 6-50).



LEGEND

- PRIME LOBSTER HARVESTING GROUNDS
- PRIME COD (COD TRAP TO 150 FATHOMS FROM SHORELINE)

NOTES

1. DEPTHS ARE IN FATHOMS.
2. LOBSTER IS HARVESTED ALONG SHORELINE OF LITTLE LAWN HARBOUR. PRIME LOBSTER GROUNDS AS INDICATED. SOME COD HARVESTING IS CARRIED OUT WITHIN PRIME LOBSTER GROUNDS ALONG EASTERN SIDE OF LITTLE LAWN HARBOUR.

0 1000m 2000m

1 : 50000

REFERENCE SOURCE(S):

PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
FISHERY ZONES

CONSULTANT
JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-28
DESIGN	MW
DRAWN	GM
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE 6-49

There are 10–12 lobster licences fished out of Lawn along the shoreline in Little Lawn Harbour (J. Drake, harvester, Lawn, pers. comm., 25 April 2019). The harvesters indicated that essentially the entire coastline of Little Lawn Harbour is used for lobster fishing. The prime lobster grounds occur on eastern and western shorelines toward the head of the harbour. Lobster is fished from 1 May through early July, and cod from August through to the end of year (R. Henneberry, harvester, pers. comm., 25 April 2019).

The fishers at the meeting suggested that there are between 30–40 enterprises that may use the areas of deep water outside Little Lawn Harbour for cod (gill nets) and crab (pots). The prime cod grounds occur along the eastern side of Little Lawn Harbour, south of the prime lobster grounds. Both gill nets and traps are used in the area to fish cod; gill nets around the mouth of Little Lawn Harbour, and a trap ~275–300 m offshore of the prime cod ground on the eastern side of Little Lawn Harbour. Snow crab is also harvested in the vicinity of Little Lawn Harbour, specifically outside of the cod gillnet fishing area at the mouth of the harbour.

According to local fishers, there is also a capelin spawning beach in Little Lawn Harbour. However, there is no active fishery in the immediate area for either capelin or bait species, such as herring.

6.7.5.2 Recreational Fisheries

Within NAFO Div. 3Ps there is a recreational fishery for groundfish. During 2018, the fishery was open for 39 days between June–September. The dates for the 2019 season are still subject to change. The retention limits for recreational fisheries are five groundfish per day, including Atlantic cod, and the maximum boat limit when three or more people are fishing is 15 groundfish per day (DFO 2018e). The recreational groundfish fishery is open to residents and non-residents of NL and there is no requirement for licences or tags.

The recreational salmon fishery that occurs within the vicinity of the Project area takes place within Zone 10 (Cape Race to Cape Ray) and is open from 1 June to 7 September. Salmon within Zone 10 are included in the South Newfoundland population, which was assessed as *threatened* by COSEWIC (see Table 6.3.3-1). All scheduled rivers within Zone 10 are categorized as Class 2 whereby only one fish per day can be retained by licensed anglers and no fry, parr, smolt, slinks (spent salmon), or salmon <30 cm in length may be retained. When a salmon is retained, a tag indicating the catch month and day must be immediately secured through the gills and mouth of the fish before the angler leaves the river. Salmon caught on non-scheduled waters cannot be retained (DFO 2018f).

North of the proposed marine terminal location is the scheduled Lawn River and its tributary streams, a Class 2 river system (DFO 2019e). A full science stock assessment for Atlantic salmon in the province was scheduled for 5–7 March 2019, following indications of slight improvement in small salmon during a Preliminary Data Review in February 2019 (DFO 2019f). Until the assessment is complete, interim management measures currently allow anglers to possess one fish and catch-and-release up to three fish per day within Class 2 rivers (DFO 2019e). The retention of juvenile salmon (fry, parr, smolt) or salmon <30 cm is prohibited for all rivers in NL (DFO 2019e). During 2019, the angling season within (SAZ) 10 will be open from 1 June–7 September (DFO 2019e). Individual rivers within the Zone may have different opening/closing dates, bag limits and/or closed or special management areas specified when the 2019–2020 Angler's Guide is released in the near future (DFO 2019f). During 2015, there were 105 rod days for Lawn River and anglers retained seven small (<63 cm) fish and released 10 small fish, for a catch-per-unit-effort (CPUE) of 0.16 (G. Veinott, Research Scientist, Atlantic Salmon, DFO, pers. comm., 19 February 2018 [unpublished data]). During 2012–2016, there were a total of 215 rod days for Lawn

River and 66 salmon caught (19 retained, 47 released), for a CPUE of 0.31 (see Table 4.13 *in* LGL 2018a).

The smelt (*Osmeridae*) recreational fishery was open during 15 May to 7 September in 2018 in insular Newfoundland and is open during 15 January to 15 April in 2019. There is no bag or possession limit for smelt and angling in coastal waters is permitted year-round (DFO 2018f). Recreational jigging for northern shortfin squid *(Illex illecebrosus)* and longfin inshore squid *(Loligo pealeii)* during August–September has been recorded in Great St. Lawrence Harbour, east of the Project area (CFI 2009, 2015).

The recreational scallop fishery (sea scallops [*Placopecten magellanicus]* and Iceland scallops *[Chlamys islandica])* in Div. 3Ps is open from 1 January to 31 December and the 2019 bag limit is 50 scallops per day for a maximum possession of 100 scallops (DFO 2019g). During 2019, recreational scallop licence holders are also allowed to fish in Canadian Shellfish Sanitation Program (CSSP) closed areas, provided they only retain the scallop adductor muscle, shuck all scallops where they are harvested, notify DFO of all fishing activities in CSSP closed areas, and do not fish both within and beyond a closed area during the same fishing trip (DFO 2019g).

The harp seal *(Pagophilus groenlandicus)* fishery opened 9 April 2019 for adult seals in Newfoundland and the Project area lies within Seal Fishing Area 8. A Personal Use licence allows seal licence holders to harvest up to six seals per year (DFO 2019h). In order to obtain a licence, applicants must be over 18 years old, hold a valid a Firearms Safety/Hunter Education Certificate, and attend a seal information session held by DFO (DFO 2019i).

6.7.5.3 Indigenous Fisheries

There are two Indigenous communities in Newfoundland, the MFN and the Qalipu. As of March 2019, the MFN and Qalipu have registered populations of 3057 and 22,418, respectively (D. Ball Resource Manager, DFO, pers. comm., 2 April 2019; DFO 2019j,k). The Qalipu has no reserve land but is headquartered in Corner Brook, 290 km northwest from the Project area, and its members live in 67 communities throughout Newfoundland (Nexen 2018; D. Ball Resource Manager, DFO, pers. comm., 2 April 2019). The closest Indigenous community to the Project area is the MFN Reserve in Conne River, ~100 km north of Little Lawn Harbour.

The MFN holds a Food, Social and Ceremonial (FSC) license in NAFO Div. 3Ps that includes scallop, lobster, mackerel, herring, rainbow trout, brook trout, Atlantic cod, eel, smelt, capelin, snow crab, redfish, and harp and grey seals (Statoil 2017; Nexen 2018; D. Ball, Resource Manager, DFO, pers. comm., 2 April 2019). The MFN holds Communal-Commercial fishing licences for groundfish, groundfish (mobile gear), sea cucumber, whelk, scallop, capelin (Areas 10–11), herring (Area 11), mackerel (Area 11), snow crab (Areas 10–11), bait (home port or lobster area 10–11), seal (Area 8), and squid (Area 10) in Div. 3Ps (Statoil 2017; Nexen 2018; D. Ball Resource Manager, DFO, pers. comm., 2 April 2019). The Qalipu do not hold FSC licenses for Div. 3Ps but do hold Communal-Commercial licences for mackerel (Area 11) and capelin (Areas 11).

Together the MFN and Qalipu have formed the Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA) under Aboriginal Aquatic Resource and Oceans Management (AAROM) (MAMKA 2019), a joint fisheries initiative that holds Communal-Commercial licenses for groundfish, whelk, scallop, snow crab (Areas 10–11), bait (home port or lobster areas 13A/B), herring (Area 10) and capelin (Area 10) in Div. 3Ps (Statoil 2017; Nexen 2018; D. Ball, Resource Manager, DFO, pers. comm., 2 April 2019).

6.7.6 Historic Resources

Historic resources surveys were carried out for CFI to support their 2010 and 2015 EAs (GPA 2015). The 2015 investigation covered the area of the then-proposed mine and mill and included some recognisance around Mine Cove.

The area investigated during both surveys, which encompasses the St. Lawrence peninsula, has been partly affected by historic mining activity (between the mid-1930 and 1990s), and since August 2018 by the AGS Mine.

There is limited forest cover and the area mainly consists of bog, marsh, heathland with numerous shallow ponds. Blue Beach is a registered archaeological site in the area and consists of a shipwreck dating back to 1946. There have also been recordings of onshore shipwreck remains at Blue Beach (GPA 2015). More proximal to, but outside of, the Project area is the abandoned mid-19th century adit located near the eastern shoreline of Little Lawn Harbour near Mine Cove, which is identified as a registered historic site (Little Lawn Mine - CfAu-08). Although this is not within the Project's footprint, a 20 m buffer zone will be marked around the site.

The Provincial Archaeology Office (PAO) was recently contacted to determine whether further investigation is required within the proposed marine terminal Project area, based on site plans showing the conceptual layout of the Project's on-land infrastructure. In response, PAO indicated that it has "…reviewed the … marine port location and plans for on-site infrastructure against the previous archaeological investigations, as well as the archaeological potential at the Little Lawn Harbour location" and that "…no further archaeological investigation is warranted in (the) area on the basis of these plans"; however, "…should the plans substantially change, the PAO would need to re-evaluate them to determine whether further archaeological investigation would be required" (M. Drake, PAO, pers. comm., 2019).

6.8 Land and Water Use

A description of land designation and ownership, current and historical land use activities, shipping and navigation and water use is provided in the following section.

6.8.1 Current Land Use

Although the St. Lawrence peninsula is occupied by infrastructure belonging to CFI representing historical mining activity, as well as new infrastructure associated with the AGS Mine, there are no permanent dwellings or other infrastructure located in the Project area.

There are two registered cabins located west of Island Pond (Licence to Occupy [LTO] 92020, K. Kettle; and LTO 101685, R. Slaney). These cabins are accessed by the existing gravel access roads and are connected with an ATV trail (Figure 6-51). In addition, access roads on the peninsula are occasionally used for recreational purposes by local residents for walking, ATV use and berry picking.

There are some homes (permanent residential dwellings) located on privately owned properties located on the peninsula. Two homes are located off the Blue Beach South road between Clarkes Pond and Blue Beach and there are four homes off Director Drive in the vicinity of Haypook.

LEGEND

Tourist Attraction
Licence to Occupy

MUNICIPAL ZONING

- Residential
- Mixed Development
- Public
- Solid Waste Disposal
- Rural
- Industrial
- Mining
- Environmental Protection
- Environmental Protection Management Unit
- Watershed Conservation
- Protected Public Water Supply

TOPOGRAPHY

- Navigation Light
- Building
- Tower (Communication)
- Tank
- Blocked Passage
- Municipal Boundary
- Power transmission line (overhead)
- Highway
- Existing Road
- Manmade Hydrographic entity (Wharf)
- Watercourse
- Waterbody
- Wetland
- Pit
- Mine
- Cemetery
- Park/Sports Field
- Transformer Station

0 1 2 km

1:40000

REFERENCE SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC+, 1:50 000 SCALE, NRCAN; GOOGLE TERRAIN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
LAND USE

CONSULTANT

YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023
REV: 0
FIGURE **6-51**

Shoal Cove, just west of Blue Beach Cove, is known for its sandy beach and is often used by recreational users. There is a Provincial park located in Frenchman's Cove and privately-owned park facilities in Lewin's Cove (which is ~28 km from the Project area). The Fortune Head Ecological Reserve is located in Fortune, ~70 km away.

There are no National Parks or National Historic Sites located near the Project area. There are also no designated Indigenous lands near the Project.

The St. Lawrence Historical Advisory Committee manages several trails and historic sites along the eastern and southern coastline of the St. Lawrence peninsula. These trails lead to the wreck sites of the *USS Truxtun* and *USS Pollux* (located in Chambers Cove and off Lawn Head, respectively) which have been designated as municipal historic sites by the Heritage Foundation of Newfoundland (a non-profit organization). The Iron Springs Mine site is also classified as a municipal heritage site.

In July 2017 the Little Lawn Trail Association submitted an application to the Town of St. Lawrence to develop a walking trail within the EP-MU, leading from Highway 220 to Lawn Head, near the wrecks of the US naval ships. To date, this application is still active in the Crown Land System, but the Town has not responded.

6.8.2 Historical Land Use

The study area has been used for mining and processing fluorspar for several decades beginning in the 1930s and as such, a large portion of the area is considered a brownfield site (see Section 6.4.1.1).

6.8.3 Water Use

There are a number of small streams and ponds in the Project area. Many have been the subject of hydrological and fisheries studies, and water quality sampling to meet the AGS Mine's regulatory responsibilities. With the exception of those water bodies that form part of the AGS Mine WMP, no water bodies within the Project footprint are used for any commercial or domestic purpose.

Most of St. Lawrence peninsula is underlain by metasedimentary rock with lesser amounts of rhyolite (i.e., fine-grained granite). Due to the properties of the rock mass, with abundant open fractures through which groundwater flows, the area has naturally elevated levels of radon in its groundwater, which can lead to various health concerns. As such groundwater wells are not recommended or used for potable water in the town. The town's potable water is sourced mainly from the St. Lawrence River and its tributaries, which is located approximately seven kilometers northeast of the AGS Mine (Golder 2015a).

6.8.4 Shipping and Navigation

For safety along Canada's coasts, the *Vessel Traffic Services* (VTS) *Zones Regulations,* under the *Canada Shipping Act,* establish VTS zones. The Project area is regulated under the *Eastern Canada Vessel Traffic Services Zone Regulations*. The Canadian Coast Guard's Marine Communications and Traffic Services (MCTS), Atlantic Region, monitors shipping in these zones. The MCTS provides distress and safety communications, vessel traffic services and marine weather information.

Ships of 500 tonnes gross tonnage or more must report to an MCTS officer 24 hours before entering the VTS zone. The incoming vessel must report information about the ship and its intended route, including any defects and deficiencies relevant to potential marine pollution, any dangerous goods, as well as position, speed, draft of the ship, destination, estimated time of arrival, prevailing weather, etc. This allows any safety or environmental concerns to be addressed before ships receive clearance to enter Canadian waters. Vessels within the zone must also make regular reports at specified calling-in points (Transport Canada 2015).

VTS zones, however, do not operate like air traffic control. It is the ship master's responsibility to safely guide the ship; however, the shipmaster must comply with a direction given by a MCTS officer. A Pre-Arrival Information Report (PAIR) is required to be filed 96 hours prior to arrival in Canadian waters, as per the *Marine Transportation Security Regulations* in accordance with instructions set out in the Canadian Coast Guard's Radio Aids to Marine Navigation, unless the total duration of the voyage before entering Canadian waters is less than 96 hours in which case the notification must be provided at least 24 hours prior to entering Canadian waters. The MCTS logs movements of larger vessels but non-reporting traffic includes a significant proportion of tugs, fishing and recreational vessels (DFO 2015).

The Placentia Bay VTS zone comprises all Canadian waters between a line bearing 180° True from Bass Point, 46°55'05"N 055°15'55"W; and a line bearing 180° True from Cape St. Mary's light, 46°49'22"N 054°11'49"W. As of March 2015, the St. John's MCTS centre consolidated to the Placentia MCTS centre, which covers the Project area (DFO 2015).

Marine vessels pass through Atlantic waters off the coast of the Burin Peninsula as they travel west to the Gulf of St. Lawrence or down the eastern seaboard, or as they travel east across the Atlantic. These vessels include crude tankers, product tankers, chemical tankers, ore ships, grain ships, general cargo, paper ships, reefer ships, container ships, passenger ships and fishing vessels. Many of these vessels pass by the south coast of the province without entering Newfoundland waters. Others enter Placentia Bay en route to the North Atlantic Refinery located in Come by Chance or the Newfoundland Transshipment facility located in Whiffen Head.

The main shipping lane in Placentia Bay is a deep water, two-way route that passes through the Eastern Channel between Long Island and the Avalon Peninsula. This route is on the eastern side of the Bay, across from the Great St. Lawrence Harbour. All vessels over 20 m entering the bay report to the Placentia MCTS centre. Traffic in Placentia Bay generally includes tankers, ferries, container and bulk carriers, general cargo and fishing vessels. Major ports in Placentia Bay include Come By Chance, Whiffen Head, Argentia and Marystown. According to available data, between 1992 and 2005, the number of tankers traversing the main shipping lane has increased from 346 vessels in 1992 to more than 1200 vessels in 2005. The number of tankers in Placentia Bay reached a peak in 2003, with ~1400 vessels using the shipping lane (DFO 2008b).

The Environmental Oil Spill Risk Assessment for the South Coast of Newfoundland (Transport Canada 2007) also contains information regarding large ships that travel off the south coast of Newfoundland. Data is available for ships traveling in and out of Placentia Bay, St. John's Harbour and those traveling to Trinity Bay en route to the Holyrood generating station; however, specific information regarding the number of vessels in-transit that do not enter a designated port in Newfoundland is not available. Therefore, shipping volume in Placentia Bay cannot be accurately defined.

The St. Lawrence Harbour is managed by the St. Lawrence Harbour Authority. and the Harbour Authority for Lawn also manages the harbours for several other adjacent communities (P. Curran, Transport Canada, pers. comm., 16 April 2019).

Each Harbour Authority is considered an independent business that is responsible for managing, operating and maintaining one or more public fishing harbours, through a lease agreement with DFO's Small Craft Harbours (SCH) program. Small Craft Harbours' primary responsibility is to ensure core fishing harbours are kept open and in good repair. The term "core harbour" includes harbours that are critical to the fishing and aquaculture industries.

According to DFO, both St. Lawrence and Lawn are designated as core fishing harbours, such that vessels within the Harbour are primarily used for commercial and recreational fishing activities (DFO 2014). In 2004, St. Lawrence was reportedly a Class "A" harbour that served 26 enterprises operating from 28 vessels with total length of 245 m (CFI 2009). As reported in previous sections, crab vessel traffic is relatively high in the Harbour, particularly along the eastern side, as it is home to the Supplementary Crab Fleet during the fishing season.

Shipping Traffic During Construction

Vessel traffic during Project construction will consist of barges and tugs for the construction of the marine terminal and associated breakwater. All vessels will meet Transport Canada regulations and standards, under the *Canada Shipping Act*, as well as international regulations established by the IMO. Barges will be inspected and approved for use by a recognized classification society and the Project will retain the services of a Marine Warranty surveyor to verify that transportation procedures that are put into place for safe vessel operation and transportation of goods and materials are followed. Sea fastening of cargo will be designed to meet all requirements and follow recommended practice. Navigation aids will be provided as per DFO and Transport Canada, Canadian Coast Guard requirements.

Shipping Traffic During Operation

Occasionally, large marine vessels associated with the Project will be transiting between the primary shipping lane in Placentia Bay and the St. Lawrence Harbour/Little Lawn Harbour. The production capacity for the Project is 200,000 t/yr of Fluorspar Concentrate and ~2,000,000 t/yr of Aggregates. CFI's proposed marine terminal near Mine Cove will accommodate vessels up to 72,000 DWT in size. Approximately 10–20 shipments of fluorspar (10,000–25,000 DWT bulk carriers) are anticipated to be exported per year. In addition, construction aggregate will be exported from time to time (~25–30 shipments of 72,000 DWT bulk carriers per year would be anticipated).

It should also be noted that neither fluorspar nor aggregate shipping falls under the *Transportation of Dangerous Goods Act*.

7.0 ENVIRONMENTAL EFFECTS ANALYSIS

An environmental effects analysis was conducted for the various VCs identified for this Project, including:

- Physical Environment;
- Atmospheric Environment;
- Water Resources (including freshwater fish and fish habitat);
- Terrestrial Environment;
- Wildlife (including birds and species at risk);
- Marine Environment, including:
  - Fish as defined in section 2 of the *Fisheries Act*, and fish habitat as defined in subsection 34(1) of that Act);
  - Aquatic species, as defined in subsection 2(1) of the *Species at Risk Act*; and
- Socio-Economic Environment.

The methodology for the analysis is described in Section 4.0. A description of likely environmental effects is provided for each VC at each Project phase: construction, operation, and rehabilitation and closure. Mitigation measures and monitoring procedures that are designed to result in the avoidance or reduction of likely adverse environmental effects are outlined. The effects analysis also considered the implications of accidental and malfunction events, and cumulative effects.

7.1 Physical Environment

The Physical Environment VC is focused on surface soil quality and soil disturbance. The Project-related interactions and likely effects on the Physical Environment VC, along with the mitigation to reduce or avoid these effects, are described below. Interactions between the Project and sub-surface geology are considered in the groundwater effects analysis (Section 7.3) while the potential for soil contamination due to accidental spills of petroleum products and hazardous material are covered in Sections 2.9 and 7.8.

Based on the preliminary identification of likely Project-environment interactions (see Table 4-1), it is likely that the Project will affect the Physical Environment VC during all phases of the Project (i.e., construction, operation, rehabilitation and closure). The majority of the effects are associated with Project construction (i.e., stripping), when the majority of soil disturbance will occur within the Project footprint.

Information on potential effects on soil within the Project area is described in the following section.

7.1.1 Construction

The construction phase of the Project will have a direct effect on soils, primarily from exposing soils during clearing and grubbing, temporary and permanent soil displacement/disturbance, potential metal contamination of soil surface due to dust fallout, and contaminated surface runoff water on the ground surrounding the working areas. The main activity sources contributing to soil disturbance and loss during the construction phase are:

- stripping;
- excavation and blasting;
- construction activities and equipment mobilization;
- waste management; and
- staging and storage of construction-related equipment and materials.

The construction phase of the Project will have the greatest effect on the Physical Environment VC. During stripping activities, excavation and blasting, and construction of roads, aggregate stockpiles, and other infrastructure, trees, shrubs and stumps will be removed to accommodate construction of the staging and stockpile areas, and access roads.

Removal of the vegetation to accommodate construction will result in exposing topsoil and overburden soils to wind and water erosion. Topsoil and overburden will be carefully stripped to avoid admixing, and will be stockpiled separately, stabilized against erosion accordingly (e.g., covered with mulch), and used during the progressive rehabilitation of the Project site. Stripping activities will be limited to that required for construction and Project activities, to the extent practical.

A Site Grading and Drainage Plan will be developed during the detailed design phase. The plan will include the erosion control measures to be implemented across the Project area during all Project phases, such as directing surface flow; constructing drainage channels; and using rip-rap, filter fabrics, hay/straw mulch or wood chip mulches in areas prone to erosion.

Exposed surfaces that are at risk of erosion will be protected by using appropriate slopes and by diverting surface runoff away from disturbed areas. After precipitation events, slopes will be inspected, and corrective measures will be implemented to prevent soil erosion. Slopes for finished-grade surfaces will be built in accordance with best engineering practice and will be surface-finished to provide long-term stability. Final grading will be undertaken immediately after completion of an activity rather than at the end of construction.

The main Project activities that may affect soil quality during the construction phase are:

- waste rock processing and aggregate stockpiling;
- temporary storage of construction-related material and equipment; and
- all activities which contribute to generating dust emission.

Processing of waste rock and stockpiling of aggregate can result in contamination of soils within the area and surrounding environment due to direct contact with the material and water runoff from the stockpiles. Other construction material may be stored on the ground and can constitute a source of contamination as well (e.g., minor leaks or spills). As described in Section 6.1.4, geochemistry testing has been ongoing since 2015 to assess the acid rock drainage potential of the waste rock material. Results indicate that the waste rock samples evaluated to date are considered to be non-acid generating. Should any potential acid rock drainage issues be identified in the future, mitigation measures will be implemented to avoid contamination, if required.

As detailed in Section 7.2, fugitive dust emissions will increase locally during construction activities. Because the chemical composition of the material to be handled for the Project could differ from the surrounding soils, dust deposition on the soil surface could potentially result in alteration of its chemical properties and may constitute a source of metal contamination. Based on the geochemistry testing conducted to date, the main elements found in the bedrock that may exceed typical crust abundance are iron, arsenic, bismuth, fluorine, lead, lithium, and antimony. The most affected soils are expected to be those that are downstream from the predominant wind direction, which blow from northwest to southwest.

Although the Project will result in permanent loss of soils in the aggregate stockpile area, rehabilitation and closure activities will reinstate the Project footprint with topsoil and overburden stripped and salvaged during construction. Standard mitigation measures during construction, including proper disposal and/or recycling of all surplus construction materials and wastes, will minimize or avoid any further loss or disturbance of soil.

The potential contamination of soil surface with metal and other contaminants due to dust fallout and potentially contaminated runoff water is expected to be limited to the surroundings of the Project footprint, specifically in the vicinity of Project infrastructure and temporary construction storage areas. The extent of any potential contamination is considered to be low due to mitigation measures in place for reducing dust emissions throughout the Project life. Further, water quality sampling will be conducted to monitor surface runoff released into the natural environment so that its quality meets regulatory standards.

The following mitigation measures will be implemented during the construction phase:

- implement the detailed Site Grading and Drainage Plan, including erosion and sediment control to stabilize eroded areas;
- strip topsoil appropriately to avoid admixing with subsoil; and
- minimize the need for borrow material by using granular material from the mine's waste rock dump that has been crushed on-site, to the extent possible.

To prevent contamination of soils due to dust fallout, refer to mitigation measures related to reduction of dust emissions outlined in Section 7.2.

In summary, the expected residual environmental effect of the Project on the physical environment is minor or negligible, when mitigations measures listed above are considered.

7.1.2 Operation

As for the construction phase, waste rock processing/aggregate stockpiling during the operation phase will affect soils mainly from temporary and permanent soil disturbance, potential metal contamination of soil surface due to dust fallout and contaminated runoff water on the ground surrounding the working areas. However, the effect is much less, where most of soil disturbances have already taken place during construction.

The main activities contributing to soil disturbance and loss during the operation phase are:

- aggregate stockpiling; and
- site and equipment maintenance.

Soil disturbance will be similar to that expected during the construction phase, but to a much lesser extent, as most of the site preparation will be completed during construction. Disturbed areas during the operation phase will be limited to where waste rock processing/aggregate stockpiling, and site and equipment maintenance activities will occur. During these activities, exposed soil will be stabilized to limit the potential for erosion where possible and revegetation of disturbed areas will be done when the work in an area is completed (i.e., progressive rehabilitation).

The main Project activities that are likely to affect soil quality due to dust fallout and contaminated runoff during the operation phase are similar to those identified for the construction phase.

The mitigation measures identified for the construction phase will also be implemented during the operation phase, as appropriate, to address potential effects on soil quality and disturbance (as per Project EPP).

7.1.3 Rehabilitation and Closure

In general, the Project's rehabilitation and closure phase will consist of similar activities as those of the construction phase and will therefore have similar effects. However, with respect to soil disturbance and loss, effects are expected to be limited, with the goal being to stabilize the area and return topsoil over disturbed areas to promote revegetation. During the rehabilitation and closure phase, the above ground infrastructure will be dismantled, and their footprints rehabilitated with the stored overburden and topsoil. Progressive revegetation of disturbed and eroded areas is expected to have a positive effect on soil by reducing erosion.

Like the construction and operation phases, dust generation from the operation of heavy equipment and vehicles to transport materials and employees to the site is a Project-related effect for the rehabilitation and closure phase. The mitigation measures identified above and in Section 7.2 will be implemented to minimize the dust generation during the rehabilitation and closure phase of the Project.

7.1.4 Environmental Effects Summary

A summary of the likely environmental effects and proposed mitigation for the Physical Environment VC is provided in Table 7-1.

Table 7-1: Environmental Effects Summary and Mitigation Measures for Physical Environment VC

Project Phase	Activity	Likely Environmental Effects	Proposed Mitigation Measure
Construction	Stripping, excavation and blasting, construction activities and equipment mobilization	Temporary and permanent soil disturbance.	Minimize the Project footprint to that required for efficient and safe construction.
			Implement best practices to prevent soil erosion and sediment control.
			Strip topsoil appropriately to avoid admixing with subsoil.
			Minimize the need for borrow pits, by using granular material from the waste rock to the extent possible.
	Excavation and blasting, construction activities and equipment mobilization, transportation, waste management staging and storage of construction	Potential metal contamination of soil surface due to dust fallout.	Implement best practices to prevent soil erosion and sediment control.

Project Phase	Activity	Likely Environmental Effects	Proposed Mitigation Measure
	related equipment and material		See mitigation measures specific to dust emissions reduction in Section 7.2 Atmospheric Environment.
	Staging and storage of construction-related equipment and materials	Possible contamination of soil due to contaminated runoff water.	Wherever possible, make use of previously disturbed areas for staging and stockpiling.
Operations and Maintenance	Waste rock processing and aggregate stockpiling	Temporary and permanent soil disturbance.	Minimize the Project footprint to that required for efficient and safe operation.
			Implement best practices to prevent soil erosion and sediment control.
			Minimize the need for borrow pits, by using granular material from the waste rock to the extent possible.
	Aggregate and concentrate transportation	Potential metal contamination of soil surface due to air dust fallout	See mitigation measures specific to dust emissions reduction in Section 7.2 Atmospheric Environment.
Rehabilitation and Closure	Rehabilitation and Closure	Potential contamination of soil surface due to air dust fallout	See mitigation measures specific to dust emissions reduction in Section 7.2 Atmospheric Environment.

In summary, the expected residual environmental effect of the Project on the physical environment is minor or negligible, when mitigations measures listed above are considered.

7.2 Atmospheric Environment

The Atmospheric Environment VC includes consideration of air quality and noise. Several sources of atmospheric emissions will result from the proposed Project including noise and air emissions, including GHG, from fuel burning vehicles and equipment, and emissions generated from waste rock processing, material handling, and transportation. Based on the preliminary identification of likely Project-environment interactions (see Table 4-1), it is likely that the Project will affect the Atmospheric Environment VC during all phases of the Project (i.e., construction, operation, rehabilitation and closure).

CFI has engaged with stakeholder groups and is committed to being responsive to issues. During engagement activities, CFI identified one issue raised by stakeholder groups in relation to the atmospheric environment. This issue was related to the potential for dust emission during transport of concentrate to the marine terminal. Mitigation measures to reduce dust emission during transport of concentrate will be implemented during the operation phase (using enclosed gallery conveyor system). Additional mitigation measures to reduce likely increase in dust emission associated with the Project are outlined in the following sections.

7.2.1 Construction

Air Quality

Construction activities associated with the Project will affect air quality by increasing dust (particulate) in the atmospheric environment as well as GHGs and other criteria air contaminants (CACs), which include CO, NO_x, SO_2, and VOCs.

The following activities are considered likely to affect the air quality during the construction phase of the Project:

- stripping;
- construction activities and equipment mobilization;
- staging and storage of construction-related equipment and material; and
- transportation.

Based on the assay composition, particulate emissions generated from the mining activities are likely to contain some elevated metals. The geochemical analysis of the rock indicates that the main elements that may exceed typical crust abundance are iron, arsenic, bismuth, fluorine, lead, lithium, and antimony.

Removal of vegetation and exposing topsoil and overburden during stripping activities creates the potential for wind erosion. Further, the excavation and transport of these materials and creation of topsoil stockpiles and overburden storage can generate dust and increased potential for erosion. To reduce potential for wind erosion during stripping and grading activities, water will be applied to exposed soils as needed.

Vehicle traffic on haul roads and unpaved access roads is considered an important source of dust emissions and the magnitude is directly related to the road composition, maintenance, vehicle weight, speed and number of trips. To reduce the dust emissions associated with transportation, regular and adequate maintenance of unpaved roads will be implemented, and application of water or other dust suppressants will be considered, as needed. As part of engineering design, trucks will be sized appropriately to reduce the number of trips, and roads will be designed to reduce travel distances. In addition, speed limits will be implemented on access and haul roads, and a non-idling policy will be put in place to reduce combustion emissions.

The degree of drilling, blasting, and excavation during the construction phase is expected to be limited to that required for construction of the marine terminal, access road, and waste rock processing/aggregate stockpiling area. Appropriate BMPs will be implemented to reduce particulate emissions during these activities.

The main sources of CACs (excluding fugitive dust emissions discussed above) and GHGs that may affect the air quality during the construction phase of the Project are:

- exhaust from fuel burning equipment such and heavy equipment, vehicles, ships and generators;
- blasting activities associated with site development (NO2, carbon monoxide or methane formation); and
- electricity consumption (supplied by the Newfoundland Power grid).

The main air contaminants from fuel combustion are NO_x, CO, VOCs, SO_2, CO_2, CH_4, N_2O and GHGs. All vehicles used for the Project will comply with the *Newfoundland and Labrador Air Pollution Control Regulations* (O.C. 2004-232). In addition, the fuels used will comply with the applicable regulations for specific contaminant content (e.g., lead, sulfur). Routine inspection and regular maintenance of the vehicles and other fuel-powered equipment will help reduce emissions.

Blasting emissions will be dependent on the type of explosives used. It is expected that CO, and NO_2 will be the main air contaminants associated with blasting activities. The OH&S Plan will address this unlikely scenario and will implement specific mitigation measures to provide a high level of protection for workers and the public during blasting activities.

The electricity needs, extending from the construction phase to site closure, will be supplied from the Newfoundland Power grid. Indirect emissions of GHG will be caused by the electricity consumption. The GHG emission factor for electricity production in NL is 37 g CO_2 eq/kWh[18]. GHG emissions from the emergency diesel generators are considered negligible compared to the emissions from mobile equipment, and other fuel burning on-site equipment and electricity consumption, since the generators will be in operation only for routine testing and during power outages.

The effect of particulate matter on air quality is expected to be localized (i.e., close to the Project footprint) given particulate fallout at a close distance from emission sources. However, the effects of other CAC air contaminants and GHGs are expected to be regional and beyond. The closest receptors are cabins located approximately 3.5 km south-southeast of the marine terminal, homes on Director Drive located ~4 km east of the marine terminal, and the homes in the community of Lawn situated about 4 km west-northwest from the marine terminal. Prevailing winds blow from northwest to southwest, thereby limiting the likely effects of air emissions from the Project on those receptors.

Potential sources of air emissions, including GHGs, can be mitigated through various means (e.g., engineered systems, operational and maintenance controls, and industry best practices) to meet regulatory requirements. The mitigation measures to be implemented include:

- prevent wind erosion during stripping and grading activities by applying water to exposed soils as needed (e.g., during high winds);
- regular and adequate maintenance of the unpaved roads;
- application of water or other dust suppressants on unpaved roads, as needed;
- reduce drop heights during material transfers;
- use enclosed conveyor system for fluorspar and aggregate transfer to ships;
- size trucks appropriately to reduce the number of vehicle trips, as required;
- proper design of haul and access roads, to minimize distance travelled;
- stabilize exposed surfaces and stockpiles with filter fabric, rock or mulch, as appropriate, to minimize wind erosion;
- implement a speed limit on the access and haul roads;
- implement progressive rehabilitation during all Project phases;
- maintain vehicles and equipment regularly and adequately;
- implement a no-idling policy to reduce combustion emissions;

[18] http://publications.gc.ca/collections/collection_2018/eccc/En81-4-2016-3-eng.pdf

- promote the use of block heaters during winter months as part of the no-idling policy; and
- implement an awareness program to promote fuel consumption reduction.

Noise

Activities during the construction phase will also affect the atmospheric environment by increasing the level of noise in the vicinity of the Project. The main sources of noise during the construction phase of the Project are:

- Stripping activities;
- Excavation and blasting;
- Construction activities and equipment mobilization; and
- Transportation.

The noise generated during construction activities will vary depending of the type of activity being performed and its location with respect to sensitive receptors. It is not expected that noise generated by construction activities or other activities from the Project will affect the closest sensitive receptors (cabins, homes in the Town of St. Lawrence and/or Lawn) given the distance between receptors, and the Project site and activities.

Blasting activities (although much less for the Project than the mining operation) can, however, create high levels of noise during short durations. Blasting noise could potentially affect the surrounding receptors. Blasting plans and procedures will be implemented to reduce the potential adverse effects of noise and vibrations. Blasting activities will be coordinated and scheduled during daytime hours and in a manner that reduces the number of blasts required per week.

Mitigation measures to reduce noise generated during the construction phase may include the following:

- when possible, construction activities will be limited to daytime, especially in work areas that are closest to the sensitive receptors;
- consider evaluating the use of newer technologies associated with back-up alarms to reduce to amount of noise from equipment operation;
- reduce vehicle traffic during night-time, where possible;
- maintain vehicles and equipment regularly and adequately;
- in the event that acceptable noise levels would be exceeded, implement engineering mitigation and control measures to reduce noise to an acceptable level;
- perform blasting during daytime and, to the extent possible, at a regular scheduled time; and
- implement a Complaints Response Plan to establish a mechanism to record, address and resolve complaints related to Project activities and phases.

7.2.2 Operation

Air Quality

Project activities during the operation phase are likely to affect air quality by increasing dust emissions (particulates) in the atmospheric environment as well as emission of GHGs and other CACs. The following activities are considered likely to have an effect on air quality during the operation phase of the Project:

- product handling (concentrate, DMS and waste rock aggregate handling and conveyance);
- waste rock processing (including material transfer, and crushing, screening, and stockpiling); and
- transportation (including vehicle traffic and activities at the marine terminal);

Dust produced by waste rock crushing and screening will be controlled by mitigation measures described in previous sections.

The waste rock will be transported by truck on unpaved roads between the waste rock dump and aggregate stockpile/waste rock processing area. In addition, fluorspar concentrate and DMS Floats will be transported from the mill to the concentrate storage building and aggregate stockpile area, respectively. As for the construction phase, vehicle traffic on unpaved access roads is considered an important source of fugitive dust (particulate) emissions during the operation phase and the mitigation measures as they related to transportation described for the construction phase will be applied throughout the life of the Project.

The expected particulate size of the concentrate product is estimated to be ~80–100 microns and would contain ~8–10% percent water. Given these physical characteristics, it is expected that fugitive emission of concentrate from material handling activities at the concentrate storage building, conveyor, and marine terminal would be minor and would remain localized. In addition, to further reduce potential for particulate emissions, the material will be loaded onto the ships via covered conveyors.

The main sources of CACs (excluding fugitive dust discussed above) contaminants and GHGs that may affect air quality during the operation phase of the Project are the same as for construction phase, but with much less quantities. Effects related to emissions from this additional fugitive source are expected to be minimal given that the emissions would occur infrequently.

It is important to note that the proposed marine terminal is designed to allow large ships to unload some of their ballast water and replace it with acid-grade fluorspar concentrate and thus, increasing their payload. This will effectively reduce the number of ships that would be required to travel to the marine terminal, thereby reducing overall fuel consumption and GHGs.

It is expected that most mitigation measures implemented during the construction phase will remain in place for the duration of the operation phase. In addition to the measures indicated in the construction phase, the following additional mitigation measures will be implemented, as appropriate, during the operation phase:

- Design of the ventilation system at the concentrate storage building to minimize emissions to the natural environment (i.e., maximize collection points to the dust collection system);
- Maximize indoor storage of fine acid-grade concentrate and undertake periodic moistening of concentrate piles to reduce fugitive emissions and over-drying of the concentrate in the storage building; and
- Consider implementing engineering controls, such as installing enclosures for transfer points and sizing stations, conveyors and bins at the marine terminal to reduce product loss and minimize fugitive emissions.

Noise

During the operation phase, the main sources of noise will be associated with the following activities:

- Material handling, conveying, ship loading;
- Waste rock processing; and
- Transportation.

The activities associated with the operation phase will be carried out on a continual basis year-round. Noise generated by vehicles, heavy-equipment and waste rock processing will vary depending on the type of activity being performed and its location with respect to sensitive receptors. It is not expected that noise generated from these activities will affect the closest sensitive receptors (cabins and homes in the towns of St. Lawrence and Lawn) given their distance from the Project footprint.

It is expected that noise mitigation measures implemented during the construction phase will remain in place for the operation phase.

7.2.3 Rehabilitation and Closure

Some of the activities during the rehabilitation and closure phase will have adverse effects on air quality and noise similar to those listed for the construction phase; however, given the reduced number and areas of activities that will occur during this phase, the magnitude of the emissions will be less than those discussed above in the construction phase. It is also expected that the re-vegetation of disturbed areas will reduce fugitive dust emissions from wind erosion across the Project area.

7.2.4 Environmental Effects Summary

A summary of the likely environmental effects and proposed mitigation for the Atmospheric Environment VC is provided in Table 7-2.

Table 7-2: Environmental Effects and Mitigation Measures for Atmospheric Environment VC

Project Phase	Activity	Potential Environmental Effect	Proposed Mitigation Measure
Construction	Stripping	Increase in fugitive dust in the atmosphere	Prevent wind erosion during stripping and grading activities by applying water to exposed soils as needed (e.g., during high winds).
			Regular and adequate maintenance of the unpaved roads.
	Excavation and blasting		Application of water or other dust suppressants on unpaved roads, as needed.

Project Phase	Activity	Potential Environmental Effect	Proposed Mitigation Measure
			Reduce drop heights during material transfers.
	Construction activities and equipment mobilization		Size trucks appropriately to reduce the number of vehicle trips.
			Proper design of haul and access roads, to minimize distance travelled.
	Transportation		Stabilize exposed surfaces and stockpiles with filter fabric, rock or mulch as appropriate to minimize wind erosion.
			Consider the use of fogging systems and wind barriers to reduce wind erosion.
	Staging and storage of construction related equipment and material		Implement a speed limit on the access and haul roads.
			Implement progressive rehabilitation during all Project phases to minimize dust generated from wind erosion.
	Blasting	Potential risk during blasting activities of formation of carbon monoxide, nitrogen dioxide (NO_2) or methane	Implement Project OH&S Plan and emergency response procedures.
	Energy Consumption	Emissions of air contaminants and GHGs in the atmosphere	Regular and adequate maintenance of the unpaved roads.
			Implement a no-idling policy to reduce combustion emissions.
			Promote the use of block heaters during winter months as part of the no-idling policy.
			Implement an awareness program to promote fuel consumption reduction.
	Stripping	Noise level increase in the surroundings of the working areas	When possible, construction activities will be limited to daytime especially in work areas that are closest to the sensitive receptors.
	Excavation and blasting		Consider evaluating the use of newer technologies associated with back-up alarms to reduce to amount of noise from equipment operation.
	Construction activities and equipment mobilization		Reduce vehicle traffic during night-time.
	Transportation		Maintain vehicles and equipment regularly and adequately.
	Staging and storage of construction related equipment and material		In the event that applicable noise levels would be exceeded, implement additional engineering mitigation and control measures.
			Perform blasting during daytime only at a regular scheduled time.
			Implement a Complaints Response Plan to establish a mechanism to record, address and resolve complaints related to Project activities and phases.
Operations	Material handling	Dust emission increase in ambient air	Same as construction phase.
	Waste rock /aggregate processing		Operate and maintain a dust suppression system in accordance with the manufacturer operation manual.
	Transportation		Maximize indoor storage of fine AG concentrate and undertake periodic moistening of concentrate.

Project Phase	Activity	Potential Environmental Effect	Proposed Mitigation Measure
			Consider implementing engineering controls at the Marine Terminal such as enclosures for transfer points.
			Implement Project OH&S Plan and emergency response procedures.
	Waste rock/aggregate processing	Emissions of air contaminants and GHGs in the atmosphere	Same as for construction phase.
	Waste rock/aggregate processing, handling, transportation	Noise level increase in the surroundings of the working areas	Same as for construction phase.
Rehabilitation and Closure	Rehabilitation and Closure	Dust, noise, and GHG emissions	Same as for construction phase.

In summary, the expected residual environmental effect of the Project on the Atmospheric Environment VC is minor or negligible, when mitigations measures listed above are considered.

7.3 Water Resources

The Water Resources VC includes water quantity and quality, as well as fish and fish habitat that could potentially be affected by the Project. The interactions between this VC and Project activities, the likely effects of these activities on the Water Resources VC, and the mitigation measures to minimize these effects are described below.

Based on the preliminary identification of likely Project-environment interactions (see Table 4-1), it is likely that the Project will interact with the water resources during all phases of the Project (i.e., construction, operation and maintenance, rehabilitation and closure). Most of the effects on water resources are associated with waste rock processing and transportation.

In 2015, CFI developed a comprehensive WMP for the AGS Mine. The WMP has evolved since then in parallel with mine development throughout construction and now during operations phase. The WMP describes the use and flow of water through and around all of CFI's mining and milling infrastructure during all phases of CFI's industrial activities in St. Lawrence. It includes mitigation measures intended to maintain water quality and quantity within each watershed in the mine footprint. The WMP has taken into account surface and groundwater flow patterns prior to mine construction, with the goal of maintaining pre-development water volumes and flows in each watershed, to the extent practical, to avoid off-site adverse effects such as flooding and erosion.

CFI will update its WMP by incorporating the marine terminal and its associated infrastructure.

It will describe the use and flow of water through and around the marine terminal and its associated infrastructure during all Project phases. The key objectives of the WMP will be to:

- minimize disturbance to, and use of, natural waterbodies (including groundwater);
- ensure water discharged from the site to the natural environment is of suitable quality (i.e., meets regulatory standards and/or meets baseline conditions); and
- avoid or limit the transfer of water from one watershed to another, to the extent practical, and to avoid off-site adverse effects, such as flooding and erosion.

The WMP will be updated in consultation with the provincial Water Resources Management Division of NL DMAE to ensure that the goals, objectives, and outcomes of the plan satisfy all parties.

The ACCDC information request submitted in February 2015 in support of the Project did not identify any historical occurrences of freshwater species at risk or conservation concern. Species experts at ACCDC consider it possible for the Banded Killfish, which is provincially and federally listed, to occur in the Project area (ACCDC 2015); however, none were identified during the various field surveys within the Project area that have been conducted over the years (SEM 2015; Amec 2009; ADI Nolan Davis 1996). Field studies have reported American Eel (provincially listing: vulnerable and COSEWIC status: threatened [COSEWIC 2010b]) in all watersheds affected by the Project, and Atlantic Salmon (COSEWIC status: threatened [COSEWIC 2010b]) in Salt Cove Watershed and the watersheds around the AGS Vein (i.e., Grebes Nest Watershed, Upper Island Pond Watershed, and Northwest Pond Watershed) (SEM 2015). As these species have similar interactions and likely effects with the Project as non-listed fish species, the analysis of Project-related effects is provided in the same discussion.

No issues related to water resources were raised by stakeholders during consultations (Section 5.2).

7.3.1 Construction

Water Quality and Quantity

During the construction phase of the Project, the following activities are considered likely to have an effect on water quality and/or quantity:

- stripping;
- excavation and blasting;
- construction activities and equipment mobilization;
- transportation;
- waste management;
- water management; and
- staging and storage of construction-related equipment and materials.

As described in Section 2.0, the activities listed above are required to allow construction of the marine terminal and staging and storage areas for Project-related equipment and materials, access roads, and waste rock processing/storage areas.

Removal of vegetation to accommodate construction, as well as stripping of topsoil and excavation of overburden (where required) will result in exposure of soils to wind and water erosion. Wind erosion of soils, as well as dust generated by heavy equipment operation and transportation of materials, may result in deposition of dust directly onto surface waterbodies or onto other surfaces which are subsequently subject to precipitation and surface runoff, potentially resulting in the deposition of sediment-laden water into surface waterbodies. This could result in elevated levels of suspended sediment in surface water and potential adverse effects on fish and fish habitat. Dust control during the construction phase will be mitigated as per the measures indicated in Section 7.2.

A Site Grading and Drainage Plan will be developed during the detailed design phase. It will include the erosion control measures to be implemented across the Project area during construction, such as directing surface flow, constructing drainage channels, and stabilizing erosion prone areas.

Exposed surfaces that are at risk of erosion will be protected by grading and contouring slopes and diverting surface runoff away from disturbed areas. After precipitation events, slopes will be inspected and corrective measures will be implemented to prevent soil erosion, as required. Slopes for finished-grade surfaces will be built in accordance with best engineering practices and will be surface-finished / stabilized to provide long-term stability. Final grading will be undertaken immediately after completion of an activity rather than at the end of construction. Revegetation will also be considered for areas adjacent to existing roads where erodible soil has been exposed (i.e., progressive rehabilitation).

There will be construction of new roads of varying design around, in and in-between the waste rock dump, waste rock processing/aggregate stockpiling area, and wharf/breakwater access road. Proper installation or upgrading of culverts and/or bridges across a number of watercourses in the Mine Cove Watershed will be required. CFI will apply to NL DMAE for approvals for Alteration of a Body of Water pursuant to the provincial *Water Resources Act* for the installation of new and upgrading of existing structures, and will comply with terms and conditions of approval and guidance materials provided by NL DMAE regarding the design, construction, and maintenance of the crossing structures to avoid or minimize the potential adverse effects on water quality and fish habitat. CFI will also comply with DFO's guidance on measures to avoid causing serious harm to fish and fish habitat, in compliance with the *Fisheries Act* (DFO 2013c). In addition to potential surface water contamination from dust and/or sediment laden runoff, improper management of waste (e.g., poor housekeeping) has the potential to result in surface water quality concerns. CFI's existing Waste Management Plan will be reviewed and updated for the Project to ensure the proper handling, storage, transport, and disposal of Project-related hazardous materials and wastes.

Freshwater Fish and Fish Habitat

As stated above, the only watershed near the proposed Project that would include fish and fish habitat is Mine Cove Pond. This watershed was previously included in the existing mine/mill EA and Project Review process. Because of these processes, Mine Cove Pond was included under the Serious Harm determination for the mine/mill and was therefore included in the existing *Fisheries Act* Authorization and Offsetting Plan.

As part of the DFO project review process for the mine/mill, they recommended that mitigation measures be included into CFI's plans for freshwater components of the project to avoid the potential of serious harm to fish and their habitat beyond those identified. These components included:

- Culvert upgrades;
- Stream fording;
- Site preparation;
- Construction of access and haul roads; and
- Water Extraction.

It was determined that if the recommended mitigation measures are incorporated into CFI's plans, DFO's Fisheries Protection Program (the Program) was of the view that the Project would not result in serious harm to fish. They stated "the Program is also of the view that your proposal will not contravene sections 32, 33 or 58 of the SARA. No formal approval is required from the Program under the *Fisheries Act* or the SARA in order to proceed."

While the Project will not likely require a *Fisheries Act* Request for Review, the information and recommendations provided during the previous review process will be applied to this aspect of the project. It is also understood that the mitigations outlined in DFO's response to the prior Request for Review are applicable to the construction of the marine terminal and will therefore be implemented.

Given the lack of fish and fish habitat in the Project area, and the existing *Fisheries Act* Authorization that provides offsets to any serious harm caused in Mine Cove Pond watershed, and the standard mitigations for site preparation and construction of access roads, there will be no interaction with freshwater fish and fish habitat during the construction phase and therefore no significant residual effects or serious harm.

7.3.2 Operation

Water Quality and Quantity

During the operation phase of the Project, the following activities are considered to have likely effects on water quality and/or quantity:

- Waste rock processing;
- Transportation;
- Water management; and
- Material handling (including loading, unloading, stockpiling, and conveying).

Project-related effects associated with waste rock processing and transportation are related to dust which can ultimately affect surface water quality. Deposition of particulates combined with precipitation and uncontrolled surface runoff may result in subsequent sedimentation of surface waterbodies. Mitigation to minimize this potential effect is the same as for the construction phase (e.g., dust control and erosion and sediment control).

Increased loading of select metals could occur as a result of leaching from the waste rock processing/aggregate stockpiling area. Based on the geochemistry results, potential parameters of concern include fluoride, arsenic, copper, iron and lead. The updated WMP will include details of the construction and operation of settling ponds to receive runoff from this area. The WMP will also include details of water quality monitoring to be implemented for all surface water discharges into the natural environment to ensure that water quality meets the required provincial standards.

Surface water flow within the Mine Cove Watershed may be altered by Project development. In some instances, flow in the down-gradient tributaries will increase while in others it may decrease. The WMP will seek to maintain hydrological conditions of the waterbodies that existed prior to Project development.

Fish and Fish Habitat

As indicated above for the construction phase, it is also understood that the mitigations outlined in DFO's response to the prior Request for Review are applicable to the operations phase of the marine terminal and will therefore be implemented. Given the lack of fish and fish habitat in the Project area, and the existing *Fisheries Act* Authorization that provides offsets to any serious harm caused in Mine Cove Pond watershed, and the standard mitigations for site preparation and construction of access roads, there will be no interaction with freshwater fish and fish habitat during the operations phase, and therefore no significant residual effects or serious harm.

7.3.3 Rehabilitation and Closure

The physical activities associated with rehabilitation and closure are described in Section 2.5. Likely effects on the Water Resources VC during this phase of the Project are expected to be similar to but less in magnitude than those anticipated during construction. Rehabilitation and closure methods and activities will comply with all applicable federal and provincial regulatory requirements in force at the time.

Fish and Fish Habitat

As indicated above for the construction and operations phases, it is also understood that the mitigations outlined in DFO's response to the prior Request for Review are applicable to the operations phase of the marine terminal and will therefore be implemented. Given the lack of fish and fish habitat in the Project area, and the existing *Fisheries Act* Authorization that provides offsets to any serious harm caused in Mine Cove Pond watershed, and the standard mitigations for site preparation and construction of access roads, there will be no interaction with freshwater fish and fish habitat during the rehabilitation and closure phase, and therefore no significant residual effects or serious harm.

7.3.4 Environmental Effects Summary and Evaluation

A summary of the likely environmental effects and proposed mitigation for the Water Resources VC is provided in Table 7-3.

Table 7-3: Environmental Effects and Mitigation Measures for Water Resources VC

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
Construction	Stripping, construction activities and equipment mobilization, transportation, staging and storage of construction-related equipment and materials	Changes in water quality due to generation of dust and increase potential for erosion and sedimentation Changes in fish habitat due to increased siltation of ponds and watercourses Alteration of fish habitat and water quality due to watercourse crossing installations	Minimize the Project footprint to that required for efficient and safe construction (limit to one watershed)
			Design and implement a Site Grading and Drainage Plan.
			Implement measures to control dust as per Section 7.2.
			Design and implement Water Management Plan in consultation with NL DMAE.
			Obtain and comply with Alteration of a Body of Water permits for bridge and/or culvert installation
			Implementation of a Fisheries Offsetting Plan pursuant to the *Fisheries Act* Section 35(2)(b) –N/A
			Comply with DFO's guidance on measures to avoid causing serious harm to fish and fish habitat (DFO 2013c). – N/A

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
			Implement progressive rehabilitation measures.
	Excavation and blasting	Changes in water quality due to generation and deposition of dust and subsequent surface runoff Change in water quantity due to re-direction of surface and groundwater flow Harm of fish and fish eggs	Implement measures to control dust as per Section 7.2.
			Blasting to comply with DFO guidelines for blasting in or near water.
			N/A No fish/fish habitat in the Project Area
	Water Management	Altering natural water flows in streams	Obtain and comply with Alteration of a Body of Water permits for water withdrawal
			Design and implement Water Management Plan in consultation with NL DMAE.
			Implementation of a Fisheries Offsetting Plan pursuant to the *Fisheries Act*. – N/A
Operation	Waste Rock processing and Aggregate Stockpiling	Change in water quality due to use of water for ore processing Change in water quantity due to use of clean surface or groundwater for processing and discharging to TMF	Effluent treatment in compliance with all applicable legislation prior to release into the environment, if needed.
			Design and implement Water Management Plan in consultation with NL DMAE.
	Water Management	Loss of water quantity due to ongoing dewatering of the pit	Design and implement Water Management Plan in consultation with NL DMAE.
			Obtain and comply with Alteration of a Body of Water permits for water withdrawal
Rehabilitation and Closure	Rehabilitation and closure.	Similar to those to those experienced during construction	Implement Rehabilitation and Closure plan prepared and approved by NL DNR
			Design and implement Water Management Plan in consultation with NL DMAE.

In summary, the expected residual environmental effect of the Project on the Water Resources Environment (including Fish and Fish Habitat) is minor or negligible, when mitigations measures listed above are considered.

7.4 Terrestrial Environment

The Terrestrial Environment VC includes wetlands, vegetation communities, and provincially and federally listed vegetation species under the NL ESA, SARA or COSEWIC. The extent of the Project area used to identify likely effects of the Project on the Terrestrial Environment VC was defined by the area of potential physical land disturbance (i.e., terrestrial area of focus [98 ha]) and includes the potential zone of influence resulting from either potential interactions with infrastructure or activities during each Project phase (i.e., construction, operation, or rehabilitation and closure). Within this area, ELCs, identified by the

ELC mapping exercise described in Section 6.4, were used to identify the habitat types present (see Figure 6-23).

Project-environment interactions which will likely affect the Terrestrial Environment VC during each Project phase are discussed herein. The adverse effects for this VC mainly relate to the alteration or loss in productivity of vegetated habitat during the construction and operation phases. Project-environment interactions on the Terrestrial Environment VC, related to accidents and malfunctions, are addressed in Section 7.8 of this RD/PD.

An ELC product and desktop review, as described in Section 6.4, was used to identify unique land classes and their potential presence of listed plant species. Only species at risk which are known to occur, or to have occurred, in the vicinity of the Project area were considered in this effects analysis. No vegetation species at risk are known to occur within the Project area or were identified within the desktop review. Available information presented in Section 6.4 confirmed that the ACCDC database identifies only a historical occurrence of marsh fern, a species that is not provincially or federally listed but is considered vulnerable to extirpation by species specific experts within ACCDC.

A species of particular interest to the region is the boreal felt lichen. This lichen is typically found on mature balsam fir trees within intact forest stands associated with adjacent *Sphagnum-rich* wetlands (Maass and Yetman 2002). While it is possible, specific experts within ACCDC and DFLR consider it unlikely that boreal felt lichen occurs within the Burin Peninsula (ACCDC 2015; C. Hanel, Ecosystem Management Ecologist/Botanist, DFLR, pers. comm., 21 February 2018). It is not expected in the Project area on the basis of habitat limitations. The species requires a microclimate regime for light, moisture and wind protection that is provided by mature (old growth) conifer stands that exhibit forest continuity (Goudie et al. 2011; Power et al. 2018). These conditions are not present in wind-exposed, patchily distributed, coastal tuckamore habitat. Additionally, no historical records of boreal felt lichen have been identified within the Eastern Hyper-Oceanic Barrens ecoregion of Newfoundland.

The ELC product was used to calculate the surface area of each land cover class identified within the ELC study area (Table 7-4). The Project footprint (i.e., waste rock stockpile, aggregate stockpile, concentrate storage building and roads) is anticipated to result in the alteration or loss of vegetation communities for an approximate area of 20 ha. However, in lieu of the finalized spatial orientation of the footprint and given that Project activities causing alteration or loss of vegetation may occur in both the construction and the operation phase of the Project, total surface area for the terrestrial area of focus (98 ha) was calculated and is presented in Table 7-4 (see also Figure 7-1). This summary table quantifies all surface areas in ha and provides the percentage (%) of each land class found within the terrestrial area of focus, compared to the respective ELC areas within the ELC study area. To clarify, these are conservative estimates for respective ecological land classes altered or lost considering the entire Project terrestrial area of focus. Overlap of the finalized Project footprint with ELC areas will result in a fraction of these presented values.

Table 7-4: Ecological Land Class Surface Areas

Ecological Land Class (ELC)	ELC study area (A) (ha and [% of total study area])	Project Footprint Area (B) (ha and [% of total Footprint Area])	Habitat Type Altered or Lost within the ELC study area (C, where C=B/A*100)
Anthropogenic	175 ha [2 %]	<1 ha [<1 %]	N/A
Barren	660 ha [6 %]	3 ha [3%]	0.5 %

Ecological Land Class (ELC)	ELC study area (A) (ha and [% of total study area])	Project Footprint Area (B) (ha and [% of total Footprint Area])	Habitat Type Altered or Lost within the ELC study area (C, where C=B/A*100)
Broadleaf Dense	5 ha [<1 %]	<0.1 ha [<1 %]	N/A
Body of Fresh Water	260 ha [3 %]	<1 ha [<1 %]	N/A
Body of Salt Water	3580 ha [34 %]	1 ha [1 %]	N/A
Coastal	240 ha [2 %]	1 ha [1 %]	0.5 %
Coniferous Dense	10 ha [<1 %]	5 ha [5 %]	45.9 %
Coniferous Open	100 ha [1 %]	2 ha [2 %]	1.7 %
Coniferous Sparse	4430 ha [43 %]	85 ha [87 %]	1.9 %
Mixed Wood Dense	45 ha [<1 %]	<1 ha [<1 %]	N/A
Mixed Wood Sparse	2 ha [<1 %]	<1 ha [<1 %]	N/A
Rivers	10 ha [<1 %]	<1 ha [<1 %]	N/A
Shrub Low	660 ha [6 %]	<1 ha [<1 %]	N/A
Shrub Tall	15 ha [<1 %]	<1 ha [<1 %]	5.6 %
Wetlands	200 ha [2 %]	<1 ha [< 1%]	N/A
Total	**10,400 ha** [100 %]	**98 ha** [100 %]	**0.9 %**

Source: NRCan 2014
Note:
N/A: Not Applicable – the habitat type altered or loss within the ELC study area has not been calculated for the Project footprint areas interacting with less than 1 ha of a certain land class

7.4.1 Construction

The construction activities will result in the direct and indirect alteration or loss of vegetation communities. In particular, the following activities are considered likely to have an effect on one or more components of the Terrestrial Environment VCs:

- stripping;
- excavation and blasting;
- transportation (i.e., service roads, conveyor system, potential slurry pipeline); and
- staging and storage of construction-related equipment and material.

LEGEND

- Marine Terminal Footprint
- New Access Road Route
- Mine Footprint

ECOLOGICAL LAND CLASSIFICATION

- Anthropogenic
- Barren
- Broadleaf Dense
- Coastal
- Coniferous Dense
- Coniferous Open
- Coniferous Sparse
- Mixewood Dense
- Mixewood Sparse
- Shrub Low
- Shrub Tall
- Wetlands
- Body of Fresh Water
- Body of Salt Water

0 1000 2000 m

1:35000

REFERENCE
SOURCE(S): DEVELOPMENT REGULATIONS 2011 LAND USE ZONING MAP 1, JAN. 19, 2013, TOWN OF ST. LAWRENCE; CANVEC+, 1:50 000 SCALE, NRCAN; GOOGLE TERRAIN.
PROJECTION: NAD 83 MTM ZONE 2.

CLIENT
CANADA FLUORSPAR INC.

PROJECT
ST. LAWRENCE FLUORSPAR MARINE SHIPPING TERMINAL PROJECT
EA REGISTRATION

TITLE
ECOLOGICAL CLASSIFICATION AND PROJECT FOOT PRINT

CONSULTANT
JEWER BAILEY CONSULTANTS

YYYY-MM-DD:	2019-05-28
DESIGN	MW
GIS	ED
REVIEW	BE
APPROVED	RB

PROJECT: 19-C-023 REV: 0 FIGURE 7-1

Stripping activities, although kept to a minimum, are necessary during the site preparation for the construction of the marine terminal and its connection infrastructure (e.g., concentrate/aggregate conveyor, access roads) to upland stockpile storage stockpile facilities, as identified in the PD (Section 2.0). Stripping activities will result in the loss of localized vegetation habitats within the Project footprint and likely alteration of vegetation communities along the edge of the Project footprint. Dedicated bird surveys will be conducted prior to stripping activities to mitigate loss of active nesting habitat in accordance with federal *Migratory Birds Convention Act, 1994* and SARA; provincial *Wild Life Act* and ESA; and their respective *Regulations*.

A cutting permit will be obtained from the NL Government and trees will be cut, stockpiled next to roads and made available for locals to use for firewood. Given that the landscape of the upper plateau is dominated by the Coniferous Sparse ELC unit, it is anticipated that a limited amount of wood having an appropriate size for this activity is likely available within the Project footprint. However, the steeply sloped coastal area of the Project area may contain intermittent pockets of larger diameter coniferous trees. Erosion control measures will be employed for all construction activities in steep-sloped areas to prevent soil/sediment runoff to freshwater and marine environments. Any slash will be stockpiled in windrows and left to naturally decompose, which, in turn, contributes to maintaining the natural nutrient cycles typically found within plant communities. The excavated topsoil will be temporarily stored in a stockpile, and stabilized, and will be used during the Project's reclamation activities.

During the construction phase, dust will be generated from excavation and blasting activities, from exposed stockpiles (especially during windy conditions), and from operation of vehicles along unpaved access- and haul roads. This dust may travel through the air, over some distance, and be carried from the Project footprint and deposited onto adjacent areas. The deposition of this dust, generally rich in metals as described in Section 7.2, on vegetation habitats may potentially adversely affect the productivity of a vegetation community or may lower plants' photosynthetic ability.

The footprint used for staging and storage of construction-related equipment and material may also result in the loss or alteration of vegetation habitats. A possible example of localized vegetation community alteration would be the compaction of overburden from heavy equipment operation on land not stripped for transport or building infrastructure.

Effects of the above-mentioned activities on identified ELC units were analyzed with respect to the entire terrestrial area of focus (98 ha). Overlap of the finalized Project footprint with ELC areas will result in a fraction of these presented values. The focal area (87%) affected by stripping activities will result in the direct alteration or loss of up to 85 ha, characterized by the Coniferous Sparse land class. However, this potential alteration or loss only represents ~2% of the Coniferous Sparse land class present within the ELC study area, since it is the most common land class (i.e., 43%) in the ELC study area.

The alteration or loss of vegetation communities dominated by the Coniferous Dense land class may amount to 5% (5 ha) of the terrestrial focal area or ~46% of the ELC study area. The high proportion is related to a relatively productive closed-canopy stand localized to the mid-slopes along a deeply-incised stream near the coast. Final selection of Project footprint elements will avoid this stream and the need to raze the adjacent Conifer Dense stand. It should be noted that along the forested coastal slope within the terrestrial area of focus, there are no mature conifers of significant height which would be attractive nesting, roosting or perch sites for large raptors (e.g., bald eagle or osprey) (N. Wilson, pers. comm., May 2019).

Similarly, alteration or loss of low shrub habitat is not expected to affect the sustainability of shrub communities in the ELC study area, as this corresponds to less than 1% of all the low shrub land class found within the ELC study area. Likewise, a number of other vegetation communities have small percentages of their habitats potentially affected within the terrestrial area of focus. Such habitats comprise land classes with close to or less than 1 ha and include the following ELC units: the broadleaf dense, the coastal, the coniferous open, the mixed wood sparse, the mixed wood dense or the low shrub.

The barrens land class (660 ha) is not comprised of extensive or sensitive terrestrial vegetation communities or wetlands within the ELC study area. The effect on the alteration or loss of 3 ha of this land class, is expected to have a minimal effect on the Terrestrial Environment VC during the construction phase. No wetlands greater than 100 m^2 occur within the terrestrial area of focus. The finalized project footprint will not overlap wetlands and wetlands will not be impacted by this Project.

Effects related to the alteration or loss of vegetation communities cannot be completely avoided. Implementation of BMPs for construction is expected to reduce the alteration or loss of vegetation communities. BMPs include:

- minimize the Project footprint to that required for efficient and safe construction;
- use existing access to the extent practical;
- avoid any off-site equipment and vehicle movement;
- wherever practical, make use of previously disturbed areas for staging and stockpiling;
- stockpile topsoil and keep separate from subsoils to limit admixing, and stabilize against wind and water erosion for future use during reclamation; and
- implement soil erosion and sediment control measures.

Dust emissions associated with excavation, drilling and blasting as well as vehicle and equipment movement can also be minimized with standard BMPs (e.g., use of water for dust suppression). Refer to Section 7.2 for additional mitigation measures to be implemented during the Project construction and operation to reduce the effects of dust on the terrestrial environment.

In addition to the above noted mitigation measures, a listed plant and habitat survey will be conducted prior to construction to confirm the presence of any listed vegetation species and habitats. The results of the survey will be used to modify the Project footprint, if required and feasible and/or to identify additional mitigation to avoid or reduce loss to any listed vegetation species or habitat.

7.4.2 Operation

The operation phase of the Project will likely result in the alteration or loss of vegetation communities within the Project footprint. The following activities are considered likely to affect one or more components of the Terrestrial Environment VC:

- waste rock storage; and
- transportation (i.e., service roads).

The progressive expansion of waste rock stockpiles with extraction of ore during active mining extends the alteration or loss of vegetation communities within the footprint of waste dumps. Although disturbance to these areas will be initiated during the construction phase, it will continue progressively during the operation phase until the entire Project footprint has been developed. Effects on each ELC are similar to those described for the construction phase.

Dust generation is a Project-related effect that will extend throughout operation activities. In this phase, dust may be generated during the transportation of waste rock material from the mine to the concentrate storage facility or the aggregate processing, stockpiling and handling area. Dust may also be generated on a regular basis during the transportation of materials around the marine terminal. Similarly, dust is generated by the movement of employees' vehicles, and the transportation of goods and materials between the marine terminal and upper-level facilities on unpaved roads. As previously indicated, the accumulation of dust particles, which is likely to be rich in metals, could affect vegetation productivity and lower the photosynthetic ability of plant communities adjacent to the Project footprint.

The following mitigation measures with be implemented during the operation phase to minimize the adverse effects of the Project on the Terrestrial Environment VC:

- progressive rehabilitation including seeding according to the approved Closure Plan;
- minimize the Project footprint to that required for efficient and safe operation; and
- mitigation measures to control dust described in Sections 2.8.1 (as applicable) and 7.2.

7.4.3 Rehabilitation and Closure

The Rehabilitation and Closure phase of the Project will consist of similar activities as the construction phase and will therefore have similar effects. The exception to this is that there is not expected to be any direct alteration or loss of vegetation species and habitats during this phase. Once the mining operation is complete, no additional habitat loss is expected to occur. Progressive rehabilitation, reusing stockpiled topsoil and using native species and/or seed mixes containing naturalized species which are well established for this region of the province, will, over time, provide new habitat and effectively mitigate the habitat altered or lost as a result of the Project. This is expected to be enhanced by the natural encroachment of native species from outside the Project footprint, over time.

More specifically, the proposed Rehabilitation and Closure Plan includes plans for revegetation of the fluorspar concentrate storage facility and conveyor/aggregate conveyor to the marine terminal. Like the construction and operation phases, dust generation from the operation of heavy equipment and vehicular traffic to transport materials and employees about the site is a Project-related effect for the Rehabilitation and Closure phase. The mitigation measures identified above and in Section 7.2 will be implemented to minimize the dust generation during the Rehabilitation and Closure phase of the Project.

7.4.4 Environmental Effects Summary and Evaluation

In summary, the Project-related effects on the Terrestrial Environment VC consist of direct and indirect alteration or loss of vegetation communities across the Project footprint during construction and operations as well as the potential alteration of vegetation species and habitats surrounding the Project footprint that may be affected by dust deposition. A summary of the likely environmental effects and proposed mitigation for the Terrestrial Environment VC is provided in Table 7-5.

Table 7-5: Environmental Effects and Mitigation Measures for Terrestrial Environment VC

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
Construction	Stripping	Alteration of vegetation communities	Minimize the Project footprint to that required for efficient and safe construction
			Avoid any off-site equipment and vehicle movement
			Bird surveys prior to cutting/grubbing activities to mitigate loss of nesting habitat
	Staging and storage of construction-related equipment and material		Wherever practical, make use of previously disturbed areas for staging and stockpiling
			Implement soil erosion and sediment control measures
			Implement progressive rehabilitation measures
			Use existing access to the extent practical
	Stripping	Alteration or loss of habitat due to changes in soil conditions	Implement best practices to prevent soil erosion and sediment control
			Use existing access to the extent practical
	Excavation and blasting		Implement dust control measures as described in Section 7.2
			Stockpile topsoil and keep separate from subsoils to limit admixing, and stabilize against wind and water erosion for future use during reclamation
	Transportation		Implement progressive rehabilitation measures
	Stripping	Alteration or loss in productivity of vegetation communities due to dust deposition	Implement dust control measures as described in Section 7.2
	Excavation and blasting		
	Transportation		
	Staging and storage of construction-related equipment and material		
	Staging and storage of construction-related equipment and material	Alteration or loss in habitat conditions due to compaction of soil	Minimize the Project footprint to that required for efficient and safe construction
	Transportation	Alteration or loss in productivity of vegetation communities	Minimize the Project footprint to that required for efficient and safe construction
Operation	Aggregate crushing and stockpiling	Alteration or loss of vegetation communities	Implement progressive rehabilitation measures
	Transportation	Alteration or loss in productivity of vegetation communities	Implement dust control measures as described in Section 7.2
Rehabilitation and Closure	Rehabilitation and Closure	Reestablishment of vegetation communities	Implement Rehabilitation and Closure Plan as approved by NL DFLR
The above activities will be conducted in full compliance with all relevant Acts and Regulations, including, but not limited to the *Migratory Birds Convention Act,* 1994 and the *Species at Risk Act,* 2002 and in accordance with the Project's EPP and other management plans.			

In summary, the expected residual environmental effect of the Project on Terrestrial Environment VC is negligible, when mitigations measures listed above are considered.

7.5 Wildlife

The Wildlife VC considers birds, both terrestrial and marine, and wildlife species at risk. The Project-related interactions and likely effects on the Wildlife VC, along with the mitigation measures to minimize or avoid these effects, are described below. It is noted that birds and wildlife, in general, exhibit similar interactions and likely effects with the Project as birds and wildlife species considered to be at risk or of conservation concern

The federal *Migratory Birds Convention Act* was designed to protect and conserve migratory birds, both at the levels of species populations and individuals, and their nests (Government of Canada 1994a). The *Act* and its associated *Regulations* are administered through ECCC by the Canadian Wildlife Service (ECCC-CWS; Government of Canada 1994b). Coverage of the *Migratory Birds Convention Act* includes land birds (e.g., warblers, thrushes, sparrows, and waterfowl [e.g., loons, ducks and geese]), and water birds (e.g., gulls and terns) but does not include grouse, ptarmigan, hawks, owls, eagles, falcons, cormorants, kingfishers, blackbirds, crows or jays (Government of Canada 1994a). These species receive the same form of protection under the provincial *Wildlife Act*. Efforts will be made to mitigate risks of potential harm to wildlife imposed by Project activities, including disturbance of breeding birds and/or their nests, and to align with federal and provincial wildlife and species at risk legislation.

An ACCDC information request submitted in 2015 identified 15 occurrences of terrestrial wildlife species at risk or species of conservation concern within a 5 km radius of the Project. No new instances of note have been recorded within the search radius in the past four years (A. Durocher, Data Manager, ACCDC, pers. comm., 26 April 2019). The 15 occurrences account for the following five bird species: American pipit, chipping sparrow, northern goshawk, northern harrier, and sharp-shinned hawk. None of the five bird species identified by ACCDC are listed provincially or federally and are not considered globally rare outside of the province of NL. As such, likely effects on these species are not discussed separately.

Although no confirmed breeding records have been identified in the area, it is considered possible for the short-eared owl to occur in the vicinity of the Project, based on expert opinion and prior confirmed sightings (ACCDC 2015; LGL 2015; Amec 2016; N. Wilson, pers. comm., May 2019). The short-eared owl is listed as Vulnerable under the provincial ESA, and as Special Concern under Schedule 1 of SARA and by COSEWIC. The limited short-eared owl sightings that been recorded for the St. Lawrence area in the past 20 years are likely associated with cyclical populations of their primary prey, meadow vole (*Microtus pennsylvanicus*). Meadow vole populations peak every 2–5 years and presumably longer in areas with suboptimal habitat, such as the Project area (e.g., peatland and sparse balsam fir). Regardless, the alteration or loss of preferred habitat for short-eared owl associated with the Project is minimal (due to the small size of the Project footprint).

The harlequin duck, another federally and provincially listed species (Special Concern and Vulnerable, respectively), is a seaduck that may occur in the marine Project area. The eastern population of harlequin duck is known to winter along parts of Southern Newfoundland, but it a low probability of occurrence within Little Lawn Harbour. The species typically prefers staging areas in close proximity to small, offshore islands that receive a lot of wave action and upwelling preferential for feeding. The alteration or loss of habitat for this species associated with the Project will be minimal in relation to the area of available coastal and marine habitat on the Burin Peninsula, and within the Harbour or Placentia Bay as a whole. Given the low probability of occurrence for short-earred owl and harlequin duck in the Project area, likely effects on these species are not discussed separately. Likely effects of vegetation communities (as components of wildlife habitat) are considered in Section 7.4, while likely effects on fish are considered in Section 7.3, as well as in Section 7.6, which includes marine mammals and marine species at risk. Accidents and malfunctions, including those with effects on wildlife are considered in Section 7.8.

Primary issues related to wildlife raised by stakeholders during consultation activities were potential Project-related effects on birds and compliance with the *Species at Risk Act, 2002* and *Migratory Bird Convention Act, 1994* and their *Regulations* (Section 5.2).

Based on the preliminary identification of potential Project-environment interactions (see Table 4-1), it is likely that the Project will affect wildlife during all phases of the Project (i.e., construction, operation, rehabilitation and closure).

7.5.1 Construction

During the construction phase of the Project, the following activities are considered to have a likely effect on wildlife:

- stripping;
- excavation and blasting;
- construction activities and equipment mobilization;
- transportation; and
- staging and storage of construction related equipment and materials.

As described in Section 2.0, the activities listed above are required to allow construction of Project components and infrastructure including the marine terminal, ore storage facility and transfer corridor to pier and access roads.

Birds

While construction activities will occur intermittently at different locations (e.g., marine terminal, upland storage site) during the construction period, operation activities will be continuous in subsequent years. Therefore, interactions between birds and above ground infrastructure, for example, could occur at any time during the life of the Project, although such events are expected to be rare. The area to be occupied by infrastructure will be minor in relation to the area of available habitat in Little Lawn Harbour and the greater St. Lawrence area as a whole. It is anticipated that marine birds will land on, rather than collide with, above ground infrastructure, as they are well adapted and habituated to the presence of anthropogenic activities and structures.

Project-related vessel strikes could lead to the direct mortality or injury of marine birds. Also, increased levels of noise may cause some marine birds to exhibit localized and temporary avoidance behaviour in the area of the vessels. The Project will involve the use of large, slow moving barges and vessels during construction. Increased vessel traffic in the harbour, in addition to existing commercial fishing vessel traffic, increases the potential for vessel collisions with marine birds, although such events are expected to be rare. As indicated, it is anticipated that marine birds will land on, rather than collide with, Project-related vessels, as they are well adapted to the presence of moving vessels and structures and are known to land on boats and buoys. The likelihood of vessel collisions with marine birds will be reduced by implementation of mitigation measures including maintaining low navigational speeds.

The Project may also have indirect adverse effects on marine birds through a reduction in the quantity or availability of primary food sources. This may result from the removal of benthic habitat and communities, or by the localized and temporary degradation of marine habitat resulting from disturbance to the seabed during construction of the marine terminal and associated breakwater, which would likely cause elevated levels of suspended sediments in the water column. Elevated levels of suspended sediments may cause fish to temporarily avoid the immediate affected area until suspended sediments return to baseline levels. Environmental effects of the proposed Project on the Marine Environment are discussed in Section 7.6.

As noted in Section 7.4 and Section 7.6, up to 20 ha of terrestrial habitat may be removed as a result of the Project and up to 4 ha of marine habitat, based on preliminary design of the marine terminal and associated breakwater. There are a number of birds that are known to be local breeders. The ground-nesting short-eared owl, a provincially and federally listed species at risk, may be a local breeder, although no confirmed records have been made to date. The short-eared owl nests are scraped in the ground and lined with grasses. They are one of the few species that seem to have benefited from strip-mining, nesting on reclaimed and replanted mines south of their normal breeding range (Cornell Lab of Ornithology 2015).

Terrestrial habitat within the Project area consists mostly of open coniferous tree cover (tuckamore in low-lying areas or scrub conifers along slopes), dense coniferous tree cover, barrens, and disturbed habitat (brownfield). A small amount of cut timber will be stockpiled next to roads and slash stockpiled in windrows, potentially providing an enhancement to habitat (e.g., protection from predators) for some bird species (e.g., ruffed grouse). Stripping activities in the Project footprint and any temporary work areas (e.g., staging, laydown and storage areas for construction related equipment and materials) will be reduced to the extent possible and will be restricted to areas absolutely necessary to carry out the Project.

The main effect on birds will be the alteration or loss of nesting and foraging habitat. Vegetation clearing and stripping activities could also result in the loss of nests and nestlings or eggs if conducted during the bird breeding season, which occurs from 15 April to 15 August in the region (Nesting Zone D3-4; ECCC 2018a). Furthermore, increased deposition of dust generated during construction activities, could also potentially result in habitat alteration for species that could potentially be nesting in the area. Given that the only forested habitat overlapped by the finalized project footprint will be comprised primarily of stunted conifer (e.g., tuckamore) forested habitat, minimal effects are predicted for bird species with life histories and preference for nesting sites within tall, large diameter trees (e.g., raptors). To reduce potential adverse effects on nesting birds, clearing activities will take place outside of the bird breeding season for most bird species (15 April to 15 August), where possible. Prior to stripping operations (e.g., cutting/grubbing), CFI will follow its Avifauna Management Plan (Amec 2016) and dedicated bird surveys will be conducted in accordance with the federal *Migratory Birds Convention Act* and/or provincial *Wildlife Act*. Consultation with the ECCC-CWS and DFLR will occur as necessary to maintain compliance with acts and regulations.

Should any tree- or cavity-nesting species be found in areas to be cleared or should any ground- or burrow-nesting species initiate breeding activities on stockpiles or exposed areas, an appropriate species-specific buffer will be established around the nest location as stipulated in the CFI Avifauna Management Plan. For all discovered nests, the appropriate buffer zone will depend on a number of conditions including the nesting species, level of disturbance and the landscape context (ECCC 2018b;

Amec 2016). Potentially disruptive activities will be halted within the buffer area, measures will be taken to reduce potential for erosion of the pile, and the nest(s) will be protected. Periodic monitoring of the nest(s) will be undertaken by qualified professionals until the fledglings have left the area and the nest site is found to be inactive, at which time construction activities in the area will resume. It is of note, that only a limited number of trees will be cleared during stripping activities.

In addition to habitat loss, construction noise (including blasting) may have adverse effects on wildlife in and near the Project area. Construction noise can interfere with normal bird behaviour, such as feeding, migrating, and breeding. Flushing of nesting birds may result in decreased productivity due to increased nest predation and stress on adult birds affecting foraging behaviour (Beale 2007); as well, birds may leave the Project area and be forced to move to less favourable nesting sites (Larkin 1996).

The distance of effect is related to frequency, intensity, and duration of the noise. Research has shown that for birds, overt behavioural responses such as flushing typically occur at sound pressure levels above 80–85 decibels (dB) sound pressure level (SPL) (Brown 1990). Adverse effects from noise vary from species to species because of interspecies differences in both hearing abilities and in behavioural and physiological responses to stimuli. In addition to interspecies differences, there is considerable intraspecies variation in vulnerability to effects of noise (e.g., in different times of year [different stages of the breeding cycle] and different life stages [Blumstein et al. 2005]). The likely effects of noise due to construction of the Project are expected to be temporary and short-term.

Seabird breeding colonies are numerous on headlands and islands along the entire perimeter of the Placentia Bay area, three of which are known IBAs off the southern Burin Peninsula, including Green Island, Middle Lawn Island and Corbin Island (IBA Canada 2019). The nearest IBA and protected area from the proposed marine terminal is ~10 km and ~7 km, respectively (i.e., Colombier Island of the provincial Lawn Bay Ecological Reserve, within Middle Lawn Island IBA), which is sufficiently far from the Project area such that no disturbance at these colonies is anticipated during Project construction (ECCC 2018c). Minor disturbance of foraging birds from blasting and other construction noise is possible; however, this distance is greater than the 1 km buffer recommended by Environment Canada for high-disturbance activities including drilling and blasting (ECCC 2016).

Other Wildlife

Habitat alteration, loss and fragmentation from clearing and construction activities will likely result in displacement of wildlife within the Project footprint, reduction of the available habitat used by terrestrial mammals, and interruption of local movement to and from adjacent areas of suitable habitat. Species that can move easily will likely relocate to similar adjacent habitat. Although some wildlife habitat will be altered or lost, it does not represent a major portion of the habitat available for the wildlife that occurs in the ELC study area. Through Project footprint design and mitigation measures, the localized stand of closed-canopy Coniferous Dense land class will remain undisturbed during construction activities.

Based on the results of the ELC study presented in Section 7.4, the Project terrestrial area of focus will result in the alteration or loss of ~1% of the total area encompassed in the ELC study area and no habitat type will be completely lost. Wildlife species will have the opportunity to relocate to other similar habitat types in the region.

During construction, temporary and reversible effects from noise and dust may also affect terrestrial wildlife in and around the Project area. Project related noise (including blasting) may cause mammals in adjacent areas to temporarily leave the area (e.g., moose, bears, coyotes, fox). The mammals in the area of disturbance may temporarily move elsewhere during the construction period. Local populations are likely to return to normal after construction is complete. Furthermore, wildlife (e.g., coyotes, fox, bears) may be attracted to domestic type waste generated by workers potentially increasing the likelihood of direct mortality of wildlife through collisions with Project-related equipment and vehicles. Workers will be instructed to maintain good housekeeping practices and not leave any food or garbage at the Project site to avoid attracting wildlife, including omnivorous predators which may disturb or cause direct mortality or injury to other wildlife (including birds).

7.5.2 Operation

During the operation phase of the Project, the following activities are considered to have a likely effect on wildlife:

- shipping transportation;
- concentrate/aggregate conveyor system; and
- access and haul roads.

Birds

Increased human activity associated with the operation phase is expected to result in an increase in populations of wildlife species that are adapted to human environments, including American robins, common grackles and rock pigeons. These species may compete with native woodland and forest edge birds, resulting in habitat loss for species less adapted to human presence.

Portions of the Project area must, for worker safety, be well-lit with high intensity lighting at night, and although the lighting will be directed as narrowly as possible by shielding, these lights may have disorienting effects on migrating birds (and Leach's storm-petrels) particularly on foggy and overcast nights, causing potentially fatal collisions. To reduce the risk to migrant birds, the minimum amount of pilot warning and obstruction avoidance lighting will be used on tall structures. White or green-hued lights will be preferred for use on towers or high structures at night, as recommended by the US Fish and Wildlife Service (2003). Solid or flashing red lights will be avoided as they have potential to both attract and disorient the internal compass of nocturnal migrants more than lights with low red-spectrum profiles (Poot et al. 2008). High intensity lights, including shielded downward-directed floodlights, will be turned off at night outside of working hours, if possible, especially during the spring and fall migration period.

Increased human activity and noise (e.g., conveyor transport and ore/aggregate transfer to vessel) around the marine terminal may result in increased disturbance to fauna in the surrounding coastal environment, including shorebirds that may feed in the area. Also, increased shipping activity associated with Project operation will cause disturbance to coastal/marine birds in the waters off the Project site and along shipping routes. The possible effects of marine vessel traffic on birds in the offshore environment include behavioural changes (e.g., avoidance, stress response) that may have energetic consequences (Schummer and Eddleman 2003), and loss of suitable feeding habitat as vessel traffic can reduce bird use of vessel disturbed areas (Bramford et al. 1990). Use of existing shipping lanes and areas travelled by local fishing vessels for most of the route is expected to minimize this effect.

Marine traffic associated with the Project will travel within existing domestic commercial shipping lanes, upon entering Placentia Bay, before traveling west into Little Lawn Harbour. Vessel activity will not occur near any of the three IBAs and as recommended by Environment Canada, ships will maintain a minimum distance of 300 m from any colony or island occupied by seabirds and waterbirds (ECCC 2018c). While day-to-day shipping activities are unlikely to have any effect on coastal and marine birds at the IBAs or provincial ecological reserve, accidental spills and releases from marine traffic could result in the direct physical exposure of birds to oil within the affected area with possible lethal and sublethal effects. The effects of accidents and malfunctions are discussed in Section 7.8.

Should seabirds or other species become stranded on vessels, CFI would expect vessel operators to adhere to appropriate handling protocols, such as best practices for stranded birds encountered offshore Atlantic Canada (ECCC 2016b). During fall migration, CFI will conduct periodic searches at the marine terminal for stranded seabirds (e.g., Leach's storm-petrel). Searches will be performed in early morning and coincide with prior night conditions that have the potential to increase stranding events (e.g., foggy nights with strong southwesterly winds). It is recognized that a valid bird handling permit from ECCC-CWS will be required to perform and document any release of stranded seabirds.

Wildlife

Likely effects on terrestrial mammals during the operation phase of the Project are anticipated from increased noise (including conveyor transport and ore/aggregate transfer to vessel) and disturbance from traffic and other human activities in the Project area. Local nocturnal species may be attracted to and/or disoriented by changes in ambient lighting. Moths may be attracted to new artificial lighting in the Project area, increasing the risk of predation. To reduce this effect, the minimum amount of pilot warning and obstruction avoidance lighting will be used.

Project operation may cause changes in the diversity and relative abundance of local mammal populations, such as potential increase in fox and/or coyotes, that are well adapted to human presence. Therefore, good housekeeping practices will be enforced during all Project operation activities to minimize the potential effects for this.

7.5.3 Rehabilitation and Closure

The physical activities associated with rehabilitation and closure are described in Section 2.5. Likely effects during this phase of the Project are expected to be similar to but less than those expected during construction. Rehabilitation and closure methods and activities will comply with all applicable federal and provincial regulatory requirements in force at the time. The final result of these activities is the rehabilitation of habitat that will be available for bird and wildlife use.

A Rehabilitation and Closure Plan will be prepared and submitted to the Government of NL under the *Newfoundland and Labrador Mining Act*. The plan will meet regulatory requirements for rehabilitation and will include closure and rehabilitation of the infrastructure at the marine terminal and associated infrastructure.

During this phase of the Project, increased human activity, noise and dust are expected to have temporary adverse effects on local terrestrial wildlife populations. Local populations are expected to return to sustainable levels following decommissioning activities. Given that the Project location is relatively isolated, it is likely that the site will be rehabilitated to an approximate natural state upon decommissioning. There is potential for increased or new types of habitats, such as ponds and rocky cliffs upon decommissioning.

7.5.4 Environmental Effects Summary

A summary of the likely environmental effects and proposed mitigation for the Wildlife VC is provided in Table 7-6.

Table 7-6: Environmental Effects Summary and Proposed Mitigation Measures for Wildlife VC

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
Construction	Pre-stripping, excavation and blasting, construction activities and equipment mobilization, transportation, staging and storage of construction-related equipment and materials	Reduction of wildlife habitat Fragmentation of wildlife habitat Mortality of wildlife Disturbance and behavioural changes of wildlife Destruction of active migratory bird nests	▪ Refer to Section 7.2 Atmospheric and Section 7.6 Terrestrial and Marine Environment; ▪ Minimize construction area; ▪ Minimize duration of construction; ▪ Avoid clearing during the breeding bird season , where possible; ▪ If clearing during the breeding bird season, follow the CFI Avifauna Management Plan and consult with CWS for contingency plan(s), as necessary; ▪ Discourage ground- and burrow-nesting species from nesting on denuded soil (e.g., by covering unattended soil piles); ▪ If a nest is identified on the site, establish a species-specific buffer around the nest, halt potentially disruptive activities within the buffer area and protect nests until chicks have fledged; ▪ If a nest is identified on the site, consult with CWS for further advise; ▪ Implement 1 km buffer from breeding seabird colonies recommended by CWS for high-disturbance activities; ▪ Maintain proper housekeeping practices and activities that may attract wildlife. ▪ Compliance with the *Migratory Birds Convention Act,* 1994 and the *Species at Risk Act,* 2002
Operation	Aggregate production, transportation, water & waste management,	Reduction of wildlife habitat Mortality of wildlife Disturbance and behavioral changes of wildlife Destruction of active migratory bird nests	▪ Refer to construction mitigation above and Section 7.4 Terrestrial Environment and Section 7.8 Accidents and Malfunctions; ▪ Implement 300 m buffer between ships and breeding seabird colonies as recommended by Environment Canada; ▪ Minimize use of pilot warning and obstruction avoidance lighting on tall structures; ▪ White lights would be preferred for use on towers or high structures at night; ▪ Solid red or flashing red lights will be avoided; ▪ High intensity lights, including floodlights, will be turned off at night outside of working hours, if possible, especially during the spring and fall migration period; ▪ Lighting for the safety of the employees should be shielded to shine down and only to where it

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
			is needed, without compromising safety; ▪ Use existing shipping lanes where possible; ▪ Should seabirds or other species become stranded on vessels or on land, adhere to relevant protocols; and ▪ Annually complete a permit application form prior to handling birds. ▪ Compliance with the *Migratory Birds Convention Act,* 1994 and the *Species at Risk Act,* 2002
Rehabilitation and Closure	Similar to those used during construction with the exception of blasting	Similar to those to those experienced during construction	▪ Refer to construction.
The above activities will be conducted in full compliance with all relevant Acts and regulations, including, but not limited to the *Migratory Birds Convention Act,* 1994 and the *Species at Risk Act,* 2002 and in accordance with the Project's EPP and other management plans.			

In summary, the expected residual environmental effects of the Project on Wildlife VC (including migratory and resident birds) are minor or negligible, when mitigations measures listed above are considered. Please note: stakeholders raised no issues related to wildlife during our public consultations with local residents.

7.6 Marine Environment

The Marine Environment VC includes marine fish and fish habitat, marine mammals, sea turtles and marine species at risk that could potentially be affected by the Project. The Project-related interactions and likely effects on the Marine Environment VC, along with the mitigations to reduce or avoid these effects, are described below. Note that the interactions of marine fishes, marine mammals and sea turtles with the proposed Project, and any potential effects of these interactions are generally the same as those associated with marine fishes, marine mammals and sea turtles considered to be at risk or of conservational concern.

The potential effects of the proposed project on marine birds are considered in Section 7.5 where both terrestrial and marine birds are discussed. Accidents and malfunctions, including those potentially affecting the marine environment, are considered in Section 7.8.

Based on the preliminary identification of likely Project-environment interactions (see Table 4-1), the Project will interact with the marine environment during all phases (i.e., construction, operation, rehabilitation and closure). Most of the potential effects on the marine environment are associated with the construction of the wharf and breakwater in Little Lawn Harbour. The design of the wharf and breakwater includes the installation of various sized stone (e.g., armour stone, filter stone) to protect against damage (Section 2.0). The armour stone and filter stone will create marine habitat that is suitable for use by a variety of marine invertebrates, such as lobster, and marine fishes, thereby potentially supporting local commercial fisheries. It is anticipated that the installation of the various stone types will provide offset for the marine habitat that is affected as a result of the construction of the wharf and breakwater.

No issues related to the marine environment were raised by stakeholders during consultation activities (Section 5.2).

7.6.1 Construction

The following Construction Phase activities have potential to affect one or more components of the Marine Environment VC:

- stripping;
- excavation and blasting;
- pile driving;
- construction activities and equipment mobilization; and
- transportation.

As described in Section 2.0, the activities listed above are required to allow construction of the wharf and breakwater, and of the access road connecting them to the mine site and other Project components and infrastructure.

The primary potential effects of the Construction Phase activities listed above are as follow:

- loss of fish and fish habitat within the footprint of the wharf and breakwater;
- alteration to fish and fish habitat due to re-suspended sediment and/or dust from land-based activities; and
- behavioural effects on invertebrates, fishes and other marine species due to noise and vibrations associated with construction activities (e.g., pile driving, on-land blasting, operating vessels).

As construction areas are stripped, the vegetation is removed leaving bare surfaces, thereby increasing the potential volume and peak rate of runoff discharged from the Project area and ultimately into the nearshore marine environment. Also, removal of vegetation could increase concentrations of suspended solids within stormwater runoff affecting water quality of the receiving environment and resulting in adverse effects on marine species (e.g., lobster). Dust will be produced during excavation and blasting, construction activities and equipment mobilization, and the operation of Project-related vehicles and equipment. Suspended solids concentrations in the marine environment will likely be increased through dust being deposited directly on the water in Little Lawn Harbour, and through runoff into the marine environment.

As described in Section 2.0, construction of the wharf and breakwater in Little Lawn Harbour will be based on open piles supporting conveyor with mooring dolphins. The wharf and breakwater infrastructure will occupy a maximum footprint of 3 ha within the marine environment, resulting in the alteration or loss of the marine habitat in the footprint as well as flora and fauna associated with the affected habitat. Marine construction activities are expected to result in disturbance of bottom sediments, potentially affecting the water column and nearby benthic habitats.

As indicated above, construction of the wharf and breakwater will result in both the loss and alteration of fish and fish habitat. The reduction in available fish and fish habitat associated with Project activities will be minimal in relation to the area of available similar fish and fish habitat in Little Lawn Harbour and vicinity. While this habitat is important to the marine biota (flora and fauna) it supports, it is not limiting within Little Lawn Harbour. Due to the nature of the Project, unavoidable serious harm to marine fish and fish habitat will result from the construction of the wharf and breakwater in Little Lawn Harbour.

Construction of the wharf and breakwater could also result in the alteration of fish and fish habitat through re-suspension of sediments into the water column. High suspended sediment concentrations may clog gills, decrease feeding success, reduce rates of growth or embryo development, decrease resistance to disease and reduce the ability of marine fish to see and avoid predators, while also reducing the amount of light reaching any submerged vegetation, thereby decreasing photosynthesis (Park 2007). Increased levels of suspended sediment may also pose a problem for filter-feeding species. These effects will likely vary depending upon the susceptibility of the species and the nature of the substrate at the site. Sublethal effects on a variety of fish species have been recorded by Appleby and Scarratt (1989), when species were continuously exposed for a period of several days in waters with suspended sediment concentrations of approximately 650 mg/L or greater. Although this may affect marine plants and cause reduced habitat quality as there is generally a lower amount of dissolved oxygen associated with high suspended sediment values (Ntengwe 2006), some invertebrates, fishes, marine mammals and sea turtles would likely re-locate to adjacent areas to avoid the temporary disturbance.

Construction of the wharfl and breakwater may also result in behavioural effects on, direct injury to or mortality of flora and slow-moving or immobile fauna. Benthic communities have been shown to recover from disturbance related to types of marine construction activities (e.g., dredging) (Dernie et al. 2003). Lobsters that are displaced from the Project footprint are expected to return within a relatively short time period after the construction activities are completed, with a minimal effect on catchability (Payne et al. 2008; Martec Ltd. et al. 2004).

Sound associated with onshore blasting and pile driving in the marine environment may result a zone of increased disturbance to marine flora and fauna. Blasting produces compressive shock waves in water followed by a rapid decay to below ambient hydrostatic pressure. Overpressure can damage fish swim bladders, rupture or hemorrhage internal organs, and cause alteration or loss of fish eggs and larvae, including crab and lobster eggs and larvae. Shore-based blasting and pile driving during the construction phase is expected to occur over several months but will be temporary in duration and localized.

Additional noise in the marine environment will be created by other construction activities, including vessel traffic. Increased noise (magnitude, frequency, duration and character) above background levels resulting from construction activities may result in short-term changes to behaviour and habitat use of marine invertebrates and fishes. Marine fish utilize sound for communication, as well as for predator and prey detection, making use of the rapid propagation of sound through water to perceive and discriminate sounds in the marine environment (Smith et al. 2004). Loud noises may result in behavioural responses, including avoidance of the noise source, which could result in avoidance of feeding or spawning grounds (Popper 2003). Most adult pelagic and demersal fish species will likely avoid such activities due to the associated noise and vibration, thereby limiting direct mortality and injury as a result of the Project.

It has been reported by Richardson et al. (1995) that typical vessel traffic (e.g., barges, tugs and bulk carriers) generally produce sound levels between 168 and 193 dB (1 μPa) at 1 m distance. Excessive vibration may cause direct effects on the seabed, including liquefaction, increasing turbidity and the disruption of benthic communities. These potential effects are dependent on the type of seabed and sediment characteristics.

Marine mammals and sea turtles are also sensitive to noise. Cetaceans (i.e., whales, dolphins and porpoises) have low reproductive potentials, rendering them particularly vulnerable to anthropogenic effects (National Marine Fisheries Service [NMFS] 1996). Small cetaceans have shorter life spans (ranging from 15–30 years) compared to larger marine species, which may live to be over a century in age (Hoyt 1984). The noise associated with vessel traffic during the construction phase may disturb marine mammals and sea turtles, causing them to avoid the work area. At close proximity, these sounds have the potential to impair marine mammal and sea turtle feeding efficiency, predator detection, and/or migratory success (Richardson et al. 1995). Marine vessels produce low-frequency sounds with most acoustic energy below 1 kHz. As seals and harbour porpoises are most sensitive to mid-frequency sounds (>1 kHz), much of the acoustic energy produced by vessel traffic will not be audible to these marine mammals. The behavioural effects described above will subside once the construction activities are complete.

The vessel traffic associated with the all phases of the Project has the potential to either attract marine mammals/sea turtles or frighten them away, depending on the type of activity. Some mammals may be indifferent. Some dolphin species are well known for bow riding, and baleen whales have been known to approach fishing vessels at the sound of trawl doors being raised. The concern related to attraction of marine mammals and sea turtles to vessel traffic is the increased likelihood of collision. Vessel collisions with marine mammals and sea turtles are more likely to occur when vessel speeds are high. The likelihood of collision can be decreased if vessels maintain constant speed and course while in transit (Laist et al. 2001).

Collisions where vessel speeds were above 15 knots (28 km/hr) were found to be lethal to whales nearly 100% of the time, while collisions where vessels were travelling at lower speeds found lethality rates at less than 50% (Vanderlaan and Taggart 2007). While lethal collisions with right whales can occur even with small vessels, ships greater than 80 m in length are more likely to cause fatality to fin whales.

7.6.1.1 Mitigation

A number of mitigations can be applied to lessen the potential effects of construction activities on the Marine Environment VC. They are as follow:

- creation of buffer between all-natural waterbodies and waste rock, overburden and topsoil piles;
- installation of armour stone and filter stone during construction of wharf and breakwater which could provide more complex hard substrate habitat for various biota (to be described in Offsetting Plan);
- minimization of underwater noise by suitable setback from high water mark of any on-land blasting, and use of bubble curtains while pile driving;
- minimization of runoff water into marine environment to minimize sedimentation in marine environment;
- use of sedimentation curtains to minimize sedimentation in marine environment; and
- reduction of vessel speed in Little Lawn Harbour and along north-south shipping lane connecting to main shipping lane to minimize potential for vessel-marine mammal/sea turtle collisions.

Only a small portion of ground cover adjacent to Little Lawn Harbour will be disturbed during on-land construction. A buffer of at least 25 m between all-natural waterbodies and waste rock, overburden, and topsoil piles will be maintained to minimize the risk of sedimentation. The limited area of disturbance and use of setbacks, combined with the use of standard erosion and control measures (during all phases of the Project), will help prevent sediment-laden runoff from entering the marine environment.

As indicated previously, the armour stone and filter stone installed during construction will create new complex marine habitat that is suitable for utilization by a variety of marine invertebrates and fishes which support local commercial fisheries. To counter unavoidable serious harm to fish and loss of fisheries productivity for species that are part of or support a commercial fishery, CFI will apply for an Authorization pursuant to the *Fisheries Act* Section 35(2)(b), including the preparation of a Marine Fisheries Offsetting Plan. This Plan will be developed in consultation with DFO, to offset the likely effects of the Project on marine fish and fish habitat.

Fixed and moored structures typically become a focus for marine production (e.g., reef effect) by attracting marine life, including invertebrates, fishes, marine mammals and seas turtles. Structures built in the marine system may potentially provide alternate habitat for marine benthos, such as lobster, and prove beneficial in terms of benthic species diversity in the area. The artificial reef effect might be considered an indirect mitigation.

Consideration will be given to the use of silt curtains or other similar methods in the marine environment during construction to limit the extent of the effects of suspended sediments.

To avoid potential effects of sound from blasting on land, charge size will be reduced if the location of blast is near the water's edge. CFI will comply with DFO guidance which stipulates that, for large blasts, on the order of 100 kg per hole, a setback of about 150 m is required (Wright and Hopky 1998). If pile driving is required during construction of the marine terminal, the use of bubble curtains may be considered to mitigate the emitted sound.

Vessels used during construction of the wharf and breakwater will have a maximum speed of 14 knots while operating in Little Lawn Harbour and vicinity, regardless of the size of the vessel. In addition, sufficient distance will be maintained between Project vessels and whales and sea turtles, whenever possible.

Implementation of the above mitigations will likely result in residual effects of construction activities on the Marine Environment VC that are deemed not significant.

7.6.2 Operation

The following Operation Phase activities have potential to affect one or more components of the Marine Environment VC:

- presence of vessels at the marine terminal; and
- movement of vessels between the marine terminal and the main shipping lanes south of the Burin Peninsula.

The primary potential effects of the Operation Phase activities listed above are as follow:

- disturbance of marine invertebrates and fishes in Little lawn Harbour;
- disturbance of marine mammals and sea turtles along north-south shipping lane between marine terminal and main shipping lane south of the Burin Peninsula; and
- potential collisions between marine mammals/sea turtles and Project vessels.

During the operation phase of the Project, the primary activity that will likely affect components of the marine environment is transportation (i.e., vessel presence and operation). The most likely effects of vessel operation on the Marine Environment VC are behavioural changes to fishes, invertebrates and other marine species due to exposure to the noise and vibration associated with vessel operation, and the increased potential for collisions between Project vessels and marine mammals/sea turtles.

During operation, noise produced by vessels transporting fluorspar concentrate and aggregate may adversely affect the behaviour of marine species near the ship loading area and in the shipping lane between the marine terminal and the main shipping lanes south of the Burin Peninsula. Fish or marine mammals may avoid the area, change migratory routes, and/or alter feeding habits (Lawson et al. 2000). Propeller wash from the larger ships used during the operation phase of the Project may also re-suspend sediment.

Large shipping vessels (i.e., bulk carriers) will be used to transport fluorspar concentrate to markets. These large vessels are expected to be greater than 120 m in length and will therefore have limited maneuverability to avoid collisions with marine mammals and sea turtles. These vessels are commonly designed for a speed of 13–15 knots. Project-related vessels will have a maximum speed of 14 knots in coastal waters (i.e., out to the established shipping lanes in Placentia Bay) to reduce the risk of collision with marine mammals and sea turtles.

7.6.2.1 Mitigation

Mitigations that can be applied to lessen the potential effects of operation activities on the Marine Environment VC are as follow:

- minimize the vessel engine noise while in Little Lawn Harbor; and
- reduction of vessel speed in Little Lawn Harbour and along north-south shipping lane connecting to main shipping lane to minimize potential for vessel-marine mammal/sea turtle collisions, and lessen the noise being emitted by the vessels.

Implementation of the above mitigations will likely result in residual effects of operation activities on the Marine Environment VC that are deemed not significant.

7.6.3 Rehabilitation and Closure

The physical activities associated with rehabilitation and closure would include removal of the wharf from Little Lawn Harbour while the breakwater will remain in place. Many of the marine activities, potential effects and mitigations already described for the construction phase are also relevant to rehabilitation and closure as it applies to the Marine Environment VC. The generation of underwater sound and the potential of re-suspension of sediment will likely be the two activity-associated consequences that could potentially have the most effect on the Marine Environment VC. These potential effects would be temporary and very low magnitude. Rehabilitation and closure methods and activities will comply with all applicable federal and provincial regulatory requirements in force at the time.

A Rehabilitation and Closure Plan will be prepared and submitted to the NL Government under the *Newfoundland and Labrador Mining Act*. The plan will meet regulatory requirements for rehabilitation and will include closure and rehabilitation of the marine infrastructure.

Fixed structures (e.g., breakwater) typically become a focus for marine production (e.g., reef effect) through utilization by marine life. In some cases, structures can provide alternate habitat for marine benthos such as lobster, the effect of which may even be considered beneficial if these structures provide habitat diversity which may in turn increase benthic species diversity in the area.

7.6.4 Environmental Effects Summary

A summary of the likely environmental effects and proposed mitigation for the Marine Environment VC is provided in Table 7-7. A Project-specific EPP will be prepared to describe the procedures required to meet regulatory obligations, as well as the recommendations, mitigation measures and commitments made in this document.

Table 7-7: Environmental Effects Summary and Proposed Mitigation Measures for Marine Environment VC

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
Construction	Stripping, excavation and blasting, construction activities and equipment mobilization, transportation, staging and storage of construction-related equipment and materials	Increased suspended sediments in runoff into marine environment	Refer to stripping and mitigation measures indicated in Section 7.2 Atmospheric Environment and Section 7.3 Water Resources.
			Implement standard erosion and sediment control measures on land-based construction areas.
			Consider use of silt curtain or other measures in marine construction areas.
			Monitor discharge of settling ponds for suspended sediments.
	Excavation and blasting, pile driving, other construction activities and equipment mobilization	Alteration or loss of marine fish habitat Disturbance and behavioural changes of marine species Loss of benthic communities within the footprint of the wharf (piles) and breakwater	Minimize the Project footprint to that required for efficient and safe construction.
			Minimize duration of construction. minimize underwater noise.
			Comply with DFO guidance related to blasting near and in the marine environment. There will be no blasting in marine area, only pile deriving.
			Use of bubble curtains or other similar methods in the marine environment to limit the potential effects of noise, as appropriate.
			Maintain 150 m setback from coast for blasts larger than 100 kg per hole.
			Maintain constant course and vessel speed under 14 knots while operating in Little Lawn Harbour and vicinity
			Implement Marine Fisheries Offsetting Plan pursuant to the *Fisheries Act* Section 35(2)(b).

Project Phase	Activity	Likely Environmental Effect	Proposed Mitigation Measure
Operation	Transportation - shipping	Alteration of marine habitat	Maintain constant course and vessel speed under 14 knots while operating in Little Lawn Harbour and shipping lane approach; Install proper navigation aids; Minimize underwater noise; minimize engine noise while in Little Lawn Harbour;
		Disturbance and behavioural changes of marine species	
Rehabilitation and Closure	Rehabilitation and closure.	Similar to those associated with construction	Refer to construction.
The above activities will be conducted in full compliance with all relevant Acts and regulations, including, *Species at Risk Act,* 2002, and in accordance with the Project's EPP and other management plans.			

In summary, the expected residual environmental effect of the Project on the Marine Environment (including fish and fish habitat, and fisheries) would be moderate, when mitigations measures listed above are considered. Stakeholders raised no issues related to the marine environment during consultation activities (except the fishers, which is addressed in Section 7.7).

7.7 Socio-Economic

7.7.1 Construction

Construction activities will likely affect the Socio-Economic VC to various degrees. The following activities are considered likely to have an effect on one or more components of the Socio-Economic VC:

- Stripping;
- Excavation and blasting;
- Pile driving;
- Other construction activities; and
- Transportation (i.e., vessel movement).

This section presents an analysis of the most likely key Project effects on the Socio-Economic VC and proposed mitigation measures to reduce or avoid the likely adverse effects during construction.

Health and Safety

Canada Fluorspar Inc.'s most recent Health, Safety and Environment manual was issued in June 2018, which emphasizes the following commitment to health, safety and environment:

> *"CFI is committed to the highest standard of responsibility in every activity it undertakes to protect the environment, public health and employee safety and to comply fully with all applicable laws and regulations.*
>
> *Our commitment to protecting the environment and the health and safety of our employees and the communities we work in represents a critical part of the core values that guide our corporation. As part of that commitment, all CFI employees actively support these values and strive to achieve continuous and measurable improvement of all our processes and products*

This program is intended to support CFI`s vision for ensuring the health and well-being of our employees as well as the integrity of the environment in which we work. CFI's Heath, Safety and Environmental Programs will detail the roles and responsibilities of the various stakeholders in CFI (NL) Inc. The duty of each workplace party is interrelated and thus the successful implementation of HSE practices and procedures is dependent on the cooperation of all individuals in CFI (NL) Inc."

The Health, Safety and Environment Manual applies to all operations by CFI (NL) Inc. and will be updated for the specific operations associated with the Project.

Demography

The Project has the potential to extend the life of open pit mining at the AGS site for an additional 10 or 18 years, which added to the current anticipated 10 years, enables anticipation of an ongoing need for a 200 or person workforce for almost 30 years. The Peninsula has seen significant out migration and population decrease over the last 15 years (Section 6.7.2) and many 'boom/bust' projects. The prospect of continuity of employment provides opportunities for residents who wish to remain on the Burin Peninsula or return from living and/or working away and may well help address the loss of residents. The residual effect of the Project on the demography of the area is deemed to be not significant.

Economy, Employment and Business

Construction has been part of activities at the AGS site since 2016 as the site was prepared for production. Construction of the new mill and new site infrastructure to enable production started in 2016 and is now slowing: there will be second construction period associated with the Project, both on land for an access road and aggregate stockpile area and conveyor system as well as marine works, the breakwater and the ship loading system (Section 2.2).

Construction of the Project facilities at the mine site related to the marine terminal will take place over about three years with approximately 27, 87 and 44 positions during these years (see Table 2-4, Section 2.6.1). Construction during preparation for production peaked at close to 375 direct hire employees with most workers from local area and with the labour force available on the Burin Peninsula, (see Table 6-24, Section 6.7.3), a similar situation is expected with the Project.

CFI is committed to maximizing local benefits, including hiring locally or provincially where possible. The commitment includes direct employment, training and specific policies for gender equity and diversity. CFI set a target of 15% female participation during construction: by early June 2018 the number of females working for CFI was 14.08% (Table 7-8). CFI will fully implement and abide by its Gender Equity and Diversity Plan (CFI 2018a) as per Schedule B of CFI's Benefits Agreement with the province (CFI 2018b), which is applicable to the Project.

There is the necessary business capacity in the region to serve the Project. Businesses on the Peninsula are represented by the Burin Peninsula Chamber of Commerce (BPCC 2015). While the number of businesses on the Burin Peninsula has declined over the last 10 plus years, there has also been the establishment of a cluster of companies supporting heavy industry and fabrication in the Avalon Isthmus area, about a two-hour drive away. As well, there is an increase in business diversity in communities in the local area with the start of the Grieg NL aquaculture project and updating of aquaculture facilities and equipment by Northern Harvest (M. Butland, Consultant, pers. comm., 25 April 2019).

Table 7-8: CFI Current Female Employees

Occupation	NOC Code (2011)	Current Number of Females
Accounts Payable Administrator	1431	2
Buyer	1225	1
Control Room Operator	9231	1
Cost Accountant	1111	1
AMMS Administrator	1241	1
Environmental Monitor	2231	1
Environmental Technician	2231	1
Executive Assistant	1222	1
Geologist	2113	1
Heavy Equipment Operator	7521	6
Human Resources Advisor	1223	3
Health, Safety and Environment Advisor	2263	1
Janitor	6733	2
Laboratory Technician	2212	7
Maintenance Planner	0714	1
Metallurgist	2115	1
Process Clerk	1241	1
Process Operator	9411	2
Purchasing Clerk	1524	1
Security Officer	6541	4
Total		**39**
Percentage		**14.08%**

CFI is committed to enhancing local benefits through the use of local suppliers and contractors. During construction a range of goods and services will be required. Table 6-28 in Section 6.7.3 shows typical service and supply needs as does the list below:

- Engineering services;
- Finance services;
- Transportation;
- Education and training;
- Environmental studies and services;
- Civil works;
- Hotel services;
- Surveying;
- Land clearing and site preparation;
- Laboratory services;
- Design and Fabrication; and
- Construction management.

The residual effects of the Project construction phase are anticipated to be positive for economy, employment and business.

Community Services and Infrastructure

The Burin Peninsula has a wide range of community services and infrastructure, much of it put in place to serve a larger population. The estimated addition of approximately 87 jobs at peak construction, with some if not all filled by residents, can be absorbed by the community infrastructure for education and health services, regional services such as police, fire and waste management. There will be short term increases in traffic on the highway and some sections of community roads, associated with the mobilization and later demobilization of equipment for construction. Notifications of movement of heavy vehicles, equipment or materials will be made through usual procedures and social media. The residual effect of the Project construction phase is deemed to be not adverse or significant for Community Services and Infrastructure.

Commercial/Recreational/Indigenous Fisheries

As indicated in Section 7.6, the construction activities listed above have potential to affect marine invertebrates and fishes, including those typically targeted by commercial fisheries. Therefore, the potential effects and mitigations discussed in Section 7.6.1 are also relevant to commercial/recreational/Indigenous fisheries.

The other potential effects of construction activities on fisheries include displacement of fishers from traditional gear deployment locations, particularly in Little Lawn Harbour, and the potential collision of Project vessels with fishing gear deployed both in the harbour and along the route used by Project vessels to access the main shipping lanes south of the Burin Peninsula. Initial discussions have been held with the area harvesters who typically use Little Lawn Harbour for lobster fishing (and some cod fishing) and use the deep-water areas (‘holes’) outside the harbour.

The best mitigation for the potential displacement and gear collision effects is open communication between the fishers and CFI. There will be follow-up discussions between CFI and the harvesters regarding how to minimize or avoid disruption to the lobster fishery during construction. Implementation of this mitigation will likely result in residual effects of construction activities on the fisheries component of the Socio-Economic VC that are deemed not significant.

7.7.2 Operation

Health and Safety

Canada Fluorspar Inc.’s most recent Health, Safety and Environment manual was issued in June 2018 (Appendix B):

In the exit surveys at the Public Information Session, residents were asked to identify what they believe is the most important aspect of the Project: they were asked to rank five different aspects: Health and safety; jobs/employment; environment; local benefits; and other (see Figure 5-3). The overwhelming interest is in health and safety, which was ranked as number one priority and almost twice as important to participants as employment.

Many participants identified reduced or eliminated heavy truck traffic on community roads as an advantage of the proposed alternate location for the shipping facility, reducing wear and tear on the roads, reducing risk and reducing air emissions. The afternoon discussions with fish harvesters had identified the need to address the passage of the large vessels coming to/from the terminal through areas where small fishing boats would be working: the potential need for a designated route and pilotage and effective communication were suggested as means to reduce risk.

Exporting aggregate is anticipated to extend the use of open-pit mining at the AGS vein by 10 or more years, delaying or replacing underground mining. Open-pit mining is inherently safer. Exporting aggregate means additional handling of the waste rock – maintaining the stockpiles, crushing operations and conveyor operations. The chemical nature of the rock itself has no health implications. Dust emissions will be controlled as per regulation.

Demography

The relatively small increase in workforce associated with the Project is different from the 'boom and bust' of large projects that have been typical of the Burin Peninsula, associated with the construction and fabrication facilities at or near Marystown. It is anticipated that the potential for an extended period of operations associated with the opportunities provided by the new terminal location will enable residents to foresee not just the current 10 years of work but an additional 10 or more for close to thirty years of operations, hence, employment. As the Mayor of St. Lawrence pointed out at the Public Information Session, the longer timeframe enables young people to plan and take training, knowing there are employment opportunities 'at home'. Continuity of employment may also enable residents who wish to remain on the Burin Peninsula to stay or return from living and/or working away. The residual effect of the Project on demography is anticipated to be positive.

Employment, Economy and Business

In the Benefits Plan agreed with the NL Department of Natural Resources in 2018, CFI commits to 'provide Residents first consideration for employment in relation to the Operations Phase of the Project' and to 'provide Provincial Suppliers full and fair opportunity to participate on a competitive basis and first consideration for procurement opportunities for services and goods where those services and goods are competitive in terms of fair market price and delivery..'.

Overall, CFI anticipates that the workforce required for extended operations associated with the addition of aggregate to its exports will be about 20–24 people, 10% over what was originally anticipated for the AGS mine. Much of the increase will be in the trades presently employed at site as the work focus will continue to be open pit mining with additional aggregate crushing (Table 2-5, Section 2.6.2). Approximately 10 positions are associated with the marine operations, mainly line handlers and marine crew on the work boat/tug. As the Burin Peninsula has a long history of marine operations, it is expected that trained crew will be found within the existing area residents.

Project effects on local businesses should be positive. The opportunities associated with the Project are listed in Section 6.7.3. Commercial fishing is an important part of the economy of the Burin Peninsula and is described in Section 6.7.5 and the potential effects of the Project in Section 7.7. The residual effects on the economy, employment and business are anticipated to be positive.

Community Services and Infrastructure

The Burin Peninsula has a wide range of community services and infrastructure, much of it put in place to serve a larger population. The increased employment over the longer time period anticipated with the

Project will increase the tax basis to support community infrastructure. The residual effect of the Project Operations phase is negligible to positive.

Commercial/Recreational/Indigenous Fisheries

As with construction activities, the potential effects of operation activities on commercial/recreational/Indigenous fisheries include displacement of fishers from traditional gear deployment locations, particularly in Little Lawn Harbour, and the potential collision of Project vessels with fishing gear deployed both in the harbour and along the route taken by Project vessels to access the main shipping lanes south of the Burin Peninsula. At the initial meeting with harvesters, they indicated their concerns with effects on fish and lobster habitat as a result of the breakwater.

Breakwaters can provide new fish and shellfish habitat. DFO has published guidance regarding breakwater design to meet habitat needs of the various stages of lobster. The harvesters have had a lobster research program ongoing for some time in Little Lawn Harbour and CFI hopes to work with FFAW and DFO to access this information. Those data would provide baseline for ongoing monitoring. CFI conducted a marine fish and fish habitat survey in the Project marine footprint and will be able to provide specific information on the existing seabed conditions and habitat.

While the potential route for the large vessels travelling through outer Placentia Bay as they enter and leave Little Lawn Harbour has not been defined, CFI is aware of the small boat fishery in these areas and the need for operational safety for all. CFI has also met with the Placenta Bay Traffic Committee (2 May 2019, Arnold's Cove) to introduce the proposed new terminal location and get initial comment from the Committee.

The best mitigation for the potential displacement and gear collision effects is open communication between the fishers and CFI. Discussion with harvesters will also address potential effects on commercial fishing during operations. It is expected that lobster fishing will be able to continue around the breakwater and close to the loading facilities themselves with the necessary safety measures in place. With implementation of a jointly developed program of operational safety and communication, residual effects of operation activities on the fisheries component of the Socio-Economic VC are predicted to be not significant.

7.7.3 Rehabilitation and Closure

The physical activities associated with rehabilitation and closure would include removal of the marine terminal, but retention of the breakwater in Little Lawn Harbour. Many of the marine activities, potential effects and mitigations already described for the construction phase are also relevant to rehabilitation and closure as it applies to the Commercial/Recreational/Indigenous Fisheries component of the Socio-economic VC. The generation of underwater sound and the potential of re-suspension of sediment will likely be the two activity-associated consequences that could potentially have the most effect on fisheries. While these potential effects would be temporary, some fisheries, namely lobster and cod fisheries, within Little Lawn Harbour could be affected for the duration of the rehabilitation and closure phase. However, normal fisheries should resume after completion of this phase. Rehabilitation and closure methods and activities will comply with all applicable federal and provincial regulatory requirements in force at the time.

A Rehabilitation and Closure Plan will be prepared and submitted to the NL Government under the *Newfoundland and Labrador Mining Act*. The plan will meet regulatory requirements for rehabilitation and will include closure and rehabilitation of the marine infrastructure.

Fixed structures (e.g., breakwater) typically become a focus for marine production (e.g., reef effect) by potentially attracting marine life. In some cases, structures can provide alternate habitat for marine benthos such as lobster, the effect of which may even be considered beneficial if these structures provide habitat diversity and increase benthic species diversity in the area. The intent of CFI is to work with the harvesters who fish in Little Lawn Harbour and vicinity throughout the Project to address their concerns in a practical and effective manner that enables safe operations for both the harvesters and CFI.

Closure of operations would not be abrupt. There would be a gradual decline in production and operations as the resource is depleted. This time period would allow forward planning by individuals and businesses to adjust to the changing situation. Over the anticipated thirty years of operation, alternative opportunities for employment and business in the region such as those described in Section 7.9 Cumulative Effects may have developed.

7.7.4 Environmental Effects Summary

A summary of the likely environmental effects and proposed mitigation for the Socio-Economic VC is provided in Table 7-9.

Table 7-9: Environmental Effects Summary and Proposed Mitigation Measures for Socio-Economic VC

Project Phase	Activity	Potential Environmental Interaction	Proposed Mitigation Measure
Construction	All Project activities	Potential nuisance effects (dust, noise, odor) which could affect commercial and recreational fisheries in the immediate area	Prepare and implement a Complaints Response Plan during construction phase
			Implement an EPP, waste management plan, OH&S Plan to reduce potential effects of dust, odor and noise on the quality of life of its workers
			Implement mitigation measures identified in Section 7.2 Atmospheric Environment to address likely adverse effects associated with dust and noise
		Job creation (positive)	Provide on-the-job training
			Prioritize hiring of qualified local workers
		Development of local economy (positive)	Engage with local suppliers to share information on their requirements for equipment and services
	Stripping, excavation, blasting and construction activities	Potential alteration or loss of historic resources	Incorporate measures to address unexpected discovery of historic resources in the Project EPP
			In the event of discovery of such resources, construction activities in the affected area will cease immediately and the discovery will be reported to the Provincial Archaeology Office

Project Phase	Activity	Potential Environmental Interaction	Proposed Mitigation Measure
	Construction of Marine Terminal	Necessity for vessels to modify their trajectories in the Little Lawn Harbour to avoid the marine terminal construction area. Fisheries in the immediate area of the marine construction will likely be affected temporarily.	- CFI will transmit the exact geographical coordinates of the Marine Terminal construction area to the Canadian Coast Guard to help them manage marine traffic in the Harbour; - Ongoing communication with harvesters; - Set up safety zone within the wharf and breakwater construction area
Operation	All Project activities	Potential nuisance effects (dust, noise, odour)	Continue implementation of the Complaints Response Plan during operation phase
			Implement an EPP, waste management plan, OH&S Plan to reduce potential effects of dust, odour and noise on the quality of life of its workers
			Implement mitigation measures identified in Section 7.2 Atmospheric Environment to address likely adverse effects associated with dust and noise
	Shipping Activities	Displacement of fishers from traditional gear deployment locations Potential collision of Project vessels with fishing gear	Set up safety zone within the wharf and breakwater and turning basin
			Maintain constant course and vessel speed under 14 knots while operating in Little Lawn Harbour and vicinity
			Implement Fish/Fish Habitat Offsetting Plan
			Minimize disruption to the lobster fishery
			Implement agreed fishers program
			Establish Communications procedures with Fishers for operational safety.
	All Project activities	Job creation (positive)	Provide on-the-job training
			Prioritize hiring of qualified local workers
	All Project activities	Development of local economy (positive)	Continue to inform local suppliers of Project goods and services requirements

The communities closest to the proposed marine terminal location are all supportive of the Project.

Mayor Paul Pike of St. Lawrence strongly supported the proposed Project in his comments at CFI's April 25th Public Information Session. The Town had previously written a letter of support for the Project to the Minister of Fisheries and Land Resources. The Town supports CFI's request for an easement of 750–1000 m of an existing coastal environmental management area to allow the Project access to the shoreline for the construction and operation of the loading facility and breakwater. In return, CFI will contribute coastal lands at the eastern and southeastern area of its lease to the environmental stewardship area (Section 2.1.1).

The Mayor of Lawn summed up the impact of the Project as 'It's industry. It's jobs!' (Mayor John Strang, Lawn, pers. Comm., 17 May 2019) and stated that the he and the full council are 'fully supportive'. Mayor Strang also acknowledged that he was aware of the discussions between CFI and the local lobster fishers and 'believes their concerns and insights have been presented and heard as part of this (EA) process'.

The Town Manager of Burin stressed the importance of communication between the community and the Project. He mentioned that several residents work at CFI and some have bought homes in Burin (L. Hartson, Town Manager, pers. Comm., 9 May 2019).

Support for the Project was also expressed by the Chief Administrative Officer of the Town of Marystown as 'great for the economy, great for employment' (D. Kelly, Chief Administrative Officer, Town of Marystown, pers. Comm., 9 May 2019). Mr. Kelly also made the point that the positive effects of employment and economic activity in one community were also positive for the region and, as an example, pointed out that when the Cow Head fabrication facility, adjacent to Marystown, was operating, half of the employees were from Marystown, the rest from throughout the region and other towns on the Burin Peninsula.

The residual socio-economic effects of the Project will be positive. The overall effects will be to provide steady employment for a work force approximately 10% greater than at present and for a longer time period, 10 years or more, in addition to over 150 construction jobs (short-term during the construction phase). Not only can community services and infrastructure can cope with this increase, but also the Project can help stem the extent of out-migration, making the current services more viable.

7.8 Accidents and Malfunctions

The likely effects of potential accidents and malfunctions on workers, the public, and environment, socio-economic and cultural resources are considered in this RD/PD.

Accidents and malfunctions could occur during Project activities during construction, operation, and rehabilitation and closure phases. The Project has been designed, and will be constructed and operated following applicable standards, industry BMPs, and the Project-specific mitigation measures identified in this RD/PD and the Project-specific EHMS (e.g., EPP, EEMP, WMP, ERP, etc.). These measures are expected to limit the potential for occurrence of an accident or malfunction during Project construction, operation, and rehabilitation and closure.

As part of CFI's EHSMS, an ERP will be developed and implemented during all phases of the Project. The ERP will provide an appropriate and consistent response to emergency situations that may occur over the life of the Project.

This RD/PD addresses accidents or malfunctions that might have a reasonable probability of occurring, and which may have an adverse effect on the natural or socio-economic environment, considering the design of the Project and the site-specific conditions. Accidents and malfunctions may also be instigated by external factors (natural or manmade). The likelihood of such instigating events as well as the resulting effects of such events is considered. For these "likely" accidents and malfunctions, the resulting effects identified represent the worst-case scenario. Highly unlikely or hypothetical events (e.g., failure of contingency and back-up systems) are not addressed in this RD/PD.

The objective of the analysis is to determine if any "likely" Project-related accident or malfunction could be expected to result in a likely adverse effect on the natural or socio-economic environment. Assuming that some of the activities undertaken during Project operation, or rehabilitation and closure are similar to those completed during construction, potential accidents and malfunctions related to these activities are expected to be similar through all Project phases. As such, they are not re-addressed in the operation (Section 7.8.2) and rehabilitation and closure (Section 7.8.3) subsections.

Likely Project-related accidents and malfunctions associated with the Project include marine terminal failures; failures of erosion and sediment control measures; stockpile slope failure; vehicle and vessel accidents/collisions; small terrestrial or marine spills of deleterious substances (e.g., fuels, lubricants); large marine spills of deleterious substances (e.g., fluorspar concentrate, oil spill); and fires or explosions.

It is difficult to predict the exact nature of events and their severity should they occur; however, the probability of serious accidental events causing adverse environmental effects is low since both construction and operational procedures will be designed to incorporate contingency and emergency response planning.

7.8.1 Construction

7.8.1.1 Erosion or Sediment Control Failure

This would mainly affect the access roads, stockpiles and associated structures on land as well as marine side close to the breakwater. A potential exists for failure of erosion and sediment control structures due to extreme precipitation events during all phases of the Project. Such a failure could result in the release of silt-laden runoff to receiving watercourses with adverse effects on water resources, wetlands, and both terrestrial and marine fish and fish habitat.

Erosion and sediment controls will be implemented according to industry best practices, and standard requirements and practices. Plans for erosion and sediment control measures will be developed in the Project-specific EPP and response procedures in the event of a control failure as a part of the ERP. These plans and response procedures will be developed prior to the commencement of construction activities and will be implemented to minimize adverse effects on water quality from construction activities (both fresh and marine waters). These measures could include:

- scheduling site activities to minimize disturbance (e.g., fish spawning periods, severe weather, etc.);
- avoiding leaving excavations open for long periods and compaction/covering loose materials;
- compacting soils as soon as excavations, filling or levelling activities are complete;
- installation of silt fences, hay bales, etc. to minimize the transport of silt into water bodies;
- use of suitable materials for the construction of marine infrastructures (e.g., breakwater);
- ensuring that construction personnel are familiar with the measures to control sedimentation and erosion and that they conduct them in the appropriate manner;
- controlling runoff during the construction phase; and
- monitoring any runoff to ensure TSS levels are within acceptable ranges.

Erosion and sediment control measures installed on-site over the life of the Project will be regularly inspected and monitored, particularly during and after extreme precipitation events. Erosion and sediment control structures found to be damaged or inefficient will be repaired immediately and any other remedial action will be taken as necessary. Fines storage areas will be confined to areas within the site so that any control failures would not result in an off-site release of material.

In the unlikely event that the on-land runoff exceeds acceptable ranges for TSS as determined through monitoring, contingency measures may include pumping of sediment laden water to vegetated areas (away from down gradient water systems) or through filter bags for additional filtration and/or the implementation of additional settling ponds or erosion and sedimentation control structures. Remedial action will be taken as quickly as practical, and as necessary. In the event of a failure, Project construction will be shut down until appropriate controls are restored.

7.8.1.2 Vehicle and Vessel Collisions

A potential exists for Project-related vehicle collisions during all phases of the Project. Vehicles operating at the site will be primarily Project-related mining equipment, bulldozers, haul trucks, loaders, service vehicles (pick-up trucks) and workers' cars. A vehicle collision has low potential to lead to substantial environmental damage, with the most important risk being to worker health and safety. Fuel spills from vehicle collisions are expected to be localized near the source, will be minimal in volume, and be addressed by site personnel using available spill response equipment.

Vehicle collision mitigation begins with adequate worker training, and by employing experienced workers to the extent possible. Vehicles accessing the site will be required to check-in at the scale house. Other controls include: access and haul roads are sufficiently wide to allow safe passage of two vehicles side by side; adequate line-of-sight around corners and at road junctions; posting and enforcing speed limits; use of in-vehicle radios linked to a central dispatch; and regular maintenance of brakes, tires and other vehicle components. Emergency response in the event of a vehicle collision or accident would follow procedures outlined in the ERP.

A potential also exists for Project-related vessel collisions during all phases of the Project. During Project construction and operation, considerable vessel activity by multiple ships, barges and boats may occur for limited periods of time around the marine terminal. Collisions may involve Project-related vessels, other marine users (e.g., fishing boats), the terminal, breakwater and submerged rocks.

In the event of a vessel fuel tank rupture following a collision, marine fuel could be discharged to the marine environment. Fuel containment would be addressed by vessel personnel using available spill response equipment. In warm weather, fuel spills to the marine environment would be expected to degrade and evaporate quickly but would be slower during colder periods of the year.

The management of marine traffic is the responsibility of the Canadian Coast Guard. It is mandatory for large vessels to report to the Coast Guard at specified points in Placentia Bay and take local pilots on board past a certain point in the bay: at this time pilotage is not required for either St. Lawrence Harbour, Mortier Bay/Cow Head or Marystown. The potential for collisions will be minimized by controlling vessel speed; scheduling and coordinating activities with other marine users, as well as Transport Canada and the Coast Guard; and posting Notices to Mariners, as necessary. The marine terminal will have navigational aids and anti-collision radar will provide early warning of collision hazards. Weather reports and wind and sea state information will also be used to monitor changing weather conditions that could increase the risk of collisions during vessel navigation to or from the terminal. Tugs and pilots may also be used for guiding vessels during docking, as required.

Emergency response in the event of a vessel collision is coordinated by the Canadian Coast Guard with support from local land-based emergency responders, as needed. The Coast Guard will be advised of the timing and type of activity associated with Project operation and will be informed of the construction schedule by CFI before work begins. The ERP will contain a section regarding response to incidents at sea; however, the ship's Master is ultimately responsible for the safe operation and emergency response in case of an accident.

7.8.1.3 Spills and Leaks of Deleterious Substances

Terrestrial Spills

The proposed Project is mainly marine operations and will have a relatively small terrestrial footprint, mainly associated with assess road, stockpiles and the materials handling system. However, a potential exists for terrestrial spills during all phases of the Project.

During the construction phase of the Project, terrestrial spills would be limited to fuels and servicing fluids. The operation phase of the Project will also include waste materials generated during equipment maintenance. Spills and leaks could result from equipment failure, damage to storage or piping systems, mobile equipment accidents, or failure to follow proper procedures related to fuel and other bulk material transfers or equipment maintenance activities.

The amount of any potential spill is limited to the size of fuel, storage and equipment tanks. Small volume spills of less than 70 litres (L) are predicted to have minimal environmental effects. In the unlikely event of a large spill (more than 70 L), soil, groundwater and surface water contamination may occur. It is unlikely that a spill or leak would adversely affect the quality of habitats and/or result in ingestion or uptake of contaminants by vegetation and/or wildlife, as working areas of the industrial Project site will be largely devoid of vegetation, and wildlife are not expected to be found in these areas.

CFI will continue to enforce strict procedures for the safe transportation of all deleterious (hazardous) materials on-site. Materials stored on-site in bulk will be stored in above ground storage reservoirs with secondary containment. Storage tanks and facilities will be designed to conform to NL DMAE regulations, as required. Workers will use best practices during material transfer operations including monitoring and oversight of the transfer activities and verification to ensure that the receiving container has adequate capacity prior to beginning the transfer procedure. Such spills in the event that one occurred, would probably be small (less than 70 L), and emergency response and clean-up procedures would be initiated. Any spillage inside the containment will be recovered and managed in accordance with provincial waste management regulations.

Most spills or leaks would be localized near the source and be addressed by site personnel using available spill response equipment. All deleterious substances will be handled in a manner that reduces or eliminates the risk of spillage and accidents. Contingency planning will be in place to enable a quick and effective response to a spill or leak. Personnel will be trained in response measures, and spill response equipment will be readily available in the event of an accidental spill or leak. In the case of spill or leak of a deleterious substance, emergency response and clean-up procedures will be implemented. Immediate action will be taken to stop the leak and contain the spilled material. All contaminated material will be collected and stored in an appropriate manner so as to not re-release to the environment until such a time as it will be transported to an approved treatment/disposal facility. The procedures and requirements of the WHMIS program and other applicable government regulations will also be enforced.

Marine Spills

A potential exists for marine spills during all phases of the Project. The severity of the adverse effects resulting from a spill or leak of a deleterious substance to the marine environment depends on the spill volume and composition, sea state, current and wind conditions, and the promptness and effectiveness of response efforts. Small spills or leaks are most likely to occur at valves and hose connections. Any such spills will likely be small in quantity and frequency and will disperse rapidly. Effects of localized, minor spills on the marine environment would be minimal, as any such spills would be rapidly cleaned up in accordance with emergency response and contingency plans.

Larger marine spills could occur as a result of damage to a ship's hull sufficient to rupture a fuel tank, bilge water tank, or other ships structure. If large quantities of deleterious substances were to be spilled into the marine environment, there is potential for effects on marine fish and fish habitat, marine mammals, and marine birds, as well as fisheries (e.g., effect on the health of target species and either actual or perceived tainting of the species fished commercially). The likely effects of such an event may include spilled materials expanding to cover an area beyond the immediate spill location, creating a "slick". Over the short term (i.e., from the spill to approximately 10 days) the adverse effect of such a spill might include fish kills, coating of the fur and feathers of marine mammals and birds, and loss of lobster and other marine species, etc. in the immediate area of the spill, as well as in areas where the spill migrates before being contained. Over the longer term (i.e., one month and beyond) likely adverse effects following clean-up of the spill might include impairment of fisheries productivity. Certain mobile marine species could relocate to other areas, such that effects on breeding areas could lead to decreases in fisheries productivity over time.

Whales may interact with spilled hydrocarbons but are not considered to be at high risk to the effects of hydrocarbons. Whales present in the affected area could experience sub-lethal effects, but these effects are reversible and would not cause permanent damage to the animals. Effects of hydrocarbons on sea turtles would also be reversible, although there is a possibility that foraging abilities may be inhibited by exposure to hydrocarbons.

The risk of a spill or leak of a deleterious substance into the marine environment is limited given there will not be any transfer of fuel, ballast water, sewage, waste or other materials apart from fluorspar concentrate and aggregate between the ship and the shore at the marine terminal.

Ships will arrive ballasted and ballast water will be discharged during loading in accordance with the *Canadian Ballast Water Control and Management Regulations* (SOR 2011-237) and the IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments. Vessels will not be refueled at the marine terminal.

Adherence to BMPs and proper equipment selection, inspection and maintenance will act to prevent potential accidental marine spills. Storage areas for deleterious substances onboard vessels will have secondary containment to prevent discharges onto decks and into the marine environment. Emergency response and contingency plans for accidents scenarios will be in place by the vessel contractors to contain any spilled material. Vessels over 400 GRT coming into Canadian waters must have an agreement in place with a certified oil spill response agency. In NL, the certified agency is Eastern Canada Response Corporation (ECRC).

Spill prevention and response preparedness planning will reduce the likelihood of contamination of the marine environment. Spill containment and clean-up materials (e.g., absorbent pads and dry chemicals) will be available for trained personnel to handle small spills. The ERP will provide details regarding procedures for responding to larger or more serious marine spills, including contacts for first responders and clean-up crews. The appropriate regulatory authorities (e.g., Canadian Coast Guard) will be notified of spills, as appropriate.

All shipping and offshore activities will be conducted in compliance with the *Canada Shipping Act* requirements for vessel inspection and certification, and training and appropriate certificates of competency for operators. Collisions between marine vessels are considered unlikely to occur given the lack of significant large-ship traffic in the area of the marine terminal and the active vessel management system in Placentia Bay. Furthermore, the potential for collisions may be further reduced by using tug and pilot assist for docking at the marine terminal.

Vessels and operators will be required to have procedures in place to safeguard against marine pollution including, but not limited to awareness training of all employees, means of retention of waste oil on board, and capacity of responding to and clean-up of accidental spills caused by vessels involved in the Project.

All Project vessels will have spill mitigation and clean-up equipment on board to respond to any deck spills or leaks, including booms, absorbent pads and dry chemicals. These measures will reduce the potential of spilled material entering the water. In the event of a spill, the ERP will be implemented to respond to and investigate the occurrence and follow up with corrective actions to reduce the likelihood of repeat spills.

7.8.1.4 Fires and Explosions

A potential for fire to occur at the Project site also exists. Fire could be caused by lightning, forest fire, human error or electrical/equipment malfunctions. The extent and duration of a fire depends on meteorological conditions, the fuel source and the success of the response effort. The immediate concern for a fire is human safety and damage of property. As well, in addition to destruction of habitat or direct loss of wildlife, emissions, particulate matter, and other contaminants may be generated. Smoke emissions from the fire would contain particulate matter, CO2, CO, NOx, SO2, VOCs, poly-cyclic aromatic hydrocarbons or other contaminants. Total particulate matter would increase and contribute metals to aquatic environments. Runoff would contain ash and sediment and increase alkalinity and TSS.

Forest fire is not likely to occur in the Project area (as the area is largely barrens).

A large fire could create air contaminant levels greater than the ambient air quality standard over distances of several kilometres; however, the likelihood of such a large fire is considered low and if such a fire was to occur, the duration would likely be short due to implementation of emergency response procedures and suppression response efforts.

As with all accidents and malfunctions, the most important effort is prevention. Proper material management and operational procedures will reduce the incidence and extent of accidental fires related to the Project. Burning of vegetation and debris will not be permitted.

In the unlikely event of a fire, contingency plans will be in place to enable a quick and effective response to an on-site fire, reducing the severity and extent of damage. Fire fighting water will be available at the wharf and personnel will be trained in fire prevention and response, and appropriate firefighting equipment will be readily available in the event of a fire. This capability will also serve to reduce the environmental effects of fires caused by lightning and other natural phenomena in the vicinity of the Project area.

Fire detection and protection systems will be installed at the Project site. The ERP will be implemented immediately upon the detection of a fire. Firefighting equipment and an emergency response vehicle equipped with firefighting equipment will be deployed immediately from on-site facility and from the

St. Lawrence Fire Department. Ships are typically equipped with firefighting equipment, which would be mobilized in case of fire onboard the ship.

Evacuation of personnel from the area affected will be the highest priority. Meeting places for site workers will be established and headcounts taken to account for all personnel. The appropriate Forest Management Unit office and RCMP office will be notified immediately and in the unlikely event of a large fire, local emergency response and firefighting capability will be called to respond, reducing the severity and extent of damage and to protect the safety of workers. The possibility of a large fire is very low.

Explosions at the marine terminal could result from an accident, failure of process equipment, over-pressure, sabotage, or as the result of a fire. As with accidental fires, the immediate concern for explosions is human safety and damage of property. No explosives are planned to be manufactured or used as part of the marine terminal Project. The use of explosives as part of the mining activities have been addressed in detail in the previous AGS EA: storage and use procedures are in place. Should blasting used in the construction of the site access road or sourcing of construction materials (rocks or armour stones) for the breakwater, preventive measures aimed at reducing the effects of blast accidents include: ensuring that all personnel have evacuated the blast area prior to detonation; using adequate blasting shelters for employees whose presence is required; controlling and monitoring all entrances to the blast area; ensuring that the blast is properly designed, drilled, and loaded; and emphasizing education and training to enhance skill levels for implementation of engineering control techniques. In addition, the DFO procedures for blasting near water will be implemented.

A leak and gas detection system will be in place to detect possible sources of ignition. A permit-to-work system will be implemented in all areas of the plant and “hot work” will be strictly controlled in areas with a potential to have an ignition source.

Site security will control access to the site (i.e., limited to approved personnel). The fire detection and alarm system will be monitored from the central control room and the fire brigade to minimize response time so that small fires are detected and extinguished before developing into a major incident.

7.8.2 Operation

7.8.2.1 Marine and Terminal Failure

Marine terminal failure could result in materials being released into the marine environment and possibly human injury. Equipment wear-and-tear is expected over the life of the Project, particularly in a coastal environment subject to salt spray and consequent corrosion. Given this, a regular inspection and maintenance program will be initiated as a matter of course so that worn or inefficient equipment can be replaced on a regularly scheduled maintenance rotation.

Emergency response procedures will primarily be those responses applicable to accidents and worker injury. These procedures will be contained within the Workers Occupational Health and Safety (WOH&S) Plan and ERP.

7.8.2.2 Aggregate Stockpile Slope Failure

Aggregate stockpile(s) slope will be designed to be stable: however unlikely, failure could result in materials being released and possible human injury and damage to equipment. Given the low maximum height, low slope angles and the stable design of the stockpiles, the risk of slope failure is minimal. In the event that slumping occurs, soil will be confined within the property boundary thereby limiting effects.

Stockpiles will be located greater than 100 m from the coast. A Site Grading and Drainage Plan will be implemented prior to operation to ensure clean runoff is intercepted and diverted from the rock storage areas to minimize likely effects of Project activities on the environment. The remainder of the storm water control process is to intercept runoff water from the site and treat it in a manner appropriate to the potential contaminants and sediment loadings, so that it can be discharged back into the environment.

If stockpile failure were to occur, the first response will be to cease all work in the area and ensure worker safety. When the failure area is secured, and depending on the scale of the failure, stockpile slope would be re-contoured in place. Slumped material would be excavated and returned to the stockpile, and if required drainage ditches would be repaired. An investigation into the causes of the failure would be completed so that the conditions leading to failure could be avoided or mitigated in the future.

7.8.2.3 Spills of Fluorspar Concentrate During Transfer to Ships

Fluorspar concentrate will be transferred from the fluorspar storage building to the wharf by an enclosed built conveyor system to a wharf-mounted radial ship loader into marine vessels docked at the marine terminal. In the unlikely event that a ship or any loading systems are damaged, fluorspar concentrate may be released to the environment. Fluorspar (i.e., calcium fluoride) is relatively insoluble in water and therefore does not pose a threat to marine biota in the sense of chemical contamination; however, it could have effects on marine biota in terms of increased turbidity.

The concentrate would tend to slowly settle to the seabed due to its density. Currents in the area would likely disperse some material from the spill site. The majority of the material would sink in place and remain. Should an accident occur at the loading facility, large quantities of fluorspar concentrate could enter the Little Lawn Harbour, potentially smothering benthic community. Accidental releases of concentrate into the marine environment could also occur along the shipping route if a collision occurred.

In all cases, the response will conform to CFI's ERP. The procedures will be designed to reduce, contain, and if possible, recover spilled material to ensure that adverse effects are at most short-term and localized.

7.8.3 Rehabilitation and Closure

The physical activities associated with rehabilitation and closure are described in Section 2.5. Likely effects during this phase of the Project are expected to be similar to but much less than those expected during construction. Rehabilitation and closure activities will comply with all applicable federal and provincial regulatory requirements in force at the time.

A Rehabilitation and Closure Plan will be prepared and submitted to the NL Government under *Newfoundland and Labrador Mining Act* and other relevant Federal Acts and Regulations. The plan will meet regulatory requirements for rehabilitation and will include rehabilitation and closure of the infrastructure at the marine terminal (stockpiles, materials handling and the wharf structure). As mentioned in previous sections, the breakwater may remain in place with proper navigation warning signs.

7.9 Cumulative Effects Analysis

Cumulative effects can be defined as changes to the environment resulting from an action, project or activity in combination with other existing or future projects or activities.

The cumulative effects analysis considers likely environmental effects associated with the Project, after consideration of mitigation measures. Likely environmental effects that are considered in this analysis are associated with the following VCs:

- Marine environment;
- Atmospheric environment (air quality and noise); and
- Socio-economic environment (community services and infrastructure; employment, economy and business).

Existing and/or future projects located in the Burin Peninsula and north-western Avalon Peninsula are shown in Table 7-10. Most are in operation with established workforces, with employment forecasts available for new projects. As shown in Table 7-10, most of these projects are located between 40 km and 300 km from the proposed Project, and therefore, no cumulative biophysical effects, other than cumulative effects on the atmospheric environment, may be anticipated. Socio-economic effects are considered. General information about the projects considered for the cumulative effects analysis is provided in Table 7-10.

Table 7-10: Projects Considered for Cumulative Effects Analysis

Project	Status	Job creation	Location	Relevance
St. Lawrence Wind Power Project	In operation	2 to 3 full-time jobs during operations	St. Lawrence 46º55'46.63'' N 55º24'28.95''W	Project effects do not overlap or interact with the effects of the CFI Project
Marystown Industrial Park Development	In operation	Specific developments within the industrial park No information available on number of workers during operations	Marystown 47º10'49''N 55º08'30''W	Project effects do not overlap or interact with the effects of the CFI Project
Whiffen Head Oil Transhipment Facility	In operation	No information available on number of workers during operations	Whiffen Head 47º46'26''N, 54º00'58''W	Project effects do not overlap or interact with the effects of the CFI Project
Come By Chance Oil Refinery	In operation	Approximately 500 employees	Come By Chance 47º48'22''N 53º59'40.5W	Project effects do not overlap or interact with the effects of the CFI Project
Vale Inco's Long Harbour Commercial Nickel Processing Plant	In operation	Approximately 475 employees at full production	Long Harbour 47º25'26.36''N 53º49'48'' W	Project effects do not overlap or interact with the effects of the CFI Project
Husky Energy White Rose Extension Project	Under construction	Estimated 138 workers for graving dock construction and 670 workers for construction of concrete gravity structure	Argentia 47°17'44"N 53°59'41"W	Project effects do not overlap or interact with the effects of the CFI Project

Project	Status	Job creation	Location	Relevance
Grieg Salmon Hatchery and Aquaculture Farms	Under construction	Hatchery Construction: 200, Operations: 36 Farms Construction: 12, Operations: 137	Marystown 47º10'49"N 55º08'30"W	Hatchery and farm management in Marystown: farms at locations in Placentia Bay. No overlap expected.
Ocean Choice International	In operation	Approximate workforce of 200: will change from seasonal to full time when start to process farmed salmon	St. Lawrence	No overlap expected as different skills required
Marbase (Marystown)	In development	If the development proceeds, estimated workforce is 50 - 200 in year 1 with growth to 400 in 3 to 4 years (reference is : https://www.cbc.ca/news/canada/newfoundland-labrador/marystown-shipyard-sale-1.5048208	Marystown 47º10'49"N 55º08'30"W	Maybe some temporary overlap in relevant trades but will also encourage retention and return of residents
Cannabis Grow facility (Burin)	Under construction	Approximately 35 jobs when in production (Ref L. Hartson, Town Manager, Burin, pers comm. May 9 2019)	Burin	No overlap expected as different skills required

7.9.1 Marine Environment

The likely cumulative Project effect on marine environment will be in the form of increased shipping activities in the vicinity of the Project and offshore approaches to the Project (i.e., and the North Atlantic main shipping lane). However, considering the added shipping activities from the Project of approximately 30–50 ships per year, which is relatively small, the cumulative effect of the Project is negligible.

7.9.2 Atmospheric Environment

Likely Project cumulative effect on the Atmospheric Environment would be associated with air emissions and noise. These have the potential to overlap both spatially and temporally with the residual effects of the projects and activities identified in Table 7-10. More specifically, the ongoing and future projects that potentially have overlapping effects with the Project on the Atmospheric Environment are the Come By Chance Oil Refinery, Vale Inco's Long Harbour Commercial Nickel Processing Plant, Husky Energy White Rose Extension Project, and Whiffin Head Transshipment Terminal.

Air emissions or noise from these ongoing or future projects are not likely to overlap with those from the Project due a distance of more than 40 km distance between the projects. Emission of air contaminants from the Project is likely to disperse quickly within the Project area and are unlikely to overlap with emissions from other existing or future projects.

7.9.3 Socio-Economic Environment

Overall, potential cumulative Project effects associated with community services and infrastructure and employment, economy and business are anticipated to be positive. There is the potential for overlap both spatially and temporally with the ongoing and future projects identified in Table 7-10.

Cumulative effects on community physical infrastructure are anticipated to be greater during the construction phase of the Project with a short term increased in traffic on provincial and municipal roads as machinery and equipment are mobilized/demobilized to site. Once materials are on site and construction begins, traffic will be more normalized especially on Route 210 (the Burin Highway) and municipal streets. If all planned developments go forward, there may be an overall increase in traffic on the peninsula as people commute to the additional work locations. There is already considerable commuting for work. The current transportation infrastructure is expected to be adequate to meet any cumulative demand during all phases of the Project; and therefore, cumulative effects on transportation infrastructure are expected to be within the capacities of the main highways and roads.

The project will add 30–50 vessels a year to the traffic in Placentia Bay. However, it is not anticipated to result in cumulative effects because the proposed marine terminal will be dedicated to the Project, avoiding increased pressure on other existing marine terminal facilities used for the other projects identified in Table 7-10. There may be a need for a new pilotage area with the addition of large vessels into this part of Placentia Bay. The increased marine traffic as a result of the Project can be accommodated by the vessel traffic system in Placentia Bay.

Cumulative effects on community services and infrastructure (e.g., housing, health, policing and fire services) in the Town of St. Lawrence are not anticipated. The other projects and operations are outside of the municipal boundaries and are not anticipated to rely on community services and infrastructure in the Town of St. Lawrence. The Town and area were well able to accommodate the workforce for construction of the mill in 2017–2018: the workforce expected for the terminal will be similar, from about 115 in year one, to about 215 for the second and third year of construction. There has been a noticeable increase in house sales and rental with the commencement of the Grieg NL aquaculture project and resumption of work at the CFI site (L. Hartson, Town Manager, Burin, pers. comm., 9 May 2019). The potential for the return and retention of residents will add to the support base for community services and infrastructure already in place.

Through Benefits Agreements with the Province, CFI and other new projects are committed to buy from and support as many of local businesses as possible, with comparable policies regarding employment.

There is the necessary business capacity in the region to serve the Project. There are opportunities for existing public and private businesses, including hardware supplies; general freight trucking; automobile sales, parts and repair services; industrial equipment rental and leasing for construction and operation; engineering services; commercial banking; petroleum and petroleum products; regulation, licensing and inspection; durable goods; metal work; building materials; surveying and mapping; accommodations and food services; wholesale and retail supplies; real estate and rentals and more.

It has been noted earlier in this document that the percentage of Burin residents with training in trades, transportation and equipment operator is twice the national average: all are relevant to all of the new projects or industries listed above. Training in many of the skills needed in the Project is available on the Burin Peninsula itself, through private and public institutions.

The Project will contribute to cumulative effects in a positive way: it adds to the ongoing and anticipated economic opportunities on the Burin Peninsula in a manageable scale, it is not a ‘boom and bust’ Project as has been too often experienced in the area.

8.0 FUNDING AND FEDERAL INVOLVEMENT

The Project will be mainly funded through private financing by CFI. The primary funders of the Project are investment funds affiliated with Golden Gate Capital. Financial assistance from the NL Government has been secured through a Government Loan Agreement for the development of the marine terminal.

There is no proposed or anticipated federal financial support from federal authorities to support the carrying out of the Project.

The proposed marine terminal footprint is not located on or near any federal lands and no federal lands will be used for the purpose of carrying out the Project.

A list of federal permits, licenses, and other authorizations that may be required for any phase of the Project is included in Section 1.4.

31 May 2019

Date *Bill Dobbs, President and CEO*

9.0 PROJECT RELATED DOCUMENTS

In support of its operations and its proposed marine terminal Project in St. Lawrence, CFI and its consultants have prepared (or are in the process of preparing) the documents listed below, many of which are unpublished, and many of which are referenced in this RD/PD:

CFI Management Plans

Amec 2016. Avifauna Management Plan to Canada Fluorspar (NL) Inc.; Development of the AGS Fluorspar Mine. Prepared for CFI by Amec Foster Wheeler Environment & Infrastructure (a Division of Amec Foster Wheeler Americas Limited), AFW Project # TF1691002. 25 March 2016.

CFI 2016. Waste Management Plan, St. Lawrence Fluorspar Project. Submitted to Newfoundland and Labrador Department of Environment and Conservation, Environmental Assessment Division, Submitted by: Canada Fluorspar (NL) Inc., February 2016.

CFI 2016. Environmental Protection Plan for Project Construction Phase. Submitted to Newfoundland and Labrador Department of Environment and Conservation, Environmental Assessment Division, Submitted by: Canada Fluorspar (NL) Inc., April 2016.

CFI 2016. Environmental Effects Monitoring Plan. Submitted to Newfoundland and Labrador Department of Environment and Conservation, Environmental Assessment Division, Submitted by: Canada Fluorspar (NL) Inc., June 2016.

CFI 2016. St. Lawrence Fluorspar Project Mine Development Plan. Submitted to the NL Department of Natural Resources (Mines – Mineral Development), Submitted by Canada Fluorspar (NL) Inc., October 2016.

CFI 2017. Environmental Protection Plan: Operations Phase. Submitted to Newfoundland and Labrador Department of Environment and Conservation, Environmental Assessment Division, Submitted by: Canada Fluorspar (NL) Inc., June 2017.

CFI 2017. Environmental Effects Monitoring Plan: Operations Phase. Submitted to Newfoundland and Labrador Department of Environment and Conservation, Environmental Assessment Division, Submitted by Canada Fluorspar (NL) Inc., June 2017.

Golder 2017. Best Management Practices Plan for the Control of Fugitive Dust St. Lawrence Fluorspar Project. Submitted to Canada Fluorspar (NL) Inc., March 2017.

Golder 2017., Best Available Control Technologies Report, St. Lawrence Fluorspar Project. Submitted to Canada Fluorspar (NL) Inc., June 2017.

Golder 2018. St. Lawrence Fluorspar Project, Gender Equity and Diversity Plan. Submitted to CFI, October 2018

Knight Piesold 2016. Initial Mine Rehabilitation and Closure Plan. Prepared for Canada Fluorspar (NL) Inc. 12 October 2016.

Knight Piesold 2017. St. Lawrence Fluorspar Project – Site Wide Water Management Plan (updated), Memorandum, File No.:NB101-00642/15-A.01, 1 February 2017.

Project-Related Baseline Studies

Baird 2019. Met-Ocean Study for St. Lawrence Fluorspar Marine Shipping Terminal Project. Prepared for Canada Fluorspar (NL) Inc., **IN-PROGRESS**

CFI 2019a. Water Quality Monitoring Results, Canada Fluorspar (NL) Inc, unpublished data supplied by S. Adams on 6 March 2019.

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Golder 2015b. Geochemistry Testing Report, Canada Fluorspar Inc. St. Lawrence, NL for the Proposed AGS Mine Project. Report Submitted to Canada Fluorspar (NL) Inc., May 2015.

Golder 2015c. Fluorspar Mine Site – Phase 2 Hydrogeology Work, Factual Report Submitted to Canada Fluorspar (NL) Inc., October 2015.

Golder 2016a. St. Lawrence Fluorspar Project – Baseline Geochemistry Program. Report Submitted to Canada Fluorspar (NL) Inc, September 2016.

Golder 2017. Canada Fluorspar Inc. – Interim Kinetic Geochemistry Results Update #3. Technical Memorandum submitted to Canada Fluorspar (NL) Inc, October 2017.

Golder 2019. 2019 Geochemistry Update, Technical Memorandum Submitted to Canada Fluorspar (NL) Inc, 16 May 2019.

Golder 2019. Air Emissions Inventory for St. Lawrence Fluorspar Marine Shipping Terminal Project. Prepared for Canada Fluorspar (NL) Inc., **IN-PROGRESS**

Golder 2019. Preliminary Noise Assessment for St. Lawrence Fluorspar Marine Shipping Terminal Project. Prepared for Canada Fluorspar (NL) Inc., **IN-PROGRESS**

GPA 2015. St. Lawrence Mine Historic Resources Impact Assessment. Submitted to the Provincial Archaeology Office, Submitted by Gerald Penney Associates Limited, Archaeological Investigation Permit #14.55, January 2015.

LGL 2015. Assessment of the Wetlands, Avifauna and Wildlife at Risk in the Proposed Fluorspar Mine Project Footprint Area: Full Report. Submitted to Canada Fluorspar (NL) Inc., 23 September 2015.

LGL 2019. Bathymetric Survey of Little Lawn Harbour for St. Lawrence Marine Shipping Terminal Project. Prepared for Canada Fluorspar (NL) Inc., **IN-PROGRESS**

LGL 2019. Marine Fish and Fish Habitat Survey for St. Lawrence Marine Shipping Terminal Project. Prepared by Wood PLC., **IN-PROGRESS**

Wood 2019. Freshwater Fish and Fish Habitat Survey for St. Lawrence Marine Shipping Terminal Project. Prepared by Wood PLC., **IN-PROGRESS**

Previous Environmental Assessments

CFI 2009. Reactivation of the St. Lawrence Fluorspar Mine. Environmental Preview Report Pursuant to the Newfoundland and Labrador *Environmental Protection Act* and the Federal Environmental Assessment Screening Report Pursuant to the *Canadian Environmental Assessment Act*. Available at: https://www.mae.gov.nl.ca/env_assessment/projects/Y2010/1418/index.html. Accessed May 2019.

CFI 2015a. AGS Fluorspar Mine, Environmental Assessment Registration Pursuant to the Newfoundland and Labrador *Environmental Protection Act*. Submitted to the Newfoundland and Labrador Department of Environment and Conservation, 230 pp. Available at: https://www.mae.gov.nl.ca/env_assessment/projects/Y2015/1794/index.html. Accessed May 2019.

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APPENDIX A

Health, Safety, Environmental and Social Responsibilities Statement

Appendix A

CANADA FLUORSPAR INC.

ENVIRONMENT POLICY

Canada Fluorspar Inc. is committed to the protection of the environment. Recognizing that all management and employees have a role to play in achieving environmental protection, the company has formulated the following guiding principles.

Canada Fluorspar Inc. will:

- *Ensure that operations comply with government legislation, corporate policy and applicable industry standards concerning the protection of the environment and the public.*
- *Ensure during project planning, implementation and operation, that environmental issues associated with the business are identified, evaluated and mitigated.*
- *Ensure that the appropriate waste management programs are developed and implemented.*
- *Ensure that all employees, and others engaged on behalf of the Company, are informed and trained regarding protection of the environment.*
- *Ensure that operations allow for the efficient use of energy and other resources.*
- *Deal openly and fairly with members of the public regarding environmental concerns*

"Safety - Commitment - Success"

Bill Dobbs, Chief Executive Officer

May 29th, 2019

Date

APPENDIX B

CFI Design, Construction and Operations Guiding Principles

Appendix B – CFI DESIGN, CONSTRUCTION AND OPERATIONS GUIDING PRINCIPLES

Health & Safety

As our commitment states: **We live here…. We work here**.

CFI understands the concerns and deficiencies in past practices with mining in St. Lawrence. The health and safety issues connected to dry drilling and radon gas underground has been well researched and documented. Now that these problems are fully understood, CFI will ensure that problems of the past will remain in the past. To prevent silicosis, all drilling activities will be conducted wet – not only is this commonsense it is the law. To prevent the build-up of radon gas carried by mine underground water, new flow-control techniques on each level will reduce the risk of spreading the gas and sufficient ventilation will provide adequate dilution and extraction. These techniques will also provide a drier working environment in the stopes and improve ground conditions.

In the M ill the major concern was the crushing section. The crushers will be removed and housed in a new, purpose-built facility ensuring a dust-free working environment within the Mill.

In the past problems associated with airborne dust during the storage and transport of product is recognized as a concern by local residents. CFI will ensure that dust emissions are kept to a minimum. The new wharf, to be built in the Greater St. Lawrence Harbour, will minimize vehicular traffic through the Town and eliminate the loading of vessels in the inner harbour. All product will remain under cover both during storage and transport whether in a truck or on a conveyor. Airborne dust is a loss of revenue to the company.

CFI will incorporate the highest health and safety standards in design, construction and operations. A detailed safety management system will be implemented to continuously identify, reduce and manage safety risks. All levels of the workforce will have a responsibility to safety. Safety procedures will be established, tracked and monitored. Regular safety audits will be carried out. This safety culture will be recognized as an integral part of every single employee's duties.

CFI is committed to a healthy and safe working environment both on surface and underground. The company's most valuable asset is its workforce.

Applying Best Available Technologies Economically Achievable

The design and construction of the Project facilities will incorporate the best available technologies economically available (BATEA) principle to provide a safe, robust and environmentally friendly company that complies with all national and provincial regulations and industry codes and standards. The principle of BATEA will be applied to all phases of the Project to ensure that the facilities are constructed and operated efficiently and with minimal impact on the environment. For example, mining and processing methods, new to the St. Lawrence area, will be used to address efficiency and maximize safety within the working environment. BATEA will also be used in the design and implementation of safety systems, security and emergency response.

Applying Best Environmental Protection Practices

CFI will apply the precautionary approach in the design and implementation of the Project. Where there is a potential threat or serious or irreversible damage to the environment all potential alternatives will be considered. Long-term data will be evaluated both from the immediate area and similar Projects globally.

CFI is committed to stewardship of the environment in which it seeks to operate and will design and execute the Project in a manner that will eliminate or minimize the potential adverse effects on the environment in all phases of the Project. CFI is committed to prevent pollution and to continually improve the integration of environmental protection practices in all its activities and will ensure that Project activities are carried out in full compliance with all applicable environmental, health and safety laws and regulations by applying the best available technologies and highest standards.

The company has taken a proactive approach to environmental protection at an early stage of Project planning. Examples include the use of the north alternative in the construction of the wharf. This will be the more expensive option but will not impact the more favourable marine habitat adjacent to the shoreline that the south alternative would have done. The use of Shoal Cove Pond, used in the past by a previous operator for mill tailings, will not destroy virgin habitat such as the alternative of storing close to Director Mine would have done. A further discounted alternative was the construction of hillside berms since they would involve the destruction of huge areas of unspoiled land in the Shoal Cove Pond area. CFI has also adopted the "offsetting" principle for replacing and enhancing fish productivity.

Commitment to Community Participation and Maximizing Local Benefits

CFI understands the importance of consultation with former workers, local residents and the community in general. It is only through discussion and understanding that past deficiencies can be eradicated, and lessons learned. CFI understands the past health and safety issues and intends to provide a strong foundation to ensure the well-being of its employees and affiliates.

Not only is the company committed to local employment, it intends to be an exemplary corporate citizen embracing the community spirit. CFI wishes to become part of the local community and where possible will support community initiatives. CFI is committed to maximizing local benefits, both through direct employment, training and by giving assistance and preference to local suppliers.

Sustainable Development – Project Sustainability

Sustainable development is the principle whereby development meets the needs of the present without compromising the ability of future generations to meet their own needs. CFI intends to become established within the community and will grow along with it. In the past companies mining fluorspar in the area have not needed to commit to exploration since there has always been sufficient known ore to sustain their activities. CFI will not use this approach but will continue exploration to ensure long-term viability. The Project is incorporating the principle of sustainable development into Project design and operations through planned integration of environmental, social and economic considerations.

APPENDIX C

Stakeholder Consultation – Public Information Session

Appendix C Public Information Session

Publicity

A Public Information Session was held on April 25, 2019 at the St Lawrence Recreation Centre from 6–9 pm, with a Project presentation by Bill Dobbs, CFI President and CEO, and Ray Bailey, P. Eng. of Jewer Bailey Consultants Ltd. at 6:30 pm. The Session was publicized in advance in multiple media: print advertisement in the local newspaper, the *Southern Gazette*; a public notice posted in St. Lawrence and nearby town offices, public institutions and their related social media; CFI's Facebook account and related distribution; electronic/digital signs; and letters of invitation.

An Advertisement about the Public Information Session was provided in the Southern Gazette newspaper on April 23, 2019:

Advertisement

PUBLIC NOTICE

Canada Fluorspar (NL) Inc. is assessing the feasibility of a marine terminal west of the AGS Mine Project in St. Lawrence, NL.

A Public Information Session on the Proposed St. Lawrence Fluorspar Marine Shipping Terminal Project will be held on Thursday, April 25, 2019.

Canada Fluorspar (NL) Inc. would like to welcome the public to an Information Session, from **6:00 pm to 9:00 pm** (with a presentation at 6:30 pm) at the St. Lawrence Recreation Centre.

This session will be conducted by the Proponent, Canada Fluorspar (NL) Inc. (709) 873-3331, as part of the project registration for environmental assessment. The purpose of this session is to describe all aspects of the proposed project, to describe the activities associated with it, and to provide an opportunity for interested persons to request information.

ALL ARE WELCOME.

CFI
CANADA FLUORSPAR INC.

A Public Notice / Notification for the Public Information Session was circulated widely as a PDF: it was emailed to stakeholder groups including those listed in Table 5-1; it was posted at the Town Hall and Post Office in St Lawrence and the communities and public institutions to whom CFI sent the letter of invitation and who have public spaces, were requested to post the notice.

Public Notice

CFI also posted a copy the Notice of the Public Information Session on Facebook; and social media posting messages were prepared:

Social Media Posting

A version of the Notice was displayed on electronic signboards in Marystown and Route 230.

Billboard Sign

Letters of Invitation were sent to key stakeholders as listed in Table 5-1, including each councillor in nearby towns.

Letter of Invitation (sample)

April 17, 2019

Mayor John Strang
Town of Lawn
Via: townoflawn@eastlink.ca

Public Information Session
Canada Fluorspar Inc. St. Lawrence Fluorspar Marine Shipping Terminal Project

We are currently carrying out a feasibility study for the construction of an alternative marine shipping terminal on the western side of the mine property in St. Lawrence to ship both fluorspar and aggregate. A dedicated marine shipping facility is vital to the project's development and sustainability, and we are looking at expanding revenue options for the mine to increase mine viability and lifespan.

In the meanwhile, to ensure we are ready should the alternative prove feasible, we are preparing to register the proposed western marine shipping terminal project for Environmental Assessment by the provincial Department of Municipal Affairs and Environment and the Canadian Environmental Assessment Agency.

CFI invites you to attend a Public Information Session and presentation on April 25, 2019 at the St. Lawrence Recreation Centre. We will provide information about the proposed western marine terminal and related activities. Your feedback will guide project planning, engineering and design.

The session is scheduled from 6:00 pm to 9:00 pm, with a presentation at 6:30, followed by an opportunity to visit information stations to learn about the project and offer comments and questions.

Sincerely

Bill Dobbs
President and CEO

CFI
CANADA FLUORSPAR INC.

The list of people to whom the invitation letter, signed by CFI President and CEO Bill Dobbs, includes the following:

Government Agencies and Institutions
Burin Campus College of North Atlantic

Associations and Organizations
Burin Peninsula Chamber of Commerce
Burin Peninsula Waste Management Board
Burin Peninsula Environmental Reform
Burin Peninsula Health Care Foundation
Burin Peninsula Heritage Tourism Association

Greater Lamaline Area Development Association
St. Lawrence Soccer Assoc
Heritage Run Tourism Association

Harbour Authorities
St. Lawrence Harbour Authority
Harbour Authority of Lawn
Harbour Authority of Lord’s Cove

Fire Departments
Lawn Fire Department

Elected Officials
Government of Newfoundland and Labrador

- Premier Dwight Ball
- Minister Carol Ann Haley, Minister Responsible for the Status of Women
- Minister Gerry Byrne, Minister of Fisheries and Land Resources
- Minister Siobhan Coady, Minister of Natural Resources
- Minister Graham Letto, Minister of Municipal Affairs and Environment
- Minister Christopher Mitchelmore, Minister of Tourism, Culture, Industry and Innovation
- Mark Browne, Member of House of Assembly

Government of Canada

- Minister Seamus O’Regan, Minister of Indigenous Services
- Member of Parliament, Churence Rogers, Bonavista-Burin-Trinity

Business Leaders

- Grieg NL, Knut Skeidsvoll
- Martin Sullivan, President & CEO, Ocean Choice International
- Blaine Sullivan, COO, Ocean Choice International

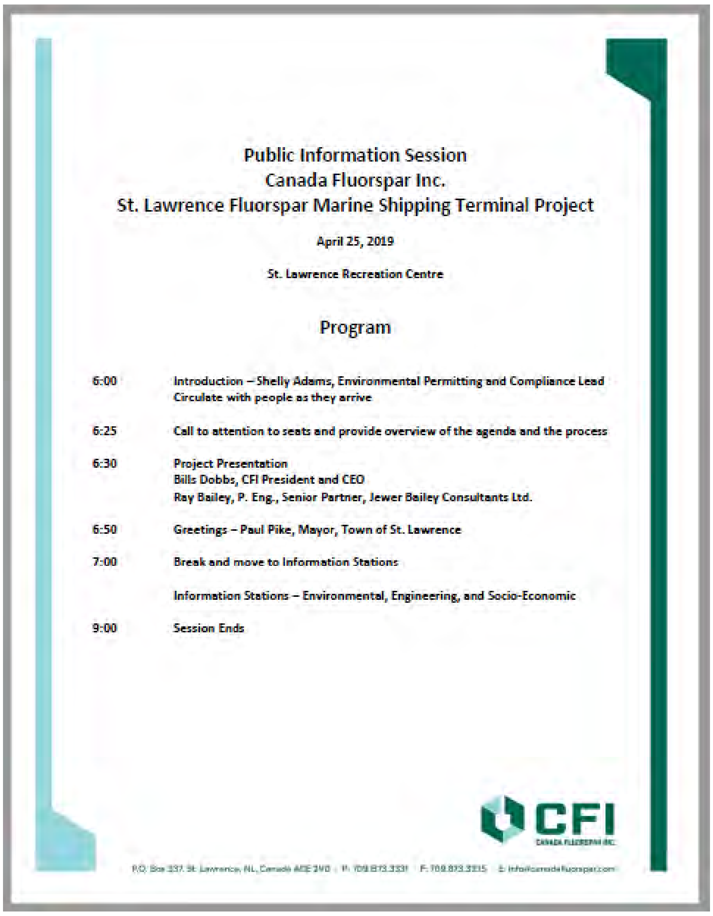
Municipalities

Mayor Pike, Town of St. Lawrence
Town of St. Lawrence Deputy Mayor Walsh
Town of St. Lawrence Councillor Doyle
Town of St. Lawrence Councillor Dupré
Town of St. Lawrence Councillor Lundrigan
Town of St. Lawrence Councillor Slaney
Town of St. Lawrence Councillor Stacey
Little St. Lawrence Local Service District
Town of Bay L'Argent Mayor Baker
Town of Burin Mayor Lundrigan
Town of Burin Deputy Mayor Lundrigan
Town of Burin Councillor Evans
Town of Burin Councillor Farwell
Town of Burin Councillor Francis
Town of Burin Councillor Myles
Town of Burin Councillor Riggs
Town of Frenchman’s Cove Mayor Cluett
Town of Fortune Mayor Penwell
Town of Fortune Deputy Mayor Smith
Town of Fortune Councillor Curtis
Town of Fortune Councillor Dunne
Town of Fortune Councillor Kendell
Town of Fortune Councillor Parsons
Town of Fortune Councillor Woodland
Town of Garnish Mayor Day
Town of Grand Bank Mayor Matthews
Town of Grand Bank Deputy Mayor Welsh
Town of Grand Bank Councillor Bennett
Town of Grand Bank Councillor Brooks
Town of Grand Bank Councillor Burfitt
Town of Grand Bank Councillor Burt
Town of Grand Bank Councillor Grikis
Town of Lamaline Mayor Hillier
Town of Lawn Mayor Strang
Town of Lewin's Cove Mayor Moore
Town of Lord's Cove
Town of Marystown Mayor Synard
Town of Marystown Deputy Mayor Myles
Town of Marystown Councillor Brennan
Town of Marystown Councillor Edwards
Town of Marystown Councillor Keating
Town of Marystown Councillor Lewis
Town of Marystown Councillor Tremblett
Town of Point May Mayor Harnett
Town of St. Bernard’s-Jacques Fontaine Mayor Hodder

Information Session

The information session was attended by 76 individuals, including CFI employees and the consultant team.

Session Program Agenda



Public Information Session
Canada Fluorspar Inc.
St. Lawrence Fluorspar Marine Shipping Terminal Project

April 25, 2019

St. Lawrence Recreation Centre

Program

6:00	Introduction – Shelly Adams, Environmental Permitting and Compliance Lead Circulate with people as they arrive
6:25	Call to attention to seats and provide overview of the agenda and the process
6:30	Project Presentation Bills Dobbs, CFI President and CEO Ray Bailey, P. Eng., Senior Partner, Jewer Bailey Consultants Ltd.
6:50	Greetings – Paul Pike, Mayor, Town of St. Lawrence
7:00	Break and move to Information Stations
	Information Stations – Environmental, Engineering, and Socio-Economic
9:00	Session Ends

CFI
CANADA FLUORSPAR INC.

P.O. Box 337, St. Lawrence, NL, Canada A0E 2V0 | P: 709.873.3331 | F: 709.873.3315 | E: info@canadafluorspar.com

Bill Dobbs, CFI President and CEO and Ray Bailey, P. Eng. Jewer Bailey Consultants shared the delivery of the presentation.

At the end of the presentation, attendees moved about three information stations to view posters and engage in conversations with the consultant team and CFI management team.

Survey

A survey was distributed to each person as they entered the St. Lawrence Recreation Centre on April 25.

Information Session Survey

Of the 76 individuals who signed in at the Public Information Session, 62 participants submitted exit surveys.

Canada Fluorspar (NL) Inc.

St. Lawrence Fluorspar

Marine Shipping Terminal Project

ENVIRONMENTAL ASSESSMENT PROJECT REGISTRATION
GENERAL INFORMATION

APRIL 25th, 2019

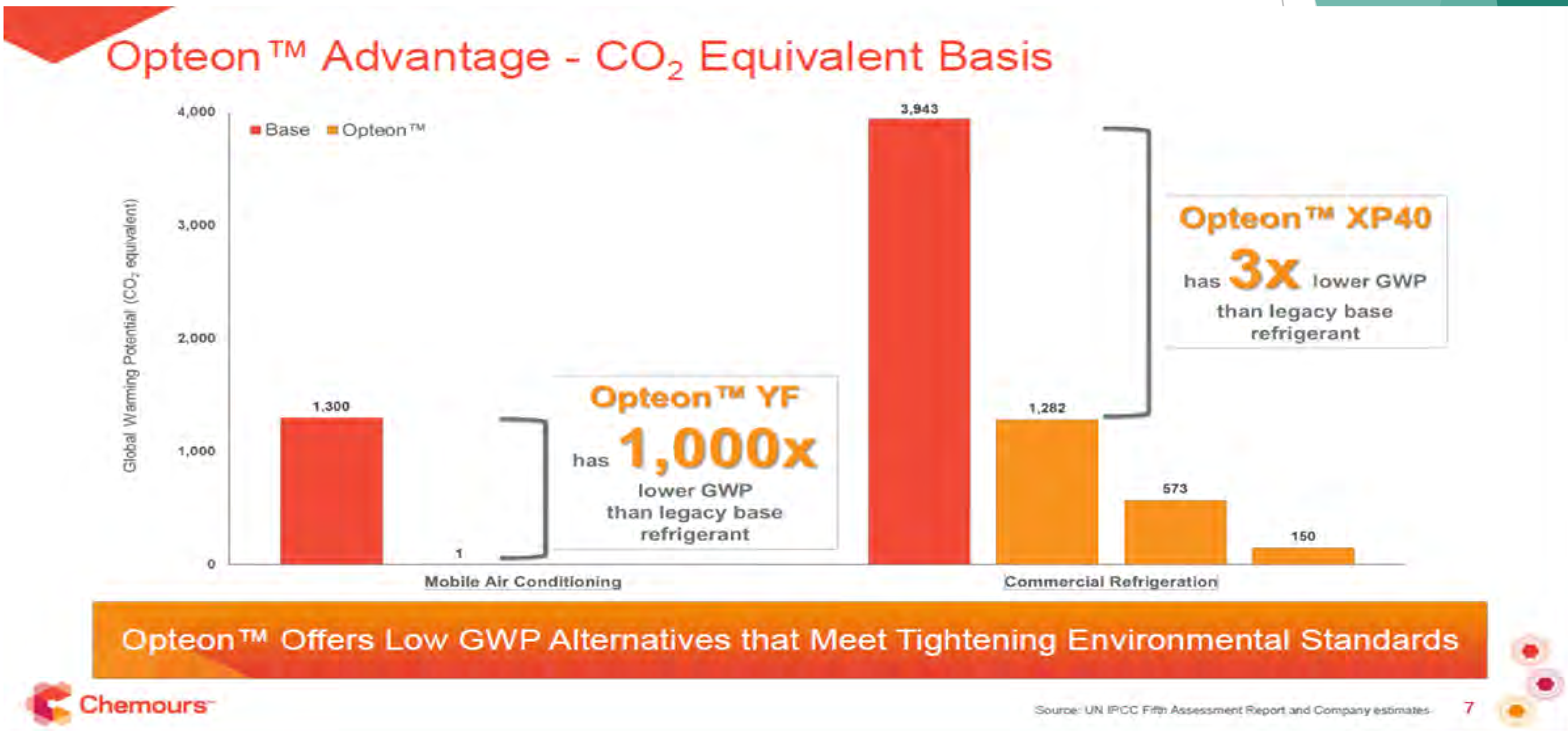
Fluorspar Growth Markets and the *Aggregate Opportunity* of the West Marine Terminal Option

- Refrigerants
  - Latest generation of low global warming potential (GWP) refrigerants
  - 'Opteon' patented/manufactured by Chemours, Honeywell and licensed to Arkema
  - These are CFI's three largest customers

- LiOn Battery Polymers
  - Fast growing markets in consumer and automotive (electric and hybrid electric vehicle) industries

- Aggregates (West Marine Terminal)
  - Access to eastern seaboard commercial, civil and residential construction industries in an environmentally acceptable and cost effective manner using ocean going vessels
  - Potential to increase life of mine by 10+ years
  - Potential to increase employment opportunities

CFI Fluorspar (Acidspar) product is a critical component of environmentally friendly technologies – Refrigerants



CFI Fluorspar (Acidspar) product is a critical component of environmentally friendly technologies - Lithium Ion Batteries

- Latest generation of Lithium Ion battery materials Lithium Hexafluorophosphate (LiPF6) contain fluoropolymers produced by CFI customers
- China is the center of the Lithium Ion battery industry and this production is also spreading to Europe to support the European auto manufacturers who have made vehicle electrification their top priority
- Current customers include Lanxess, Solvay and Fluorchemie
- Chinese LiPF6 producers Minmetals and Dofluoride have both visited CFI in St. Lawrence and would like to buy CFI acidspar for their Chinese based production of LiPF6
- China has historically dominated global fluorspar markets via its exports but has become a net-importer of fluorspar in 2019 and all indications are that this will be the future state of the global fluorspar market

Recent Developments in Global Fluorspar Markets

China becomes net importer of fluorspar, official data confirms

By Michael Greenfield, Michael Greenfield
Published: Wednesday, 13 March 2019

China, the world's main steel-producing nation, imported almost half-a-million tonnes of fluorspar in 2018, driven by its booming domestic steel market.

Chinese imports of fluorspar trebled year-on-year in 2018 as the nation became a net importer of the material, according to the latest data from the country's customs authorities.

The data showed that 419,828 tonnes of fluorspar was imported into China during 2018, three times the 140,229 tonnes imported in 2017.

Fluorspar exports from China grew to 202,000 tonnes in 2018, from 184,000 tonnes the year before.

Because of the Chinese boom in steel production over 2018, the majority of this growth in fluorspar imports was likely to be metallurgical grade material, although the Customs data does not distinguish between acid and met grades.

Fluorspar is used as a flux material in steel production.

Exports were steady throughout 2018, peaking at 23,940 tonnes in January. The 12,315 tonnes shipped in March was the lowest single monthly value.

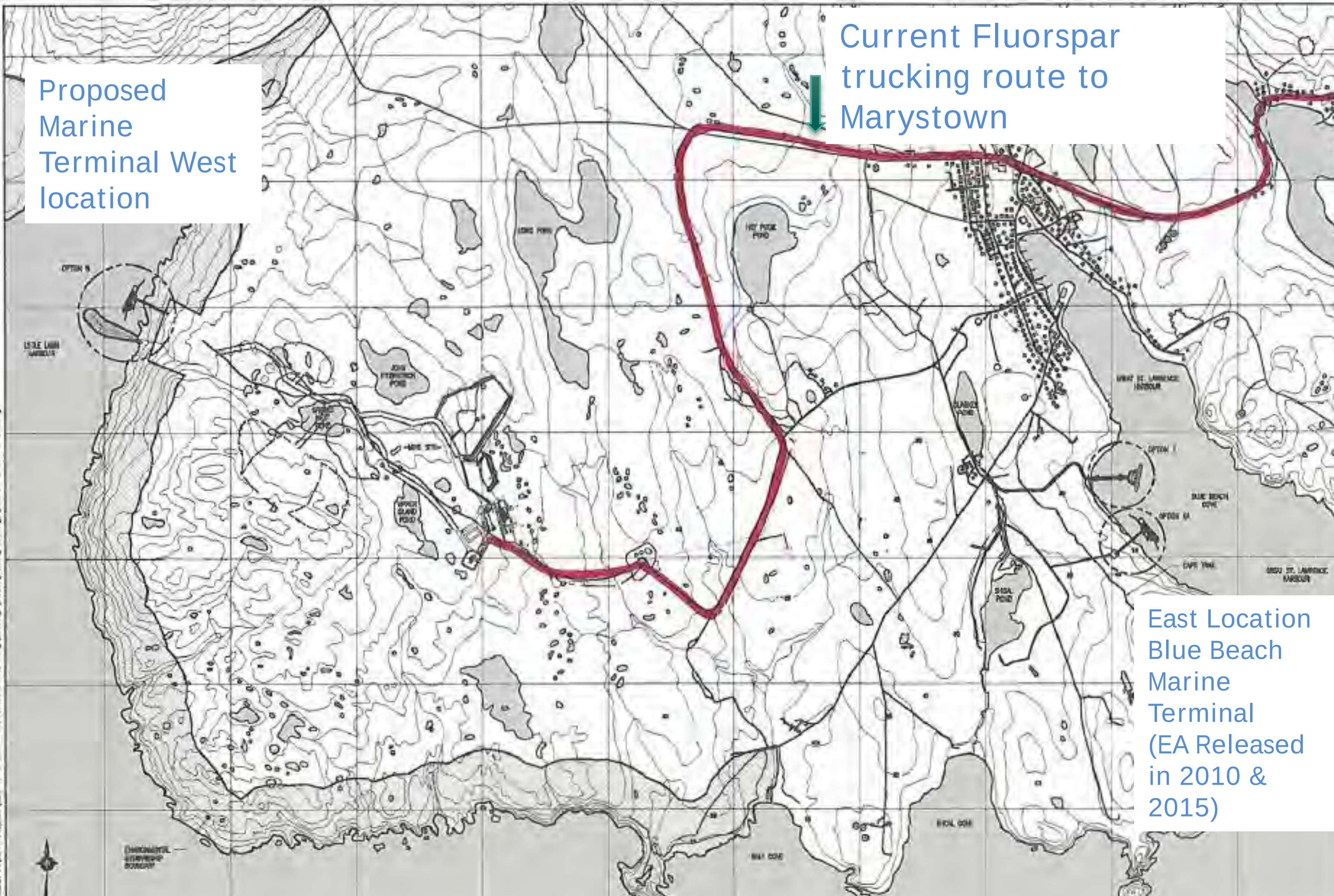
Project EA Overview & History

- The Mine Reactivation Project was released from the provincial and federal EA in Oct. 2010 and amendment in Feb. 2012.
  - Approved Blue Beach Marine Terminal

- In 2015 the CFI - St. Lawrence AGS Vein Fluorspar Mine Project was released (Nov 5, 2015).
  - Approved Blue Beach Marine Terminal

- Current EA scope: A dedicated marine shipping terminal adjacent to the mine/mill operations is vital to the project’s long term development and sustainability.
  - The West location is the only viable Marine Shipping option for aggregate products
  - The potential aggregate sales will increase the life of mine for 10+ years

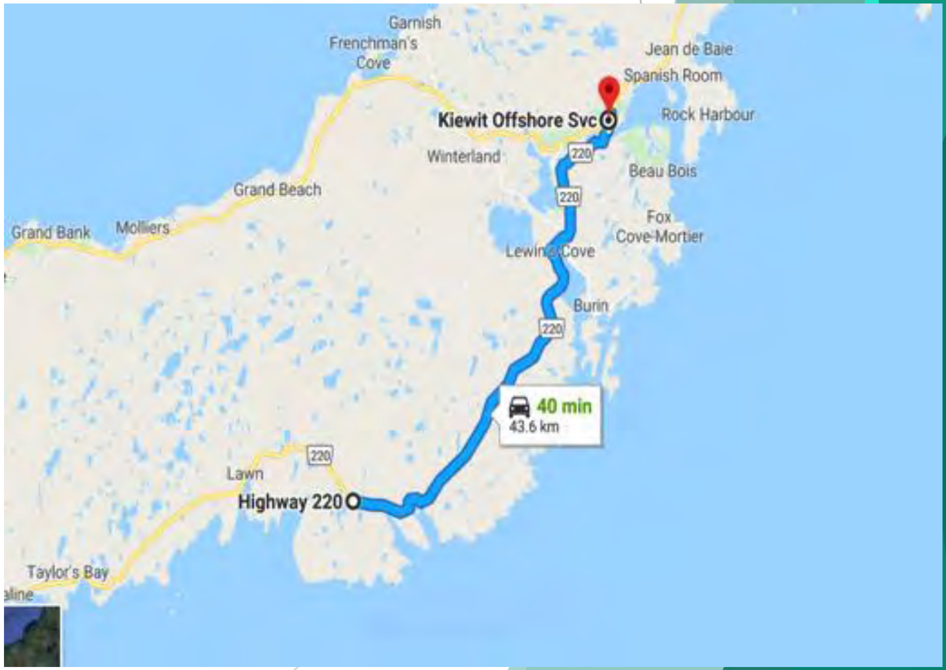
The Proposed Marine Terminal Alternative Locations



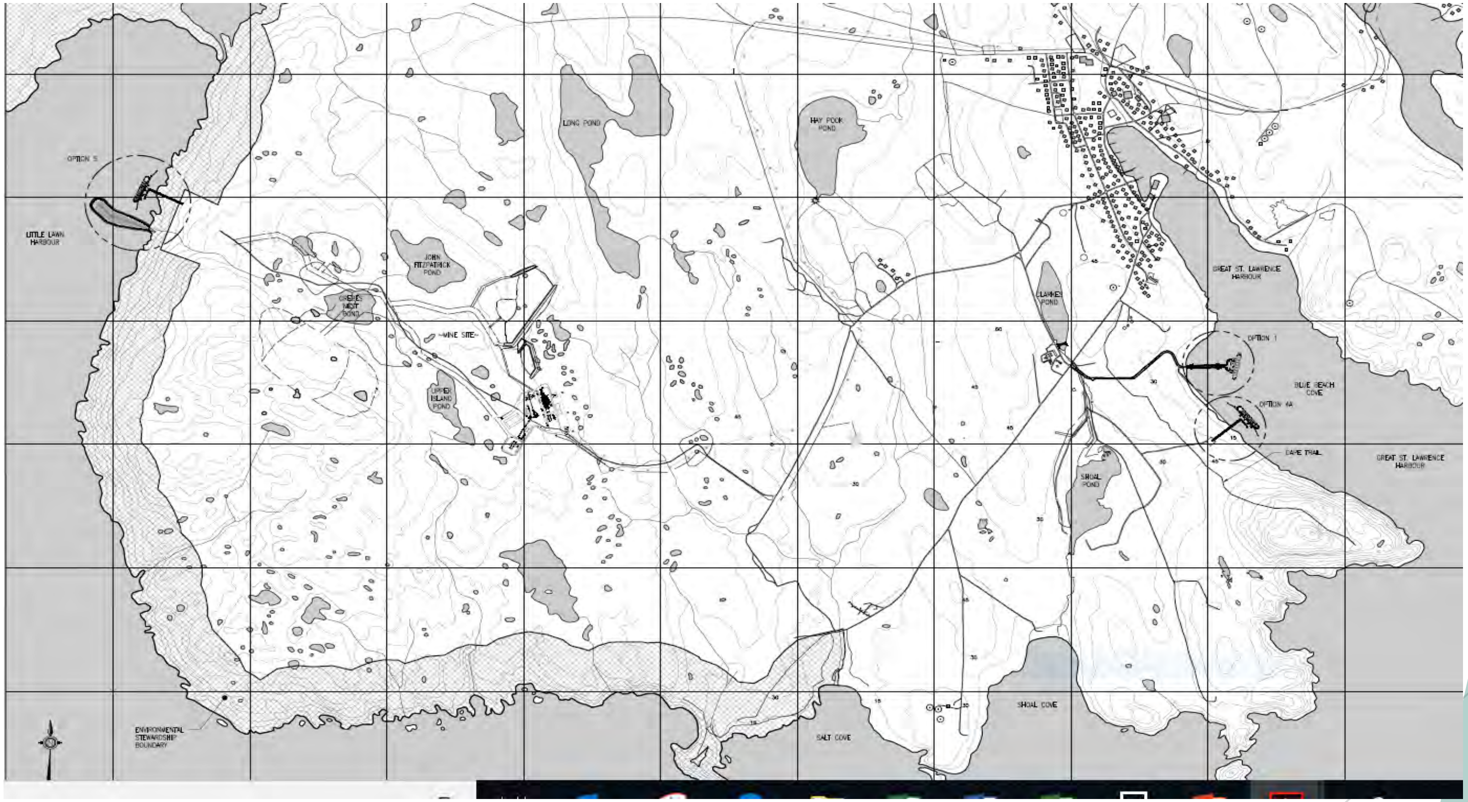
Marine Terminal Options - Current Situation

- Currently the Fluorspar Concentrate is being transferred by 30-tonne trucks to the Cow Head Offshore Fabrication Yard at Marystown, 45 km from the mine site
- Approximately 7,000 trucks per year
- CFI currently incur high logistics costs due to the trucking distance to Marystown and storage limitations at Cow Head
- Significant Carbon Footprint

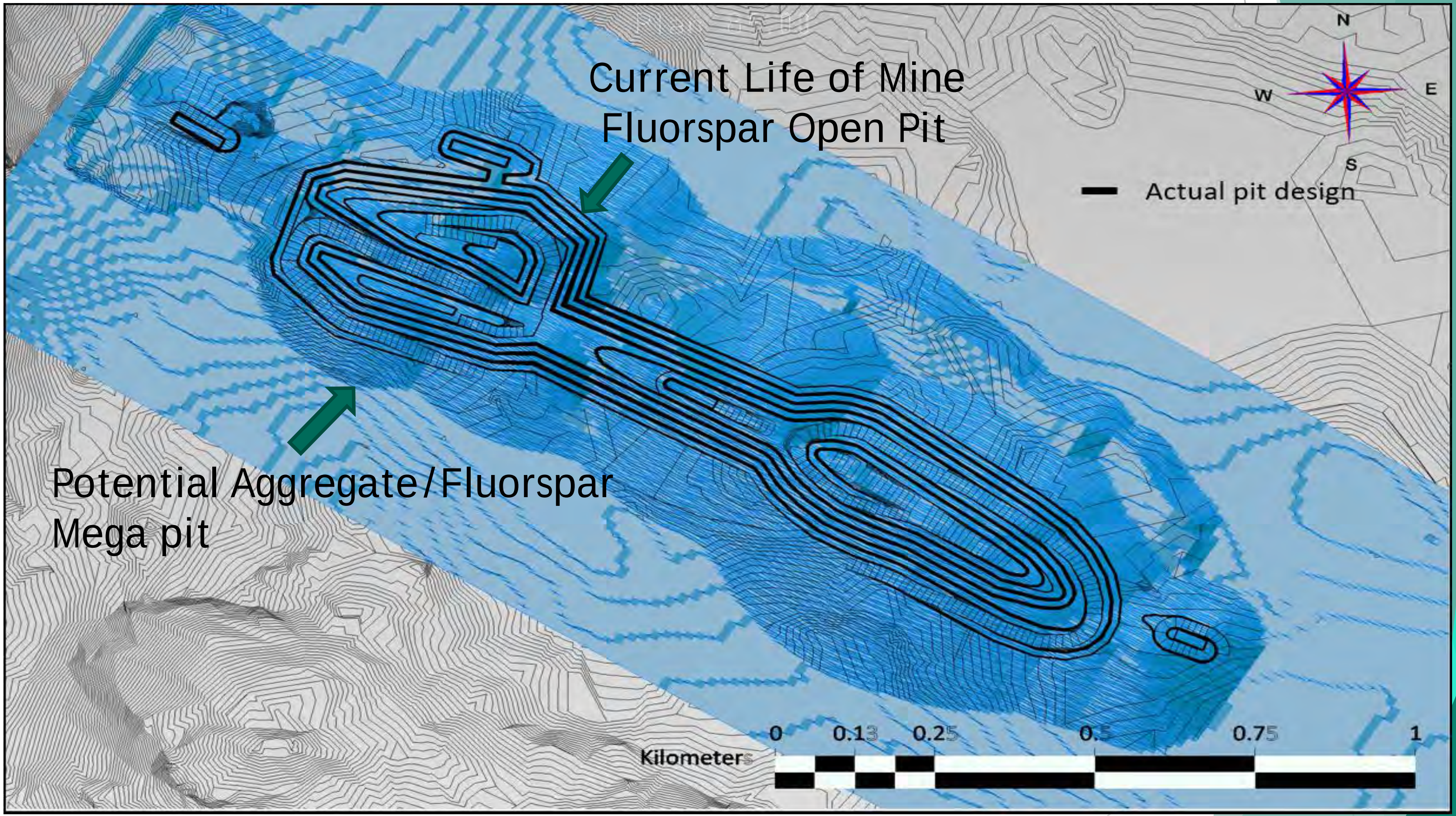
The proposed West marine shipping terminal solves this logistics issue, reduces trucking emissions, improves public safety, and expands export products (aggregate).



West Shipping option resolves this logistics issue, eliminates trucking emissions and puts global markets within reach and expands products sold by CFI - AGGREGATES



Potential Open Pit Configurations



West Marine Shipping Terminal - Project Rationale

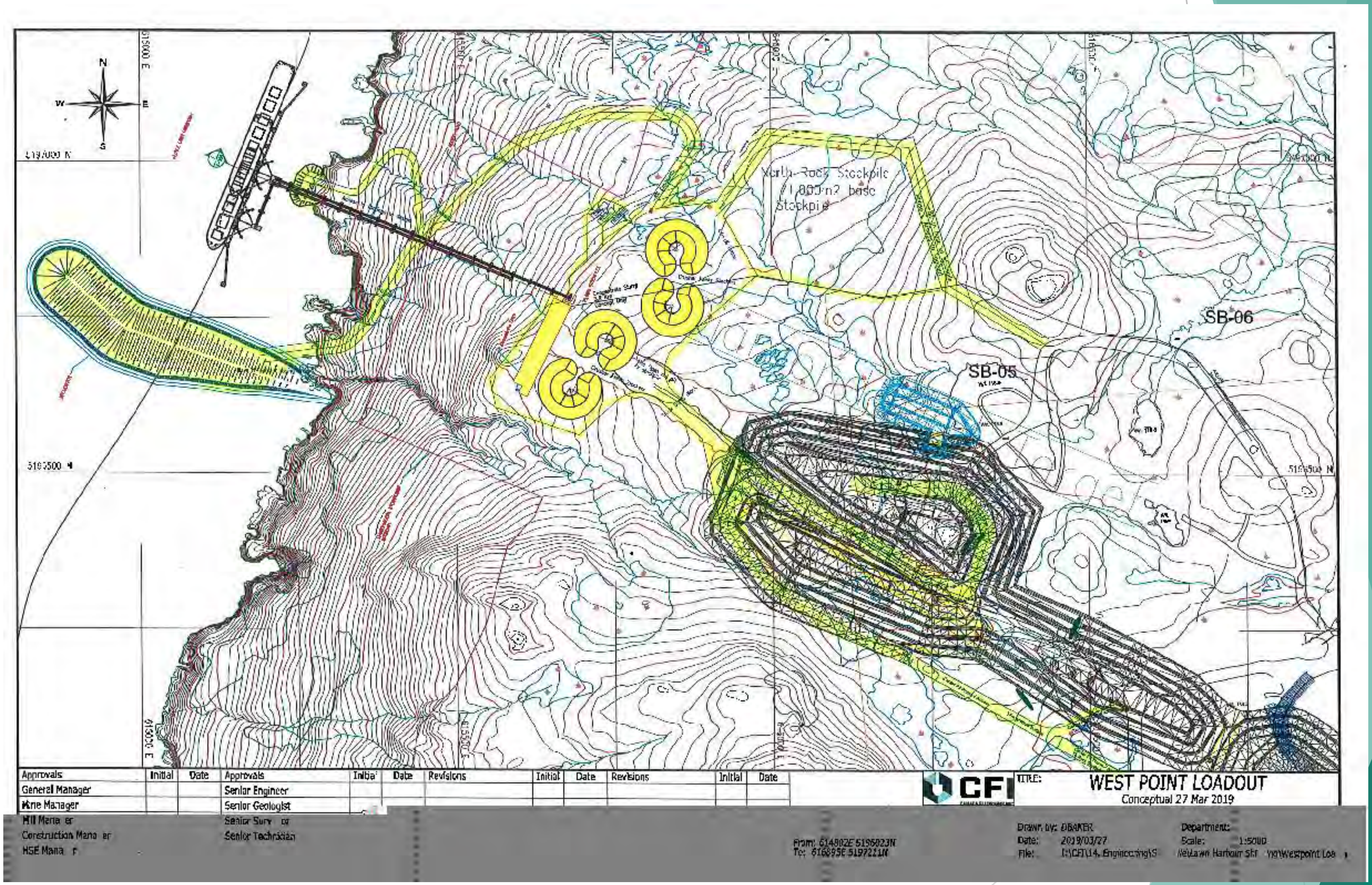
- The proposed new location of the west marine shipping terminal is much closer to the Mine and Mill and associated waste rock & stockpile storage areas (~ 500m away), thus the transport and ship loading costs will be significantly less than those associated with the Marystown or the Blue Beach locations.
- More advantageous option, particularly when shipping of aggregate is considered, using larger vessels (up to 72,000 DWT) versus much smaller ships currently utilized at Marystown port facility (5,000 - 10,000 DWT).
- Will reduce the carbon-footprint and the impact on the environment and highway and town roads from trucking operations (approximately 45 km to Marystown, and 8 km to Blue Beach)
- Processing waste rock into a high-quality construction aggregate for export via a wharf at the proposed west location could add to the mine's profitability, extend the life of the project.

Marine Shipping Terminal Description and Environmental Process

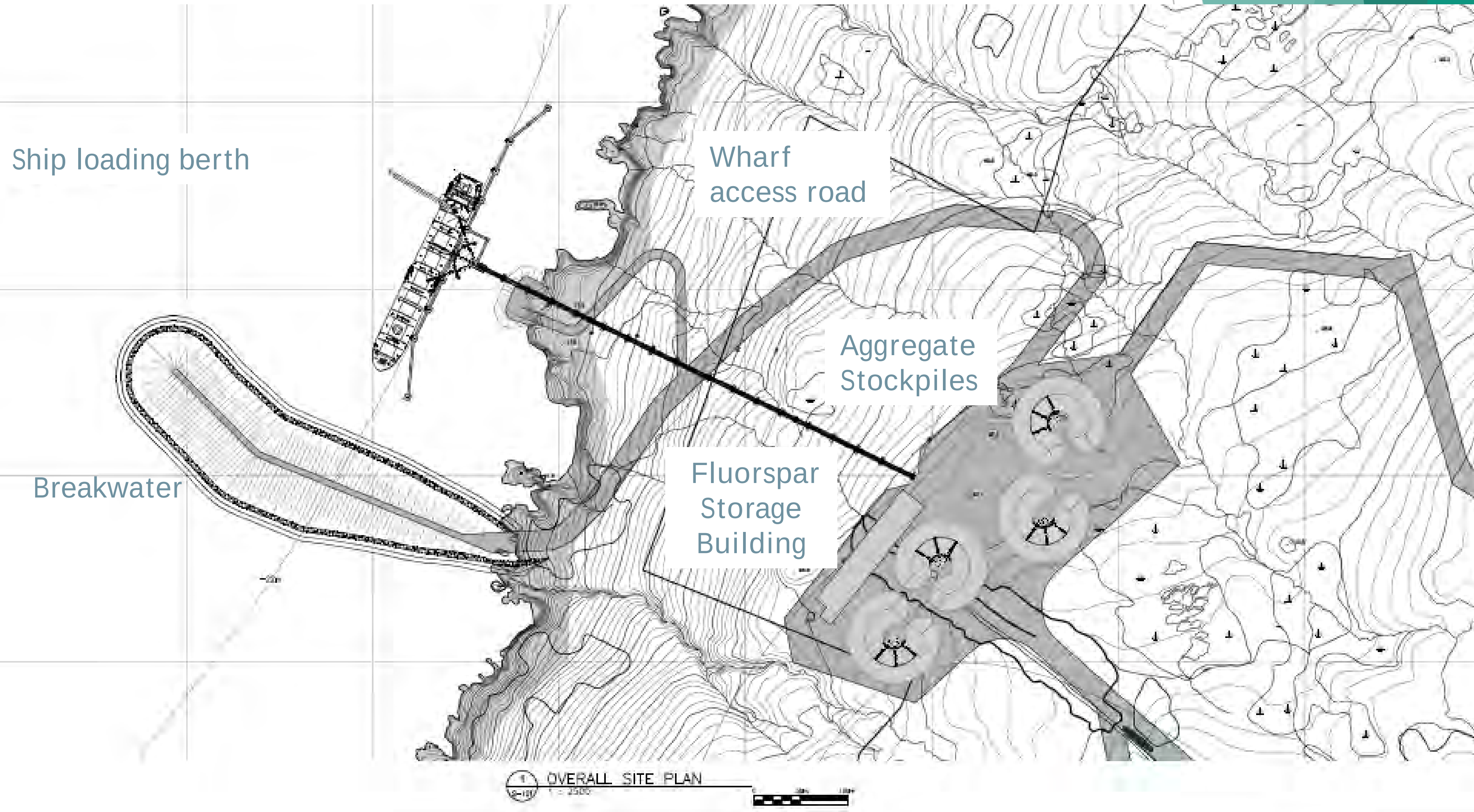
Marine Terminal

- CFI is proposing to build and operate a dedicated marine shipping terminal, west of the the current AGS Mine & Mill operations to serve as an export wharf for its acid-grade Fluorspar Concentrate (200,000 t/yr.) and Construction Aggregates (2 Mt/yr.)
- The proposed terminal will be capable of handling vessels up to 72,000 DWT and loading ships at a rate of 500 to 2500 tonnes per hour.
- The terminal will be part of CFI's current St. Lawrence Fluorspar Mine & Mill (AGS) Project, which has been in operation since August 2018
- This undertaking represents an alternative, more viable location to the previously proposed Marine Terminal in Blue Beach area in St. Lawrence Harbour, which was approved and had been released from environmental assessment in October 2010 (*Registration 1418)* and in November 2015 (*Registration 1794*).
- The Project will be subject to both the federal and provincial environmental assessment processes.

Marine Terminal Design Concept - Overview

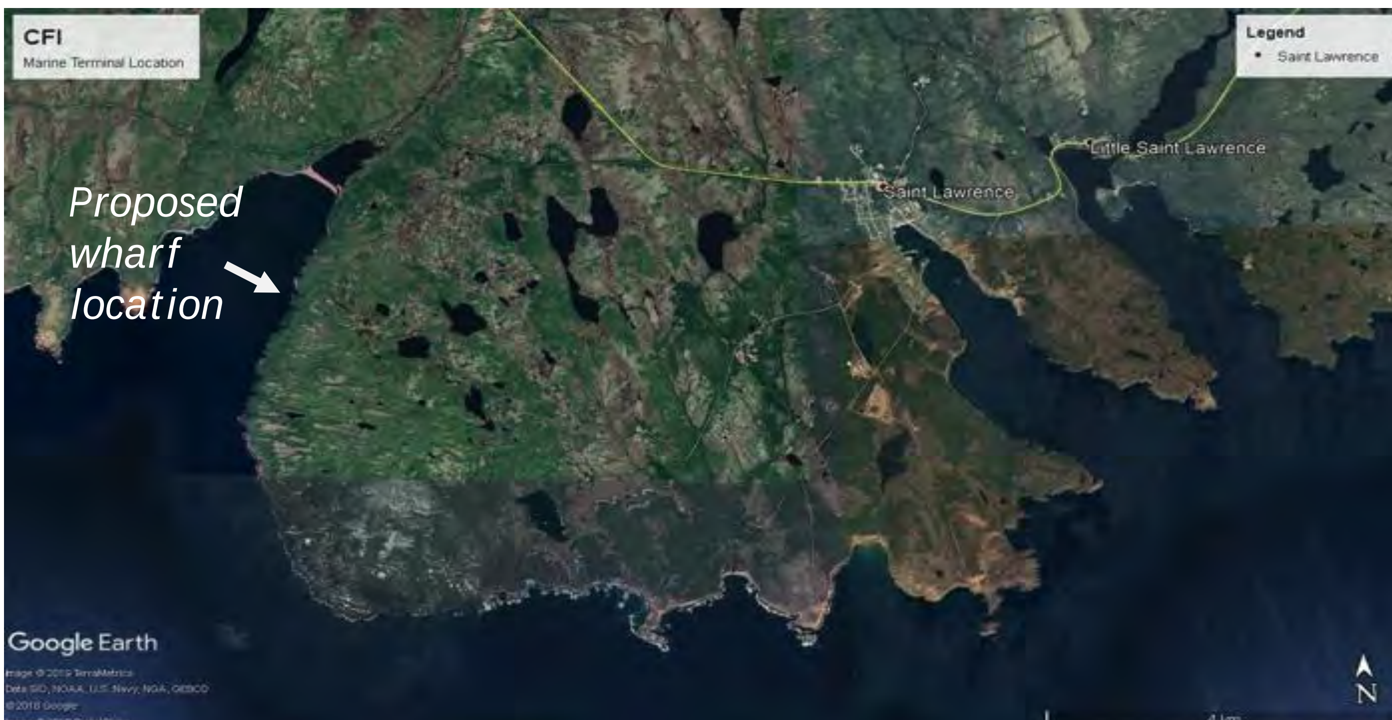


The Proposed West Marine Shipping Terminal Design Concept



Project Registration for EA process

- CFI is currently carrying out a Feasibility Study for the Construction and Operation of the Marine Shipping Terminal.
- CFI will submit a comprehensive EA Project Registration to the Province (pursuant to NL *Environmental Protection Act)* / Project Description to CEAA (pursuant to *Canadian Environmental Assessment Act 2012).*
- CFI will submit the EA documents by the end of May 2019.



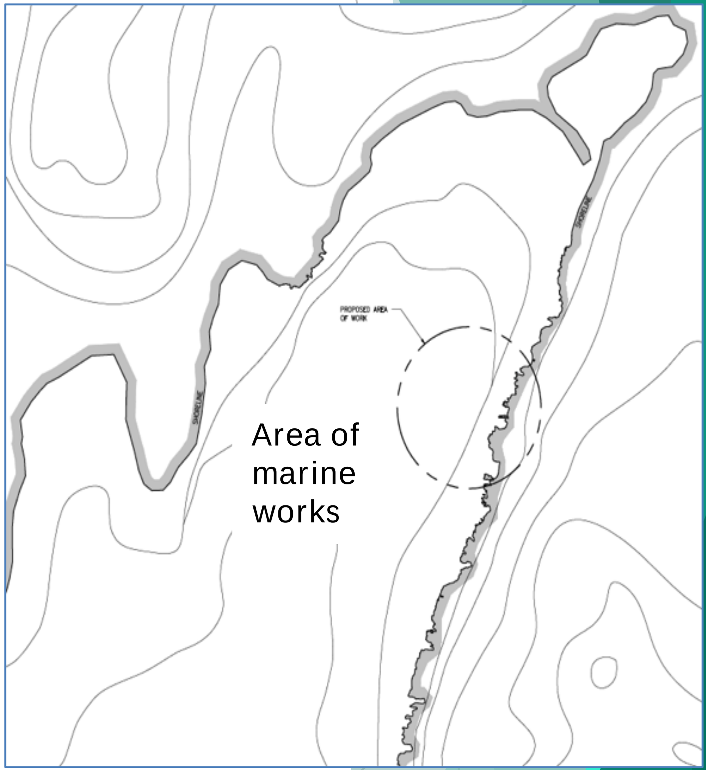
West Marine Shipping Terminal Site Investigations

CFI is currently procuring and conducting the following site-specific investigations:

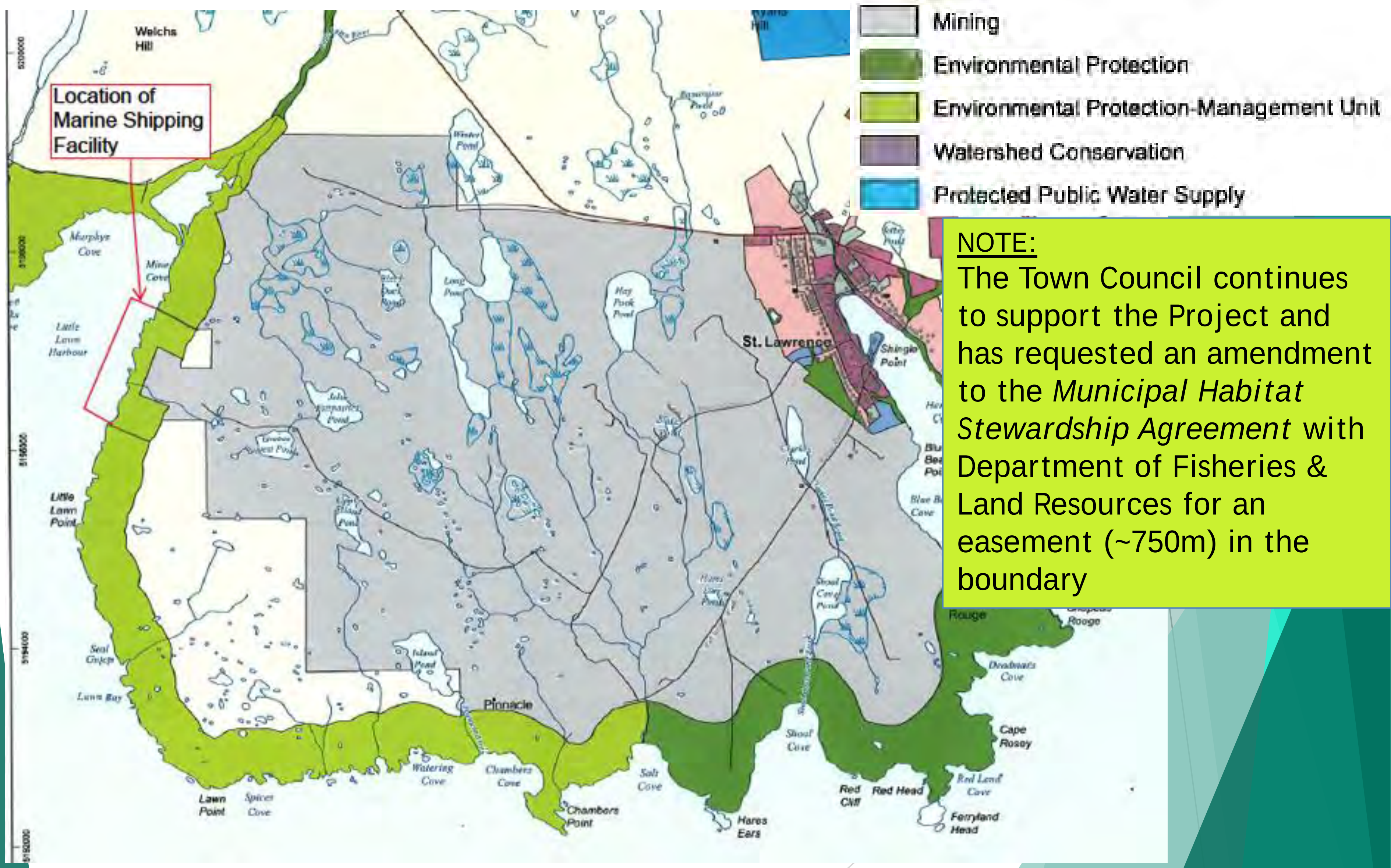
- Bathymetric Survey
- Marine Fish & Fish Habitat Baseline Survey
- Air Emissions & Noise Study
- Geotechnical Investigations

Other Baseline/Components Studies are being carried out including:

- Met-Ocean Climate Study
- Freshwater Fish & Fish Habitat update
- Socio-Economic Update
- Public / Stakeholders Consultations



St. Lawrence Municipal Zoning & Land Use in the Project Area



<u>NOTE:</u>
The Town Council continues to support the Project and has requested an amendment to the *Municipal Habitat Stewardship Agreement* with Department of Fisheries & Land Resources for an easement (~750m) in the boundary

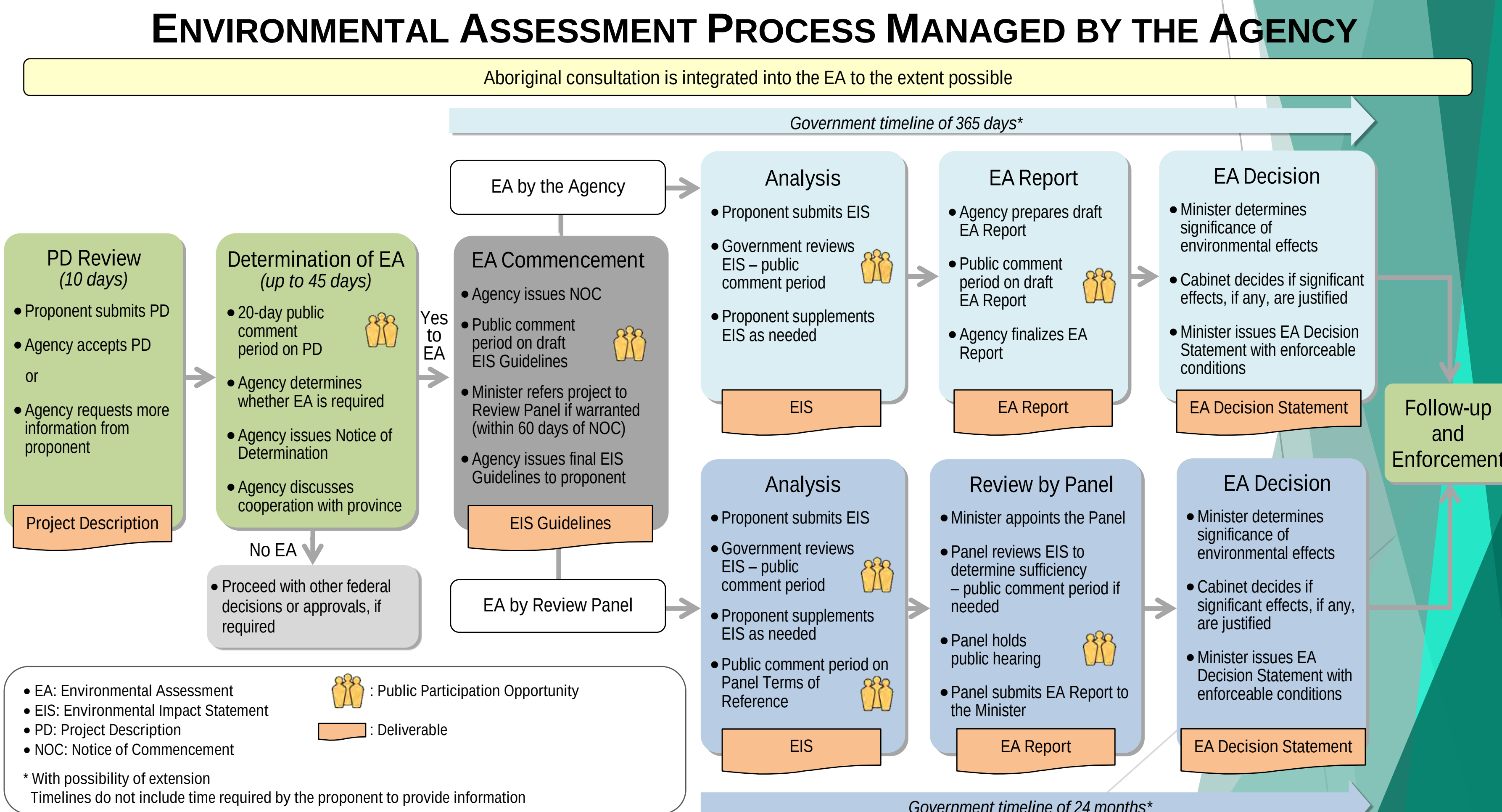
Environmental Assessment Process

Provincial EA General Process Roadmap

CFI HAS INITIATED THE EA PROCESS AND PLAN TO SUBMIT PROJECT REGISTRATION BY THE END OF MAY 2019, WITH THE HOPE TO START CONSTRUCTION IN 2020

Federal Environmental Assessment Process

Canadian Environmental Assessment Agency | Agence canadienne d'évaluation environnementale



May 2013 www.ceaa-acee.gc.ca

Canada

The West Marine Shipping Terminal is vital to:

- Safety - eliminating haul trucks from provincial & municipal roadways
- Reducing CFI's carbon footprint
- Increasing the reach of CFI fluorspar sales to the Chinese markets by accommodating larger shipping vessels than Cow Head
- Introducing the potential to sell aggregate products to East Coast markets
- Potentially increase employment opportunities
- Potentially extending the life of mine by 10+ years

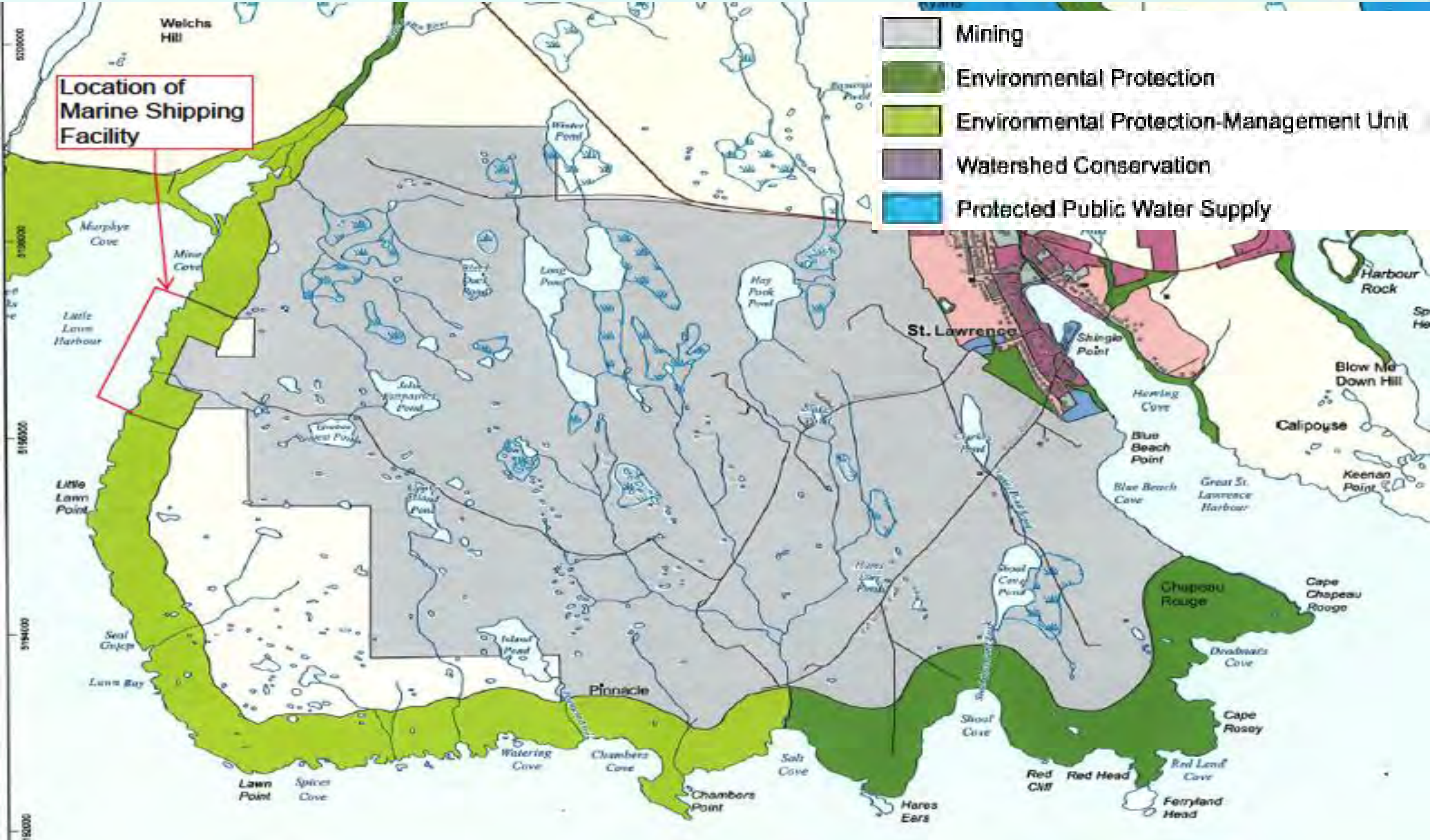
THANK YOU

FOR YOUR CONTINUED SUPPORT

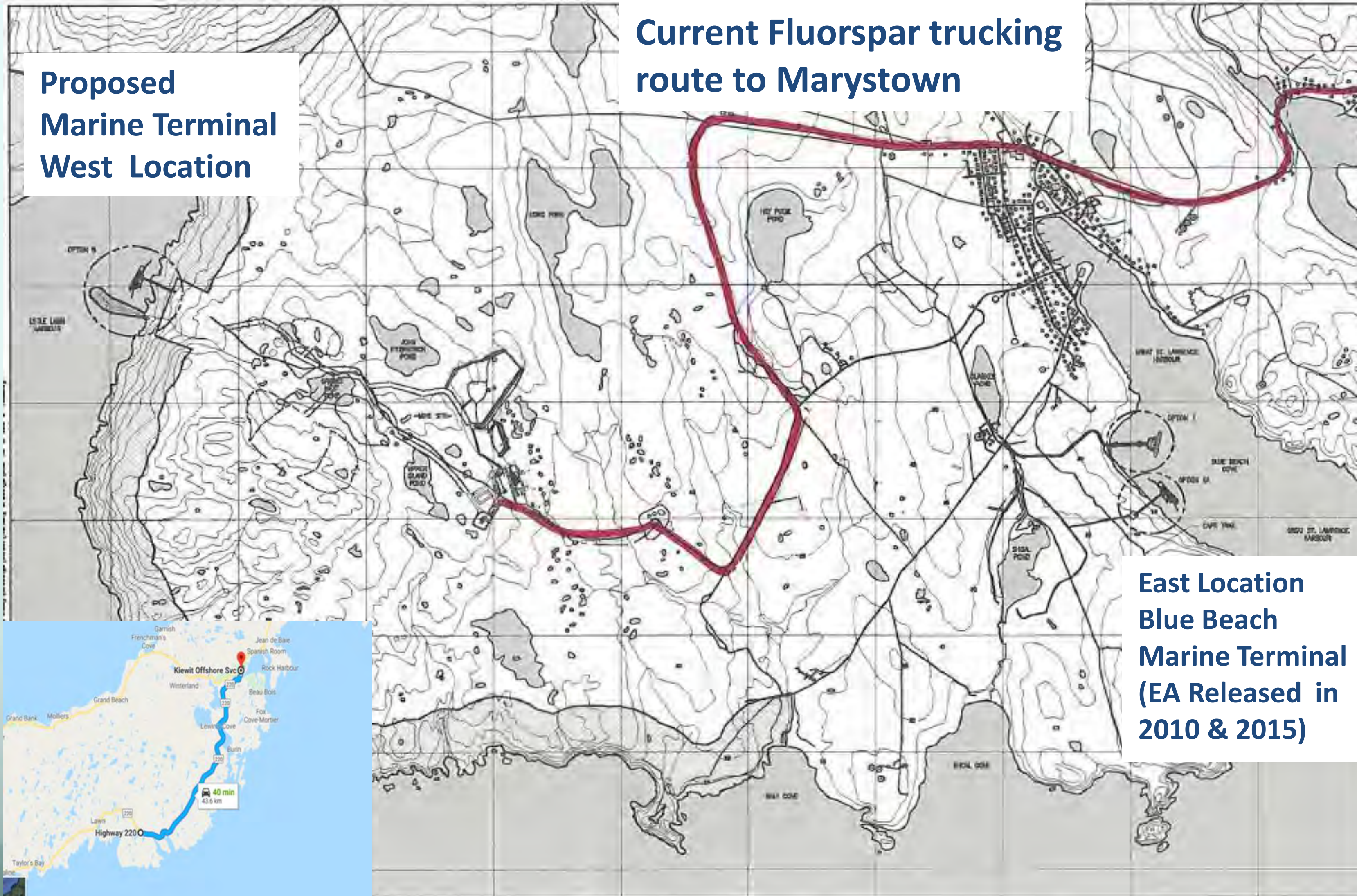
Marine Shipping Terminal Project - Environmental Studies

- Marine Fish Study
  - Survey of fish habitat and fish populations in project footprint
- Freshwater Fish Study
  - Characterize fish habitat and fish populations in freshwater bodies in project footprint
- Water Quality
  - Evaluate existing water quality baseline data in project area
- Air Emissions Inventory
  - Criteria Air Contaminants and Greenhouse Gas Emissions
  - Existing mine operations
  - Port construction and operation
  - Compare alternative port locations
- Preliminary Noise Assessment
  - Nearest receptors (cabins, homes) to south, east, and west of project.
- Socio-Economic Update
- Historic Resources
  - 19th century adit at Mine Cove, must maintain 20 m buffer
  - Clearance obtained from Provincial Archaeology Office
- Met-Ocean Study

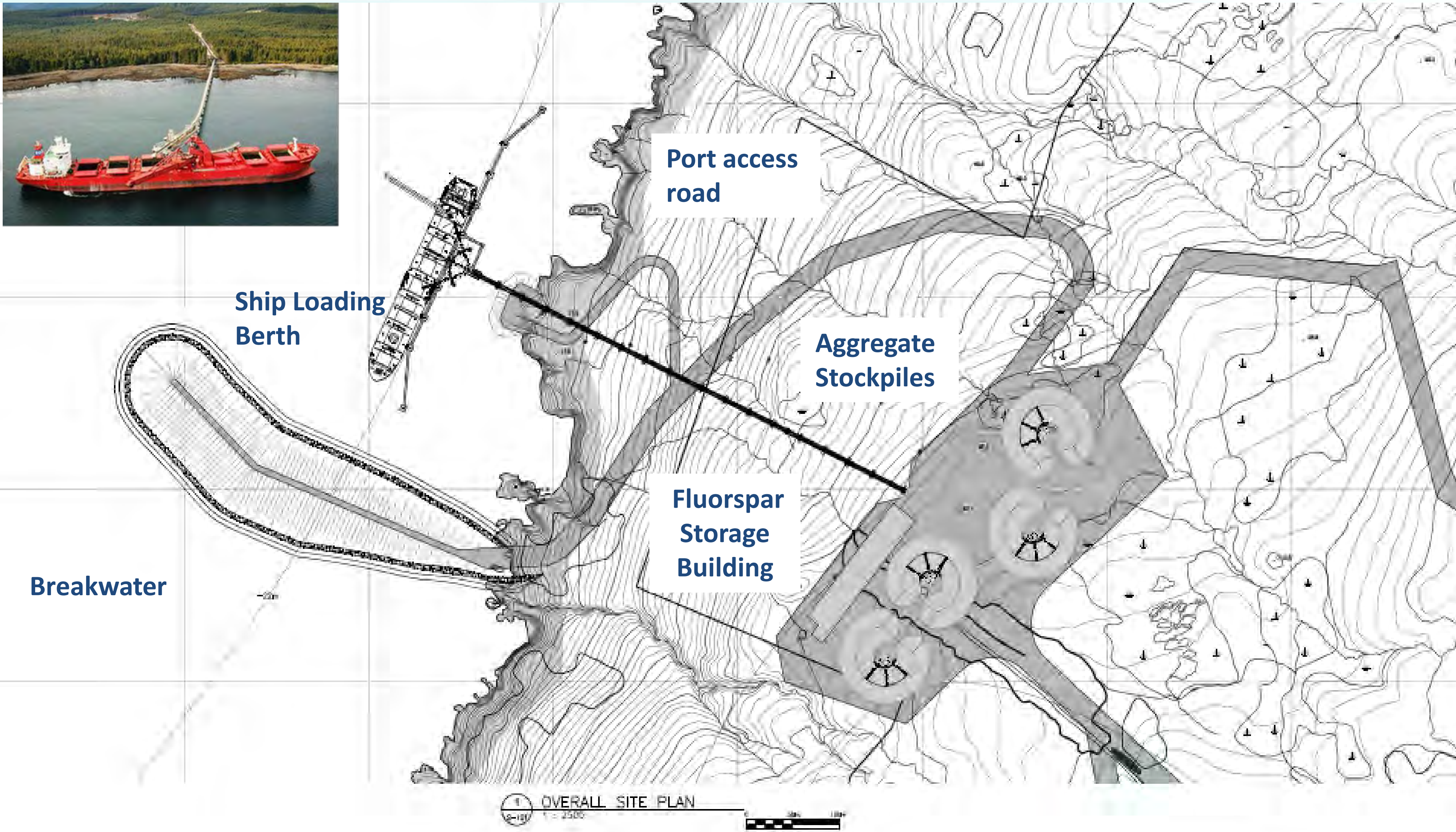
Marine Shipping Terminal Project - Environment Assessment



Proposed Marine Terminal Alternative Locations

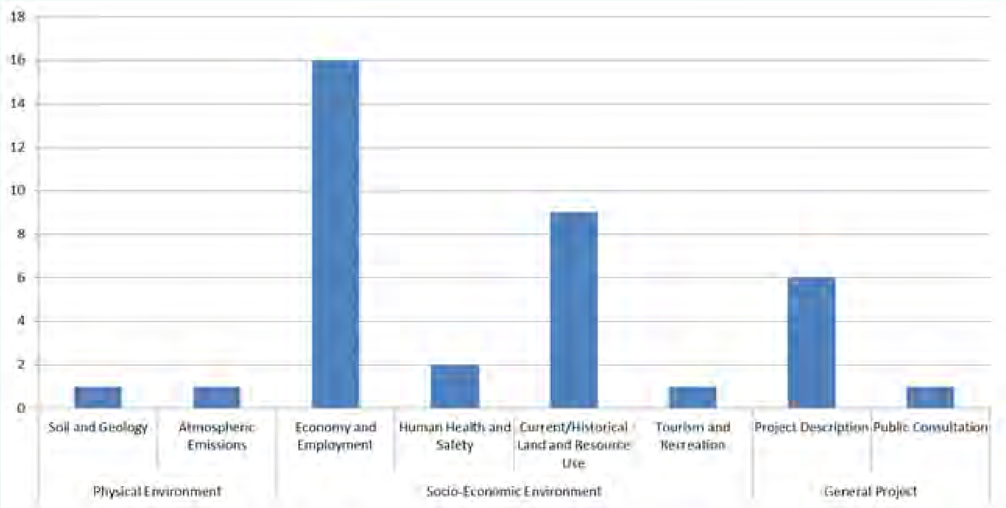


The Proposed Marine Shipping Terminal Design Concept



Marine Shipping Terminal Project – People & Community

Your main interests as identified during the 2015 CFI consultations:



With the addition of aggregate as an export product the project offers the following benefits:

Economy and Employment

- Improved operational feasibility from sale of aggregate
- Increased efficiency in mine operations
- Potential to extend the life of the mine by 10+ years
- Increase workforce by approximately 10%
- A second construction phase for wharf and breakwater

Marine Shipping Terminal Project - People & Community

Human Health and Safety

- Health and Safety Plan in place
- Add marine operations to the Health and Safety Plan
- Reduced heavy truck traffic on public roads
- Reduced air and greenhouse gas emissions associated with fluorspar export compared to other options

Current/Historical Land and Resource Use

- New facilities almost entirely within the mine area
- Modification of Environmental Stewardship Management Area along the coast – potential to increase the area
- Temporary disruption of Mine Cove area during construction
- Breakwater will create new lobster habitat

Tourism and Recreation

- Visitor interest in current and past history of mining in St Lawrence
- Continued corporate support of local initiatives

EXIT SURVEY
Public Information Session April 25, 2019

We appreciate your interest in this Public Information Session for the Proposed St. Lawrence Fluorspar Marine Shipping Terminal Project.

Please take a few minutes to complete this survey by either placing a check mark in the appropriate box or by providing a written response. Your feedback is very important to us.

1. **How did you learn about this Public Information Session (please check all that apply)?**

   - ❑ Newspaper ad
   - ❑ Letter
   - ❑ Notice posted in the community
   - ❑ News coverage on radio or TV
   - ❑ Facebook
   - ❑ Electronic signage
   - ❑ Friend / word-of-mouth
   - ❑ Other ____________________

2. **In which community do you reside?** ____

3. **Was the information in the presentation and the information stations useful?**

   - ❑ Very useful, a lot of new information
   - ❑ Somewhat useful, some new information
   - ❑ Neutral, no new information
   - ❑ Not very useful, need more information

4. **Are there any areas or water bodies you use for fishing near the Proposed Marine Shipping Terminal Project area?**

   Recreational Fishing
   - ❑ Yes
   - ❑ No

   Commercial Fishing
   - ❑ Yes
   - ❑ No

   If you answered yes, please provide the names and/or location of the areas you use.

   ____

CFI
CANADA FLUORSPAR INC.

5. **What types of activities (if any) do you participate in the area around the proposed marine terminal area?**

- ❑ Walking/Hiking
- ❑ Cross-Country Skiing
- ❑ Bird Watching
- ❑ Other ____________________

Please explain where: ____

____

6. **Are you aware of the St. Lawrence Habitat Stewardship Agreement with the Provincial Government?**

- ❑ Yes
- ❑ No

7. **Do you or anyone in your family work with CFI or with a CFI contractor or supplier?**

- ❑ Yes
- ❑ No

8. **Do you support the Proposed Marine Shipping Terminal on the west side of the mine?**

- ❑ Yes
- ❑ No

9. **Please rank from 1 to 5 the following in order of importance to you. 1 is the most important, 5 is the least important.**

Health/Safety ____

Jobs /Employment ____

Environment ____

Local Benefits ____

Other ____ describe other ______________________________

10. **Do you see any advantages or disadvantages to the proposed location? E.g. truck or boat traffic.**

____

____

CFI
CANADA FLUORSPAR INC.

P.O. Box 337, St. Lawrence, NL, Canada A0E 2V0 P: 709.873.3331 F: 709.873.3335 E: info@canadafluorspar.com

11. Please provide any additional questions or comments related to the Project. List any information you need.

____

____

____

____

____

____

____

____

OPTIONAL: Please provide your contact information below if you would like to receive Project update information. Note that your information will remain confidential.

Name: ____

Address: ____

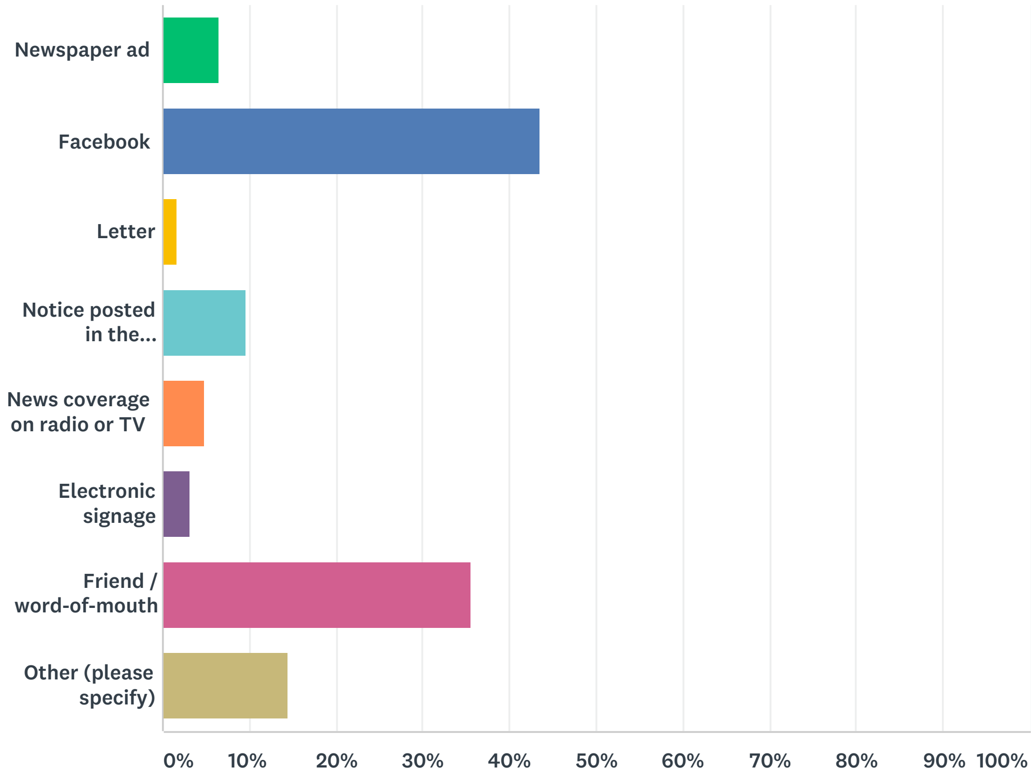
Phone: _______________ Email: ____

Thank you for taking the time to fill out this survey. The information is important to us and the Project.

For more information please contact us at 709-873-3331

Q1 How did you learn about this Public Information Session (please check all that apply)?

Answered: 62 Skipped: 0



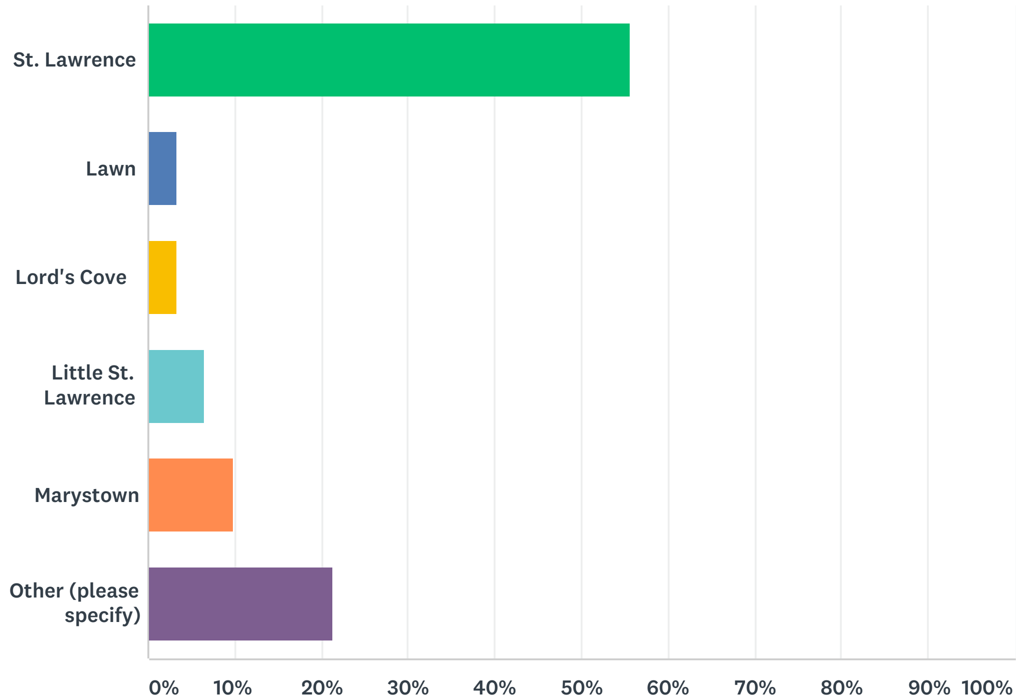
ANSWER CHOICES	RESPONSES	
Newspaper ad	6.45%	4
Facebook	43.55%	27
Letter	1.61%	1
Notice posted in the community	9.68%	6
News coverage on radio or TV	4.84%	3
Electronic signage	3.23%	2
Friend / word-of-mouth	35.48%	22
Other (please specify)	14.52%	9
Total Respondents: 62		

#	OTHER (PLEASE SPECIFY)	DATE
1	employee	4/27/2019 2:29 PM
2	work	4/27/2019 2:24 PM
3	CFI contact	4/27/2019 2:14 PM
4	CFI	4/27/2019 2:09 PM

5	email	4/27/2019 1:43 PM
6	Chamber of Commerce	4/27/2019 1:29 PM
7	news release	4/27/2019 1:05 PM
8	email	4/25/2019 11:57 PM
9	work	4/25/2019 11:39 PM

Q2 In which community do you reside?

Answered: 61 Skipped: 1



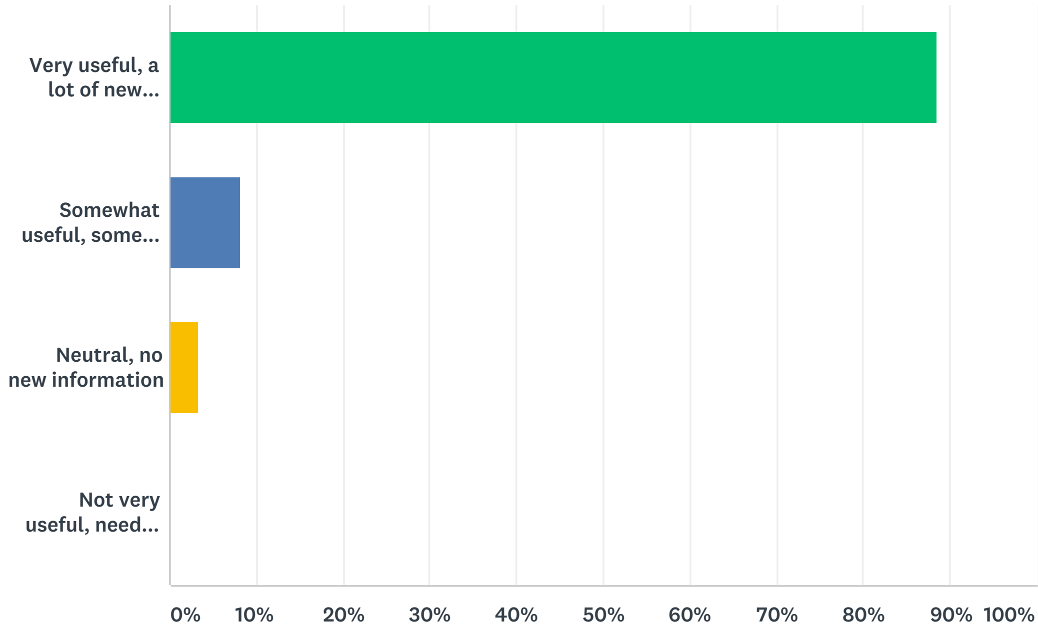
ANSWER CHOICES	RESPONSES	
St. Lawrence	55.74%	34
Lawn	3.28%	2
Lord's Cove	3.28%	2
Little St. Lawrence	6.56%	4
Marystown	9.84%	6
Other (please specify)	21.31%	13
TOTAL		61

#	OTHER (PLEASE SPECIFY)	DATE
1	Burin	4/27/2019 2:32 PM
2	Salt Pond, Burin	4/27/2019 2:20 PM
3	Burin	4/27/2019 2:16 PM
4	Spanish Room	4/27/2019 1:45 PM
5	Burin	4/27/2019 1:43 PM
6	Burin	4/26/2019 9:31 AM
7	Musgrave harbour	4/26/2019 9:11 AM
8	St. John's	4/26/2019 9:09 AM
9	Mooring Cove	4/26/2019 9:05 AM

10	St. John's	4/26/2019 8:51 AM
11	Clarenville	4/25/2019 11:54 PM
12	St. John's	4/25/2019 11:46 PM
13	St. John's	4/25/2019 11:34 PM

Q3 Was the information in the presentation and the information stations useful?

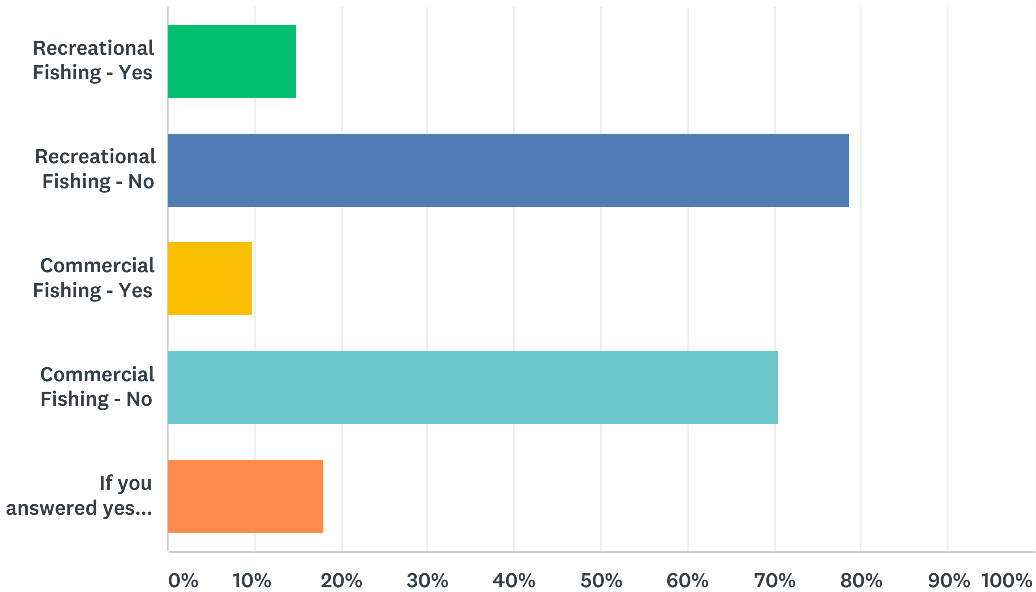
Answered: 61 Skipped: 1



ANSWER CHOICES	RESPONSES	
Very useful, a lot of new information	88.52%	54
Somewhat useful, some new information	8.20%	5
Neutral, no new information	3.28%	2
Not very useful, need more information	0.00%	0
TOTAL		61

Q4 Are there any areas or water bodies you use for fishing near the Proposed Marine Shipping Terminal Project area?

Answered: 61 Skipped: 1

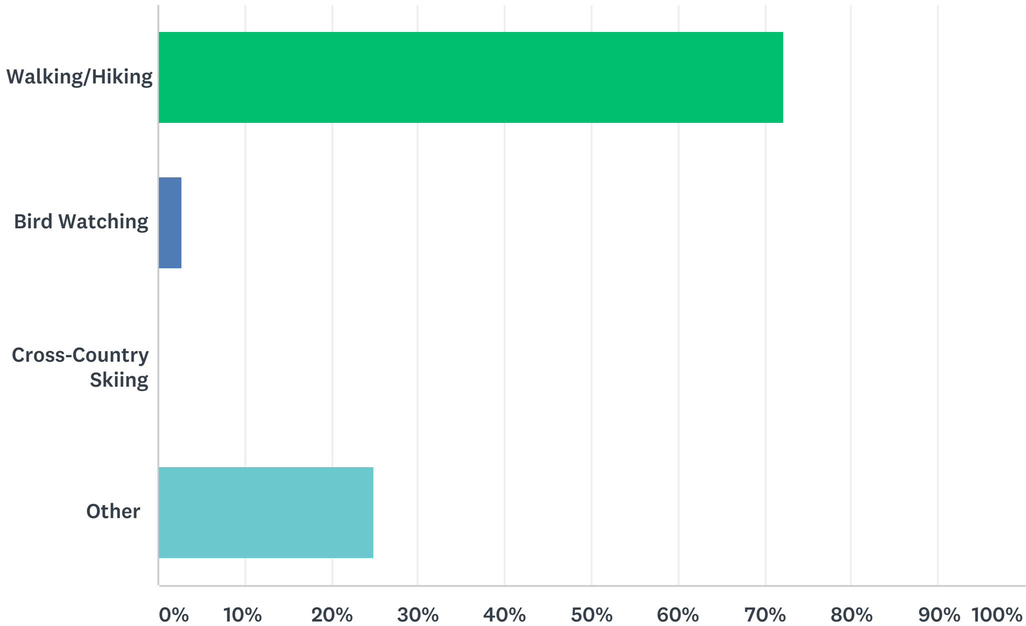


ANSWER CHOICES	RESPONSES	
Recreational Fishing - Yes	14.75%	9
Recreational Fishing - No	78.69%	48
Commercial Fishing - Yes	9.84%	6
Commercial Fishing - No	70.49%	43
If you answered yes, please provide the names and/or location of the areas you use.	18.03%	11
Total Respondents: 61		

#	IF YOU ANSWERED YES, PLEASE PROVIDE THE NAMES AND/OR LOCATION OF THE AREAS YOU USE.	DATE
1	Lawn Point Area	4/27/2019 2:27 PM
2	Little Lawn Brook near the highway - trout	4/27/2019 2:04 PM
3	Little Lawn Gut	4/27/2019 1:56 PM
4	Trout in Little Lawn Pond. Lobster fishing and cod fishing on the shore	4/27/2019 1:52 PM
5	Little Lawn	4/26/2019 9:21 AM
6	Little Lawn River and Gut	4/26/2019 9:19 AM
7	Little Lawn	4/26/2019 9:16 AM
8	Little Lawn Harbour	4/26/2019 9:13 AM
9	1 Grip rise in to head (illegible)	4/26/2019 8:58 AM
10	I work for harvesters in area (FFAW/Unifor)	4/25/2019 11:54 PM
11	Little Lawn Beach	4/25/2019 11:37 PM

Q5 What types of activities (if any) do you participate in the area around the proposed marine terminal area?

Answered: 36 Skipped: 26

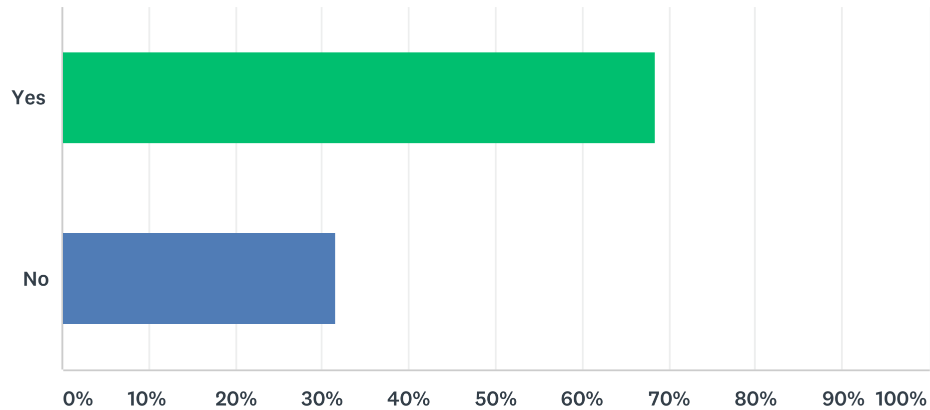


ANSWER CHOICES	RESPONSES	
Walking/Hiking	72.22%	26
Bird Watching	2.78%	1
Cross-Country Skiing	0.00%	0
Other	25.00%	9
TOTAL		36

#	PLEASE EXPLAIN WHERE	DATE
1	Hiking trail to Cape Chapeau Rouge & Chambers Cove	4/27/2019 2:32 PM
2	Other - ATV	4/27/2019 2:27 PM
3	Along Directors out towards Chambers Cove	4/27/2019 2:09 PM
4	Other - fishing for sea trout inland	4/27/2019 1:56 PM
5	Cape Trail, Chambers Cove Trail	4/26/2019 9:35 AM
6	Other - ATV for hunting	4/26/2019 9:21 AM
7	Other - Fishing	4/26/2019 9:13 AM
8	Other - ATV	4/26/2019 9:11 AM
9	Other ATVs	4/26/2019 9:09 AM
10	fishing at Lawn Point	4/26/2019 8:58 AM
11	Used to cut wood, berry pick	4/25/2019 11:37 PM

Q6 Are you aware of the St. Lawrence Habitat Stewardship Agreement with the Provincial Government?

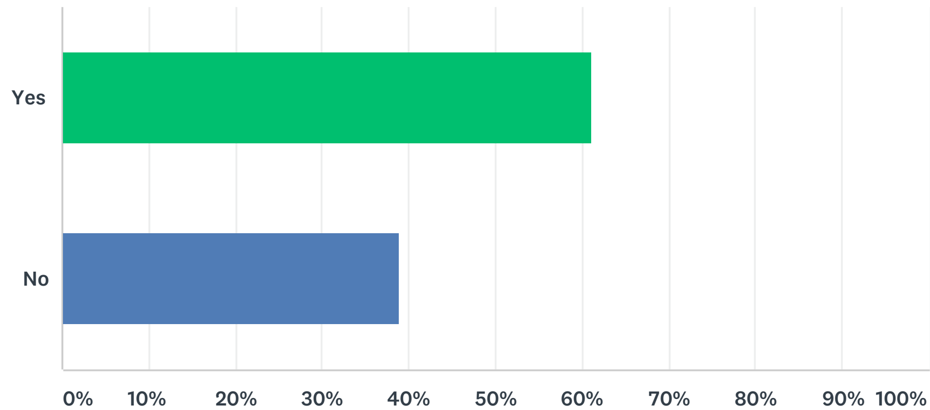
Answered: 60 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	68.33%	41
No	31.67%	19
Total Respondents: 60		

Q7 Do you or anyone in your family work with CFI or with a CFI contractor or supplier?

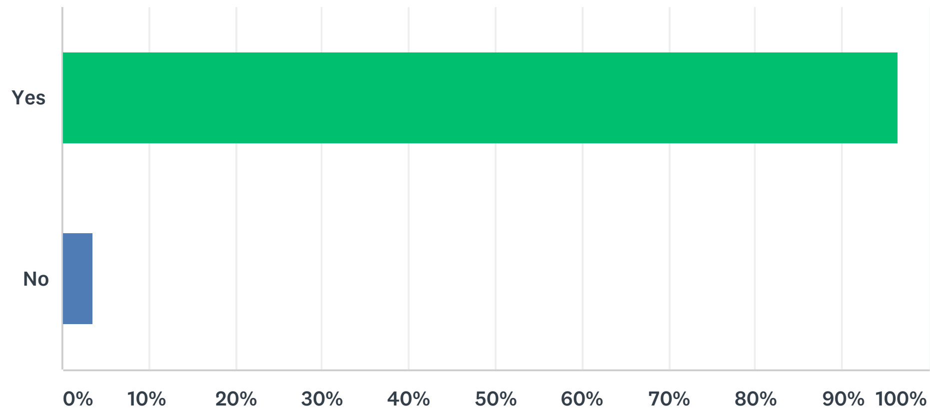
Answered: 59 Skipped: 3



ANSWER CHOICES	RESPONSES	
Yes	61.02%	36
No	38.98%	23
TOTAL		59

Q8 Do you support the Proposed Marine Shipping Terminal on the west side of the mine?

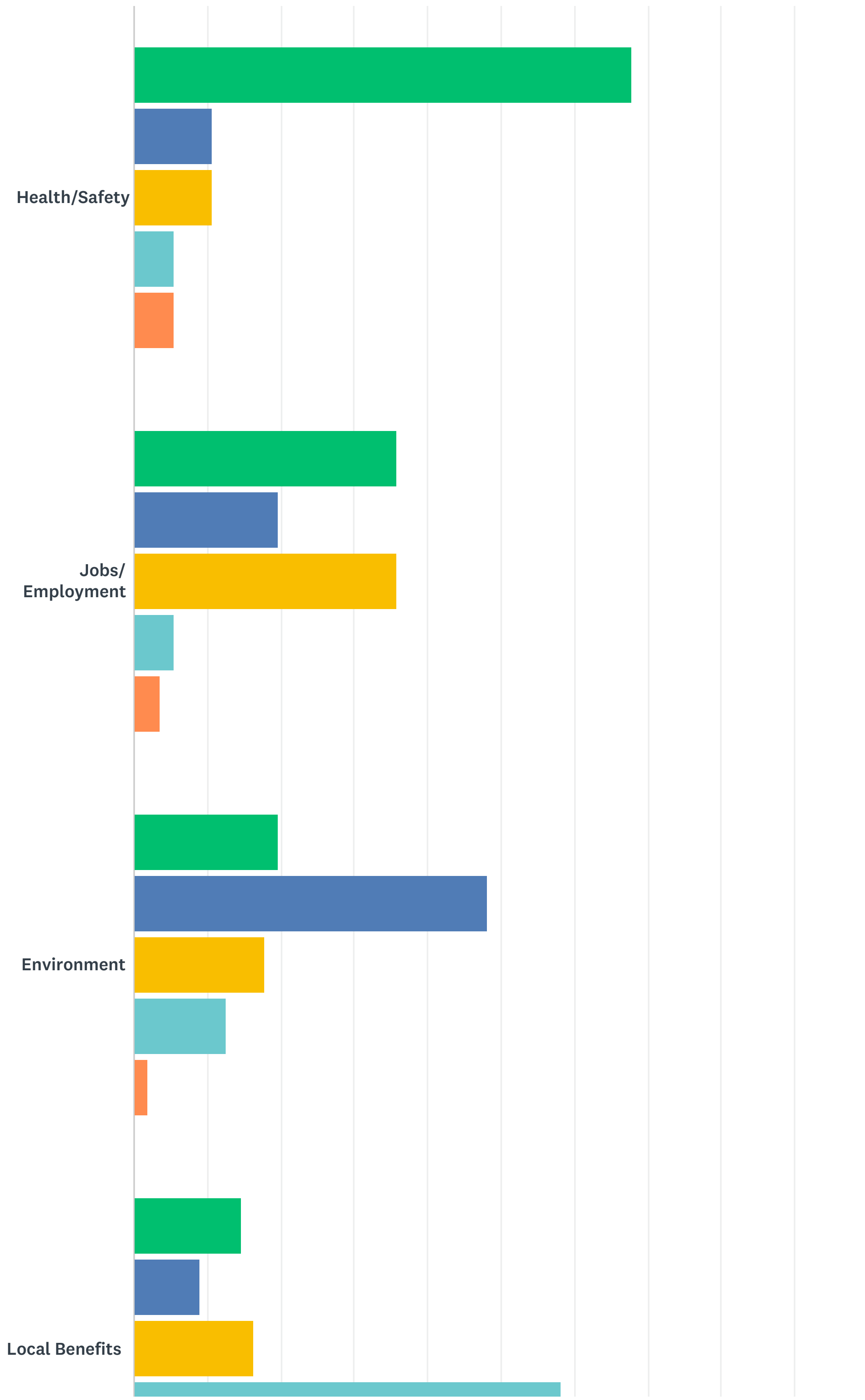
Answered: 56 Skipped: 6

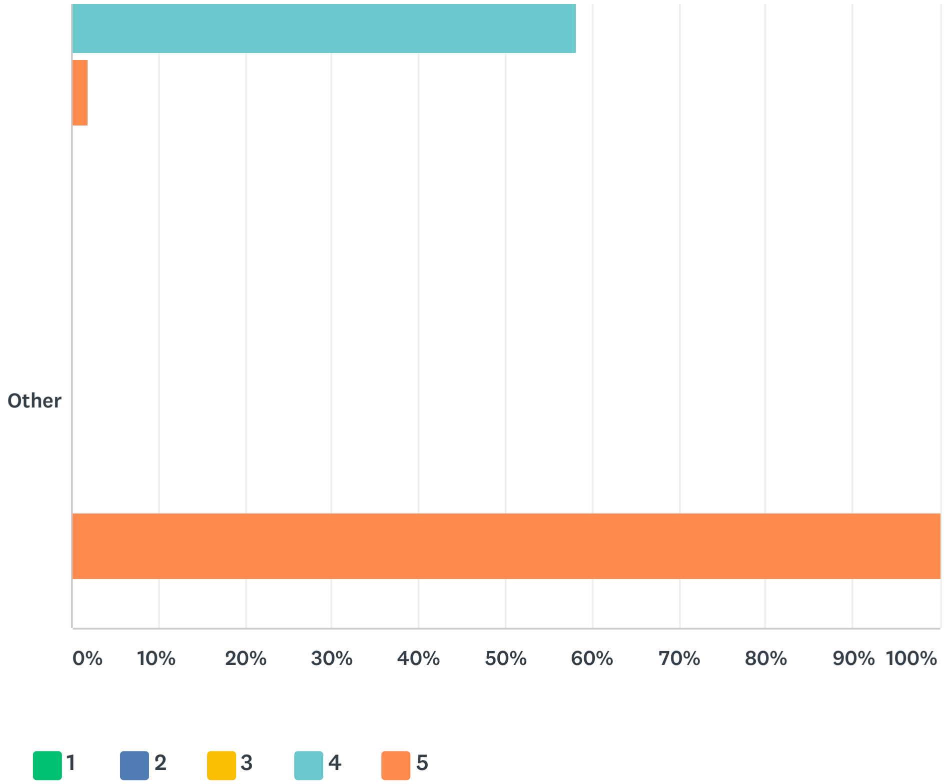


ANSWER CHOICES	RESPONSES	
Yes	96.43%	54
No	3.57%	2
TOTAL		56

Q9 Please rank from 1 to 5 the following in order of importance to you. 1 is the most important, 5 is the least important.

Answered: 56 Skipped: 6





	1	2	3	4	5	TOTAL	WEIGHTED AVERAGE
Health/Safety	67.86% 38	10.71% 6	10.71% 6	5.36% 3	5.36% 3	56	1.70
Jobs/ Employment	35.71% 20	19.64% 11	35.71% 20	5.36% 3	3.57% 2	56	2.21
Environment	19.64% 11	48.21% 27	17.86% 10	12.50% 7	1.79% 1	56	2.29
Local Benefits	14.55% 8	9.09% 5	16.36% 9	58.18% 32	1.82% 1	55	3.24
Other	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 2	2	5.00

#	OTHER (PLEASE SPECIFY)	DATE
1	Economic Benefits for the Community	4/27/2019 2:09 PM
2	Education	4/27/2019 1:43 PM
3	infrastructure 5	4/27/2019 1:29 PM

Q10 Do you see any advantages or disadvantages to the proposed location? E.g. truck or boat traffic. Please describe.

Answered: 48 Skipped: 14

#	RESPONSES	DATE
1	Facility/Dock could open yet unforseen opportunities	4/27/2019 2:32 PM
2	Advantages less carbon emissions, less traffic	4/27/2019 2:29 PM
3	Adv - trucks off highway disadv - None	4/27/2019 2:27 PM
4	Pros - reduce traffic, less handling of the product. advantage of additional Products to world markets.	4/27/2019 2:24 PM
5	no disadvantages	4/27/2019 2:20 PM
6	Advantages for better economics	4/27/2019 2:19 PM
7	Advantages. Less traffic & enviro. impact.	4/27/2019 2:18 PM
8	Advantage to reduce the traffic of trucks travelling to Marystown	4/27/2019 2:16 PM
9	Exposed to Sea	4/27/2019 2:15 PM
10	Advantages - 8000 trucks less on the 210 Route to Cowhead per annum	4/27/2019 2:09 PM
11	The people who might object to this location are fishermen but my experience in the area tells me the fishermen should not be concerned	4/27/2019 2:04 PM
12	close to the mine site has the least Environment impacked	4/27/2019 1:56 PM
13	Boat	4/27/2019 1:54 PM
14	Taking trucks off the highway (advantage) Ships in fog (disadvantage)	4/27/2019 1:52 PM
15	nil	4/27/2019 1:50 PM
16	advantage - less traffic i.e. trucks disadvantage - less jobs re trucking	4/27/2019 1:48 PM
17	It Keep it in the Community	4/27/2019 1:45 PM
18	yes - several heath and safety #1 cost savings	4/27/2019 1:43 PM
19	Yes should go in St. Lawrence	4/27/2019 1:41 PM
20	proximity would be the greatest asset	4/27/2019 1:29 PM
21	advantage - less traffic on highways (trucks)	4/27/2019 1:27 PM
22	environmentally friendly	4/27/2019 1:01 PM
23	less traffic on highway	4/26/2019 9:32 AM
24	less traffic on road ways	4/26/2019 9:31 AM
25	much better for the ore to be shipped	4/26/2019 9:28 AM
26	advantage of shorter route for trucking - would not have to go through community disadvantage - any loss of jobs trucking/	4/26/2019 9:27 AM
27	Trucks will be off our roads	4/26/2019 9:25 AM
28	Trucks off roads good location	4/26/2019 9:23 AM
29	yes, a much better site than Blue Beach	4/26/2019 9:22 AM
30	fishing net traffic would be the only thing	4/26/2019 9:21 AM
31	Adv: #, safety to our community Disad - environment, salmon river	4/26/2019 9:19 AM
32	traffic harbour will be less	4/26/2019 9:16 AM

33	less truck traffic	4/26/2019 9:14 AM
34	disadvantage Boat	4/26/2019 9:13 AM
35	advantage - employment	4/26/2019 9:11 AM
36	Employment advantage	4/26/2019 9:09 AM
37	sea conditions could be difficult at times	4/26/2019 9:08 AM
38	NO	4/26/2019 9:05 AM
39	bad for lobster fishermen	4/26/2019 8:58 AM
40	as stated in presentation	4/26/2019 8:53 AM
41	less trucks = less traffic in communities less pollution less road maintenance	4/26/2019 8:51 AM
42	less traffic on highways; worried about truck drivers employment	4/25/2019 11:57 PM
43	Adv: no truck traffic	4/25/2019 11:51 PM
44	larger trucks not on the road	4/25/2019 11:50 PM
45	new marine terminal construction aggregate production employment	4/25/2019 11:46 PM
46	less truck traffic through communities	4/25/2019 11:39 PM
47	Promised to the town to put the wharf in Blue Beach. cost is cost, Thank you	4/25/2019 11:37 PM
48	Better for aggregate shipping	4/25/2019 11:34 PM

Q11 Please provide any additional questions or comments related to the Project. List any information you need.

Answered: 8 Skipped: 54

#	RESPONSES	DATE
1	I think it is a very positive project development for the community.	4/27/2019 2:09 PM
2	I a OK with what I have seen and heard and highly support the project. Please make sure the engineering team does their homework on a properly design breakwater that can stand up to the water conditions i.e. install a wave buoy in the area for info.	4/27/2019 2:04 PM
3	Note: her response to Q8, re support Proposed marine Shipping Terminal of the west side of the Mine, showed ??? next to the No response	4/27/2019 1:59 PM
4	great project for town and region	4/27/2019 1:50 PM
5	1. consult with local fishermen/women 2. consider political situation re markets (China) etc.	4/27/2019 1:48 PM
6	All Good	4/26/2019 9:05 AM
7	would like more consultations with harvesters who use the area and have some compensation when displacement happens. Lost of fishing grounds	4/25/2019 11:54 PM
8	Good project for long term viability.	4/25/2019 11:34 PM

APPENDIX D

Representative Frame Grabs of Fish and Fish Habitat Observed in the Marine Portion of the Project Area

Appendix D – Representative Frame Grabs of Fish and Fish Habitat Observed in the Marine Portion of the Project Area

Figure 1. Representative frame grab showing predominant substrate in fish and fish habitat survey area, depth range 0-10 m.

Figure 2. Representative frame grab showing heavy kelp cover in fish and fish habitat survey area, depth range 0-10 m.

Figure 3. Representative frame grab showing predominant substrate and Atlantic wolffish in fish and fish habitat survey area, depth range 10-30 m.

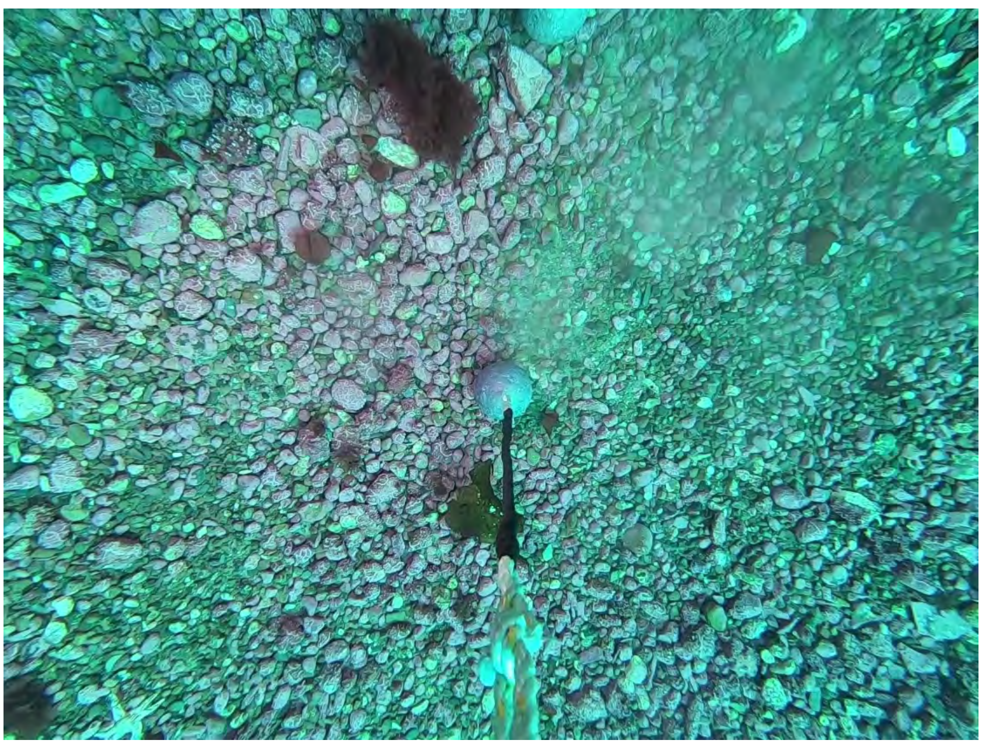


Figure 4. Representative frame grab showing predominant substrate in fish and fish habitat survey area, depth range 10-30 m.