

**ENVIRONMENTAL PREVIEW REPORT  
PURSUANT TO THE NEWFOUNDLAND  
AND LABRADOR *ENVIRONMENTAL  
PROTECTION ACT***

**AGS Fluorspar Project  
St. Lawrence, NL  
Volume 1, Appendix A-D**

**Submitted to:**

Newfoundland and Labrador Department of Environment  
and Conservation, Environmental Assessment Division

**Submitted by:**

Canada Fluorspar (NL) Inc.



September 2015



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# AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

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## Environmental Preview Report

### AGS Fluorspar Project St. Lawrence, NL

Prepared for:

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Document Reference: 0058-1407707-R-Rev0-CFI EPR

This document should be cited as:

CFI (Canada Fluorspar [NL] Inc.). 2015. AGS Fluorspar Mine, Environmental Preview Report Pursuant to the Newfoundland and Labrador *Environmental Protection Act*. Submitted to the Newfoundland and Labrador Department of Environment and Conservation, 38 pp.



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## 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. (CFI) is proposing to develop the St. Lawrence AGS Vein Fluorspar Mine (the Project) in St. Lawrence, in the province of Newfoundland and Labrador (NL). The Project will include construction, operation, rehabilitation and closure of a surface and underground Mine, a Mill, a Tailings Management Facility (TMF), ancillary infrastructure, and a Marine Terminal (the Project). The proposed Project will be located partly on a brownfield site used historically for mining. The site is located entirely within the municipal boundaries of the Town of St. Lawrence, on the southern tip of the Burin Peninsula in Newfoundland.

The Project is subject to a provincial environmental assessment (EA) under the NL *Environmental Protection Act* (EPA). On June 12, 2015, the undertaking was registered through the submission of the EA Registration (CFI 2015). Following a government and public review period, the NL Department of Environment and Conservation (NL DOEC) determined that an Environmental Preview Report (EPR) is required for the Project. The Minister of Environment and Conservation issued the EPR Guidelines on September 18, 2015 (NL DOEC 2015). A table of concordance with the EPR Guidelines is provided in Appendix A.

This EPR provides additional information on the Project, as required under the EPR Guidelines, and also includes responses to the various written comments from provincial and federal regulatory agencies that were received by CFI between August 31<sup>st</sup> and September 18<sup>th</sup>, 2015, prior to CFI's receipt of the EPR Guidelines (Appendix B).



### 2.0 PROPONENT

CFI's corporate office is based in St. John's, NL and is owned by Golden Gate Capital of San Francisco, California, USA. CFI was registered as a corporation in NL in 2009.

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### 3.0 THE UNDERTAKING

The proposed Project is located entirely within the municipal boundaries of the Town of St. Lawrence, and to the west of the community. The Project includes construction, operation, and rehabilitation and closure of the following primary components (Figure 1):

- surface and underground mine development of the AGS Vein;
- mill facility;
- design and construction of a TMF within an area historically used as a tailings lagoon;
- ancillary infrastructure to support the Mine and Mill (i.e., access roads, explosives magazine storage, conveyors, administration building, warehouse and maintenance building, employee facilities, concentrate storage building, security building, sewage and water treatment units, and electrical building); and,
- Marine Terminal facility at Blue Beach Cove.

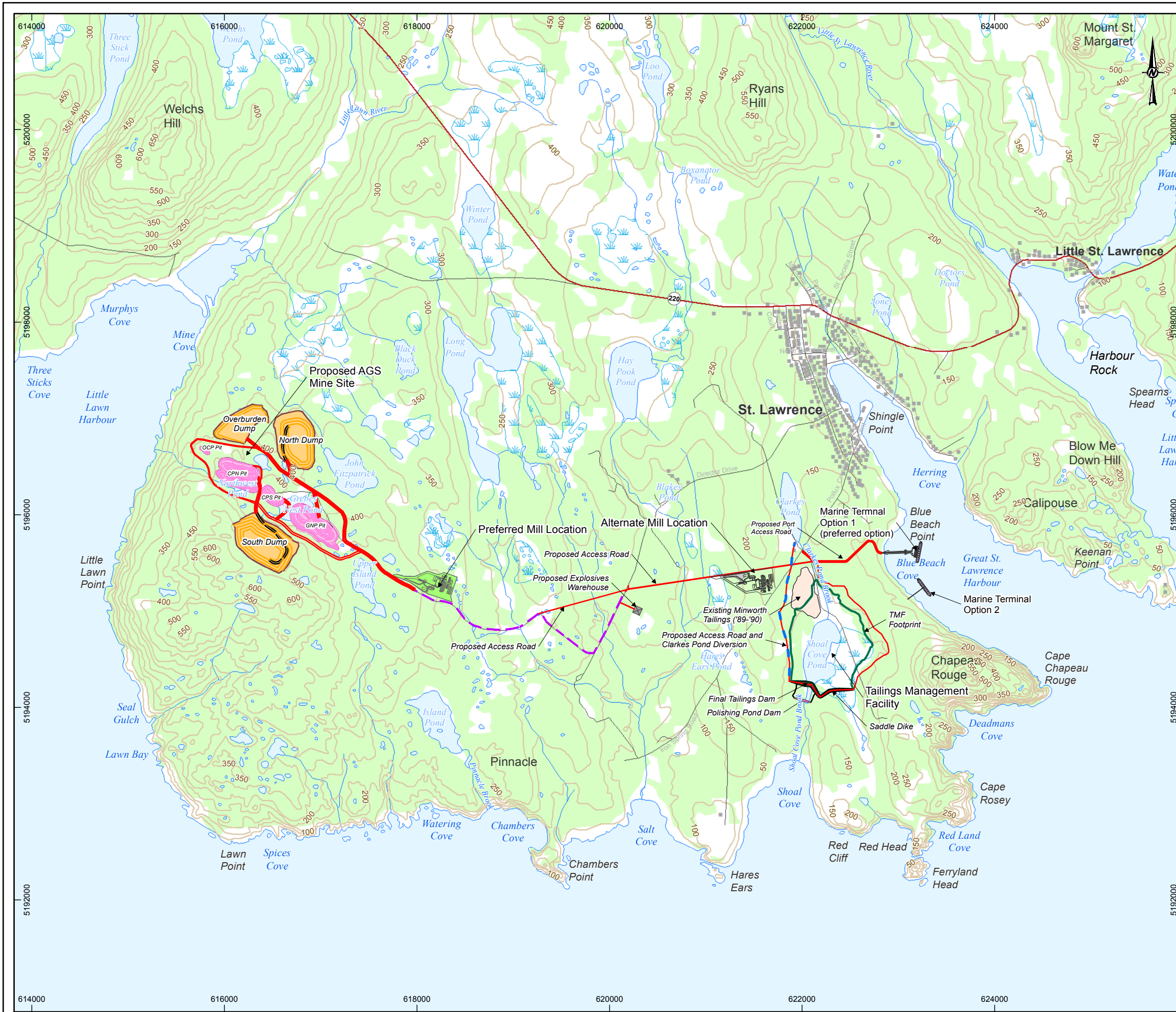
In response to comments from regulatory agencies on the EA Registration and with the view of reducing the Project's environmental footprint, CFI has reviewed the Project site layout and moved the Mill facility to the southeast to avoid interaction with an existing waterbody. The updated Project site plan is shown in Figure 1. A detailed description of the Project components and activities is provided in Section 2.0 of the EA Registration (CFI 2015).

The Project's purpose is to mine fluorspar ore from the AGS Vein near St. Lawrence, NL, in an efficient and environmentally responsible manner, to process it to produce acid-grade fluorspar concentrate, and to export this product to domestic and international markets. The fluorspar deposits of St. Lawrence are recognized for their accessibility, relatively high grades, and absence of impurities such as arsenic. The location of the Project, with an ice-free, deep water harbour close to major North Atlantic shipping routes provides a strategic advantage.

As described in Section 3.1 of the EA Registration, production of hydrofluoric acid is the leading use for acid-grade fluorspar. Fluorspar is also used in iron and steel casting, primary aluminum production, glass manufacture, enamels, welding rod coatings, cement production, and in various products such as refrigerants, Teflon®, fire retardant clothing, toothpaste, plastic, and lithium batteries. There are few known deposits of fluorspar in Canada and the United States of America (US) that can be mined economically. In Canada, there are currently no producing mines. In the US, only 119 tonnes were produced in 2014 (USGS 2015). In 2013, the volume of the global fluorspar market was approximately 7 million tonnes. Fluorspar production and demand was growing at a rate of approximately 5% in the past decade. Given the current economic conditions, the market is currently in a slowdown period but still maintains a healthy growth that is estimated at 3% per year. Based on these growth projections, it is expected that the demand for fluorspar will increase to approximately 8.4 million tonnes by 2020. The current status of the global fluorspar market justifies the need for an additional supply of fluorspar.

In addition to the status of the global market, the recent downturn in the economy reinforces the need for infrastructure projects and economic development in the St. Lawrence area. There is strong community support for the Project, as observed during the public consultation events (CFI 2015). As shown in Section 7.0 of this EPR, the proposed Project would directly create approximately 340 jobs (at peak) during construction and approximately 164 full-time jobs during operations. The proposed Project presents an opportunity for significant economic benefits to local communities, the Burin Peninsula, the province and Canada.





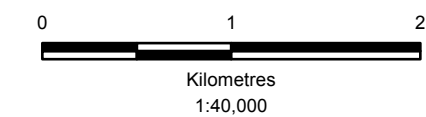
**LEGEND**

**PROJECT COMPONENTS**

- Clarke's Pond Diversion Channel
- Proposed Road
- Proposed Upgraded Road
- TMF Footprint
- Final Tailings Dam
- Settling Pond Dam
- Saddle Dike
- Existing Minworth Tailings
- Mine Dump Option
- Pit

**TOPOGRAPHY**

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



**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.

DATUM: NAD 83. PROJECTION: UTM ZONE 21.

CLIENT

**CANADA FLUORSPAR INC.**

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PROJECT

**AGS MINE PROJECT, ST. LAWRENCE NL  
EA REGISTRATION**

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TITLE

**PROJECT SITE PLAN**

CONSULTANT	YYYY-MM-DD	2015-05-13
	DESIGN	CG
	GIS	ED
	REVIEW	EL
	APPROVED	DJ

Path: \\golder-gdp\gdm\mnt\GIS\Projects\Canada Fluorspar\St. Lawrence\_NL\_Mineral\PROJECT\1407707\_EA\_AGS\_Min\_St. Lawrence\13\_Model\_Preferenc\_MK1407707\_Figure\_1\_Project\_Site\_Plan\_20150513.mxd

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### 4.0 DESCRIPTION OF THE UNDERTAKING

The proposed Project is located partly on a brownfield site on which mining and milling activities have occurred since the early 1930s. The site 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. The Project is approximately 350 kilometres (km) by road from St. John's, Newfoundland, and next to the community of St Lawrence. Access to the Project area is by Provincial Highway 220 to St. Lawrence, followed by approximately 8 km of gravel road to the proposed AGS Mine site. The Project is west of the St. Lawrence Harbour, which is ice-free year round.

The Project components are shown on Figure 1 and a detailed description of Project components and activities for the various phases of Project development is provided in Section 2.0 of the EA Registration (CFI 2015).

#### 4.1 Geographical Location/Physical Components/Existing Environment

A description of the geographical location, physical components and existing environment is provided in Section 2.0 and Section 6.0 of the EA Registration (CFI 2015). As required in the EPR Guidelines (NL DOEC 2015), additional information on land use, water management, acid rock drainage and environmental field studies is provided in the following subsections. It should be noted that the Project area covers an area of 40 km<sup>2</sup> and includes the Project footprint, the Town of St. Lawrence and the surrounding environment, as shown on Figure 1.

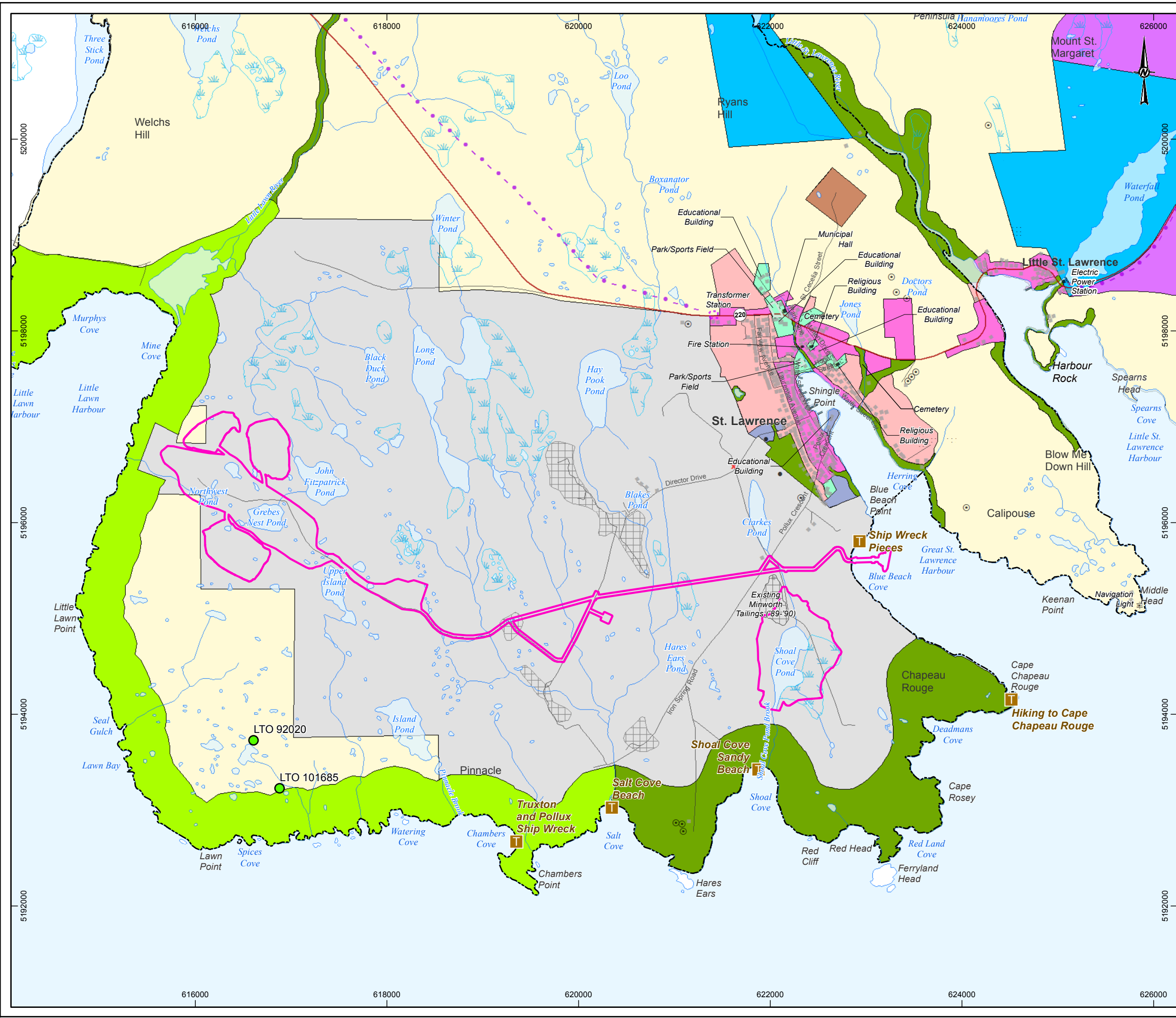
##### 4.1.1 Land Use

As described in the Section 6.5.3 of the EA Registration (CFI 2015), there are no permanent dwellings located in the Project area. The nearest human receptors include two registered cabins located west of Upper Island Pond, approximately 2 km south of the Mill site. These cabins are accessed by way of the existing gravel access roads within the Project area and are connected with an all-terrain vehicle (ATV) trail (Figure 2). In addition, the Project area access roads are occasionally used for recreational purposes by local residents for walking, ATV use and berry picking. The Town of St. Lawrence is located more than 5 km east of the Mine site, and approximately 2 km north of the TMF.

There are six homes (permanent residential dwellings) located on privately owned properties located close to the Project area. 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 Haypoock Brook. The four homes on Director Drive are not connected to the municipal water distribution system, but the two homes off Blue Beach South road are on the municipal water system and do not draw water from the Project area.

As indicated during the consultation activities conducted for the Project (see Section 5.2 of the EA Registration), land and resource use activities occurring in the Project area mainly consist of hunting, fishing and berry picking. The community members who shared information about these activities during CFI's consultation activities mentioned that these resources are generally available in other areas and it would be possible to shift their resource use activities to these alternate areas. This information on availability of resources that are found within the Project footprint are also available in other areas is supported by the results of the ecological land classification (ELC) study, which indicate that the vegetation communities within the Project footprint are present in other areas within the ELC Study Area (an area of approximately 10,400 hectares (ha), see Section 6.2 of the EA Registration) and no vegetation community will be entirely lost as a result of the Project (see Section 7.4 of the EA Registration). An evaluation of the potential effects of the Project on the socio-economic environment, including land use, is provided in Section 7.7 of the EA Registration (CFI 2015).





**LEGEND**

- Tourist Attraction
- License to Occupy
- Project Footprint (10 m Buffer)

**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**

- Navigational aid (navigation light)
- Building (unknown)
- Building (religious building)
- Building (fire station)
- Building (electric power station)
- Building (municipal hall)
- Tower (communication)
- Tank
- Blocked passage
- Municipal Boundary
- Highway
- Existing Road
- Manmade hydrographic entity (dam)
- Manmade hydrographic entity (wharf)
- Watercourse
- Waterbody
- Wetland
- Pit
- Mine
- Cemetery
- Park/Sports field
- Transformer station

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**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.

DATUM: NAD 83. PROJECTION: UTM ZONE 21.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

AGS MINE PROJECT, ST. LAWRENCE NL  
ENVIRONMENTAL PREVIEW REPORT

**LAND USE AND PROJECT FOOTPRINT**

CONSULTANT	DATE	REVISION
	YYYY-MM-DD	2015-05-14
	DESIGN	CG
	GIS	ED
	REVIEW	EL
	APPROVED	DJ

Path: \\golder\gdp\gdp\Montreal\GIS\Projects\Canada Fluorspar\St.Lawrence\_NL\_Mineral\PROJECTS\1407707\_EA\_AGS\_Min\_St.Lawrence\12\_Model\_Preview\_ML\1407707\_Figure\_2\_LandUse\_ProjectFootprint.mxd

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### 4.1.2 Water Management

The surface water, groundwater, and runoff from all areas of the Project have been the subject of a Water Management Strategy for construction, operation, and decommissioning and closure phases of the Project (Appendix C). Further to the water management information provided in the EA Registration, additional groundwater studies have been completed during the summer 2015 to gather additional data on the groundwater system (Appendix D). In addition, a groundwater and surface water sampling program is being completed quarterly by CFI. The standard work instruction for the water quality sampling is provided in Appendix H. Information on the Water Management Strategy and additional water monitoring surveys are provided in the following subsections. Additional information on water management is provided in response to comments number: PPD 19, WRMD 08 to 10, and DNR 03 (Appendix B).

#### *Water Management Strategy*

Water management will be a major focus for CFI during construction, operation, and rehabilitation and closure of the mine. Appropriate handling of surface and groundwater flows in open pits, groundwater flows into the underground Mine, and surface water runoff from other Project facilities is critical to the success of the Project. The preliminary Water Management Strategy outlines sources of water (groundwater and surface), strategies to manage water on site, and mitigation measures to be implemented for the Project (Appendix C). The proposed strategies to manage water on site are:

- Maintain existing flow regime where possible to minimize natural watercourse and water body disturbance.
- Provide erosion and sediment control for runoff in disturbed areas to prevent downstream transport.
- Intercept, store, and if required, treat surface water and groundwater potentially affected by the Project prior to releasing into the environment.
- Reduce new water requirements by reusing, recycling, and treating Mine water, process water, storm water and wastewater, wherever practical.
- Divert clean surface water from undisturbed areas around disturbed areas through a series of ditches and diversions to reduce the volume of water requiring treatment.
- Upon decommissioning and closure, restore disturbed areas to a stable and safe condition, minimizing erosion and sediment transport downstream.
- Restoring pre-mining drainage patterns and conditions where practical, rehabilitating disturbed areas and removing water management infrastructure.

As part of preparing the Water Management Strategy, preliminary construction, operation and closure water balances were completed to determine the extent of management required for the Project. Complete details on the concepts for the Water Management Strategy are provided in Appendix D.

### *Groundwater Studies*

Two hydrogeology programs have been commissioned to inform CFI about the groundwater systems within the Project footprint. The Phase 1 Hydrogeology Program consisted of an assessment of the baseline hydrogeological conditions around the perimeter of the proposed open pit Mine footprint, hydrological measurements, and water sampling of surface water and groundwater. The methodology and results of the Phase 1 Hydrogeology Program are presented in Appendix E.

Based on the results of the Phase 1 Hydrogeology Program, a Phase 2 Hydrogeology Program was designed. The Phase 2 Hydrogeology Program is currently ongoing. The results will be presented in a technical report, which will be issued to regulatory agencies. The program's initial scope included the following activities:

- drilling of 2 monitoring wells to a depth of approximately 100 metres (m);
- drilling of 1 pumping well to a depth of approximately 200 m, conducted in two stages: the first stage of drilling from surface to about 120 m depth followed by a 3-hour pumping test, and the second stage where drilling was extended to the final depth of 200 m;
- a 72-hour pumping test in the pumping well;
- packer testing in three exploration holes; and,
- groundwater sampling and water level surveys.

The details of the Phase 2 Hydrogeology Program are provided in Appendix D.

Following the interpretation of the field data collected during the Phase 2 Hydrogeology Program, a 3D groundwater flow model will be developed. The 3D finite-element FEFLOW model will be used for this Project. The results of the numerical model will allow prediction of the extent of the zone of hydraulic influence induced by the Mine dewatering operations, which is a key component to assess the potential effects of the Project on surface water bodies and water wells. The modelling will also allow the estimation of the water inflow at various stages of the Mine development. This will provide a finer temporal breakdown of the water volume to be dealt with, leading to a better understanding of the pumping capacity required during the life of the Mine. The water inflow estimate will also be compared to the historical inflows in the former underground mines using the available information on the geometry of the openings. This comparison exercise will help verify the order of magnitude inflow estimation. Modelling results will be shared with regulatory agencies.

Not only will this study provide an estimate of seepage flows and water quality into the proposed open pits, it will provide information on the suitability of the Mine dewatering water for mill processes.

Once the potential effects of the mining operation are defined, a groundwater monitoring program will be prepared and implemented prior to the start of construction. The groundwater monitoring program will comprise groundwater sampling and water-level measurements in wells that will be installed in strategic locations to assess potential effects on receptors. The groundwater monitoring program will be developed in consultation with relevant regulatory agencies.

### *Water Quantity and Quality Monitoring*

Several historical water monitoring studies have been carried out within the Project footprint to characterize surface and groundwater quality and flow conditions. A preliminary surface water monitoring program was initiated by CFI in 2014 to establish background levels of various parameters in surface water around the Project site and support the permitting for the Project. Water quality results obtained during that program were compiled and presented in the EA Registration (see Appendix D of EA Registration [CFI 2015]).

A hydrological monitoring program is currently being implemented. The program is comprised of four flow monitoring stations and two tipping bucket rain gauges. The program is designed to collect baseline flow data in the vicinity of the project for comparison and correlation with regional flow monitoring data.

CFI continues to monitor water quality at 12 surface water and 10 groundwater locations in the vicinity of the AGS Mine Site and tailings areas. This monitoring program is conducted on a quarterly basis to capture selected seasonal and annual water quality variability. The samples are collected in May (wet season), July/August and February (dry season), and October (transitional season). In-field measurements of temperature, pH, dissolved oxygen, and electro-conductivity are collected at the time of sample collection. Samples are sent to an accredited laboratory to be analyzed for a suite of parameters to comply with the NL *Environmental Control Water and Sewage Regulations* and the Canadian Environmental Quality Guidelines for the Protection of Aquatic Life (CCME 2014). The surface water and groundwater quality monitoring program is provided in Appendix F.

### **4.1.3 Acid Rock Drainage**

As outlined in Section 2.4.5 of the EA Registration (CFI 2015), waste rock generated during the Project will be stored in the waste rock disposal areas located to the northeast and southwest of the AGS Mine Site. Some of the waste rock will be used during construction to develop access roads and other infrastructure throughout the Project area. During operation, some waste rock will likely be placed into excavated stopes to minimize both material transfer to surface and the size of the waste rock dumps. It is anticipated that waste rock will also be used to build the tailings and polishing pond dams. Waste rock from underground development will be loaded into dump trucks and trammed either to the surface via the haulage drifts and ramp, or trammed and tipped into a completed stope.

A geochemistry program is currently ongoing to characterize the potential for acid rock drainage and metal leaching, which includes testing of waste rock samples. The results of the Stage 1 Geochemistry Program are provided in Appendix G. The Stage 1 Geochemistry Program included a screening level assessment with static testing of a select number of samples to gain an initial understanding of the acid generating and metal leaching potential of the waste rock and ore. Based on those results, the waste rock material is anticipated to be non-acid generating. However, additional testing is ongoing through the Stage 2 Geochemistry Characterization Program to confirm this conclusion. The Stage 2 program includes additional static testing of waste material (e.g., waste rock and tailings) to ensure appropriate spatial and compositional characterization. A Stage 3 program will be conducted after Stages 1 and 2 are complete and it will consist of long-term geochemical leach testing (Kinetic Tests) conducted on a limited number of waste rock and tailings samples collected during Stage 1 and Stage 2. A description of the proposed scope of work for Stage 2 and Stage 3 is provided in Appendix G.

Once the geochemistry characterization programs are completed, the potential of acid generating material in the waste rock will be assessed. If waste rock is identified as having the potential for acid generation or metal leaching, only non-acid generating waste rock will be used for construction purposes. A waste rock management program will be developed to handle, store, and appropriately dispose of waste rock. This waste rock management program will outline disposal options and runoff management in the event that potentially acid generating material is encountered.



### 4.1.4 Environmental Field Surveys

Following the submission of the EA Registration, field surveys were completed to gather additional data on wetlands, avifauna, wildlife species at risk, and freshwater fish and fish habitat. An overview of these field programs is provided in the following sections. Additional information on these surveys is provided in response to the following comments from regulatory agencies (Appendix B):

- Wetland, Avifauna and Species at Risk: PNAD 01, EC 30, EC 39, EC 40; and,
- Fish: PPD 12, PNAD 01, DFO 01, EC 06 to EC 13.

#### *Wetland, Avifauna and Species at Risk Survey*

CFI retained LGL Limited (LGL) to conduct an assessment of wetlands occurring within and proximate to the Project footprint and a survey of avifauna and species at risk (Appendix H). The wetland assessment included the identification and classification of wetlands that met the spatial criteria indicated above. The avifauna and species at risk survey was conducted within the Project footprint to identify bird species observed. The results of these surveys are provided in Appendix H. During the detailed engineering design phase, CFI will use the study findings to develop appropriate mitigation measures and monitoring programs as part of CFI's Environmental Protection Plan and Environmental Effects Monitoring Plan.

CFI recognizes that the Project footprint overlaps some wetland areas. The proposed access road that will connect the Mine area with the TMF and the Marine Terminal at Blue Beach Cove will intersect a number of wetland areas including the northern portion of a wetland located north of Hares Ears Pond, and fluvial fen streams and brooks emptying into Salt Cove, as shown on Figure 7-2 of the EA Registration (CFI 2015). Mitigation measures will be developed as part of ongoing Project design and planning to promote conservation of this wetland.

The large fen and peatland area adjacent to Shoal Cove Pond is located within the boundaries of the proposed TMF and will likely be affected by the Project. Based on available data, it is known that this wetland has historically been disturbed by mining activities dating back to the 1930s (ADI Nolan Davis 1990, 1995). The Water Management Strategy prepared for this Project considers the hydrologic function of the wetland adjacent to the TMF (Appendix C). Specifically, the spill level in the TMF spillway will be set to encourage development of a stable wetland surrounding the pond. Measures to maintain hydrologic function of wetlands in the vicinity of the Project area will be considered in the Water Management Plan.

CFI understands the importance of protecting the wetland habitat within the Management Unit established through the Municipal Habitat Stewardship Agreement. The Project footprint does not overlap with this Management Unit and as required, CFI will engage with NL DOEC to discuss the potential to implement mitigation measures to reduce potential adverse effects of the Project on this Management Unit.

#### *Freshwater Fish and Habitat Survey*

A fish habitat study was conducted in 2014 in support of the Project (Appendix I). The study consisted of surveys and biological assessment of stream and lake habitats and the results were presented in the EA Registration document (CFI 2015). With the ongoing refinement of the Project footprint through the pre-feasibility study, a 2015 freshwater fish and habitat program is currently ongoing to collect additional information on fish species presence and habitat characterization in Grebes Nest Pond and in other water bodies and associated streams over the Project area.

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The 2015 program has been designed to collect fish population and habitat characterization data suitable for determining the potential for the Project to result in Serious Harm to Fish under Section 35 of the *Fisheries Act*. The key objective of this program is to confirm that predictions regarding potential downstream effects presented in the EA Registration documents (CFI 2015) can be verified.

CFI recognizes that certain components of the Project could cause Serious Harm to Fish. As a result, a team of qualified environmental professionals have been included on the Project team and discussions have begun with Fisheries and Oceans Canada (DFO) by recent submission of a Request for Project Review, a review of proposed mitigation measures, and a residual Serious Harm determination. CFI submitted the Request for Project Review to DFO on September 14, 2015. When available, the results of the 2015 freshwater fish and habitat program will be provided to relevant regulatory agencies, including DFO, as part of the *Fisheries Act* authorization process. Any residual Serious Harm will be subject of an authorization request to DFO under Section 35 of the *Fisheries Act*.

### 4.2 Construction

The Project will be undertaken in four specific phases, as shown on Figure 3:

- Pre-construction (ongoing);
- Construction (Q1 2016 to Q1 2018);
- Operations (2018 to 2027); and
- Rehabilitation and Closure (2027 to 2029).

The pre-construction phase is currently ongoing and includes various activities such as metallurgical test work, engineering prefeasibility, feasibility studies, detailed engineering, EA and planning studies, and regulatory permitting. The construction phase is planned to begin in the first quarter of 2016 and is expected to last approximately two years.

Project Phase	2015			2016				2017				2018				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4												
Pre-Construction																											
Construction																											
Operation																											
Rehabilitation and Closure																											

*Figure 3: Project Schedule*

The key activities to be completed during the construction period include site preparation, open pit development, construction of infrastructure, installation of utilities, restoration of temporary work areas and commissioning. The general timeline for each of these activities is shown on Figure 4.

Project Phase	2015			2016				2017				2018				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4												
Construction																											
Site Preparation																											
Open Pit Development																											
Construction of Infrastructure																											
Installation of Utilities																											
Restoration of Temporary Work Areas																											
Commissioning																											

*Figure 4: Construction Schedule*



As identified by Environment Canada, the breeding bird season in this area occurs between April 15<sup>th</sup> and August 15<sup>th</sup> (see Appendix B, comment number EC 31). Most of the activities identified in Figure 4 have the potential to occur during the bird breeding season. However, CFI will limit clearing activities to outside of the bird breeding season, where practical, to avoid the disturbance of migratory birds or their nests. If some tree clearing is necessary during the bird breeding season, CFI will prepare and implement an Avifauna Management Plan, in consultation with the Canadian Wildlife Service, to maintain compliance with the *Migratory Birds Convention Act*.

The details, materials, methods and location of all planned construction activities are provided in Section 2.3 of the EA Registration (CFI 2015), which includes a description of site preparation activities, open pit development, construction of infrastructure (Mill, TMF, access roads and haul roads), installation of utilities, restoration of temporary work areas and potential sources of pollutants. The list of permits and authorizations that are expected to be required for the Project is provided in Section 10.0 of this EPR.

In addition, as outlined in response to comment number WRMD 06 (Appendix B), CFI understands that a Real Time Water Quality Network is required by NL DOEC. The objective is to install a real time water quality and quantity monitoring network on the Project site to monitor Project effects on water quality and flow in and around the Project area. CFI will continue to engage with the Water Resources Management Division to conclude a Memorandum of Agreement prior to start of construction.

CFI commits to using a TMF design that exceeds a 1:100 year storm and will follow the requirements of the Canadian Dam Association (CDA) guidelines (CDA 2007) for the design and construction of the TMF, including the preparation of the following documents: Emergency Preparedness and Response Plan, Operation Maintenance & Surveillance Manual, and Dam Safety Reviews. The TMF is designed to accommodate the tailings solids, free water from the tailings and other hydrological inputs (e.g., Clarkes Pond Brook base flow, typical precipitation events), as well as an additional storage allotment for the 1 in 100 years 24 hour storm event. Flows exceeding the 1 in 100 year rainfall event will be conveyed to the tailings pond, which will store a portion of the excess flow before discharging through the spillway. The spillway will be located on the southeast side of the TMF. The spillway will be designed for the routed outflows specified by the CDA guidelines for a 'significant' classed dam. An emergency spillway will also be constructed in the TMF settling pond to discharge flows exceeding a 1 in 100 year storm.

The Clarkes Pond storm water diversion system will divert storm flows around the TMF. Detailed engineering will ensure storm flows are also diverted around the Minworth facility and thereby prevent any interaction with the structure.

### 4.3 Operation and Maintenance

As shown in Figure 3, start of the operation phase is planned to begin in the first quarter of 2018 and is projected to last ten years based on the current resource estimate. The details of all aspects of the operation and maintenance activities, including mining, processing, water management, tailings management, waste rock disposal areas, power, transportation, Marine Terminal and potential sources of pollutants are described in Section 2.4 of the EA Registration (CFI 2015).



### 5.0 ALTERNATIVES

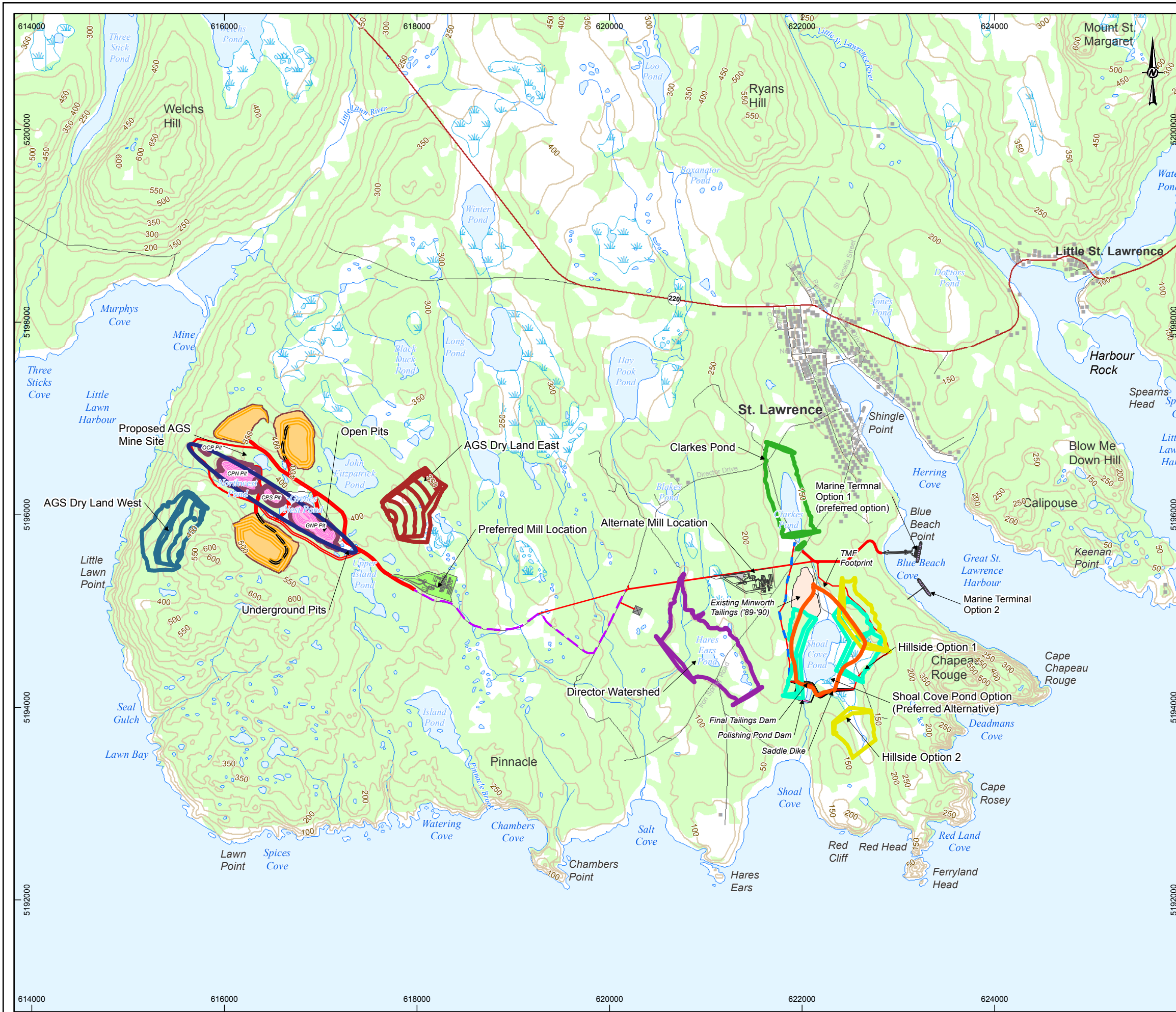
Information regarding alternative means of carrying out the Project was provided in Section 3.3 of the EA Registration (CFI 2015). The alternative means of carrying out the Project presented in the EA Registration focused on the TMF, Marine Terminal, mining methods, waste rock and overburden storage, and water use. Following the submission of the EA Registration, an alternatives analysis for the TMF was completed and the results are provided in Section 5.1. As part of the pre-feasibility study, an alternatives analysis for the Mill was completed and is described in Section 5.2.

#### 5.1 Tailings Management Facility

The EA Registration provides an alternatives analysis overview for the TMF which included six methods of tailings disposal and seven tailings disposal locations (CFI 2015, Section 3.1.1). The information provided in the EA Registration was based on a review of the TMF alternatives assessment that was conducted for the Newspaper Project. Given the increase in capacity of the TMF for the Project, updated TMF alternatives analysis was conducted (Appendix J) in accordance with the Environment Canada *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (EC 2011). These guidelines recommend the use of a Multiple Accounts Analysis (MMA) approach, which is a well-accepted, transparent decision-making tool. In this analysis, the following options were considered:

- Tailings disposal location:
  - Shoal Cove Pond;
  - Hillside option 1;
  - Hillside option 2;
  - Clarkes Pond;
  - Director watershed;
  - Underground paste backfill;
  - AGS pit dry land west;
  - AGS pit dry land east; and
  - In pit disposal.
- Tailings disposal methods:
  - Slurry;
  - Thickened tailings;
  - Paste;
  - Filtered; and
  - Cemented paste backfill.

The tailings disposal location options considered in this evaluation are shown on Figure 5.



**LEGEND**

**PROJECT COMPONENTS**

- Clarke's Pond Diversion Channel
- Proposed Road
- Proposed Upgraded Road
- Final Tailings Dam
- Settling Pond Dam
- Saddle Dike
- Existing Minworth Tailings
- Mine Dump Option
- Pit

**TAILINGS MANAGEMENT FACILITY ALTERNATIVES**

- Shoal Cove Pond Option (Preferred Alternative)
- AGS Dry Land West
- AGS Dry Land East
- Clarke's Pond
- Director Watershed
- Hillside Option 1
- Hillside Option 2
- Open Pits
- Underground Pits

**TOPOGRAPHY**

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

0 1 2  
Kilometres  
1:40,000

**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.

DATUM: NAD 83. PROJECTION: UTM ZONE 21.

CLIENT	CANADA FLUORSPAR INC.	
PROJECT	AGS MINE PROJECT, ST. LAWRENCE NL ENVIRONMENTAL PREVIEW REPORT	
TITLE	TAILINGS MANAGEMENT FACILITY ALTERNATIVES	
CONSULTANT	YYYY-MM-DD	2015-05-13
	DESIGN	CG
	GIS	ED
	REVIEW	EL
	APPROVED	DJ
PROJECT No. 14-07707	Rev. 0	FIGURE 5



Path: \\golder-gdp\gdm\mnt\GIS\Projects\Canada Fluorspar\St. Lawrence\_NL\_MineralPROJECT\1407707\_EA\_AGS\_Min\_St. Lawrence\13\_AlternativesForTMF\1407707\_Figures\_5\_TailingsManagementFacilityAlternatives.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 26mm

## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

The MAA assessment process involved identifying feasible locations for the tailing management facility. A total of nine possible locations and four levels of tailings dewatering (i.e., slurry, thickened tailings, paste and filter cake) were examined based on the following fundamental considerations:

- That the footprint of the TMF of any greenfield location did not overlap a body of water frequented by fish.
- That the footprint of the TMF avoids known restricted non-mitigable sites.
- That the TMF alternative did not exceed an acceptable risk threshold for failure.
- That the TMF alternative did not exceed a reasonable financial threshold (capital cost).

The results of the MAA, including the sensitivity analysis, indicated that the Shoal Cove Pond location was the most appropriate option for the TMF for the Project. As for the selection of the level of tailings dewatering, both slurry and thickened tailings were similar and will therefore require further study as part of the feasibility study of the Project to determine which technology is the most appropriate (Appendix J).

Additional information on the TMF is provided in response to comments number: PPD 13, DNR 05 and EC 12 (Appendix B).

### 5.2 Mill

The Preliminary Feasibility Study consultant for the Project, Worley Parsons, have carried out an options evaluation for the process plant location considering environmental, technical and economical criteria (WorleyParsons 2015). Four locations were considered for siting of the Mill:

- existing mill site;
- director site;
- AGS Mine site; and,
- Marine Terminal site.

The summary of the options evaluation is provided in Figure 6. Based on the analysis conducted, the preferred option is near the AGS Mine site, with the Mill moved slightly to the southeast of the location indicated in the EA Registration to avoid surface waterbodies, as shown on Figure 1.

CRITERIA	RELATIVE Overall IMPORTANCE 1-10	EXISTING MILL SITE	RANK	SCORE	DIRECTOR	RANK	SCORE	AGS	RANK	SCORE	PORT	RANK	SCORE
EA Permitting	10	Existing development, already permitted	4	40	Partially developed	2	20	Single impacted area	3	30	Potentially re-open the existing EA approval for port	1	10
Tailings distance to SC Pond	3	Closest to TMA	4	12	3rd closest to TMA	2	6	Most remote from TMA	1	3	2nd closest to TMA	3	9
Mill Water Discharge Compliance	2	Closest to CP	4	8	3rd closest to CP	2	4	Most remote from CP	1	2	2nd closest to CP	3	6
Impact on local public	8	Already impacted area but closer to town	2	16	Already impacted area	3	24	Most remote from town	4	32	Close to town, more sensitive area	1	8
Weather	3	2nd least exposure	3	9	Least exposure	4	12	Remoteness, altitude	1	3	Direct exposure	2	6
Future Expansion	6	Next centrally located	2	12	Central location	4	24	Potential for new discoveries	3	18	Furthest from known deposits	1	6
Cost	10	Capex/NPV, 3rd best	2	20	Capex/NPV, 2nd best	3	30	Capex/NPV, best	4	40	Capex/NPV, worst	1	10
<b>TOTALS</b>				<b>117</b>			<b>120</b>			<b>128</b>			<b>55</b>

*Figure 6: Mill Location Options Evaluation Summary*



### 6.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

In Section 7.0 of the EA Registration (CFI 2015), CFI provided an environmental effects analysis for the following Valued Environmental Components (VECs):

- physical environment;
- atmospheric environment;
- water resources;
- terrestrial environment;
- wildlife;
- marine environment; and,
- socio-economic environment.

The description of likely environmental effects was provided for each VEC at each Project phase: construction, operation, and rehabilitation and closure. Proven and effective 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 events and malfunctions, and cumulative effects.

In this EPR, additional information is provided on climate change, air quality, radon gas and noise effects.

#### 6.1 Air Quality and Climate Change

Following the submission of the EA Registration (CFI 2015), air emission inventories were completed to outline expected emissions of dust, namely suspended particulate matter (SPM), PM<sub>10</sub>, and PM<sub>2.5</sub>, products of combustion, such as carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and greenhouse gases (GHG) (Appendix K). An inventory was prepared for two operating phases of the Project, construction phase and operation phase, and includes emissions from stationary, mobile and fugitive sources. The inventory for each phase was based on the operating year which would generate the most emissions, i.e., the worst case operating scenario. For the operations phase, this worst case operating scenario occurs when all mining is occurring via the open pits.

During the detailed engineering design phase, CFI will complete a BACT analysis for equipment that will be used to control emissions from material processing and handling sources, such as crushing, screening and transfer conveyors as well as fugitive dust emission sources. CFI will engage with NL DOEC during the preparation of the BACT analysis to ensure that it meets Section 6 of the *Air Pollution Control Regulations*.

A Best Management Practices Plan to control fugitive dust emissions will be prepared and implemented by CFI prior to start of construction. This plan will characterize the existing fugitive dust sources at the site, rank them according to relative risk and provide reasonable control measures to be followed by the site to minimize the dust emissions. The plan will also include frequency for inspection of the fugitive sources and procedures for implementation of adaptive management measures following inspection, as required. The plan will be kept up to date and revised accordingly throughout the various Project phases.



CFI will consult with DOEC's Pollution Prevention Division regarding an ambient monitoring program for particulates in the Town of St Lawrence commencing during construction and continuing into operations. The monitoring program's design will be appropriate to the scale of the Project and will be revised accordingly as activities and operations change at the site. The monitoring program is intended to confirm the methods used to estimate the emissions and the effectiveness of assumed mitigation measures, and in doing so, assess if alternative mitigation strategies are required to minimize emissions from the Project and their effects.

In addition to estimates of GHG emissions associated with the Project during construction and operations and how these emissions compare to provincial, national and global emissions, information is provided on the predicted effect of climate change on the Project. The provincial climate change projections for St. Lawrence were used in this assessment.

The detailed air emissions inventory report is provided in Appendix K. Additional information on the air emission inventory and air quality is provided in response to comments number: PPD 15, PPD 17, CCEEET 01, HC 01, EC 26, EC 27 and EC 28 (Appendix B).

### 6.2 Radon Gas

In response to comments from regulatory agencies regarding radon, CFI prepared a radon gas assessment, which provided information on the radon releases from the historical St. Lawrence underground mine (Appendix L). The results from an outdoor survey of radon gas in the St. Lawrence area, as measured in 1990, were also provided in this report. To obtain site specific information, CFI will undertake baseline radon studies at the proposed Mine site and in the surrounding area prior to the start of operations. The baseline radon studies and subsequent outdoor radon measurements during mining operations will provide an assessment of the radon exposures to the general public attributable to Mine operations.

Radon gas is a noble gas similar to the other noble gases such as helium and argon. The capture of such gases at the point of release is not technically feasible. The only practicable mitigation measure is to elevate the point of release to increase the atmospheric dispersion of the radon. Such mitigation, if required, will be implemented in the unlikely event that the radon released during mining operations is found to exceed the Health Canada Guidelines for the exposure of the general public (Health Canada 2011). The Health Canada Guidelines specify a maximum annual dose to the general public of 1 millisieverts (mSv) with an annual dose constraint for releases from any one operation of 0.3 mSv. Further, as outlined in the Health Canada Guidelines, CFI commits to limiting the radon releases to a level as low as reasonably achievable, while taking into consideration economic and social factors.

As described in the radon gas assessment (Appendix L), the experience at the Saskatchewan uranium mines is that the radon released from the mines disperses rapidly with distance from the mine. Such atmospheric dispersion is weather dependent. It is noted that the Saskatchewan uranium mines are subject to atmospheric inversions during which the radon can accumulate at the mine site. The windy conditions common in St. Lawrence are likely to result in more rapid dispersion of the radon release from the CFI operations than is the case for the Saskatchewan mines and this is expected to lead to lower radon levels at and around the Mine site. Additional information on the radon surveys is provided in response to comment number PPD 16 (Appendix B).

### 6.3 Noise Effects

A preliminary noise assessment was completed for the Project to identify potential effects of noise on sensitive receptors in the vicinity of the Project area (Appendix M). Based on the preliminary noise assessment, it is expected that there is a potential for Project noise emissions to result in a 'negligible' to 'low' change in average noise levels at the identified representative receptors. CFI will carry-out a follow-up noise assessment program once the Project is commissioned to verify the findings of this preliminary noise assessment. This follow-up noise assessment will be used to verify that mitigation measures implemented into the Project design are effective once implemented, and to determine whether there is a need for additional mitigation measures. This follow-up noise assessment program will form part of a more comprehensive environmental monitoring program, which will include implementing a complaints-based recording and resolution program where regulating authorities and/or members of the public will have the opportunity to work with CFI to log and resolve concerns.

Additional information on the noise surveys is provided in responses to comment number HC 01 (Appendix B).

### 7.0 EMPLOYMENT AND TRAINING

CFI provided employment information in Section 2.6 of the EA Registration. As part of ongoing Project planning, employment information for the construction and operation phases has been updated and is provided in the following subsections. CFI remains committed to local employment, to maximizing local benefits, both through direct employment, training and by giving assistance and preference to local suppliers.

As the Project design and planning advances, employment numbers may be updated. Updates to employment numbers will be made available to NL Department of Advanced Education and Skills (DAES), as applicable. CFI will monitor employment throughout the life of the Project and will provide quarterly summary reports to NL DAES during each phase of the Project. These reports will include, at a minimum, the following information:

- employment numbers by 4-digit National Occupational Classification (NOC) code;
- full-time and part-time employment numbers;
- number of apprentices (by level) and journeypersons for each applicable 4-digit NOC code;
- employment by gender; and
- employment by location and source of workforce.

Comments from the NL DAES were submitted during the review of the EA Registration. Additional information on employment is provided in the response to comments AES 01 to 07 (Appendix B).

### 7.1 Construction Employment

The construction of the Project will result in a peak employment of approximately 340 workers during the construction period. In the fourth quarter of 2015, it is estimated that 138 workers will be on site as construction ramps up. In 2016, there will be a peak of 334 workers and the overall construction employment peak is expected to occur in 2017. Table 1 provides a quarterly estimated average number of construction workers by type of occupation based on the 2011 NOC codes for the construction phase. CFI is committed to hiring apprentices, when feasible, and has included an estimated number of apprentices by trade and NOC code in Table 1.

The construction workforce will include a wide range of occupations which are anticipated to be full-time in nature. Human resource planning for the construction phase is in progress and 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 number of individuals in St. Lawrence will also benefit from indirect employment.



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**Table 1: Estimated Quarterly Occupational Requirements for the Construction Phase**

Occupation	NOC Code (2011)	2015	2016				2017			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pipefitter Journey Persons	7252	1	2	2	4	5	5	5	5	2
Pipefitter Apprentice	7252	0	0	0	0	1	1	1	1	0
Millwright Journey Persons	7311	1	6	6	6	6	6	6	6	2
Millwright Apprentice	7311	0	2	2	2	2	2	2	2	0
Sheet Metal Worker Journey Persons	7233	2	7	7	7	7	7	7	7	4
Sheet Metal Worker Apprentice	7233	0	1	1	1	1	1	1	1	0
Construction Management	0711	4	6	6	6	6	6	6	6	6
Scheduler	1523	1	1	1	1	1	1	1	1	1
Construction Trades Helpers and Labourer	7611	16	24	30	30	30	30	30	30	12
Electrician Journey Persons	7242	2	2	2	3	3	3	3	3	2
Electrical Apprentice	7242	0	0	0	1	1	1	1	1	0
Equipment Operators	7452	24	24	24	24	24	24	24	24	24
Pipe Welder Journey Persons	7237	0	2	2	5	5	5	5	5	4
Pipe Welder Apprentice	7237	0	0	0	1	1	1	1	1	0
Roofers	7291	0	4	4	4	4	2	2	2	2
Insulator	7293	0	0	0	0	0	2	2	2	2
Painter (Industrial)	9536	0	2	2	2	2	4	4	4	4
Carpenter Journey Persons	7271	4	7	7	7	7	9	9	9	9
Carpenter Apprentice	7271	0	1	1	1	1	3	3	3	3
Surveyors	2154	2	2	2	2	2	2	2	2	2
Plumber Journey Persons	7251	0	1	2	3	3	3	3	2	2
Plumber Apprentice	7251	0	0	0	1	1	1	1	0	0
Ironworker Journey Persons	7236	0	5	7	10	10	10	10	10	7
Ironworker Apprentice	7236	0	1	1	2	2	2	2	2	1
Welder- Structural Journey Persons	7237	0	4	5	5	5	5	5	5	2





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Occupation	NOC Code (2011)	2015	2016				2017			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Welder - Structural Apprentice	7237	0	0	1	1	1	1	1	1	0
Concrete Finisher	7282	0	0	2	4	4	4	4	2	1
Drywall Installers	7284	0	0	0	0	0	4	4	4	4
Heavy Duty Equipment Mechanic Journey Persons	7312	5	5	5	5	5	5	5	5	5
Heavy Duty Equipment Mechanic Apprentice	7312	1	1	1	1	1	1	1	1	1
Crane Operators	7371	4	4	4	4	4	4	4	4	4
Drillers & Blasters	7372	6	6	6	6	6	6	6	6	6
Commercial Divers	7511	4	4	4	4	4	4	4	4	4
Truck Drivers	7511	12	12	12	12	12	12	12	12	12
Electrical Power Line and Cable Workers	7244	4	4	4	4	2	1	1	1	1
Telecommunications Line and Cable Workers	7245	4	4	4	4	2	1	1	1	1
Other Trades Helpers and Labourers	7612	4	8	12	12	12	12	12	12	12
Construction Inspectors	2264	2	4	4	4	4	4	4	4	4
Engineering Inspectors	2262	2	4	4	4	4	4	4	4	4
Construction Supervisors – Electrical	7202	1	2	2	2	2	2	2	2	2
Construction Supervisors – Pipefitters	7203	1	2	2	2	2	2	2	2	2
Construction Supervisors – Metal Workers	7201	1	2	2	2	2	2	2	2	1
Construction Supervisors – Carpentry	7204	1	2	2	2	2	2	2	2	2
Construction Supervisors – Mechanic	7301	1	2	2	2	2	2	2	2	2
Construction Supervisors – Heavy Construction	7205	1	2	2	2	2	2	2	2	2
Construction Supervisors – Other Trades	7205	2	4	4	4	4	4	4	4	4
Mining Personnel for Pit Development	8614	25	45	90	125	125	125	125	90	45
<b>Total</b>		<b>138</b>	<b>221</b>	<b>283</b>	<b>334</b>	<b>332</b>	<b>340</b>	<b>340</b>	<b>301</b>	<b>210</b>



### 7.2 Operation Employment

Employment during the 10 year operation phase will result in the creation of 164 full-time positions. In the first year of operation, the number of employees is expected to be lower since underground mine development will not be started. However, the employment numbers are expected to reach 164 in the second year of operation and this number of employees will be maintained throughout operation. 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 provides a quarterly estimated average number of construction workers by type of occupation based on the 2011 NOC codes for the operation phase. CFI is committed to hiring apprentices, when feasible, and has included an estimated number of apprentices by trade and NOC code in Table 2.

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 region, and the direct-to-indirect labour ratio associated with this Project is estimated to be 1:3.

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**Table 2: Estimated Annual Occupational Requirements for the Operation Phase**

Occupation	NOC Code (2011)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
<b>Mill Workforce</b>											
Mill Manager	8221	1	1	1	1	1	1	1	1	1	1
Senior Metallurgist	9211	1	1	1	1	1	1	1	1	1	1
DMS Operator/Grinding Operator	9411	4	4	4	4	4	4	4	4	4	4
Day Crew Dewatering Equipment Operator	9411	2	2	2	2	2	2	2	2	2	2
Flotation Operator	9411	4	4	4	4	4	4	4	4	4	4
Shift Laboratory Technician	2212	2	2	2	2	2	2	2	2	2	2
Laboratory Supervisor	2212	1	1	1	1	1	1	1	1	1	1
Laboratory Technician	2212	2	2	2	2	2	2	2	2	2	2
Crushing Operator	9411	2	2	2	2	2	2	2	2	2	2
Loader Operator	7521	2	2	2	2	2	2	2	2	2	2
Reagent Operator	9411	2	2	2	2	2	2	2	2	2	2
Operations General Foreman	8221	1	1	1	1	1	1	1	1	1	1
Maintenance Planner	0714	1	1	1	1	1	1	1	1	1	1
Maintenance Foreperson	7301	1	1	1	1	1	1	1	1	1	1
Instrumentation Tech	2243	2	2	2	2	2	2	2	2	2	2
Maintenance Fitter Mechanic Journey Persons	7311	5	5	5	5	5	5	5	5	5	5
Maintenance Fitter Mechanic Apprentice	7311	1	1	1	1	1	1	1	1	1	1
Electrician	7242	2	2	2	2	2	2	2	2	2	2
<b>TOTAL MILL</b>		<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>
<b>Mine Workforce</b>											



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Occupation	NOC Code (2011)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Mine Superintendent	0811	1	1	1	1	1	1	1	1	1	1
Mine Foreman	8221	1	1	1	1	1	1	1	1	1	1
Open Pit Shift Foreman	8221	1	1	1	1	1	1	1	1	1	1
Underground Shift Foreman	8221	0	1	1	1	1	1	1	1	1	1
Underground Mine Captain	8221	0	1	1	1	1	1	1	1	1	1
Dispatcher	1525	1	1	1	1	1	1	1	1	1	1
Mine Clerk/Secretary	1241	1	1	1	1	1	1	1	1	1	1
Surveyor	2154	1	1	1	1	1	1	1	1	1	1
Geologist	2113	2	2	2	2	2	2	2	2	2	2
Mine Technician	2212	1	1	1	1	1	1	1	1	1	1
Maintenance Superintendent	0714	1	1	1	1	1	1	1	1	1	1
Maintenance Planner	0714	1	1	1	1	1	1	1	1	1	1
Engineer Open Pit	2143	3	3	3	3	3	3	3	3	3	3
Engineer Underground Mine	2143	0	2	2	2	2	2	2	2	2	2
Shovel Operator Open Pit	7521	6	6	6	6	6	6	6	6	6	6
Truck Operator Open Pit	7511	9	9	9	9	9	9	9	9	9	9
Mechanics Open Pit Journey Persons	7612	5	5	5	5	5	5	5	5	5	5
Mechanics Open Pit Apprentice	7612	2	2	2	2	2	2	2	2	2	2
Electricians Open Pit Journey Persons	7241	1	1	1	1	1	1	1	1	1	1
Mechanics Underground Mine Journey Persons	7612	0	4	4	4	4	4	4	4	4	4
Mechanics Underground Mine Apprentice	7612	0	1	1	1	1	1	1	1	1	1
Electricians Underground Mine Journey Persons	7241	0	1	1	1	1	1	1	1	1	1



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

Occupation	NOC Code (2011)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Drill Operators OP	7372	6	6	6	6	6	6	6	6	6	6
Auxiliary equipment operators	9241	4	4	4	4	4	4	4	4	4	4
Miner Underground Stoping	8231	0	12	12	12	12	12	12	12	12	12
LHD Operators	8231	0	9	9	9	9	9	9	9	9	9
UG truck operators	8231	0	12	12	12	12	12	12	12	12	12
Underground Mine Development (Drill, Faceman, Raise Miner, Alimak Trainer)	8614	0	25	25	25	25	25	25	25	25	25
Underground Mine Services (Construction, Pumpman, Grader)	8614	0	3	3	3	3	3	3	3	3	3
<b>TOTAL MINE</b>		<b>47</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>	<b>118</b>
<b>Administration</b>											
General Manger	0811	1	1	1	1	1	1	1	1	1	1
Comptroller	0111	1	1	1	1	1	1	1	1	1	1
Receptionist/Clerk	1414	1	1	1	1	1	1	1	1	1	1
General Accountant	1111	1	1	1	1	1	1	1	1	1	1
Accounts Payable	1431	1	1	1	1	1	1	1	1	1	1
Payroll, Accounts Receivable/other	1431	1	1	1	1	1	1	1	1	1	1
Warehouse, Buyer (1225)	1225	1	1	1	1	1	1	1	1	1	1
Human Resources Manager, Trainer	0112	1	1	1	1	1	1	1	1	1	1
Health, Safety and Environment Manager, Trainer	2263	1	1	1	1	1	1	1	1	1	1
Environment Technician (2263)	2263	1	1	1	1	1	1	1	1	1	1
<b>TOTAL ADMINISTRATION</b>		<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>
<b>GRAND TOTAL</b>		<b>93</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>



### 8.0 PROJECT RELATED DOCUMENTS

Documents prepared in support of the proposed Project include:

- Agnerian (Agnerian Consultants Limited). 2015. Technical Report on the AGS Vein Deposit, St. Lawrence Property, Newfoundland and Labrador. Author: Agnerian, Hrayr. NI 43-101 Report, March 27, 2015.
- CFI (Canada Fluorspar (NL) Inc.) 2015. 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.
- Golder (Golder Associates Ltd.) 2015a. Phase I Hydrogeology Study, Canada Fluorspar Inc. St. Lawrence, NL for the Proposed AGS Mine Project. Report Submitted to Canada Fluorspar (NL) Inc., January 2015.
- 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. AGS Project Preliminary Water Quality Baseline Report. Report Submitted to Canada Fluorspar (NL) Inc., May 2015.
- Golder 2015d. Stage 1 Screening Level Geochemistry Assessment. Report Submitted to Canada Fluorspar (NL) Inc., August 2015.
- Golder 2015e. Water Management Strategy. Report Submitted to Canada Fluorspar (NL) Inc., July 2015.
- Golder 2015f. Phase 2 Hydrogeology Program, Scope of Hydrogeological Work for Canada Fluorspar Inc's Proposed AGS Mine Site in St. Lawrence. Report Submitted to Canada Fluorspar (NL) Inc., July 2015.
- Golder 2015g. Stage 1 Screening Level Geochemistry Assessment. Report Submitted to Canada Fluorspar (NL) Inc., August 2015.
- Golder 2015h. Tailings Management Facility Alternative Assessment. Report Submitted to Canada Fluorspar (NL) Inc., September 2015.
- Golder 2015i. Air Emissions Inventory. Report Submitted to Canada Fluorspar (NL) Inc., September 2015.
- Golder 2015j. Radon Emission from Proposed AGS Fluorspar Project. Report Submitted to Canada Fluorspar (NL) Inc., July 2015.
- Golder 2015k. Preliminary Noise Assessment – AGS Fluorspar Project, St. Lawrence, NL. Report Submitted to Canada Fluorspar (NL) Inc., September 2015.
- Golder 2015l. Minworth Dam, St. Lawrence, NL. Report Submitted to Canada Fluorspar (NL) Inc., September 2015.
- GPA (Gerald Penney Associates Limited). 2015. St. Lawrence Mine Historic Resources Impact Assessment. Submitted to the Provincial Archaeology Office, Archaeological Investigation Permit #14.55, January 2015.
- LGL Limited. 2015. Assessment of the Wetlands, Avifauna and Wildlife at Risk in the Proposed Fluorspar Mine Project Footprint Area. Report Submitted to Canada Fluorspar (NL) Inc., September 2015.



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## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

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NL DOEC (Newfoundland and Labrador Department of Environment and Conservation). 2015. Guidelines for Environmental Preview Report for the St. Lawrence AGS Vein Fluorspar Mine. Registration No. 1794. September 18, 2015. 7 pp.

SEM (Sikumiut Environmental Management Ltd.). 2015. Proposed AGS Fluorspar Mine, St. Lawrence, NL Aquatic Studies Field Report. Golder Document Number: 0009-1407707 (rev 0). Prepared for Golder Associates Ltd. January 15, 2015.

Worley Parsons. 2015. Preliminary Feasibility Study on the AGS Vein Deposit St. Lawrence Property. Prepared for Canada Fluorspar (NL) Inc. May 22, 2015.



### 9.0 DECOMMISSIONING AND REHABILITATION

Decommissioning and rehabilitation plans for the Project are described in detail in Section 2.5 of the EA Registration (CFI 2015). CFI is currently preparing a Rehabilitation and Closure Plan which will be 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 Mine Site, Mill Site, TMF, Marine Terminal and quarries and borrow sources. The rehabilitative measures have generally been developed at a conceptual level for the purpose of the prefeasibility study and the EA Registration. 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.



## 10.0 APPROVAL OF THE UNDERTAKING

CFI is committed to conducting all Project-related activities in compliance with applicable legislative and regulatory requirements. Information on potentially required approvals and permits for the Project is provided in Section 1.4 of the EA Registration (CFI 2015). Following a review of the EA Registration, several regulatory agencies provided additional guidance on which regulatory requirements will apply to this Project. Based on this information, CFI updated the list of applicable federal and provincial permits, approvals and authorizations, which are provided in the following subsections.

Responses to specific comments received from regulatory agencies regarding applicable regulatory requirements are provided in Appendix B. The following comments relate to regulatory compliance: PPD 01 to 10, PPD 18, PPD 20, PPD 21, WRMD 01 to 06, PNAD 02 to 03, CCEEET 02 to 04, SNL 01 to 07, OHSD 01 to 26, MIA 01 to 04, FAA 01, DNR 06 to 08, DNR 10, DNR 11, DTW 01, CEAA 01, TC 01, EC 01 to 05, EC 07 to 11, EC 13 to 24, EC 29, EC 31 to 39, and EC 41 to 51.

### 10.1 Federal Requirements

CFI is committed to conducting all Project-related activities in compliance with all applicable legislation and will obtain all necessary permits, authorizations and/or approvals required from Federal government agencies, as listed in Table 3.

**Table 3: Applicable Federal Permits, Approvals and Authorization**

Agency	Permit, Authorization, Approval	Act/Regulation
Transport Canada	Transportation of Dangerous Goods – Explosives	<i>Canada Transportation Act</i>
	Approval for the Marine Terminal (already acquired)	<i>Navigation Protection Act</i>
Natural Resources Canada	Magazine Licence Application	<i>Explosives Act</i>
	Application for Permit to Transport using a Flatbed Trailer	<i>Explosives Act</i>
	Application for Authorization of Explosives	<i>Explosives Act</i>
Fisheries and Oceans Canada (DFO)	Request for Project Review	<i>Fisheries Act</i>
	Application for Authorization under Section 35	<i>Fisheries Act</i>
Environment Canada	Compliance with <i>Canadian Environmental Act</i>	<i>Canadian Environmental Act</i>
	Compliance with the <i>Wastewater Systems Effluent Regulations</i>	<i>Fisheries Act</i>
	Compliance with Section 36(3) of the <i>Fisheries Act</i>	<i>Fisheries Act</i>
	Compliance with the <i>Migratory Birds Convention Act</i> and associated regulations	<i>Migratory Birds Convention Act</i>
	Compliance with <i>Environmental Emergencies (E2) Regulations</i>	<i>Canadian Environmental Protection Act</i>
	Compliance with <i>Canadian Water Quality Guidelines for the Protection of Aquatic Life for Un-ionized Ammonia</i>	<i>Canadian Environmental Protection Act</i>
	Compliance with <i>Canadian Environmental Protection Act</i>	<i>Canadian Environmental Protection Act</i>
	Reporting to the <i>National Pollutant Release Inventory (NPRI)</i>	<i>Canadian Environmental Protection Act</i>



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Agency	Permit, Authorization, Approval	Act/Regulation
	Compliance with the <i>Federal Policy on Wetland Conservation</i>	<i>Canada Wildlife Act, Fisheries Act, Migratory Birds Convention Act, Species at Risk Act, and Canadian Environmental Assessment Act</i>
Canadian Wildlife Service	Scientific Permit	<i>Migratory Birds Convention Act</i>
	Compliance to <i>Species at Risk Act</i>	<i>Species at Risk Act</i>
Industry Canada	Communications Licence	<i>Radiocommunication Act</i>
	Radio Station Licence	<i>Radiocommunication Act</i>
Canadian Nuclear Safety Commission	Nuclear Substances and Radiation Devices License	<i>Nuclear Substances and Radiation Devices Regulations</i>

### 10.2 Provincial Requirements

CFI is committed to conducting all Project-related activities in compliance with all applicable legislation and will obtain all necessary permits and approvals required from Provincial government agencies, as listed in Table 4.

**Table 4: Applicable Provincial Permits and Approvals**

Agency	Permit, Authorization, Approval	Applicable Act/Regulations
Department of Environment and Conservation (DOEC) - Water Resources Management Division	Alteration to a Body of Water	<i>Water Resources Act</i>
	Application for Permit for Constructing a Non-Domestic Well	<i>Water Resources Act</i>
	Water and Sewage Works	<i>Water Resources Act</i>
	Application for Water Use Licence	<i>Water Resources Act</i>
	Enter into a Memorandum of Agreement for real time water quality/quantity monitoring network	<i>Water Resources Act</i>
DOEC - Pollution Prevention Division	Certificate of Approval for Construction and Operation	<i>Environmental Protection Act</i>
	Certificate of Approval –Waste Disposal Facility	<i>Environmental Protection Act</i>
	Compliance with <i>Environmental Protection Act, Part IV Waste Disposal and Litter</i>	<i>Environmental Protection Act</i>
	Compliance with <i>Environmental Protection Act Part VI Air Quality Management</i>	<i>Environmental Protection Act</i>
	Compliance with the <i>Storage and Handling of Gasoline and Associated Products Regulations, 2003</i>	<i>Environmental Protection Act</i>
	Compliance with the <i>Used Oil Control Regulations</i>	<i>Environmental Protection Act</i>



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

Agency	Permit, Authorization, Approval	Applicable Act/Regulations
	Compliance with the <i>Halocarbon Regulations NLR 41/05</i>	<i>Environmental Protection Act</i>
	Compliance with the <i>Environmental Control Water and Sewage Regulations NLR 65/03</i> during construction and operation	<i>Water Resources Act</i>
	Certificate of Approval- monitoring program <i>Environmental Control Water and Sewage Regulations NLR 65/03</i>	<i>Water Resources Act</i>
	Compliance with <i>Accredited Laboratory Policy PD:PP2001-01.2</i>	<i>Water Resources Act</i>
DOEC – Wildlife Division	Permit to destroy animal problems	<i>Wildlife Act</i>
	Compliance standard	<i>Endangered Species Act</i>
DOEC - Climate Change, Energy Efficiency & Emissions Trading	Compliance with <i>National Building Code</i> energy efficiency	<i>National Building Code</i>
Department of Natural Resources (DNR) -Forestry Resources Branch	Commercial Cutting/Operating Permit	<i>Forestry Act</i>
	Burning Permit	<i>Forestry Act</i>
DNR - Mineral Lands Division	Approval for Development Plan, Closure Plan and Financial Assurance	<i>Mining Act</i>
	Surface Lease(s)	<i>Mining Act</i>
	Mining Lease	<i>Mining Act</i>
	Quarry Lease(s)	<i>Quarry Materials Act</i>
Municipal and Intergovernmental Affairs	License to Occupy Crown Lands	<i>Crown Lands Act</i>
	Development Permit from Town Council of St. Lawrence	<i>Urban and Rural Planning Act</i>
	Approval of surface structures and haul roads from Minister responsible for <i>Lands Act</i> and Municipal and Intergovernmental Affairs	<i>Lands Act</i>
Service NL	Certificate of Approval- Storage and Handling of Gasoline and associated products	<i>Environmental Protection Act</i>
	Permit for Flammable and Combustible Liquid Storing and Dispensing (Above or Below Ground) and for Bulk Storage (Above Ground Only)	<i>Environmental Protection Act</i>
	Storage Tank System	<i>Environmental Protection Act</i>
	Building Accessibility Exemption	<i>Buildings Accessibility Act</i>



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Agency	Permit, Authorization, Approval	Applicable Act/Regulations
	Statutory Declaration for Registration of Boiler and pressure Vessel Fittings Fabricated in NL	<i>Public Safety Act</i>
	Certificate of Plant Registration for Power, Heat, Refrigeration, Compressed Gas or Combined Plant	<i>Public Safety Act</i>
	Contractor's Licence- Pressure Piping System	<i>Public Safety Act</i>
	Examination and Certification of Propane System Installers	<i>Public Safety Act</i>
	Compliance with <i>Sanitation Regulations and Standards of Accepted Practice for On-Site Sewage Disposal System</i>	<i>Environmental Protection Act</i>
	Approval of Plans for Fire/Life Safety	<i>Fire Protection Services Act</i>
	Compliance with <i>Protected Road Zoning Regulations, 1996</i>	<i>Urban and Rural Planning Act</i>
	Compliance with the <i>NL Occupational Health and Safety Act</i>	<i>NL Occupational Health and Safety Act</i>
Forestry and Agrifoods Agency	Commercial cutting permit	<i>Forestry Act</i>
Transportation and Works	Compliance Standard- Storing, handling and transporting dangerous goods	<i>Dangerous Goods Transportation Act</i>
	Highway Access Permit	<i>Transportation Act</i>
Human Resources Labour and Employment	Compliance Standard- Occupational Health and Safety	<i>Occupational Health and Safety Regulations</i>
Tourism, Culture and Recreation	Compliance Standard- <i>Historic Resources Act</i>	<i>Historic Resources Act</i>

Legend:  Permit/Approval may be required

### 10.3 Municipal Requirements

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).

CFI will require a Development Permit for Site Development—Quarry and Soil Removal from the Town of St. Lawrence. 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.*



### 10.4 Monitoring and Follow-Up

A follow-up and monitoring program will be designed and conducted, as appropriate, during all phases of the Project. The program will be developed in consultation with relevant regulatory agencies. The purpose of the program is to verify the accuracy of the predictions made during the EA process and the effectiveness of the mitigation measures. This information will be used to refine and optimize mitigation measures and implement adaptive management measures during the Project activities.

This program will include, but is not limited to, the following plans:

- Environmental Protection Plan (EPP);
- Avifauna Management Plan;
- Environmental Effects Monitoring Plan (EEMP);
- Gender Equity and Diversity Plan;
- Emergency Contingency Plan; and,
- Water Management Plan.

Compliance inspection and monitoring will also be conducted to confirm that the Project is being operated in compliance with all regulatory requirements and commitments. Elements of compliance monitoring will be included in the EPP and EEMP.



11.0 SIGNATURE

9/24/15  
Date



Lindsay Gorrill, President and CEO



### 12.0 REFERENCES

- ADI Nolan Davis. 1990. Shoal Cove Pond Tailings Disposal Site Environmental Preview Report. October 1990. (Prepared for Burin Minerals Ltd. by ADI Nolan Davis).
- ADI Nolan Davis. 1995. Shoal Cove Pond Tailings Disposal site Environmental Preview Report. November 1995. (Prepared for Burin Minerals Ltd. by ADI Nolan Davis).
- AMEC (AMEC Earth & Environmental). 2009. Water Quality and Fish Habitat Program in St. Lawrence – Proposed Reactivation of Fluorspar Mine. Report Prepared for SNC- Lavalin Inc. / BAE-Newplan Group Limited, Report # 9116559, September 2009.
- CCME (Canadian Council of Ministers of the Environment). 2014. Canadian Environmental Quality Guidelines. [http://www.ccme.ca/en/resources/canadian\\_environmental\\_quality\\_guidelines/index.html](http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/index.html) Accessed April 2015.
- CDA (Canadian Dam Association). 2007. Dam Safety Guidelines. [www.cda.ca](http://www.cda.ca). Accessed April 15, 2015.
- CFI (Canada Fluorspar (NL) Inc.) 2015. 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.
- EC (Environment Canada). 2011. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. Published in 2011. <http://ec.gc.ca/> Accessed September 2015.
- Health Canada. 2011. Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM). Prepared by the Canadian NORM Working Group of the Federal Provincial Territorial Radiation Protection Committee. ISBN: 978-1-100-23019-1.
- NL DOEC (Newfoundland and Labrador Department of Environment and Conservation). 2015. Guidelines for Environmental Preview Report for the St. Lawrence AGS Vein Fluorspar Mine. Registration No. 1794. September 18, 2015. 7 pp.
- Town of St. Lawrence. 2012. Town of St. Lawrence Municipal Plan 2012. Urban and Rural Planning Act. <http://www.townofstlawrence.com/municipalplan.htm> Accessed March 2015.
- Worley Parsons. 2015. Preliminary Feasibility Study on the AGS Vein Deposit St. Lawrence Property. Prepared for Canada Fluorspar (NL) Inc. May 22, 2015.



## Report Signature Page

### GOLDER ASSOCIATES LTD.



Elisabeth Luther  
Environmental Assessment Lead



Daryl Johannesen  
Principal

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# APPENDIX A

## Table of Concordance with EPR Guidelines



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

EPR Guidelines Section		EPR GuidelinesText	EPR Section
1	Name of Undertaking	The undertaking has been assigned the Name "St. Lawrence AGS Vein Fluorspar Mine".	1.0
2	Proponent	Name the proponent and the corporate body, if any, and state the mailing address. Name the chief executive officer if a corporate body, and telephone number, fax number and E-mail address. Name the principal contact person for purposes of environmental assessment and state the official title, telephone number, fax number and E-mail address.	2.0
3	The Undertaking	State the nature of the project.	3.0
		State the purpose/ rationale/need for the project. If the proposai is in response to an established need, this should be clearly stated. Identify needs that are immediate as well as potential future needs.	3.0
4	Description of the Undertaking	Provide complete information concerning the preferred choice of location, design, construction standards, maintenance standards, etc.	4.0
4.1	Geographical Location/Physical Components/Existing Environment	Describe the proposed location and planned layout of the mining project and associated infrastructure such as open pits, stockpiles, waste rock storage and disposai areas, processing facilities and access roads. Also, need to identify the locations and proximity of the nearest human receptors to the site (ie. nearest cabins/cottages, proximity of the project to the Town of St. Lawrence, etc.), and, any resource users that may be in the vicinity of the project (ie. fishing, hunting, berry picking, etc.).	4.1
		The EPR must include a complete hydrogeology study that addresses the effects of the project on groundwater and surface water management. This must include discussion of the effect of the undertaking on adjacent wetlands, as well as any effect on groundwater-surface water interaction, planned mitigations and an assessment of the residual effects, including on any human users of surface and/or groundwater resources in the area. Expected effluent discharges and storm water runoff management for the considered locations should be presented.	4.1, Appendices D, E, and F
		The EPR should provide detail regarding options for waste rock disposal and runoff management in the event that potentially acid generating material is encountered.	4.1, Appendix G
4.1	Geographical Location/Physical Components/Existing Environment	The EPR must include field surveys of the following: Wetlands, Avifauna, Wildlife Species at Risk, and Freshwater Fish/Habitat to collect baseline information that will inform mitigations and monitoring of the projects effects. Environmental Protection Plan's (EPP) and Environmental Monitoring Plans will be required to address survey findings, mitigations and monitoring of environmental effects. The EPR must also commit to providing an EPP, informed in part by the field surveys that mitigate any potential negative effects.	4.1, Appendices H and I
		State the time period in which proposed construction will proceed (if staged, list each stage and its approximate duration) and proposed date of first physical construction-related activity. A timeline should be presented that identifies construction activities that will occur during the breeding bird season.	4.2
4.2	Construction	State the time period in which proposed construction will proceed (if staged, list each stage and its approximate duration) and proposed date of first physical construction-related activity. A timeline should be presented that identifies construction activities that will occur during the breeding bird season.	4.2



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

EPR Guidelines Section		EPR GuidelinesText	EPR Section
		The details, materials, methods, schedule, and location of all planned construction activities must be presented.	4.2
		The existing Minworth tailings dam has been preliminarily classified as significant, and the proposed main dam has been given a classification of significant. The design flood for a significant class dam should be between 1:100 and 1:1000. Given the magnitude of storms that can affect this area of the province, the EPR must use a design storm above 1:100.	4.2, Appendix N
		There should be mention in the EPR of the following documentation that will be required for proposed dams: Emergency Preparedness and Response Plan, Operation Maintenance & Surveillance Manual, and Dam Safety Reviews. Also, ownership for the existing Minworth tailings dam should be discussed, along with, any effects on the dam as a result of the stormwater diversion plan.	4.2
		List the permits and authorizations that are expected to be required for this project, including, a reference and brief description of the Real Time Water Quality Network.	4.2, 10.0
4.3	Operation and Maintenance	All aspects of the operation and maintenance of the proposed development should be presented in detail.	4.3
5	Alternatives	Alternative means of carrying out the project to meet the stated purpose and rationale must be provided.	5.0
		The EPR must provide an evaluation of alternatives for tailings management. Provide reasons for the rejection of any alternatives. The analysis must include consideration of the following:	5.1, Appendix J
		Mine development is to be designed with rehabilitation and closure of the mine site in mind such that the requirement for mine discharge treatment after closure is eliminated and the rehabilitated site will have minimal long term maintenance requirements.	5.1, Appendix J
		The evaluation should consider as one of the alternatives paste backfill and cost-benefits analysis associated with the evaluation and must consider net present value of long term maintenance costs of any required infrastructure, including inflation.	5.1, Appendix J
		The potential for acid mine drainage should be considered in the analysis.	5.1, Appendix J
		The EPR must include an evaluation of alternatives for the mill location. The evaluation should provide a full account of the weighted scoring exercise and details of the criteria used.	5.2
6	Potential Environmental Effects and Mitigation	Provide detailed information regarding the potential effects of the mine construction and operation on the environment and the proposed mitigation to be used to avoid adverse environmental effects.	6.0



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

EPR Guidelines Section	EPR GuidelinesText	EPR Section
	<p><b>Climate Change</b> Information is required on the predicted effect of the Project on climate change with respect to greenhouse gas (GHG) emissions or the necessary data to calculate GHG emissions, such as total projected annual fuel consumption. This should include an outline of projected fuel use, as well as the estimated greenhouse gas emissions for the project.</p>	6.1, Appendix K
	<p>Additional information is also required on the predicted impact of climate change on the project (e.g., effect of climate change projections such as changes in temperature, precipitation and extreme precipitation events). The provincial climate change projections for St. Lawrence should be used.</p>	6.1, Appendix K
	<p><b>Air Quality</b> A detailed emission inventory is required outlining expected emissions of PM, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub> and GHGs for both construction and operation phases of the project. The inventory shall include emissions from fugitive, mobile and point sources, and an air quality assessment of those emissions is required subject to the location of facility infrastructure and project alternatives. Additionally the proponent shall devise an ambient air monitoring program for particulate matter in the Town of St. Lawrence.</p>	6.1, Appendix K
	<p>All new emission sources shall employ best available control technology (BACT). The Pollution Prevention Division (PPD) has requested that the proponent provide a BACT analysis for any major emissions sources. CFI have responded they will meet the BACT requirements by developing fugitive dust Best Management Practices Plans and installing a baghouse to service the crushers, screening, transfer points and ore loading. PPD has since advised CFI that a more detailed BACT analysis will be needed to demonstrate that the BACT criteria outlined in Section 6 of the Regulations are met. While this BACT analysis may be deferred to the Certificate of Approval application stage, the proponent should confirm their understanding of the BACT analysis requirements as their previous submissions have shown some misunderstanding in this regard.</p>	6.1, Appendix K
	<p><b>Radon Gas</b> A radon gas assessment must be provided that evaluates the potential impacts of the project and health effects to both on-site workers and off-site human receptors.</p>	6.2, Appendix L
	<p><b>Noise Effects</b> A noise assessment must be provided that evaluates the potential impacts of the project. This should include an assessment of the noise levels for residents in the Town of St. Lawrence and nearest receptors.</p>	6.3, Appendix M



## AGS FLUORSPAR PROJECT - ENVIRONMENTAL PREVIEW REPORT

EPR Guidelines Section	EPR GuidelinesText	EPR Section
7	<p>Employment and Training</p> <p>Further details are required on the potential impacts on employment. Specifically, the EPR must include:</p> <ul style="list-style-type: none"> <li>• National Occupation Classification (NOC 2006 or 2011) codes at the 4-digit level associated with each position for all phases of the project, including the number of positions associated with each NOC code.</li> <li>• The approximate timelines for each of the positions during the construction phase of the project. This would include the number of positions for each 4-digit NOC 2006/2011 code throughout the project at specified time intervals (monthly or at least quarterly) which would show levels of employment throughout the project timeline.</li> <li>• An indication of whether the positions are full-time equivalent or if they are the actual number of positions; if they are indeed the actual number of positions, how many are full-time vs. part-time.</li> <li>• An estimate of the number of apprentices (by level and trade/4-digit NOC code) and journeypersons required.</li> <li>• Qualifications, certifications and other requirements, including the need for, location and availability of related training opportunities (e.g., postjourneyperson training) associated with key positions for all phases of the project.</li> <li>• The anticipated source of the workforce, including an estimate of local employment (local area, provincial) and any strategies for recruitment. This should also include clarification on which positions would be direct hires, and which would be from companies contracted to carry out project work.</li> <li>• A commitment to provide quarterly summary reports for each phase of the project. These reports would include information on the number employed by 4-digit NOC 2006/2011, the number of full-time/part-time employees, the number of apprentices (by level) and journeypersons for each applicable 4-digit NOC code, gender and source of the workforce.</li> </ul>	7.0
8	<p>Project-Related Documents</p> <p>Provide a bibliography of all project-related documents generated by, or for, the Project (e.g., feasibility study, engineering reports, technical studies, etc.).</p>	8.0
9	<p>Decommissioning and Rehabilitation</p> <p>Describe all aspects of the decommissioning and rehabilitation plans for the project.</p>	9.0
10	<p>Approval of the Undertaking</p> <p>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.)</p>	10.0



# APPENDIX B

## Responses to Government Review Comments on the EA Registration



**Responses to Government Review Comments on the EA Registration**

Regulatory Agency	Department	Comment #	Comment	Response
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 01	<p>General</p> <ul style="list-style-type: none"> <li>All activities associated with this project are subject to the Environmental Protection Act (EPA), the Water Resources Act (WRA), and their regulations. Official copies of these may be obtained from the Queen's Printer. Unofficial versions are available through the Government of Newfoundland and Labrador website (<a href="http://www.gov.nl.ca">www.gov.nl.ca</a>).</li> <li>These comments highlight the pertinent issues of these acts and regulations and the Pollution Prevention Division's policies and guidelines.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 02	<p>Environmental Protection Act, Part IV - Waste Disposal and Litter</p> <ul style="list-style-type: none"> <li>Waste receptacles shall be installed at all active areas for use by workers.</li> <li>The proponent shall ensure that all waste (ex. empty oil containers) is recovered and disposed of appropriately.</li> <li>All waste material shall be considered, prior to disposal, for reuse, resale or recycling.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider these waste disposal measures in the preparation of its Waste Management Plan.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 03	<p>Environmental Protection Act, Part VI - Air Quality Management</p> <ul style="list-style-type: none"> <li>All activities associated with this proposal are subject to Air Pollution Control Regulations, 2004, <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc040039.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc040039.htm</a>.</li> <li>Schedule E of the regulations prohibits the open burning of tires; plastics; treated lumber; asphalt and asphalt products; drywall; demolition waste; hazardous waste; biomedical waste; domestic waste; trash, garbage, or other waste from commercial, industrial or municipal operations; manure; rubber; tar paper; railway ties; paint and paint products; fuel and lubricant containers; used oil; animal cadavers; hazardous substances; materials disposed of as part of the removal or decontamination of equipment, buildings or other structures.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 04	<p>Environmental Protection Act, Part XI - Approvals</p> <ul style="list-style-type: none"> <li>A Certificate-of-Approval will be required from the Pollution Prevention Division for this operation.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. The Certificate of Approval is included in the list of potential permits and approvals provided in Section 1.4 of the EA Registration (CFI 2015) and in Section 10.0 of the EPR. Following release from the EA process, CFI will engage with the Pollution Prevention Division to obtain this approval prior to start of the construction phase.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 05	<p>Environmental Protection Act - Storage and Handling of Gasoline and Associated Products Regulations</p> <ul style="list-style-type: none"> <li>Petroleum storage and handling, associated with operation of this project, shall be in compliance with the Storage and Handling of Gasoline and Associated Products Regulations, 2003, as amended, <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc030058.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc030058.htm</a>.</li> <li>All petroleum storage tanks shall be registered with SNL and all leaks/spills must be reported to the Department.</li> <li>An environmental emergency contingency plan should be developed which includes information regarding the location of spill response equipment and a trained contractor, in the event of a spill.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will include spill response measures in its Emergency Contingency Plan.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 06	<p>Environmental Protection Act - Used Oil Control Regulations</p> <ul style="list-style-type: none"> <li>The proponent shall maintain constant compliance with the Used Oil Control Regulations, <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc020082.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc020082.htm</a>.</li> <li>Waste oils and used lubricating oil shall be retained in a tank or closed container, and disposed of by a company licensed for handling and disposing of used oil products.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 07	<p>Environmental Protection Act - Halocarbon Regulations</p> <ul style="list-style-type: none"> <li>Any use of halocarbons or other regulated substances, for example in fire suppression or air conditioning systems, associated with the proposed activity is subject to the Halocarbon Regulations NLR 41/05, <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc050041.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc050041.htm</a>.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 08	<p>Water Resources Act - Environmental Control Water and Sewage Regulations</p> <ul style="list-style-type: none"> <li>All waters discharged from the proposed site during construction and operation, are subject to compliance with the Environmental Control Water and Sewage Regulations, NLR 65/03. This includes, but is not limited to sump water and discharge from settling ponds. <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc030065.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc030065.htm</a>.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 09	<p>Water Resources Act - Environmental Control Water and Sewage Regulations</p> <ul style="list-style-type: none"> <li>If necessary, a monitoring program will be established for this project through the Certificate of Approval process to ensure compliance with the Environmental Control Water and Sewage Regulations, NLR 65/03.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. A water monitoring program will be developed in consultation with NL DOEC as part of the Certificate of Approval process.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 10	<ul style="list-style-type: none"> <li>Analyses completed for the purposes of compliance determination will be subject to the Accredited Laboratory Policy, PD: PP2001-01.2.</li> </ul>	Comment noted. CFI will use accredited laboratories for all analyses completed for the purposes of compliance determination.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 11	<p>Additional Comments</p> <ul style="list-style-type: none"> <li>Newspaper has informed our Department that they intend to proceed with development of the Tarefare and Blue Beach North deposits, including construction of the Shoal Cove Pond Tailings Management Facility, as per their project that was released from Environmental Assessment in 2010. Newspaper has an active Certificate of Approval from the Pollution Prevention Division (PPD) to proceed with related construction activities.</li> </ul>	CFI has come to an agreement with Arkema wherein Arkema will surrender all of its mineral interests in Newfoundland to CFI. CFI is finalizing the commercial terms of this agreement, and we would be happy to have this transfer of ownership stated as a condition of EA release.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 12	<ul style="list-style-type: none"> <li>The figures on pages 13 and 15 show several small waterbodies in proximity to the preferred mill location, pits, dumps and other infrastructure located in the mill/mine area. The only waterbody that has been noted in the document is Grebe's Nest Pond. The PPD has previously questioned whether any of these smaller waterbodies are fish-bearing, and how the water from these areas will be managed and to where it is expected to be diverted. CFI have responded that the smaller waterbodies have not yet been surveyed but related data gaps will be filled in at a later date. They have further generally noted that dewatering discharges will be directed to down gradient tributaries in the same watershed.</li> </ul>	<p>With the ongoing refinement of the Project footprint through the pre-feasibility study, a number of smaller additional waterbodies and associated streams have been identified within it. In early September 2015, these waterbodies and associated streams have been surveyed for fish species presence and habitat characterization suitable for determining potential Serious Harm to Fish under Section 35 of the Fisheries Act. In addition, prior to any dewatering, a pumpdown plan will be developed as part of a Section 35 Fisheries Act Offset Plan to ensure that excess pumped water is timed such that excessive downstream inputs, and associated potential habitat damage, is avoided and/or mitigated.</p> <p>The water and runoff from all areas of the Project site has also been the subject of a water management strategy for both construction and operation (including decommissioning). The strategy outlines sources of water (groundwater and surface), mitigations including: diversion channels to ensure clean water avoids the project area, proper settling pond location and design to accommodate volumes and settling times of project water, proper mitigations to avoid excessive erosion and sediment-laden water from entering streams/ponds, proper release points of treated water to minimize alterations to downstream waterways, and final hydrology of watersheds upon decommissioning of the project. The strategy is provided in Appendix C.</p>
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 13	<ul style="list-style-type: none"> <li>On page 39 and with more details on page 94, there is some concern that the tailings and waste rock may have some acid generating and metal leaching potential. Given the potential, the PPD has requested further information on management and contingency options for this material. For example, if sufficient volume of NAG waste rock is not available for the tailings dams and road construction, where will the material be sourced? If the tailings are determined to be acid-generating, is there capability to store them sub aqueously? Is the selected TMF capacity still sufficient? How will the additional quantities of acid generating waste rock be handled? CFI have responded that the results from a preliminary Phase 1 geochemistry program for the waste rock and tailings suggest that there is limited potential for acid generation. They also note that approximately 30% of the ore has uncertain potential for acid generating tailings. CFI have stated that further testing of the waste rock and tailings is being conducted as part of a Stage 2 geochemistry program and if any waste rock is determined to be potentially acid generating that a management plan will be developed and implemented.</li> </ul>	A geochemistry characterization program is currently being conducted to determine the acid generating and metal leaching potential of the waste materials that will be produced as part of the Project. This program is being conducted in three phases. Stage 1, which was completed in August 2015, is a screening level assessment and includes static testing of a select number of samples to gain an initial understanding of the acid generating and metal leaching potential of the mine wastes and ore. The results of the Stage 1 screening level geochemistry assessment are presented in Appendix G. Stage 2 is currently ongoing and includes additional static testing of the mine waste to ensure appropriate spatial and compositional assessment of acid generation and metal leaching. Stage 3, which will be conducted after the completion of Stage 1 and Stage 2, consists of long-term geochemical leach testing (Kinetic Tests) to be conducted on a limited number of samples. The results of the geochemistry characterization program will be considered during the detailed engineering phase. As previously stated, based on the results of Stage 2 and 3 geochemistry programs, CFI will develop and implement a management plan if any of the waste rock is determined to be potentially acid generating. The results of the Stage 2 and Stage 3 programs will be shared with relevant regulatory agencies.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 14	<ul style="list-style-type: none"> <li>On page 72 it is indicated that the location chosen near the AGS mine is the preferred location for the mill. The PPD has previously questioned why this location has been deemed more favorable, as from an environmental perspective there is concern that this location introduces disturbance into another watershed (Upper Island Pond Watershed). CFI have since provided a list of the criteria that were used for their location alternatives analysis, but have not provided any details on how these criteria were weighted or scored. A detailed alternatives analysis for the mill location that provides a full account of the weighted scoring exercise including details of what each criteria includes should be presented.</li> </ul>	The Preliminary Feasibility Study consultant for the Project, Worley Parsons, have carried out an options evaluation for the process plant location considering environmental, technical and economic criteria. The details of the mill alternative analysis are provided in Section 5.2 of the EPR.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 15	<ul style="list-style-type: none"> <li>The PPD has previously requested information from CFI to validate their statement that there would be limited likely effects of air emissions from the project on sensitive receptors. CFI has since provided PPD with a detailed air emissions inventory report to characterize emissions from all project sources. Due to the recent submission date, the PPD will not be in a position to fully review this report until mid-September. At that time, the PPD may require further information to further assess any impacts on surrounding receptors. Should this proceed to an EPR, these information requirements will be included in the associated EPR guidelines.</li> </ul>	An updated Air Emissions Inventory Report has been prepared and addresses comments provided by the PPD (Appendix K).
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 16	<ul style="list-style-type: none"> <li>As noted in the registration, historically there was a radon gas worker exposure issue in underground mining operations; however those issues were addressed with proper ventilation. The PPD has requested further information from CFI on the amount of radon which may be emitted and the mitigative measures that will be in place to protect the general public. CFI have since provided the PPD with a report prepared by Golder that concludes that "based on Golder's experience, it is expected that the outdoor radon gas...within the surrounding areas can meet the standards described in the Health Canada NORM Guidelines with appropriate monitoring and controls." It is recommended that further information be provided to support this and other statements in the report, including: identification of appropriate numerical criteria for assessing community impacts; further evaluation and/or references of the assumed factors used in the report (is the previously measured underground radon progeny of 0.16 WL applicable to open pit mining, would an equilibrium factor of 0.4-0.5 be more appropriate than the selected 0.2, etc.); and information on radon measurements and decreases in concentration over distances from the source for comparable mining operation(s) elsewhere, including the referenced Key Lake uranium mine if comparable.</li> </ul>	<p>The Radon Technical Memo (Appendix L) provided information on the radon releases from the historical St. Lawrence underground mines. In addition, the results from an outdoor survey of radon gas in the St. Lawrence area, as measured in 1990, were provided. To obtain site specific information, CFI will undertake baseline radon studies at the proposed mine site and in the surrounding area prior to start of operations. The baseline radon studies and subsequent outdoor radon measurements during mining operations will provide an assessment of the radon exposures to the general public attributable to mine operations.</p> <p>The Radon Technical Memo (Appendix L) provide data available on radon releases from the historical underground mine operations. These calculations are subject to considerable uncertainty, including the choice of the equilibrium factor, as indicated in the regulatory comment. While the historical releases provide an indication of the potential radon releases, the actual radon releases for the proposed mine will depend on the mining activities in progress at during any one period. The projected radon releases from the proposed Project, for both underground and open pit mines, will be calculated as part of the detailed mine planning currently underway.</p> <p>Radon gas is a noble gas similar to the other noble gases such as helium and argon. The capture of such gases at the point of release is not technically feasible. The only practicable mitigation measure is to elevate the point of release in order to increase the atmospheric dispersion of the radon. Such mitigation, if required, is feasible and CFI undertakes to consider this measure in the unlikely event that the radon released during mining operations is found to exceed the Health Canada Guidelines for the exposure of the general public. The Health Canada Guidelines specify a maximum annual dose to the general public of 1 millisieverts (mSv) with an annual dose constraint for releases from any one operation of 0.3 mSv. Further, as outlined in the Health Canada Guidelines, CFI undertakes to limit the radon releases to a level as low as reasonably achievable, while taking into consideration economic and social factors.</p> <p>As described in the Radon Technical Memo (Appendix L), the experience at the Saskatchewan uranium mines is that the radon released from the mines disperses rapidly with distance from the mine. Such atmospheric dispersion is weather dependent. It is noted that the Saskatchewan uranium mines are subject to atmospheric inversions during which the radon can accumulate at the mine site. The windy conditions common at St. Lawrence are likely to result in more rapid dispersion of the radon release from the CFI operations than is the case for the Saskatchewan mines and this will lead to lower radon levels at and around the mine site.</p>
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 17	<ul style="list-style-type: none"> <li>As per section 6 of the Air Pollution Control Regulations, 2004, all new emission sources shall employ best available control technology (BACT). The PPD has requested that the proponent provide a BACT analysis for any major emissions sources. CFI have responded they will meet the BACT requirements by developing fugitive dust Best Management Practices Plans and installing a baghouse to service the crushers, screening, transfer points and ore loading. PPD has since advised CFI that a more detailed BACT analysis will be needed to demonstrate that the BACT criteria outlined in Section 6 of the Regulations are met. While this BACT analysis may be deferred to the Certificate of Approval application stage, the proponent should confirm their understanding of the BACT analysis requirements as their previous submissions have shown some misunderstanding in this regard.</li> </ul>	The updated Air Emissions Inventory Report contains a section that describes how CFI intends to implement BACT into the design of control equipment or practices for the Project (Appendix K). A BACT analysis will be performed for fugitive dust sources as well as material processing and handling sources, such as crushing, screening and transfer conveyors. The draft "Top-Down" Best Available Control Technology Guidance Document published by the US EPA will be considered in the BACT analysis and the PPD will be consulted on the proposed approach for the analysis. The analysis will typically include a review of all potential control technologies for each source type. Technologies will be eliminated based on technical infeasibility. The remaining technologies will be ranked according to effectiveness. The most effective option based on energy, environmental and economic effects will be selected for each source type.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 18	<ul style="list-style-type: none"> <li>All waters discharged from the proposed site, during construction and operation, are subject to compliance with the Environmental Control Water and Sewage Regulations, NLR 65/03.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 19	<ul style="list-style-type: none"> <li>A monitoring program will be established for this project through the Certificate of Approval process and will include effluent discharge monitoring, background water quality monitoring, receiving water quality monitoring and groundwater monitoring.</li> </ul>	<p>Several historical studies were carried out in the vicinity of the Project to characterize surface and groundwater quality and groundwater flow conditions (CFI 2015). A baseline surface water and groundwater quality sampling program was initiated in 2014 to provide additional information on existing water quality in those areas that could potentially be affected by development of the Project. The preliminary results of this program are provided in the baseline monitoring report appended to the EA Registration (CFI 2015).</p> <p>In 2015 the water quality monitoring program was expanded to include 12 surface water locations and 10 monitoring wells in the vicinity of the AGS Mine Site and tailings area. A quarterly sampling frequency was selected to capture seasonal and annual surface water quality variability. Samples are collected in the wet (May), dry (July/August and February), and transitional (October) seasons. In situ measurements of temperature, pH, dissolved oxygen, and conductivity are collected, and samples are analyzed for a suite of parameters consistent with NL EWSR (2003) criteria. Further details on the water quality monitoring program are provided in Appendix F.</p> <p>An operational monitoring program will be established as the Project progresses through the Certificate of Approval process. In addition to the effluent discharge and receiving water quality monitoring, it is anticipated that a groundwater monitoring network will be established.</p>
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 20	<ul style="list-style-type: none"> <li>The proponent should be cognizant that the Environmental Control Water and Sewage Regulations, NLR 65/03 contain a requirement related to radioactivity and as such the effluent generated at this facility will need to demonstrate compliance with this regulation. The proponent will be expected to treat the effluent to meet this requirement in the event that there are levels of radioactivity detected that exceed the regulatory limits.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. As outlined in response to comment number PPD 09, a water monitoring program will be developed in consultation with NL DOEC.
NL Department of Environment and Conservation	Pollution Prevention Division	PPD 21	<ul style="list-style-type: none"> <li>Analyses completed for the purposes of compliance will be subject to the Accredited Laboratory Policy, PD: PP2001-01.2.</li> </ul>	Comment noted. As outlined in response to Comment Number PPD 10, CFI will use accredited laboratories for all analyses completed for the purposes of compliance determination.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 01	<p>1. Regulatory requirements relevant to this proposal.</p> <p>The proponent must apply for and obtain a Permit for Constructing a Non-Domestic Well under the Water Resources Act, 2002, specifically Section 58 <a href="http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm">http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm</a> for drilled well(s) prior to the start of construction.</p> <p>Contact: Ms. Dorothea Hanchar, Manager, Groundwater Section - (709) 729-2539</p>	Comment noted. This permit is included in the list of potentially applicable permits and approvals provided in Section 1.4 of the EA Registration (CFI 2015) and in Section 8.0 of the EPR. CFI will engage with the Water Resources Management Division during the permitting process to acquire this permit.

NL Department of Environment and Conservation	Water Resources Management Division	WRMD 02	The proponent must apply for and obtain a water use licence under the Water Resources Act, 2002 <a href="http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm">http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm</a> for the use of water from any existing or new water source for any water use purpose prior to the start of construction.	Comment noted. This permit is included in the list of potentially applicable permits and approvals provided in Section 1.4 of the EA Registration (CFI 2015) and in Section 8.0 of the EPR. CFI will engage with the Water Resources Management Division during the permitting process to acquire the water use licence.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 03	The proponent must apply for and obtain a permit under the Water Resources Act, 2002, specifically Section 48 <a href="http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm">http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm</a> for any work in any body of water (including wetland), including, but not limited to, bridge(s), culvert(s), fording, other stream crossing(s), etc. along with a site drainage plan prior to the start of construction. Contact: Dr. Abdel-Zaher Kamal Abdel-Razek, Manager, Water Rights & Investigations Section - (709) 729-4795	Comment noted. This permit is included in the list of potentially applicable permits and approvals provided in Section 1.4 of the EA Registration (CFI 2015) and in Section 8.0 of the EPR. CFI will engage with the Water Resources Management Division during the permitting process to obtain permits for any works in bodies of water.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 04	The Final Tailings Dam, Saddle Dyke, Polishing Pond Dam, and cut-off wall on Clarks Pond will be treated as dams. Therefore, the proponent must apply for and obtain a permit under the Water Resources Act, 2002, specifically Section 48 <a href="http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm">http://assembly.nl.ca/Legislation/sr/statutes/w04-01.htm</a> prior to the start of construction. In this regard, it should be pointed out that the design of these structures is dependent on their failure consequence classification as per the CDA Dam Safety Guidelines, which will have to be approved WRMD of this Department prior to the start of construction. Contact: Ms. Paula Dawe, Manager, Drinking Water & Wastewater Section, Dam Safety Program - (709) 729-4048	Comment noted. This permit is included in the list of potentially applicable permits and approvals provided in Section 1.4 of the EA Registration (CFI 2015) and in Section 8.0 of the EPR. CFI will engage with the Water Resources Management Division during the permitting process to obtain permits for any works in bodies of water.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 05	Any effluent or runoff leaving the site will be required to conform to the requirements of the Environmental Control Water and Sewage Regulations, 2003 <a href="http://assembly.nl.ca/Legislation/sr/regulations/rc030065.htm">http://assembly.nl.ca/Legislation/sr/regulations/rc030065.htm</a> . Application forms for permits and licences, fee schedules, and guidelines are available at: <a href="http://www.emr.gov.nl.ca/en/wateres/regulations/bppforms/index.html">http://www.emr.gov.nl.ca/en/wateres/regulations/bppforms/index.html</a> .	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. As outlined in response to comment number PPD 09, a water monitoring program will be developed in consultation with NL DOEC.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 06	2. Additional information that you require on the proposal and/or the environmental planning of the proposal. The operation of Shoal Cove Pond into Shoal Cove Brook as a tailings management facility may result in impacts on groundwater and surface water quality and quantity in the project area. Therefore, WRMD will require real time water quality and quantity monitoring of surface water and/or groundwater on the Shoal Cove Brook system and potentially other watersheds throughout the project area as deemed necessary. The proponent will be required to enter into a Memorandum of Agreement with WRMD of this Department for the installation of a real time water quality/quantity monitoring network to monitor impacts on flow and water quality (both surface water and groundwater) in and around the proposed mining project. These stations will provide near real-time water quality and quantity data to ensure emerging issues (from the construction and operational phases) are caught and mitigative measures implemented in a timely manner thus minimizing the impact to the surrounding environment. The type, number and locations of the stations required will depend on site conditions and final operation plans and will be determined through collaborative engagement with the proponent. The proponent will be responsible to bear all costs (i.e. capital and annual operation/maintenance) associated with the monitoring network. The Memorandum of Agreement must be signed and the network installed prior to the start of construction. Contact: Ms. Renee Paterson, Program Lead, Water Agreements Section - (709) 729-1159	Comment noted. CFI will continue to engage with the Water Resources Management Division to conclude a Memorandum of Agreement for real-time water quality and quantity monitoring prior to start of construction.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 07	• The existing Minworth tailings dam has been preliminarily classified as significant, and the proposed main dam has been given a classification of significant. The design flood for a significant class dam should be between 1:100 and 1:1000. The EA registration document mentions 1:100 as the current design storm. Given the magnitude of storms that can potentially affect this area of the province, consideration should be given to a design storm above 1:100. Besides the design storm, the dam will also have to meet freeboard and other CDA Guideline criteria. • There should be mention of the following documentation that will be required for proposed dams: Emergency Preparedness and Response Plan [mentioned in 2.9.10], Operation Maintenance & Surveillance Manual, and Dam Safety Reviews. • Who will be responsible for the existing Minworth tailings Dam? Will ownership transfer from the Department of Natural Resources to Canada Fluorspar Inc.? Will there be any effect on the existing Minworth tailings dam as a result of the stormwater diversion plan around the proposed TMF? There is no mention of this in the EA registration and this will need to be addressed. Contact: Ms. Paula Dawe, Manager, Drinking Water & Wastewater Section, Dam Safety Program - (709) 729-4048	CFI is committed to conducting all Project-related activities in compliance with applicable legislation. CFI developed an analytical model of the Minworth Dam to conduct a series of slope stability analyses. The results of this model show that the proposed TMF is not anticipated to affect the existing Minworth tailings dam and there is no notable change in the factor of safety for the dam. Additional information is provided in Appendix N. At this time, there will be no change with respect to the existing Minworth Tailings Dam and, as such, responsibility for same will remain with the Department of Natural Resources.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 08	• This EA registration document lacks information regarding groundwater and/or hydrogeologic investigation. While mention is made of a groundwater component to a Water Management Plan, no details are provided.	A Phase 1 Hydrogeology Program was completed and the results are presented in Appendix E. The Phase 2 Hydrogeology Program is currently ongoing. The results will be presented in a technical report, which will be issued to regulatory agencies. The program includes the following activities: - Drilling of 2 monitoring wells to a depth of about 100 m. - Drilling of 1 pumping well to a depth of about 200 m, conducted in two stages: the first stage of drilling from surface to about 120 m depth followed by a 3-hour pumping test, and the second stage where drilling was extended to the final depth of 200 m. - A 72 hours pumping test in the pumping well. - Packer testing in three exploration holes. - Groundwater sampling and water level surveys. The details of the hydrogeologic investigation are provided in Appendix G.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 09	• A hydrogeologic report should provide an analytical or numerical model that predicts long-term effects of groundwater drawdown based on current groundwater levels and that will be validated using monitoring data during the lifetime of the mining operations. A comprehensive groundwater monitoring network will be required to understand the groundwater system and to provide long-term monitoring of water level changes.	The development of a 3D groundwater flow model will be completed following the interpretation of the field data obtained during the Phase 2 Hydrogeology program. The results of the numerical model will allow predicting the extent of the zone of hydraulic influence induced by the mine dewatering operations, which is a key component to assess the potential effects of the Project on surface waterbodies and water wells. It would also allow to estimate the water inflow at various stages of the mine development. This would provide a finer temporal breakdown of the water volume to be dealt with, leading to a better understanding of the pumping capacity required during the life of mine. The water inflow estimate will also be compared to the historical inflows in the former underground mines using the available information on the geometry of the openings. This comparison exercise will help verify the order of magnitude inflow estimation. The 3D finite-element FEFLOW model will be used for this Project and modelling results will be shared with regulatory agencies.
NL Department of Environment and Conservation	Water Resources Management Division	WRMD 10	• As outlined above, a groundwater monitoring network will be required during environmental monitoring. Wells should be completed to the full operating depth of the mine, with multi-level wells to monitor geochemical effects on different aquifer systems. Contact : Ms. Dorothea Hanchar, Manager, Groundwater Section - (709) 729-2539	A groundwater monitoring program will be prepared once the potential effects of the mining operation will be defined. This program will be implemented prior to start of construction. The groundwater monitoring program will comprise groundwater sampling and water-level measurements in wells that will be installed in strategic locations to assess potential effects on receptors. It will be developed in consultation with relevant regulatory agencies.
NL Department of Environment and Conservation	Parks and Natural Areas Division & Wildlife Division	PNAD 01	Prior to any construction/clearing activities, surveys should be conducted for Terrestrial and Aquatic VEC's: Wetlands, Avifauna, Wildlife Species at Risk, and Freshwater Fish/Habitat to collect baseline information that will inform mitigations and monitoring of the projects effects. Environmental Protection Plan's and Environmental Monitoring Plans should be required to address survey findings, mitigations and monitoring of environmental effects.	Baseline data related to wetlands, avifauna and wildlife at risk occurring in the Project Footprint Area were collected in September 2015. The wetland assessment was conducted as a desktop exercise using aerial photos of the area, and the avifauna/wildlife at risk survey was conducted at site over a two day period. Some observations made during the avifauna/wildlife survey were used to supplement the aerial photo analysis of the wetlands. The baseline report that includes information on all three VECs is provided in Appendix H. Aquatic baseline data have been collected in 2014 and 2015. As part of the 2015 freshwater fish and habitat program, existing population estimates of fish species within the lower portions of Grebes Nest Pond have been collected and recorded to ensure that predictions regarding downstream effects can be verified. In addition, any required Environmental Effects Monitoring (EEM) programs will include appropriate use of treatment and control sampling. The 2014 baseline habitat report is provided in Appendix I. The 2015 report is currently being prepared and will be provided to regulatory agencies, including DFO, as part of the Fisheries Act authorization process.
NL Department of Environment and Conservation	Parks and Natural Areas Division & Wildlife Division	PNAD 02	Where applicable, the Wildlife Division also recommends that a minimum 30 m naturally vegetated buffer be maintained along all waterbodies and wetlands to protect sensitive riparian and aquatic species, and their habitat. Pending baseline surveys, additional buffers may be required for sensitive wildlife habitat.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. Measures to minimize potential adverse effects on waterbodies, wetlands and wildlife will be incorporated in the Environmental Protection Plan.
NL Department of Environment and Conservation	Parks and Natural Areas Division & Wildlife Division	PNAD 03	Habitat disturbance impacts wildlife (birds, small mammals etc) negatively and should be kept to a minimum. To help reduce any negative impacts on any species, the Wildlife Division recommends that any necessary vegetation clearing or excessive noise be undertaken outside of the nesting, breeding and brood rearing period (May to mid-July), when disturbance would be most critical. Where vegetation clearing is not avoidable and a nest is found: • The nest and neighbouring vegetation should be left undisturbed until nesting is completed; and • Construction activities be minimized in the immediate area until nesting is complete.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. Measures to minimize potential adverse effects on wildlife species will be incorporated in the Environmental Protection Plan.
NL Department of Environment and Conservation	Climate Change, Energy Efficiency & Emissions Trading (CCEET)	CCEET 01	While there is information provided about the air pollution emissions, there is no information in the application regarding the project's impact on climate change with respect to greenhouse gas (GHG) emissions or the necessary data to calculate GHG emissions, such as total projected annual fuel consumption. CCEE requests that an outline of projected fuel use, as well as the estimated greenhouse gas emissions for the project be provided and included within the registration document. Emissions factors are available at: <a href="http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&amp;n=AC2B7641-1">http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&amp;n=AC2B7641-1</a> .	A summary of annual fuel consumption and GHG releases for the Project for Construction and Operation Phases has been included in the Air Emissions Inventory Report (Appendix K). This includes a comparison of the Project GHG releases with provincial, national and global releases.
NL Department of Environment and Conservation	Climate Change, Energy Efficiency & Emissions Trading (CCEET)	CCEET 02	There is little information included about the impact of climate change on the project. Climate change is expected to result in more precipitation and more frequent extreme weather events. These factors should be considered when developing near a pond to avoid the possibility of flooding.	As Project design continues to advance, climate change considerations will be incorporated into Project design.
NL Department of Environment and Conservation	Climate Change, Energy Efficiency & Emissions Trading (CCEET)	CCEET 03	CCEE suggests that provincial climate change projections for St. Lawrence be considered when constructing and upgrading the access and haul roads, pit and buildings. These projections suggest that extreme precipitation events will become more intense. For example: • On a 24-hour basis, a 1-in-100 year storm is expected to bring 153 mm of precipitation by mid-century, an increase from the current climate's 132 mm (16% growth). By mid-century, what is today a 1-in-100 year storm could become a 1-in-25 year storm; and • On a 12-hour basis, a 1-in-100 year storm is expected to bring between 129 mm of precipitation by mid-century, an increase from the current climate's 113 mm (15% growth). More information on climate data can be provided by contacting Amanda Hannaford (729-1394) or at the following link: <a href="http://www.exec.gov.nl.ca/exec/ccee/publications/rdf_curve_2015.pdf">http://www.exec.gov.nl.ca/exec/ccee/publications/rdf_curve_2015.pdf</a> on pages C-112 (current climate) and D-13 (projected climate).	Comment noted. As Project design continues to advance, climate change considerations will be incorporated into Project design.
NL Department of Environment and Conservation	Climate Change, Energy Efficiency & Emissions Trading (CCEET)	CCEET 04	CCEE would also like to draw the proponent's attention to recent updates (Section 9.36) of the National Building Code, which now includes energy efficiency requirements for new buildings. If the proposed buildings fall within a municipality and within Part 9 of the National Building Code, the proponent must comply with these new energy efficiency requirements. It is further noted that the clearing of trees and brush can contribute to climate change. Where required, all clearing activities must be undertaken with appropriate permits through the Forestry Division. In addition, all heavy equipment should be operated in a manner to maximize fuel efficiency, thereby reducing greenhouse gas emissions that could contribute to climate change issues.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
NL Executive Council	Women's Policy Office	WPO 01	The construction phase of the Project will extend for three years and require approximately 340 full-time positions at peak employment (2016). Human resource planning has already begun and consideration is being given to employment equity, apprenticeship and training, and entry requirement strategies. The operations phase will begin in 2018, extend over a period of ten years, and require 164 full-time positions. The Government of Newfoundland and Labrador has invested heavily in developing the skills of women to work in natural resource industries through, education, training and other supports. WPO recommends that the proponent develop a separate and detailed Gender Equity and Diversity Plan (GEP) for approval by the Minister Responsible for the Status of Women prior to project start up. The GEP will include a women's employment plan, a diversity plan for people with disabilities, Aboriginal people, and visible minorities, and a business access strategy for the target populations.	Comment noted. CFI is committed to incorporating gender equity, diversity and inclusiveness into business processes and practices for the Project. CFI is currently preparing a Gender Equity and Diversity Plan which will describe the diversity goals and initiatives that will be implemented for the Project. The plan will include diversity targets during the various Project phases and actions to promote gender equity and diversity throughout the life of the Project. CFI will engage with the Women's Policy Office during the preparation of the Gender Equity and Diversity Plan.
Service NL	Government Service Centre	SNL 01	Waste (Environmental Protection Act, 2002) <a href="http://assembly.nl.ca/Legislation/sr/statutes/e14-2.htm">http://assembly.nl.ca/Legislation/sr/statutes/e14-2.htm</a> All waste material generated during the construction and operation of the facility is to be placed in suitable refuse containers and removed to an approved waste disposal site on a weekly basis, with the approval of the site owner/operator. Derelict vehicles, scrapped equipment and other debris is not to be stored on site. This material must be disposed of at an approved waste disposal site or scrap yard on a regular basis, with the prior approval of the site owner/operator. The site is to be kept neat and tidy at all times. Tires and used or waste oil are not to be used to aid in the burning of brush.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider these waste disposal measures in the preparation of its Waste Management Plan.



Service NL	Government Service Centre	SNL 02	<p>Gasoline and Associated Products All fuel storage tank systems, other than those connected to a heating appliance of capacity of 2,500 litres or less, and any proposed fuel cask will require registration prior to installation.</p> <p>All fuel storage tank systems connected to a heating appliance of a capacity of 2,500 litres or less must comply with the Heating Oil Storage Tank System Regulations.</p> <p>The storage, handling and disposal of used and or waste oil must be in compliance with the Used Oil Control Regulations.</p> <p>Floor drains from service bays or other areas handling used or waste oils are to be routed through an oil water separator to remove oily waste before being discharged. Plans and specifications must be submitted for review and approval by Government Service Centre prior to installation.</p> <p>In order to ensure that a quick and effective response to a spill event is possible, spill response equipment should be readily available on-site. Response equipment, such as absorbents and open-ended barrels for collection of cleanup debris, should be stored in an accessible location on-site. Personnel working on the project should be knowledgeable about response procedures. The proponent should consider developing a contingency plan specific to the proposed undertaking to enable a quick and effective response to a spill event.</p> <p>Any spill or leak of gasoline or associated product is to be reported immediately to Service NL by calling the Environmental Emergencies Telephone Line at 772-2083 or 1-800-563-9089.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. As outlined in response to comment number PPD 05, CFI will include spill response measures in its Emergency Contingency Plan.
Service NL	Government Service Centre	SNL 03	<p>Electrical (Public Safety Act, 1996) <a href="http://assembly.nl.ca/Legislation/sr/statutes/p41-01.htm">http://assembly.nl.ca/Legislation/sr/statutes/p41-01.htm</a></p> <p>(Electrical Regulations, 1996) <a href="http://www.assembly.nl.ca/legislation/sr/regulations/rc969120.htm">http://www.assembly.nl.ca/legislation/sr/regulations/rc969120.htm</a></p> <p>Electrical plans must be submitted to the Government Service Centre for review and approval.</p> <p>An electrical permit is required for each meter. The applicable permit fees will apply.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will apply for electrical permits during the permitting process.
Service NL	Government Service Centre	SNL 04	<p>Water and Sewer (Sanitation Regulations) <a href="http://www.assembly.nl.ca/legislation/sr/regulations/rc960803.htm">http://www.assembly.nl.ca/legislation/sr/regulations/rc960803.htm</a></p> <p>(Environmental Control Water and Sewage Regulations, 2003) <a href="http://www.assembly.nl.ca/legislation/sr/regulations/rc030065.htm">http://www.assembly.nl.ca/legislation/sr/regulations/rc030065.htm</a></p> <p>Approved subject to the applicant submitting plans and receiving approval for the proposed water and sewerage system. Systems in excess of 4546 litres must be in compliance with the Environmental Control Water and Sewage Regulations and the Guidelines for the Design, Construction and Operation of Water and Sewerage Systems and require certified engineering drawings and specifications. Systems less than 4546 litres must be in conformance with the Sanitation Regulations and Standards of Accepted Practice for On-Site Sewage Disposal System and prepared by an approved designer</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Service NL	Government Service Centre	SNL 05	<p>Fire &amp; Life Safety (Buildings Accessibility Act, 2006) <a href="http://assembly.nl.ca/Legislation/sr/statutes/b10.htm">http://assembly.nl.ca/Legislation/sr/statutes/b10.htm</a></p> <p>Application must be made to Service NL for Fire/Life Safety (Request for Approval of Plans Form) and Building Accessibility (Application for Building Accessibility Registration Form) review/approvals.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Service NL	Government Service Centre	SNL 06	<p>Development Control (Protected Road Zoning Regulations, 1996) <a href="http://www.assembly.nl.ca/legislation/sr/regulations/rc960996.htm">http://www.assembly.nl.ca/legislation/sr/regulations/rc960996.htm</a></p> <p>A permit is required from Service NL, Government Service Centre in accordance with the Urban and Rural Planning Act for the construction of an access road in a protected area, or for any access onto a protected road.</p> <p>The extent of land clearing and grubbing should be restricted such that naturally vegetated areas between the site and surrounding properties and thoroughfares are maintained.</p> <p>The extent of land clearing and grubbing should be restricted such that a 30 metre undisturbed buffer is maintained between the site and any surrounding watercourse or water body.</p> <p>Any existing tree screen concealing the operation from public view is to be maintained.</p> <p>Any proposed access roads from Route 210 to the site must be approved by the Department of Transportation and Works.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Service NL	Government Service Centre	SNL 07	<p>Other. All propane system installations exceeding 211,000 kilojoules (200,000 BTU) are subject to the Boiler, Pressure Vessel and Compressed Gas Regulations under the Public Safety Act and will require approval prior to installation. <a href="http://www.assembly.nl.ca/legislation/sr/regulations/rc969119.htm">http://www.assembly.nl.ca/legislation/sr/regulations/rc969119.htm</a></p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Service NL	Occupational Health and Safety Division	OHSD 01	<p>The proponent must, generally, ensure that activities associated with the Mining Operations are conducted in compliance with the Occupational Health and Safety Act and its Regulations. This includes the responsibility for ensuring that contractors hired to perform work also comply with this legislation, as per OHS Act s.10.</p> <p>In particular, the proponent must:</p> <p>1) Provide and maintain a workplace and the necessary equipment, systems and tools that are safe and without risk to the health and safety of his or her workers. NL OHS Act 5(a)</p>	Comment noted. CFI is committed to ensuring full compliance with all applicable sections of legislation to provide a safe, healthy workplace.
Service NL	Occupational Health and Safety Division	OHSD 02	<p>2) Provide the information, instruction, training and supervision and facilities, as necessary, for the health and safety of his or her workers. NL OHS Act 5(b)</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 03	<p>3) Ensure that his or her workers, and particularly his or her supervisors, are made familiar with any health or safety hazards that may be encountered by them in the workplace. NL OHS Act 5(c)</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 04	<p>4) Conduct his or her undertaking so that persons not in his or her employ are not exposed to health or safety hazards as a result of the undertaking. NL OHS Act 5(d)</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 05	<p>5) Ensure that personal protective equipment and devices are worn according to the work being performed and that his or her workers are given operating instruction in the use of such equipment and devices provided for their protection including the proper fitting and use of respirators. NL OHS Reg s72 and s85</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 06	<p>6) Ensure that a respiratory protection program is in place. NL OHS Reg s83 NL OHS Reg s72.</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 07	<p>7) Consult and co-operate with the occupational health and safety committee at the workplace, where one has been established, or the worker occupational health and safety representative where one has been elected or appointed. NL OHS Reg 25</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 08	<p>8) Ensure that machinery and/or equipment is operated by competent persons. NL OHS Reg s252 (1)a</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 09	<p>9) Ensure that the regulatory requirements as described in the attached Hazard Alert are addressed</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 10	<p>10) Ensure that powered mobile equipment is well maintained and equipped with: - a fire extinguisher; - protective screens, windows and doors, - a reverse alarm, and - a roll-over/fall-on protective structure. NL OHS Regulations Part 12 and 13</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 11	<p>11) Ensure that an emergency response plan is in place that details measures to be taken to effectively respond to any foreseeable mishap that may occur as a result of the undertaking. The following minimum items should be considered when developing such a plan: - a proper first-aid kit, and other requirements of the First Aid regulations; - communication devices; - a list of emergency names and numbers, appropriately placed; and - an action plan (with the crew aware of their roles and responsibilities). NL OHS Reg s38 and First Aid Regulations</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 12	<p>12) Ensure that a risk assessment is conducted where workers are assigned to work alone or in isolation; and where the assessment identifies a hazard, appropriate controls shall be implemented to eliminate, or where elimination is not practicable, minimize the risk associated with the hazard. A procedure must be written for checking the well-being of a worker assigned to work alone or in isolation. (Refer to all subsections of s.15 OHS Regs.)</p>	Comment noted. See response to comment number OHSD 01.
Service NL	Occupational Health and Safety Division	OHSD 13	<p>13) In the event blasting is required, ensure that the Blasting Requirements of Part XIX of the NL OHS Regulations is followed.</p>	Comment noted. See response to comment number OHSD 01.

Service NL	Occupational Health and Safety Division	OHS 14	14) Ensure that there are adequate toilet, washing and eating facilities for employees. NL OHS Reg s61, s62, and s65.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 15	15) Ensure that a thermal environment which is reasonable and consistent with the nature and degree of the work performed, as established by the ACGIH, is provided and maintained in a workplace. NL OHS Reg s44	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 16	16) Ensure that the workplace is sanitary and kept as clean as reasonably practicable. NL OHS Reg s67	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 17	17) Ensure that atmospheric contamination of the workplace by hazardous substances is kept below levels outlined by the ACGIH. Examples of substances include, but are not limited to asbestos, silica, lead, DPM, NO2, SO2, H2S, and radon (see 18 below). Where no TLV exists, then exposure must be kept to as minimal as reasonably practicable. If hazardous substances do exist they must be monitored, and engineering and administrative controls employed (and maintained). NL OHS Reg s42.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 18	18) Exposure levels for radon must not exceed those levels listed by ACGIH. Personal exposure monitoring for radon and radon daughters must be implemented for all mine workers. NL OHS Reg s42.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 19	19) Ensure that appropriate facilities are made available where workers may be exposed to contact with chemicals harmful to skin (e.g. eyewash facilities, emergency showers, etc.).	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 20	21) Ensure that any work completed near, in or over water is done in compliance with Part XXIII of the NL Occupational Health and Safety Regulations.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 21	22) Ensure that mining activities are conducted in accordance with Parts XXVIII (General Mining Requirements) and XXIX (Underground Operations) of the NL OHS Regulations.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 22	23) Ensure that miners medicals (health surveillance) to be conducted. NL OHS Regulations s.47	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 23	24) Ensure that noise hazards are managed in accordance with section 68 of the NL OHS Regulations.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 24	25) Ensure that the ventilation underground is sufficient for the equipment operating. NL OHS Regulations s. 413,415, and 582.	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 25	26) Ensure that musculoskeletal injury is minimized according to NL OHS Regulations s. 50 to 56 .	Comment noted. See response to comment number OHS 01.
Service NL	Occupational Health and Safety Division	OHS 26	27) Ensure that any work conducted in an open pit mine is conducted in accordance with Part XXXII of the NL OHS Regulations entitled Open Cut Workings in Mining Operations.	Comment noted. See response to comment number OHS 01.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 01	The Department of Advanced Education and Skills requests: • National Occupation Classification (NOC 2006 or 2011) codes at the 4-digit level associated with each position for all phases of the project, including the number of positions associated with each NOC code.	The 2011 4-digit level National Occupational Classification (NOC) codes are included for each occupation in Table 2-6 and 2-7 of the EA Registration (CFI 2015). These tables have also been updated and are provided in Section 7.0 of the EPR. As the Project design and planning advances, employment numbers may be updated. Updates to employment numbers will be made available to NL DAES, as applicable.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 02	• The approximate time lines for each of the positions during the construction phase of the project. This would include the number of positions for each 4-digit NOC 2006/2011 code throughout the project at specified time intervals (monthly or at least quarterly) which would show levels of employment throughout the project timeline.	Quarterly employment numbers for each position associated with the 4-digit 2011 NOC codes are provided in Section 7.1 of the EPR. As detailed engineering advances, these numbers may be updated. Updates to employment numbers will be made available to NL DAES, as applicable.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 03	• An indication of whether the positions are full-time equivalent or if they are the actual number of positions; if they are indeed the actual number of positions, how many are full-time vs. part-time.	As outlined in Section 2.6.1 of the EA Registration (CFI 2015), it is indicated that employment positions are "anticipated to be full-time in nature." This also applies to the updated employment numbers provided in Section 7.0 of the EPR. In Section 2.6.2 of the EA Registration, it is indicated that "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." (CFI 2015). This also applies to the updated employment numbers provided in the EPR. As outlined in response to Comment Number AES -2, employment numbers may be updated as part of the detailed engineering phase and updates will be made available to NL DAES, as applicable.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 04	• An estimate of the number of apprentices (by level and trade/A-digit NOC code) and journeypersons required.	CFI commits to hiring apprentices, when feasible. CFI has included an estimated number of apprentices by trade and 4-digit NOC code in Section 7.0 of the EPR. In addition, CFI is currently working on developing a Human Resources (HR) Plan that will include information such as: • roles and responsibilities; • employment needs for various Project phases, including details on hiring of apprentices and journeypersons; • recruitment strategies; and • specialized training requirements.  CFI can provide a summary of the HR Plan to NL DAES prior to the start of Project construction, or by October 31, 2015, whichever occurs first.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 05	• Qualifications, certifications and other requirements, including the need for, location and availability of related training opportunities (e.g., post-journeyperson training) associated with key positions for all phases of the project.	As outlined in Section 6.4.4 and Section 7.7 of the EA Registration (CFI 2015), CFI has entered into an agreement with Keyin College to set up a mining school in St. Lawrence to train mine and mill workers following approval of the Project. This partnership is anticipated to increase local capabilities in the mining sector, and enhance local hiring.  Additional information on qualifications, certifications and other requirements will be available in the HR Plan that is currently being prepared by CFI, as outlined in response to Comment Number AES 04.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 06	• The anticipated source of the workforce, including an estimate of local employment (local area, provincial) and any strategies for recruitment. This should also include clarification on which positions would be direct hires, and which would be from companies contracted to carry out project work.	CFI is committed to hiring qualified workers from Newfoundland and Labrador, whenever feasible. CFI is currently working with the NL Department of Natural Resources (DNR) to facilitate hiring of qualified workers from another mine located in the Province that has recently closed. Strategies for recruitment for the Project will be outlined in the HR Plan and the Gender Equity Diversity Plan that are currently being prepared by CFI. The Gender Equity and Diversity Plan and a summary of the HR Plan will be provided to NL DAES prior to start of construction, or by October 31, 2015, whichever occurs first.
NL Advanced Education and Skills	Skills and Labour Market Research Division	AES 07	• A commitment to provide quarterly summary reports for each phase of the project. These reports would include information on the number employed by 4-digit NOC 2006/2011, the number of full-time/part-time employees, the number of apprentices (by level) and journeypersons for each applicable 4-digit NOC code, gender and source of the workforce.	CFI commits to providing quarterly summary reports to NL DAES during each phase of the Project. These reports will include, at a minimum, the following information: • employment numbers by 4-digit NOC code; • full-time and part-time employment numbers; • number of apprentices (by level) and journeypersons for each applicable 4-digit NOC code; • employment by gender; and • employment by location and source of workforce.
Municipal and Intergovernmental Affairs		MIA 01	• The proposed undertaking is within the Municipality of St. Lawrence ( <a href="http://www.assembly.nl.ca/Legislation/sr/Regulations/rc060049.htm">http://www.assembly.nl.ca/Legislation/sr/Regulations/rc060049.htm</a> ). The AGS Vein is within the Mining Land Use Zone of the Town's Development Regulations. Mineral Exploration, Mineral Working, and Mining are permitted uses in the zone. A development permit from the Town Council of St. Lawrence must be obtained.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. CFI is aware of the requirement to obtain a development permit from the Town of St. Lawrence, as outlined in Section 1.4 of the EA Registration (CFI 2015) and Section 10.0 of the EPR.
Municipal and Intergovernmental Affairs		MIA 02	• The proposal will require various types of land tenure to proceed for the mining, locations of surface structures and haul roads. Mining and Surface Leases issued under the Mineral Act are required to be reviewed and approved by the Minister responsible for the Lands Act in addition to those terms and conditions that may be required by the Minister of Municipal and Intergovernmental Affairs (MIGA).	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Municipal and Intergovernmental Affairs		MIA 03	• The final location of the explosives warehouse should be communicated to the Land Management Division (MIGA). This site may require mapping of a protection buffer to prevent other developments from taking place in proximity to this location.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will communicate the final location of the explosives warehouse to the Land Management Division.
Municipal and Intergovernmental Affairs		MIA 04	• The Marine Terminal will require a Crown lands application for the both the land and land covered by water portions of the required location. Occupation of the 15m shoreline reservation requires compliance with Section 7 of the Lands Act. The Crown lands application is required to be accompanied by an approved Municipal Recommendation Form from the Town of St. Lawrence.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. CFI will submit a Crown Lands application for both the land and land covered by water portions of the Project site.
Forestry and Agroforestry Agency NL Department of Natural Resources	Mines Branch	FAA 01	A commercial cutting permit must be obtained from the local forestry services office prior to any harvesting and or timber removal activities. During the declared Fire Season (May 1-Sept 30), the proponent must also obtain and adhere to the conditions of an operating permit.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will obtain a commercial cutting permit, as outlined in Section 1.4 of the EA Registration (CFI 2015) and in section 10.0 of the EPR.
NL Department of Natural Resources	Mines Branch	DNR 01	NR requires mine development to be designed with rehabilitation and closure of the mine site in mind such that the requirement for mine discharge treatment after closure is eliminated and the rehabilitated site will have minimal long term maintenance requirements.	As project engineering continues to advance, CFI will continue to engage with DNR to review the rehabilitation and closure design. CFI will also consider rehabilitation and closure objectives in its detailed engineering design.
NL Department of Natural Resources	Mines Branch	DNR 02	As part of their development plan under the Mining Act, the proponent will be required to provide an acceptable engineering report on the acid generation and metal leaching potential of all ore, waste rock and tailings, and an appropriate plan for managing these materials. It is understood that the proponent expects the materials to be not acid generating. NR will not accept a rehabilitation and closure plan with permanent water cover of tailings and water retaining structures that require maintenance in perpetuity if the chemical characteristics of the tailings does not require acid generating mitigative measures.	CFI is committed to complying with all applicable legislation and will provide engineering reports on the acid generation and metal leaching to DNR, as outlined in response to comment number PPD 13.
NL Department of Natural Resources	Mines Branch	DNR 03	If permanent water retaining structures are required, the proponent will be required to post financial assurance that includes long term maintenance of these structures.	CFI will post securities as required.
NL Department of Natural Resources	Mines Branch	DNR 04	The proponent's tailings pond level appears to impact the toe of the former Minworth tailings dam for which government is responsible. Appropriate engineering studies and strengthening of the Minworth dam, such that it is demonstrated that the water at the toe of the dam will not affect its stability, will be the responsibility of the proponent.	As outlined in response to comment number WRMD 07, CFI developed an analytical model of the Minworth Dam to conduct a series of slope stability analyses. The results of this model show that the proposed TMF is not anticipated to affect the existing Minworth tailings dam and there is no notable change in the factor of safety for the dam. Additional information is provided in Appendix N.
NL Department of Natural Resources	Mines Branch	DNR 05	An evaluation of alternatives for tailings management should be provided. The evaluation should consider paste backfill and cost-benefits analysis associated with the evaluation must consider net present value of long term maintenance costs of any required infrastructure, including inflation.	An evaluation of alternatives for tailings management was completed and is provided in Appendix J.
NL Department of Natural Resources	Mines Branch	DNR 06	In addition, the proposed mining operation requires a mining lease issued under the Mineral Act; the mining lease shall cover the minimum area necessary to cover the resources to be mined.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will obtain a mining lease, as outlined in Section 1.4 of the EA Registration (CFI 2015) and in section 10.0 of the EPR.
NL Department of Natural Resources	Mines Branch	DNR 07	The proposed mining operation also requires surface rights sufficient to support the mining operation including for the siting of infrastructure; for any land required to support the mining operation for which the surface rights are not held by the proponent, one or more surface leases issued under the Mineral Act are required. Surface leases issued under the Mineral Act are associated with a mining lease and shall not extend beyond the time period covered by the mining lease. The proponent recognizes in the registration document (p. 6) that mining lease(s) and surface lease(s) are potentially required.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will obtain surface leases, as outlined in Section 1.4 of the EA Registration (CFI 2015) and in section 10.0 of the EPR.

NL Department of Natural Resources	Mines Branch	DNR 08	Any quarry materials (e.g. aggregate, fill, rock, stone, gravel, sand, clay, borrow material, etc.) used for the mining project, including for the construction of infrastructure including access roads, must either be sourced from within the legal boundaries of the mining project or be sourced from a site permitted under the Quarry Materials Act, 1998.  The proponent recognizes in the registration document (p. 6) that quarry lease(s) are potentially required	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will obtain quarry lease(s), if required, as outlined in Section 1.4 of the EA Registration (CFI 2015) and in section 10.0 of the EPR.
NL Department of Natural Resources	Energy Branch	DNR 09	The Department of Natural Resources is recommending that the development of a Benefits Plan that meets the approval of the Minister be included as a condition of release for the project. The proponent is required to finalize the Benefits Plan and obtain Ministerial approval prior to the commencement of site development activities.	CFI is committed to preparing a Gender Equity and Diversity Plan, as a condition of EA release, as outlined in response to comment number WPO 01. CFI is also committed to providing benefits to the Province by maximizing local employment; continuing the taxation agreement with the Town of St. Lawrence and providing financial benefits to the province.
NL Department of Natural Resources	Energy Branch	DNR 10	The registration document states the proponent has considered its power supply needs and has discussed them Newfoundland Power. The documents indicate no other concerns with respect to electricity policy. Also, this proposal is not located within the sedimentary basins of western NL and therefore poses no concerns from a hydrocarbon exploration and development perspective.	Comment noted. No response required.
NL Department of Natural Resources	Strategic Planning and Policy Coordination	DNR 11	SPPC offers no comment related to the proposed undertaking.	No response required.
NL Department of Transportation and Works		DTW 01	If the proponent is going to use an existing access road, as stated, there are no Department of Transportation and Works requirements. However, if another access is required or if an old abandoned access is to be used, the proponent must obtain a Highway Access Permit from the Department. This permit can be obtained from the nearest Transportation and Works Depot.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will obtain a Highway Access Permit from the Department of Transportation and Works if another access to the Project site is required. The list of potentially applicable permits has been updated to reflect this comment in Section 10.2 of the EPR.
Canadian Environmental Assessment Agency (CEAA)		CEAA 01	The Regulations Designating Physical Activities (the Regulations) under CEAA 2012 set out a list of physical activities considered to be "designated projects". The proponent of a designated project must provide the Canadian Environmental Assessment Agency with a project description that includes information prescribed by applicable regulations (Prescribed Information for the Description of a Designated Project Regulations).  Based on the information in the Environmental Assessment Registration for the AGS Fluorspar Project, dated June, 2015, and based on discussions with the proponent, the proposed undertaking is not a designated project under CEAA 2012. The proponent is therefore not required to submit a description of a designated project to the Canadian Environmental Assessment Agency.  The proponent is encouraged to contact me at the coordinates below if they have any further questions or concerns	Comment noted. No response required.
Health Canada		HC 01	Health Canada is the Federal department responsible for helping Canadians maintain and improve their health, while respecting individual choices and circumstances. Health Canada has no role in any permitting or regulatory responsibility with respect to this project, however Health Canada can provide expert advice upon request.  Health Canada considers the following aspects when participating in environmental assessment reviews: <ul style="list-style-type: none"> <li>The appropriateness of methodologies used.</li> <li>The predicted health impacts and any comparisons to health-based guidelines and standards.</li> <li>The measures proposed to mitigate human health impacts.</li> <li>The conclusions made concerning human health effects and the accompanying rationales or justifications.</li> <li>The evidence provided to justify the conclusions and the scientific defensibility of the rationales for the conclusions regarding potential effects to human health.</li> </ul> Health Canada has expertise that may be of use in the evaluation of environmental assessments, including: <ul style="list-style-type: none"> <li>Air quality effects</li> <li>Drinking and recreational water quality</li> <li>Radiological effects</li> <li>Noise effects</li> <li>Human health risk assessment</li> <li>Contamination of country foods</li> <li>Federal air, water and soil quality guidelines/standards</li> <li>Toxicology (multimedia-air, water, soil)</li> </ul> As a Federal Government Department with no permitting or regulatory responsibility with respect to this project, Health Canada cannot require any additional information, however, there are several areas where Health Canada's review is limited because of a lack of information. Please see the "Additional comments based on your experience and expertise" section below.  Health Canada cannot require that the proponent conduct any original environmental or impact research, however, there are several aspects where there is insufficient information in order for Health Canada to evaluate the potential for adverse health impacts.  In order for the report to contain sufficient information for Health Canada to review and evaluate the potential for adverse health effects as a result of this project, Health Canada has published the "Useful Information for Environmental Assessments" which outlines information that is relevant based on each specific area of expertise. It has been attached for your information.	The updated Air Emissions Inventory Report (Appendix K) was prepared taking into consideration the Health Canada "Useful Information for Environmental Assessments" document (the Health Canada Document). The inventory contains emissions of potential contaminants from the proposed project, such as criteria air contaminants and other possible contaminants, as recommended by the Health Canada Document. A rationale for any emissions not included in the inventory is also provided. CFI will comply with all regulatory requirements, and should further assessment be required following a review of the updated Air Emissions Inventory Report, CFI will participate in additional discussions with regulatory agencies to satisfy their concerns.  A preliminary noise assessment was completed for the Project to identify potential effects of noise on sensitive receptors in the vicinity of the Project area (Appendix M). Based on the preliminary noise assessment, it is expected that there is a potential for Project noise emissions to result in a "negligible" to "low" change in average noise levels at the identified representative receptors. CFI will carry-out a follow-up noise assessment program once the Project is commissioned to verify the findings of this preliminary noise assessment. This follow-up noise assessment will be used to verify that mitigation measures implemented into the Project design are effective once implemented, and to determine whether there is a need for additional mitigation measures. This follow-up noise assessment program will form part of a more comprehensive environmental monitoring program, which will include implementing a complaints-based recording and resolution program where regulating authorities and/or members of the public will have the opportunity to work with CFI to log and resolve concerns.
Transport Canada		TC 01	Since an approval under the Navigation Protection Act was reissued in 2015 by Transport Canada for the Marine Terminal, the project does not require any other regulatory approvals from Transport Canada to proceed.	Comment noted. No response required.
Fisheries and Oceans Canada		DFO 01	Based on our preliminary review of the provincial environmental assessment registration document, some components of the project could cause serious harm to fish (and/or fish habitat) which is prohibited under subsection 35(1) of the Fisheries Act. It is recommended that the proponent seek advice on avoiding and mitigating these possible effects from a qualified environmental professional. If these effects cannot be avoided the proponent should submit a Request for Review form for the project to the Fisheries Protection Program of DFO at FPP-NL@dfo-mpo.gc.ca.	It is agreed that components of the project could cause Serious Harm to Fish. As a result, a team of qualified environmental professionals have been included on the project team and discussions have begun with DFO regarding a Request for Project Review, a review of mitigations, and a residual Serious Harm determination. CFI submitted the Request for Project Review to DFO on September 14, 2015. Any residual Serious Harm will be subject of an authorization request to DFO under Section 35 of the Fisheries Act.
Environment Canada		EC 01	Fisheries Act Pollution prevention and control provisions of the Fisheries Act are administered and enforced by EC. The proponent should be aware of the general applicability of Section 36(3) of the Fisheries Act which states: "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water". Environmental protection and mitigation measures should reflect the need to comply with Section 36(3) of the Fisheries Act. For example, measures should be taken to prevent substances such as lubricating fluids, fuels, etc. from being deposited into water frequented by fish, and drainage from construction and operational drainage must not be harmful to fish.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada		EC 02	<b>Migratory Birds Convention Act</b> Migratory birds, their eggs, nests, and young are protected under the Migratory Birds Convention Act (MBCA). Migratory birds protected by the MBCA generally include all seabirds except cormorants and pelicans, all waterfowl, all shorebirds, and most landbirds (birds with principally terrestrial life cycles). Birds protected under the Migratory Birds Convention Act are specifically named in the Environment Canada publication, Birds Protected in Canada under the Migratory Birds Convention Act, Canadian Wildlife Service Occasional Paper No. 1. Under Section 6 of the Migratory Birds Regulations (MBR), it is forbidden to disturb, destroy or take a nest or egg of a migratory bird, or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. It is important to note that under the current MBR, no permits can be issued for the incidental take of migratory birds caused by development projects or other economic activities. Furthermore, Section 5.1 of the MBCA describes prohibitions related to deposit of substances harmful to migratory birds: "5.1 (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area. (2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds." It is the responsibility of the proponent to ensure that activities are managed so as to ensure compliance with the MBCA and associated regulations.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation, including the MBCA and associated regulations.
Environment Canada		EC 03	Canadian Environmental Protection Act The proponent should also be aware of the potential applicability of the Canadian Environmental Protection Act (CEPA). The Canadian Environmental Protection Act enables protection of the environment, and human life and health, through the establishment of environmental quality objectives, guidelines and codes of practice, and the regulation of toxic substances, emissions and discharges from federal facilities, international air pollution, and disposal at sea.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation, including the CEPA.
Environment Canada		EC 04	Potential Applicability of the Environmental Emergency Regulations It is stated in the registration that the project will involve blasting. If operational activities involve the use of ammonium nitrate, the proponent should note that this substance is listed in Schedule 1 (Part 1 – Substances Likely to Explode) of the Environmental Emergencies (E2) Regulations under CEPA, 1999. The proponent should confirm the quantities of ammonium nitrate (and other substances controlled by the E2 Regulations, such as propane, gasoline, etc.) that will be stored on site.	The exact amounts of these substances required will be determined in the detailed design stage and as required to obtain permits necessary to commence construction.
Environment Canada		EC 05	The Environmental Emergency Regulations under Section 200 of the CEPA apply to any person in Canada who owns, or has charge, management or control of, a substance listed on Schedule 1 of the regulations where either the total amount of the substance or the single largest container on site is equal to or greater than that specified in the Schedule. Where either or both of the criteria are satisfied, that person must undertake a number of actions. The regulations identify the information that must be submitted to EC within 90 days after acquiring a scheduled substance at or above the specified threshold quantities. An environmental emergency plan will also be required for all facilities that store or use any of the scheduled substances at or above the specified threshold quantities. When preparing an emergency plan, the proponent would be required to consider the following: <ul style="list-style-type: none"> <li>The properties and characteristics of the substances;</li> <li>The maximum expected quantity of the substance at the place at any time during the calendar year;</li> <li>The commercial, manufacturing, processing or other activity in relation to which the plan is prepared;</li> <li>The characteristics of the place where the substance is located and of the surrounding area that may increase the risk of harm to the environment or of danger to human life or health;</li> <li>The potential consequences from an environmental emergency on the environment or human health. Consequences are identified through the use of worst-probable-case and alternative scenarios (more information can be found in CRAIM 2007);</li> <li>A description of roles and responsibilities of individuals during an environmental emergency; and</li> <li>A description of the measures to be taken to notify members of the public who may be adversely affected by an environmental emergency.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. An Emergency Contingency Plan will be prepared and these measures will be considered in the preparation of the Plan.
Environment Canada		EC 06	Water Quality The Registration document indicates that Shoal Cove Pond is currently frequented by fish (page 104). If this is the case, the deposit of deleterious substances (tailings) into this water cannot be authorized under the Fisheries Act (the Proponent does not have access to Schedule 2 of the MMR since they are not a metal mine). If DFO has determined that the existing HADD no longer applies, the Proponent will have to be made aware of section 36(3) of the Act and that their current proposal can most likely not be authorized.	Shoal Cove Pond was a former tailings facility used in previous mining operations and is characterized as containing a substrate of thick fine silt from former tailings. It is currently shallow throughout, especially towards the northern end where tailings have infilled approximately 50% of the former pond. While fish were identified (brook trout) in the TMF in past surveys, they were in poorer condition than those in Clarke's Pond (smaller, black spot) and lower abundance. As stated in Section 6.2.3.1 of the EA Registration: "According to studies conducted in 1990 and 1995 (ADI Nolan Davis), the Shoal Cove watershed contains brook trout (Salvelinus fontinalis) and American eel (Anguilla rostrata). Fish from Clarke's Pond were found to be in better condition than fish further downstream; fish from Shoal Cove Pond exhibited shorter length, lower weight, and many were heavily infested with black spot (ADI Nolan Davis 1995). Like the previous studies, fish studies conducted in 2009 found that brook trout appeared to be more abundant in Clarke's Pond Brook compared to Shoal Cove Brook (AMEC 2009)." (CFI 2015).  Angling in Shoal Cove Pond was identified in recent public consultations, but only one person noted it and angling was not conducted recently. Other respondents identified alternative waterbodies as being more fished and important. Prior to re-activation of the TMF, any fish present will be relocated to Clarke's Pond. A bypass structure will be constructed to allow higher flows during storm events to flow between Clarke's Pond Brook and the lower Shoal Cove Brook so that natural hydrology is maintained downstream.  The existing Shoal Cove Pond has been used for tailings deposition since the 1930s. It is currently included in an existing Section 35 Fisheries Act authorization and a revised Fish Habitat Compensation Plan (in 2012) which was acceptable to DFO for the same alterations that re-activating the TMF would cause. The proposed TMF area, including Shoal Cove Pond (~160,000 m <sup>2</sup> in surface area), underwent an alternatives assessment and the former TMF is considered the most appropriate location for the current project as well (See Section 3.3 of EA Registration and Section 5.0 of EPR). The proposed TMF area has been seriously affected by past activities in terms of aquatic habitat and additional serious harm is being minimized by re-activating this area. Design advances such as a bypass for high water, fish passage to maintain habitat connectivity, and differing dam configuration all add to increased mitigation and decreased further serious harm.  Given the nature of the existing TMF with respect to the habitat that has been previously harmed and the limited recreational fishery it provides, it is conservatively anticipated that some Residual Serious Harm to Fish will occur. This Serious Harm will be reviewed by DFO and incorporated into a revised Offset Plan to be submitted to DFO as part of the ongoing Section 35 Fisheries Act authorization process.
Environment Canada		EC 07	Table 1-2. Potentially Applicable Federal Permits, Approvals and Authorizations, Page 6. Section 36(3) of the Fisheries Act should be included here.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and Section 36(3) of the Fisheries Act has been added to the list of potentially applicable federal permits, approvals and authorizations provided in Section 10.1 of the EPR.
Environment Canada		EC 08	Section 2.3.4, page 24, paragraph 6: The paragraph discusses effluent discharge limits, Section 36(3) of the Fisheries Act would also likely apply	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada		EC 09	Section 2.5.3, page 44: Re "treatment of water until quality reaches applicable standards (estimated 2 years). Section 36(3) of the Fisheries Act will continue to apply to the discharge from the site, there is no time limit.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada		EC 10	Section 2.8.1, page 51: Section 36 (3) Fisheries Act will also likely apply.	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada		EC 11	Section 2.8.4, page 54: Section 36(3) of the Fisheries Act could also apply to the site drainage that is being diverted and discharged	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada		EC 12	Section 2.9.4: The standards to which the TMF dam is to be designed should be cited here.	Canadian Dam Association Dam Safety Guidelines 2007
Environment Canada		EC 13	Table 7-3, page 165: Section 36(3) of the Fisheries Act should be discussed here. Most of the above comments relate to 36(3) of the Fisheries Act which is not addressed in the Registration. See Regulatory Requirements above.	As outlined in response to comments number DFO 01, certain components of the Project, including the TMF, could cause Serious Harm to Fish. As a result, discussions with DFO are ongoing regarding obtaining an authorization under Section 35 Fisheries Act. As part of the authorization process, a Fish Offset Plan and Fish Relocation Plan will be prepared. Prior to re-activation of the TMF, any fish present will be relocated to Clarke's Pond. A bypass structure will be constructed to allow higher flows during storm events to flow between Clarke's Pond Brook and the lower Shoal Cove Brook so that natural hydrology is maintained downstream. Therefore, deposition of deleterious substances into waters frequented by fish is not anticipated to occur in Shoal Cove Pond, in which case, Section 36(3) of the Fisheries Act would not apply and all required offsets would be authorized under Section 35.

Environment Canada	EC 14	<p><b>Blasting Operations</b> Ammonia from explosives can spread into surface and groundwater through shot rock and ore, spillage, and incomplete detonation. The available scientific literature indicates that that environmental risks associated with ammonia are related to both its acute and chronic toxicity to freshwater organisms, as well as contributing to eutrophication and algal blooms. The Canadian water quality guideline for the protection of aquatic life for un-ionized ammonia has a freshwater value of 0.019 mg/L.</p> <p>The best means of minimizing effects of ammonia during blasting are well documented best management practices based on prevention principles. The proponent may wish to consider Gordon F. Revey's 1996 paper, "Practical Methods to Reduce Ammonia and Nitrate Levels in Mine Water" (Mining Engineering, 48(7):61-64), which provides useful recommendations on ammonia residue reduction.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider the Gordon F. Revey's 1996 study to minimize effects of ammonia during blasting.
Environment Canada	EC 15	<p><b>Erosion and Sedimentation – On-land Activities</b> Mine development will involve various construction activities. The following measures should be implemented as applicable to minimize and control erosion and sedimentation: • coordinate construction activities with seasonal constraints (e.g. time clearing, grubbing [if any], and excavation activities to avoid heavy precipitation; avoid sensitive periods for fish and wildlife; shut down and stabilize the work site in accordance with pre-established criteria in advance of the winter season);</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider these erosion and sediment control measures in the preparation of the EPP.
Environment Canada	EC 16	<ul style="list-style-type: none"> <li>• implement measures in advance of any grubbing and excavation activities, that will allow surface drainage to be diverted around the work area;</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 17	<ul style="list-style-type: none"> <li>• install all perimeter control structures (e.g. silt fencing, sediment traps, settling ponds) prior to any land disturbance;</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 18	<ul style="list-style-type: none"> <li>• maintain vegetated buffer zones as appropriate to protect environmental values;</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 19	<ul style="list-style-type: none"> <li>• minimize the exposed soil area (by limiting the area that is exposed at any one time and by limiting the amount of time that any area is exposed);</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 20	<ul style="list-style-type: none"> <li>• stabilize exposed soil as soon as possible (e.g. stabilize interim exposed soil with mulch, erosion control blankets or final exposed soil with fast-growing, non-invasive, native vegetation);</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 21	<ul style="list-style-type: none"> <li>• maintain sediment control structures (by inspecting and repairing structural problems during and after storm events, removing accumulated sediment at regular intervals or at designated capacities, and by disposing of it at an approved site, given its unsuitability as structural fill material);</li> </ul>	Comment noted. See response to comment number EC 15.
Environment Canada	EC 22	<p><b>Construction</b> At the project planning stage, all available construction materials should be considered (e.g., untreated wood, treated wood, pre-cast concrete, corrosion-resistant steel, plastic lumber), and those materials best suited to the conditions and intended use of the structure should be selected. Analysis of the preferred construction material should include a consideration of the full life-cycle of the material (ease of use, design factors associated with the construction material, maintenance requirements, and final disposal). Environmental implications (e.g. storm and ice damage) associated with each life-cycle phase should also be considered. For example, it may not be cost effective to use pressure treated wood for a coastal structure that may be destroyed or damaged by storm surge during the life expectancy of the structure.</p>	Construction materials will be evaluated during the Project detailed design phase. Environmental implications of the various materials will be considered as part of Project design and planning.
Environment Canada	EC 23	<p><b>Concrete Production</b> Discharges from project work involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials may have a high pH, and work should be planned and conducted to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Any potentially contaminated water (e.g. exposed aggregate wash-off, wet curing, equipment and truck washing), should be prevented from entering the aquatic environment unless it can be confirmed that this water will not be deleterious to fish or harmful to migratory birds. Containment facilities should be provided at the site as required</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider these measures in the preparation of the EPP.
Environment Canada	EC 24	<p><b>Water Quality Monitoring and Adaptive Management</b> The Registration indicates that effluent monitoring will be carried out to demonstrate compliance with regulatory discharge limits. A water quality monitoring program should include location and number of sampling sites, sampling protocols (parameters, sampling frequency) that allows for timely detection of water quality changes and identifies action thresholds for implementation of appropriate adaptive management measures. Such a program should take into account Section 36 (3) of the Fisheries Act, other existing and appropriate regulations, the Canadian Council of Ministers of the Environment publication, Environmental Quality Guidelines for the protection of aquatic life (<a href="http://www.ccme.ca/publications/ceqg_rqce.html">http://www.ccme.ca/publications/ceqg_rqce.html</a>) in conjunction with existing ambient water quality and site-specific factors.</p>	A water quality monitoring program will be developed in compliance with all applicable legislation and regulatory requirements.
Environment Canada	EC 25	<p><b>Air Quality</b> Table 1-2 Potentially Applicable Federal Permits, Approvals and Authorizations, page 6 should reference the Canadian Environmental Protection Act (CEPA) not the Canadian Environmental Act. Also since dust is one of the key environmental effects, it would be beneficial to include the CEPA PM 2.5 Standard/Objective (2015 PM 2.5 24 hour objective of 28 ug/m3 and PM2.5 Annual standard of 10.0 ug/m3, respectively). For more information on the new standards see link: <a href="http://www.ec.gc.ca/default.asp?lang=En&amp;n=56D4043B-1&amp;news=AB2C28A-2DF8-4BF4-8777-ADF29B4360B0">http://www.ec.gc.ca/default.asp?lang=En&amp;n=56D4043B-1&amp;news=AB2C28A-2DF8-4BF4-8777-ADF29B4360B0</a></p>	An updated table of potentially applicable federal permits, approvals and authorizations is provided in Section 10.0 of the EPR.
Environment Canada	EC 26	<p>Section 7.2.4 Environmental Effects Summary discusses the environmental effects and mitigation. However there is no mention of a dust prevention and management plan. It would be beneficial to include this type of plan that would include control and mitigation measures applicable to each emission source. Furthermore, Page 88 table 5-3 entitled "Summary of Key Issues Raised by Public Information Session Participants" identifies dust as a key issue especially during the transport of the concentrate from the site to the terminal; hence dust management should be a priority.</p>	As stated in the Air Emissions Inventory Report (Appendix K), a Best Management Practices Plan to Control Fugitive Dust will be prepared and implemented by CFI prior to construction. This plan will characterize the existing fugitive dust sources at the site, rank them according to relative risk and provide reasonable control measures to be followed by the site to minimize the dust emissions. The plan will also include frequency for inspection of the fugitive sources and procedures for implementation of adaptive management measures following inspection. The plan will be kept up to date and revised accordingly during the various Project phases.
Environment Canada	EC 27	<p>Section 7.2.1 entitled "Operation Air Quality" discusses air quality in general terms and should be more detailed. Page 152 states "The effect of particulate matter on air quality is expected to be localized" but there does not appear to be any scientific documentation to support this such as modelling. The Proponent should provide an inventory of emissions. Depending on the magnitude of emissions modelling can be conducted to estimate the magnitude of effects on local air quality.</p>	To date, an inventory of air emissions expected to be generated during both the construction and operations phases of the Project has been prepared and is currently being reviewed by regulators (Appendix K). CFI will comply with all regulatory requirements, and should further assessment be required following a review of the emissions inventory, CFI will participate in additional discussions with regulatory agencies to satisfy their concerns.
Environment Canada	EC 28	<p><b>Dust Suppression</b> Site preparation and operational activities have the potential to produce dust. Water, calcium chloride, magnesium chloride and lignin-based dust suppressants are often selected as dust suppressants for application throughout a project lifecycle. Excessive use or poor application of chemical dust suppressants can have adverse environmental effects. The proponent should consider the following factors in selecting suppressants and in determining when, where and how suppressants are to be applied: • From an environmental quality perspective, the application of water is the preferred method of dust suppression. • Aquatic toxicities of lignin-based lignosulfonates are considered low, but the potential offsite movement of lignosulfonates into watercourses is of ecological concern as they may reduce dissolved oxygen and increase colour and suspended solids in water. Prior to application, it should be determined if any significant migration via water drainage might occur into local streams, rivers, ponds, or lakes and thereby affect the oxygen needs of aquatic communities. If either calcium chloride or magnesium chloride is considered for use as a dust suppressant, it should only be used in accordance with guidance offered in the Environment Canada report entitled, Best Practices for the use and Storage of Chloride-Based Dust Suppressants (available on request at: <a href="https://www.ec.gc.ca/seis-sais/default.asp?lang=En&amp;n=9C0C2E1-1">https://www.ec.gc.ca/seis-sais/default.asp?lang=En&amp;n=9C0C2E1-1</a>).</p>	As stated in the Air Emissions Inventory Report (Appendix K), a Best Management Practices Plan (BMPP) to Control Fugitive Dust will be prepared and implemented by CFI prior to construction. The BMPP will take into consideration the Environment Canada report entitled, Best Practices for the use and Storage of Chloride-Based Dust Suppressants.
Environment Canada	EC 29	<p><b>National Pollutant Release Inventory</b> An EA should consider the applicability of the National Pollutant Release Inventory to the project design and operations. The National Pollutant Release Inventory (NPRI) is a federally administered program that collects data on annual on-site emissions of substances to the air, water, and land, as well as off-site transfers of substance disposal or recycling. Information is collected to assess whether risk-management activities for various industrial sources of criteria air contaminants (CACs) are resulting in reduced emissions, and to support various domestic and international programs including the Canada-wide Standards for PM and Ozone and development of Ambient Air Quality Objectives. Facilities that meet certain reporting criteria for any of the listed substances are required to report information to EC through the NPRI. Reporting to the NPRI is a legal requirement and mandatory under Canadian Law; the legal authority for the NPRI is the Canadian Environmental Protection Act, subsection 46(1). Generally, facilities must review their activities and determine if there are additional substance emissions that are subject to reporting. Further details on NPRI reporting requirements may be found by contacting the NPRI office at 1-877-877-8375 or <a href="mailto:inrp-npri@ec.gc.ca">inrp-npri@ec.gc.ca</a>.</p>	CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will report to the NPRI as required. This requirement has been included in the Table of Applicable Federal Permits, Approvals and Authorizations found in Section 10.1 of the EPR.
Environment Canada	EC 30	<p><b>Migratory Birds and Species at Risk</b> Section 7.5 Wildlife Olive-sided Flycatcher and Red Crossbill should be added to the effects assessment of Species at Risk.</p>	<p>Proposed mitigation measures for the wildlife VEC is provided in Table 7-6 of the EA Registration document (CFI 2015). These mitigation measures apply to all potential effects on wildlife species and species at risk, including the Olive-sided Flycatcher (<i>Contopus cooperi</i>) and Red Crossbill (<i>Loxia curvirostra perca</i>), which are listed under the Newfoundland and Labrador Endangered Species Act and the federal Species at Risk Act (SARA), as identified in Table 6-9 of the EA Registration document.</p> <p>It is difficult to define the breeding range and time of year of Red Crossbills in NL due to their year-round nomadic nature and opportunistically breeding that relies mainly on the productivity of cone-bearing trees. Conifer stands with black or white spruce, red or white pine, balsam fir and tamarack are preferred habitat for foraging, roosting, and nesting (COSEWIC 2004, Adkisson 1996). Based on an assessment of the Ecological Land Classification (ELC) presented in the EA Registration, the trees present in the Project area are small and sparse and do not likely represent good quality habitat for Red Crossbill.</p> <p>Olive-sided Flycatcher is known to forage in open forest habitat dominated by conifers or mixed forest with tall trees or snags for perching and offering better sights to capture insects. This species migrates and arrives in Canada between April and June and breeds almost immediately upon its arrival. This species breeds along forest edges and openings, semi-open forest, water edges and harvested forest (Altman, B. and R. Sallabanks. 2000, COSEWIC. 2007). Based on an assessment of the ELC presented in the EA Registration, the open coniferous tree cover in the Project area may provide suitable habitat for Olive-sided Flycatcher.</p> <p>To confirm whether or not there is suitable foraging and/or breeding habitat in the Project footprint area for bird species at risk, CFI retained LGL Limited (LGL) to conduct an avifauna and wildlife species at risk survey at site (Appendix H). This survey focused on bird species currently listed as either endangered or threatened on Schedule 1 of the Species at Risk Act (SARA) or as endangered, threatened or vulnerable under the NL Endangered Species Act (ESA), and with reasonable likelihood of occurrence in the general vicinity of the Project footprint area. Results of the avifauna/wildlife at risk survey indicate that there is no suitable foraging/breeding habitat for these bird species at risk within the Project footprint. There is anecdotal information suggesting that the Rusty Blackbird may breed in the vicinity of Clarks Pond located upstream from Shoal Cove Pond. However, this pond occurs outside of the Project footprint area. It should be noted that this survey was conducted outside of the typical bird breeding period.</p> <p>As outlined in Section 7.5 of the EA Registration, mitigation measures to minimize or avoid Project-related interactions and likely adverse environmental effects on the Wildlife VEC include, but are not limited to reducing potential adverse effects on nesting birds by having clearing activities during construction take place outside of the bird breeding season for most bird species (April 1 to September 1), where possible, to prevent the disturbance of migratory birds or their nests (Environment Canada 2014a). If some clearing is necessary during the bird breeding season, CFI will assess if the work can be conducted without contravention of the Migratory Birds Convention Act (MBCA) and implement a contingency plan in consultation with the Canadian Wildlife Service (CWS) to maintain compliance with the MBCA.</p>
Environment Canada	EC 31	<p>Section 7.5.1 Construction - Birds Quote: To reduce potential adverse effects on nesting birds, clearing activities will take place outside of the bird breeding season for most bird species (April 15th to August 15th), where possible, to prevent the disturbance of migratory birds or their nests (Environment Canada 2014a). If some clearing is necessary during the bird breeding season, CFI will assess if the work can be conducted without contravention of the Migratory Birds Convention Act and a contingency plan (e.g., nest surveys prior to clearing will be developed in consultation with the Canadian Wildlife Service (CWS) to maintain compliance with the act. An avifauna management plan (i.e. contingency plan) should be in place prior to project initiation. See also updated breeding season guidance later in this document.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will prepare an Avifauna Management Plan prior to start of construction.
Environment Canada	EC 32	<p>Section 7.5.2 Operation - Birds Quote: Should seabirds or other species become stranded on vessels or on land, CFI would expect vessel operators to adhere to appropriate handling protocols, such as best practices for stranded birds encountered offshore Atlantic Canada (Environment Canada 2014b).</p> <p>The attached draft document, entitled "Best practices for stranded birds encountered offshore – Atlantic Canada (April 2015)", should be implemented for use in all cases concerning stranded birds. This document replaces the Williams and Chardine protocol for handling stranded birds.</p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada	EC 33	<p>Section 7.5.2 Operation - Birds Quote: "The presence of the TMF (Tailings management Facility) and settling ponds on the site may provide some marginal habitat for shorebirds and waterfowl, although the high level of human activity makes it unlikely that these ponds will be utilized during the operation phase."</p> <p>Section 5.1 of the MBCA indicates that it is unlawful to deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.</p> <p>EC recommends that the proponent:</p> <ul style="list-style-type: none"> <li>• monitor the use of water management ponds by migratory birds at the tailings management facility, as well as presence of substances in this pond or associated water bodies that are harmful to migratory birds; and</li> <li>• implement measures to prevent contact of migratory birds with the harmful substances, to ensure compliance with the MBCA if birds are detected on ponds or other water bodies that contain substances harmful to migratory birds.</li> </ul>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation.
Environment Canada	EC 34	<p><b>Vegetation Clearing</b> Clearing vegetation during construction activities may cause disturbance to migratory birds and inadvertently cause the destruction of their nests and eggs (<a href="http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=FA4AC736-1">http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=FA4AC736-1</a>). Many species use trees, as well as brush, deadfalls and other low-lying vegetation for nesting, feeding, shelter and cover. This would apply to songbirds throughout the region, as well as waterfowl in wetland areas. Disturbance of this nature would be most critical during the breeding period. The breeding season for most birds within the project area occurs between April 15th and August 15th in this region, however some species protected under the MBCA do nest outside of this time period. Please see the webpage "General Nesting Periods of Migratory Birds in Canada" (Website: <a href="http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=4F39A78F-1">http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=4F39A78F-1</a>). This project area falls within zone "D3-4" for more information concerning the breeding times of migratory birds.</p> <p>Environment Canada provides the following recommendations:</p> <ol style="list-style-type: none"> <li>1. to avoid the risk of nest destruction, the proponent should avoid vegetation clearing during the most critical period of the migratory bird breeding season, which is April 15th through August 15th in this region.</li> <li>2. to develop and implement a management plan that includes appropriate preventive measures to minimize the risk of impacts on migratory birds (See "Planning ahead to reduce risks to migratory bird nests", PDF: <a href="http://www.ec.gc.ca/Publications/default.asp?lang=En&amp;n=50C4FE11-801E-4FE3-8019-B2D8537D76CF">http://www.ec.gc.ca/Publications/default.asp?lang=En&amp;n=50C4FE11-801E-4FE3-8019-B2D8537D76CF</a>). It is the responsibility of the individual or company undertaking the activities to determine these measures. For guidance on how to avoid the incidental take of migratory birds nests and eggs, please refer to the Avoidance Guidelines (Website: <a href="http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=AB36A082-1">http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=AB36A082-1</a>). The management plan should include processes to follow should an active nest be found at any time of the year.</li> </ol>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will prepare an Avifauna Management Plan prior to start of construction.

Environment Canada	EC 35	<p><b>Stockpiles</b> Certain species of migratory birds (e.g. Bank Swallows) may nest in large piles of soil left unattended/unvegetated during the most critical period of breeding season (April 15th through August 15th). To discourage this, the proponent should consider measures to cover or to deter birds from these large piles of unattended soil during the breeding season. If migratory birds take up occupancy of these piles, any industrial activities (including hydroseeding) will cause disturbance to these migratory birds and inadvertently cause the destruction of nests and eggs. Alternate measures will then need to be taken to reduce potential for erosion, and to ensure that nests are protected until chicks have fledged and left the area. For a species such as the Bank Swallow, the period when the nests would be considered active would include not only the time when birds are incubating eggs or taking care of flightless chicks, but also a period of time after chicks have learned to fly, because Bank Swallows return to their colony to roost.</p> <p>It should be ensured that stockpiled dredge spoils are not placed in wetlands or watercourses or their buffers, or in the other sensitive habitats (e.g. habitats of Species at Risk or species of conservation concern).</p>	Comment noted. CFI will consider these measures in the preparation of the Avifauna Management Plan and the EPP.
Environment Canada	EC 36	<p><b>Revegetation</b> A variety of species of plants native to the general project area be used in revegetation efforts. Should seed mixes for herbaceous native species for the area not be available, it should be ensured that plants used in revegetation efforts are not known to be invasive.</p>	Comment noted. This recommendation will be considered in the selection of plants to be used in revegetation efforts.
Environment Canada	EC 37	<p><b>Invasive Species</b> Measures to diminish the risk of introducing invasive species should be developed and implemented during all project phases. These measures could include:  <ul style="list-style-type: none"> <li>• Cleaning and inspecting construction equipment prior to transport from elsewhere to ensure that no vegetative matter is attached to the machinery (e.g., use of pressure water hose to clean vehicles prior to transport)</li> <li>• Regularly inspecting equipment prior to, during and immediately following construction in areas found to support Purple Loosestrife to ensure that vegetative matter is not transported from one construction area to another.</li> </ul> </p>	Comment noted. CFI will incorporate measures, considering those suggested, intended to diminish the risk of introducing vegetative invasive species to areas currently devoid of them.
Environment Canada	EC 38	<p><b>Species at Risk</b> The following species at risk (as listed on Schedule 1 of the Species at Risk Act) may occur within the study area: Olive-sided Flycatcher (Threatened), Piping Plover (Melodus subspecies, Endangered) and Red Crossbill (Percna subspecies, Endangered). Though unlikely to be found within the project footprint, these species may occur within the study area and we request that sightings be reported to EC-CWS.</p>	Comment noted. Any sightings of these species during Project-related activities will be reported to EC-CWS.
Environment Canada	EC 39	<p><b>Wetlands</b> The proponent should be aware that as part of its commitment to wetlands conservation, the Federal Government has adopted The Federal Policy on Wetland Conservation (FPWC) with its objective to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future." In support of this objective, the Federal Government strives for the goal of No Net Loss of wetland function on federal lands or when federal funding is provided.</p> <p>Though this project does not take place on federal lands, EC-CWS still recommends that as a beneficial management practice, the goals of the policy be considered in wetland areas. EC-CWS further recommends that the hierarchical sequence of mitigation alternatives (avoidance, minimization, and as a last resort, compensation) recommended in FPWC is followed. Avoidance refers to elimination of adverse effects on wetland functions, by altering the siting or modifying the design of a project, and is the preferred option. In the event that avoidance is not possible, the reasons why elimination of adverse effects on wetland functions were not possible should be clearly demonstrated in environmental assessment documents, and EC-CWS should be contacted for advice on next steps to follow for compliance with the FPWC.</p> <p>A copy of the FPWC can be found at: <a href="http://dsp-psd.communication.gc.ca/Collection/CW66-116-1991E.pdf">http://dsp-psd.communication.gc.ca/Collection/CW66-116-1991E.pdf</a></p> <p>EC-CWS recommends using a 30m buffer from the high water mark of any water body (1:100 year Flood Zone) in order to maintain movement corridors for migratory birds.</p>	CFI is committed to conducting all Project-related activities in compliance with applicable legislation and will consider the goals of the FPWC during the development of the Project. Additional information is provided in response to comment number EC 40.
Environment Canada	EC 40	<p>In order to promote wetland conservation EC-CWS recommends the following:  <ul style="list-style-type: none"> <li>• developments on wetlands should be avoided</li> <li>• where development does occur in the vicinity of wetlands, a minimum vegetation buffer zone of 30 m should be maintained around existing wetland areas</li> <li>• hydrologic function of the wetland should be maintained</li> <li>• runoff from development should be directed away from wetlands</li> </ul> </p>	<p>In an effort to promote wetland conservation, avoidance of wetlands has been considered during the Project design and where possible, a vegetation buffer zone will be maintained between the Project infrastructure and existing wetlands. Where possible, consideration will also be given to maintaining the hydrologic function of the wetlands. CFI retained LGL Limited (LGL) to conduct an assessment of wetlands occurring within and proximate to the Project footprint (Appendix H). The wetland assessment included the identification and classification of wetlands that met the spatial criteria indicated above. The assessment also included recommendations for preliminary environmental management strategies, mitigation measures (e.g., re-routing of proposed roads, compensation) and monitoring plans for wetlands that may be adversely affected by the Project. CFI will consider the findings and recommended mitigation measures identified in the wetland survey during the detailed design engineering.</p> <p>CFI recognizes that the Project footprint overlaps some wetland areas. The proposed access road that will connect the mine area with the TMF and the Marine Terminal at Blue Beach Cove will intersect a number of wetland areas including the northern portion of a wetland located north of Hares Ears Pond, and fluvial fen streams and brooks emptying into Salt Cove. Mitigation measures will be developed as part of ongoing Project design and planning to promote conservation of this wetland. The large fen and peatland area adjacent to Shoal Cove Pond is located within the boundaries of the proposed tailings management facility (TMF) and will likely be affected by the Project. Based on available data, it is known that this wetland has historically been disturbed by mining activities dating back to the 1930s (ADI Nolan Davis 1990, 1995). The Water Management Strategy prepared for this Project considers the hydrologic function of the wetland adjacent to the TMF (Appendix C). Specifically, the spill level in the TMF spillway will be set to encourage development of a stable wetland surrounding the pond. Measures to maintain hydrologic function of wetlands in the vicinity of the Project area will also be considered in the Water Management Plan.</p>
Environment Canada	EC 41	<p><b>Light Attraction and Migratory Birds</b> In Atlantic Canada, nocturnal migrants and night-flying seabirds (e.g. storm-petrels) are the migratory birds most at risk of attraction to lights and flares. Attraction to lights at night or in poor visibility conditions during the day may result in collision with lit structures or their support structures, or with other migratory birds. Disoriented migratory birds are prone to circling light sources and may deplete their energy reserves and either die of exhaustion or be forced to land where they are at risk of depredation.</p> <p>To minimize risk of incidental take of migratory birds due to human-induced light, Environment Canada recommends at minimum the following beneficial management practices:  <ul style="list-style-type: none"> <li>• The minimum amount of pilot warning and obstruction avoidance lighting should be used on tall structures.</li> <li>• The use of only strobe lights at night, at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada, is recommended.</li> <li>• Using the minimum number of lights possible is recommended.</li> <li>• The use of solid-burning or slow pulsing warning lights at night should be avoided.</li> <li>• Lights should completely turn off between flashes.</li> <li>• Lighting for the safety of the employees should be shielded to shine down and only to where it is needed, without compromising safety.</li> <li>• Use of LED lights is encouraged, as LED light fixtures are less prone to light trespass (i.e. are better at directing light where it needs to be, and do not bleed light into the surrounding area), and this property reduces the incidence of migratory bird attraction.</li> </ul> </p>	Comment noted. CFI will incorporate management practices, considering those suggested, for working on shorelines in the preparation of the Project EPP.
Environment Canada	EC 42	<p><b>Other Coastal Infrastructure Activities</b> EC has the following recommended beneficial management practices for working on shorelines:  <ul style="list-style-type: none"> <li>• Project staff should not approach concentrations of seabirds, sea ducks or shorebirds.</li> <li>• Project staff should use the main navigation channels to get to and from the site, and should have well muffled vessels and machinery.</li> <li>• Project staff should undertake any measures that may minimize or eliminate discharge of oily waste into the marine environment.</li> <li>• Food scraps and other garbage left on beaches and other coastal habitats can artificially enhance the populations of avian and mammalian predators of eggs and chicks. The proponent should ensure that no litter (including food waste) is left in coastal areas by their staff and/or contractors</li> <li>• If there is any noticeable change in seabird numbers or distribution at the location during operations, EC-CWS should be notified.</li> </ul> </p>	Comment noted. CFI will consider the incorporation of these management practices for working on shorelines in the preparation of the Project EPP.
Environment Canada	EC 43	<p><b>Management of Hazardous Materials and Waste</b> Provisions for the management of hazardous materials (e.g. fuels, lubricants) and wastes (e.g. contaminated soil, sediments, waste oil) should be identified and implemented in order to ensure compliance with Section 36 (3) of the Fisheries Act, and with CEPA and the Migratory Birds Convention Act and their Regulations. The following mitigation recommendations are made with respect to the transport, storage, use and disposal of petroleum products and toxic substances which, when employed, may minimize the risk of chronic and accidental releases and impacts to the environment:  <ul style="list-style-type: none"> <li>• Even small spills of oil can have very serious effects on migratory birds and fish. Therefore, every effort should be taken to ensure that no oil spills occur in the area.</li> <li>• Fuelling and maintenance of equipment should be undertaken on level terrain, at least 30m from any surface water (including wetlands), on a prepared impermeable surface with a collection system to ensure oil, gasoline and hydraulic fluids do not enter surface waters. Waste oil should be disposed of in an approved manner.</li> <li>• Biodegradable alternatives to petroleum-based fluid for heavy machinery are commonly available from major manufacturers. Such biodegradable fluids should be considered for use in place of petroleum products whenever possible, as a standard for best practices.</li> <li>• In order to ensure that a quick and effective response to a spill event is possible, spill response equipment should be readily available on-site. Response equipment, such as adsorbents and open-ended barrels for collection of cleanup debris, should be stored in an accessible location on-site. Personnel working on the project should be knowledgeable about response procedures. The proponent should have a contingency plan specific to the proposed undertaking to enable a quick and effective response to a spill event. The proponent should indicate how the contingency plans will be prepared, and response measures implemented, to reflect site-specific conditions and sensitivities. In developing a contingency plan, it is recommended that the Canadian Standards Association publication Emergency Planning for Industry CAN/CSA-Z731-03, be consulted as a useful reference.</li> <li>• The proponent should report any spills of petroleum or other hazardous materials to the Environmental Emergencies 24 Hour Report Line (1-800-563-9089)</li> </ul> </p>	Comment noted. CFI is committed to conducting all Project-related activities in compliance with applicable legislation. The following measures will be considered in the preparation of the Emergency Contingency Plan.
Environment Canada	EC 44	<p><b>Effects of the Environment on the Project</b> Because the proposed project will be sensitive to climate and weather, particularly extreme events, mitigative procedures should be factored into the design to ensure that the risk of infrastructure and environmental damage and other accidents is minimized. Historical data, local area knowledge and increasing ranges of weather events (e.g. Hurricane Igor) should be taken into account in determining the adequacy of the project design.</p>	CFI has considered the effects of climate and weather during the Project design and will continue to consider these during the detailed design phase to reduce the risk of damage and accidents.
Environment Canada	EC 45	<p>Climatological data to assess the effects of the environment on the project can be obtained at <a href="http://www.climate.weatheroffice.ec.gc.ca/">http://www.climate.weatheroffice.ec.gc.ca/</a>. Value-added data can be obtained by consulting EC's Atlantic Climate Centre at (506) 451-6006 or by email at: <a href="mailto:climate.atlantic@ec.gc.ca">climate.atlantic@ec.gc.ca</a>.</p> <p>The proponent is also encouraged to regularly consult EC's local forecast at <a href="http://www.weatheroffice.ec.gc.ca/">http://www.weatheroffice.ec.gc.ca/</a> so that construction-related activities can be scheduled accordingly.</p>	Comment noted. No response required.

# APPENDIX C

## Water Management Strategy





July 20, 2015

AGS MINE, ST. LAWRENCE, NL

# Water Management Strategy

**Submitted to:**  
Frank Pitman  
Canada Fluorspar Inc.

REPORT



**Report Number: 1407707 (Doc#0053 - Rev 0)**

**Distribution:**

Canada Fluorspar Inc. - 1 Electronic Copy  
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## 1.0 INTRODUCTION

Canada Fluorspar (NL) Inc. (CFI) is proposing to develop the AGS Fluorspar Mine (the Project) in St. Lawrence, in the province of Newfoundland and Labrador (NL). The Project includes construction, operation, and rehabilitation and closure of the following primary components:

- surface and underground mine development of the AGS Vein, including: four open pits; underground mine workings; waste rock, overburden, and topsoil dumps/stockpiles;
- Mill facility, with a production capacity of up to 200,000 tonnes per year of fluorspar concentrate and 200,000 tonnes per year of dense media separation floats (i.e., high-quality construction aggregate or used as underground backfill);
- Tailings Management Facility (TMF) within an area historically used as a tailings lagoon, capable of storing 2.8 million tonnes of flotation tailings over the life of the Project, conveyed as slurry by pipeline;
- ancillary infrastructure to support the Mine and Mill, including access roads, explosives magazine storage, conveyors, administration building, warehouse and maintenance building, employee facilities, concentrate storage building, security building, and electrical building; and
- Marine Terminal facility at Blue Beach Cove, capable of handling vessels from 10,000 deadweight tonnage (DWT) to 65,000 DWT and loading ships at a rate of 500 tonnes per hour.

A Pre-Feasibility Study (PFS) has been completed for the Project and a registration document has been submitted to initiate the provincial environmental assessment (EA) process under the NL *Environmental Protection Act*. As part of the engineering and EA registration process CFI has engaged Golder Associates Ltd. (Golder) to prepare a Water Management Strategy for the Project. Recognizing that water management planning is incorporated in the PFS design, this document is focused on environmental considerations during construction, operation and closure.

### 1.1 Objectives

The objectives of the Water Management Strategy include the following:

- Review available background information to identify and understand potential Project-environment interactions for consideration in the development of the water management strategy;
- Develop a preliminary water management plan with a focus on environmental considerations important to the environmental assessment process;
- Identify key water issues and areas of uncertainty moving forward that can be used to focus baseline studies and future study needs; and
- Establish a working document that will evolve as Project design and environmental evaluation progresses.



## **2.0 BACKGROUND INFORMATION**

### **2.1 Existing Watersheds**

The St. Lawrence area has been shaped by glaciation into three broad but elongated southward sloping upland valley troughs separated by rounded ridges that form the main basins. The direction of these features follows the structure of the geology. The land drops from elevations of 300 to 500 metres (m) in the north to about 50 to 100 m at the cliff bound coast (Scott Wilson 2009).

The Project area can be subdivided into six main watersheds as shown in Figure 1 and described below. Collectively, the Grebes Nest, Mine Cove, Northwest Pond and Upper Island Pond watersheds constitute the AGS watersheds. In places, gradients are generally low and many shallow ponds of various sizes have formed. Flat areas between ponds are often occupied by heavily saturated upland bogs (Scott Wilson 2009).

Based on surficial geology mapping by the Department of Natural Resources (DNR 2014), soils in the area generally consist of a relatively thin (1.5 m) to thick (15 m) glacial till consisting of silty sand and gravel with some cobbles and boulders over much of the Project area. On higher ground to the northeast, areas of bog are underlain by glacial till predominate. At the highest topographic levels, such as the hills of Cape Chapeau Rouge and western parts of the Project area, bedrock is exposed or covered by a thin veneer of till or vegetation (CFI 2015).

#### **Shoal Cove watershed**

The proposed TMF is located in the Shoal Cove watershed, which drains an area of approximately 379 hectares (ha). The watershed encompasses two large ponds: Clarkes Pond (surface area 9.4 ha) and Shoal Cove Pond (surface area 17.8 ha); as well as Clarkes Pond Brook, which links the two ponds, and Shoal Cove Pond Brook (1.5 km along its main stem) which travels north-south to discharge into Shoal Cove. Mining activities have historically been carried out in the watershed, including the use of Clarkes Pond for water supply and Shoal Cove Pond for tailings deposition.

#### **Salt Cove watershed**

Salt Cove watershed is the largest of the six watersheds with a drainage area of 2,465 ha. Salt Cove Brook flows north-south to discharge into Salt Cove and is approximately 8.6 kilometres (km) along its main stem. There are four large ponds in the upper watershed: Winter Pond (surface area 14.9 ha), Long Pond (surface area 50.6 ha), Loo Pond (surface area 11.2 ha), and Hay Pook Pond (surface area 25.8 ha).

The previously mined Tarefare and Director Veins are located in the Salt Cove watershed. The outflow of Hay Pook Pond currently flows through a man-made diversion channel constructed in the 1950s to redirect water from the Director Mine area (CFI 2015). A canal was constructed to divert water from the Director Mine to the lower reaches of Salt Cove Brook, which reduced flows into the upper reaches of the brook (Scott Wilson 2009).

Project facilities located in the Salt Cove watershed will include the access road connecting the AGS mine and the TMF, and a small portion of the plant site.



### **Grebes Nest Pond watershed**

The Grebes Nest Pond watershed is located to the north of the AGS Vein and has a drainage area of 507.1 ha. It includes two major water bodies: Grebes Nest Pond (surface area 8.4 ha) and John Fitzpatrick Pond (surface area 14.8 ha). The watershed drains in a general northwest direction via a creek with a main stem approximately 3.2 km in length, and discharges into Little Lawn Harbour.

The two waste rock dumps, two of the four open pits and the underground mine will be located in the Grebes Nest Pond watershed.

### **Upper Island Pond watershed**

The Upper Island Pond watershed is located to the south of Grebes Nest Pond watershed and drains an area of 230 ha. It contains one major pond, Upper Island Pond (surface area 8.2 ha), which is located in the upper watershed. The watershed drains via a creek (2.4 km in length along its main stem) which flows in a southern direction into a small cove located west of Watering Cove.

A small portion of the mine site and most of the plant site will be located in the Upper Island Pond watershed.

### **Northwest Pond watershed**

This watershed drains an area of 38 ha via a creek (0.96 km along its main stem) flowing in a westward direction to discharge into a small cove south of Mine Cove. The watershed contains a small water body, Northwest Pond (surface area 0.4 ha), at the headwaters of the creek. The lower reach of the creek (approximately one third of its length) flows over steep slopes (>20%) to its mouth in Little Lawn Harbour.

### **Mine Cove watershed**

The Mine Cove watershed contains several small creeks that drain westwards over steep slopes (>20%) to discharge into Little Lawn Harbour. The creeks range in length from 0.06 km to 1.3 km and are considered to be intermittent or seasonal streams (flowing for part of the year) or ephemeral streams (flowing only during and immediately after precipitation). This watershed has a drainage area of 163 ha.

## **2.2 Hydrology**

### **2.2.1 Precipitation and evaporation**

The Town of St. Lawrence is located on the southeast portion of the Burin Peninsula where the climate is heavily influenced by the ocean; summers are cool and winters are mild with limited to no snow cover (CFI 2015). Precipitation occurs all year-round as rain, with some snow in the winter months. Evaporation rates are low, with losses occurring mainly in the summer months.

Table 1 shows long-term average total precipitation and potential evapotranspiration (1966 to 2005) for Environment Canada's St. Lawrence, NL meteorological station, which is located within 10 km of the AGS mine and TMF sites. Potential evapotranspiration was estimated from air temperature data using the Thornthwaite equation (Johnstone and Louie 1983). Mean annual total precipitation amounts to 1,617 millimetres (mm), and is distributed relatively uniformly throughout the year. Mean monthly total precipitation ranges from 110.2 mm (July) to 166 mm (October). Mean annual potential evapotranspiration is estimated to be 479 mm, with as much as 350 mm occurring in the months of June to September.



**Table 1: Average Total Precipitation and Potential Evapotranspiration**

Period	Total Precipitation		Potential Evapotranspiration	
	Depth (mm)	Percent of Annual Total	Depth (mm)	Percent of Annual Total
January	145	8.9	0.0	0.0
February	131	8.1	0.0	0.0
March	129	8.0	1.1	0.2
April	125	7.8	15.4	3.2
May	124	7.6	49.1	10.2
June	123	7.6	75.2	15.7
July	110	6.8	102	21.3
August	120	7.4	101	21.1
September	148	9.1	71.7	15.0
October	166	10.3	43.4	9.0
November	154	9.5	18.4	3.8
December	145	9.0	1.9	0.4
Year	1,617	100	479	100

Annual total precipitation and potential evapotranspiration at St. Lawrence, NL for wet and dry years are shown in Table 2. Values are based on frequency analysis of 1966 to 2005 annual data recorded for the meteorological station. Six probability distributions were fitted to each dataset and the distribution with the best fit was determined using statistical tests. The Normal distribution provided the best fit for the total precipitation data, and the Pearson III distribution provided the best fit for the potential evapotranspiration data. The data in Table 2 indicate a greater range in annual total precipitation (1,098 mm) than in potential evapotranspiration (109.4 mm).

**Table 2: Annual Total Precipitation and Potential Evapotranspiration for Wet and Dry Years**

Return Period (years)	Wet Years		Dry Years		
	Annual Total Precipitation (mm)	Annual Potential Evapotranspiration (mm)	Return Period (years)	Annual Total Precipitation (mm)	Annual Potential Evapotranspiration (mm)
100	2,166	429	2	1,617	478
25	2,030	440	10	1,315	510
10	1,920	450	25	1,204	523
2	1,617	478	100	1,068	539



### 2.2.3 Stream flow

Long-term historical flow records for creeks in the Project area are not available. Golder reviewed existing stream flow records (1966 to 2005) for Environment Canada’s Garnish River near Garnish, NL, hydrometric station located approximately 35 km north-northeast of the Project area to develop an estimate of runoff from the Project sites (Table 3). The available hydrometric information is for a relatively large watershed (205 km<sup>2</sup>) outside the Project area, and therefore, serves as only an approximation of runoff from the Project sites.

**Table 3: Distribution of Annual Surface Runoff**

Period	Runoff Depth (mm)	Runoff as Percent of Annual Total
January	122	8.7
February	110	7.8
March	146	10.4
April	191	13.7
May	131	9.4
June	80.1	5.7
July	59.8	4.3
August	58.8	4.2
September	89.4	6.4
October	127	9.1
November	138	9.9
December	146	10.5
Year	1,401	100

Source: Environment Canada

Mean monthly runoff depths range from 58.8 mm (August) to 191.3 mm (April), and the mean annual total is 1,401 mm. Stream flows 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). A comparison of mean annual runoff to mean annual precipitation indicates a runoff coefficient of 87%, suggesting that the Project area will exhibit high runoff productivity.

AMEC (2013) analyzed stream flow data recorded at the Garnish River near Garnish, NL, hydrometric station to estimate the annual baseflow component. The baseflow contribution to total annual runoff was estimated to be 50% in an average year. Baseflow includes groundwater discharge and water released from lakes, ponds, and bogs. In Newfoundland, baseflow is expected to include a significant amount of water released from bogs, particularly during wet periods (AMEC 2013).

Scott Wilson (2009) completed a regional analysis, based on historical flow records for four regional Environment Canada hydrometric stations, to develop flow duration curves for Salt Cove and Shoal Cove Brooks. The curves indicate perennial streams and the relatively flat sections show the influence of storage in lakes, ponds, and bogs during wet periods.



## 2.3 Hydrogeology

The Project area is predominantly underlain by metasedimentary rocks and rocks of granitic composition (St Lawrence Granite and fine-grained granitic porphyry, locally referred to as “rhyolite”), characterized by strong faulting and fracturing, covered in places by a thin layer of undifferentiated glacial till. The St Lawrence Granite (primarily found underlying the Salt Cove and Shoal Cove Watersheds) has little or no intrinsic permeability, but the fault and fracture zones that are sufficiently open and interconnected to give the granite a secondary permeability. Locally, the overlying glacial till can act as a shallow aquifer (B. Sparkes (CFI geologist) 2015, pers. comm.; Scott Wilson 2009).

The occurrence and movement of groundwater in the St. Lawrence Granite is controlled by the frequency and degree of interconnectivity of the faults. Thus groundwater tends to occur in areas where mineralisation also occurs, that is in discrete fracture sets. Such fractures tend to be linear in conformity with the principal direction of faulting. In the absence of pumping test data for the Project area, Scott Wilson (2009) conservatively assumed that the hydraulic conductivity of the St. Lawrence granite was within the range  $10^{-8}$  m/s to  $10^{-6}$  m/s and of the veins  $10^{-1}$  m/s to  $10^{-5}$  m/s.

Based on pumping tests conducted in 2014 at exploration boreholes in the AGS Vein (which is hosted by metasedimentary and porphyritic bedrock), the hydraulic conductivity of the bedrock ranges from  $10^{-7}$  m/s to  $10^{-6}$  m/s (Golder 2015a). While the faults present in the bedrock provide transmission paths and storage for groundwater, the storage of the bedrock itself will be low.

The thin and discontinuous overlying glacial till can locally constitute a shallow aquifer that also provides storage for groundwater. The hydraulic conductivity of the till was estimated at  $10^{-5}$  m/s to  $10^{-4}$  m/s (Scott Wilson 2009).

There is limited groundwater data available to define groundwater levels and flows with certainty. Based on field work conducted in 2014 under the Hydrogeology Phase 1 investigation (Golder 2015a), groundwater levels in monitoring wells in the vicinity of the AGS Vein were observed to be near ground surface. Insufficient data were collected to determine deep groundwater flow directions, and the working assumption is that shallow bedrock flow directions are the same as surface water flows. Based on a review of groundwater levels and surface water and groundwater hydrographs, Golder determined that there is a downward gradient from the shallow aquifer (glacial till) to the deeper aquifer (fractured bedrock) and that the shallow aquifer system is largely controlled by surface runoff and local recharge, which makes groundwater levels in this aquifer sensitive to dry periods.

Estimates of groundwater inflow rates into the open pits and the underground workings were developed by Golder using the Marinelli closed-form solution (Marinelli and Niccoli 2000) and the lower bound hydraulic conductivity of  $8E-07$  m/s obtained from the Hydrogeology Phase 1 investigation. The Marinelli solution is a steady-state flow analysis for estimating the groundwater inflow rate into an open pit and considers three factors: (1) the effect of decreased saturated thickness near the pit walls, (2) the distributed recharge of the water table, and (3) the upward flow through the bottom of the pit. By assuming that the underground workings can be approximated by an equivalent cylindrical well, the solution can also be used to estimate seepage for the underground workings. Groundwater inflow rates are summarized in Table 4 and should be considered high level order of magnitude estimates potentially subject to significant change as the future study work progresses.



**Table 4: Estimated Groundwater Inflow Rates<sup>a</sup>**

Facility	Seepage (m <sup>3</sup> /d)	Seepage (USGPM)
Open Cut Pit	357	65
Central Pit North	5,036	924
Central Pit South	2,003	368
Grebes Nest Pit	5,497	1,009
Underground Mine	8,634	1,584
Total	21,527	3,950

NOTES:

- a) Estimates updated using the lower bound hydraulic conductivity of 8E-07 m/s from limited in-situ testing (Golder 2015a)
- b) USGPM – US gallons per minute

## 2.4 Water Quality

Available background information relevant to water quality was taken from four primary sources:

1. Geochemistry Testing Report (Golder 2015b);
2. AGS Project Preliminary Water Quality Baseline Report (Golder 2015c);
3. Pre-Feasibility Study – Hydrological Aspects (Scott Wilson 2009); and
4. Phase 1 Hydrogeology Study (Golder 2015a).

The results were compared to NL Environmental Control Water and Sewage Regulations (EWSR) (2003) and Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life (CCME 2007) to identify potential parameters of concern. The results are summarized in the following subsections.

### Geochemistry

A preliminary geochemistry program was conducted to gain an initial understanding of the acid generation and metal leaching potential of the mine wastes and ore. Geochemical static test work was completed on: 10 waste rock, 2 ore, 2 Dense Media Separation (DMS) float and 2 tailings samples. The key findings are:

- Waste rock, ore, DMS float and combined tailings samples collected from the Project are considered to be non-acid generating based on the acid-base accounting (ABA) and non-acid generating (NAG) test results.
- The tailings sample with sulphide concentrate has an uncertain potential to generate acidic conditions based on ABA test results. However, this sample is considered non-acid generating based on the NAG tests. The tailings samples were collected from processing of low carbonate ore which only represents approximately 30% of ore. The tailings sample with sulphide concentrate is considered the worst case in terms of geochemical properties of the expected tailings. Since the majority of tailings will come from the high carbonate ore (approximately 70%) which has approximately 2 times the amount of carbonate (based on the ABA results of the high carbonate ore), the tailings are not expected to be acid generating. The tailings potential to generate acidic conditions will be assessed further as part of the Stage 2 geochemistry program which will include analysis of the high carbonate ore tailings (with and without sulphide concentrate) and mathematical mixing of the high and low carbonate tailings.





- Metal leaching from the waste rock, ore and DMS float does not appear to be an issue under neutral pH conditions; however, the tailings decant water had concentrations of fluoride, arsenic, copper, iron and lead greater than CCME criteria. In the shake flask extraction (SFE) results, fluoride concentrations were above CCME criteria in all samples while select metals (e.g., arsenic, chromium, copper, and lead) were above either CCME or EWSR criteria in at least one sample.

### *Existing Surface Water Quality*

In 1984 and 1985, surface water quality sampling was conducted throughout the Shoal Cove and Salt Cove watersheds. The surface water at that time can be characterized as slightly acidic to slightly alkaline, with pH values ranging from 6.2 to 8.5. Parameters that exceeded criteria in at least one sample included fluoride, aluminum, cadmium, copper, iron, lead and zinc.

Mining occurred in the Shoal Cove watershed between 1986 and 1990 with surface water quality samples collected between the Clarkes Pond inlet and the Shoal Cove Pond outlet. Parameters that exceeded criteria in at least one sample included fluoride, total suspended solids, iron, lead and zinc. Samples were not analyzed for aluminum, cadmium or copper concentrations. The same parameters, with the exception of total suspended solids and zinc and the addition of cadmium, exceeded criteria in at least one sample during sampling programs in 2009 (AMEC 2009) and 2014 (Golder 2015c).

Surface water quality samples in the Salt Cove watershed were also collected in 2009 and 2014. The water can be characterized as neutral to slightly acidic, with pH values ranging from 6.0 to 7.1. Parameters that exceeded criteria in at least one sample included fluoride, aluminum, cadmium, iron and lead.

In 2014, surface water quality sampling was conducted in the AGS watersheds. Surface water quality in the AGS watersheds can be summarized as having acidic pH values (5.0 to 6.2) and concentrations of fluoride, aluminum, iron and lead that exceeded criteria in at least one sample.

Surface water quality sampling was also conducted in 2014 at one reference location in the neighboring Little Lawn watershed, to represent background surface water quality not affected by historical or current mining activity. The pH value was slightly acidic (6.0) and parameters that exceeded criteria included aluminum and iron.

### *Existing Groundwater Quality*

A sample of mine water from the discharge at Director Mine was collected in 1941, and a pumped sample from Blue Beach Mine was collected in 1987. Samples were collected in 1995 and 1997 from various mine shafts and wells when the mines were not in operation. One spring sample and one mine shaft sample from the Blue Beach North Mine were also sampled in 2009 (Scott Wilson 2009).

Groundwater quality can be characterized as slightly acidic to slightly alkaline, with pH values ranging from 6.4 to 7.9, with the exception of a sample from the Director Mine shaft (11.3). Parameters that exceeded criteria in at least one sample included fluoride, aluminum, arsenic (in the Director Mine shaft), cadmium, copper, iron, lead, manganese, selenium (in the Director Mine shaft) and zinc.



## **3.0 PRELIMINARY WATER MANAGEMENT PLAN (CONSTRUCTION AND OPERATION)**

### **3.1 Design Objectives**

During the construction and operation phases, water management will focus on handling surface water and groundwater flows into the open pits, groundwater flows into the underground mine, and surface water runoff from the other Project facilities, as well as satisfying the Project's water requirements and environmental commitments.

Objectives for the water management strategy during these two Project phases include:

- Minimize the disturbance of natural watercourses and water bodies (including groundwater);
- Project discharges satisfy the requirements of the provincial *Environmental Control Water and Sewage Regulations, 2003* and/or meet baseline conditions; and
- A reliable supply of water, of acceptable quantity and quality, is available to meet Project water requirements.

### **3.2 Proposed Strategies**

To meet the design objectives, the following strategies were adopted in developing the preliminary water management plan for the construction and operation phases of the Project:

- Maintain existing flow regimes in the watersheds, where possible, to minimize the disturbance of natural watercourses and water bodies (including groundwater);
- Provide erosion and sediment control for runoff from disturbed areas to prevent off-site sediment transport into downstream watercourses and water bodies;
- Collect and manage contact water, water potentially affected by Project activities, separately from non-contact water, water not affected by Project activities;
- Reduce the requirement for fresh water make-up through the reuse and recycling of mine water, storm water and wastewater where feasible; and
- Divert clean surface water (non-contact water) from undisturbed areas around disturbed areas to minimize runoff over exposed erosion-prone areas, the generation of sediment, and the volumes of contact water.

### **3.3 System Elements**

The main elements of the preliminary water management plan for the AGS mine site and TMF site are outlined in the following sub-sections. Many of the basic design elements and criteria have been adopted from the Worley Parsons PFS surface water management plan (Worley Parsons 2015a) and TMF design report (Worley Parsons 2015b). The watershed and key water management system elements for the construction and operation phases are illustrated in Figure 2 (AGS Mine Site) and Figure 3 (TMF).



### **3.3.1 AGS Mine Site**

#### **Clean water diversion channels**

Diversion channels are proposed upslope of the overburden stockpile, the north dump, and the plant site at the AGS mine site to direct clean water around these facilities and into downstream natural drainage systems. The channels will be appropriately designed to minimize erosion and the transport of sediment loads.

#### **Erosion control measures**

Topsoil storage areas will be sloped and covered with erosion control blankets, or similar, such that runoff from stockpiles will not mobilize sediment loads. Interceptor ditching will be located downslope of each waste dump between the toe of the dump and the run-out control berm to capture runoff and direct it to a sedimentation pond (discussed below). The ditching will be put in place prior to stripping the area which underlies the dump. Dumps will be progressively reclaimed and erosion will be controlled by back-sloping the dump faces.

#### **Interceptor ditching**

Interceptor ditching will be provided downslope of Project facilities at the AGS mine site to collect runoff from disturbed areas during construction and operation. A minimum buffer will be maintained from existing watercourses, where ditching runs alongside these streams, to minimize adverse effects. The footprint around all surface infrastructure areas will be graded towards the interceptor ditching, which will convey flows by gravity to sedimentation ponds for treatment prior to reuse/recycling or discharge. Ditching is located downslope of the open pits, topsoil storage, haul roads, overburden stockpile, waste dumps and plant site.

Ditching will be constructed in bedrock and coarse colluvium without armouring. Ditching constructed in fine or mixed grained colluvium or till will be armoured with rock or coarse gravel. Channels will have side slopes appropriate to the material in which they are constructed. The maximum channel gradient will be limited through the use of check dams where necessary.

Sediment traps will be constructed in channels to capture coarse suspended sediments and bed loads. Traps will consist of an overflow weir constructed of well-graded, coarse durable rock fill. The traps will be located at appropriate intervals based on the design flow, channel gradient and the ease of removing sediment by excavation equipment.

#### **Mine sumps and pumping systems**

Surface runoff and/or groundwater inflows to the open pits and underground workings will be collected in sumps on the pit bottoms and in the underground mine, where debris and suspended solids will be separated out prior to pumping the water to the ground surface. The water will be directed to a sedimentation pond for final treatment prior to release to the environment.

#### **Sedimentation ponds**

Sedimentation ponds will be located close to and down-gradient of the source of sediments and within a short distance of the discharge point on a natural watercourse or water body. The ponds will be sited with consideration given to the proximity to access roads for maintenance and operation of the ponds.



A total of seven sedimentation ponds are proposed down-gradient of Project facilities:

- Plant site (SED\_01);
- Central Pit South and Grebes Nest Pit (SED\_02);
- North dump (SED\_03);
- Overburden stockpile (SED\_04 and SED\_05);
- Open Cut Pit and Central Pit North (SED\_06); and
- South dump (SED\_07).

The ponds will be designed to settle suspended solids without flocculation to meet the discharge criterion in the NL *Environmental Control Water and Sewage Regulations, 2003*.

### 3.3.2 TMF Site

#### Clean water diversion channels

At the TMF site, it is proposed to divert flows from Clarkes Pond around the facility, except for an environmental flow that will be maintained to sustain aquatic life in Clarkes Pond Brook. The diversion will be comprised of the following components and will be sized to convey flows in excess of approximately 50 litres per second (L/s) during a 100-year rainfall event:

- A concrete cut-off wall at the outlet of Clarkes Pond;
- A decant structure integrated into the retaining wall;
- A diversion channel to convey flow from the decant structure;
- Fish passage consisting of concrete box with a single submerged inlet and outlet orifices for creating hydraulic steps to slow the stream allowing fish to migrate freely between Clarkes Pond and Clarkes Pond Brook; and
- A surface channel upslope of the access road around the west side of Shoal Cove Pond.

Bedrock or armoured diversion channels will also be constructed upslope of perimeter access roads on the west and southeast sides of the TMF, to limit flows from the surrounding watershed into the facility. Runoff from the west side of the facility will share the same channel as the flows diverted from Clarkes Pond. Diversion weirs and a saddle dyke will also be incorporated into the access road on the southeast side of the TMF to divert two streams that currently have a terminus in Shoal Cove Pond. Diverted flows will re-enter Shoal Cove Pond Brook downstream of the TMF.

The TMF will be constructed in stages and the clean water diversions will be developed as part of the construction.



### Tailings pond

The tailings pond will be located at Shoal Cove Pond, where tailings were disposed of from the early 1930s to the late 1950s. An engineered TMF at this location would provide a greater level of environmental control than that which currently exists.

The tailings pond will be constructed as a valley impoundment to contain conventional tailings slurry. Natural containment will be formed against the hillside along the southeast side of the reservoir. An embankment will be constructed on the southwest side. The embankment will be constructed as a starter dam with subsequent raises in stages, depending on the mining schedule. The starter dam will be constructed with a crest height of 21 m (dam height of 6 m) and raised in 2 to 3 m lifts, as required, until the ultimate dam height is reached. The ultimate crest height is approximately 27 m (dam height of 12 m) (Worley Parsons 2015b). The starter dam has been designed to store approximately 0.5 Mm<sup>3</sup> of tailings solids. The ultimate dam will store approximately 2.0 Mm<sup>3</sup>. The embankment will be constructed to contain the tailings volume, together with allowances for the inflow design flood and freeboard.

Supernatant water in the tailings pond will be removed from the facility via a central decant tower and piped into the polishing pond located immediately downstream of the tailings pond embankment. A tailings beach will be created against the embankment to provide seepage control and maintain the surface pond remote from the embankment.

The existing Minworth Tailings facility is located adjacent to the northwestern limit of the currently proposed TMF footprint. The potential for interactions between the two facilities will be carefully considered and evaluated as part of next stage of engineering design for the TMF.

### Polishing pond

A polishing pond will be located directly south (downstream) of the tailings pond embankment, covering the southern tip of Shoal Cove Pond. Supernatant in the tailings pond will be discharged to the polishing pond for additional settling of suspended sediments with a contingency for flocculation before being released to the environment. The polishing pond will also collect seepage emerging to the surface under and through the tailings pond embankment. Water will be discharged from the polishing pond into the lower reach of Shoal Cove Pond Brook, provided that the water meets the requirements of the provincial *Environmental Control Water and Sewage Regulations, 2003* and/or baseline conditions.

## 3.4 Preliminary Flow Schematic

A preliminary flow schematic illustrating how water will be collected, moved, treated, discharged and used across the Project during mining operations has been prepared for the Project (Figure 4). Figure 4 shows the flows within each of the six Project watersheds, together with flows between the Project watersheds where these occur. The Project watersheds are defined in Figure 2 (AGS Mine site) and Figure 3 (TMF).

### Plant site watershed

Runoff from the plant site, the surface area in the southeast portion of the mine site, and sections of haul road will be collected in interceptor ditching and conveyed to sedimentation pond SED\_01. Water collecting in the pond will be retained to allow the settling out of suspended solids prior to discharge to the Upper Island Pond



watershed. Inflows to the pond may be augmented by direct precipitation on the pond surface, and there may be a small loss from the pond volume due to evaporation.

Process water inputs to the Mill will include the moisture in the ore, a supply of fresh (clean) water (for reagent mixing and gland water), and make-up water (to account for losses during ore processing). Water losses will consist of water leaving the Mill with the product, evaporation and spillage, and water in the tailings slurry being discharged to the TMF.

### **North dump watershed**

Runoff from the north dump will be intercepted by perimeter ditching and conveyed to sedimentation pond SED\_03. Direct precipitation on the pond surface may add to the pond volume, and there may be a small loss from the pond volume due to evaporation. Suspended solids in the water collecting in the pond will be settled out prior to its discharge to the Grebes Nest Pond watershed.

### **Overburden stockpile watershed**

Sedimentation ponds SED\_04 and SED\_05 will collect runoff from the overburden stockpile intercepted in perimeter ditching around the stockpile. Sedimentation pond SED\_05 will also receive runoff from the surface area in the northwest portion of the mine site collected in interceptor ditching. Inflows to the ponds may be augmented by direct precipitation on the pond surfaces, and there may be small evaporation losses from the pond volumes. Water will be retained in the ponds to settle out suspended solids and then discharged to a small creek in the Mine Cove watershed.

### **Mine site watershed**

As described above, runoff from surface areas in the southeast and northwest portions of the mine site will be conveyed to sedimentation ponds SED\_01 and SED\_05, respectively.

Runoff from the pit walls and groundwater inflows into the Central Pit South and Grebes Nest Pit will be pumped to sedimentation pond SED\_02. Runoff from surface area surrounding these two pits in the central portion of the mine site will be collected in interceptor ditches and conveyed by gravity to the pond. Water collecting in sedimentation pond SED\_02 will be treated for suspended solids and discharged to the creek upstream of John Fitzpatrick Pond in the Grebes Nest Pond watershed.

Similarly, runoff from the pit walls and groundwater inflows into the Open Cut Pit and Central Pit North will be pumped to sedimentation pond SED\_06. Runoff from the surface area surrounding these two pits in the western portion of the mine site will be collected in interceptor ditches and conveyed by gravity to the pond. Suspended solids in water collecting in sedimentation pond SED\_06 will be settled out, prior to discharge of the treated water to the Northwest Pond watershed.

Groundwater inflows into the underground workings will be pumped to sedimentation pond SED\_07, and eventually discharged to the Northwest Pond watershed.

Mine dewatering flows (runoff from the pit walls and/or groundwater inflows) have been distributed between the Project watersheds to minimize the disturbance of natural watercourses by Project discharges. This action, while expected to have an effect on Northwest Pond Brook, will limit the number of watersheds disturbed by Project discharges.



**South dump watershed**

Runoff from the south dump will be intercepted by ditching and conveyed to sediment pond SED\_07. Inflows to the pond will be augmented by pumped groundwater inflows from the underground workings. Direct precipitation on the pond surface may add to the pond volume, and there may be a small loss from the pond volume due to evaporation. Suspended solids in the water collecting in the pond will be settled out prior to its discharge to the Northwest Pond watershed.

**TMF watershed**

Water in the tailings slurry discharged from the mill will be pumped to the tailings pond. The tailings pond will also receive the environmental flow from Clarkes Pond, runoff from the northeast portion of the watershed that cannot be diverted away from the facility, and runoff generated within the facility. Losses in the tailings pond will consist of water retained in the deposited tailings, evaporation from the pond surface and wet tailings, and supernatant removed from the facility via a central decant tower and piped into the downstream polishing pond.

The polishing pond will receive the supernatant from the tailings pond, and runoff generated within the facility. There may be a small loss from the pond volume due to evaporation from the pond surface. Water will be retained in the polishing pond until its quality is suitable for discharge to Shoal Cove Brook.

The Project watersheds shown in Figure 2 (AGS Mine site) and Figure 3 (TMF) represent areas to be disturbed by the Project and are based on proposed water management infrastructure. The outlets of these watersheds represent discharge points from the Project site. Watershed areas, together with the composition of ground surface cover in each watershed, are provided in Table 5.

**Table 5: Project Watersheds**

Watershed	Watershed Area (ha)	Ground Surface Cover	
		Description	Percent of Watershed Area
Plant site	11.69	Prepared ground	100
		Pond surface	0
North Dump	22.26	Natural ground	7
		Prepared ground	2
		Waste rock	91
		Pond surface	0
Overburden Stockpile	17.00	Natural ground	24
		Prepared ground	2
		Waste rock	74
		Pond surface	0
Mine Site	84.83	Natural ground	58
		Prepared ground	11
		Topsoil storage	3
		Pit walls	28
		Pond surface	0



Watershed	Watershed Area (ha)	Ground Surface Cover	
		Description	Percent of Watershed Area
South Dump	44.87	Natural ground	43
		Prepared ground	1
		Waste rock	56
		Pond surface	0
Tailings Management Facility	108.30	Natural ground	34
		Dry tailings beach	12
		Wet tailings and pond surfaces	54
TOTAL	288.92	-	-

## 4.0 PRELIMINARY WATER MANAGEMENT PLAN (CLOSURE)

### 4.1 Design Objectives

During the closure phase of the Project, water management will focus on meeting water-related environmental commitments in a cost-effective manner. The overall design objectives for the preliminary water management strategy during this phase of the Project include:

- Establish conditions at the Project site comparable to those existing prior to development of the Project to extent feasible; and
- Reduce the requirements for long-term maintenance and monitoring by establishing the stability of disturbed areas as quickly as is practical.

### 4.2 Proposed Strategies

To meet the design objectives, the following strategies were adopted in developing the preliminary water management plan for closure:

- Restore disturbed areas to a stable and safe condition to minimize erosion and sediment transport to downstream watercourses and water bodies; and
- Restore pre-mining drainage patterns and conditions, where possible, by rehabilitating disturbed areas and removing water management infrastructure.

### 4.3 Closure Watersheds

Closure watersheds for the AGS Mine site are shown in Figure 5, and have been delineated based on the assumption that clean water diversions and interceptor ditching will be removed, and the overflow points identified in the crests of the four open pits.





Low points in the pit crests were identified by inspection of topographical data (2 m contour) provided by Worley Parsons, and bathymetry data (1 m contour) for Grebes Nest Pond presented in SEM (2014). The accuracy of these datasets is currently unknown and the locations of low points in the pit crests will need to be confirmed based on more detailed survey data. Based on these overflow points, Open Cut Pit will overflow to the southwest into the Northwest Pond watershed, and Central Pit North will overflow to the northwest into the Mine Cove watershed. The crest of Central Pit South will intersect the ground surface to the southeast in Grebes Nest Pond at a depth approximately 3 m below the pond surface, and Grebes Nest Pit will intersect the ground surface to the southwest at an elevation of approximately 5 m below the pond surface. Once flooded, it is expected that Central Pit South will overflow into Grebes Nest Pond and when both pits are flooded they will drain to the northeast towards John Fitzpatrick Pond.

Table 6 compares the existing and proposed closure watershed areas; existing watershed areas will be almost completely restored with the exception of the Northwest Pond watershed.

**Table 6: Existing and Proposed Closure Watershed Areas**

<b>Watershed</b>	<b>Pre-Mining Watershed Area (ha)</b>	<b>Closure Watershed Area (ha)</b>	<b>Percent Change</b>
Shoal Cove	379	379	0
Salt Cove	2,465	2,465	0
Grebes Nest Pond	507	510	0.5
Upper Island Pond	230	228	-0.9
Northwest Pond	38.0	22.2	-42
Mine Cove	163	178	9

## 4.4 Rehabilitation and Closure Measures

The following specific rehabilitation and closure measures are proposed to re-establish, as far as possible, pre-mining drainage patterns and conditions for the Project area.

### 4.4.1 AGS Mine Site

**Open pits and underground mine.** Flooding of the open pits and underground mine will commence at closure to ensure the chemical stability of the pit walls and underground workings. The area surrounding the pits within the perimeter haul road will be graded and re-vegetated. The ramp portal to the underground mine will be backfilled and air rises will be capped.

**Waste rock dumps.** The dumps will be progressively reclaimed over the mine life and erosion will be controlled by back-sloping the dump faces to 2H: 1V. Horizontal surfaces on the dumps will be re-graded to encourage drainage. Overburden will be applied to the dumps prior to re-vegetation.

**Processing plant.** Buildings will be demolished, and wastes sorted and disposed of appropriately. Building site areas will be re-graded to match surrounding grades and the surface capped with local soils and re-vegetated.



**Access and haul roads.** New roads constructed for the Project will be rehabilitated, including the removal of culverts, re-grading and re-vegetation of disturbed areas.

**Water management infrastructure.** Clean water diversions, interceptor ditching, and sedimentation ponds will be removed, re-graded and re-vegetated. Where necessary, berms will be constructed to direct the flow of water.

#### **4.4.2 TMF Site**

**Tailings pond.** Tailings consolidation and related strength gain are not expected to be sufficient at closure to breach the tailings embankment. A spillway will be left in place with the maximum water level in the pond controlled by setting the sill elevation below the dam crest level to provide sufficient freeboard for the design flow. The exterior slopes of the tailings dam will be covered with topsoil and vegetated, if required. A layer of soil will be spread over exposed tailings and a vegetative cover established. A permanent pond will be established within the vegetated rim. The sill level in the spillway will be set to encourage development of a stable wetland surrounding the pond.

Full flow from Clarkes Pond will be restored to Clarkes Pond Brook and allowed to flow through Shoal Cove Pond by removal of the Clarkes Pond diversion on the west side of the tailings pond, and the diversion weirs, diversion channel and saddle dyke on the southeast side of the facility.

**Polishing Pond.** The polishing pond located directly downstream of the tailings pond embankment will be reclaimed. The dam will be breached and the pond footprint re-graded and re-vegetated. A drainage channel through the footprint will be re-established to convey outflows from Shoal Cove Pond.

### **4.5 Preliminary Pit Flooding Assessment**

A preliminary pit flooding assessment was completed for the Project to estimate the approximate time required to flood the open pits. Flooding of the underground mine was not included in the assessment.

Watersheds contributing runoff to the open pits at closure were delineated based on the assumption that clean water diversions and interceptor ditching from the operations phase will be removed. The assessment considered runoff from the surface areas surrounding the pits, runoff from the pit walls and groundwater inflows into the pits under average hydrological conditions. Based on this preliminary assessment, it is expected to take 10 years or less for the open pits to flood.



## **5.0 PATH FORWARD**

Based on a review of the foregoing, a number of potential additional studies have been identified to augment the information collected to date. Early identification of issues is critical to meeting Project timelines, environmental outcomes and long-term Project sustainability. Based on a review of available background information and the preliminary water management planning activities completed, the following information will be gathered as the Project is developed.

### **5.1 Water Quality**

The following additional investigations and analysis will be completed to confirm the type of treatment, if any, is required for intercepted runoff from the Project site and mine dewatering flows prior to discharging to the environment.

#### **Phase II Geochemical test program**

The initial phase of geochemical testing discussed in Section 2.4 included a screening level assessment with static testing of a select number of samples to gain an initial understanding of the acid generating and metal leaching potential of the waste rock, ore and tailings. The Phase 2 program is currently being implemented, and is based on the updated mine plan. Phase 2 includes additional static testing of waste material (e.g., waste rock and overburden) to obtain appropriate spatial and compositional assessment as per MEND (2009). Phase 3 will consist of long-term geochemical leach testing (Kinetic Tests) conducted on a limited number of waste rock and tailings samples collected during the first two phases. The Phase 2 and Phase 3 programs are expected to confirm the findings from Phase I.

#### **Comprehensive water quality baseline sampling program**

A baseline surface water and groundwater quality sampling program is currently being implemented to provide information on existing water quality in those areas that could potentially be affected by development of the Project. Monitoring locations were selected to reflect the site development plan. The Project area includes water bodies and watercourses upstream and downstream of the Project that could potentially receive mine-related discharge and/or could be adversely affected by regional mine-related development. It also includes the sampling of eight wells in the vicinity of the AGS Mine Site and four wells around the tailings area.

The quarterly sampling frequency was selected to capture seasonal and annual surface water quality variability. Samples will be collected in the wet (May), dry (July/August and February), and transitional (October) seasons. Parameters are consistent with NL EWSR (2003) and CCME (2007) criteria.

#### **Predictive water quality modelling – mass balance**

The water balance will be refined based on the additional information gathered during the Phase 2 hydrogeological investigations (see Sections 5.2 and 5.3) and the surface water flow monitoring program (see Section 5.4). The refined water balance will then be incorporated into a predictive water quality model along with results from: the geochemical testing programs; the surface water quality baseline; and, the groundwater quality baseline (including sampling from the long duration pump test in the AGS Mine Area, see Section 5.2). The predictive model will provide future water quality estimates to assess the suitability of the following flow scenarios:



- Direct discharge from AGS Mine Area dewatering to ponds and/or watercourses;
- Use of existing mine water as process water at the Mill;
- Direct discharge or treatment of diverted runoff and seepage from overburden, waste rock and ore stockpiles; and
- Discharge of treated effluent to the selected watercourse.

### 5.2 Groundwater Inflows to Open Pits and Underground Mines

The initial phase of hydrogeological investigations discussed in Sections 2.3 and 2.4 was focused on gathering information on the following two mining concepts: shallow surface mining with the later development of an underground mine; or, an underground mine only. The Phase 2 hydrogeological investigations are currently being implemented, and focused on addressing the refined mining plan of three surface pits and an underground mine. As part of the Phase 2 investigations, the following tasks will be completed:

- Packer testing on three to four exploration boreholes in the vicinity of the future AGS Mine footwall, ore body and hanging wall rock masses;
- Construction of pumping well and observation wells, with various types of pumping tests taking place as wells are developed
- Four rounds of groundwater quality sampling during the pumping tests;
- Numerical modelling of extent of drawdown cone;
- Refine estimates of groundwater inflows to the AGS Mine Area; and
- Evaluation of potential effects on local lakes/ ponds/ stream flow surrounding mining operations.

### 5.3 Water Sources

Sources for supply of fresh water and process water will be supplied by wells or surface ponds. Groundwater quality and availability for the Mill operations from dewatering of the existing underground mines is being investigated as part of the Phase II hydrogeological investigations identified in Section 5.2. The following tasks will be completed as information from Phase 2 hydrogeological investigations becomes available:

- Identification and evaluation of alternatives
- Confirm the volume and quality of groundwater storage currently available;
- Water balance development and analysis of both surface water and groundwater, of process water supply options;
- Estimate future mine water quality (see Section 5.1); and
- Review of suitability of water from existing mine water and future mine dewatering for process use.



Staging of the process water supply will also be evaluated for the initial few years of mine life when dewatering flows are lower due to the smaller open pits and the later advancement of the underground mines.

## **5.4 Surface Runoff**

As a result of changes in natural watershed areas and Project discharges, changes to the flows in watercourses and into water bodies are expected during construction and operation. The following surface water monitoring programs are currently being implemented:

- Establish tipping bucket rain gauges and flow monitoring stations at strategically selected locations. Local flow monitoring will help to establish correlations with longer term regionally available flow data and local conditions. This will support refinement of the water balances and an improved understanding of low flow conditions necessary to support hydrogeological and water quality evaluations; and
- Survey of tributaries predicted to have a potentially significant change in flow to establish fluvial geomorphic baseline and evaluate need for mitigation measures.

## **6.0 CLOSING**

The Water Management Strategy document was prepared to support the engineering design and EA registration process for the Project. This document is focused on environmental considerations during construction, operation and closure, and complements the Pre-Feasibility Study (PFS) completed for the Project.

The preliminary water management planning concepts used in this document aim at addressing key water-related issues identified during the environmental assessment process. Additional studies have been identified to reduce areas of uncertainty in the data collected to date. This strategy document will evolve as the Project design and environmental evaluation progresses.



## Report Signature Page

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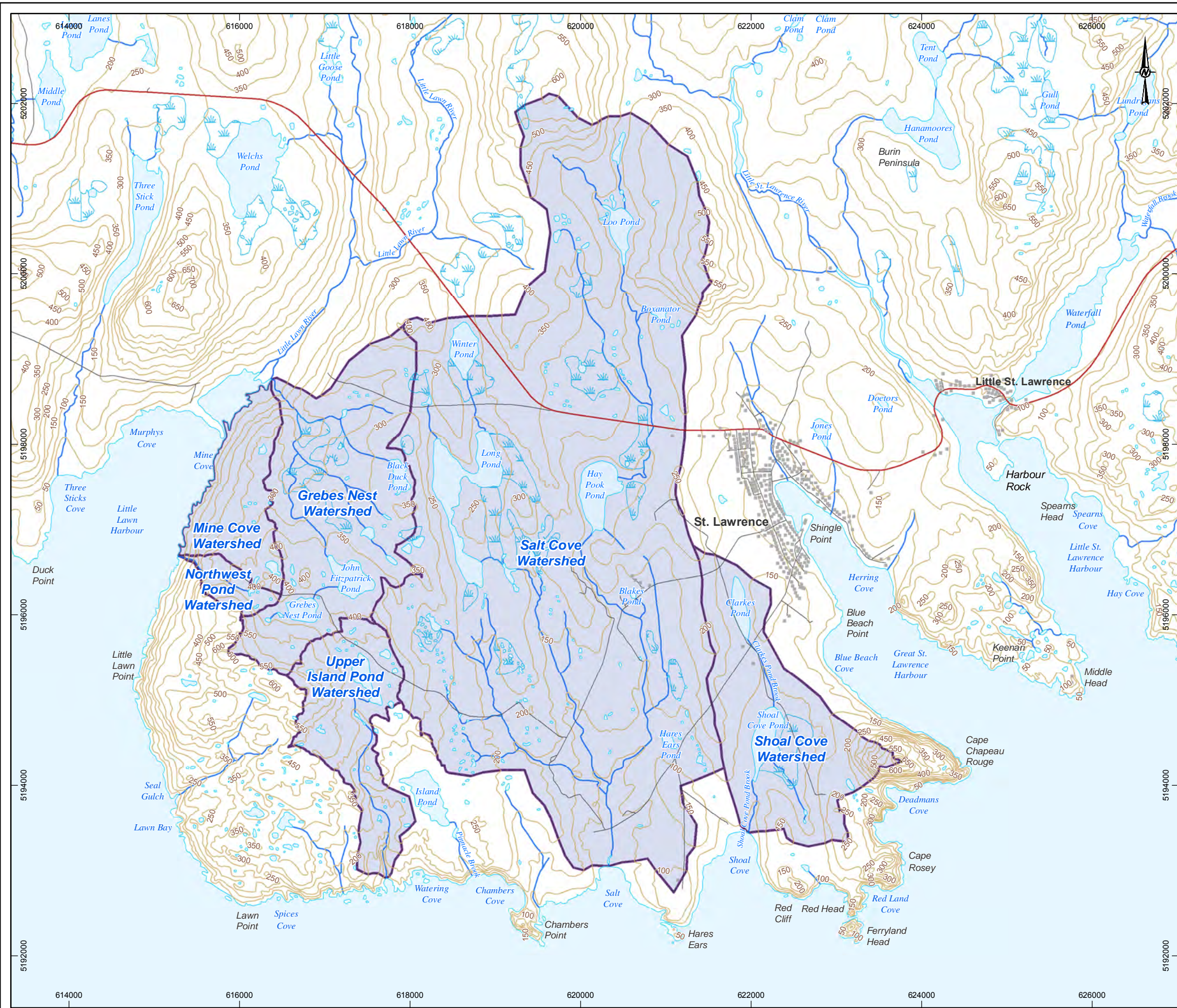
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**LEGEND**

**WATERSHED**

- Watershed Area

**TOPOGRAPHY**

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

**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.

DATUM: NAD 83. PROJECTION: UTM ZONE 21.

CLIENT

CANADA FLUORSPAR INC.

PROJECT

AGS MINE PROJECT, ST. LAWRENCE NL  
WATER MANAGEMENT PLAN

TITLE

**EXISTING WATERSHEDS**

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	DESIGN	CC
	GIS	ED
	REVIEW	DJM
	APPROVED	DJM

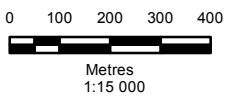
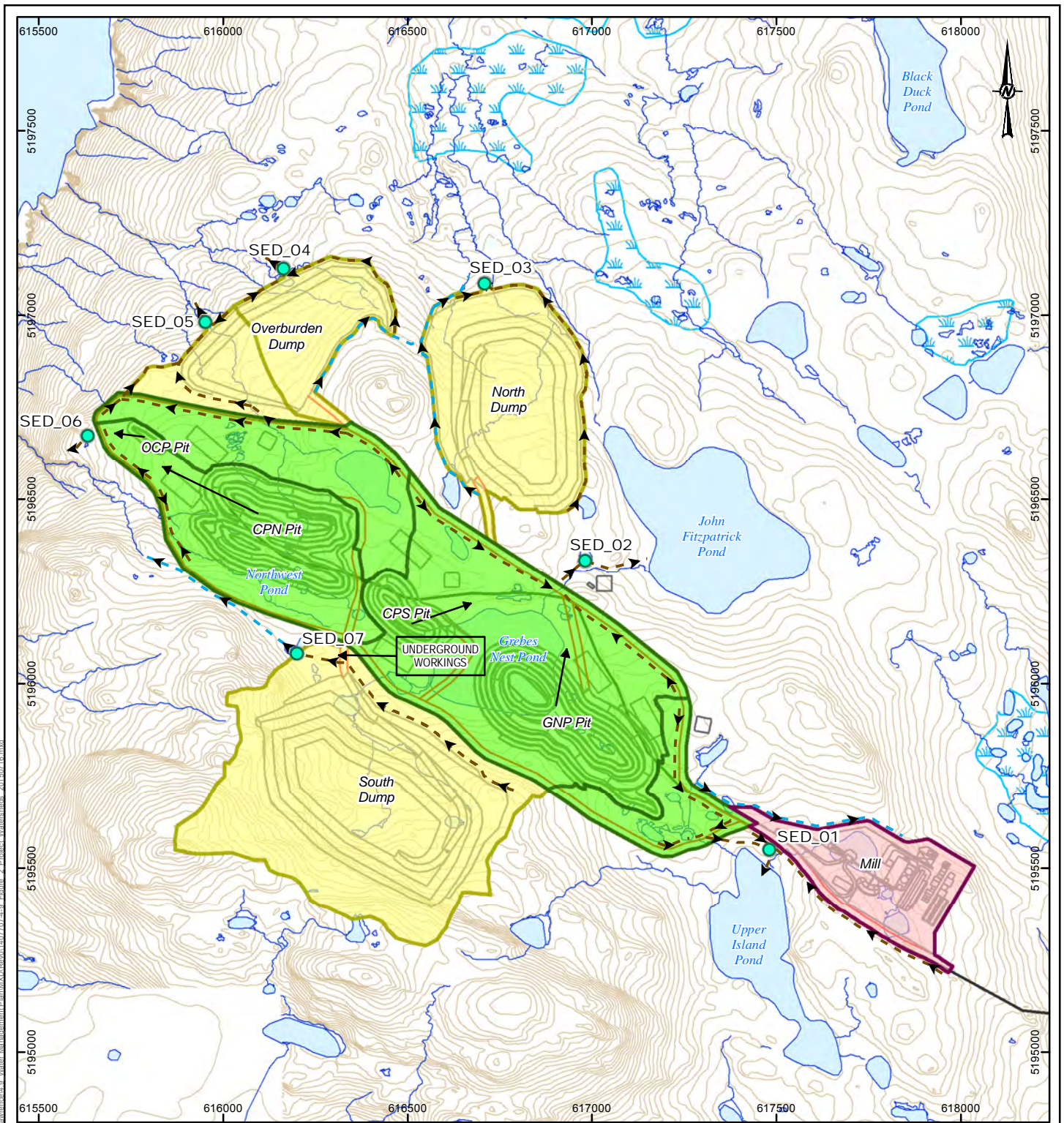
PROJECT No. 14-07707

Rev. 0

FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm





**LEGEND**

- Existing Road
- Proposed Road
- Project Footprint
- Contour Line
- Watercourse
- Waterbody
- Wetland
- Clean Water Diversions
- Interceptor Ditches
- Pumped Dewatering Flow Direction
- Sedimentation Pond
- Mine Site Watershed
- Plant Site Watershed
- Waste Dump Watershed
- Sedimentation Pond

**REFERENCE**

SOURCE(S): INFRASTRUCTURES AND TOPOGRAPHY: VARIOUS DRG, WORLEYPARSONS; CANVEC & CANVEC+, 1: 50 000 SCALE, NRCAN  
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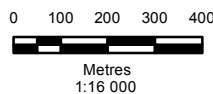
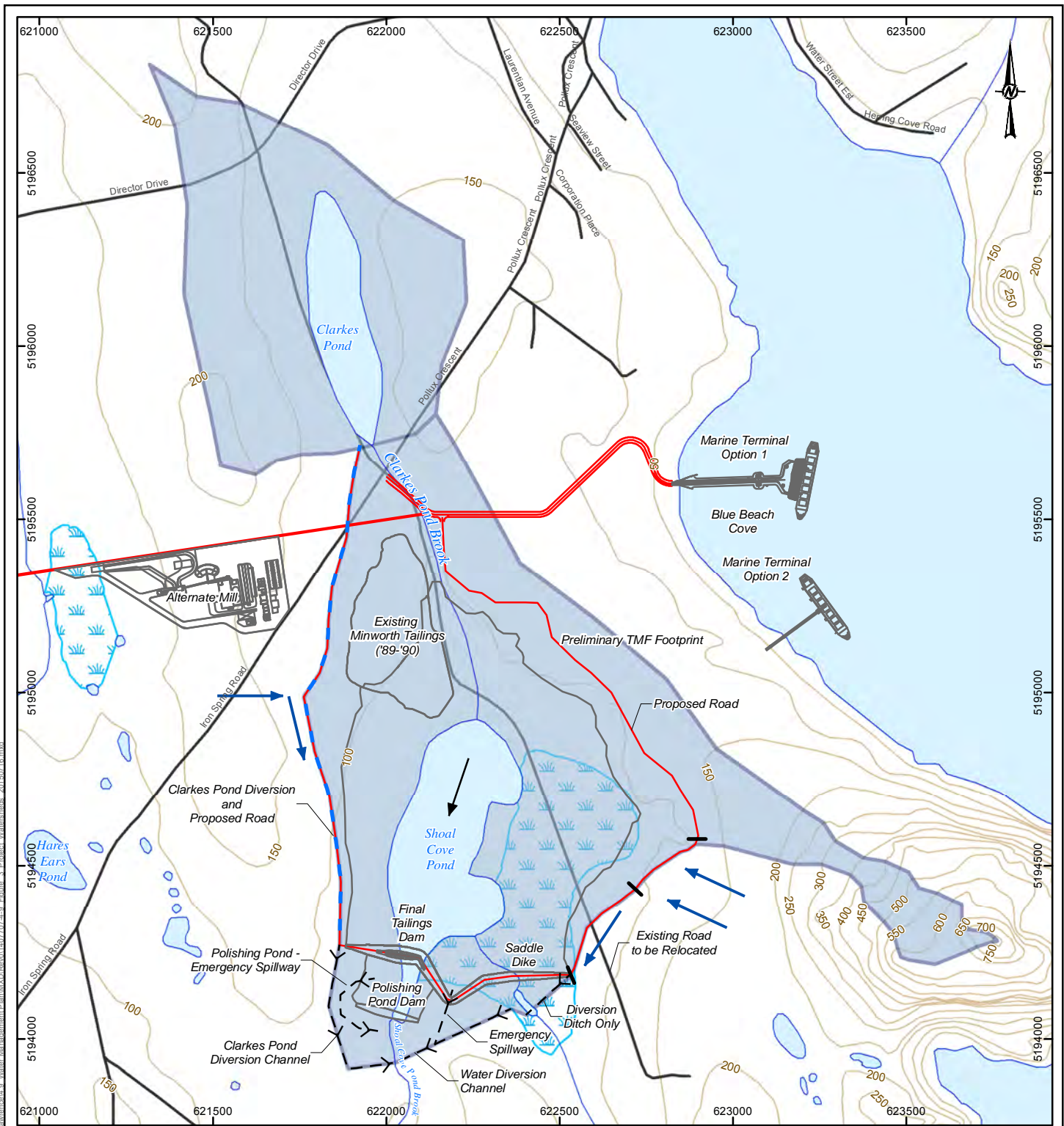
CLIENT  
**CANADA FLUORSPAR INC.**

PROJECT  
**AGS MINE PROJECT, ST. LAWRENCE NL  
 WATER MANAGEMENT PLAN**

TITLE  
**PROJECT WATERSHEDS, AGS MINE SITE**

CONSULTANT	YYYY-MM-DD	2015-07-16
	DESIGN	CC
	GIS	ED
	REVIEW	DJM
	APPROVED	DJM

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**LEGEND**

- Existing Road
- Proposed Road
- Project Footprint
- Water Diversion Direction
- Contour Line (interval: 50 ft/15.2m)
- Watercourse
- Waterbody
- Wetland
- Flow Direction
- TMF Watershed

**REFERENCE**

SOURCE(S): INFRASTRUCTURES: VARIOUS DRG, WORLEYPARSONS; CANVEC & CANVEC+, 1: 50 000  
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 PROJECTION: NAD 1983 UTM ZONE 21N

CLIENT  
**CANADA FLUORSPAR INC.**

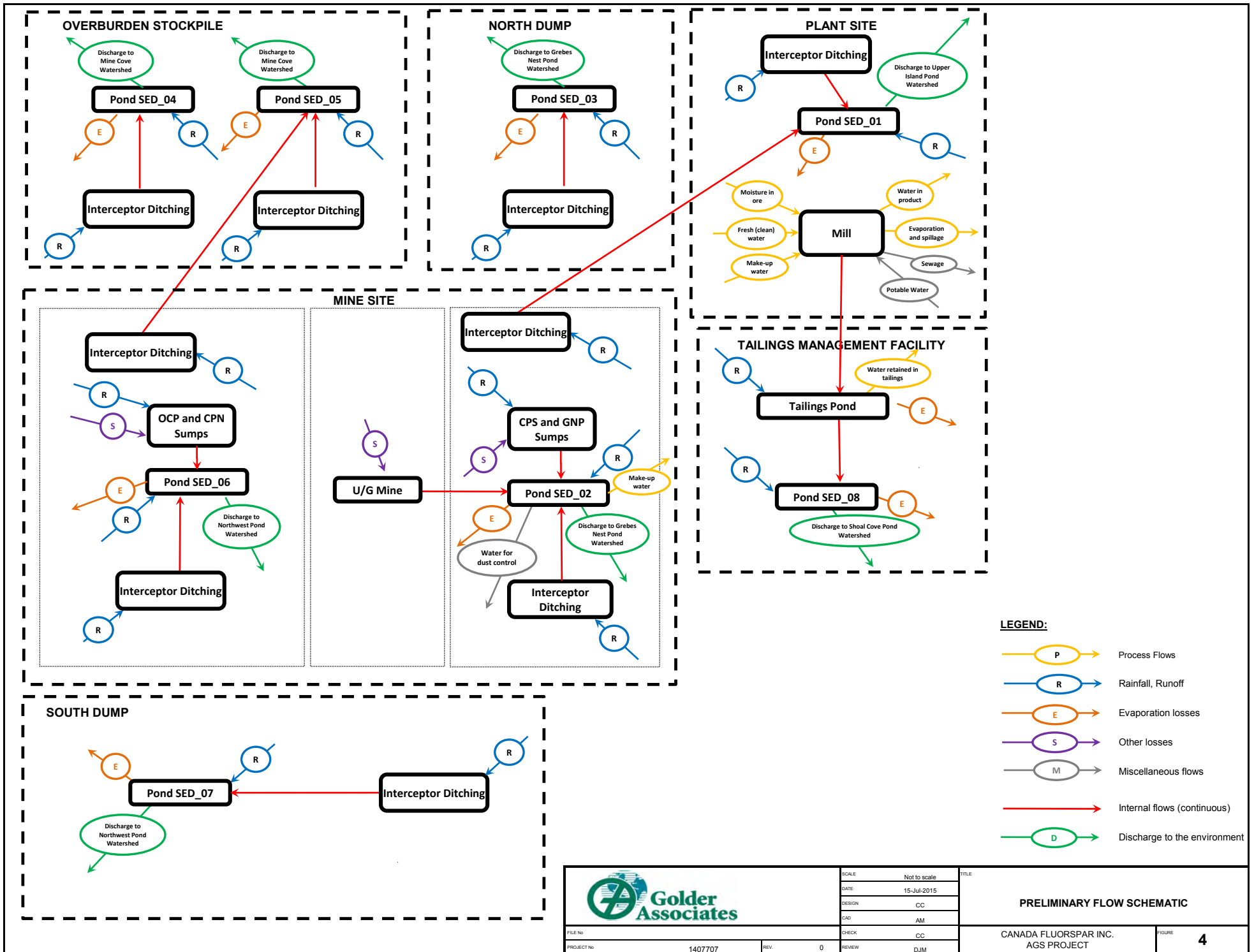
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 WATER MANAGEMENT PLAN**








TITLE  
**PROJECT WATERSHEDS, TMF**


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	DESIGN	CC
	GIS	ED
	REVIEW	DJM
	APPROVED	DJM

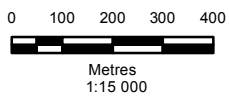
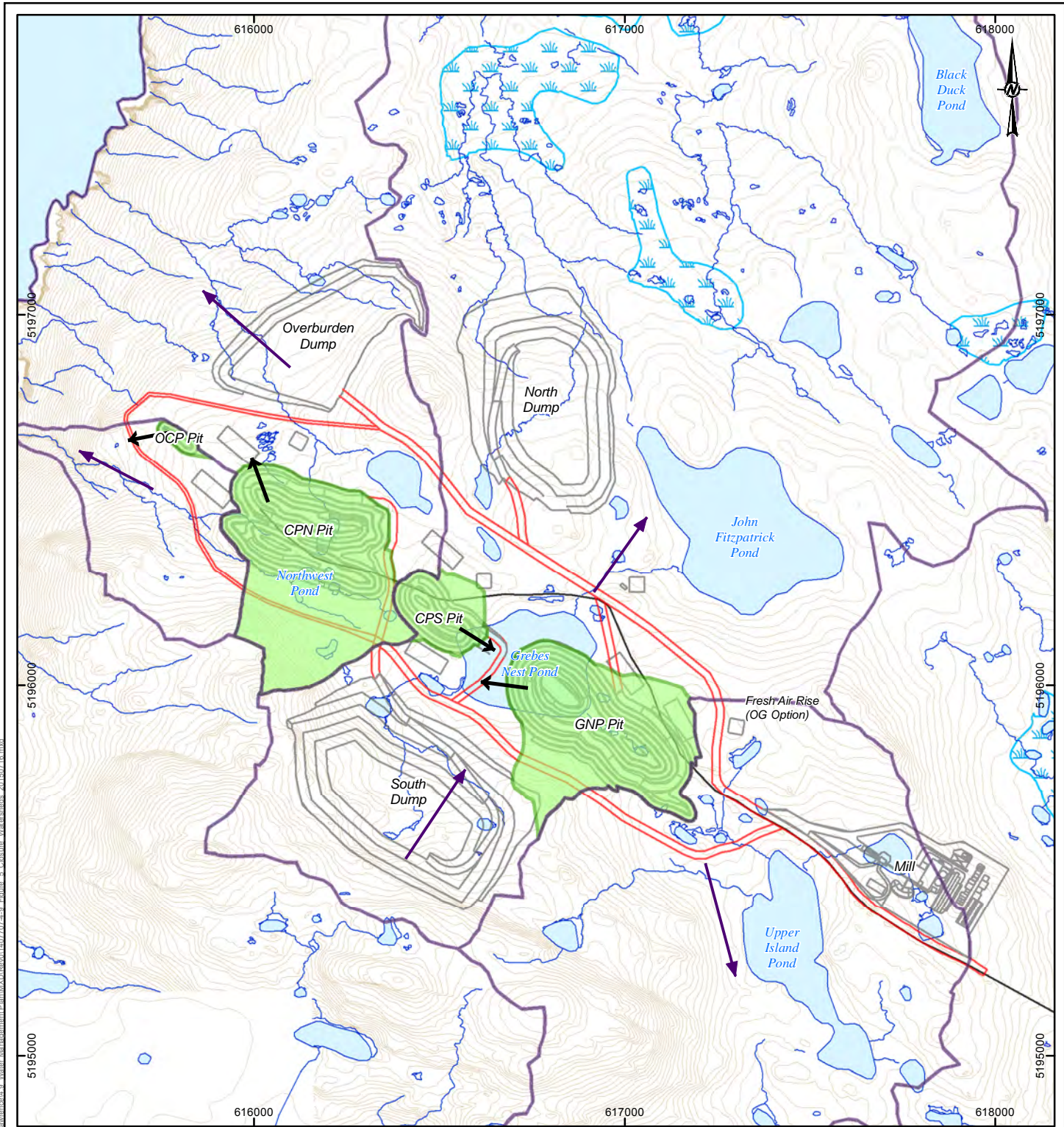
PROJECT	REV	FIGURE
14-07707	0	<b>3</b>

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- LEGEND:**
-  Process Flows
  -  Rainfall, Runoff
  -  Evaporation losses
  -  Other losses
  -  Miscellaneous flows
  -  Internal flows (continuous)
  -  Discharge to the environment

		SCALE	Not to scale	TITLE	PRELIMINARY FLOW SCHEMATIC
		DATE	15-Jul-2015		
FILE No		DESIGN	CC	CANADA FLUORSPAR INC. AGS PROJECT	FIGURE <b>4</b>
PROJECT No	1407707	CAD	AM		
		CHECK	CC		
		REVIEW	DJM		



**LEGEND**

- Existing Road
- Proposed Road
- Project Footprint
- Contour Line
- Watercourse
- Waterbody
- Wetland
- Flow Direction
- Pit Overflow
- Closure Watershed
- Pit Watershed

**REFERENCE**

SOURCE(S): INFRASTRUCTURES AND TOPOGRAPHY: VARIOUS DRG, WORLEYPARSONS; CANVEC & CANVEC+, 1: 50 000 SCALE, NRCAN  
 PROJECTION: NAD 1983 UTM ZONE 21N

CLIENT  
**CANADA FLUORSPAR INC.**

PROJECT  
**AGS MINE PROJECT, ST. LAWRENCE NL  
 WATER MANAGEMENT PLAN**

TITLE  
**CLOSURE WATERSHEDS**

CONSULTANT	YYYY-MM-DD	2015-07-16
	DESIGN	CC
	GIS	ED
	REVIEW	DJM
	APPROVED	DJM

PROJECT	REV	FIGURE
14-07707	0	<b>5</b>

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 Figure 5 - Closure Watersheds - 20150716.mxd

# APPENDIX D

## Phase 2 Hydrogeology Program



**DATE** July 14, 2015**REFERENCE No.** 1407707-0048 (Rev 0)**TO** Frank Pitman  
Canada Fluorspar Inc**CC** Phonce Cooper, Pierre Frechette, Sarah Butt**FROM** Michel Wawrzkow, P.Eng, P.Geo**EMAIL** michel\_wawrzkow@golder.com**SCOPE OF HYDROGEOLOGICAL WORK FOR CANADA FLUORSPAR INC'S PROPOSED AGS MINE SITE  
IN ST. LAWRENCE, NL**

Golder Associates Ltd proposes to perform a series of hydraulic tests at the proposed AGS mine site on behalf of Canada Fluorspar Inc (CFI). The purpose of the current technical memorandum is to provide the scope of work of the testing program, and describe the methodology.

## **1.0 FIELD AND LABORATORY PROGRAM**

### **1.1 General Description**

In general terms, the proposed work program includes:

- The drilling of two 150 mm diameter monitoring wells (MW-15-01 and MW-15-02) to a depth of about 100 m;
- The drilling of one 150 mm diameter pumping well (PW-15-01) to a depth of about 200 m, to be conducted in two stages: the first stage of drilling from surface to about 50 m depth followed by a 3-hour pumping test, and the second stage where drilling will be extended to the final depth of 200 m;
- A step pumping test in PW-15-01;
- A long term pumping test in PW-15-01; and,
- Packer testing.

The tasks listed above are described in greater detail in the next paragraphs.

### **1.2 Well Drilling**

The drilling of the boreholes would be done by a licensed water well driller with a downhole hammer direct rotary rig. The upper portion in the overburden and underlying unstable bedrock will be drilled in a nominal diameter of 250 mm to allow the installation of a nominal 150 mm I.D steel casing, equipped with a shoe bit, to prevent borehole collapsing. The annular space between the borehole and casing will be sealed with a cement-bentonite grout. The borehole will then be pursued at depth with the downhole hammer, in a nominal diameter of 150 mm, to the desired depth.



The stratigraphy of the borehole will be inferred from the rock cuttings and from the logs of the nearby mineral exploration boreholes. The water overflow caused by the airlift of the drilling operations will be intercepted and channeled to allow the measurement of the approximate well water yield. Measurements of flow will be done on a regular basis or whenever a significant change is noticed.

All three boreholes will be drilled with the same general specifications except for the depth which will be greater for the pumping well. Also the drilling sequence for PW-15-01 will be slightly different to allow the undertaking of a short pumping test after the first 50 m of drilling is completed and before completing the drilling operations.

All drilling will be carried out under the full-time supervision of a Golder site representative.

### **1.2.1 Well Development**

To remove drilling artifacts and improve hydraulic performance, the three wells will be developed by air-lift pumping until clear water is obtained.

Clear water is expected to be generally obtained after 1.5 or 2 hours of continuous air-lift pumping. During development, the pumping rate will also be monitored to determine the nominal pumping rate to be used for the step pumping test.

### **1.2.2 Pump Installation**

A stainless steel submersible pump will be temporarily installed for the purpose of the pumping tests.

A first installation will be done after the first 50 meters is drilled, with the pump intake located at a depth of about 40 m.

A second installation, to a nominal depth of 75 m, will be done once the pumping well is drilled down to its nominal depth of 200 m and properly developed. The pump will then be left in the well until the monitoring of the recovery period is completed.

The pump will be equipped with a foot valve, to prevent backflow of water after the end of the pumping.

### **1.2.3 Transducer Installation**

To monitor the evolution of the water level during the tests, pressure transducers (Level logger 10-m range and 30-m range) will be installed in the pumping well and in a total of four selected observation wells (the 2 vertical monitoring wells installed during the current work program and 2 existing and accessible mineral exploration holes). The transducers will be programmed for measurement intervals ranging between 30 seconds and 6 hours, and then lowered below (5 to 27 m) the static groundwater level, depending on the capacity of the level logger. All the level loggers will be recovered at the end of the recovery monitoring.

## **1.3 Pumping Tests**

The pumping tests will be conducted in three stages:

- Step test;
- Long-term constant-rate test; and,
- Recovery.

### **1.3.1 Step Test**

The objective of the step test is in part to verify the efficiency of the pumping well but it is mostly meant to prepare the long-term pumping test.

The step test would be constituted of three consecutive steps of about 60 to 90 minutes length each.

During the test, the pumping flow rates, as well as the water levels, will be monitored on a regular basis in the pumping well. In addition to the presence of water level transducers, as a backup, and in order to monitor the evolution of the pump test, manual measurements will be taken with an electric water level probe.

The flow rate could be measured by measuring the time required to fill a container of known volume at the discharge point, using a water level meter, a trapezoidal flume or using the pipe orifice method, depending on the flow rates to be measured and on the equipment available from the water well contractor.

### **1.3.2 Long-Term Constant –Rate Test**

Using the step test results, the long term constant pumping rate will be set with the aim at pumping during a nominal pumping period of 72 hours.

Once the pumping started, the flow rate will be adjusted whenever the difference between measured rate and target rate exceeds 10%.

Water levels measurements will be done at approximately one minute intervals by the level loggers and complemented by manual measurements, though at a lower frequency, in the monitoring wells not equipped with loggers. Manual water level measurements will also be done at monitoring wells equipped with loggers to provide backup data in case of technological failure.

Finally, the physico-chemical parameters (temperature, electrical conductivity) of the pumped water will be monitored on a regular basis using a multi-parameter probe. These water quality measurements will be complemented by the collection of three samples of the pumped water, respectively after 24, 48 and 72 hours after the start of the pumping, for analysis at a licensed laboratory for major anions/cations and metals. It is to be noted that a fourth water sample will be collected at the end of the first short term pumping test to be performed in the top 50 m of the pumping well. The samples will be put in appropriate containers provided by the laboratory and kept cold in coolers with ice until their delivery to the laboratory.

### **1.3.3 Recovery**

After the end of the 72-hours pumping test, the recovery of the water levels towards their pre-pumping, static levels will be monitored in the pumping and monitoring wells for a period of 24 hours.

## **1.4 Packer Testing**

The pumping tests described above will allow the assessment of the bedrock mass hydraulic properties. Whilst the zone of hydraulic influence developed during the testing will extend vertically beyond the 200 m planned depth of the pumping well, CFI requested additional information on the hydraulic properties of the bedrock at depths greater than 200 m. To that end, a targeted packer testing program in existing and accessible mineral exploration boreholes is proposed and described in greater detail in the following paragraphs.

Generally described, the testing program would consist of lowering a single packer testing set up using the drill rig into an existing (and accessible) mineral exploration borehole to a depth of about 200 m. The packers, once



inflated, would isolate the lower part of the borehole (i.e. deeper than 200m) and permeability testing would be conducted on that lower interval to assess the hydraulic conductivity (K) of bedrock.

If, as anticipated, the lower portion of the bedrock has low hydraulic conductivity, then the packer would be retrieved up to the top of the borehole and a second test would be conducted to test the full length of the borehole. If, on the other hand, the measured value of K for the lower interval is high, then the packer testing setup would be lowered at a greater depth (e.g. about 300 m) and another test would be conducted on this shortened and deeper isolated interval in an attempt to delineate the depth at which K would decrease.

At this stage, it is planned to test 3 to 4 boreholes depending on results, logistics and accessibility. As per information provided by CFI, the number of accessible mineral exploration boreholes is rather limited. CFI indicated that for the 2014 mineral exploration program, 12 boreholes might be accessible. CFI also indicated that for the 2015 mineral exploration program, 5 boreholes might be accessible. The selection of the boreholes to be tested will be based on location (spatial coverage to test the sectors of the three planned pits, proximity to planned underground infrastructure), geology (intersection by the boreholes of significant geological features) and accessibility, understanding that the limited number of accessible boreholes might limit the potential the optimally meet all the criteria.

## 1.5 Surveying and Water Level Measurements

The pumping well and monitoring wells to be installed as part of the current work program will be surveyed with appropriate precision.

In addition to the various water level measurements done during the course of the hydraulic testing program, a general water level survey will be conducted during the field work period to provide a “snapshot” of the water table position.

## 2.0 DELIVERABLES

The work program described below will be documented in five main deliverables:

- Technical specifications to assist CFI for their request for bids from the water well drillers;
- A factual technical report on the packer testing program. The report will describe the field work performed and the interpretation of the test data;
- A factual technical report on the pumping test program. The report will describe the field work performed and the interpretation of the test data;
- A numerical model that will provide an estimation of water inflow and the definition of the zone of hydraulic influence induced by the mine dewatering operations at various stages of mine development; and,
- An interpretation report describing the mining site conceptual and numerical hydrogeological model based on the phase 1 hydrogeological program results as well as those resulting from the two above listed factual reports.

The estimate of water inflow will also be compared to the historical anecdotal inflows to the former underground mines using the available information on the geometry of the openings. This comparison exercise is meant as verification for the order of magnitude inflow estimation.

We trust the information provided is satisfactory to your needs. If there are any questions or concerns please contact the undersigned.

Yours truly,

**Golder Associates Ltd.**



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