Cochrane Hill Gold Project

Project Description

Highway 7
Melrose, Nova Scotia

Atlantic Mining NS Corp.
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ATLANTICGOLD

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Glossary of Terms and Abbreviations

ACCDC	Atlantic Canada Conservation Data Centre
ARD	acid rock drainage
Argillite	highly compacted sedimentary or slightly metamorphosed rocks consisting primarily of particles of clay or silt
CEAA	Canadian Environmental Assessment Act or Agency
CLC	Community Liaison Committee
CO	carbon monoxide
CO_2	carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRM	Cultural Resource Management Group
CWS	Canadian Wildlife Service
dBA	decibel on the A-scale
DDV Gold	DDV Gold Limited (owned by Atlantic Gold Corporation)
DFO	Fisheries and Oceans Canada
Doré	a semi pure gold alloy cast in bars at the mine site
Drumlin	an elongated hill or ridge of glacial drift
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document
EIS	Environmental Impact Statement
IA	Industrial Approval
IR	Indian Reserve
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
LAA	Local Assessment Area
LGO	low grade ore
LNG	liquified natural gas
MEKS	Mi'kmaq Ecological Knowledge Study
MEL	McCallum Environmental Ltd
MDMER	Metal and Diamond Mining Effluent Regulations
MSC	Meteorological Service of Canada
NAAQS	National Ambient Air Quality Standard
NAPS	National Air Pollution Surveillance
NP	neutralization potential
NSDLF	Nova Scotia Department of Lands and Forestry (formerly Nova Scotia Department of Natural Resources [NSDNR])
NS	Nova Scotia
NSE	Nova Scotia Environment
NSESA	Nova Scotia Endangered Species Act
NSTIR	Nova Scotia Transportation and Infrastructure Renewal
NTS	National Topographic System
PA	Project Area
PM	particulate matter
POL	petroleum, oil, and lubricants

RAA	Regional Assessment Area
ROM	run-of-mine
SARA	Species at Risk Act (Canada)
S	Sulphur
SO_2	sulphur dioxide
tailings	mine waste consisting of ground rock and process effluents that are generated in a mine processing plant
till	glacial drift composed of an unconsolidated, heterogeneous mixture of clay, sand, pebbles, cobbles, and boulders.
TMF	Tailings Management Facility
TSP	total suspended particulates
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
WRSF	Waste Rock Storage Facility

Units of Measure

Gpt	grams per tonne
Ha	Hectare
kg	Kilogram
kl	Kiloliter
kV	Kilovolts
L	Litres
m	Metre
Ma	million years
masl	metres above sea level
mg	Milligrams
mm	Millimeter
Mm^3	million cubic metres
Mt	megatonne (1 million tonnes or 10^9 kg)
Mtpa	million tonnes per annum
MW	Megawatt
pH	logarithmic scale used to specify the acidity or basicity of an aqueous solution
ppm	parts per million
tpa	tonnes per annum
tpd	tonnes per day
µm	micron (1/1,000,000th of a metre)

1.0 General Information and Contacts

1.1 Nature of the Designated Project

The Cochrane Hill Gold Project (the Project) is contemplated to be developed in association with the currently operating Touquoy Mine. The Project is planned to be permitted and operated as a separate satellite surface mine operating at a production rate of approximately two million tonnes (Mt) of gold-bearing ore per year. Ore will be crushed and concentrated at the Project site to produce a gold concentrate which will be hauled by on-road highway trucks to the Touquoy Mine carbon-in-leach (CIL) processing facility for final processing into gold doré, a distance of just over 142 km on existing roads. This will eliminate the need for a separate CIL cyanide leach circuit at the Project site since the concentrate will be processed at the existing Touquoy Mine site. For further description of these projects see Section 2.6.

The planned start date for construction for the Project is May 2021 with a scheduled start-up for 2022. The mine will operate for six years to 2027 and will employ up to 220 persons including both salaried and hourly personnel. At the cessation of mining activities, the site will be reclaimed.

Changes to the Touquoy Mine as a result of the Project are anticipated to be minimal. Only minor changes to the existing processing facility at the Touquoy Mine site will be required, including the addition of concentrate storage and the addition of a second gravity concentrate leach reactor and a gravity electrowinning cell. With the exception of the concentrate storage, the additions to the gravity circuit can be accommodated within the existing process building footprint. There will be a small increase in the volume of tailings deposition into the existing mined out Touquoy pit as a result of concentrate from the Project site. Source term estimates for Cochrane Hill tailings supernatant will be used to update the Touquoy water quality model to predict potential changes in water quality in the Touquoy open pit as a result of the addition of tailings from processing of Cochrane Hill concentrate at the Touquoy Mine. This information will be used in support of an application to amend to the Touquoy Industrial Approval (IA) to accept processing of Cochrane Hill concentrate and disposal of tailings from Cochrane Hill concentrate to the Touquoy open pit. All other aspects of the Touquoy Mine will remain the same as previously assessed including the disturbed footprint, tailings management aspects and the size and locations of waste rock and ore stockpiles.

Operations at the Project site will include mining, crushing, concentration and operation of a waste rock storage facility (WRSF), low grade ore (LGO) stockpiles and tailings management facility (TMF). A gold concentrate will be produced at site and transported by C-train configured highway dump trucks to the Touquoy processing facility for final processing into gold doré. Tailings will be generated from mill processing at the Project site and deposited into an above ground TMF. Infrastructure will include crushing facilities, fine ore stockpile and reclaim, concentrator facilities, maintenance facilities, fuel storage, office infrastructure and site haul roads.

An existing 25kV line is located approximately 13 km to the east of the site at Cross Roads Country Harbour. This line will supply power to the Project via a 4 km upgrade of an existing single phase line, and construction of an additional 9 km of three phase line to extend the 25kV line to the plant site sub-station. The power will be stepped down to 4.16kV and distributed throughout the site from the sub-station. It is anticipated that clearing for powerline corridors will be minimal as the majority of the line will be constructed within the existing Melrose Country Harbour Road right-of-way.

Two process concentrate streams will be produced at the Project site, a gravity concentrate and a float concentrate. Both will be transported from the Project site to the Touquoy Mine site utilizing existing highways in conjunction with the Beaver Dam haul road thus requiring minimal upgrades to existing road infrastructure. Gold concentrate will be hauled south along

Highway 7 (97 km), through Sherbrooke to Sheet Harbour, and onto Highway 224 from Sheet Harbour to the Beaver Dam Cross Road (17 km). From there, the Beaver Dam haul route will be utilized for the remainder of the haul to the Touquoy Mine site (24 km). As a result of using existing road infrastructure, infrastructure previously upgraded for the Beaver Dam Project, and the very minor increase from Project haul truck traffic, impacts to plant, animal or Mi'kmaq land use and/or archaeological resources are not anticipated as a result of concentrate transport.

The majority of tailings will be stored in an approved above ground TMF located at the site. The containment dams will be constructed with rock aggregate material sourced from mine waste rock or nearby quarries with upstream impermeable membrane and seepage cut off constructed using local till material, if available

Final processing of gold concentrate will be undertaken at the Touquoy processing facility resulting in a minor quantity of additional tailings being deposited into the mined out Touquoy open pit. This allows the Touquoy Mine footprint to be maintained as currently permitted. The approved reclamation plan for the Touquoy Mine calls for the mined-out pit to be filled with water. At the end of processing at the Touquoy Mine, the remaining volume within the open pit would naturally fill with water and the deposited tailings will be stored under a water cap, creating a lake as per the approved plan for the reclaimed Touquoy pit, albeit slightly shallower. "Wet" disposal is recognized internationally as an accepted method of permanent tailings ARD management as opposed to "dry" storage. The Project will be reclaimed to a point that is safe, stable, consistent with the natural surroundings and in alignment with general community and Mi'kmaq wishes regarding final land use.

The Project Scope for the purposes of the assessment of potential environmental impacts of the Project includes the Project site, gold concentrate transportation route and the necessary components of the Touquoy Mine site to process the gold concentrate and manage the associated additional tailings. This Project Scope is shown in Figure 1-1.

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FIGURE 1-1

Cochrane Hill Project Scope

Guysborough County

Cochrane Hil PA
Touquoy Mine Site
Haul route

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 2.5 5 10 Kilometers

1:275,000 Scale when printed @ 11" x 17"

Drawn By: LP

Date: 2018-09-10

McCallum Environmental Ltd.

1.2 Proponent Information

1.2.1 Name of the Designated Project

The designated project will be known as the "Cochrane Hill Gold Project" (the Project).

1.2.2 Name and Address of the Proponent

Atlantic Mining NS Corp., the Proponent, is a wholly owned subsidiary of Atlantic Gold Corporation ("Atlantic Gold"). Atlantic Gold was formerly Spur Ventures Inc. which had been looking for suitable precious metals investment opportunities focusing on the Americas for approximately two and one-half years. Spur Ventures was made aware of Touquoy Mine Project and other assets that were controlled by an Australian listed company called Atlantic Gold NL. Upon completion of satisfactory due diligence, the two companies merged in August 2014 and Spur Ventures subsequently changed its name to Atlantic Gold Corporation. This acquisition gave Atlantic Gold access to the Project site and other properties and holdings in Nova Scotia. Diamond drilling on the Project site commenced in November 2016. Environmental data collection began at the Project site in Fall 2014.

Atlantic Mining NS Corp.

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1.2.3 Project Description Contact

The Project Description was produced by McCallum Environmental Ltd. under contract to the Proponent.

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1.3 Applicable Regulatory Framework

The Project will require Environmental Assessment (EA) approval from CEAA and Nova Scotia. The government of Nova Scotia employs a "One Window" process for reviewing, permitting and monitoring mine development projects in the province. This approach formalizes how government departments (including federal authorities) involved with mine development activities act collectively to streamline the review process for both government and industry.

The Project mining infrastructure is expected to encroach on waters frequented by fish. In the presence of impacts to recognized fish or fish habitat, authorization will be required from Fisheries and Oceans Canada (DFO) under Paragraph 35(2)(b) of the *Fisheries Act*. The Environmental Impact Statement (EIS) will address potential effects of the proposed Project footprint and activities on fish and fish habitat.

Migratory birds will be assessed through Canadian Wildlife Service (CWS) protocols and breeding birds point count methodology during appropriate breeding windows in the Project Area (PA) of the proposed Project. Breeding bird surveys will be performed on migratory birds, as defined in the *Migratory Birds Convention Act*, 1994. The EIS will address potential effects of the proposed Project and activities on migratory birds and their habitat.

The potential effects of the construction and operation of the Project on vegetation, aquatic life and wildlife and their habitat will be assessed as they relate to the *Species at a Risk Act*. The Project design has considered minimization of the Project footprint based on the existing knowledge of the site. Avoidance of certain habitats will mitigate the potential effects and protect species at risk to the extent feasible. The Environmental Impact Statement (EIS) will address potential effects of the proposed Project footprint and activities on species at risk and their habitats.

1.3.1 CEAA - Regulations Designating Physical Activities

The Project activity designated in the Schedule to the Regulations Designating Physical Activities (CEAA, 2012a) that may necessitate a federal environmental assessment for this Project is:

> *16(c) The construction, operation, decommissioning and abandonment of a new rare earth element mine or gold mine, other than a placer mine, with an ore production capacity of 600 t/day or more.*

This Project Description provides information on the Project components and potential environmental effects as described in Prescribed Information for a Description of a Designated Project Regulations (CEAA, 2012b). Further, the content of this document conforms to the "Guide to Preparing a Description of a Designated Project under CEAA 2012" (CEAA, March 2015).

1.3.2 List of Permits, Licenses and other Authorizations

Federal and provincial environmental acts and regulations apply to the Project regarding the design, site preparation, construction, operation, and reclamation of the proposed mine. In addition to the environmental legislation, other acts and regulations relating to labour standards, mining practices, and other phases are applicable to the Project. The Proponent is aware of the applicable acts and regulations that pertain to the proposed undertaking and the Proponent's project team have the demonstrated experience and ability to prepare the necessary information and design plans to obtain the required permits and approvals, as well as having shown the ability to operate within the requirements of such acts and regulations at the Touquoy Mine and other previously completed surface mining projects in first world jurisdictions. The following

provides a listing of some pertinent acts that may be applicable for the undertaking and/or were considered in the preparation of Project Description. Further reference will be made to specific legislation in the EIS/EARD.

Federal Legislation

- *Canada Wildlife Act* and Regulations
- *Canadian Environmental Assessment Act* and Regulations
- *Canadian Environmental Protection Act* and Regulations
- *Fisheries Act* and Regulations, including Metal and Diamond Mining Effluent Regulations
- *Migratory Birds Convention Act* and Regulations
- *Transportation of Dangerous Goods Act* and Regulations
- *Species at Risk Act*
- *General Nuclear Safety and Control Act* and Regulations

Based upon the absence of any designations of local waterways, no permit for navigable waters is anticipated to be required for the Project under the current *Navigation Protection Act*. The federal government recently proposed changes to these regulations and a Proposed Canadian Navigable Waters Act that would replace the *Navigation Protection Act* is under review and is expected to come into effect as early as June 2019. There is potential that, under this new regulation, waterways within the PA could require permitting. Further consultation with Transport Canada will be required as more information on the new act becomes available.

Explosives will be supplied by a blasting contractor and all permits related to the storage and use of explosives related to the Project will be obtained by the selected contractor though Natural Resources Canada. Blasting operations will be undertaken by qualified blasters and the supply and delivery of explosives by a contract explosives supplier. The requirement to store explosives on-site will depend upon the selected supplier, quantities and transport distance. Should the decision be made to store explosives on-site then the appropriate permitting through Natural Resources Canada will be undertaken for this Project. Nuclear density gauges will be used in the mill and therefore a license will be required under the *General Nuclear Safety and Control Act* and Regulations.

Provincial Legislation

- *Environment Act* and Regulations
- *Dangerous Goods Transportation Act* and Regulations
- *Endangered Species Act* and Regulations
- Labour Standards Code
- *Mineral Resources Act* and Regulations
- *Crown Lands Act* and Regulations
- *Occupational Health and Safety Act* and Regulations
- *Wildlife Act* and Regulations

The Proponent will follow provincial processes for watercourse and wetland permitting and standard mitigation methods (both Nova Scotia Environment (NSE) and DFO) will be adhered to for watercourse alteration, culvert installation and wetland alteration. Culvert installations will be completed in accordance with Nova Scotia Watercourse Alteration Standard (NSE 2015) and DFO Guidelines for the Design of Fish Passage for Culverts in Nova Scotia (DFO February 2015). Internal mine site roads will be designed and constructed to minimize impact on the environment, the new road sections will be aligned at 90 degrees to the watercourse channel at the crossing location wherever possible.

During the design process, the Proponent will work to avoid wetland habitat where practical across the Project. Where avoidance is not feasible, wetland alteration permitting will be completed to support the mine development.

NSE will require an Industrial Approval (IA) to construct, operate, reclaim and abandon the mine; a Water Approval to withdraw surface and/or groundwater for mining operations; and a Wetlands or Watercourse Alteration Approval to alter waterbodies and/or wetlands within the mine development. All approvals are as described under the Activities Designation Regulations (*Nova Scotia Environment Act*, 2014) as follows:

Industrial Approval: An IA defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring plans. An IA application will be made by the Proponent when EA approval is received. An application for an amendment to the Touquoy IA will also be made to allow for the acceptance and processing of Cochrane Hill concentrate and disposal of the associated minor volumes of tailings in the Touquoy open pit.

Water Withdrawal Approval: This approval will be required prior to withdrawing groundwater or surface water to support mine development at a rate greater than 23,000L/day.

Wetlands Alteration Approval: This approval will be required prior to altering any wetlands in the PA. The approval application will include a functional assessment of the wetlands in question and a compensation plan.

Watercourse Alteration Approval: This approval will be required prior to altering any watercourse in the Project. The approval application will include a detailed assessment of the watercourses in question and a description of fish habitat and a fisheries off-setting plan should one be required.

1.3.3 Description of Potential Changes in Review of Various Federal Acts

The *Fisheries Act* protects the sustainability and productivity of recreational, commercial and Aboriginal fisheries. The distribution of fish in the PA watercourses is ongoing in 2018. It is expected that the Project will require DFO authorization and offsetting under the Fisheries Act. The Proponent will follow standard mitigation practices, in consultation with DFO, which could include fish capture and safe rescue from the area to be impacted, and compensation with the creation of new habitat to offset that which is disturbed. The potential for residual effects to fish, fish habitat, and aquatic resources from the Project more broadly will be based upon impacts of the Project to surface water quantity and quality. The Proponent will follow provincial processes for watercourse and wetland permitting and standard mitigation methods (both NSE and DFO) will be adhered to for watercourse alteration, culvert installation and wetland alteration. Provincial wetland alteration permitting may also trigger DFO "serious harm to fish" authorization if wetland habitat proposed for alteration is evaluated to be fish habitat and if impacts to those wetland(s) are considered significant.

The *Migratory Birds Convention Act* protects migratory bird species. The potential effects related to migratory birds that are associated with the construction and operation phases of the Project are:

- Direct loss of habitat for birds due to clearing and grubbing of the open pit, TMF, processing plant, administration area, stockpile(s), and waste rock storage areas;
- Destruction or displacement of birds in areas of excavation and stockpiling of mined materials;
- Increase in dust levels from heavy machinery operation and a general increase in vehicular activity, amongst other things, may affect vegetative growth and indirectly cause a decrease in prey populations;
- Bird injury and mortality from vehicle collisions and entrapment (i.e. in the open pit);
- Disturbance resulting from reduced habitat, anthropogenic noise, dust and vibrations;
- Attraction and disorientation resulting from night-lighting; and,
- Other effects.

More details on migratory birds can be found in this report.

The *Species at Risk Act* protects wildlife species from becoming extinct through prohibitions against killing, harming, harassing, capturing or taking species-at-risk, and against destroying their critical habitats. More information on the baseline condition and potential impact to species at risk can be found in this report.

1.4 Jurisdictions and Parties Consulted

The following jurisdictions and parties have been consulted during the preparation of this Project Description:

Government

The Government of Canada

- Environment and Climate Change Canada
- The Canadian Environmental Assessment Agency
- Fisheries and Oceans Canada
- Natural Resources Canada
- Transport Canada

The Province of Nova Scotia

- Premier's Office
- Environment (Environmental Assessment, Wetlands, Protected Areas)
- Lands and Forestry (Crown Lands, Wildlife, Forestry)
- Energy and Mines
- Labour and Advanced Education (Health and Safety - Technical Services)
- Transportation and Infrastructure Renewal
- Office of Aboriginal Affairs

- Finance (Statistics)

The Municipality of the District of St. Mary's

- Council

First Nations

- Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)
- Assembly of Nova Scotia Mi'kmaq Chiefs
- Sipekne'katik First Nation
- Millbrook First Nation
- Native Council of Nova Scotia

1.5 Subject to Other Jurisdictions

The Project requires a Class 1 environmental assessment under Nova Scotia provincial legislation. The designated project is not subject to environmental assessment and/or regulatory requirement of any other jurisdiction other than the permits required from the government bodies listed above.

1.6 Other Environmental Studies

A review of CEAA and NS EA Projects database indicates that no regional environmental studies have been undertaken or are currently being conducted for the region or in the vicinity of the designated project within the spatial confines of the databases. The studies that have been completed for review closest to the proposed project site include: Touquoy Mine - 80 km (2008); Cooks Brook Sand and Gravel Pit – 106 km (2013), ScoZinc Operations Southwest Mine Expansion - 110 km (2011), Goldboro LNG Plant – 35 km (2014), Loch Katrine Quarry Expansion- 20 km (2016), and Beaver Dam Mine – 60 km (2017). Of these projects, only Beaver Dam Mine include the Project site in their regional context.

Beaver Dam Mine Project considers the Project site in its cumulative effects assessment. No adverse cumulative effects were predicted.

No relevant regional studies of environmental effects from other projects are available.

1.7 Federal Funding and Lands

No federal funding will be sought or has been received for this Project.

Changes to the environment are not expected to occur, as a result of carrying out the Project, on federal lands, in a province other than the province in which the Project is proposed to be carried out, or outside of Canada. No federal lands will be used to undertake this project.

The Project is located within central Nova Scotia, a distance of over 180 km from the nearest provincial boundary - New Brunswick. The site is over 400 km from the United States (Maine border). All distances referenced in this section are based on straight line measurements.

Cape Breton Highlands National Park is the closest national park approximately 170 km from the Project site. The closest national historic site is the Grassy Island Fort National Historic Site which is located approximately 77 km from the Project

site. The two closest Mi'kmaq communities are the satellite community to the Millbrook First Nation of Sheet Harbour and the Paqntkek First Nation of Paqtnkek-niktuek. These two Indian Reserves (Sheet Harbour IR 36, Paqtnkek-niktuek IR 23) are located approximately 54 km and 39 km (straight line measurement) respectively from the Project site.

Expected impacts from the site activities include localized noise and light, localized air quality impacts from vehicle use and roads and land disturbance and potential impact to wildlife and aquatic habitat that will be described elsewhere in this document. All of these valued components (VCs) have been and will continue to be evaluated for effects within the PA, Local Assessment Area (LAA) or Regional Assessment Area (RAA), depending on the nature of each VC. None of the VCs evaluated within the PA or LAA are expected to extend to the federal lands described above. Air quality and Mi'kmaq considerations are expected to be evaluated at the RAA level and overlap with federal lands (Sheet Harbour and Paqtnkek-niktuek IRs) is possible.

2.0 Project Information

2.1 General Description

The Project will comprise the development, operation, closure and reclamation of a surface gold mine near Melrose, Nova Scotia. This will consist of the development of an open pit mine, milling facilities (e.g. primary crusher and concentrator), WRSF, TMF, mine haul roads and associated mine infrastructure (e.g. maintenance facilities, local supply systems, explosive storage, fuel storage and mine offices). Associated with development of the Project will be additional gold production output from the existing processing facility at the Touquoy Mine site which will process concentrate from the Project mine and include deposition of a minor amount of concentrate tails into the exhausted Touquoy pit.

The total infrastructure footprint of the Project is approximately 241 hectares (ha) as detailed below. The PA for the purpose of the environmental assessment is the infrastructure footprint plus an associated buffer. Upgrades to existing on-site road infrastructure, such as minor widening, improving the road base, ditching and other potential improvements will also occur. Project components with respective areas are provided below:

i. Ore extraction area (open pit) (28 ha);
ii. Materials storage (waste rock, till/overburden, low grade ore) (70 ha);
iii. Crusher and concentrator facilities (12 ha);
iv. Site infrastructure (6 ha);
v. TMF (105 ha);
vi. Mine site haul roads (15 ha); and
vii. Access roads (5 ha).

At closure, all facilities will be removed, disturbed lands rehabilitated, and the property returned to otherwise functional use according to approved reclamation plans, accepted practices at the time of closure, and in accordance with the general wishes of the community and Mi'kmaq regarding final land use. Figure 2-1 shows the location of the Project in relation to surrounding features.

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FIGURE 2-1

Cochrane Hill Mine Location and Surrounding Area

Melrose, NS
Guysborough County

- Closest Residences
- Trans-Canada Highway
- 100-Series Highway
- Trunk / Arterial
- Collector
- Local
- Game Sanctuary
- Indian Reserve
- National Park or Adjunct
- National Wildlife Area
- Nature Reserve
- Wilderness Area
- Provincial Park
- To Be Determined (PAPA plan site)
- Land Trust or Easement
- Cochrane Hill PA

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 5 10 20 Km

1:350,000 Scale when printed @ 11" x 17"

Drawn By: LP Date: 2018-09-27

McCallum Environmental Ltd.

2.2 Design Standards

The design of the Project is based on nationally and provincially accepted design standards and criteria. The Project will be constructed and operated in accordance with all applicable legislation for mining and construction projects in Nova Scotia. All construction activities will be completed under the supervision of qualified staff with the appropriate credentials for work in Nova Scotia.

Social and environmental concerns have been carefully considered in the planning and preliminary design of the Project. These are described, herein, as potential effects on Valued Components (VC's). To support this assessment, additional information sources pertinent to the review of mining projects were consulted.

2.3 Project Components and Activities

2.3.1 Geology and Mineralization

Nova Scotia can be divided into two distinct metallogenic terranes; the Avalon Terrane to the north and the Meguma Terrane to the south. These two terranes developed independently until they were juxtaposed along the Cobequid-Chedabucto Fault Zone during the mid-Devonian Acadian Orogeny.

The gold deposits in Nova Scotia are contained within the Meguma Supergroup which is divided into, the basal greywacke dominated Goldenville Group (5,600 m thick) and the overlying, finer grained, argillite dominated Halifax Group (4,400 m). These sediments were uplifted and deformed into a series of tightly folded subparallel northeast trending anticlines and synclines during the Acadian Orogeny. The Cochrane Hill property encompasses a section of the northeast-trending Cochrane Hill anticline which can be traced for at least 28 km from a position approximately 14 km west of the Cochrane Hill deposit, to approximately 12 km east of the Cochrane Hill deposit. The Cochrane Hill anticline is a tight to isoclinal fold in the vicinity of the Cochrane Hill deposit, overturned with both limbs dipping to the north at between 55° and 80°.

The Goldenville Group comprises, from oldest to youngest:

- Moose River Formation;
- Tangier Formation; and
- Taylors Head Formation.

The deposit is hosted in an interbedded argillite and greywacke sequence which may either represent sediments of the Moose River Formation or the Tangier Formation of the Goldenville Group.

Lithologies in the area have been metamorphosed to amphibolite (staurolite) metamorphic grade, coinciding with the development of biotite schists from argillite protoliths and the formation of porphyroblastic textures. Mineralization is in the form of a tabular zone of parallel, planar quartz veins in a well-bedded argillite and greywacke protolith. The mineralization dips steeply to the north at approximately 70° and is parallel to bedding in the southern limb of the Cochrane Hill anticline.

Gold mineralization occurs over true widths of up to 60 m to 70 m, within which, higher grade material (e.g., >0.8 g/t Au) is persistent over true widths varying from 5 m to 30 m. The foot wall contact with respect to gold mineralization is relatively sharp in terms of grade cut-off but the hanging wall contact is less defined, with an erratic distribution of weakly anomalous grades and occasional >1 g/t Au grades. The mineralization has been defined over a strike length of 1,500 m and down to a vertical depth of 250 m.

Gold mineralization occurs within quartz veins and within biotite schist (after argillite) and metagreywacke host rock. Mineralization is associated with sulphides, including arsenopyrite, pyrite and pyrrhotite and lesser galena and sphalerite. There appears to be very little disruption of the mineralised zone by post-mineralization faulting.

2.3.2 Exploration and Production History

Gold was discovered at Cochrane Hill in 1868. By 1869 a shaft (Ross Shaft) had been sunk to a depth of 100 feet on the Ross lead and a 15 stamp mill erected at nearby Melrose by the Cochrane Hill Company. The first recorded production was in 1877, however, production from the Mitchell area up to 1928 was sporadic. Initially the property was operated by the Cochrane Hill Company followed by the California Gold Mining Company from 1904 and 1907. The property then lay dormant until 1922 when the Ross Shaft was pumped out and further underground development was undertaken.

The Cochrane Hill Mining Company started dewatering the workings in the Mitchell area in 1925 and by March 1926, the workings had been dewatered and surveyed. The work was continued by the Novamac Mines and Power Corporation Limited which erected a 10 stamp mill on the property, deepened the Mitchell Shaft to 230 feet and completed crosscuts and drifting on the 213 foot level, producing 177.2 ounces of gold from 1458 tons of ore from 1927 to 1928.

Guildford's Ltd. and the Eastern Mining Syndicate reactivated the property in the early to mid-1930s. Additional development was carried out on the 213 foot level of the Mitchell workings and a 44 foot shaft, the New Shaft was sunk about 560 feet west of the Mitchell shaft. Crosscuts were driven approximately 45 feet north and south of the prospect shaft. No production is recorded. Three surface diamond drill holes, totaling 800 feet in length, tested the westward strike extension of the mineralized area. The holes failed to intersect any significant mineralization.

Various companies and individuals held the Cochrane Hill property between the late 1930s and the 1960s, but very little of that work was filed. In the mid-1960s, Milado Mines surveyed a portion of the property using self-potential and long wire electromagnetic techniques. The later survey outlined a number of anomalies that were attributed to graphitic slate within the mineralized zone.

Mineral rights over the Cochrane Hill area were acquired by Massval Mines Limited in 1973. Massval Mines Ltd., Midas Resources Ltd., and Atlantic Ltd. carried out surface exploration on the property between 1973 and 1975. Geophysics, prospecting, surface stripping, trenching, and bulk sampling surveys were carried out during this period together with diamond drilling of 44 BQ diameter holes for a total of 4912m (Macpherson, 1979).

Northumberland Mines Ltd. optioned this property in 1979. During that year, humus geochemical and VLF electromagnetic surveys were implemented over a cut grid. (Harrington, 1980, 1981a, 1981b, 1981c). One diamond drill hole was completed to a depth of 91m in 1979 and a 20 hole, 3840m diamond drilling program was completed in 1981, while over the same period the area was included in an airborne magnetic and VLF electromagnetic survey flown by Sander Geophysics for Northumberland affiliate Pan East Resources Inc.

Between 1980 and 1984 Northumberland also carried out extensive bulk sampling and metallurgical test work. In 1980, a 17-ton bulk sample was tested at the Ontario Research Foundation. No report on this program is available, however, on the basis of this work a cyanide test mill was erected at the site. Between 1982 and 1983, 13106 tons of material were excavated from an 80m long x 30m wide x 10m deep open pit and processed in the test mill. A total of 512.4 ounces of gold was recovered representing 76.7% of the calculated contained gold content. Also during this period, a 100-ton heap leach test was carried out on open pit material crushed to minus ½ inch with 67% gold recovery in 22 days and 600lb of open pit material was tested at the Atlantic Research Institute by vat CN leaching, jigging and cyanidation of tails.

Between 1984 and 1986 Inco Limited under the auspices of the Scotian Mineral Exploration Venture (Scominex) completed surface and borehole geophysical testing, drill core relogging, surface stripping and channel sampling, a 15 hole, 2536m diamond drilling program and additional metallurgical testing.

Scominex conducted an underground exploration program between October 1986 and February 1987. The underground program consisted of rehabilitation of the Mitchell workings, driving new drifts in mineralization on the 213 foot level, acquisition of bulk sample material, and 28 underground diamond drill holes totaling 829m. A further 16 surface drill holes for 2566m were completed in conjunction with the underground program. Scominex completed a resource estimate in 1987 based the 59 holes drilled by Scominex and 67 holes drilled prior to 1984.

The Scominex bulk sample consisted of 4,443 tons of material mined in four separate drifts. Each of the 94 drift rounds was crushed to minus ½" and passed through a sampling tower to obtain a 150 lb sample. A 60 lb sample was riffled from each 150 lb. tower sample and leached in an alkaline cyanide solution. Filtered solution and residue were then analysed to determine the grade of each sample. In total, 2.8 tons of the bulk sample was analysed, returning an average grade of 0.061 ounces of gold per ton (2.09 g/ t). In addition, 3400lbs of material was collected from muck piles and from face samples with the muck pile samples analysed via fire assay and the face samples via a combination of cyanide leach and fire assay.

Inco withdrew from the Scominex Joint Venture in the fall of 1987. Shortly thereafter Northumberland Mines (as Novagold Resources Inc.) initiated an underground program to evaluate the mineralized zone to the east of the Mitchell workings. MPH Consulting Limited, Toronto, Ontario, was retained as the overall project manager and the program was completed between January and June 1988.

In that program, a 423m underground access ramp was driven west, parallel to the mineralized zone between the open pit and the 200 level of the Mitchell workings. Two crosscuts totaling 146m of development were driven to the north from the ramp to crosscut the mineralized zone at sections 10,570E and at 10,300E. From these crosscuts, a further 241m was developed in drives along various mineralized leads. The mill feed supplied by this development was supplemented with approximately 300 tons of material from earlier development areas underground such that, a total of approximately 5,000 tons of bulk sample material was obtained from within the mineralized zone.

Mill testing was completed on 1490 tons of material taken from within the first cross-cut, returning a calculated mill head grade across the mineralized zone of 0.06 oz Au/ ton (2.06 g/ t Au). A further 370 tons of material derived from more selective mining from the first cross cut was processed, returning a calculated mill head grade of 0.10 oz Au/ ton (3.43g/ t Au).

Geological evaluation of the mineralized zone was also completed in the 1988 development area and the 200 level of the Mitchell workings. This included geological sampling, panel sampling, surface sampling east of the open pit, and the drilling of 28 underground diamond drill holes for a total of 2044m.

Diamond drilling by Acadian Mineral Ventures to the east of the Cochrane Hill Deposit in 1988-89 intersected sparse arsenopyritic and quartz veined intervals typical of the Cochrane Hill Deposit style. Anomalous gold values were returned but were restricted to narrow intervals. The Property was staked by Mr. Scott Grant in 2002 and subsequently optioned to Scorpio Mining Corporation. Scorpio focused exploration on areas to east and west of the Cochrane Hill Deposit, along the projected trend of mineralization. Various surveys were completed in 2004, comprising ground magnetics, mapping, prospecting, trenching and till and soil sampling. Scorpio retained Mac-Gillivray (2004) to complete a resource estimate

from a high -grade narrow vein underground mining perspective, based on results from 155 diamond drill holes. The resource estimate was reported in compliance with NI 43-101 reporting guidelines.

Under an option agreement with Scorpio, Atlantic Gold NL, through its wholly-owned subsidiary, DDV Gold Ltd, assumed the management of exploration and development of the Property from May 2007.

Atlantic Gold NL has carried out five separate drill campaigns at Cochrane Hill to further define the gold mineralization and the open pit potential. Drilling from the 2007–2009 programs were focused on shallow mineralization within the eastern portion of the proposed pit, for a total of 47 holes (3,628 m). Of these 47 core holes, eight holes were drilled for a total of 505 m along strike to the west of the main mineralized zone, to test a tabular zone which had been intersected by RC drill holes. Only weak gold values were returned.

In August 2014, Atlantic Gold NL merged with Atlantic Gold Corporation. In the fall of 2016 Atlantic Gold Corporation initiated the first resource definition drill campaign over the entire proposed pit area. The program continued until spring 2017, for a total of 177 diamond drill holes (26,895 m). Drill spacing for this program was on nominal 25 m x 20 m spaced mine grid setup over an 820 m strike length. Mineralization was tested at depth and to the west and east extensions. In September 2017, Atlantic Gold Corporation retained FSSI Consultants (Aust) Pty. and completed an updated resource incorporating the 216 holes drilled between 2007 and 2016.

2.3.3 Physical Works

The main elements of the Project, as described in the Atlantic Gold NI 43-101 Technical Report on Moose River Consolidated Phase 1 and Phase 2 Expansion (January 24, 2018), are as follows:

- An open-pit mine from which an estimated 43.1 Mt of rock will be excavated, comprising 11.2 Mt of ore at 1.10 g/t Au, 30.1 Mt of waste rock and 1.8 Mt of overburden. The pit will be 950 m long and 450 m wide and will have a maximum depth of 170 m based on the current mining scenario;
- Twelve month pre-production period, followed by five and a half years of production at an average extraction rate of 22,086 tpd, including ore production of 5,479 tpd.
- Water management works associated with the collection of contact water from the open pit, waste rock and low-grade stockpiles and the plant site. If unsuitable for discharge into the receiving environment, contact water will be directed to the TMF to supplement process water requirements;
- Crushing and Concentrator facilities to process 2.0 Mtpa of ore producing a gold concentrate for transport to the Touquoy processing facility.
- Transportation of gold concentrate via existing highways and Beaver Dam haul road of up to 175 tpd using a C Train truck configuration;
- Separate Run of Mine (ROM) and LGO stockpiles, for a total capacity of 0.1 Mt and 2.1 Mt respectively;
- A WRSF with a capacity of 11.6 Mt of waste rock. Additional waste rock will be used to build the TMF;
- Overburden piles which will contain 1.7 Mt of material;
- Top soil and organics storage piles that will contain 0.2 Mt of material;
- Tailings storage in an above ground TMF with a design storage capacity of 8.6 Mm^3 of tailings solids:

- Discharge works associated with the removal of surplus water from the TMF. Initial water balance calculations indicate the TMF will operate under surplus water conditions and require a discharge. Further work will be undertaken to determine the need for and design of any treatment works to ensure such discharge meets environmental discharge requirements.
- Administrative, mine employee, and maintenance buildings and a petroleum product storage facility;
- Additional minor tailings storage in the mined out open pit as a result of final processing of gold concentrate with a water cover on reclamation.
- On-site borrow and quarry development to support infrastructure requirements for aggregate and till/clay materials. Some or much of this material may be generated from waste rock and till recovered from the pit and vicinity, however, further quarrying/borrowing may be required in the event the pit material is insufficient in quantity or quality. An aggregate/borrow investigation study will be conducted to assess these requirements during the IA application phase of the Project.

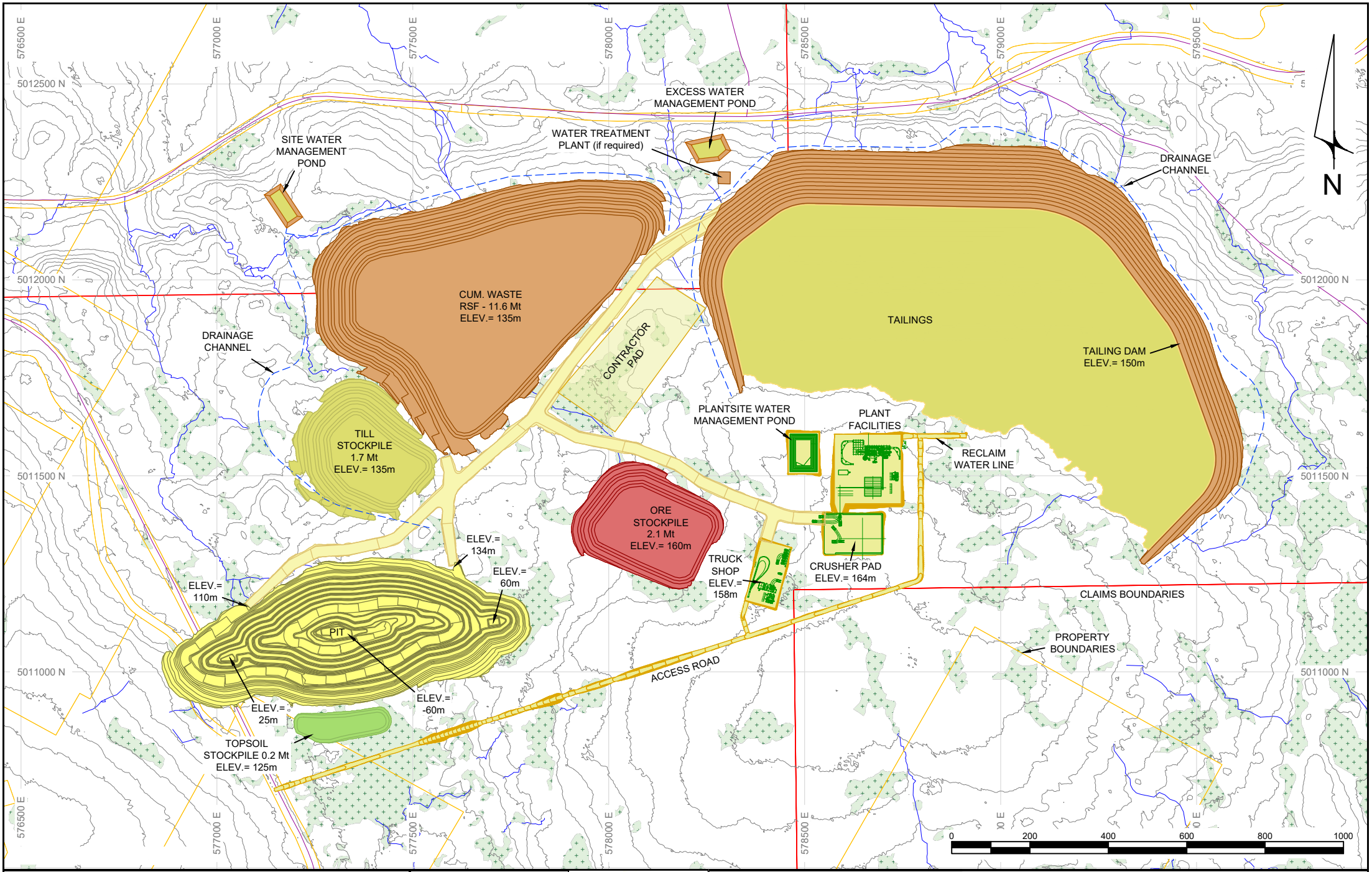
2.3.4 Mine Development and Operations

The surface mining operations are planned to be typical of similar small-scale operations in generally flat terrain. The mine operations at the Project are planned to commence in year 2022 with gold concentrate being transported to the Touquoy processing facility for final processing. The footprint of the surface mine development in relation to the environment is shown on Figure 2-2.

2.3.4.1 Development

A twelve month pre-production period is anticipated in order to supply material for construction including internal haul roads and TMF starter dam. The planned mine mobile equipment fleet will be utilized for pre-production prior to the commencement of operations.

The open pit footprint, mine infrastructure and waste rock storage areas will be cleared and grubbed in advance of operations with the timing informed by Environment and Climate Change Canada (ECCC) directives relative to migratory bird nesting. Topsoil will be salvaged to a nearby stockpile for later use in reclamation activities. Glacial till overburden within the open pit footprint will be salvaged to a till stockpile storage area for later use in reclamation activities.



ATLANTIC GOLD CORP. - PREFEASIBILITY STUDY

END OF PERIOD - YEAR 5 - COCHRANE HILLS

DATE:	2018/08/27	APPROVED BY:	MS
DRAWN BY:	DH	FILE:	CH Y5 (180827)
		PROJECT:	AGC_CHS_2017

Moose Mountain Technical Services

ATLANTIC GOLD

LEGEND

- PROPOSED PITS
- NEW WASTE RSF
- PREVIOUS WASTE RSF
- TAILINGS INFRASTRUCTURE
- TAILINGS
- HAUL ROAD
- MINE FACILITES PAD
- ORE STOCKPILES
- TOPSOIL STOCKPILE
- TILL STOCKPILE
- EXISTING ROADS
- SITE INFRASTRUCTURE
- WATERCOURSE
- TOPOGRAPHY
- MINERAL CLAIMS
- PROPERTY BOUNDARY
- WETLANDS
- DRAINAGE CHANNEL

CONTOURS AT 5m INTERVALS

2.3.4.2 Operations

An open-pit mine will be developed, from which 43.1 Mt of material will be excavated, comprising 11.2 Mt of ore at 1.10 g/t Au, 30.1 Mt of waste rock and 1.8 Mt of overburden. The pit will be 950 m long and 450 m wide and will have a maximum depth of 170 m based on the current mining scenario. The pit will be developed as a series of pushbacks in order to minimize upfront stripping and maximize ore extraction. Access to active mine areas will be via a single ramp system designed to allow dual lane traffic flow. Pit walls will be developed based on independent geotechnical engineering recommendations to ensure stability and safety.

In the active mining area, in-situ rock is drilled and blasted on 5 m to 10 m bench heights. Diesel powered down-the-hole hammer drills will be used for production drilling and will also be used for horizontal highwall depressurization drilling on the ultimate pit walls. Blasting will occur approximately two to three times per week.

Additional grade control drilling will be undertaken in advance of mining to better delineate the ore and waste rock. Dedicated reverse circulation (RC) drilling will be used and the results from sampling will be used to define ore and waste rock within the blasted rock material. A fleet management system will keep track of each truck load including material type, tonnage and destination.

A contract explosives supplier will provide the blasting materials for the mine. Emulsion is the primary blasting agent as the majority of holes will be wet. Explosives and all accessories will be supplied on an as needed basis from the contractor's base location off-site and delivered to the Proponent using the contractor's equipment. All on and off-site permitting requirements for explosives handling and storage will be the responsibility of the contractor through Natural Resources Canada for this Project.

Diesel powered hydraulic excavators will load both ore and waste rock into haul trucks. These loading units will also function to re-handle low grade ore material from stockpile and load overburden and topsoil for transport to stockpile.

All ore will be loaded into off-highway rigid frame haul trucks and hauled to the ROM pad and primary crusher. All waste rock will be loaded into off-highway rigid frame haul trucks and hauled to the WRSF. If dust is generated from hauling in the warmer months of the year, it will be controlled by applying dust suppression measures that may include water and chemical dust suppressants to the haul roads utilizing specialized trucks.

At the ROM pad, haul trucks will dump ore material directly into the primary crusher or place it in an active stockpile on the pad, to be re-handled as crusher feed later on. Crusher loading of the stockpiled ore will be accomplished with a diesel-powered wheeled loader.

At the WRSF, the haul trucks will dump waste rock in lifts.

A small support fleet will be utilized for mine operations support services. These services will include:

- Haul road maintenance;
- Pit floor and ramp maintenance;
- Ditching;
- Reclamation;
- Open pit dewatering;
- Open pit lighting;

- Mine safety and rescue;
- Transportation of personnel and operating supplies; and
- Snow removal.

A fleet of diesel powered mobile equipment is specified to handle the above pit support activities and include a hydraulic excavator, wheeled loader, track dozers and motor grader.

Maintenance activities on the mine mobile fleet will be performed in a mine maintenance facility located near the primary crusher, as well as in the field. Fuel, lube and field maintenance will be performed with a mobile maintenance fleet of equipment by qualified staff.

Diesel fuel and lubricant storage will be located near the primary crusher, and a dedicated fuel and lube truck will deliver these materials to the mine and maintenance mobile fleet. Diesel will be supplied from local sources by road tankers and stored in approved, above ground double walled tanks. From here, fuel will be distributed to equipment consumers by means of a dedicated fuel truck or cardlock system located at the storage facility.

The fleet of road trucks required to transport the gold concentrate from the Project site to the process plant at the Touquoy Mine will be refueled at the Project site as needed using the cardlock system noted above.

The workforce will be approximately 220 persons working two shifts per day or approximately 50 persons per shift (personnel will work four days on and four days off), similar to that at the operating Touquoy Mine.

In addition, the trucking operation hauling concentrate from the Project to the Touquoy Mine will create approximately ten jobs which will be contract positions to drive the highway trucks and conduct vehicle and road maintenance.

2.3.4.3 Waste Rock Management

All waste rock removed from the open pit will be placed in the WSRF, shown on Figure 2-2.

The WRSF will range in height from 10 m to 40 m above the existing ground surface and will contain waste rock excavated from the pit. This height generally conforms with local topographic variations. A haul ramp along the south-western limit of the WRSF will provide access to all lifts. Design capacity is approximately 11.6 Mt. A separate stockpile will be constructed to the north of the pit to contain unconsolidated overburden. This material will be utilized for reclamation of the WRSF.

The WSRF will be built bottom-up in small lifts, spread out and compacted by track type dozers. Haul trucks will deliver the waste rock to the WRSF, then dump out either as free dump piles, or off the edge of an established dump lift over a safety berm. Individual lifts will be constructed to 10 m in height. At closure the face of the lift will be re-sloped to 2:1 for use in reclamation activities. Re-sloping will be done by track type dozers and small hydraulic excavators.

The waste rock will be placed according to standard practices and will ensure compliance with provincial regulations with respect to slopes, potentially acid generating material (if any), and surface water run-off.

Runoff from the WRSF will be collected in seepage ditches and/or ponds prior to release to the environment. If unsuitable for release to the environment, seepage water will be directed to the TMF to supplement processing water requirements.

2.3.4.4 Low Grade Ore Stockpile

To ensure continuity of mill feed and allow initial processing of higher grade material, an LGO stockpile will be created to the west of the plant, Error! Reference source not found. 2-2. The north-western edge of the LGO will have a maximum height of 25 m while the south-eastern edge will be tied into natural topography. Design capacity of the LGO is approximately 2.1 Mt.

As with the WRSF, the LGO will be built bottom-up in lifts, spread out and compacted by track type dozers. Haul trucks will deliver the low-grade ore to the LGO, then dump out either as free dump piles, or off the edge of an established dump lift over a safety berm. Unlike the WRSF, this stockpile is planned to be progressively recovered for milling over the mine life. The remaining footprint will be reclaimed upon closure.

The LGO will be placed according to standard practices and will ensure compliance with provincial regulations with respect to slopes, potentially acid generating material (if any), and surface water run-off.

Runoff from the LGO will be collected in seepage ditches and/or ponds prior to release to the environment. If unsuitable for release to the environment, seepage water will be directed to the TMF to supplement processing water requirements.

2.3.4.5 Other Stockpiles

Prior to construction, areas planned for development will be grubbed and topsoil removed and stockpiled for use in reclamation upon closure. In general, topsoil stockpiles will be located adjacent to areas stripped to allow stockpile sizes to be minimized thus minimizing compaction and improving the quality of material for reclamation.

2.3.5 Milling Operations

The mill is located east/north-east of the proposed pit area and south of the TMF. The approach by road to the plant will be from the west off of Highway 7

The main plant building houses the grinding, gravity recovery, flotation, concentrate dewatering and reagent sections. The concentrate storage will be located in a separate building. The three-stage crushing circuit is based on modular mobile crushing equipment and will be located to the south of the main plant building. The fine ore stockpile is covered for snow protection and dust control.

Process water will be reclaimed from the TMF for re-use in the milling operations. Initial start-up water and ongoing make-up water is expected to be sourced from nearby Archibald Lake or the St Mary's River through application for a surface water withdrawal approval (NSE).

Figure 2-2 shows the plant location in relation to the overall Project site. Figure 2-3 outlines the process flow for the Project site.

2.3.5.1 Crushing

Run-of-mine (ROM) ore from the pit will be hauled to the primary crusher using off-highway haul trucks with a nominal capacity of 64 t. The haul trucks direct tip ore into the ROM bin while a front-end loader (FEL) will supplement the direct tip feed from the ROM stockpiles to maintain a continuous crushing operation. The ROM pad is sized at approximately 100 x

150 m to provide storage of ROM blend piles. Mine operations retrieve any oversize and either use a mobile rock breaker to reduce the lump size or return oversize to the pit.

The crushing plant package consists of an outdoor three stage crushing circuit. The crushing plant produces a fine ore sized to a P80 of 10 mm. The throughput of the crushing plant package is 5,479 t/d or 381 t/h at a crushing plant availability of 60%.

The vibrating grizzly feeder feeds the primary jaw crusher at the front of the mobile crushing circuit. The oversize from the vibrating grizzly enters the single toggle jaw crusher. A tramp magnet removes steel trash from the primary crushed ore as it transfers by conveyor to the secondary crushing module. Both the secondary and tertiary crushers are similarly sized cone crushers that have closed size settings of 31 and 13 mm respectively. The fine ore product of P80 of 10 mm is conveyed by a stockpile feed conveyor to a nominal 12,000 t fine ore stockpile (FOS).

The FOS is protected with a cover to reduce moisture and dust and subsequent freezing of the fine ore. The FOS has a live volume of approximately 3,000 t or 12 hours residence time.

2.3.5.2 Grinding

Crushed ore from the FOS will be reclaimed and fed into the ball mill for grinding. A single stage ball mill grinding circuit is proposed for the primary grinding circuit. The primary grinding circuit will consist of a ball mill in a closed circuit with primary classifying cyclones. The circuit will be equipped with two gravity concentrators to recover gravity recoverable gold (GRG). Approximately 50% of the primary cyclone underflow (U/F) will be fed to two gravity concentrators simultaneously. The proposed circulation load for the closed circuit is 300%.

The primary grinding circuit will grind the crushed product to P80 of 350 µm. The major equipment in the primary grinding circuit will include:

- One 4.3 m diameter by 7.0 m ball mill driven by one 1,900 kW motor
- One primary Hydrocyclone cluster, consisting three 838mm diameter cyclones (2 operating, 1 standby)
- One secondary Hydrocyclone cluster, consisting five 510mm diameter cyclones (4 operating, 1 standby)

As required, steel balls will be added into the ball mill to maintain grinding efficiency.

The primary cyclone overflow will be pumped to the Secondary Cyclones where the fines (below 150µm) will be separated from the coarse (above 150µm) to be fed to conventional flotation and Hydroflotation.

2.3.5.3 Gravity Concentration

A portion of the ball mill circulating load will be split and fed into two 50% duty parallel gravity concentrator trains. The gold concentrate solution recovered will be stored in a mobile hopper.

The equipment is arranged to provide a gravity cascade under the cyclones. The gravity circuit splitter box provides the feed slurry to two gravity concentrator trains. Each train will consist of a scalping screen, gravity concentrator and gravity area electric chain hoist. The two gravity concentrators in parallel are sized for 188 t/h solids feed rate.

The oversize from the scalping screen will gravitate to the ball mill feed chute, while the undersize will feed the concentrator. The tailings from the concentrators will be transferred back to the ball mill circuit and the gold-containing pregnant solution

will be stored in a hopper. Two hoppers will be located on each train. Once a hopper is full, the hopper will be changed out via overhead crane and put onto a flatbed truck for transportation to the Touquoy Mine site for final processing.

The gravity concentrate tailings will be transferred back to the cyclone feed hopper in the grinding circuit.

2.3.5.4 Split Circuit Flotation

The slurry from the secondary cyclone overflow will gravity flow to the conventional flotation circuit while the underflow will gravity flow to the Hydroflotation circuit. The Flotation Circuit consists of:

- 6 x 30 m^3 Rougher/Scavenger Flotation Tank Cells;
- 2.8 m diameter Hydroflotation Cell; and
- 125 kW High Intensity Grinding (HIG) mill as a Hydrofloat concentrate regrind mill.

Rougher/Scavenger Flotation

The secondary cyclone overflow (fines slurry) gravity flows into the 30 m^3 tank flotation cell. In the rougher flotation cells, the PAX collector and MIBC frother are added to enhance the flotation performance.

Concentrates from six conventional 30 m^3 tank cells will be pumped to a cleaner circuit where re-ground Hydrofloat concentrates will join prior to the cleaning stage. The rougher/scavenger tailings will be pumped to TMF.

Hydroflotation

The secondary cyclone underflow flows to the Hydrofloat feed inlet. The PAX collector and W34 frother are added to enhance the flotation performance.

Hydrofloat concentrate is thickened in 10 m diameter thickener to optimize the grinding prior to feeding to regrind circuit. Once reground, the Hydrofloat concentrate joins with the rougher/scavenger conventional cell concentrates to be fed to a cleaner circuit. The Hydrofloat tailings will be pumped to TMF.

2.3.5.5 Rougher and Cleaner Flotation

Concentrates from the Hydrofloat will flow to the Hydrofloat concentrate thickener where the concentrate will be thickened to 50% solids to optimize the re-grind. Hydrofloat concentrate will be reground down to P80 of 80 µm with 125 kW HIG mill.

There will be one stage cleaner flotation with 6 x 5 m^3 tank cells. The tailings from the cleaner flotation circuit is pumped to the rougher/scavenger fines conventional flotation cells to minimize the Au loss.

2.3.5.6 Concentrate Thickening, Filtration and Storage

The concentrate thickening, filtration, storage and loadout facilities for Au concentrate consist of:

- 12m Concentrate Thickener;
- 20 plate 1,500mm x 1,500mm vertical plate frame Concentrate Filter Press; and
- Concentrate Stockpile.

Concentrate Thickener

The final cleaner flotation concentrate will be thickened to approximately 60% solids in a 19 m diameter high-rate thickener. The concentrate will be mixed with diluted flocculant solution at the thickener feed well. The flocculated solids settle towards the thickener discharge cone and are pumped away while the supernatant water overflows an internal weir into the overflow launder. The overflow water gravity flows to the Concentrate Thickener Overflow Tank where the water is pumped to the Process Water Tank and used as process water for the plant. The thickened solids exit the discharge cone at a nominal target solids underflow density and pumped to the Concentrate Surge Tank.

Concentrate Filtration & Storage

The concentrate thickener underflow with approximately 60% solids will be pumped to concentrate surge tank where the concentrate will be pumped to a plate and frame pressure filter for dewatering on a batch basis. The filtrate from the pressure filter will flow by gravity back to the Concentrate Thickener while the final filtered concentrate will be discharged for stockpiling in the concentrate loadout area. The final moisture content is expected to be 12% and will be discharged into a stockpile with capacity for storage of 3.5 days of production at design rates.

2.3.5.7 Tailings Disposal and Reclaim Water

The combined flotation tailings slurry (both from the rougher/scavenger flotation tank cells and the hydrofloat cell), will flow by gravity pipeline to the TMF for storage and recycling. The supernatant from the tailings pond will be reclaimed by the Reclaim Water Pumps and recirculated via pumping to the Process Water Tank and re-used as process water.

2.3.5.8 Reagents

The reagents will be prepared and stored in a separate, self-contained area within the process plant and delivered by individual metering pumps or centrifugal pumps to the required addition points. All reagents will be prepared using raw water.

Potassium Amyl Xanthate (Collector)

Preparation of the PAX will require:

- A bulk handling system;
- Mixing and holding tanks; and
- Metering pumps.

Potassium Amyl Xanthate (PAX) is used as a collector in the flotation circuit and is supplied in 25 kg bags in the form of pellets. The pellets are mixed with raw water to produce 15% solution strength. The PAX mixing system is a skid package provided by the vendor. The PAX solution is distributed to the flotation circuit by three reagent metering pumps.

Methyl Isobutyl Carbinol (Frother)

Methyl Isobutyl Carbinol (MIBC) is used as a frother in the fines rougher/scavenger and cleaner flotation circuit and is supplied in bulk tote containers in liquid form. MIBC is pumped directly from the tote by two reagent metering pumps and is used as 100% solution strength.

W34 (Frother)

W34 is used as a frother in the flotation circuit and is supplied in bulk tote containers in liquid form. W34 is pumped directly from the tote by two reagent metering pumps (1 duty and 1 standby) and is used as 100% solution strength.

Flocculant

The flocculant will be supplied in 25 kg bulk bags as a dry powder. The flocculant is mixed with raw water and diluted to 0.50% mix concentration. The flocculant mixing system is a skid package provided by the vendor. The mixed solution is supplied to the thickeners by two flocculant metering pumps.

As a result of the concentrate being transported and processed at the Touquoy Mine site, no cyanide will be used in processing at the Project site.

2.3.5.9 Air Services

Blower Air

The flotation blowers will supply air to the rougher/scavenger tank cells, hydroflotation and cleaner tank cells. The installed blowers are multiple-stage, centrifugal type blowers and will be used with a "blow-off" arrangement to adapt to fluctuations in flotation air demand.

Plant & Instrument Air

Rotary screw air compressors will provide high pressure compressed air operating in lead-lag mode, to meet the demand for plant and instrument air requirements.

Pressure filter will use the wet high-pressure air produced from the rotary screw air compressors. There will be a dedicated air receiver to store necessary compressed air required for pressure filter operation.

Wet Plant air will be stored in the plant air receivers to account for variations in demand prior to being distributed throughout the plant. Instrument air will be dried in an Instrument Air Dryer before distributed throughout the plant.

2.3.5.10 Water Services

Raw Water

Raw water will be pumped from Archibald Lake or the St Mary's River to the raw and fire water tank.

Raw water in the tank is used to supply the following services:

- Primary crushing circuit dust suppression water;
- Reagent preparation water;
- Slurry pumps gland seal water;
- Cooling water systems;
- Make-up water for the process water system; and
- Fire water.

Raw water is supplied to the plant by two raw water pumps in a duty standby configuration.

Potable Water

Potable water will be sourced from on-site drilled wells, or the raw water source (Archibald Lake or the St Mary's River) and treated as necessary.

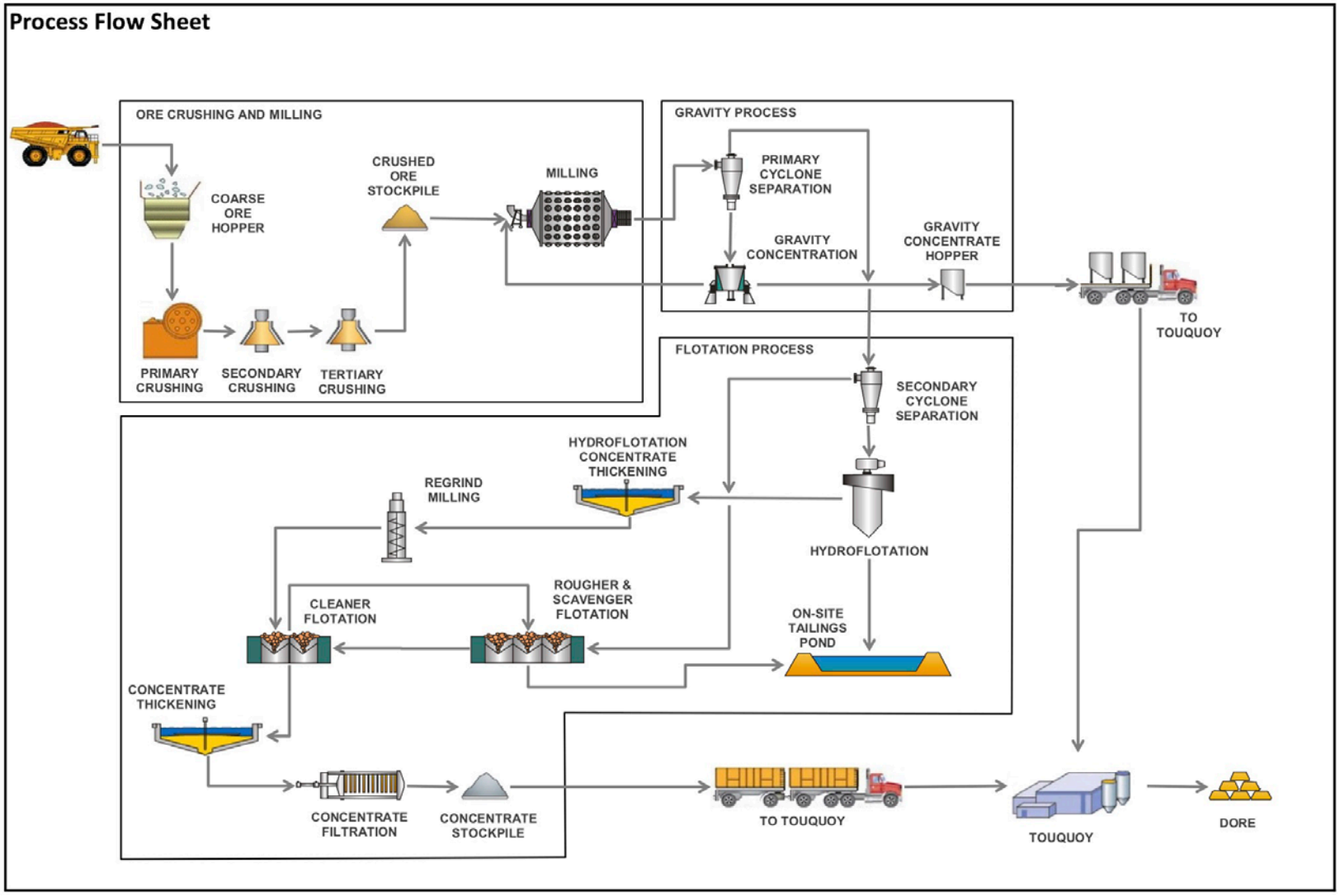
Gland Water

Gland water is supplied from the raw water and distributed to the plant by two gland seal water pumps in a duty standby configuration.

Process Water

Process water is comprised mainly of concentrate thickener overflow water and tailings pond reclaim water. Process water is stored in the process water storage tank and distributed by the two process water pumps, in a duty – standby configuration.

Figure 2-3: Cochrane Hill Process Flow Diagram



2.3.6 Concentrate Loading and Haulage

The gold concentrate produced at the Project site will consist of a gravity concentrate and a float concentrate. The gravity concentrate represents a small portion of the gold concentrate produced and will be stored and transported in specialized hoppers. The hoppers will be transported on the back of a flatbed once a hopper has been filled [in the order of 1 hopper every 2 days]. The majority of concentrate to be hauled will be float concentrate. Up to 60,000 t will be hauled on an annual basis in purpose-built side dump highway haul trucks. The trucks will be loaded inside the concentrate loadout area by front-end loader. The concentrate will be covered to prevent any losses and the trucks weighed prior to leaving to ensure appropriate loading.

The concentrate from the Project site will then be transported to the Touquoy process plant along a combination of existing public roads and a private road. The route proposed is south along Highway 7 through Sherbrooke to Sheet Harbour to Highway 224 and then north-west along Highway 224 connecting with the upgraded private Beaver Dam Haul Road to Mooseland Road.

The route will use mainly public highways (Highway 7 – 97 km, Highway 224 – 17 km). The Beaver Dam Haul Road (12.7 km) is a private logging road that will be upgraded as a result of the development of the Beaver Dam project. This upgrading will involve widening to two lanes and improving alignment to provide better curves and gradients, where necessary, to achieve an operational design speed of approximately 70 km/h. The upgrade of the Beaver Dam Haul Road between Highway 224 and the Touquoy Mine site will be completed separately, and in advance of, the Project, as part of the Beaver Dam Mine Project, as such, this project will not be considering this upgrade as a project activity. The final section of the proposed haul route will be along the Mooseland Road for approximately 11 km.

Truck payloads will be consistent with the limits applied by the Nova Scotia Highways department to comply with the proposed route segments. Trucks with trailers in a C Train configuration will be used to haul concentrate. The 8 axle, 58,500 kg C Train is a standard across Canada. Based on the requirement to haul 170 t/d and a maximum payload of 28.5 t, 6 return trips per day will be required. Assuming a single 12-hour shift, this would result in approximately 1 truck every two hours, however, the exact number will depend on the final hauling schedule, truck sizing and road restrictions. Approximately 3 trucks would be required necessitating the hiring of 6 drivers plus supporting personnel for truck maintenance and road maintenance. During construction and pre-production there will be no concentrate hauled. In addition to the main concentrate haul, proposed is a secondary haul of low tonnage (approximately 2 tonnes) gravity concentrate. This product will be delivered weekly by a flat deck, 5 tonne truck, with security.

The Spring Weight Restriction period in Halifax County, Nova Scotia is legislated from March 23 to May 18 of each year but is typically adjusted (shortened) due to yearly conditions and can be expected to be in place for approximately one month. Highway 7 and 224 in the area of interest are exempt from the Spring Weight Restrictions and the Beaver Dam Haul Road (including Moose River Cross Rd. between Highway 224 and Mooseland Road) is private and is therefore not subject to provincial restrictions. Mooseland Road is currently subject to spring weight restrictions. However, as the majority of the haul route is not subject to weight restrictions, an exemption will be applied for the Mooseland Road, if required. In addition, to spring weight restrictions, a 51km section of Highway 7 between New Chester Road and Port Dufferin is subject to a year-round weight restriction of 41,500 kg. The intention for this section of road is to apply for an exemption through NSTIR.

The majority of dwellings located along the proposed haul route are located in the communities of Sherbrooke and Sheet Harbour. A lower density of dwellings outside of these communities are spread along the Highway 7 from Stillwater to Marinette on Highway 224. These dwellings are currently exposed to highway traffic which includes logging trucks and aggregate haulers. For the remainder of the haul route, there are a small number of houses that will be affected by these vehicles.

The proposed truck traffic associated with the Project is envisioned to have only a minor impact on the existing traffic volumes on the segment of Highway 7, Highway 224 and, Mooseland Road. Records of traffic volumes for nine years between 2007 and 2016 are presented in Table 2-1.

Table 2-1: Average Traffic Volumes 2007 to 2016

Highway #	Section Length (km)	Section Description	Average Daily Traffic #	Average Annual Daily Traffic #	Comments
7	11.8	Rte 248 to Rte 211	1,001	835	
7	4.5	Rte 211 to Main St (Sherbrooke)	1,140	950	Sherbrooke
7	14.9	Main St (Sherbrooke) to Little Liscomb Rd	661	535	
7	11.2	Little Liscomb Rd to Liscomb River Bridge	537	360	
7	5.7	Liscomb River Bridge to Bakers Cove Rd	545	417	
7	9	Bakers Cove Rd to Guysborough-Halifax County Line	570	465	
7	11.8	Guysborough-Halifax County Line to Moosehead Rd	547	560	
7	14.5	Moosehead Rd to Port Dufferin Bridge	689	642	
7	12.0	Port Dufferin Bridge to Rte 374	1,064	1,035	
7	3.6	Rte 374 To Rte 224	2,623	2,552	Sheet Harbour
224	8.8	Tk 7 to Marinette-Sheet Harbour Line	514	494	
224	8.3	Marinette-Sheet Harbour Line to Beaver Dam Road	357	343	

Nova Scotia NSTIR Open Data: https://data.novascotia.ca/Roads-Driving-and-Transport/Traffic-Volumes-Provincial-Highway-System/8524-ec3n (accessed February 2018)

2.3.7 Tailings Management – Cochrane Hill

Several alternative TMF locations are currently being considered and are subject to ongoing environmental and geotechnical investigation. A summary of alternatives is detailed in Section 2.7.4 of this project description, however, the principle design objectives and features detailed below are applicable to all options being considered.

The principal design objectives for the TMF are to protect the regional groundwater and surface water resources during both operations and in the long term (after closure), and to achieve effective reclamation at mine closure. The design of the TMF considers the following requirements:

- minimizing impact and risks to the surrounding environment;
- permanent, secure, and total confinement of all solid tailings materials within engineered storage facilities;

- control, collection, and removal of free-draining liquids from the tailings during operations for recycling as process water to the maximum practical extent;
- discharge of surplus water collected in the TMF, with provision for treatment as necessary;
- the inclusion of monitoring features for the facility to demonstrate performance goals are achieved and design criteria and assumptions are met;
- staged development of the facility over the life of the proposed project to allow for efficient use of materials from pre-production and operational pit development as construction materials for the TMF; and
- some of the materials may be obtained from separate aggregate quarries and borrow pits based on volume and quality factors.

To meet the design criteria the facility must be capable of retaining 10.9 Mt of tailings solids and allow for appropriate management of water entering the facility.

The preliminary TMF option selected for design purposes is located to the south of Melrose Country Harbour Road. The TMF positioned in this manner allows the planned mine facilities to be clustered near to the proposed open pit and simplifies water management requirements for the mine site. The TMF has been designed to permanently store tailings material generated by the ore milling process at the Project site. Specific features of the TMF are listed below:

- Zoned water-retaining earth-rockfill dam;
- Interior rockfill causeways located within the TMF;
- Diversion channels and dams that route water around the TMF during construction;
- Perimeter road and seepage collection ditches;
- Sediment ponds and seepage collection ponds;
- Surplus water pipelines, pump systems, and surplus water management pond;
- Tailings distribution system;
- Reclaim water system;
- Raw water intake and pipeline for initial filling of TMF and ongoing makeup water for the plant operations;
- Tailings beaches;
- Supernatant water pond; and
- Discharge works associated with the removal of surplus water from the TMF. Initial water balance calculations indicate the TMF will operate under surplus water conditions and require a discharge. Further work will be undertaken to determine the need for and design of any treatment works to ensure such discharge meets environmental requirements.

The current conceptual design of the TMF will be contained on three sides by a continuous embankment and on one side by natural ground as shown on Figure 2-4. Rockfill causeways raised with the accreting tailings mass will separate the facility into two cells to increase filling efficiency and allow for positioning of the reclaim water pumps and pipeline. The TMF embankment is designed as an earthfill-faced rockfill embankment with appropriately graded filter and transition zones. The primary construction materials for the embankment will be non-acid generating (NAG) rockfill and clay fill sourced locally from the open pit and surrounding areas. Tailings from the mill process will be delivered by gravity from the mill to the TMF. The tailings slurry will be conveyed to the TMF by pipeline and deposited on a subaerial tailings beach from discharge points located along the embankment crest and interior tailings distribution causeway.

The Stage 1 embankment will be 50 m high in maximum section and requires approximately 2.6 Mm^3 of material to construct. Approximately 2.3 Mm^3 of pit-run rockfill will be provided by pre-stripping the open pit with the balance of material

requirements coming from local borrow areas for glacial till and crushing/screening rockfill for the embankment filters. An upstream liner of compacted fine-grained earthfill is included in the Stage 1 design to reduce seepage gradients prior to development of the tailings beach.

The embankment will be raised in four additional stages, throughout the mine life, by downstream method to an ultimate elevation of approximately 150 m. The ultimate embankment will be 70 m high from crest to toe in maximum section and the maximum depth of stored tailings within the facility will be approximately 40 m. Sustaining embankment construction will require approximately 6.4 Mm^3 of construction material with 6.0 Mm^3 of pit-run rockfill and the balance sourced from external borrows or stockpiles. An additional 260,000 m^3 of pit-run rockfill will be used for the interior rockfill causeways over the life of the mine.

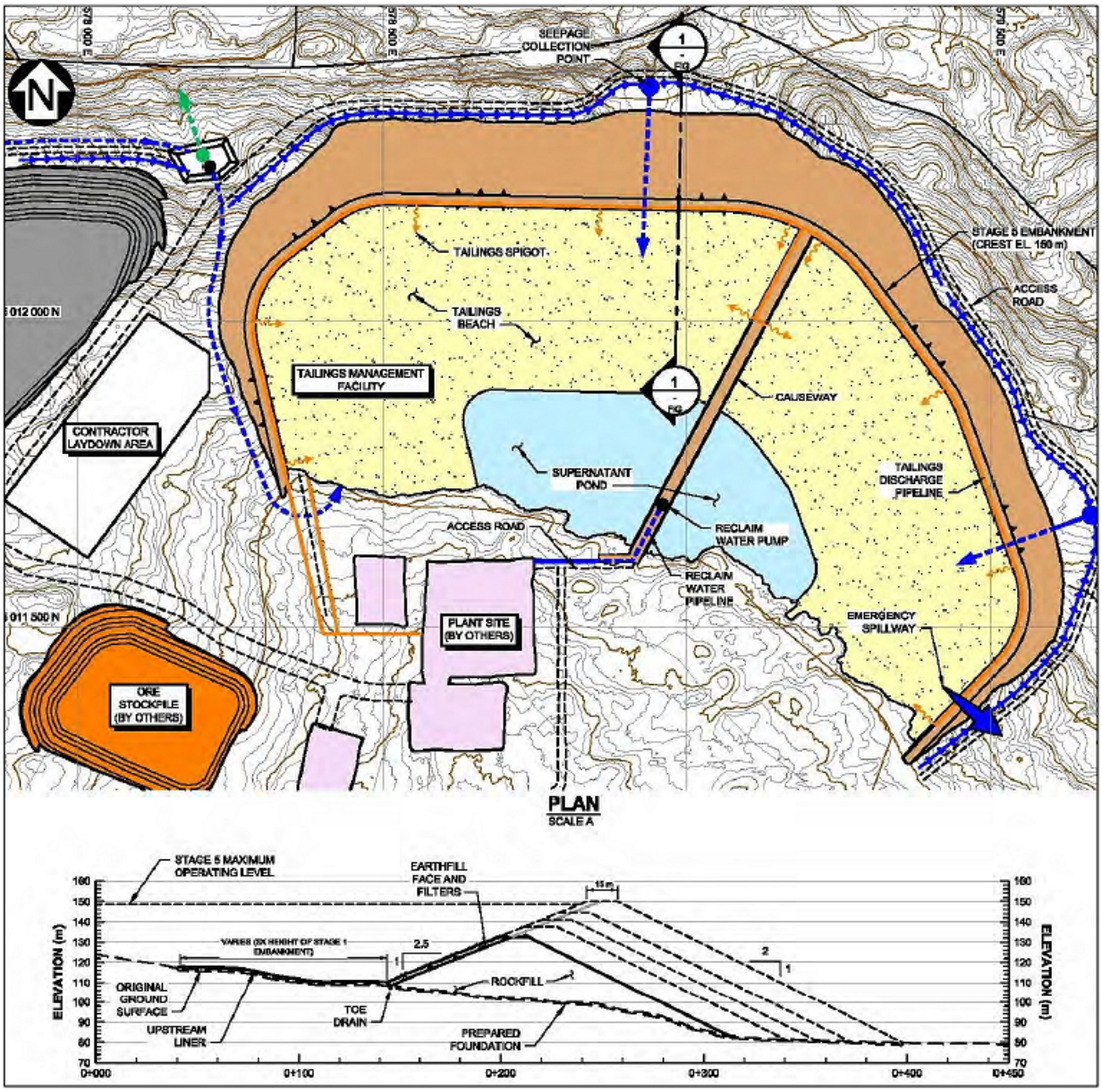
Seepage will largely be controlled by the low-permeability embankment face constructed prior to the development of the tailings beach, the tailings deposit, and the low-permeability foundation materials. Seepage through the embankment will be collected in the embankment filter and drain system before reporting to the seepage collection and recycle ponds. Seepage in the foundation would follow the natural topography to report to seepage collection ditches along the perimeter road. Water will be conveyed to a central seepage collection point downstream of the embankment and pumped back to the TMF during operations and closure until water quality is suitable for release to the downstream receiving environment.

- Runoff from the active mine areas will generally be collected in a combination of seepage ditches and/or ponds and if of suitable quality will be released to the receiving environment, or if unsuitable conveyed to the supernatant pond in the TMF and reused as a source of process water.
- Initial water balance calculations indicate the TMF will operate under surplus water conditions. The TMF will be designed to handle storm events, however, at some point, water will be required to be discharged. Discharge works will be designed and constructed to remove surplus water from the TMF to prevent surplus water accumulation. Further work will be undertaken to determine the need for and design of any treatment works, including an effluent treatment plant and polishing pond, to ensure the discharge meets environmental requirements.

The anticipated scenario for closure of the facility is that exposed tailings beaches will be covered and then re-vegetated. A spillway invert will be lowered within the tailings pond to allow free flow of runoff out of the facility once water quality monitoring indicates pond water to be suitable for direct discharge.

The preliminary design of the TMF is subject to on-going engineering studies.

Figure 2-4: Cochrane Hill TMF: Plan and Typical Section



Note: Figure prepared by Knight Piésold, 2018.

2.3.8 Water Management

The landscape in the PA is characterized by a gentle hillslope covered with areas of forest and some deforested areas. The Project is situated to the east of Highway 7, south of Melrose Country Harbour Road, and west of Indian River Road. The Project facilities are located entirely within the drainage area of McKeen Brook and its tributaries, which wraps around the northern and eastern sides of the PA. The Project is confined by topography to the south with the proposed open pit, ore stockpile, and mill site occupying the higher ground near the catchment divide.

Runoff from the active mine areas will generally flow towards the north and be directed to a site water management pond. Active mine areas will include the open pit area, mill site, WRSF, till stockpile, LGO stockpile, and the TMF. Water from these areas will be directed to the supernatant pond within the TMF to be reused as a source of process water. As such, the TMF will act both as containment for tailings and site contact water unsuitable for discharge. Initial water balance calculations indicate the TMF will operate under surplus water conditions and require a discharge. Further work will be undertaken to determine the need for and design of any treatment works to ensure such discharge meets environmental requirements.

Water collection ditches will be established surrounding the bases of the WRSF and LGO stockpiles. Relief is designed into these facilities so that surface water that comes into contact with them will run to the surrounding collection ditches by gravity, wherever possible. Runoff from these active mine areas will be collected in the site management pond and discharged to the receiving environment or conveyed to the TMF supernatant pond if unsuitable for discharge and used as process water.

A plant site water management pond will be located adjacent to the plant facilities. Water collection ditches will be established surrounding the facilities area, as well as the ROM ore stockpile, that will divert collected surface water to this water management pond. The earthworks for the facilities are designed with enough relief that contact surface water will run by gravity into these surrounding collection ditches, and into the plant site water management pond. Settled water will be released to the environment if of suitable quality or if unsuitable pumped to the TMF for use as process water.

An in-pit water diversion ditch will be established along the top bench of the open pit to intercept any surface water that makes it through the berm and comes into contact with the open pit. This ditch will direct water to in-pit sumps for collection, where it will be pumped out of the pit and to the TMF supernatant pond for use as process water. Where necessary, sub-horizontal drain holes will be established in the final open pit walls as they are exposed. On the active bench floor, the water that is collected from these drain holes, along with surface runoff, will be directed to a sump. All collected ground and surface water in the pit will be handled by high lift skid mounted pumps installed in each active pit bottom as part of the in-pit pumping system. The mine sump pumps will be connected to semi-permanent and permanent piping systems to convey water through a HDPE pipe directly to the TMF located east of the open pit. The in-pit sumps will be installed with each box cut as the benching is advanced.

Seepage from the TMF and runoff from the TMF embankment will be captured in the seepage collection ditches beyond the ultimate footprint of the embankment. Water will be conveyed to two seepage collection points downstream of the embankment and pumped back to the TMF supernatant pond during operations and closure until water quality is suitable for release to the downstream receiving environment. Water suitable for discharge from the TMF will be released through an engineered discharge to Archibald Lake and its downstream receiving environment or a location within the McKeen Brook system. Options for the final release point location are still being evaluated.

2.3.9 Site Infrastructure

This section provides a description of the site infrastructure provided to support the operation of the Project.

2.3.9.1 Roads

A well-maintained bituminized road (Highway 7), which connects Antigonish (Antigonish County) with the coastal communities along the eastern shore (Sherbrooke and Sheet Harbour), provides access to the site.

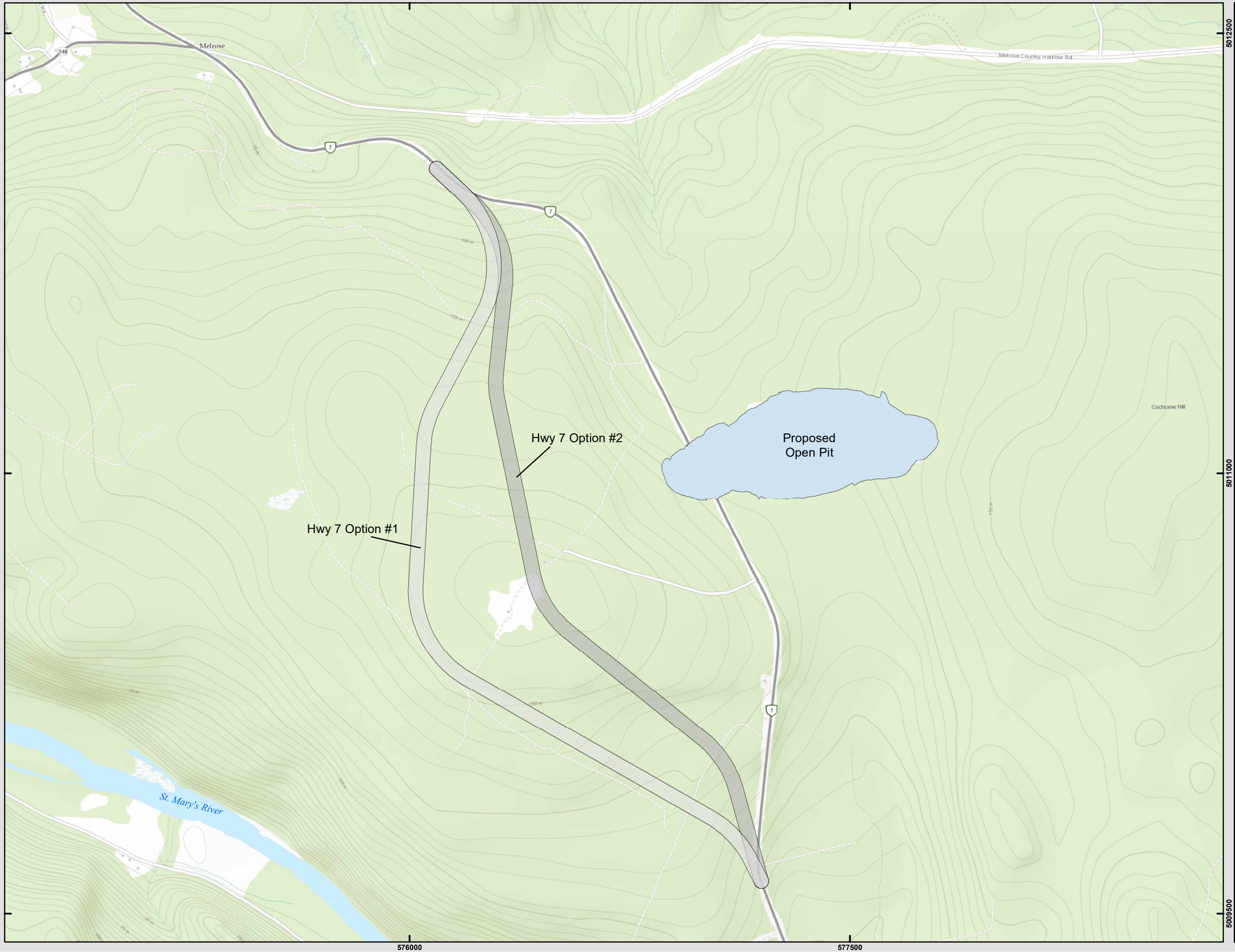
To allow development of the proposed open pit, and to prevent the need to shut down the public highway during blasting operations, a 2.9 km section of Highway 7 will be relocated approximately 1 km to the west depending on the final design option selected (Figure 2-5). The diversion will be constructed outside of a 500 m diameter rock blasting disturbance zone and consist of single lane, two-way traffic, similar to the existing road section. This relocated section of road will meet the Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Highway Design Guidelines for a Minor F Collector route. The mine site will use a 1 km portion of the existing Trunk 7 as the access road to the south of the site. Preliminary alignment options have been designed and discussions with Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) have been initiated. Further discussions with landowners and NSTIR will be required prior to mine development.

The administration office and plant site are accessed via a dedicated mine access road approximately 2 km in length. This road will be constructed east of Highway 7 and will not be paved.

In addition to the mine access road, three onsite haul roads will be constructed using the mine fleet during the pre-production period and will be required to haul ore and waste rock material. The ore haulage road is 2 km and connects the mine open pit to the ROM stockpile pad. The waste rock haulage road will consist of two roads, one connecting the open pit with the WRSF (0.1 km) and the other connecting the open pit with the TMF (0.8 km).

Additional onsite roads/tracks will include:

- A track for decant line and tailings line;
- A track for accessing the raw water intake at Archibald Lake or the St Mary's River;
- A track for accessing the engineered discharge from the TMF to the confirmed discharge location;
- A track for accessing the powerline; and
- A track around the perimeter of the TMF.



Prepared For:

ATLANTICGOLD

FIGURE 2-5

Cochrane Hill Highway 7 Realignment Options

Melrose, NS

- Highway 7 Alignment Option #1
- Highway 7 Alignment Option #2
- Proposed Open Pit

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 125 250 500 Meters

1:12,000 Scale when printed @ 11" x 17"

Drawn By: LP Date: 2018-09-28

McCallum Environmental Ltd.

2.3.9.2 Power Supply and Reticulation

An existing 25kV line is located approximately 13 km to the east of the site at Cross Roads Country Harbour. This line will supply power to the project via a 4 km upgrade of an existing single phase line to three phase and construction of an additional 9 km of three phase line to extend the existing 25kV line to the plant site sub-station.

The incoming 25kV feed will be stepped down to 4.16V at the plantsite substation. Power will be distributed from this point throughout the site to supply the Gatehouse, Mine Office, Truck Workshop, Warehouse, Mining Office, Change Room Buildings and TMF. The power distribution from the plantsite substation will be via overhead power lines and buried conduits wherever required. The 4.16kV will be stepped down to each of these buildings through a bank of pole top transformers.

A 500 kW black-start diesel generator will provide emergency power. In the event of a total power black-out the generator will be started by an operator. The emergency generator will only supply back-up power to select equipment in the process plant area.

The total connected load will be approximately 5.4 MW with an operating load of 4 MW as detailed in Table 2-2.

Table 2-2: Power Demand

Power Requirements (kW)	Maximum Demand (kW)	Average (kW)
Crushing	1,345	720
Grinding	2,446	2,085
Gravity	44	49
Flotation	871	641
Concentrate Dewatering	84	50
Tailings	45	30
Potable, Fresh Water	142	108
Blower & Inst. Air	461	382
Reagent	13	6
Administration & workshop - warehouse	85	57
Total site power (rounded)	5,535	4,128

2.3.9.3 Fuel Supply, Storage and Distribution

A diesel storage and distribution facility (50,000 L) will be located adjacent to the workshop/warehouse. Diesel will be delivered to site in tanker trucks and will be available for use by vehicles using a bowser arrangement with cardlock. Gasoline usage is expected to be minor, as required for light vehicles use only, and will be satisfied by purchase from local retail suppliers.

A propane storage facility will be located near the process building. The major propane use will be for space heating.

2.3.9.4 Water Supply and Distribution

Sources of water include mine dewatering operations, raw water from Archibald Lake or the St Mary's River, precipitation that includes run-off and snowmelt, and return water from the TMF.

Raw water will be drawn from either Archibald Lake or the St Mary's River subject to the appropriate surface water withdrawal approval (NSE). The water will be withdrawn by submersible pumps mounted within a decant structure. Water will be delivered to the plant via a buried HDPE pipeline to the Raw Water Tank, the lower portion of which will be reserved for fire protection.

The bulk of the plant water demand for processing is drawn as a recirculating flow from the TMF pond. It will be recovered by a submersible pump mounted within a decant structure. The decant return water will be delivered via an HDPE pipeline laid on the surface and routed along the decant causeway and then alongside the tailings line, to the Process Water Tank located within the plant site.

To address TMF start up water requirements, raw water will be sourced from Archibald Lake or the St Mary's River for a short period of time. It is anticipated that between 300,000 m^3 and 500,000 m^3 will be required. During operations, daily raw water withdrawal is expected to be in the range of 50 m^3/day.

2.3.9.5 Sewage and Waste

Sewage from the plant site buildings will gravitate via a pipe network buried below the frost line to septic tanks with leach drains.

Chemical waste from the laboratory will be either, depending on type, pumped to the tailings hopper or stored for off-site disposal. Office waste and waste from the meal areas will be collected and disposed of off-site in accordance with the applicable regulations.

2.3.9.6 Plant Buildings

Buildings located at site will include:

- Gatehouse;
- Administration office;
- Mining office and change rooms;
- Truck workshop, warehouse and wash facility;
- Plant offices and change rooms;
- Plant workshop;
- Fine ore stockpile;
- Filtration, Storage & Loadout;
- Process plant;
- Ball mill lube room;
- Plant switch room;
- Raw water supply; and
- Laboratory.

All buildings will have a heating and ventilation system, using propane space heaters.

Gatehouse

The guardhouse will be located on the site access road where security staff can control entry to the mine and process plant areas.

Administration

The Administration Office will include private offices, open plan offices, meeting and training rooms, kitchen, toilets, change-house and first aid facilities. The building will be of a similar area and construction as that at the Touquoy Mine site.

Mining Office and Change Room

Mining Office and Change Room facilities for the workforce will be constructed in the mine facility area and will be approximately 400m^2. These facilities will have wet and dry areas complete with showers, basins, toilets, lockers and overhead laundry baskets.

Truck Workshop and Warehouse

The Truck Workshop and Warehouse will be approximately 720 m^2 and will be positioned adjacent to the mine office at the Project site. This area will be divided, one section for warehousing spare parts and the other will be a maintenance workshop. Other maintenance activities will be performed outside the building on a hardstand area. Lifting and handling activities will be fulfilled by an overhead crane within the building and forklift.

A vehicle wash-down facility will be provided adjacent to the workshop/warehouse and will be similar to that used at Touquoy Mine site.

Plant Office and Change Room

The Plant Office and Change Room facilities for the process plant will house the majority of the employees associated with the processing facilities. A meals room and all ablutions will be provided within the building for these employees including wet and dry areas complete with showers, basins, toilets, lockers and overhead laundry baskets. The building will be approximately 260 m^2.

Plant Workshop

The Plant Maintenance building will be located adjacent the concentrator building and will house maintenance personnel undertaking maintenance activities in support of ore processing. The Plant Workshop will be approximately 300 m^2. This building will be a pre-engineered building

Fine Ore Stockpile

The Fine Ore Stockpile is used to keep the ore dry and heated to prevent freezing during the winter. The building will be approximately 2,080 m^2. This building will be a pre-engineered building.

Filtration, Storage & Loadout

The Concentrate Loadout will provide secure storage, stockpiling and loading facilities for gold concentrate prior to trucking to the Touquoy Mine site for final processing. The building will be located adjacent to the Concentrator building and is

nominally 650 m^2 (27 m long x 25 m wide). It will also include a concentrate thickener and filter press to remove surplus water from the concentrate prior to trucking. This water will be recirculated for use as process water. This building will be a pre-engineered building.

Process Plant

The Process Plant Building will be approximately 1,490 m^2 in area (24 m wide x 62 m long) and will house milling, gravity, flotation and reagent equipment. The building will be divided into two sections. The first section contains the mill; the second section contains the gravity, flotation and reagent system equipment. Both sections are serviced by overhead cranes. The building will be heated using electrical space heaters. This building will be a pre-engineered building.

Individual areas within the process building will be bunded, each with a sump, to provide for process upsets and spill management.

Ball Mill Lube Room

The Ball Mill Lube Room will be located outside the Process Plant Building, adjacent to the Ball Mill section. The building will be approximately 80 m^2. This building will be a pre-cast concrete building.

Plant Switch Room

The Plant Switch Room will be located just outside the Process Plant Area. This building will house the control equipment for the switch yard. The building is approximately 160 m^2. This building will be a pre-cast concrete building.

Raw Water Supply

The Raw Water Supply Building will be located at either Archibald Lake or the St Mary's River and house the pumping equipment. The building will be 36 m^2 and will be a pre-engineered building.

Laboratory

The laboratory will be situated adjacent to the plant and is approximately 300 m^2 in area. The building houses all laboratory equipment for the site, including the metallurgical and environmental requirements. Any mechanical items associated with the dust collection equipment will be located external to the building.

2.3.9.7 Fire Protection

Fire protection for the plant site will be via a "wet system" with hydrants located around the plant site area. The water contained within the lower portion of the raw water tank will be reserved for fire protection. A main fire alarm indicator panel (MIFB) for surface facilities will be provided in the main control room, cabled to fire detectors in the following areas:

- process plant MCC rooms;
- main control room;
- workshop store and offices; and
- laboratory.

In each area, a combination of heat and smoke detectors will be provided with break-glass units mounted externally to the buildings. Within the process plant MCC rooms, very early smoke detection alarms (VESDAs) will be installed for early smoke detection and alarm initiation.

The large primary mining fleet including excavators, front end loader, haul truck, dozers and drills will be fitted with fire suppression systems in case of fire.

2.3.9.8 Lighting

3m pole-mounted high intensity discharge type weatherproof lights will be utilized for plant and conveyor lighting, while 8m pole-mounted floodlights will be utilized for ROM, crushing and plant area lighting. High bay and low bay lighting will be used for process plant building operating floors. Energy efficient LED type lighting fixtures will be applied where suitable. Emergency lighting will be also installed throughout the plant, in stairways and exits to provide sufficient light to allow safe egress of personnel from the buildings.

Lighting throughout the active mine areas and material storage areas will be by diesel lighting towers.

2.3.10 Touquoy Processing

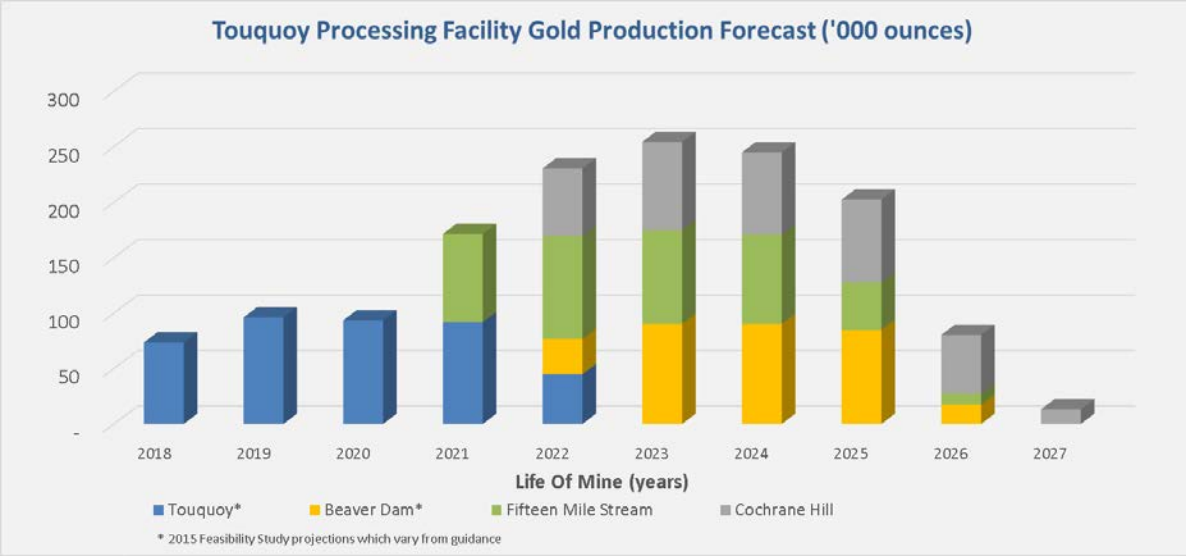
Final processing of gold concentrate will take place at the existing Touquoy facility currently operating at the Touquoy Mine site. The Touquoy plant has the capacity and is designed to be able to treat the Cochrane Hill concentrate with only minor modifications required including:

- Concentrate storage;
- Gravity concentrate leach reactor; and
- Gravity electrowinning cell.

These changes can be accommodated in the existing plant site footprint. Figure 2-7 outlines the process flow at the Touquoy Mine site for final processing of the concentrate.

The current gold production forecast for the combined output from the Touquoy processing plant is shown below in Error! Reference source not found.6.

Figure 2-6: Touquoy Processing Facility Gold Production Forecast



2.3.10.1 Intensive Cyanidation

Gravity gold concentrate will be transported to the Touquoy Mine site within a mobile hopper. The hopper will be designed to connect directly with the intensive batch leach system, thus avoiding re-handling of concentrate. The intensive batch leach circuit will receive the periodic gold concentrate from the Project site for treatment in an intensive leach reactor. The gold-containing pregnant solution will pump periodically to a dedicated eluate tank in the gold room.

2.3.10.2 Carbon-in-Leach

Flotation gold concentrate from the Project site will be transferred into the leach feed box for slurry conditioning prior to leaching. The leach feed slurry will be mixed with lime slurry in the leach feed box to raise the slurry pH for cyanide gold extraction. The feed box will gravitate to the leach tank and optionally can feed directly to CIL Tank 1.

The circuit is a hybrid CIL type and consist of one leach tank and six adsorption tanks in series, each having a live volume of 1,169 m^3. The design allows for a 250 t/h solids feed rate at 50% solids for an average 24 hour residence time. Each tank will be interconnected with launders to allow slurry to flow sequentially by gravity to each tank in the train.

Barren carbon will enter the adsorption circuit at CIL Tank 6. The carbon will advance countercurrent to the main slurry flow during periodic transfers of slurry and carbon using air lift movement from a downstream to upstream tank. Carbon concentrations of 10 to 15 g/L are required in all tanks. Carbon will be retained in the upstream tank by an intertank screen. The countercurrent process will be repeated until the carbon becomes loaded and reaches CIL Tank 1. Then a recessed impeller pump will be used to transfer slurry and carbon to a loaded carbon recovery screen. The loaded carbon will be washed with water and released to the acid wash column located inside the main plant, in the desorption area. The slurry will be returned to CIL Tank 1.

Following elution of the loaded carbon and thermal regeneration, the barren carbon will be screened and report to CIL Tank 6. Fine carbon will be discarded to the CIL tailings hopper.

Tailings slurry from CIL Tank 6 will flow by gravity to the vibrating carbon safety screen to recover any carbon in the event of damage, wear or other issues with the CIL Tank 6 interstage screen. Recovered carbon will be collected in a bin that can be manually transferred for re-use or disposal. Tailings discharging from the safety screen will gravitate to the cyanide detox Tank 1 in the cyanide detoxification circuit.

2.3.10.3 Desorption and Regeneration

Carbon will be acid-washed.

The pressure Zadra elution circuit (elution column, strip solution tank, strip solution pump and a strip solution heater package) will operate in a closed loop with the electro-winning cells located inside the gold room.

After completion of the elution process barren carbon will be transferred from the elution column to the kiln dewatering screen and into the carbon regeneration kiln feed hopper. Regenerated carbon discharges from the kiln to a quench tank and will be pumped to the carbon sizing screen. The screen oversize will return to CIL Tank 6, while the quench water and fine carbon will report to the tailings hopper via the carbon safety screen for disposal in the TMF.

2.3.10.4 Gold Room

Three electro-winning sludging cells will be used; one cell will be dedicated to the intensive cyanidation circuit and the other two to the elution circuit.

The electro-winning cell dedicated to the intensive cyanidation circuit will be fed leach solution via a fixed speed centrifugal pump from the gravity leach liquor storage tank. Solution will be pumped to the electro-winning cell and then gravitates back into the gravity leach solution storage tank in a closed loop until suitable gold recovery is achieved. The duration of this cycle varies with the quantity of gold recovered by gravity but is projected to be less than 24 hours.

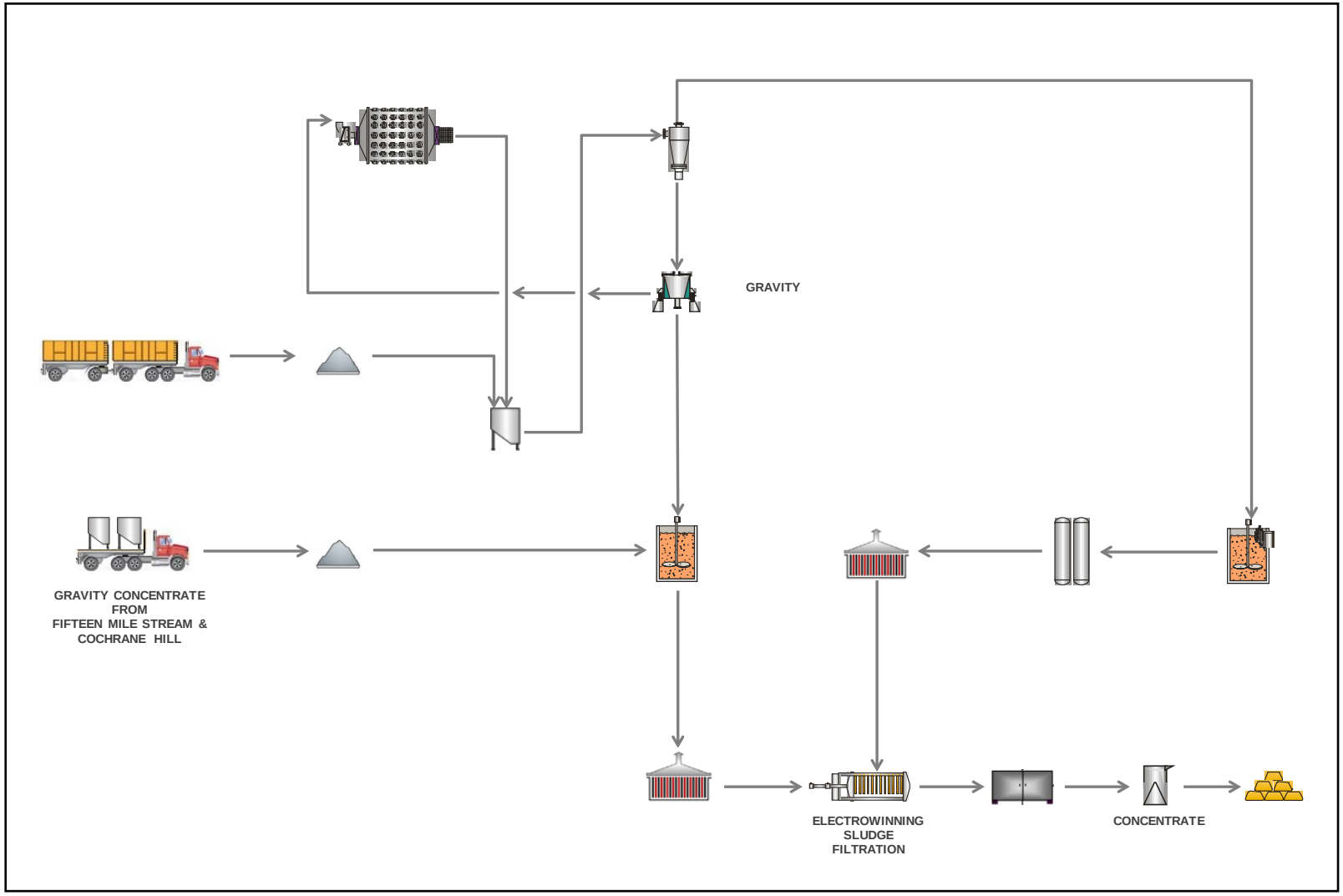
The two electro-winning cells dedicated to the elution circuit will operate in a closed loop with the elution column and associated equipment. Eluate will flow directly from the top of the elution column to the electro-winning cells after cooling through heat exchangers. The eluate will flow through the electro-winning cells and then gravitate back to the strip solution tank and then be pumped to the elution column in a continuous closed loop. The duration of this cycle is approximately 16 hours.

2.3.10.5 Cyanide Detoxification and Tailings Disposal

Slurry passing through the carbon safety screen will gravitate to two 300 m^3 cyanide detoxification tanks which are designed on the conventional air-SO_2 process and can operate in series or parallel for operational flexibility. The average slurry residence time at 250 t/h is 1.5 hours.

The detoxified slurry stream will gravitate to the tailings hopper from where it will be pumped through a single pipeline to the Touquoy exhausted open pit for storage. Supernatant water and run-off from precipitation will be collected in the exhausted Touquoy pit. If necessary based on water quality, this water will be pumped to TMF for treatment and release.

Figure 2-7: TQ Process Flow Diagram – Gold Concentrate



2.3.11 Tailings Management - Touquoy

Final processing of the gold concentrate from the Project site will be undertaken at the Touquoy facility. The small amount of additional tailings generated from this operation will be pumped to the mined out Touquoy pit for storage. Process water will be recycled from the Touquoy TMF. At some point, process water may be sourced from the exhausted Touquoy pit.

It is anticipated that a total of approximately 350,000t of tailings from the Project will be deposited into the mined out Touquoy pit commencing in 2022, once Touquoy ore has been exhausted. Tailings from the Cochrane Hill concentrate will be deposited in the exhausted open pit in conjunction with tailings from Beaver Dam, and Fifteen Mile Stream concentrate. The Cochrane Hill tailings deposited represents an increase of approximately 5% over and above the total Beaver Dam and Fifteen Mile Stream tailings that will be deposited into the pit.

Source term estimates for Cochrane Hill tailings supernatant will be used to update the Touquoy water quality model to predict potential changes in water quality in the Touquoy open pit as a result of the addition of tailings from processing of Cochrane Hill concentrate at Touquoy. This information will be used in support of an application to amendment to the Touquoy Industrial Approval (IA) to accept processing of Cochrane Hill concentrate and disposal of tailings from Cochrane Hill concentrate to the Touquoy open pit.

The Touquoy Pit is not expected to completely fill with water during the processing of the concentrate but if this does occur, surplus water will be pumped into the existing Touquoy TMF in order that it can pass through the water treatment system.

2.4 Emissions, Discharges and Waste

Dust emissions resulting from mine construction and operation will be controlled with the application of water obtained from Archibald Lake or the St Mary's River via a stand pipe on the raw water line, or wet/chemical suppressants. Stockpiled soils and tills will be revegetated as piles become stabilized. With a relatively short mine life, the majority of reclamation activities will be commencing at the end of the mining operation. However, where possible, inactive disturbed areas including stockpiles and roads will be reclaimed upon cessation of activity.

Combustion emissions, including nitrogen oxides (NO_X), carbon monoxide (CO), carbon dioxide (CO_2), sulphur dioxide (SO_2), and particulate matter (PM), will be generated from the operation of Project equipment and vehicles. Emissions will be reduced by proper equipment selection, maintenance and inspection. Modern diesel engines utilizing low sulfur diesel fuels have reduced particulate and sulfur dioxide emissions compared to similar engines used in the past. Air quality monitoring will be conducted as per the conditions of an IA, Nova Scotia Air Quality Regulations and the National Ambient Air Quality Objectives. Predictive modelling relating to dust deposition is planned as part of the environmental assessment.

Noise and vibration from blasting and equipment will be controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design. Predictive noise modelling is also planned to support the environmental assessment process.

Sediment and erosion control measures will be in place throughout all phases of the Project to ensure that surface runoff generated during operations is appropriately managed. Surface runoff will be collected in ditches and/or ponds and if of suitable quality discharged to the receiving environment. Groundwater and precipitation in the open pit, will be directed or pumped to the TMF for use as process water. Water from the water management pond(s) may be used in for dust suppression, to the extent feasible. Water management pond development will be staged with the overall development and needs of the Project. Details regarding the water management pond volumes required for the proposed mine will be defined

during the detailed design and reported in the EIS and/or EARD. Final design details will be a requirement of the provincial IA application.

Water discharges will be monitored and sampled in accordance with the terms and conditions of the provincial IA. Monitoring will ensure that total suspended solids (TSS) levels do not exceed the approved final discharge limits. The Proponent is aware of the requirements of the Metal and Diamond Mining Effluent Regulations (MDMER) and will comply with said requirements as applicable to the site. Since this is a satellite mine operation with no cyanide processing on-site, effluent will generally be tested for TSS, metals and pH and any other requirements stemming from Environment Canada or the Province via the IA process.

Solid and hazardous waste generated onsite will be minimal and limited to office and domestic refuse and oily waste. Waste streams will be managed by accredited waste collection contractors who will regularly pick up waste for transport to authorized/approved off-site disposal or recycling facilities utilizing legislated or approved methods. If a spill occurs, contaminated material will be removed from the site for disposal and recycling to an approved facility. An on-site septic system will be designed and built for sewage and greywater disposal.

2.5 Reclamation

The goal of the reclamation plan is to return land and water disturbed by development to a safe and stable condition compatible with the surrounding landscape and final land use as determined by the appropriate level of community and regulatory consultation. The plan will employ recognized reclamation best practices, acknowledged principles of ecological restoration, and consultation with relevant stakeholders. The site has been used for past mining and exploration activities (decline installed, roads, exploration camps, water management pond system, and small waste piles of rock and overburden along with successive tree harvesting and silviculture activities) for the last 100 plus years. Evidence of limited recreational use of the land (hunting, fishing and off-road vehicles) at the site suggests that these activities could be re-instated after the mining operation ceases and reclamation activities completed. The majority of the lands proposed for the mining operation and infrastructure are owned by the Provincial Crown.

All marketable timber or biomass will be removed from the pit, crusher, plant site, TMF and waste rock disposal areas. Organic debris (roots, stumps, brush) will be stockpiled in conjunction with topsoil and used for reclamation at closure. All reclaimed areas will be covered with overburden and growing medium to a depth suitable to establish and support a self-sustaining vegetative cover.

At closure, all infrastructure will be removed except as required for long term maintenance and monitoring. The open pit at the Project site will be allowed to flood creating a lake. Re-contouring of the WRSF, carried out progressively throughout the Project life where practical, will be completed. The crusher site will be contoured to match the local topography.

The anticipated scenario for closure of the TMF is long term wet cover. Where practical, exposed tailings beaches will be covered and then re-vegetated. A spillway invert will be lowered within the tailings pond to allow free flow of runoff out of the facility once the contained water is deemed suitable for discharge to the receiving environment. Re-vegetation will employ hardy pioneer species and grasses to colonize disturbed areas and stabilize soil. Native species will be planted to hasten a return to a natural ecosystem reflecting the pre-development site.

All runoff associated with the site will be contained and directed to either the TMF or open pit until determined to be suitable for discharge. Runoff in the vicinity of the open pit will be directed as dispersed flow into the open pit to speed filling. The

flooded pit will have shallow margins along the pit perimeter and will sustain a seasonal flow channel downstream of the pit. Runoff from stockpiles will be directed to stable channels and released to the natural drainages.

Decommissioning of the site will require approximately three to five years after cessation of operations. Two years will be needed to complete regrade and re-vegetation of the site, after which monitoring will continue until deemed no longer necessary – typically two to three years post-reclamation. The reclamation measures are designed to enable eventual walk away from the site, leaving the site in a safe and stable state. The self-sustaining site will be compatible with the surrounding environment and future land use. The Project site is intended to be returned to its previous land use after mining: recreation and forestry. Other opportunities may exist for the site. The final disposition of the site will come from consultation with all stakeholders throughout the course of the Project life and adherence to applicable legislation.

2.6 Project Development

2.6.1 Background

For context, a description of the existing Touquoy Mine, and proposed Beaver Dam and Fifteen Mile Stream mines and their permitting history/status are outlined below.

2.6.1.1 Touquoy Gold Mine

DDV Gold Limited, the project Proponent in 2007 (subsequently acquired by Atlantic Gold Corporation in 2014), submitted an Environmental Assessment Registration Document (EARD) to NSE on March 15, 2007 for the Touquoy Mine. As a result of the subsequent review, the Minister of Environment and Labour directed DDV Gold to prepare a Focus Report to provide additional details on certain specific aspects of the project. During the provincial EA review, the document was also reviewed by federal agencies. Under the former *Canadian Environmental Assessment Act* in 2008, a federal environmental assessment was not required. The Canadian Environmental Assessment Agency (CEAA) file number for this review was 10700-40.

The nature of the Focus Report was detailed in the Terms of Reference (TOR) in a public letter to DDV Gold dated April 15, 2007. The Focus Report Study Area (FRSA), as designated by the Minister, encompasses an area of 54,337 ha in the general area of Moose River Gold Mines in Halifax County. Geographic boundaries extend north to Caribou Mines, south to the community of Lake Charlotte, west to Shaw Little Lake, and east to Snowshoe Lake.

The TOR specified that the Proponent should examine the impact of the project on the surrounding area, in particular the downstream watershed, existing nearby wilderness areas, and undeveloped lands to the southwest. The physical, biological, ecological, and cultural aspects of the FRSA were to be described. The decisions underlying the project design were to be detailed and all measures employed to mitigate and monitor impacts were to be explained.

Based on the Focus Report details, the Nova Scotia Minister of Environment approved the above project on February 1, 2008 in accordance with Section 18 (a) of the Environmental Assessment Regulations, pursuant to Part IV of the Environment Act.

The Touquoy Mine Project had been considered with respect to potential adverse effects and environmental effects, including effects on socio-economic conditions. The Minister was satisfied following a review of the information provided by DDV Gold Limited, and through the government and public consultation as part of the environmental assessment, that

any adverse effects or significant environmental effects of the undertaking could be adequately mitigated through compliance with the attached terms and conditions.

The Touquoy Mine Project is currently operating under an Industrial Approval from Nova Scotia Environment issued in March 2014, with subsequent amendments. All necessary supporting permits are in place including water withdrawal approvals, and wetland and watercourse alteration approvals.

2.6.1.2 Beaver Dam Mine Project

In October 2015, Atlantic Gold Corporation (Atlantic Gold) submitted a Project Description for the Beaver Dam Mine Project to the Canadian Environmental Assessment Agency (CEAA) under the *Canadian Environmental Assessment Act 2012* (CEAA 2012). The Beaver Dam Mine is planned to be operated as a satellite surface mine operating at a rate of approximately 2 million tonnes (Mt) of gold-bearing ore per year. Beaver Dam ore will be crushed and hauled by on-road trucks to the Touquoy processing facility, a distance of just over 35 km. Beaver Dam will not include a concentrate operation and will not require a TMF. This ore will be processed in conjunction with ore supply from the Touquoy, Fifteen Mile Stream, Beaver Dam and Cochrane Hill surface mines. Beaver Dam will supply ore to the Touquoy processing facility over a period of five years (2022 - 2026) of the total ten years of its operation (2018 - 2027) based on the combined feed from all four operations. In December 2015, CEAA determined that a federal Environmental Assessment was required for the Beaver Dam Mine Project pursuant to the CEAA 2012 and released EIS guidelines in January 2016. Atlantic Gold submitted an Environmental Impact Statement in June 2017, and following a technical review by CEAA, information requests were made of Atlantic Gold to provide further information in August 2017. Atlantic Gold is currently working on responding to these requests as part of the federal Environmental Assessment process.

2.6.1.3 Fifteen Mile Stream Gold Project

Fifteen Mile Stream Gold Mine is located on Highway 374 in Trafalgar, Nova Scotia. This mine is proposed as a satellite open pit gold mine with a similar operation as Cochrane Hill. Fifteen Mile Stream will supply concentrate to the Touquoy processing facility over a period of six years (2021 - 2026). The Fifteen Mile Stream Gold Mine project description was submitted to CEAA on June 1, 2018. CEAA issued its environmental assessment determination stating that environmental assessment of the designated project is required on July 16, 2018.

2.6.2 Cochrane Hill Gold Project Phases and Scheduling

The construction of the Project will be timed so that the concentrate supply to the Touquoy process plant will begin as the Touquoy deposit is exhausted and concurrently with both the Beaver Dam mining operation and Fifteen Mile Stream mining operation (four to five years overlap of each; see Fig. 2-5). The Touquoy facility will undergo routine maintenance and minor upgrades in preparation to receive concentrate which will be processed at the Touquoy processing plant.

Removal of topsoil, overburden and waste rock from the top benches of the open pit will begin one and a half years prior to the crusher installation. Timing of clearing activities will be informed by nesting bird directives or as approved subject to pre-construction nesting bird surveys. During this time, stockpiles for the topsoil and overburden will be built, and the initial lift of the WRSF will be constructed. Also, surface and ground water management facilities, including monitoring wells, ditches and berms will be constructed.

All other development work on the plant site and TMF including construction and commissioning of the support infrastructure will be completed in the twelve months prior to commencement of operation.

Supply of power to the site and placement of the fuel storage facility and support facilities will be linked to the start of early mining pre-strip operations.

The following Table 2-3 briefly outlines the Project schedule and the relationship between activities at the Touquoy Mine site and the Project site.

Table 2-3: Mine Development, Operation and Reclamation Schedule

Event	Timeline
Touquoy Construction	Year -1.5
Touquoy Operation	Year 1 – 5
Cochrane Hill Construction	Year 4
Cochrane Hill Operation	Year 5 – 10
Touquoy Reclamation (WRSF, Tailings)/Monitoring	Year 6 – 9+
Cochrane Hill Reclamation / Monitoring	Year 10 – 12+
Touquoy Reclamation (Plant, Pit) / Monitoring	Year 10 – 12+

2.6.3 Opportunities for Cochrane Hill Mine Life Extension

The proposed development plan and current mine life for the Project as described in the foregoing section is based upon extraction of the proven and probable reserves of 11.2 Mt of ore grading 1.10 g/t.

As with most mining properties, however, mineralization extends beyond the current open pit limits and the resource at the Project remains open at depth and to the east. As further exploration and infill drilling is undertaken, and resource estimates upgraded, any decision to expand the pit will be preceded by contact with regulatory authorities and applications to amend the appropriate operating permits and approvals.

2.7 Alternative Methods of Carrying Out the Project

Alternative methods of carrying out the Project are defined as means of similar technical character or methods that are functionally the same. Alternative methods differ from alternatives in that they represent the various technical and economically-feasible ways that a project can be carried out, and which are within the applicant's scope and control. The analysis addresses alternatives to extraction methods; site layout and infrastructure configuration; and, processing options. The planned project is to develop a surface mine, crush material, concentrate ore on site and transport a gold concentrate for processing at the Touquoy processing facility to take advantage of surplus capacity within the existing plant at the Touquoy Mine site.

The alternatives that have been addressed during the design phase include mining methods; ore processing; mined materials management; tailings management; site infrastructure; power supply; and road access.

2.7.1 Mining Methods

The preferred mining method is dictated primarily by the location, geology and grade of the mineral resource or ore body. Mining can theoretically be undertaken by either underground or open pit methods. Underground mining as a primary extraction method typically requires relatively high grade and vein type mineralization following a fault-like structure in order to make practical or economic sense. In the case of the Project, the resource is relatively low grade, disseminated and

near surface making it better suited to open pit extraction. A continuation of the surface mining into an underground operation below or adjacent to the pit bottom may be viable depending on the final depth of the deposit, but this is currently not under consideration and would likely not be economic unless there was a dramatic increase in grade with depth and/or gold price.

2.7.2 Ore Processing

Ore processing at the Project site is proposed to be undertaken by conventional crushing, grinding and flotation methods. The principal alternative considered in respect of ore processing is to limit Project production to a gold concentrate for shipment by highway truck 142km to the existing Touquoy plant for the final carbon in leach and electro-winning processes to produce the gold dore end product. This eliminates the need for construction of additional facilities at the Project site and restricts the use of cyanide and need for cyanide extraction to the existing facilities at the Touquoy Mine site, both of which are deemed preferable.

2.7.3 Mined Material Management - Waste Rock, Low Grade and Other Stockpiles

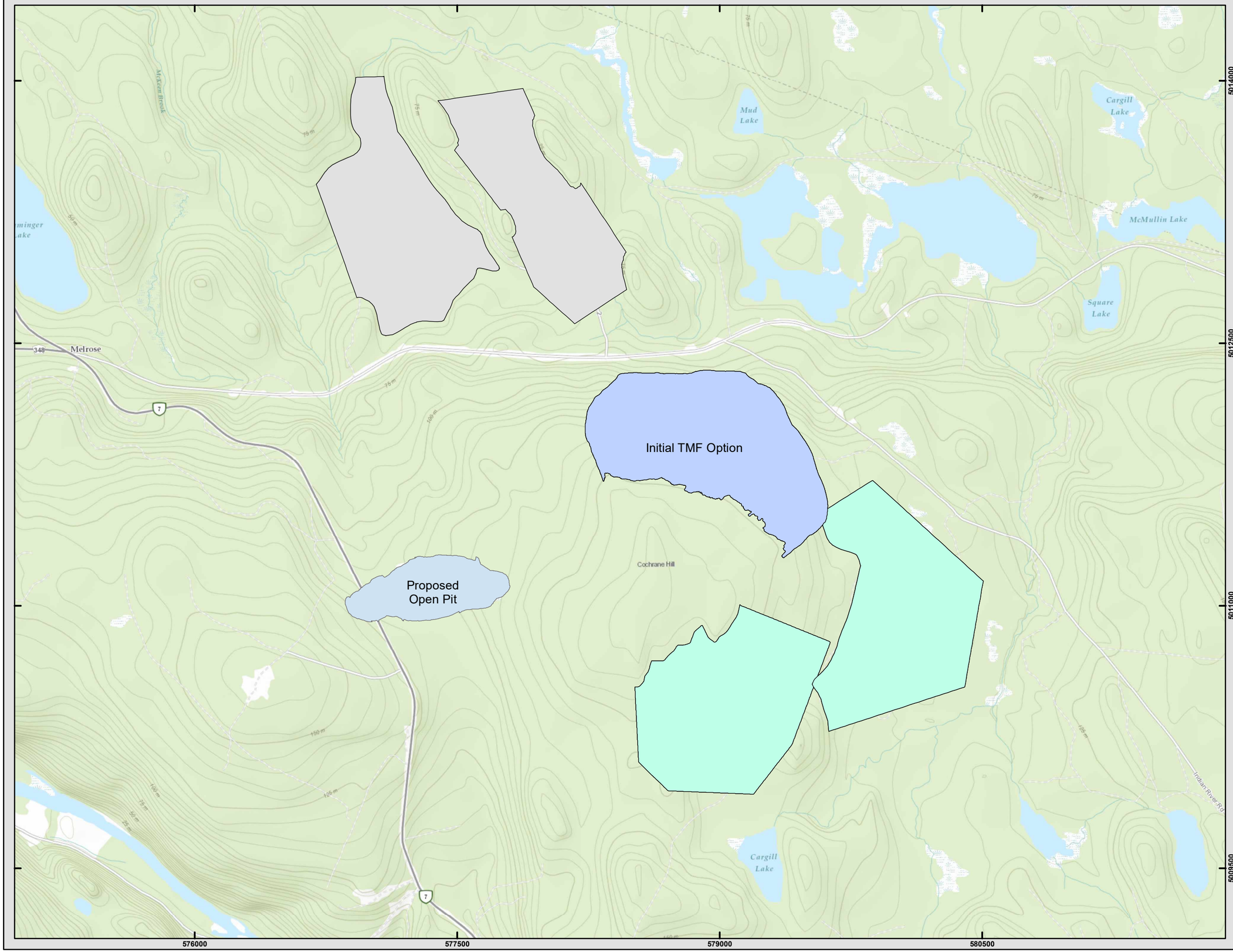
The major design considerations in evaluating alternative stockpile locations are proximity to source (haulage distance), storage capacity (surface area and height), environmental considerations, geotechnical suitability and reclamation, including conforming to adjacent topography to the extent practical. In general, stockpiles have been designed to be in close proximity to other planned facilities in order to minimize the project footprint and area of disturbance and located adjacent to areas stripped to allow stock pile sizes to be minimized thus minimizing compaction and improving the quality of material for reclamation.

2.7.4 Tailings Management

Several alternative TMF site locations (Figure 2-8) are currently undergoing evaluation in conjunction with the layout detailed in Section 2.3.7, Figure 2-4. The primary considerations in evaluating potential TMF locations are the storage capacity and initial water balance, surface area, the number and size of containment structures required including their design and stability, proximity to other facilities (particularly the mill for the purposes of tailings transport and reclaim water) and potential for impacts on fisheries and aquatic resources and other valued environmental components.

The PA is situated to the east of Highway 7 surrounding Cochrane Hill and to the north of Archibald Lake. The landscape in the PA is characterized by undulating to rolling topography, wetlands and woodlands dissected by a few lakes and streams. The major project facilities are located entirely in the drainage area of McKeen Brook or its tributaries.

The initial TMF option selected for design purposes is located within the McKeen Brook drainage to the north and is situated in a position that limits impacts to wetlands and streams frequented by fish to the maximum practical extent. The TMF positioned in this manner allows for the gravity flow of tailings from the mill to the TMF. This location as well as other alternative TMF locations are currently subject to ongoing environmental and geotechnical investigation.



Prepared For:

ATLANTICGOLD

FIGURE 2-8

Cochrane Hill Tailings Management Facility Options

Melrose, NS

- Initial TMF Option carried forward for study
- Alternate TMF Options carried forward for study
- TMF alternatives deemed unsuitable
- Proposed Open Pit

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 200 400 800 Meters

1:20,000 Scale when printed @ 11" x 17"

Drawn By: LP

Date: 2018-09-28

McCallum Environmental Ltd.

2.7.5 Site Infrastructure, Power Supply and Road Access

The location of the open pit is fixed given the location of the mineral resource. Site infrastructure has been located in as close proximity to the open pit as practical in order to minimize the footprint and disturbed area requiring reclamation.

An existing 3 phase 25 kV transmission line is located east of the PA at Cross Roads Country Harbour. This line will supply power to the site for mine operations via a 4 km upgrade of an existing single phase line and a further 9 km extension of 25kv 3 phase line to site.

With respect to road access, Provincial Highway Route #7 and the existing Indian River Road provide access to within approximately 4km of the proposed administration office and plant site area. A new gravel access road will connect the site to the existing road following the shortest practical route in order to minimize disturbance.

In addition to the mine access road, three primary on-site haul roads will be constructed: a 1.5 km ore haulage road connecting the open pit to the ROM stockpile pad, a 0.4 km waste rock haulage road connecting the open pit with the WRSF and a 1.1 km haul road connecting the open pit with the TMF.

Additional minor on-site roads/tracks will include:

- A track for decant line and tailings line;
- A track for accessing the raw water intake at Archibald Lake or St. Mary's River;
- A track for accessing the engineered discharge from the TMF to discharge location;
- A track for accessing the powerline; and
- A track around the perimeter of the TMF.

All access road alternatives were evaluated and selected based upon the proximity to proposed site infrastructure and sited to minimize the extent of new disturbance and the potential for impacts to fisheries and aquatic resources and other valued environmental components.

3.0 Project Location

3.1 Location Description

3.1.1 Location

The Project is located within Guysborough County, in central Nova Scotia, approximately 145 km northeast of Halifax and 45 km to the northeast of Atlantic Mining's Fifteen Mile Stream Mine Project (Figure 3-1).The property covers the historic Cochrane Hill Gold District located on NTS sheets 11E01/D, 11E08/A and 11E05/B and is centred at 45°14' 57" north latitude and 62° 00' 48" west longitude. The Touquoy Mine is located on the NTS sheet 11D15 and is centred at 44°59'09" north latitude and 62° 56' 16" west longitude.

Figure 3-1: General Property Location

Google Maps

3.1.2 Accessibility

The Project property is located 13 km north of Sherbrooke in Guysborough County. The property can be reached at any time of the year by travelling east from Halifax on Highway 107 and then Highway 7, which swings north at the township of Sherbrooke and traverses the central portion of the property some 13 km north of Sherbrooke for a total distance of 210 km.

Highway 7 is a well maintained bituminised road which is passable year round.

3.1.3 Climate and operating season

Eastern Nova Scotia is characterized by northern temperate zone climatic conditions moderated by proximity to the Atlantic Ocean. Seasonal variations occur, with winter conditions of freezing and/or substantial snowfall expected from late November through late March. Spring and fall seasons are cool, with frequent periods of rain. Summer conditions can be

expected to prevail from late June through early September with modest rainfall and daily mean temperatures in the 15°C to 20°C range. Maximum daily summer temperatures to 30°C occur, with winter minimums in the minus 25°C to minus 30°C range. Mineral exploration programs can efficiently be undertaken during the period of May through late November, while winter programs can be accommodated with appropriate allowance for weather delays.

3.1.4 Local Resources and Infrastructure

A large proportion of the surface rights in the PA are registered as "Ungranted Crown lands". This includes the area over the Cochrane Hill Deposit.

Availability and source of power: Lines carrying three phase 25 kV power run alongside Highway 7, crossing the western edge of the Cochrane Hill Deposit.

Availability and sources of water: There are several lakes near the edge of the Property, within 3km of the Cochrane Hill Deposit such that an abundant water supply is available.

Availability and sources of mining personnel: It is anticipated that the majority of personnel required for mining operations at the Project would be recruited from people living within daily driving distances of the Project, with specific training programs initiated as required.

Potential tailings storage areas, waste disposal areas and processing plant sites: The locations of these infrastructure components present no significant technical hurdles. Surface rights for a mining operation would necessarily involve discussions with the relevant provincial authority, together with permitting under Nova Scotia's Environmental Assessment Approval process.

3.2 Land and Water Use

3.2.1 Zoning

The project is located with the Municipal District of Saint Mary's. The private property is zoned "Rural" and the Crown lands are zoned "Conservation". Extractive facilities are not listed a permitted uses and a planning amendment is required to permit this use. An application to the municipality will be submitted in 2018 and is expected to take 6 months.

3.2.2 Legal Description and Ownership

The Project is located within Guysborough County, in central Nova Scotia, approximately 145 km northeast of Halifax and 45 km to the northeast of the Proponent's Fifteen Mile Stream Gold Project (Figure 3-1). The property covers the historic Cochrane Hill Gold District located on NTS sheets 11E01/C D, 11E08/A and 11E0211E05/D B and is centered at 45°08'3014' 57" north latitude and 62° 32' 00' 0048" west longitude. The Touquoy Mine is located on the NTS sheet 11D15 and is centered at 44°59'09" north latitude and 62° 56' 16" west longitude.

In terms of surface rights approximately 777 ha or 65% of the area of the main Exploration License (51477) is held as ungranted Crown lands by the Province of Nova Scotia and the remaining peripheral 35% area is held by nine different parties. The Cochrane Hill deposit is located entirely within the Crown lands.

Mineral tenure consists of one Exploration License EL51477 comprising 76 contiguous "map-staked" mineral claims for a total area of 1134 ha. Annual work commitments total $60,800. There are sufficient work credits to maintain this License until its 2019 anniversary without further assessment work being filed. The Property claims are held by Atlantic Mining NS Corp. (a wholly-owned subsidiary of Atlantic Gold Corporation).

The Property is subject to a 3% Net Smelter Royalty (NSR) on all metals produced payable to Mr. Scott Grant of Pictou, Nova Scotia. Up to 2% of the NSR is available for purchase for $1.5m.

In addition, a royalty of 1% of the net value received by the producer is payable to the Province of Nova Scotia on all gold production.

A Mining Lease will be sought once the Project receives Environmental Assessment Approval.

3.2.3 Current Land Use

The principal economic activity in the PA is forestry. Coastal settlements to the south support a long-standing lobster and fishing industry and there is some farming on terraces along the valleys of the St. Mary's River and its tributaries. Streams and waterways in the area support trout fishing and other recreational uses.

The PA has had previous exploration and mining activity. A series of historical and abandoned mine openings are present across the PA. Between 1982 and 1983, 13,106 tons of material were excavated from an open pit and processed in a test mill with the subsequent tailings being deposited on site. There is a road network on the site to support previous exploration and mining activity, as well as forestry activity on provincially owned land within the PA. Access roads have been in place for decades for forestry and mining activities; others may use the roads from time to time for seasonal activities on the crown land. The use of the land by First Nations communities at this point has not yet been fully revealed and is currently being evaluated. The roads present opportunities for recreational vehicle use and foot traffic but the degree of use of the private and crown roads is not well documented.

The transportation route for ore between the PA and the Touquoy site has been previously described in detail. The haul route utilizes existing provincial highways and roads including Highway 7 to Sheet Harbour, then north on Highway 224 to the Beaver Dam Haul Road to Mooseland Road.

3.3 Proximity

There are several population centres within a short driving distance of the PA, including the town of Sherbrooke, 13 km to the south, which has a population of 1,700 and provides a number of services including secondary schooling and a hospital. The town of Antigonish, some 40 km to the north, has a population of 14,600 and provides a greater range of services.

4.0 Environmental Effects

Environmental studies began in 2014 and will be continuing in support of preparation of the EIS through to November 2018. Descriptions of existing conditions in this project description are based on desktop, regional knowledge from similar projects and preliminary field study. The potential for environmental effects has been drawn based on the knowledge base accumulated to date and will be refined as further study and analysis is completed. To that end, the work that is planned to complete the analysis is also provided. Plans may be modified depending on findings. Where possible, some project components may be modified to accommodate potential environmental effects.

4.1 Ecological Context

The site straddles the eastern and Nova Scotia uplands ecoregions and is further subdivided into the eastern interior and St. Mary's River ecodistrict. The eastern interior ecoregion is underlain by quartzite and slate of the Meguma Group, with granitic intrusives. A variety of landforms are found in the eastern interior ecoregion, which include rolling till plains, drumlin fields, extensive rockland, and wetlands. The bedrock is highly visible in those areas where the glacial till is very thin, exposing the ridge topography. Where the till is thicker, the ridged topography is masked and thick softwood forests occur.

There are a few drumlins and hills scattered throughout the ecodistrict with fine textured soils derived from slates. The St. Mary's River ecoregion is underlain by siltstones and sandstones of the Horton Group. Topography of the ecodistrict is largely hummocky; where the land is level, wetlands and drumlins exist. Soils are primarily well drained, composed of stony to gravelly sandy loams that developed on till veneers derived from the underlying parent material.

The composition of the forests in the eastern interior ecodistrict strongly reflects the depth of the soil profile. Thus, many climax compositions can be found throughout. On the shallow soils, repeated fires have reduced forest cover to scrub hardwoods such as red maple and white birch, with scattered white pine and black spruce underlain by a dense layer of ericaceous vegetation. However, on the deeper, well drained soils stands of red spruce will be found. On the crests and upper slopes of hills, drumlins, and some hummocks, stands of tolerant hardwood occur. Both beech and hemlock occur on these deeper, well drained soils, but their presence is usually individual and seldom of a high percentage in any stand. On the imperfectly and poorly drained soils, black spruce will dominate the stand composition (Neily et al. 2005).

Forest composition within the St. Mary's River ecodistrict is also a reflection of the soil profiles: the shallow coarse soils support black spruce and white pine. Red spruce and tolerant hardwoods can be found on the upper slopes and drumlins. The abundance of black spruce and other fire species has resulted from historical burnings that also caused the extensive barrens within this ecodistrict. Fires on the shallow, sandy soil may have contributed to the lowered soil fertility (Neily et al. 2005).

The closest wilderness area is The Big Bog Wilderness Area which is 7 km southwest of the PA. There are two areas pending protection as wilderness areas near the PA: Nine Mile Woods Wilderness Area (900 m north of the PA) and Indian River Wilderness Area (5 km southeast from the PA). The closest nature reserve is Indian Man Lake Nature Reserve 25 km west of the PA. There is an area pending protection as a nature reserve 25 km to the west – northwest as well: Sutherlands Lake Nature Reserve. The closest Provincial Park is Sherbrooke Lake Provincial Park 9.2 km south of the PA. The PA intersects the northeastern edge of a parcel of land proposed to be included in the St. Mary's Corridor Lands.

4.2 Spatial Boundaries

The PA is defined as the current design layout for infrastructure plus an appropriate buffer setback to evaluate direct impacts. It is important to note that additional engineering and technical studies are still required to finalize site infrastructure.

The EIS Local Assessment Areas (LAA) for each VC have been drafted and will be discussed in detail in the EIS document. EIS Regional Assessment Areas (RAA) for each VC (as determined to be required for analysis) have also been drafted.

4.3 Geochemistry (ARD/ML)

4.3.1 Existing Conditions

Acid rock drainage (ARD) that is caused by human activity refers to the outflow of acidic water from metal mines, coal mines or disturbance from construction (highways, housing, commercial developments) where, due to blasting or excavation of geologic materials, iron sulphide minerals become exposed to the atmosphere. When these environments are disturbed and come into contact with water, oxygen, and certain bacteria, the sulphide minerals may oxidize and generate acid.

The acid production potential (AP) of a material, based upon its sulphide content, may be offset by its neutralization potential (NP) which is most commonly afforded by carbonate minerals such as calcite and dolomite. The balance between these two factors (NP/AP) determines the likelihood of an exposed material type to generate net acidic drainage. However, besides the relative quantities, the reaction kinetics of acid-generating and acid-buffering phases also play an important role. The rate at which mineral-dissolution reactions occur is largely driven by the grain size, texture, mineral chemistry and ambient conditions (e.g., pH, temperature, etc.) under which the material is stored.

Metal leaching (ML) is a common phenomenon at mine sites and the relationship between ARD and ML is twofold. First, many sulphide minerals commonly host base metals (e.g., Cu, Cd, Zn, Pb) and metalloids in their crystal lattice, which will be released upon oxidation of the sulphide phase. Second, most metals that are commonly considered of environmental concern in tailings porewaters are more soluble under acidic condition, although several elements that exist as oxyanions under aerobic aqueous conditions may be mobile in a pH-neutral regime (e.g., As, Se).

A Phase I geochemical assessment study is being conducted for materials (waste rock, ore, and tailings) from the Cochrane Hill deposit. However, geochemical results for the quantification of the ML/ARD potential are not yet available.

The country rock hosting Cochrane Hill deposit belongs to the Cambrio-Ordovician Meguma Group, the same unit that underlies other Atlantic Gold properties (Touquoy, Beaver Dam, Fifteen Mile Stream). However, Cochrane Hill bedrock is distinct in that it has undergone higher-grade (amphibolite) metamorphism which has altered the turbiditic argillite and greywacke protolith to mica schists with porphyroblastic texture.

4.3.2 Potential Environmental Effects

Due to their distinct relatively high metamorphic grade, the mineralogical properties of Cochrane Hill bedrock may not be comparable to those seen at other Meguma Group ore deposits. From an environmental perspective the metamorphism of the local rock units may have been accompanied by structural and geochemical changes that affect the abundance, exposure and reactivity of sulphide and carbonate phases.

In the absence of mitigation, ARD/ML can lead to contamination of natural waterways with elevated levels of metals and other elements as well as low pH conditions unsuitable for aquatic life.

As a mitigation measure for ARD/ML potential, materials excavated from the site are being tested to ensure that they continue to conform to Sulphide Bearing Material Disposal Regulations. If a material type is found to be net acid producing at the site, the Proponent will proceed in accordance with the Nova Scotia Sulphide-Bearing Material Disposal Regulations, in consultation with NSE, and generally follow best management practices.

4.3.3 Work Planned

Potential current effects of ARD/ML will be studied via hydrogeological and surface water sampling programs that are underway and will continue through 2018.

A Phase II geochemical assessment has been proposed and, based on the results from the Phase I geochemical test program, will be conducted throughout 2018 and 2019. This assessment will include more detailed mineralogical work and kinetic testing to better understand elemental speciation as well as acid and metal release rates.

As mining enters the development and production phases, routine geological and water quality monitoring will also be undertaken to confirm the potential for acid generation and metal leaching.

A robust monitoring program of site discharges, developed for the Industrial Approval, will provide data to confirm the results of the assessment. An Acid Rock Drainage Prediction and Prevention Plan will be developed in conjunction with the Industrial Approval Application as required.

The WRSF will be designed to ensure safe storage of mine-related materials based on the understanding of contaminant sources, pathways, and receivers. Modifications to the storage of materials can be made as operational data becomes available.

4.4 Groundwater

The PA is in a low density rural area of Guysborough County. The nearest domestic well, as recorded in a provincial well log database, is 550m away from the proposed pit, in a southerly direction at a residence along Highway 7. Site surveys indicate no other wells in closer proximity. Domestic wells are a mix of drilled and dug wells in the area based on a review of the Nova Scotia Well Log Database (NSE 2013).

The site hydrogeology consists of a shallow fractured top-of-bedrock aquifer system which extends into the lower portion of the overburden. Most of the overburden appears to be low permeability, acting as a confining layer for the underlying fractured top-of-bedrock aquifer system. Based on previous studies of the hydrogeology in the area, the degree of hydraulic connection between the shallow bedrock fracture systems is likely poor to moderate, and the main zones that are capable of storing and transmitting relatively large volumes of groundwater are the larger scale fault systems. The water table is close to the surface across the PA, reflecting low permeability bedrock and an excess of annual rainfall over evaporation. Thus, the bedrock sequence and part of the overlying tills will be saturated with groundwater under ambient conditions.

The Touquoy Mine was subjected to a hydrogeological investigation that consisted of a series of geotechnical/hydrogeological drill holes that were monitored for groundwater quality. Given that the geology at the PA is similar to that at the Touquoy Mine, it is anticipated that similar hydrogeological conditions exist. Results from the Touquoy Mine indicate that groundwater is slightly basic (pH from 7.02 to 8.08) with elevated hardness (45- 160 mg/L). Certain metals such as aluminum, arsenic, manganese, strontium and zinc are elevated relative to guidelines for drinking water in Canada but within ranges found in groundwater in Nova Scotia.

The actual volume of groundwater stored in the bedrock aquifer is small, and this reflects the relatively small primary porosity of these rocks. In the absence of low permeability till and lake sediments that act as barriers, some of the larger bedrock structures may be hydraulically connected to surface water bodies which may become sources of aquifer recharge under a mine dewatering scenario. Some higher hydraulic conductivity structures have been intercepted at depth in bedrock. The degree to which they are connected to surface water bodies has yet to be determined. An ongoing predictive modelling and testing program at the Project is expected to confirm earlier investigations that indicated the future mine operation will not negatively affect flow in McKeen Brook and tributaries.

4.4.1 Potential Environmental Effects

The physical nature and extent of interaction between the groundwater and surface water and how they might be affected by mining activities will be characterized by detailed hydrogeologic studies at the PA.

4.4.2 Work Planned

Hydrogeologic programs are being implemented at the PA in 2018. A series of multilevel groundwater monitoring wells will be installed across the site. The wells will be tested and monitored to characterize physical hydrogeological conditions and sampled to characterize the groundwater chemistry. Surface water stations will be established to measure elevations and flow in adjacent and nearby water bodies. The collected data will be used and incorporated into the three-dimensional groundwater models that will be developed for the sites and used as a predictive tool for the purpose of facility design and to predict and assess potential surface water and groundwater interaction. In particular, the model will be capable of predicting potential changes to receiving environment water quality due to groundwater transport. This site-specific hydrogeological study is underway, and results will be provided in the EIS.

4.5 Surface Water

The PA is located in the St. Mary's River Secondary Watershed (1EO-1) which measures 133,682 hectares. It is one of the larger sized watersheds in the Province. The site straddles the eastern and Nova Scotia uplands ecoregions and is further

subdivided into the eastern interior and St. Mary's River ecodistrict. This area is located in a region of the province characterized by rolling till plains, drumlin fields, extensive rockland, and numerous freshwater lakes, streams, bogs and wetlands. The bedrock is highly visible in those areas where the glacial till is very thin, exposing the ridge topography. Where the till is thicker, the ridged topography is masked and thick softwood forests occur. There are a few drumlins and hills scattered throughout the ecodistrict with fine textured soils derived from slates. The St. Mary's River ecoregion is largely hummocky; where the land is level, wetlands and drumlins exist. This inland area is somewhat removed from the immediate climatic influence of the Atlantic Ocean and is characterized by warmer summers and cooler winters.

The St. Mary's River drainage basin is drained by the St. Mary's River and its tributaries, from west and north to south. This watershed has three lobes with headwaters commencing near Trafalgar in the west, Eden Lake in the west-central and Lochaber Lake in the north. Elevation range within the catchment is 0 to 270 masl (metres above sea level), which varies from approximately 160 to 270 masl in the headwater areas and gradually decreases to sea level at the final outlet at Sherbrooke. In the vicinity of the site, the St. Mary's River is the main mapped watercourse approximately 4km to the west with McKeen Brook, a tributary of the St. Mary's running north of the site, along with Cumminger Lake to the northwest and Cargill Lake to the south as the major mapped waterbodies. The proposed project infrastructure lies within the McKeen Brook tertiary watershed (1E0-1-D). This tertiary watershed drains through the Project from south to north-northwest initiating in Cargill Lake and the tributaries of McKeen Brook that drains to McKeen Brook and eventually meeting up with St. Mary's River at McKeen's Pool just north of Glenelg Lake. The watershed is characterized by a system of lakes connected by small to medium sized streams and wet areas. This complex system of streams, lakes, bogs and wetlands is a direct result of the underlying bedrock geology found in the region. The basin ultimately drains to the south via the St. Mary's River to the Atlantic Ocean at Sherbrooke.

Quarterly surface water quality samples are currently being collected (started June 2017) and analyzed for general chemistry and metals to establish a water quality baseline for comparison of water quality before and after site activities commence. Additional locations and parameters have been added to the water quality baseline program in September 2018. The current suite of parameters are being sampled at 19 stations and include:

- Total metals – (RCAp-MS)
- Total dissolved metals – (Dissolved RCAp-MS)
- Total mercury
- Total dissolved mercury
- Methyl mercury
- Total Organic Carbon
- Dissolved Organic Carbon
- Dissolved Floride
- Total Chemical Oxygen Demand
- Chlorophyll a
- Salinity
- Total Suspended Solids (TSS)

Six hydrometric stations have been established (staff gauge and level logger), and monthly discharge volume sampling commenced in August 2018 and will continue until June 2019. Table 4-1 provides an overview of the sample locations.

Table 4-1: Environmental Baseline Sample Locations

Sample ID	Location	Rationale	Sampling Type
SW1	Unnamed tributary to McKeen Brook	To characterize water quality downstream/north of the project activities	Water quality
SW2	McKeen Brook north of PA	To characterize water quality midstream and north of the project activities	Water quality
SW3	McKeen Brook northwest of PA	To characterize water quality midstream and northwest of the project activities	Water quality
SW4	Unnamed tributary to McKeen Brook	To characterize water quality downstream/north of the project activities	Water quality
SW5	Unnamed tributary to McKeen Brook	To characterize water quality downstream/east of the project activities	Water quality
SW6	McKeen Brook east of PA	To characterize water quality downstream/east of the project activities	Water quality and hydrometric station
SW7	Unnamed tributary to McKeen Brook	To characterize water quality downstream/north of the project activities	Water quality
SW8	McKeen Brook just upstream of the St. Mary's River	To characterize water quality downstream and northwest of the project activities	Water quality
SW9	McKeen Brook	To characterize water quality midstream and east of the project activities	Water quality and hydrometric station
SW10	Cargill Lake	To characterize water quality upstream and south of the project activities	Water quality
SW11	Unnamed tributary of St. Mary's River south of PA	To characterize water quality downstream/south project activities	Water quality and hydrometric station
SW12	Cameron Lakes	To characterize water quality midstream/north of the project activities	Water quality
SW13	Archibald Lake	To characterize water quality downstream/south of the project activities	Water quality
SW14	St. Mary's River downstream of McKeen Brook	To characterize water quality downstream of the project activities	Water quality
SW15	St. Mary's River downstream of SW11 tributary	To characterize water quality downstream of the project activities	Water quality
SW16	McKeen Brook downstream of PA	To characterize water quality downstream and northwest of the project activities	Water quality and hydrometric station
SW17	Archibald Brook	To characterize water quality downstream/south of the project activities	Water quality
SW18	St. Mary's River downstream of Archibald Brook	To characterize water quality downstream of the project activities	Water quality
SW19	Glenelg Lake	To characterize water quality at surface and at depth in a waterbody downstream of the project activities	Water quality

Sample ID	Location	Rationale	Sampling Type
SW20	Outlet of Archibald Lake	To characterize water quantity exiting Archibald Lake	Hydrometric station
SW21	Unnamed tributary of McKeen Brook	To characterize water quantity entering McKeen Brook from local catchment area	Hydrometric station

4.5.1 Potential Environmental Effects

The physical nature and extent of interaction between surface water and groundwater resources and how they might be affected by mining will be characterized by detailed hydrogeologic studies. Runoff from the site will be collected in ditches and water management ponds (site water management pond, surplus water management pond, and plant site management pond) and monitored to determine suitability prior to release to the environment. Flows may be reduced in nearby surface features due to changes in groundwater elevations near the pit.

Discharges from the PA will include surface water runoff and seepage from stockpiles. Water will be collected in a combination of ditching and two water management ponds to reduce total suspended solids (TSS) prior to release to the environment. If the water quality isn't suitable for release, the water will be transferred to the TMF for use as process recycle water and for eventual treatment and release of surplus water. The proposed locations for discharge will be into a tributary of McKeen Brook or Archibald Lake. A monitoring program will be established at each release location (pond outfall) to confirm the quality of water chemical and general parameters meet the applicable guidelines and legislative requirements prior to discharge into the receiving environment.

The predicted water quality of the Cochrane Hill tailings supernatant will be used to update the Touquoy water quality model to predict potential changes in water quality in the Touquoy pit as a result of the addition of tailings from processing of concentrate at the Touquoy Mine. This information will be used in support of an application to amendment to the Touquoy IA to accept processing of concentrate and disposal of tailings from Cochrane Hill concentrate to the Touquoy open pit.

4.5.2 Work Planned

The water quality baseline sampling program provides a year-long "look" at seasonal variations in the natural flows. Watersheds will be delineated, and all water bodies characterized within the PA.

A site hydrological study will be completed to evaluate potential effects on water quality and quantity, including from storm water discharge. Groundwater to surface water interaction will be evaluated as part of the planned 3D groundwater modelling. During final design, water management ponds will be engineered to accept site runoff for storm events. The Touquoy groundwater model will be updated as necessary to evaluate potential impact to surface water receptors from the Project concentrate tailings in the exhausted Touquoy pit to support an application for amendment to the IA.

4.6 Wetlands

Wetlands are known as productive natural areas which bridge the gap between terrestrial and aquatic environments. As productive natural areas, wetlands provide habitat for diverse and abundant animal and plant communities. Any project with the potential to alter a wetland (activities including filling, draining, flooding or excavating) including direct and indirect impacts, requires a provincial approval prior to commencing work.

Wetland locations are determined by a combination of available information derived from the Nova Scotia Topographic Database, Nova Scotia Wetland Database, Nova Scotia Wet Areas Mapping, and aerial photo interpretation. If identified using the above noted data sources, the wetlands are considered "mapped wetlands". There were several mapped wetlands

within or surrounding the PA. This information was used to assist wetland specialists to identify the potential locations of wetlands for further field survey and assessment. Wetland delineation surveys commenced in 2017. Additional field surveys are on-going in 2018 to confirm and delineate all wetlands that were not previously surveyed. All of the mapped wetlands will be assessed during baseline environmental surveys and any additional wetland habitat within the PA will also be identified and evaluated. Wetland surveys consist of wetland delineation and evaluation including hydrological characterization, plant surveys, fauna surveys, species at risk surveys, and functional assessments.

All wetland habitats have been and will continue to be considered when planning the placement of project infrastructure.

4.6.1 Potential Environmental Effects

Wetland habitat is expected to be altered and/or lost during the construction and operation of the Project. Wetlands are protected in Nova Scotia under the *Environment Act* – Activities Designation Regulations and are managed in accordance with the *Wetland Conservation Policy* (NSE 2011) that provides direction and a framework for the conservation and management of wetlands in Nova Scotia. This provincial conservation policy is in alignment with the Federal policy on wetland conservation.

Wetland functions are the natural processes associated with wetlands and include water storage, pollutant removal, sediment retention and provision of nesting/breeding habitat. Functions may also include values and benefits associated with these natural processes and include aesthetics/recreation, cultural values, and subsistence production.

The potential effects on wetland functions resulting from the Project may include:

- Enrichment/Organic loading
- Acidification
- Sedimentation
- Turbidity/Shade
- Temperature Increases
- Flooding
- Wildlife Displacement
- Contamination
- Salinization
- Soil Compaction
- Vegetation Removal/Alteration
- Drainage
- Fragmentation

Loss of wetlands that are directly affected by project infrastructure is expected to be the main effect to wetlands. Avoidance is the best policy and the Proponent will design and operate the Project to minimize impact to wetlands.

Outside of the infrastructure footprint, it can be assumed that direct loss of wetlands would not occur. However, a change in surface water drainage patterns and surface water quality could result in indirect impacts to wetlands outside of the project infrastructure footprint within the PA.

Any alteration/disturbance to wetlands (direct or indirect) will require alteration approval from Nova Scotia Environment (NSE). Should wetlands be determined to support fish/fish habitat a "serious harm to fish" authorization may also be required from DFO (*Fisheries Act Authorization* 35 (2)). The environmental assessment will detail the potential wetland impacts, proposed mitigation, and compensation approach to restoring or replacing impacted wetlands.

4.6.2 Work Planned

Survey work will continue in the 2018 field season and wetland delineation and evaluation will occur as per required methodologies. Wetland assessments will provide information in accordance with the requirements as prescribed in the *Wetland Conservation Policy* (Nova Scotia Environment, 2011).

During field assessments, three criteria are reviewed to determine the presence of a wetland:

- hydric soils present;
- conditions that result in flooding, ponding, or saturation of an area for a minimum period of time during the growing season; and,
- majority of dominant vegetation species associated with wetlands.

Evaluations of functional assessments of each wetland will be completed in the field in accordance with the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC; Adamus 2011) wetland evaluation technique.

4.7 Habitat and Flora

Within the PA, there are a number of ecosites each within a variety of moisture regimes including fresh, moist and wet with poor to very rich nutrient regimes. These ecosites primarily support vegetation types from the tolerant hardwood forest group with the mixedwood forest group being the second most abundant. Generally, tolerant hardwood groups represent mid to late successional tolerant hardwood vegetation types and are usually dominated by sugar maple, beech, yellow birch and red maple. Most sites are non-rocky and soils are mainly derived from glacial till or colluvium deposits. Habitat assessments were completed in October 2014 and additional habitat assessments were conducted in June 2018.

Prior to commencement of biophysical studies within the PA, assessment of wildlife, including vegetation, and habitat was completed based on the requirements outlined in the Nova Scotia Environment (NSE) *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE 2008). Development of a priority list of species for each taxonomic group was completed based on a compilation of listed species from the following sources:

1. Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Federal *Species-at Risk Act* (SARA 2003). All species listed as Endangered, Threatened, or of Special Concern;
2. *Nova Scotia Endangered Species Act* (NSESA 1999). All species listed as Endangered, Threatened, or Vulnerable; and,
3. Species of Conservation Concern listed as SRank S1-S3 by the Atlantic Canada Conservation Data Centre (ACCDC).

This priority list of species was narrowed by broad geographic area. The priority list of species was then further narrowed by identifying specific habitat requirements for each species. For example, if a listed NSESA species required open water lake habitat, and no open water lake habitat was present inside the PA, this species would not be carried forward to the final list of priority species for field assessments.

Botanical surveys were completed throughout the PA primarily in wetlands, and intact and disturbed upland habitats during baseline assessments in 2015 and 2017 and will continue in 2018. No SARA listed vascular plant species have been identified to date within the PA.

Lichen surveys were completed throughout the PA during 2017 and continue in 2018. To date, the SAR lichen species Frosted Glass Whiskers (*Schlerophora peronella*) (SARA Special Concern) and Blue Felt Lichen (*Degelia plumbea*) (SARA Special Concern; NSESA Vulnerable) have been observed within the PA. Overall, the PA is comprised of patches of intact forest interspersed with disturbed areas from clear cutting and historical mining activities. The disturbed areas typically consist of immature canopies that lack appropriate conditions for many of the SAR lichen species in Nova Scotia (SAR lichen species are typically associated with mature canopy types). However, some areas of the PA, particularly in the east, as well as in close proximity to Cargill Lake and Archibald Lake, consist of scattered old mature Balsam Fir swamps which supported lichen species that are usually associated with Boreal Felt Lichen (*Erioderma pedicellatum*) habitat such as salted shell lichen (*Coccocarpia palmicola*). No Boreal Felt Lichen has been observed within the PA to date.

4.7.1 Potential Environmental Effects

The Project has the potential to affect habitat directly associated with site clearing activities within the PA and indirectly with disturbance associated with dust, alteration of surface and groundwater flows and habitat fragmentation. The data collected during assessments will be used to identify known, probable, or other species-specific habitat types, species at risk locations, and the likelihood of species at risk occurring within a specific area. The effects of the Project on vegetation may include total loss of species during construction and operational activities within the infrastructure footprint. Final infrastructure placement will attempt to reduce impacts to identified rare plants, where practicable. Appropriate best management practices and strategies will be considered and implemented to the extent possible to minimize potential effects to habitat and vegetation.

Preliminary desktop analysis indicates a NSDLF identified old forest patch within the PA area near Archibald Lake and another 1 km north of the PA. The Nova Scotia Old Forest Policy (2012) defines old forest as any stand or collection of stands containing old growth and/or mature climax conditions. Habitat assessment surveys found an abundance of tolerant hardwood along the northern PA extent near the potential WRSP. Tolerant hardwood stands, as indicated by Neily et al. (2010), have a high potential to sustain old growth forest. NSDLF foresters are also currently working in this area to determine if there are tracts of old growth forest within the PA.

All identified habitats appear to be contiguous with habitats present outside of the PA.

Further vegetation studies and evaluations will help confirm the presence and/or potential of presence of species at risk within the PA and the potential impacts to these species from Project activities. Final construction and operational footprint designs will consider the results of these studies in order to mitigate the effects of the Project on species at risk.

To better categorize impacts, potential effects of the Project will be divided into two categories: loss and alteration. Loss occurs when project footprints overlap the location of a species and Project activities such as vegetation clearing or construction result in the removal of the species and loss of the functions it provides. Alteration is used to indicate a change in the quality of habitat functions provided by a system due to project effects. Alteration occurs along project edges or linear corridors such as roads and may extend out from these edges such as where dust deposition or edge effects occur. To assess these effects, a footprint-based approach will be taken. Loss will be assessed where spatial overlap of Project footprints and species occurs. Potential causes of alteration are typical and include: fugitive dust, contaminants, introduction of invasive plant species, and edge effects.

Potential effects of the Project include direct loss, habitat loss, and the introduction of invasive species. Despite application of mitigation measures, residual effects may be possible. Residual effects are anticipated for the loss of vegetation and/or rare plants within the PA not offset by reclamation. Introduction and spread of invasive and exotic species associated with maintenance and operations may occur but weed management programs will minimize the associated impacts.

Habitat alteration, fragmentation and loss can cause corresponding changes in the suitability of an area for a given species. The magnitude of the change depends on the species being considered. For large, mobile mammals, a few hectares of habitat loss may be inconsequential. However, that same amount of habitat loss may remove the entire range for species with small home ranges (e.g., amphibians), if adjacent suitable and unoccupied habitat is not available. Some habitat alterations can have positive effects for some species (e.g., vegetation clearing will create edge habitat suitable for Olive-sided Flycatcher), whereas others could have long-lasting negative impacts on habitat viability (e.g., impacts on water quality). The determination of potential effects will consider disturbance, loss and alteration.

As a part of Project design, some footprints proposed early in the design have been, and may continue to be, altered to reduce effects to sensitive locations.

4.7.2 Work Planned

Survey work will continue in the 2018 field season within the PA. Further lichen, botanical, and wetland delineation will occur in 2018 as a function of other baseline environmental assessments. Consultation with NSDLF on potential old growth forest is ongoing and consultation the appropriate regulatory agencies will occur if species at risk are located and mitigation options are considered.

4.8 Avifauna

Targeted spring migration, breeding season, fall migration, nocturnal owl and Common Nighthawk surveys were completed in 2014, 2015, 2017 and continue in 2018. Opportunistic sightings of birds identified in wetland habitats were also recorded as part of an ongoing avian use assessment within and surrounding the PA. Sixty-eight species in 2014/2015 and 54 species in 2017 have been identified, including 17 species of conservation interest or species at risk which have been classified as priority bird species for the purposes of the effects assessment (Table 4-2).

Table 4-2: Priority bird species identified within the PA to date

Common Name	Scientific Name	SARA	NSESA	COSEWIC	SRank
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Special Concern	S2B
Vesper Sparrow	*Pooecetes gramineus*				S2B
Baltimore Oriole	*Icterus galbula*				S2S3B
Gray Jay	*Perisoreus canadensis*				S3
Boreal Chickadee	*Poecile hudsonica*				S3
Red-breasted Nuthatch	*Sitta canadensis*				S3
American Kestrel	*Falco sparverius*				S3B
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	S3B
Wilson's Warbler	*Wilsonia pusilla*				S3B
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Vulnerable	Special Concern	S3S4B
Yellow-bellied Flycatcher	*Empidonax flaviventris*				S3S4B
Swainson's Thrush	*Catharus ustulatus*				S3S4B
Ruby-crowned Kinglet	*Regulus calendula*				S3S4B

Common Name	Scientific Name	SARA	NSESA	COSEWIC	SRank
Bay-breasted Warbler	*Dendroica castanea*				S3S4B
Blackpoll Warbler	*Dendroica striata*				S3S4B
Tennessee Warbler	*Vermivora peregrina*				S3S4B
Pine Siskin	*Carduelis pinus*				S2S3

Note: The ACCDC works with provincial and federal experts to develop rarity ranks (i.e. S-ranks) for species in Nova Scotia, as well as the other Maritime Provinces, see http://www.accdc.com/en/rank-definitions.html for more information. An S-rank of S5 means that the species is Secure - Common, widespread, and abundant in the province.

4.8.1 Potential Environmental Effects

Migratory birds may be affected via direct mortality from collisions with transmission lines, buildings, or vehicles, removal or disruption of nests, loss of habitat due to vegetation clearing, interference from Project lighting and noise, and effects to health from potential degradation of air and water quality. Project activities could potentially affect migratory birds. All effects will be evaluated in the EIS for all construction, operational and reclamation activities required for the Project.

Land disturbance, including building of roads, clearing of vegetation, excavation and blasting activities during the breeding season may affect nesting habitats of certain species and result in changes to migratory birds and their habitat. Some migratory birds may also experience sensory disturbance as a result of increased noise, lighting and other human activities associated with the Project. Finally, the Project could affect migratory birds and their habitat during emergency incidents (fires, spills and hazardous materials) which could result in a direct or indirect impact on the bird or its habitat.

Potential impacts to migratory birds and their habitat will be minimized during all stages of the Project. The Proponent will undertake work at the Project to avoid destruction of active nests during the breeding season and will include mitigation measures such as adhering to timing windows to avoid clearing or conducting pre-clearing nest surveys to ensure the absence of nesting activity. Dust suppression mechanisms, and noise and light reduction will be considered during construction, operations and decommissioning of the Project to minimize impact to migratory birds and their habitat. Where feasible, a buffer zone of trees and vegetation will be left intact adjacent to migratory bird habitat to minimize disturbance associated with project infrastructure and operations.

Impacts to migratory birds and their habitat could occur if a deleterious substance was released into a body of water frequented by migratory birds. Migratory birds could be affected as well should they attempt to use the TMF as a waterbody for staging, although this is unlikely given the short-term duration of such staging and the relatively low levels of deleterious substances expected to occur in the TMF pond. The Proponent will work to ensure migratory birds are considered when drafted Emergency Response Plans to effectively manage emergency spill situations to reduce or eliminate impact to the birds or their habitats.

The potential effects related to migratory birds associated with the construction and operation phases of the Project are summarized as follows:

- Direct temporary and long-term loss of habitat for birds due to clearing and grubbing of the open pit, TMF, WRSF, and transmission line;
- Displacement of birds in areas of activity, including excavation and stockpiling of mined materials;

- Increase in dust levels from heavy machinery operation and a general increase in vehicular activity may affect vegetative growth and indirectly cause a decrease in prey populations;
- Bird injury and mortality from vehicle collisions;
- Disturbance resulting from anthropogenic noise and vibrations;
- Attraction and disorientation resulting from night-lighting; and,
- Bird injury and mortality due to exposure to hazardous products or deleterious substances.

The increased traffic from the addition of concentrate haul trucks on local roads may cause an incremental increase in the potential for vehicle collision mortality with migratory birds although given the low numbers of additional truck traffic (approximately 10 truckloads per day) this is expected to be minor.

4.8.2 Work Planned

Bird surveys have continued in 2018 within the PA with additional spring migration surveys, nocturnal owl surveys, breeding bird surveys and fall migration surveys. Published and collected data and consultation with regulators will be used to further assess potential impacts to birds, including breeding birds.

4.9 Watercourses and Aquatic Habitat

The PA is located within the St. Mary's Secondary Watershed, which is accessible to anadromous fish including Atlantic Salmon and American Eel. The PA is centered around Cochrane Hill, with tributaries of McKeen Brook flowing from Cochrane Hill east or north to join the main channel north of the PA before draining northwest into the St. Mary's River.

Country Harbour Rd flanking the PA on the north side has surface water flow interrupted by ditching and culverts along Country Harbour Rd which were placed to prevent or reduce erosion and the undermining of road integrity. All of the culverts assessed along the northern edge of the PA are hung and impeding fish passage to the southern upper reaches of these watercourses.

McKeen Brook, its tributaries, Archibald Lake and other unnamed watercourses within and surrounding the PA have been determined through site investigations to provide fish habitat by supporting foraging, passage, overwintering, spawning and/or rearing habitat. The following fish species were recorded during electrofishing in 2017/2018 within the PA and surrounding area: American Eel, Atlantic Salmon, Banded Killifish, Brown Bullhead, Brook Trout, Creek Chub, Common Shiner, Lake Chub, Threespine Stickleback, White Sucker, Northern Redbelly Dace, and Yellow Perch.

4.9.1 Potential Environmental Effects

The proposed project will require watercourse alteration around the location of the open pit and other infrastructure including the WRSP and either TMF option.

The distribution of fish in waterbodies is affected by the presence of natural barriers and hung culverts limiting many species from occupying the upstream reaches of creeks. Two fish species of conservation interest, American Eel (COSEWIC Threatened) and Brook Trout (S3), were identified within the PA. A third species of conservation interest (Atlantic Salmon (southern uplands population, COSEWIC Threatened) was also identified north of the PA in McKeen Brook. Further field evaluation is on-going through 2018 to confirm the potential for these species to be affected by mine development including the pit, WRSF and TMF infrastructure. However, to date, Brook Trout have been confirmed within the southern extent of the initial TMF option, and American Eel are also expected to be present within the upper reaches of this watercourse system. Brook Trout have also been identified within the wetland and watercourse present where the pit is proposed.

Additional watercourses are present intersecting with proposed infrastructure which may support fish habitat, although the majority of these watercourses are ephemeral first order systems originating from hillsides.

Currently, it is expected that a Fisheries Authorization will be required to support mine development.

Beyond the direct loss of watercourses to support mine development, the additional pathways of interaction between the Project and fish, fish habitat, and aquatic resources are expected to be a result of potential indirect changes. The likelihood of broader residual effects to fish, fish habitat, and aquatic resources from the Project mine development will be based upon:

1. Potential changes in water quantity, due to alteration of natural drainage networks, discharge from the project, and construction of infrastructure; and,
2. Potential changes in water quality (POL, pH, TSS) due to discharge and seepage from the Project.

Other potential effects to fish, fish habitat, and other aquatic species relating to direct mortality, erosion and sedimentation, and atmospheric deposition of dust are considered to be mitigated by Project design and the implementation of best practices and management plans. The assessment for potential residual effects on fish, fish habitat, and aquatic resources from changes in water quantity and water quality will use a combination of quantitative modelling for hydrology and water quality and qualitative analysis to predict the magnitude and extent of effects.

No watercourses within the Project boundary, or adjacent to, or crossed by the Project, are listed in the *current Navigation Protection Act* – Schedule (Section 3, subsections 4(1) and (3), 5(1) and 6(1), section 8, subsections 9(1), 10(1), 12(1), 13(1), 15(1), 16(1), 17(1) and 19(1), section 20, paragraphs 28(1)(e) and 28(2)(b) and (c) and subsections 29(2) to (4)) NAVIGABLE WATERS. Therefore, the Project would be exempt from application for approval under the Navigation Protection Act. Regulatory changes are expected under the Proposed Canadian Navigable Waters Act that would replace the *Navigation Protection Act*, which is currently under review and is expected to come into effect as early as June 2019. There is potential that, under this new regulation, waterways within the PA could require permitting. Further consultation with Transport Canada will be undertaken as more information on the new act becomes available.

Culverts will be upgraded as necessary during project development and new crossings will also be identified on the new mine site roads that will be constructed. Any upgrades, new crossing installations and/or watercourse alterations will be completed in accordance with the Nova Scotia Environment Watercourse Alteration approval process, and all appropriate applications for alteration will be sought prior to construction or upgrading as required.

Provided all standard watercourse alteration mitigation strategies are integrated into design, all necessary NSE approvals are acquired, and crossing structures are sized according to design flow characteristics, limited or no significant indirect effects resulting from Project development should be expected. A Fisheries Offsetting Plan will be developed to support the mine development and permitting process for watercourses and wetlands that support fish that are directly impacted by the Project.

4.9.2 Work Planned

Watercourse and aquatic habitat assessments have been ongoing since 2015 and will continue through 2018 within the PA. Work includes fish habitat characterization for each linear watercourse, wetland and waterbody identified, as well as determination of which species of fish are present within the PA.

4.10 Terrestrial Fauna

Targeted field surveys and incidental observations for various fauna species were completed throughout the field season in 2015, 2017 and winter 2018 within and surrounding the PA. Targeted surveys were completed for bats, mainland moose,

wood turtles and lepidopterans. Incidental observations were recorded for all other fauna species including other mammals, reptiles, amphibians, and invertebrates (including freshwater molluscs, lepidopterans, and odonates). The goal of both targeted surveys and incidental observations was to understand which species are present within the PA and how they are using the area to allow for an evaluation of potential Project interactions and mitigation measures.

Incidental observations and all various signs of mammals in the PA were documented and photographed during field surveys. Signs included features such as dens and nests, scat, tracks, and forage evidence. Incidental observations for priority invertebrates occurred during all field programs, particularly wetland and watercourse delineation, and fish habitat surveys. Signs of odonates and lepidopterans included live adults, larvae, or cast skins. Signs of molluscs included live or dead individuals, or shells.

Evaluation of appropriate watercourse habitats (McKeen Brook, its tributaries and unnamed watercourses) was completed in spring 2015 for Wood Turtle and Snapping Turtle habitat and species presence.

Nine mammal species were observed in the PA during the 2015, 2017 and 2018 field surveys (Table 4-3).

Table 4-3: Mammal species observed in the PA

Common Name	Scientific Name	Sign	COSEWIC, SARA, NSESA	S Rank
Eastern Coyote	*Canis latrans*	Observed, tracks, scat	-	S5
American Black Bear	*Ursus americanus*	Observed, tracks, scat, digs	-	S5
White-tailed Deer	*Odocoileus virginianus*	Observed, tracks, scat, browse	-	S5
American Red Squirrel	*Tamiasciursus hudsonicus*	Observed, tracks, middens	-	S5
North American Porcupine	*Erethizon dorsatum*	Observed, tracks, browse	-	S5
Bobcat	*Lynx roux*	Observed	-	S5
Snowshoe Hare	*Lepus americanus*	Observed, tracks, scat	-	S5
Red fox	*Vulpes vulpes*	Tracks		S5
Short-tailed Weasel	*Mustela erminea*	Tracks	-	S5

Note: The ACCDC works with provincial and federal experts to develop rarity ranks (i.e. S-ranks) for species in Nova Scotia, as well as the other Maritime Provinces, see http://www.accdc.com/en/rank-definitions.html for more information. An S-rank of S5 means that the species is Secure - Common, widespread, and abundant in the province.

Other common mammal species, such as raccoon (*Procyon lotor*), American mink (*Neovison vison*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and striped skunk (*Mephitis mephitis*) are likely to inhabit the entire PA or surrounding areas, at least periodically.

The PA falls within a NSDLF significant mainland moose (*Alces americanus*) concentration area, however, no signs of mainland moose were identified during targeted surveys or incidentally during other field programs. Additionally, there were no records of mainland moose within 5 km of the PA reported by the ACCDC.

No bat hibernacula were identified during any surveys in the PA and the ACCDC reports no known bat hibernacula within or in close proximity to the PA.

Snapping turtles (*Chelydra serpentine*) and wood turtles (*Glyptemys insculpta*) were not observed within the PA incidentally or during dedicated surveys and only low-quality habitat was identified within the PA. Wood turtles, however, are known to the St. Mary's River and its tributaries and a single wood turtle was observed along the shores of McKeen Brook, north of

the PA in June 2017. McKeen Brook and some of its tributaries have been identified as critical habitat for wood turtle by NSE. The ACCDC have recorded observations of wood turtle within 5 km of the PA, however, since wood turtles are listed as location sensitive species, the specific location of the species was not identified. According to the ACCDC, one snapping turtle was identified slightly beyond a 5 km radius of the PA. No SARA listed mammals, amphibians or reptiles were observed within the PA.

4.10.1 Potential Environmental Effects

Habitat alteration and loss can cause corresponding changes in the suitability of an area for a given species. The magnitude of the change depends on the species being considered. For large, mobile mammals, such as bears, a few hectares of habitat loss may be inconsequential. However, that same amount of habitat loss may remove the entire range for species with small home ranges (e.g., amphibians), if adjacent suitable and unoccupied habitat is not available. Some habitat alterations can have positive effects for some species (e.g., vegetation clearing will create edge habitat suitable for Olive-sided Flycatcher), whereas others could have long-lasting negative impacts on habitat viability (e.g., impacts on water quality). The determination of potential effects will consider disturbance, loss and alteration.

The Project has the potential to affect wildlife through the loss of habitat within the PA because of site clearing activities and disturbance from noise, Project related traffic, and habitat fragmentation. The potential exists for increased mortality risk through clearing activities. Sensory disturbance can occur primarily through Project generated noise, as well as ingestion of contaminants directly or indirectly and dermal absorption. Species that may be affected may include those listed under the Species at Risk Act, COSEWIC, NSESA, or NS Wildlife Act, as certain listed species like wood turtle (SARA Threatened, COSEWIC Threatened, NSESA Threatened) have been observed or have the potential to occur within the PA.

As part of the Project design, some early proposed footprints have been altered to reduce potential effects to known or identified species. Design adjustments may continue to take place in order to avoid negative effects to wildlife. Appropriate best management practices and strategies will be considered and implemented to the extent possible to minimize potential effects to wildlife or any priority habitat identified. Additionally, wildlife studies will continue to be conducted as part of the environmental assessment, which will inform the analysis of potential effects. The data collected during assessments will be used to identify known, probable, or other species-specific habitat types, species locations, and the likelihood of species occurring within a specific area. Habitat selection by wildlife is primarily a response to security, thermal comfort and forage needs. Species habitat requirements (i.e. thermal, cover, security) and rates of movement through various habitats help to determine the effect of habitat availability, use, and/or fragmentation on wildlife. Fragmentation of a particular species' habitat implies a loss of habitat, reduced patch size and/or increasing distance between patches; however, fragmentation may also suggest an increase of new habitat. Thus, the effect of habitat fragmentation on a species (population) would be primarily through habitat changes, and not solely habitat loss.

Wildlife populations may disperse from the PA during periods of construction and/or operation. However, this displacement may be only a short temporal disturbance and wildlife may return after human activity has eased or ceased. Based upon the similar vegetation characteristics in adjacent areas, it is expected that displacement of wildlife will result in the movement of wildlife to nearby habitats. Development of the Project is expected to increase forage potential as grass and forb species re-establish during interim reclamation. Loss of thermal and security cover is unavoidable; however surrounding vegetation is expected to maintain these requirements.

New road networks constructed within the PA and an increase in traffic may increase the likelihood of wildlife vehicle incidents. Wood turtles and snapping turtles may be the most at risk because they can be attracted to gravel roads or road shoulders to nest and are less mobile than other terrestrial fauna (Environment Canada, 2016). Changes in surface water flow regimes could also indirectly impact turtle habitat down-gradient of the infrastructure.

Local level changes in abundance and distribution of species may occur as the result of Project activities, but it is not anticipated than any of these changes will result in changes in overall fauna populations. While some direct loss of habitat will occur, the PA is located in an undeveloped, natural landscape with a diversity of habitats. Habitat present within the PA is not unique or rare in the local or regional context.

4.10.2 Work Planned

Targeted and incidental survey work will continue in the 2018 field season within the PA, as part of other environmental assessment programs. Data collected during assessments will continue to be used to identify known, probable, or other habitat types, species locations, and the likelihood of species occurring within a specific area. The information collected in

the preliminary stages will be used to create effective best management strategies that avoid or protect species.

4.11 Air Quality/Particulate Emissions

Airborne particulate matter is a complex mixture of organic and inorganic materials. Size and particle distribution can be categorized as either coarse particles, >2.5 microns (μm) in size, or fine particles, <2.5 μm in size. Total suspended particulates (TSP) include dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO_2 and volatile organic carbons (VOCs) are also considered particulate matter.

Baseline air quality sampling was completed in the PA in November 1-2, 2017 for a 24-hour period in accordance with USEPA CFR 40 part 50 -Regulations for Ambient Particulate Sampling. Sampling equipment utilized by AMEC consisted of high volume air samplers equipped with 8 inch X 10 inch quartz filters for sample collection. PM10 and 2 TSP units were set up at two locations and samples were analyzed for PM-10 and TSP and metals (arsenic and mercury).

Mining activities such as blasting, on site vehicle operations, crushing, and wind erosion from waste rock piles all can contribute to increased particulate levels. Based on Nova Scotia Air Quality Regulations; a significant adverse environmental effect with respect to total suspended particulate is one that would reduce air quality, such that the level of total suspended particulate matter exceeds 120 ug/m^3 over a 24-hour averaging period or 70 ug/m^3 over an annual averaging period.

Modelling is currently underway to report on expected values in comparison to the maximum permissible ground level concentration of 120 ug/m^3 as outlined in Schedule A of the Nova Scotia Air Quality Regulations.

4.11.1 Potential Environmental Effects

Air-borne particulate matter will be generated during construction and operation phases of the Project. During clearing and grubbing activities, topsoil and overburden will be stockpiled for use in progressive and final reclamation activities. The control of fugitive dust from the mining operations will centre on provision of moisture control measures, such as spraying with water as required. During construction, water from water management ponds may be used for dust suppression or commercially available dust suppression options. Trucks carrying flotation concentrate off-site will be covered.

In-pit operations will not generally have much direct off-site impact but could contribute to general dust levels at critical times if not controlled. Given that most of the fugitive dust generated at the site will be from crushing processes, and dust generated from trucking operations, most of suspended particulates generated will be inorganic and in the coarser fraction (>2.5 microns) and will tend to settle out close to source.

Pieridae Energy Canada's Goldboro Liquefied Natural Gas (LNG) Project data, along with available data from other locations in the area, such as recent particulate baseline data collected for the Proponent properties in the region will be used as representative background baseline data. The National Air Pollution Surveillance (NAPS) network is a cooperative program that measures air quality across Canada. NAPS monitoring locations such as Lake Major, Aylesford Mountain, or Kejimkujik National Park may be used to supplement the available baseline data. NSE monitors PM 2.5 levels at the Lake Major location. Monthly PM 2.5 measurements for 2005 ranged from 3 $\mu g/m^3$ -7 $\mu g/m^3$ at this monitoring station. Currently USEPA regulates PM 2.5 under the National Ambient Air Quality Standard (NAAQS) at 35 $\mu g/m^3$ for a 24-hour sample and an annual average of 15 $\mu g/m^3$. NAPS monitoring locations will be used if there is no other available data for certain parameters.

4.11.2 Work Planned

Baseline values for air quality are currently being evaluated and modelled. Additional air monitoring may be undertaken as a condition of IA. Mitigation strategies will be developed for dealing with any unacceptable air quality results if identified through predictive modelling and operational monitoring.

4.12 Noise

Baseline noise monitoring was completed at the PA in 2017 and modelling is underway. Noise is defined as any unwanted sound which may be hazardous to health, interfere with speech and verbal communications or is otherwise disturbing, irritating or annoying. Blasting, on site vehicle operations and crushing can contribute to an increase in noise levels. As specified in the Noise Measurement and Assessment Guidelines, L_{eq} values should be within the following limits:

1. ≤ 65 dBA between the hours of 0700 and 1900 hours;
2. ≤ 60 dBA between the hours 1900 and 2300 hours; and
3. ≤ 55 dBA between the hours of 2300 and 0700 hours.

Modelling will determine the predicted levels at the receptors and if those predictions are within the above guidelines.

4.12.1 Potential Environmental Effects

Noise generated throughout the mining development and operation will included drilling, blasting, crushing and transport of concentrate that may affect the suitability of adjacent habitat, adjacent residential receptors, and the behaviour of birds and mammals. The noise from mining will be generally contained to the PA.

With standard noise mitigation measures incorporated into the design and operation, increases in noise from operations are not expected to affect residents in the area.

4.12.2 Work Planned

Baseline values for noise are currently being evaluated and modelled. Additional noise monitoring may be undertaken as a condition of IA. Mitigation strategies will be developed for dealing with any unacceptable noise results should they be identified through modelling or operational monitoring.

4.13 Light

The Project is in a rural location. Ambient night time light conditions would be minimal and typical of rural residential area. There are no perennial artificial light sources in the PA and any artificial light would be from occasional sources like an all-

terrain vehicle or highway traffic. Baseline light monitoring will be completed at the Project during baseline studies. Hauling of concentrate will not occur overnight.

4.13.1 Potential Environmental Effects

Light can affect the behavior of birds and mammals. Impacts will be mitigated by using direct and focused light only at the Project where necessary and installing downward facing lights to limit excess light escape.

4.13.2 Work Planned

Light modelling will be completed. Additional light monitoring may be undertaken as a condition of IA. Mitigation strategies will be developed for dealing with any unacceptable light results identified through modelling or operational monitoring.

4.14 Climate Change and Greenhouse Gases

The local climate in the PA will be described based on information obtained from Meteorological Services of Canada (MSC) climate stations located in the vicinity of the Project and effective climate downscaling as applicable to the area. Data will be obtained from both active and historic stations as required. The data will provide information on basic indices such as temperature, wind, and precipitation. Climate norms for the specified period will be examined to assess average climate trends in the area. Seasonal variability of the various climate indices will be highlighted and weather patterns typical of the area will be addressed.

4.14.1 Potential Environmental Effects

4.14.1.1 Greenhouse Gases

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

Total GHG emissions are normally reported as CO_2-equivalents (CO_2e). This is accomplished by multiplying the emission rate of each compound by the global warming potential (GWP) relative to CO_2. CO_2e considers the global warming potential of the three main greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The global warming potential of these gases are as follows: CO_2 = 1.0, CH_4 = 21 and N_2O = 310. Therefore, the carbon dioxide equivalency factor (CO_2e) is equal to ((CO_2 mass x 1.0) + (CH_4 mass x 21) + (N_2O mass x 310)).

The Canada total GHG emissions for the years 1990 and 2005 and 2015 are presented in Table 4-4 (Environment Canada, 2012d).

Table 4-4: Greenhouse Gas Emissions: Canada

Sector	1990 Emissions (Mt CO_2e)	2005 Emissions (Mt CO_2e)	2015 Emissions (Mt CO_2e)
Oil and Gas	107	157.9	189.5
Transportation	121.8	163.2	173
Buildings	73.5	85.5	85.6
Electricity	94.5	116.9	78.7
Heavy Industry	96.6	86	74.6
Agriculture	60.1	74.4	72.8
Waste and others	56.9	54.4	47.6
Total	610.4	738.3	721.8

Source: EC 2018; https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions/canadian-economic-sector.html

In 2015, oil and gas accounted for almost 81% of the CO_2e emitted in Canada. There is a decreasing trend in GHG emissions in the last decade. Between 2005 and 2015, Canada saw GHG emissions fall by 16.5 megatonnes (kt) CO_2e (approximately 2.2%).

The Nova Scotia total GHG emissions for the years 1990, 2005 and 2015 are presented in Table 2.

Table 4-5: Greenhouse Gas Emissions: Nova Scotia(1)

	1990 Emissions (kt CO_2e)	2005 Emissions (kt CO_2e)	2015 Emissions (kt CO2e)
Total	19,800	23,200	16,200

Note: (1) Source: EC 2018; https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions/province-territory.html

Between 2005 and 2015, Nova Scotia saw GHG emissions fall by 7,000 kilotonnes (kt) CO2e (approximately 30%).

The total estimated predicted GHG emissions for the Project operation for one year is presented in Table 4-6. The estimate only includes primary sources and not support or indirect sources. The primary sources include diesel hydraulic DTH drills, diesel hydraulic RC drill, hydraulic excavators, wheel loaders and haul trucks. It should be noted the estimate is considered conservative since it is based on all equipment operating continuously (24/7) for 356 days a year.

Table 4-6: Predicted GHG Emissions for Cochrane Hill

Onsite Mobile Sources	Total CO2e (kt/year)
Cochrane Hill Primary Sources	23.9

The predicted total GHG emissions for the Project represent approximately 0.15% of the total Nova Scotia GHGs (based 2015 data from the NPRI).

4.14.2 Work Planned

Climate change and greenhouse gas research is currently underway. Additional emissions monitoring may be undertaken as a condition of IA. Mitigation strategies will be developed for dealing with any unacceptable emissions impacts identified through modelling or operational monitoring.

4.15 Archaeological & Heritage Resources

In 2014, Atlantic Gold Corporation undertook an archaeological screening and reconnaissance program at the Project site across a proposed layout including the current pit, waste rock storage, and plant location, along with two options for tailings management (no longer proposed locations for tailings disposal). The reconnaissance noted three features, all believed to be associated with past mining operations. One feature is located north of the current decline location and the other two features are located on the western side of Hwy 7 (Figure 4-1). The archaeologist (CRM Group) recommended that the three features be subject to shovel testing. Additionally, it is recommended that, in conjunction with the shovel testing, more intensive reconnaissance be conducted within the Open Pit area.

CRM Group was again retained on behalf of the Proponent to conduct a site visit in the PA in September 2017. Building upon the research and reconnaissance undertaken on the property in 2014, CRM Group revisited the sites previously noted to confirm their presence and implement a buffer zone for avoidance during exploratory drilling. CRM Group recommended that any development around the identified features (3 in total) would require shovel testing and intensified historical research. In addition, any development planned outside of their original study area from 2014 should be subject to a larger search (Figure 4-1).

The broader archeological field program across the PA and confirmed infrastructure layout is planned for Summer 2018 to allow for further archaeological investigation encompassing the proposed infrastructure and development footprint.

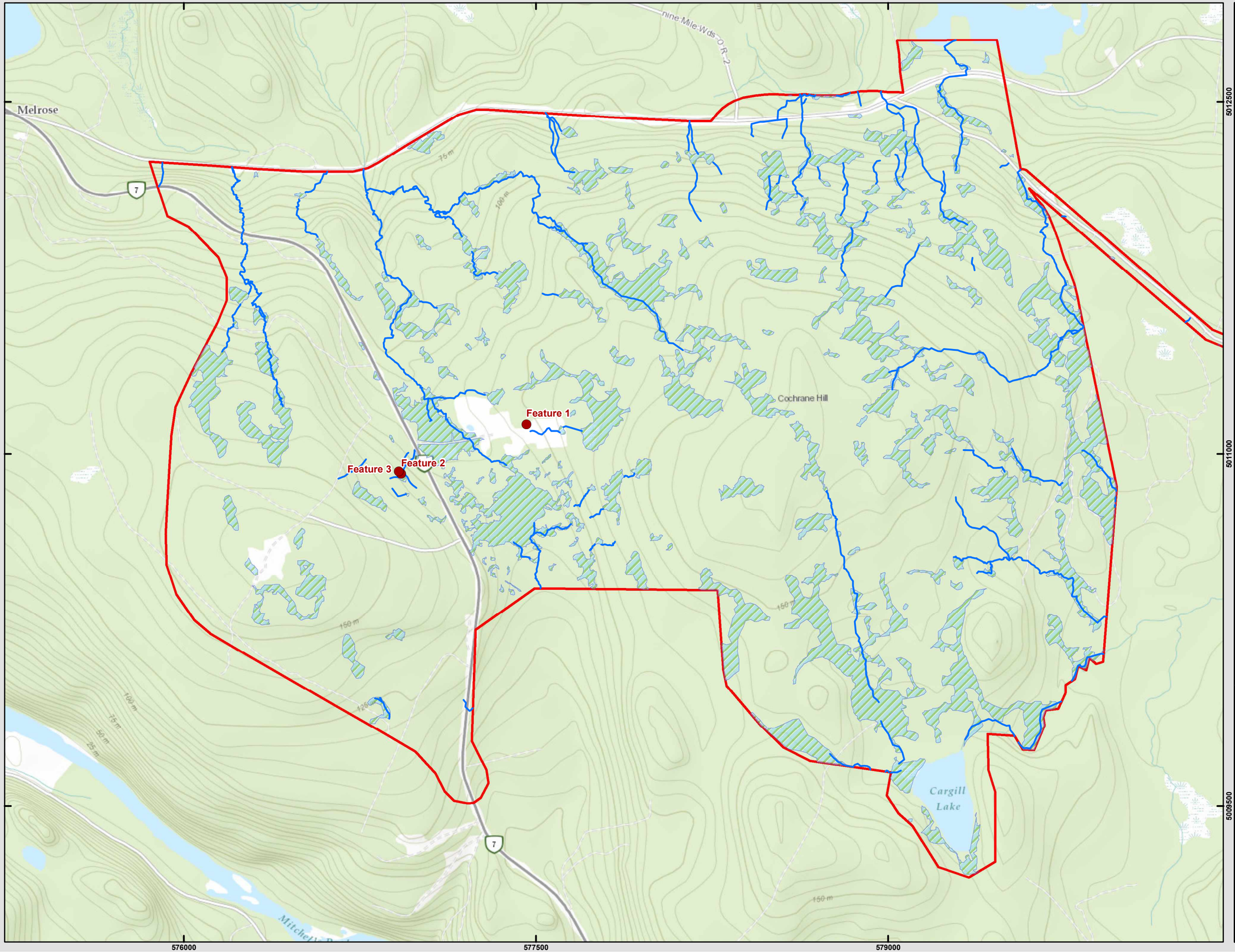
Prepared For:

ATLANTICGOLD

FIGURE 4-1

Cochrane Hill Archaeological Screening and Reconnaissance

Melrose, NS



- Archeological Sites (CRM Group, 2017)
- Field delineated watercourses to date
- Field delineated wetlands to date
- Project Area

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 175 350 700 Meters

1:15,000 Scale when printed @ 11" x 17"

Drawn By: LP Date: 2018-09-10

McCallum Environmental Ltd.

4.15.1 Potential Environmental Effects

The loss or destruction of archaeological or heritage resources is a potential environmental effect of the Project. Based on the current area, the Project is expected to interact with a minimum of one current area of known historic resources. More resources may be identified during 2018 field programs which may also interact with project infrastructure.

4.15.2 Work Planned

In addition to work that has been completed to date, additional reconnaissance work will continue in 2018 across the PA.

Areas of potential archaeological significance which cannot be avoided in the design and development of the Project will be subject to intensified historical research to provide a comprehensive context for interpreting features and a program of shovel testing to determine whether or not buried archaeological resources are present and/or to determine the age, function and significance of identified features.

All historic industrial features which cannot be avoided in the design and development of the Project will be subjected to detailed documentation. Documentation should include video, photography and surveyed plans.

If additional historic resources are encountered during project construction or operation further survey work will be undertaken. If heritage resources are identified during construction or operation of the mine, then work will stop in the immediate vicinity until said resources can be further studied.

4.16 Traditional Use by First Nations People

4.16.1 Existing Conditions

A Mi'kmaq Ecological Knowledge Study (MEKS) has been initiated for the Project and will be completed according to the Mi'kmaq Ecological Knowledge Study Protocol (ANSMC 2007). Engagement with Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), Millbrook First Nation, and Sipekne'katik First Nation has also commenced to support identification of current uses of the land in close proximity to planned Project infrastructure. To date, no specific information relating to the current use of the land by the Mi'kmaq within and surrounding the PA has been revealed. There is no present indication of expected elevated current use within the PA based on distance to the nearest Mi'kmaq community – Paqtnkek First Nation (39km) and no observations of unique ecological features or species of elevated interest to the Mi'kmaq during baseline surveys to date. Additionally, the 2015 archaeological report completed for the Project did identify several archaeological features, but all features were associated with historical mining activities, not Mi'kmaq resources.

Existing information relating to the baseline health and socio-economic conditions of the nearest Mi'kmaq community is limited. Interactions between the Mi'kmaq and the Project are anticipated to be low, for the reasons identified above. The expected interaction with the Mi'kmaq relates to potential use of the land for traditional hunting, plant gathering, and fishing. If the current use of the area is limited, then the need for data relating to baseline health and socio-economic conditions is low, given limited additional potential interaction with the Mi'kmaq. Collection of baseline health and socio-economic will be completed as is possible and available, and evaluation of the effects of the Project on the health and socio-economic condition of the Mi'kmaq will be completed in the EIS.

The Project lies within Eskikewa'kik or the "skin dressing territory". This particular district spans from Halifax County across to Guysborough County. Various authors and historians have differed in their description of how far this territory expands, but all have agreed that the PA lies within this district. The rivers in the area would have been important transportation routes and a resource base for the Mi'kmaq and their ancestors for millennia prior to the arrival of European settlers. In particular, the significance of the St. Mary's River as a salmon river would have provided a very important food resource for Native groups.

Paqtnkek Mi'kmaw Nation was established on March 3, 1820 in Antigonish County and is located 24km east of Antigonish, Nova Scotia (Paqtnkek-niktuek IR23, Welnek IR 38). Paqtnkek, meaning "by the bay", emphasizes the importance of the local bay and its resources to the Mi'kmaw people (Paqtnkek, 2018). Paqtnkek is located approximately 39 km as the crow flies (65 km via provincial highway) from the Project. Paqtnkek Mi'kmaw Nation is approximately 271 ha in size. There are 134 homes located on the reserve with an estimated population on reserve of 353 persons (Statistics Canada, 2016 Census of Population). Lands surrounding the Reserve are used for traditional hunting and gathering. The proposed transportation route for concentrate will not travel past this reserve.

There is no land claim registered with the Specific Claims Branch of Indian and Northern Affairs Canada in Ottawa for any of the Mi'kmaq communities in Nova Scotia within the PA. However, that does not suggest that any other Mi'kmaw claimants for this area may not submit land claims in the future.

In the event that Mi'kmaw archaeological deposits are encountered during construction or operation of the Project, work will be halted in the vicinity of the discovery and immediate contact will be made with the Nova Scotia Museum and The Confederacy of Mainland Mi'kmaq. Should the proposed PA change or expand, additional research will be conducted. The Proponent will continue to communicate with the Mi'kmaq on a mutual benefits agreement and Memorandum of Understanding for its Nova Scotia mining interests.

4.16.2 Potential Effects

It has not been confirmed at this point whether the Project will use lands and resources that are used for traditional purposes by First Nations peoples. The MEKS will outline any potential effects the Project will have on traditional land use and provide recommendations for mitigation measures to be implemented. Health and socio-economic impacts to the Mi'kmaq were not clearly within the MEKS mandate however the Proponent will work to identify possible impacts for these aspects and proposed mitigation. Health is defined as overall health including mental, physical and spiritual for the Mi'kmaq and the Project does have the potential for both negative and positive impacts. On the negative side there is the possibility of elevated levels (above background but not out of compliance with regulated limits) of particulate and noise associated with the Project.

There is also the possibility that reduced harvesting (game, furbearers and medicinal plants) opportunities would occur if the proposed mine site is reported as a traditional use area.

The Project has the potential to bring positive socioeconomic change in the form of well-paying jobs for members of nearby First Nation Communities, and any future Mutual Benefits Agreement that is negotiated.

4.16.3 Work Planned

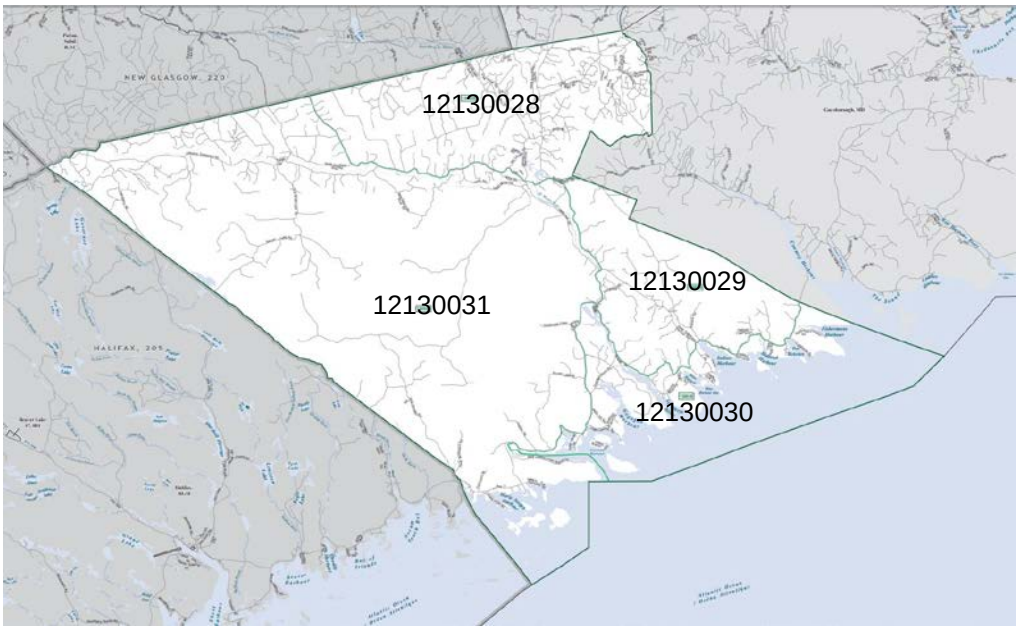
Information collected through engagement efforts with KMKNO, Millbrook First Nation and Sipekne'katik First Nation, along with the MEKS that is currently underway for the Project, will form part of the EIS that will address environmental and socio-economic effects as it relates to traditional use and other concerns raised by the community. Further engagement will be undertaken to understand the First Nation potential impacts and what mitigation is possible to build into the Project design.

4.17 Socio-Economic Setting

Primary industries such as fishing, hunting and forestry, and to a lesser extent mining and quarrying, are significant employers in the area. As with many parts of Nova Scotia, employment is higher in the combined service industries, such as health care, education, retail, accommodation and food services, although construction, manufacturing, and the transportation industries represent important sectors. The mining industry represents a significant potential source of employment in this region. Due to the strong dependence on the resource sector, the economy is typified by "boom and bust" patterns. These key activities are anticipated to continue to form the basis of the regional economy.

The socio-economic effects of the Project can potentially be beneficial for the region, as it would provide employment and taxes locally and regionally. It could potentially reduce and possibly reverse an outward migration trend of people moving to larger centres. The Proponent intends to work with local communities to maximize benefits through employment, business opportunities, training, and skills development.

Figure 4-2: Statistics Canada Dissemination Areas: Cochrane Hill



Statistics Canada (2016 Census data) for Dissemination areas 12130028, 12130029, 12130030 and 12130031 (inclusive) align with the PA (Figure 4-2 above) and sum to the St. Mary's Municipal district. These data best describe demographic characteristics. While DA 12130030 is located along the coast and is most distant from the PA, population in the area may still be impacted. The demographics of the dissemination areas are reported in Table 4-4 and compared to the St Mary's Municipal District as a whole, and to Provincial figures.

Table 4-7: Demographic Summary

Statistics	12130028		12130029		12130030	
Total Population	592		528		526	
Age 0-14	80	14%	50	9%	55	10%
Age 15-24	40	7%	50	9%	40	8%
Age 25-54	195	33%	165	31%	145	28%
Age 55-64	115	19%	95	18%	100	19%
Age 65+	150	25%	170	32%	175	33%
Median Income	$27,072		$30,304		$30,144	

Statistics	12130031		St Mary's Municipal District		Nova Scotia
Total Population	587		2,233		923,598
Age 0-14	65	11%	245	11%	15%
Age 15-24	50	9%	180	8%	13%
Age 25-54	180	31%	695	31%	42%
Age 55-64	100	17%	415	19%	14%
Age 65+	195	33%	685	31%	16%
Median Income	$24,272		$27,666		$31,813

4.17.1 Potential Socio-Economic Effects

The Project would provide many opportunities for employment in the St. Mary's Municipal District area. The area has a rich natural resource history including fishing, hunting, forestry, and mining. Mining jobs pay a premium over many other occupations and are among the highest goods producing wages in Nova Scotia.

4.17.2 Work Plan

The effects of the Project on the local economy will be assessed through a desktop review of existing studies and stakeholder consultation to update this body of knowledge and provide inputs to a socio-economic and environmental effects assessment.

4.18 Summary of Proposed Environmental Management Plans

During the development of the Environmental Assessment and IA Applications, relevant Environmental, Construction and Operational Management Plans will be developed, and mitigative measures will be implemented where appropriate. These plans may include, but are not necessarily limited to:

- Construction Environmental Management Plan;
- Erosion Prevention and Sediment Control Plan;
- Acid Rock Drainage Prediction and Prevention Plan;
- Soil and Overburden Management Plans;
- Fugitive Dust Management Plan;
- Fish Habitat Off-setting Plan (if required);
- Wetland Management Plan;
- Water Management Plan;
- Invasive Weed Management Plan;
- Wildlife Management Plan;
- Archaeological and Cultural Heritage Resources Management Plan;

- Hazardous Material Management Plan;
- Solid Waste Management Reduction and Recycling Plan;
- Petroleum Management Plan;
- Emergency & Spill Response Plan;
- Explosives Management Plan; and
- Reclamation and Closure Plans.

5.0 Public Engagement

A key component of conducting any environmental assessment project is effective communication and involvement of interested regulatory agencies and third parties.

Primarily, public engagement with stakeholders has consisted of discussions with the landowners on site access and regulators over the nature of scientific work being undertaken in relation to the environmental baseline studies during planning and design of the Project. Engagement with local stakeholder groups and the surrounding community members has also commenced. Regulatory consultation commenced in early 2017, and a public engagement program commenced in February 2018 for the Project.

5.1 Regulatory Consultation

5.1.1 One Window Meeting

For the Project, regulatory consultation officially began on July 5, 2017 with a Provincial "One Window Process: Mineral Development in Nova Scotia" meeting to present the planned project and to receive feedback on the regulatory regime and regional expertise. The purpose of the meeting was to provide guidance to the Proponent on the processes and timelines for regulatory approvals and other issues regarding development of the Fifteen Mile and Cochrane Hill gold projects. A One Window update meeting was held February 21, 2018 to allow the Proponent to introduce their new 'Life of Mine Plan' and for attendees to share information on the processes and timelines for regulatory approvals and to discuss any issues or concerns regarding the Proponent's plan.

Informal regulatory consultation with relevant provincial and federal agencies to inform and support field programming has been on-going since Spring 2017.

The Touquoy Mine site has been fully permitted and has undergone several iterations of stakeholder (public, regulator) consultations and the Proponent regularly meets with the Community Liaison Committee to discuss project progress.

5.1.2 Environmental Assessment Process

Discussions have begun with the CEAA and Nova Scotia Environment to scope the Project for Environmental Assessment requirements.

5.2 Community Engagement

A public engagement program to provide project details to local communities and opportunities for public input to the proposed mine development commenced in March 2018. The first engagement activity consisted of meetings with the

Municipality of the District of Saint Mary's Council and the Saint Mary's River Association to provide a brief overview of the project and answer any questions.

The proponent also held a public open house in Sherbrooke in March 2018, and a second event is planned for Winter 2019 once more project details are available. The Sherbrooke Open House was well attended with approximately 115-120 people present. The Proponent invited Paqkntek, Pictou Landing, Chapel Island, Millbrook and Sipekne'katik, KMKNO, and representatives of several local community groups to the open house. Local, Provincial and Federal elected representatives were also notified so that they could notify their constituents and attend if they so wished.

The event was advertised over two weeks in the Chronicle Herald and the Guysborough Journal newspapers. Flyers were posted in 10 local businesses and also sent through Canada Post to local residences (approximately 650 homes). The four hour session was held at the Sherbrook Lion's Hall and consisted of a series of poster boards describing the general location and description of the project, the EA process and opportunities for public input, preliminary Valued Components (VC) identified for the Project, details relating to reclamation and ore processing, and a poster outlining engagement methods and a request for people interested in participating in the planned Community Liaison Committee (CLC) for this Project. The key messages to the community at this meeting were:

- How do you want to be engaged? and,
- What questions or concerns do you have about the Project?

The open house focused on sharing the general description of the Project and listening to the questions posed by members of the public, understanding concerns, and determining the best methods of engagement during the preparation of the Environmental Impact Statement (EIS). The attendees asked general questions about the proposed mining operation and details on any known operational considerations, as provided in this Project Description, were shared by the Proponent team with attendees.

Since the Open Houses in March, the Proponent has continued to engage and communicate with the local community. The Proponent team has:

- Met with the Nova Scotia Nature Trust (NSNT) to provide an overview of the project and answer questions. Regular updates to NSNT will occur.
- Met with the executive director of Historic Sherbrooke Village to provide an overview of the project, answer questions and establish a regular meeting schedule.
- Met with the board of the Saint Mary's River Association (SMRA) to seek feedback and provide additional technical details for comment. The Proponent team agreed to meet with the SMRA quarterly.
- Provided regular updates to the Municipal District of Saint Mary's.
- Attended a community leader's breakfast in Sherbrooke to answer any questions and increase local knowledge of the Project.
- Struck a Community Liaison Committee, which held its first meeting in early August 2018. A second meeting is planned for October 1, 2018. Going forward, the meeting notes from these meetings will be placed on the on the Atlantic Gold website

The Proponent is working with individual landowners potentially impacted by the Project and will also be meeting with local community groups and interested parties as they are identified to discuss more individualized concerns. Project information

will be communicated to the local residents using a variety of mediums including: a quarterly newsletter to provide overall project schedule and details; a community website with project details and contact information; and a dedicated community phoneline that will respond to inquiries and concerns about the Project. Meetings with municipal officials and provincial and federal political leaders will also be important to gauge local support for the Project. By completing this engagement program, the Proponent will gather important information on the public's comments, questions and concerns and consider this information when planning the proposed mine development. The Proponent has a history of successful public engagement in Nova Scotia and continues to proactively engage to achieve the necessary social licence for its proposed mine development.

6.0 First Nations Engagement

Since the initiation of the Touquoy Mine Project, the Proponent has engaged in a pro-active and mutually beneficial relationship with the Mi'kmaq of Nova Scotia. The relationship has been close to ten years in the making and continues to be of mutual benefit. An overview of more recent and relevant engagement is noted below.

The Made in Nova Scotia process establishes a mechanism for Mi'kmaq engagement in Nova Scotia that is unique in Canada. It is a three-government agreement between the federal, provincial and Mi'kmaq that outlines the responsibilities regardless if the Project is reviewed formally by the federal or provincial government. The Proponent has shown its commitment to this process and respect for their input by inviting representatives from the KMKNO, Millbrook and Sipekne'katik to the One Window meeting in February 2018, a meeting normally reserved for federal and provincial government officials.

Table 6-1: Summary of First Nations Consultation for Cochrane Hill

Date	Meeting Summary
February 20, 2018	Email correspondence from the Proponent team to Millbrook, KMKNO and Sipekne'katik requesting a meeting with each group to introduce the project.
February 21, 2018	KMKNO and Sipekne'katik participated in One Window update meeting at NSDNR
February 28, 2018	The Proponent and MEL met with KMKNO (Melissa Nevin) and introduced the Cochrane Hill Gold Project formally.
March 29, 2018	Sipekne'katik, Millbrook and the KMKNO were invited to attend the Open House in Sherbrooke.
April 12, 2018	Proponent completed a scheduled meeting with Millbrook to introduce the Cochrane Hill Gold Project.
July 9, 2018	Proponent completed a scheduled meeting with Sipek'nekatik to introduce the Cochrane Hill Gold Project.

Formal consultation is expected to continue through 2018 and 2019 as part of the EA process with the Mi'kmaq of Nova Scotia according to the Made in Nova Scotia Process. The Mi'kmaq have a knowledge level of the Project which is significant and gained through the EA process for Touquoy Mine, the EA process for Beaver Dam, and through ongoing discussion relative to the Project as previously noted.

The Proponent will continue to engage with the KMKNO, Paqtnkek Mi'kmaw Nation, Sipekne'katik First Nation, and Millbrook First Nation specific to the Project. To date, no specific comments or concerns have been received from the Mi'kmaq relating to the project. Questions asked to date have been focused on understanding project components, as described in this Project Description. The Proponent will look to find opportunities to engage with the communities to understand how the Project may overlap with traditional uses by the Mi'kmaq. Regular correspondence and face to face

meetings will occur between the Proponent and KMKNO, Paqtnkek, Millbrook and Sipekne'katik and will provide all parties ample opportunity to review and discuss the Project.

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