Beaver Dam Mine
Project Description

Beaver Dam Mines Road
Marinette, Nova Scotia

Atlantic Gold Corporation

October 5, 2015

45 Akerley Boulevard Dartmouth Nova Scotia B3B 1J7 Canada

088664 | Phase No 12 | | Report No 1

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Glossary of Terms and Abbreviations

ACCDC	Atlantic Canada Conservation Data Centre
AMO	Abandoned Mine Opening
ANFO	Ammonium nitrate- fuel oil mixture explosive
ARD	Acid rock drainage
argillite	Highly compacted sedimentary or slightly metamorphic rocks consisting primarily of particles of clay or silt
$CaCO_3$	Calcium carbonate (limestone when a rock)
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Act or Agency
CLC	Community Liaison Committee
CMM	Confederacy of Mainland Mi'kmaq
CO	Carbon monoxide
CO_2	Carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRA	Conestoga-Rovers and Associates
CRM	Cultural Resource Management Group
dBA	Decibel on the A-scale
DDV Gold	DDV Gold Limited (owned by Atlantic Gold)
DFO	Fisheries and Oceans Canada
DO	Dissolved oxygen
doré	A mixture of gold in cast bars, as bullion.
drumlin	An elongated hill or ridge of glacial drift.
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (United States)
FWAL	Freshwater Aquatic Life
IA	Industrial Approval
ISQG	Interim sediment quality guideline
IR	Indian Reserve
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
loam	Rich soils containing a relatively equal mixture of sand and silt and a somewhat smaller proportion of clay.
MBA	Mutual Benefits Agreement
MBCA	*Migratory Bird Convention Act* (Canada)
MEKS	Mi'kmaq Ecological Knowledge Study
MEL	McCallum Environmental Ltd
MMER	Metal Mining Effluent Regulations
MOU	Memorandum of Understanding
MPA	Maximum Potential Acidity
MSC	Meteorological Service of Canada
MU	Mixed Use
NAAQS	National Ambient Air Quality Standard
NAD83 CSRS	North American Datum 1983 – Canadian Spatial Reference System
NAPS	National Air Pollution Surveillance

NO_x	Nitrogen oxides
NP	Net producing
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment
NSESA	Nova Scotia *Endangered Species Act*
NTS	National Topographic System
PID	Property Identification Number
pH	Power of the concentration of a hydrogen atom (measure of acidity)
PM	Particulate matter
POL	Petroleum, oil, and lubricants
ppm	parts per million
RCAp-MS	Rapid Chemical Analysis program – Metal Scan
ROM	Run-of-mine
SARA	*Species at Risk Act* (Canada)
S	Sulphur
SO_2	Sulphur dioxide
tailings	Mining residue
till	Glacial drift composed of an unconsolidated, heterogeneous mixture of clay, sand, pebbles, cobbles, and boulders.
TMF	Tailings Management Facility
tpd	tonnes per day
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	kilolitre
kV	kilovolts
l	litres
m	metre
Ma	Million years
masl	metres above sea level
mg	milligrams
mm	millimetre
Mm^3	million cubic metres
Mt	Megatonne (1 million tonnes or 10^9 kg)
MW	Megawatt
µm	Micron (1/1,000,000th of a metre)

1. General Information and Contacts

1.1 Nature of the Designated Project

The Beaver Dam Mine Project is contemplated to be a part of the Moose River Consolidated Gold Project that includes this proposal and the approved Touquoy Mine. 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 Mine processing facility, a distance of just over 35 km. This ore will replace the supply from the Touquoy surface mine which will be exhausted after five years of operation. Critical debt financing for the development of the Touquoy mine may be conditional on having permitting for Beaver Dam essentially complete.

The planned start date for construction for the Touquoy Mine is May 2016. In this case, Beaver Dam is scheduled to come into production in 2022, cease production in 2026 and then be reclaimed. For context, the Touquoy Mine components and permitting history are outlined below.

DDV Gold Limited, the project proponent in 2007 (purchased by Atlantic Gold Corporation), submitted an Environmental Assessment Registration Document (EARD) 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 and 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 for 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 can be adequately mitigated through compliance with the attached terms and conditions.

Changes to the Touquoy Mine as a result of the Beaver Dam Mine Project include an increase in the number of years of ore processing (4 more years), and deposition of tailings from Beaver Dam in the mined out Touquoy Pit. All other aspects of the Touquoy Mine remain the same as previously assessed including the disturbed footprint, tailings management aspects, size and locations of stockpiles and ore processing facilities. Additional information on each of these changes and the lack of impacts thereof is found in this document.

Operations at Beaver Dam would include mining, crushing, and operation of a waste rock storage facility. No ore processing, other than physical crushing to optimal size for transport, will be required at the site. No mine tailings will be generated at the Beaver Dam Mine site as there is no milling, only crushing to size of ore for transport. Maintenance facilities and office infrastructure will be minimal at Beaver Dam since these facilities will already exist at Touquoy. There are no electrical services near the Beaver Dam site; however, power requirements will not be substantial as there will be no processing of materials at the site, other than crushing to optimal size for transport. It is anticipated that power will be supplied by generators on site so there will be no requirement for power lines or any associated corridor that would be cleared if power was supplied from the provincial grid.

Two logging roads will require upgrades to support vehicle traffic between Beaver Dam and Touquoy - Beaver Dam Mines Road (7.2 km) terminates at the Highway 224 and a cross road that extends approximately 12.1 km from Highway 224 to Mooseland Road. Both roads are in existence but require upgrades for the safe passage of two way traffic. The final footprint of the upgraded road will be essentially the same as the current therefore impacts to plant, animal or Mi'kmaq and /or archaeological resources are not anticipated.

Due to the timing of the Beaver Dam ore being processed at Touquoy, the Beaver Dam tailings will not be stored in the approved above ground tailings storage facility but instead would be permanently stored in the mined-out Touquoy Pit. This allows the Touquoy Mine footprint to be maintained as permitted and no tailings facility will be needed at the Beaver Dam Mine. The approved reclamation plan for Touquoy calls for the mined-out pit to be allowed to fill with water. At the end of production of the Beaver Dam tailings, the remaining space would naturally fill with water and the Beaver Dam tailings would be stored under a water cap, forming a shallower lake than was originally intended for the reclaimed Touquoy pit. "Wet" disposal is accepted internationally as a superior method of permanent tailings management as opposed to "dry" storage. The Beaver Dam pit will also fill with water and the site will be reclaimed to a point that is safe, stable, and consistent with the natural surroundings.

1.2 Proponent Information

Name of the Designated Project

The designated project will be known as the "Beaver Dam Mine Project" (the Project).

1.2.1 Name and Address of the Proponent

Atlantic Gold Corporation ("Atlantic Gold"), the proponent, was formerly Spur Ventures Inc. which had been looking for suitable precious metals investment opportunities focusing on the Americas for about two and one half years. Spur Ventures was made aware of Touquoy 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. Shortly after completing this merger, Atlantic Gold subsequently acquired Acadian Mining Corp ("Acadian") from LionGold Mining Canada Inc. in September 2014. This acquisition gave Atlantic Gold access to the Beaver Dam property and other properties and holdings in Nova Scotia. Environmental data collection began at Beaver Dam in September 2014 and diamond drilling on the Beaver Dam property commenced in October 2014.

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1.2.2 Project Description Contact

The Project Description was produced by GHD (formerly operating as Conestoga-Rovers & Associates) under contract to Atlantic Gold.

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1.3 Applicable Regulatory Framework

The Project mining infrastructure does not directly encroach on any fish habitat. In the absence of impacts to recognized fish habitat, no authorization would be required from Fisheries and Oceans Canada (DFO) under the *Fisheries Act*. An upgrade of the haul roads may require authorization

from DFO to correct culverts that are damaged or improperly installed along the 20 km route if culvert repair/installation will result in harmful alteration to fish habitat. This is not expected..

Migratory birds will be assessed through protocols and breeding birds point count methodology during appropriate breeding windows in the study area of the proposed Project. Breeding bird surveys will be performed on migratory birds, as defined in the *Migratory Birds Convention Act, 1994*. The Environmental Impact Statement (EIS) will address potential effects of the proposed Project footprint 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 to the extent feasible.

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).

In addition to Environmental Assessment (EA) approval from CEAA and/or Nova Scotia, Nova Scotia Environment (NSE) will require an Industrial Approval (IA) to construct, operate, reclaim and abandon a mine; and Water Approval, to alter waterbodies and/or wetlands within the mine development. Both approvals are as described under the Activities Designation Regulations (Nova Scotia *Environment Act*, 2014) and are discussed further herein.

1.3.2 List of Permits, Licences and other Authorizations

Federal and provincial environmental acts and regulations apply to Atlantic Gold in regards to the design, site preparation, construction, operation, and rehabilitation 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. Atlantic Gold is well aware of the applicable acts and regulations that pertain to the proposed undertaking and Atlantic Gold's project team have demonstrated the ability to prepare the necessary information and design plans required to obtain permits and approvals, as well as the ability to operate within the requirements of such acts and regulations at previously completed surface mining projects in other 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
- Migratory Birds Convention Act and Regulations
- Transportation of Dangerous Goods Act and Regulations
- Species at Risk Act

No permit for navigable waters will be required.

Initial assessment along the haul road identified 27 watercourse crossings (24 culverts and 3 bridges). Only six of the culverts appeared to be installed correctly. The remaining eighteen watercourse crossing locations had poorly installed culverts (buried, caved in, plugged, hung, not present, water flowing through road base not culvert). Fish habitat potential at each crossing location will be determined in 2015. Road upgrades and culvert replacements are expected to increase fish passage and habitat quality, given the number of current culverts that are poorly installed. Neither culvert upgrades nor bridge upgrades/installations are expected to require a serious harm to fish authorization (Fisheries Act authorization 35(2)).

The Proponent will follow provincial processes for watercourse and wetland permitting and standard mitigation methods (both Nova Scotia Environment and DFO) will be adhered to for watercourse alteration, culvert installation and wetland alteration. Culvert installations will be completed in accordance with DFO guidelines for the design of fish passage for culverts in Nova Scotia (DFO February 2015). Should road re-alignment be required to ensure safe passage for two way truck traffic, the new road sections will be aligned at 90 degrees to the watercourse channel at the crossing location wherever possible..

In order to upgrade the road network from Beaver Dam to the Touquoy Mine, the road will be widened and re-aligned in sections to facilitate safe two way passage for trucks. During this design process, the Proponent will work to avoid wetland habitat where possible. Where not possible, wetland alteration permitting will be completed to support the road upgrade. Provincial wetland alteration permitting may trigger DFO serious harm to fish authorization if wetland habitat proposed for alteration is evaluated to be fish habitat and if impacts to wetland(s) are considered significant.

Blasting will be undertaken by a qualified contractor and explosives will be stored off-site. As the magazine will be off-site there is no requirement for an on-site magazine or associated permitting through Natural Resources Canada for this project.

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.

Industrial Approval: An Industrial Approval (IA) defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring plans. An IA application would be made by Atlantic Gold when EA approval is received.

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

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

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 likelihood of residual effects to fish, fish habitat, and aquatic resources from the Project will be based upon impacts of the Project to surface water quantity and quality. The distribution of fish in Project-area waterbodies is affected by the presence of natural barriers preventing many species from occupying the upstream reaches of creeks. Direct impact to fish bearing watercourses and waterbodies is not expected to occur from project infrastructure.

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

- Direct temporary and long-term loss of habitat for birds due to clearing and grubbing of the open pit and waste rock storage areas
- Destruction or displacement of birds in areas of excavation and piling of mine wastes
- 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 and vibrations
- Attraction and disorientation resulting from night-lighting.

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. Direct effect to aquatic species at risk, if identified within the Project Area are not expected, as watercourse and lakes within the Project Area are not expected to be directly affected by project infrastructure.

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 Canada

The Canadian Environmental Assessment Agency

The Province of Nova Scotia

Premier's Office

Environment (Environmental Assessment, Wetlands, Protected Areas)

Natural Resources (Geoscience and Mines, Crown Lands, Wildlife, Forestry)

Labour and Advanced Education (Health and Safety - Technical Services)

Transportation and Infrastructure Renewal

Office of Aboriginal Affairs

Finance (Statistics)

Halifax Regional Municipality

Planning and Development

First Nations

Confederacy of Mainland Mi'kmaq (Mainland Mi'kmaq Developments Inc.)

Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)

Assembly of Nova Scotia Mi'kmaq Chiefs

Sipekne'katik Band

1.5 Subject to Other Jurisdictions

The Beaver Dam Mine 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 of 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 - 30 km (2008); Cooks Brook Sand and Gravel Pit – 46 km (2013), ScoZinc Operations Southwest Mine Expansion - 49 km (2011), Goldboro LNG Plant – 82 km (2014). None of these projects include the Beaver Dam site in their regional context.

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. (i.e. Beaver Lake IR 17). No federal lands will be used to undertake this project. The nearest federal lands are the Beaver Lake IR 17 located approximately 5 km south of the Project site. The reserve abuts Highway 224 for a distance of 950 m. Increased truck traffic (270 per day) on existing public roads adjacent Beaver Lake IR 17 may affect air quality. The next nearest federal lands are more than 20 km southeast of the site at Sheet Harbour. The Project is located within central Nova Scotia, a distance of over 100 kilometres from the nearest provincial boundary - New Brunswick. The site is over 200 kilometres from the United States (Maine border). Impacts from the site activities include localized noise, localized air quality impacts from vehicle use and roads and land disturbance that has been described elsewhere in this document that is localized to the site. All of these do not impact beyond the general site area (within a kilometer or two of where the site activities are occurring) and none extend to the abutting provincial or third party nation borders discussed above.

2. Project Information

2.1 General Description

The Beaver Dam Mine Project will comprise the development, operation, closure and reclamation of a surface gold mine at Marinette, Nova Scotia. This will consist of the development of an open pit, materials storage facility, mine haul roads, associated mine infrastructure for crushing and haul-out (*e.g.* on-site power generation and local supply systems, fuel storage, temporary offices), improvements to private roads, extending processing timeframes at the Moose River (Touquoy) mine site, and utilizing the mined-out Touquoy Pit, at Moose River Gold Mines, for wet tailings disposal.

The total development area of the Beaver Dam Mine Project is approximately 128 hectares (ha) as detailed below. Upgrades to existing road infrastructure, such as minor widening, improving the road base, ditching, bridges spanning watercourses, and other potential improvements will also occur.

i. Ore extraction area (open pit) (30 ha);

ii. Materials storage (waste rock, overburden) (83 ha);

iii. Crusher and other associated mine infrastructure (15 ha);

iv. Improved haul roads (20 km).

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.

2.2 Design Standards

The design of the Beaver Dam Mine Project is based on internationally, 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 environmental and social-economic concerns. 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 Exploration and Production History

Gold was discovered at Beaver Dam in 1868 and there were intermittent attempts from 1871 up until 1949 to develop and mine in the area, initially focused on the Austen Shaft area and later, also on the Mill Shaft area, 1.2 km west of the Austen Shaft. The small Papke Pit approximately 400 m west of the Austen Shaft was excavated in 1926. Most of the development focused on a belt of quartz veins in greywacke and slates that were approximately 23m wide where intersected from the Austen Shaft. A total of 967 ounces of gold production is recorded for the Beaver Dam gold district between 1889 and 1941.

The next major period of work began in 1975 when MEX Explorations acquired claims in the area and from 1978 until 1988 a number of different companies drilled a combined total of 251 diamond holes for 47,944 m as well as undertaking mapping and geophysical and geochemical surveys.

Between 1986 and 1989, Seabright Resources Ltd (Seabright) explored from underground via a decline that reached a maximum depth of 100 m below surface. Seabright drilled 34 holes from underground for a total of 2,290 m and mined 135,000 tonnes of material of which 41,119 tonnes were milled at an average reconciled gold grade of 1.85 grams per tonne (gpt). In 1986, Seabright also excavated a small open-pit in the Papke and Austen zones, removing 10,055 tonnes of which 8,822 tonnes were milled for a reconciled gold grade of 2.45 gpt. In total, 2,445 ounces were recovered from bulk samples taken during this period.

In 2002, Tempus Corporation, a predecessor company to Acadian, acquired the Beaver Dam Property. Acadian retained Mercator Geological Services (Mercator) to manage its exploration activities until 2008, and from that date until 2013, Acadian managed all exploration activities within the Beaver Dam Property. Between 2005 and 2009, Mercator and then Acadian managed several diamond drill programs with a total of 153 holes drilled for 22,010 m. Acadian also undertook several other exploration programs including an aeromagnetic survey, a till survey and a follow-up

shallow Reverse Circulation (geochemical) drilling program that led to recognition of a possible offset to the Main Zone mineralization on the northern side of the Mud Lake Fault (MMTS 2014).

The provincial Abandoned Mine Openings (AMO) database (NSDNR 2014) records 20 AMOs in the area near the proposed Project Site. Of these openings, 18 will be consumed by the proposed pit. The openings consist of shafts, pits and raises that have had various forms of safety protection afforded to them over the years. Some openings are still considered hazardous.

Atlantic Gold secured the property in 2014 through the acquisition of Acadian and almost immediately planned an exploration program. In October 2014, a drill program of 38 holes for 7,810 m was conducted over the deposit with the objective of converting inferred resources into the measured or indicated category.

The property is held under two Exploration Licences: EL50421, EL50493 currently held by Annapolis Properties Corp., a wholly owned subsidiary of Acadian Mining Corp. EL50421 is comprised of 76 contiguous claims which cover an area of approximately 1,200 ha; and, EL50493 is 6 contiguous claims covering approximately 95 ha. Atlantic Gold owned companies (DDV Gold Ltd. and Annapolis Properties) also own three other exploration licences adjacent to the Beaver Dam property: EL07295 (DDV Gold) 17 claims; EL10407 (DDV Gold) 10 claims; EL 50544 (DDV Gold) 4 claims; and, EL08220 (Annapolis Properties) 43 Claims.

2.3.2 Permitting History

Several environmental considerations were outlined by Jacques Whitford and Associates Limited (Jacques Whitford and P. Lane, 1986) prior to underground exploration carried out by Seabright Resources in the late 1980s. Many of the same issues would need to be addressed should a mine be constructed on the Beaver Dam property in the future in order to prevent negative environmental impact.

Preliminary environmental work was conducted for Acadian in 2008. This work included tailings pond assessment, baseline ecological studies, surface water monitoring, archaeological reconnaissance, and a Mi'kmaq Ecological Knowledge Study (MEKS). The data and reports generated during this time have been incorporated into current studies that commenced in 2014.

2.3.3 Physical Works

The main elements of the Beaver Dam Mine Project are as follows:

- An open-pit mine from which 46.9 Mt of ore and waste rock will be excavated. The pit will be 900 m long and 300 to 450 m wide and will have a maximum depth of 170 m based on the current mining scenario;
- An average extraction rate of 35,480 tonnes of rock per day, for a daily ore production of 5,480 t/d, over a 4-year period, including the pre-production year; (4 years of operation include 8 months of pre-production and 3.3 years of full production)
- The surface and groundwater that finds its way into the pit and the runoff from the waste rock piles will be collected using sumps and pumping stations. It will be directed to water collection basins and treated before being discharged into Cameron Flowage;

- An ore transport rate (via the haul road) of up to 6,000 t/d to support a milling rate of approximately 5,000 t/d in the event of an interruption in the ore supply;
- A Run of Mine (ROM) and a low-grade ore stockpile, for a total of around 0.28 Mm^3;
- A net non-acid-generating waste rock pile, with a capacity of approximately 17 Mm^3 of waste rock;
- Overburden piles which will contain approximately 4.45 Mm^3 of material;
- Top soil and organics storage piles that will contain approximately 0.085 Mm^3 of material;
- Improvements to approximately 20 km of existing logging haul roads; including replacing three bridges and correcting/improving culverts;
- Tailings storage in the mined out Touquoy pit with a water cover on reclamation;
- Portable administrative, mine employee, and maintenance buildings, a petroleum product storage facility, portable generators, ore crushers and load out area.

2.3.3.1 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 Beaver Dam are planned to commence once ore extraction from the surface mine at Touquoy is virtually completed to allow for a smooth transition to processing Beaver Dam ore through the Touquoy plant. It is planned that most mobile equipment and some support facilities will be transported from Touquoy to Beaver Dam for re-use.

The footprint of the surface mine development in relation to the environment is shown on Figure 2.

The open pit footprint and waste rock storage areas will be cleared and grubbed in advance of operations with the timing based on Environment Canada directives relative to 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 specific portion of the waste rock storage area for later use in reclamation activities.

Water Management

Fresh water will be diverted away from contact with operations. Mine water generated within the pit area will be collected in sumps and dewatering wells and pumped by pipeline to sediment settling ponds. Treated water will then be released to the environment. Monitoring will ensure that released water meets regulatory requirements.

At Touquoy, the TMF acts as the settling pond. Collected water from the pit and plant areas is pumped to the TMF. There will also be ditching around the waste piles, with water from these ditches draining south to the TMF. No changes to this will occur as a result of the processing of Beaver Dam ore.

All water coming into contact with the Beaver Dam developments will be diverted to one of the two lined settling ponds that will be constructed, and once settled and considered environmentally stable, eventually drained into the Cameron Flowage watercourses to the north.

A settling pond (4800 m^2) will be located in the middle of the facilities area, just south of the Run of Mine (ROM) pad and stockpile. Water diversion ditches will be established surrounding the facilities area, as well as the ore stockpiles, that will divert collected surface water to this settling pond. The earthworks for the facilities are designed with enough relief that contact surface water will run by gravity into these surrounding diversion ditches, and into the settling pond. Settled water will be drained to the Cameron Flowage by gravity via a water diversion structure that runs downhill to the northeast of the settling pond, splitting the ore stockpile areas.

The second settling pond (1800 m^2) will be west of the open pit. Water collected from the WRSF, haul road and till stockpiles will be diverted by gravity to this settling pond via a water diversion channel that will be constructed from north side of the ROM pad, running north to the haul road, west along the haul road, and northwest around the open pit. Water collected from the open pit will be pumped directly to this settling pond. Settled water will be drained to the Cameron Flowage by gravity via a water diversion structure that runs northeast from the settling pond.

Water diversion ditches will be established surrounding the bases of the WRSF and till stockpiles. Relief is designed into these facilities so that surface water that comes into contact with them will run to the surrounding diversion ditches by gravity. The diversion ditches will be constructed so that collected water will be diverted to the main water diversion channel that feeds the settling pond west of the open pit. The ditches may need to be lined where they cross major geologic structures.

A berm surrounding the open pit will direct surface water away from the open pit and into the main water diversion channel that feeds the settling pond west of the open pit. 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.

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 will be directed to a sump where it can be pumped from the pit. Ditches will be constructed into the pit bench to collect the water and direct it to a sump in an area where the bench is sufficiently wide. The water from the sump on one bench can be drained down to the next bench below and collect into another sump. Actual operating conditions and detailed engineering will determine how many bench sumps can be connected together before putting a pump in place to remove the collected water. Vertical boreholes will be drilled at the pit crest, and progressively on some benches as the pit is developed, and piezometers will be established to monitor groundwater levels.

All collected ground and surface water in the pit will be handled by submersible pumps installed in each active pit bottom as part of the flexible and moveable bench scale pumping system. The mine sump pumps will be connected to semi-permanent and permanent piping systems to convey water through an HDPE pipe directly to the settling pond located west of the open pit. The in-pit sumps will be installed with each box cut as the benching is advanced.

Two submersible pumps, each capable of handling 150m^3/hour of water at over 200m head, are included for pit sump dewatering.

Operations

In the active mining area, in -situ rock is drilled and blasted on 5 m bench heights. Diesel powered rotary 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 once or twice per week, at the same time of day.

Additional grade control drilling is carried out to better delineate the ore and waste rock in advance of mining. Ore and waste rock will be defined in the blasted rock material with a grade control system based on dedicated reverse circulation (RC) grade control drilling and sampling, and a fleet management system will keep track of each load.

A contract explosives supplier will provide the blasting materials for the mine. Ammonium nitrate and fuel oil (ANFO) will be used when blast holes are dry and mixed emulsion type of explosive will be utilized when blast holes are 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 blast holes using the contractor's equipment. As the magazine will be off-site there is no requirement for an on-site magazine or associated permitting through Natural Resources Canada for this project.

Diesel powered hydraulic excavators and a wheel loader will load both ore and waste rock into haul trucks. These loading units will also function to re-handle pit material, load overburden and topsoil, pit clean up, road construction and snow removal.

All ore will be loaded into off-highway rigid frame haul trucks and hauled to the Run of Mine (ROM) pad and primary crusher. All waste rock will be loaded into off-highway rigid frame haul trucks and hauled to the waste rock storage facility. If dust is generated from hauling in the warmer months of the year it will be controlled by applying water to the haul roads utilizing a specialized water truck.

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 wheel loader.

At the waste rock storage facility, the haul trucks will dump waste rock, which will be spread into lifts by diesel powered track type dozers.

Mine operations support services will include:

1. Haul road maintenance
2. Pit floor and ramp maintenance
3. Ditching
4. Reclamation
5. Open pit dewatering
6. Open pit lighting
7. Mine safety and rescue
8. Transportation of personnel and operating supplies
9. Snow Removal

A fleet of diesel powered mobile equipment is specified to handle the above pit support activities.

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 and diesel powered generators.

Diesel fuel is required for the mining fleet and power generators for equipment at Beaver Dam. Diesel will be supplied from local sources by road tankers and stored in approved, self bunded tanks. From here, fuel will be distributed to equipment consumers by means of a dedicated fuel truck.

The fleet of road trucks required to transport crushed ore from Beaver Dam to the process plant at Touquoy will be refueled at Beaver Dam as needed using the fuel truck noted above.

The workforce at the Beaver Dam pit area will be approximately 100 persons working three shifts per day or approximately 25 persons per shift (includes 25 on leave at any time), an increase of approximately 25 persons from the Touquoy mining work force. This increase is due to the higher amount of waste material that will be mined to recover the two million tonnes of ore that will be produced annually as compared to Touquoy.

In addition, the trucking operation from Beaver Dam to Touquoy will create approximately 60 jobs which will be contract positions to drive the highway trucks and conduct road maintenance.

2.3.3.2 Crushing

Ore from the Beaver Dam pit will be delivered to the ROM pad and then direct dumped into the Primary Crusher. An auxiliary ROM stockpile will be developed to secure continuous supply to the mill if mining is suspended for any reason. Ore will be recovered and fed to the crusher by Front End Loader as necessary.

Three-stage crushing of the Beaver Dam ore is required similar to that at Touquoy; however, only primary crushing will be undertaken at Beaver Dam. This operation will reduce ore size nominally from 900 mm to 125 mm which will be fed to the Primary Ore stockpile by a short conveyor for loading into the road fleet for transfer to Touquoy. The truck loading will be by a wheeled front end loader. Once at Touquoy, the Beaver Dam ore will undergo secondary and tertiary crushing using the existing Touquoy facility.

The combined crushing circuit has been sized to match the grinding mill circuit at Touquoy with no change in capacity from the planned 2 Mt of ore per annum.

The Beaver Dam primary crushing circuit will use the primary crusher relocated from Touquoy or a new unit of similar capabilities.

2.3.3.3 Waste Rock Management

All waste rock removed from the open pit will be placed in the waste rock storage facility (WRSF), shown on Figure 3.

The WRSF will have a maximum height of 60 m above the existing ground surface, and will contain both overburden and waste rock. This height is not out of context with local topographic variations. A haul ramp along the north limit of the WRSF will provide access to all lifts. A separate area to contain unconsolidated overburden will be constructed with enough material to enable waste rock to be covered with a layer of overburden to aid in the reclamation process.

The waste rock storage facility 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. Once these smaller lifts reach 10 m in height, the face of the lift will be re-sloped to 3:1 for use in reclamation activities. Re-sloping will be done by track type dozers, motor graders and small hydraulic excavators.

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

All runoff from the WRSF will be directed to a sediment settling pond prior to release of treated water to the environment.

2.3.3.4 Trucking

Crushed ore from the Beaver Dam pit will be transported to the Touquoy process plant by truck travelling along upgraded existing roads as highlighted in Figure 4. The route is Beaver Dam Mines Road to Highway 224 to logging roads herein referred to as the Moose River Cross Road to Mooseland Road.

The Beaver Dam Mines Road (7.7 km) is an unsealed private logging road of varying quality. The 5.4 km section of the public Highway 224 forming part of the link is a dual lane sealed road built to support heavy truck traffic. The Moose River Cross Rd (12.7 km) is a private logging road of varying condition. The Mooseland Road (11.9 km) is a provincially owned road that has sealed and unsealed sections, suitable for heavy traffic. It is intended that the logging roads will be upgraded and widened to two lanes with improved alignments to provide better curves and gradients where necessary to achieve an operational design speed of approximately 70 km/h. Three bridges have been identified as requiring reconstruction and widening to achieve that condition with full passing safety. Culverts were investigated to determine the nature of the flow, which falls within three categories: Watercourse (potential for fish habitat); culvert (local drainage only); and, wetland drainage.

Generally, the existing culverts will also require lengthening to allow for the wider running surface and shoulders and better drainage control. New bridges will be constructed so as to not impinge on water courses as the present ones do by using designs that favour spanning watercourses.

The addition of turning lanes at the intersections with Highway 224 is not necessary as the traffic volumes generated by the material movement do not exceed design code requirements.

Truck payloads will be consistent with the limits applied by the Nova Scotia Highways department to comply with Spring Weight Restrictions when applicable.

Highway 224 in the area of interest is exempt from the Spring Weight Restrictions whereas they will apply to the Mooseland Road. Both the Beaver Dam Mine Road and the unnamed road (between Highway 224 and Mooseland Road) are private and are therefore not subject to provincial restrictions.

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 about one month. The maximum axle loads during this restriction for 2014 were listed as a maximum of 12,000 kg per axle grouping. A similar annual restriction has been assumed in project planning.

Options under review for the movement of the crushed ore to Touquoy include rigid body trucks, or trucks with trailers, with gross vehicle mass consistent with the above restrictions.

Alternative daily operating conditions under consideration include a single 12 hour shift, two 8 hour shifts and three 8 hour shifts in order to optimize the ore movement.

Apart from some dwellings on Highway 224 that are already exposed to highway traffic which includes logging trucks and aggregate haulers, there are no other houses on the other roads that will be affected by these vehicles.

Approximately 20 highway trucks will be required to transport the ore from Beaver Dam to Touquoy. The exact number will depend on the hauling schedules, which will likely be a single 12 hour shift or two 8 hour shifts per day. This would mean approximately 60 individuals will be required to operate the highway transport fleet. The number of return truck trips per day will be 370 or between 23 and 31 trucks per hour for 12 or 16 hours per day, 350 days per year for the duration of the mine project (3.3 years). During construction and pre-production, the number of trips will be less (8 months).

The proposed truck traffic will double the existing traffic on the segment of Highway 224 (NSTIR 2015). Records of traffic volumes for five years between 2007 and 2013 show Annual Average Daily Traffic on Highway 224: Section 025 between Beaver Dam Mines Rd and Pleasant Valley Road ranges from 290 to 370 vehicles per day.

2.3.3.5 Processing

Other than the primary ore crushing as described elsewhere, there is no mineral processing to be undertaken at Beaver Dam. All processing will be completed at the Touquoy facility after the ore from the Touquoy pit has been exhausted.

The Touquoy plant is designed to treat Beaver Dam ore with no modifications other than an increase in the total weight of grinding balls in the ball mill to accommodate the slightly harder ore from the Beaver Dam pit. This will not require any larger equipment.

2.3.3.6 Tailings Management

There is no requirement for tailings management at Beaver Dam as all mineral processing will be done at the Touquoy facility. Tailings generated from this operation will be pumped to the mined-out Touquoy pit for storage and covered with water to create a lake during reclamation. The approved Touquoy Environmental Assessment stated that the pit would be allowed to fill naturally with water over a period of time through precipitation, surface flow and groundwater in-flow. No change to this method is planned following the deposition of Beaver Dam tails, except that the time frame for refilling will be shorter given the decrease in available volume taken by the tailings.

Process water will be recycled from the Touquoy pit and from the Touquoy tailings management facility as required.

The Touquoy Pit is expected not to completely fill with water during the processing of Beaver Dam ore but if this does occur excess water will be pumped into the existing Touquoy tailings dam in order that it can pass through the waste water treatment system. Note that during operation of Touquoy, dewatering of the pit will occur with this water being directed to the TMF. As with Touquoy, it is expected that within two years of ceasing ore processing, the quality of water to be discharged will meet all provincial and federal standards without treatment. Preliminary test work has shown this to be the case but more detailed test work is ongoing and will be detailed in the Environmental Impact Statement (EIS) and/or Provincial Environmental Assessment Registration Document (EARD).

2.3.3.7 Electricity and Other Utilities

Electrical power will be required for the operation of equipment (pumps, conveyors, crushers) and for site office and service facilities. Because the Beaver Dam facility will not process ore on site, power requirements are relatively modest. It is anticipated that two 600 kVA portable generating units will be sufficient to provide power for on-site operations (one in operation and one on standby). This will mean that there will be no requirements to clear a right-of-way and construct power lines to connect to the provincial electrical power grid.

2.4 Emissions, Discharges and Waste

Dust emissions resulting from mine construction and operation will be controlled with the application of water obtained from the settling ponds. Stockpiled soils and tills will be revegetated as piles become stabilized. With a relatively short mine life of less than four years, reclamation activities will be commencing within four years of disturbance.

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 and from the diesel generators producing on-site electrical energy. 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 Industrial Approval (IA), Nova Scotia *Air Quality Regulations* and the National Ambient Air Quality Objectives.

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.

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, as well as groundwater and precipitation in the open pit, will be directed or pumped to settling ponds for treatment prior to release to the environment. Water from the settling pond(s) may be used in for dust suppression, to the extent feasible. Settling pond development will be staged with the overall development and needs of the Project. Details regarding the settling pond volume 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 discharge 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 Mining Effluent Regulations* (MMER) and will comply with said requirements as applicable to the site. Since this is a crush and haul operation with no 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. Both waste streams will be transported to Touquoy for disposal within the plant stream of waste through legislated or approved methods. If a spill occurs, contaminated material will be removed from the site for disposal and recycling to an approved facility. No permanent domestic waste water disposal facility will be established. Toilet facilities and liquid waste disposal will be contracted out.

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. 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, settling 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 majority owned by a commercial forestry operation (Northern Timber) with a minority of land along haul roads belonging to the Provincial Crown and other forestry companies.

All marketable timber or biomass will be removed from the pit, crusher, and waste rock disposal areas. Organic debris (roots, stumps, brush) will be stockpiled and mulched to provide biomass for reclamation. Topsoil will be stockpiled and used for reclamation at closure. All reclaimed areas will be covered with overburden and growing medium to a depth matching the native surroundings.

At closure, all infrastructure will be removed. The open pit will be allowed to flood creating a lake with a variety of shorelines established. Re-contouring of the Waste Rock Storage Facility (WRSF), carried out progressively throughout the Project life, will be completed. The Crusher site will be contoured to match the local topography.

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 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 wetlands along the pit perimeter, and will sustain wetlands downstream of the pit. Runoff from stockpiles will be directed to settling ponds and/or the pit prior to release to the environment.

Decommissioning of the site will require approximately 3 to 5 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 abandonment of 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 Phases and Scheduling

The construction of the Beaver Dam pit operations will be timed so that the ore supply to the Touquoy process plant will follow immediately after the Touquoy deposit has been exhausted and mining operations have ceased. There is expected to be a transition phase not exceeding two months during which time the primary crusher will be relocated from Touquoy and installed at Beaver Dam or a similar crusher installed at Beaver Dam, if required. The Touquoy facility will undergo routine maintenance in preparation to receive Beaver Dam ore and crushed and stockpiled ore will be processed at the Touquoy processing plant

Removal of topsoil, overburden and waste rock from the top benches of the Beaver Dam open pit will begin one year prior to the relocation at a time in compliance with nesting bird directives. 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 ROM pad and crusher facility including construction and commissioning of the support infrastructure at Beaver dam will be completed in the six months prior to that relocation.

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 upgrade of the connecting roads between Beaver Dam and Touquoy will be completed in the year prior to Touquoy pit operations ceasing. It is anticipated that material used in the construction

and upgrading of the private roads between Touquoy and Beaver Dam will be supplied from the Touquoy site using waste rock as the source. Several trucks that will be used in the transportation of ore from Beaver Dam to Touquoy will be acquired early and utilized to transport crushed rock from Touquoy to be used in the improvements to the connecting road. The use of this rock will be supported by appropriate geochemical and physical properties testing and data provided in the EIS and/or EARD.

The following Table 1 briefly outlines the Project schedule and the relationship between activities at Touquoy and Beaver Dam.

Table 1 Approximate Mine Development, Operation and Reclamation Schedule

Event	Timeline
Touquoy Construction	Year -1.5
Touquoy Operation	Year 1 – 5
Beaver Dam Construction	Year 4
Beaver Dam Operation	Year 5 – 8
Touquoy Reclamation (WRSF, Tailings)/Monitoring	Year 6 – 9+
Beaver Dam Reclamation / Monitoring	Year 9 – 11+
Touquoy Reclamation (Plant, Pit) / Monitoring	Year 9 – 11+

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 on site and transport ore for processing at the Touquoy Mill, and thus extend the life of the mill by using the Beaver Dam ore to extend the Touquoy project.

The alternatives that were addressed include mining methods; waste rock management; site infrastructure; power supply; road access; and, reclamation.

Mining can theoretically be undertaken by either underground or open pit methods, but underground mining as a primary extraction method does not make practical or economic sense in this situation. In this particular case, the resource is near surface and is better suited to open pit extraction – a continuation of the surface mining into an underground operation may be viable depending on the final depth of the deposit but this is currently not under consideration and would not be economic unless there was a dramatic increase in gold price.

The pond that had been previously established on the Beaver Dam site will largely become part of the proposed open pit and thereby reclaimed. No new tailings facility is planned for this site – ore will be trucked to Touquoy for milling and tailings will be deposited in the exhausted Touquoy pit. If the economics of the Project change significantly such that this project could be developed without

Touquoy then a mill and a tailings storage plan for Beaver Dam would be required, which would involve a significant increase in the Project footprint. Alternatives to processing ore at the Touquoy site are cost prohibitive and environmentally inferior.

Off-site processing at Touquoy involves the transport of material via local roadways. This haul is an increase in the cost of production and will generate additional greenhouse gases from the highway truck fleet as compared to on-site processing. This will be at least partially offset by the significant environmental benefits of processing Beaver Dam ore at the Touquoy mill and the storage of tailings in the exhausted Touquoy pit. No other gold processing facilities exist within the economic trucking limit that can handle the planned volume of material. In addition, no new construction or expansion of the approved processing or tailings storage facilities at Touquoy to process Beaver Dam ore is required.

Other than an extension in the overall project life from five to nine years and the fact that the exhausted Touquoy pit will be partially filled with tailings with a water cap, instead of just water, there will be minimal change to the Touquoy site.

3. Project Location

3.1 Location Description

The Beaver Dam Gold Mine Project is located at 45E 03' 57" N / 62E 43' 05" W (NAD83 CSRS) on Beaver Dam Mines Road, Marinette, Halifax County, Nova Scotia and found on NTS map sheet 11E/02 (Figure 1). The site is located approximately 7 km from Highway 224, which begins at Highway 7 in Sheet Harbour (23 km SE) and intersects Highway 336 at Upper Musquodoboit (20 km NW). Ore will be hauled to the Touquoy Mine for processing. The haulage route includes Beaver Dam Mines Road, Highway 224, a private road owned by Northern Timber, referred to herein as the Moose River Cross Road, and the Mooseland Road (Figure 4). The Touquoy Mine is located at 44E 59' 05" N / 62E 56' 30" W (NAD83 CSRS) in Moose River Gold Mines, Halifax County, Nova Scotia.

Access to the site is from Halifax east via Highway 7 or north and east via Highways 102 and 224 at Shubenacadie.

The nearest regional centres to the Project are Sheet Harbour (23 km) and Middle Musquodoboit (40 km). These are small rural communities that provide basic supply needs to surrounding farm, forestry and fishing communities. Sheet Harbour, located 100 km East of Halifax on the Eastern Shore, is a local service centre that provides basic needs to the local economy that is dependent on fishing, forestry and some extractive industries. Middle Musquodoboit, located about 70 km NE of Halifax is a farming/forestry community in the Musquodoboit Valley.

3.2 Land and Water Use

3.2.1 Zoning

The Project falls within the Halifax Regional Municipality - Musquodoboit Valley/Dutch Settlement Municipal Plan Area. The Beaver Dam Mines Road, a private road owned by Northern Timber Nova Scotia Limited, originates in the Eastern Shore Municipal Planning Area.

The mine area is zoned Mixed Use (MU) which allows for extractive activities (pers. comm. Faulkner 2015).

3.2.2 Legal Description and Ownership

The lands to be developed for the proposed Project are owned wholly by Northern Timber Nova Scotia Ltd. and will likely be leased by the Proponent. Currently, an access agreement with the land owner exists for exploration and environmental baseline study and assessment activities. Intrusive activities, such as drilling, test pitting or other disruptive activities are negotiated separately as required.

The properties used for the Project are described by reference to their Service Nova Scotia Parcel Identifiers (PIDs): 40201022, 41202334, 41202342, 40201030, 00541656, 40469405, 40201048, 40200941 (part), 40201063 (part), and access via PID 41215914. Buffers and ancillary structures such as ditching around the proposed waste rock stockpile location and access may require lease of land (PID 40219925) from the Province of Nova Scotia, however this will be determined in due course once environmental studies are completed and the final shape of the waste rock stockpile determined.

Subsurface rights are owned by the Province of Nova Scotia and are currently licensed to the proponent for exploration purposes. A Mining Lease will be sought once the Project receives Environmental Assessment Approval.

3.2.3 Current Land Use

The mine site has had previous exploration and mining activity as described herein. Other than the pond that was constructed in the 1980s and the road network, there are no other mine or exploration infrastructure remaining on the site. The pond was originally envisioned to be used as a disposal facility but during the bulk sampling program in the 1980's all material was disposed of offsite. The current pond was developed using a berm and dam on the western edge. The rest of the pond is topographically controlled. The dam has been removed; however debris at the outlet maintains the current water level. Commercially, the area was opened up for the forest harvesting activities. Access roads have been in place for decades and are used for access during exploration activities; others may use the roads from time-to-time for seasonal activities on the private land. Known third party activities include fishing and hunting and possible furbearer harvesting by First Nations and non-First Nations peoples. The roads present opportunities for recreational vehicle use and foot traffic but the degree of use of the private road on private land is not well documented.

First Nations use of the land was noted near the site, however most activity is not on the mine site. Section 4 and 6 provide greater detail but the use of the mine site by First Nations is limited.

The haul road for ore between Beaver Dam Mine and the Touquoy Mill has been previously described in detail. The route is on private lands and has very limited documented or observed use noted as part of the environmental baseline studies for Touquoy (2004-2009) and Beaver Dam (2012-2015). Known third party activities include fishing and hunting and possible furbearer harvesting by First Nations and non-First Nations peoples. The road presents opportunities for recreational vehicle use and foot traffic but the degree of use of the private road on private land is not well documented. The majority of the road's proximal lands are large blocks owned by Northern

Pulp and other forestry based companies and individuals. The use of the road for ore hauling does not appear to create onerous restrictions for present third party use to continue.

3.3 Proximity

The proposed mine is located approximately 6 km NNE from the nearest residence at Beaver Lake IR 17 (Figures 1 and 4). This area has a few permanent homes and seasonal cottages. Beaver Lake IR 17 is the closest federal land to the Project site. This property abuts Highway 224 which currently sees considerable heavy truck traffic from forestry and other resource operations in the area.

4. Environmental Effects

Environmental studies began in September 2014 and will be continuing until September 2015. Descriptions of existing conditions are based on desktop, regional knowledge from similar projects and preliminary field study. Potential effects are therefore drawn on this limited knowledge base 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 is located in the eastern ecoregion, and further subdivided into the eastern interior ecodistrict. The ecoregion is underlain by quartzite and slate of the Meguma Group, with granitic intrusives. A variety of landforms are found in this 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 composition of the forests in this 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.

4.2 Geology

4.2.1 Existing Conditions

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 Meguma Group rocks are metamorphosed to greenschist to amphibolite (staurolite) facies and were intruded by granites and minor mafic intrusions by circa 370 Ma (Smith and Kontak, 1996).

Mineralization at the Beaver Dam Property occurs in the north-dipping southern limb of an overturned anticline with gold hosted both within quartz veins and disseminated through the intervening inter-bedded argillite and greywacke. It is the quartz vein hosted gold mineralization augmented by disseminated style mineralization in or near anticline hinges that forms the basis of a geological model associated with the ongoing exploration and development of the Beaver Dam gold deposit.

Surficial geology consists of primarily stony till plain and drumlins, with smaller amounts of organic deposits. Till, stony and sandy matrix material is derived from local bedrock deposits. Drumlin facies are siltier due to erosion and incorporation of older till units by glaciers. The topography is flat to rolling with many surface boulders. Drumlins are oval or elongate hills veneered by stony till with underlying multiple till layers.

The Beaver Dam site is in an area of Nova Scotia dominated by the Meguma Supergroup that includes the Halifax and Goldenville Groups. The regional and site specific drilling has encountered bedrock materials that consist mainly of metamorphosed sedimentary rocks of the Goldenville Group. Atlantic Gold reviewed the historic drill core from within the deposit and has recently supplemented this with additional resource delineation drilling and core sample analysis of in situ ore and waste rock.

Historic and recent testing included analysis for acid rock drainage (ARD) potential, in accordance with the Sulphide Bearing Material Disposal Regulations. Results of the recent testing were instructive in indicating that the majority of the deposit is acid consuming but there are areas that will require specific handling and disposal. Recent testing of six samples of ore and waste rock (see Table 2) showed that two of the six samples exceeded the 0.4% sulphur (S) threshold and both of those having an acid generating potential in excess of the acid consuming potential while the remainder had net acid consuming potentials.

4.2.2 Potential Environmental Effects

Acid rock drainage (ARD) refers to the outflow of acidic water from (usually abandoned) metal mines or coal mines or disturbance from construction (highways, housing, commercial developments) in some environments where mainly iron sulphides may be exposed in the strata. When these environments are disturbed and come into contact with water, oxygen, and iron reducing bacteria, the sulphide minerals, become oxidized and acid is generated in the process. The presence of iron reducing bacteria serves as a catalyst that accelerates acid production and the potential for generation of ARD.

The Beaver Dam deposit is characterized by low contents of potentially acid generating sulphide minerals, including arsenopyrite, pyrrhotite and pyrite, with relatively rare chalcopyrite, galena, sphalerite, marcasite, and lollingite. Analysis of approximately 2900 samples from the area ("Using a portable XRF spectrometer…" Thesis, J. Guselle, Dalhousie University, 2012) indicate a median sulphide content of approximately 0.4 wt% and 90 percentile sulphide content of approximately 0.8 wt%.

Thus, the potential for substantial acid generation would be expected to be limited by the low content of sulphide minerals in the area to be mined. Acid base accounting tests and assessment of local water chemistry were carried out to further assess the potential for acid generation.

Initial testing of six samples, three from the ore zone and three from the waste rock area, was followed by the testing of an additional forty samples, twenty classified as "barren waste rock" and twenty classified as "weakly mineralized waste rock." Samples were collected from drill hole core. The Modified Sobek method was used to obtain a measure of the more readily available alkalinity (primarily carbonates). This provides for a more conservative (i.e. lower) estimate of the neutralizing potential of the samples. The results of the tests, carried out by ALS Geochemistry, are found in Table 2.

At least half of the samples in each of the waste rock types meet the Nova Scotia definition as non-acid generating material (Sulphide Bearing Material Disposal Regulations, under the *Environment Act*), having sulphide contents of less than 0.4 wt%. The barren waste rock samples are characterized by relatively low sulphide contents and substantial neutralization potential (i.e. at least 50% of the samples have a Neutralization Potential Ratio (NPR) of greater than 16). The weakly mineralized waste rock samples have higher sulphide contents and lower NPR values. Both categories of waste rock have limited potential to generate acid rock drainage. The weakly mineralized and barren waste rock dumps would both be expected to have overall net Neutralization Potential Ratio values consistent with a low potential for acid generation. The barren waste rock dump would be expected to have the lowest potential for acid generation.

Materials excavated from the site will be tested to ensure that they continue to conform to Sulphide Bearing Material Disposal Regulations. If material is found to be net acid producing at the site, Atlantic Gold will proceed in accordance with the Nova Scotia Sulphide-Bearing Material Disposal Regulations, in consultation with NSE, and generally follow best management practices.

4.2.3 Work Planned

Additional work is planned to confirm ARD potential with the results of the hydrogeological and surface water sampling programs. As mining enters the development and production phases, routine geological and water quality monitoring will be required to confirm the low potential for acid generation.

A robust monitoring program of site discharges, developed for the Industrial Approval, will provide data to confirm the results of the assessment that negative impacts will not occur. A Sulphide Bearing Materials Management Plan will be developed in conjunction with the Industrial Approval Application as required.

The waste rock facility can be designed to safely store the materials based on the information provided above. Modifications to the storage of materials can be made as operational data becomes available.

Table 2 Acid-Base Accounting Summary

SAMPLE	OA-VOL08				OA-ELE07	OA-VOL08	S-IR08	S-IR07	S-GRA06a	OA-VOL08m				
	FIZZ RATING	MPA	NNP	NP	pH	Ratio (NP:MPA)	S	Sulphide S	S	FIZZ RATING	NP	MPA	NNP	Ratio (NP:MPA)
	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity	Unity	%	%	%	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity
BD014-015	1	31.3	-17	14	8.7	0.45	1	0.88	0.02	1	8	31.3	-23	0.26
BD190-040	1	18.1	-5	13	9.1	0.72	0.58	0.55	0.02	1	9	18.1	-9	0.5
BD156-009	1	9.1	5	14	9.4	1.54	0.29	0.28	0.02	1	9	9.1	0	0.99
BD156-075	1	0.6	23	24	9.4	38.4	0.02	0.02	0.01	1	22	0.6	21	35.2
BD157-070	3	5	153	158	9.2	31.6	0.16	0.14	0.02	3	145	5	140	29
BD034-066	2	8.1	36	44	9.3	5.42	0.26	0.28	<0.01	2	35	8.1	27	4.31
BD160-039	1	5	4	9	9.5	1.8	0.16	0.14	0.02	1	8	5	3	1.6
BD005-054	1	21.3	-4	17	8.2	0.8	0.68	0.65	0.03	1	14	21.3	-7	0.66
BD049-042	4	4.4	544	548	8.4	125.25	0.14	0.1	0.03	4	521	4.4	517	119.09
BD179-045	3	0.3	197	197	9.1	630.4	0.01	<0.01	0.01	4	160	0.3	160	512
BD179-149	2	5.6	22	28	9.2	4.98	0.18	0.12	0.03	2	24	5.6	18	4.27
BD110-050	2	2.5	46	48	9.5	19.2	0.08	0.07	0.01	2	37	2.5	35	14.8
BD006-012	2	9.7	49	59	9.3	6.09	0.31	0.3	0.01	2	59	9.7	49	6.09
BD169-044	1	0.3	14	14	9.3	44.8	0.01	0.01	0.02	1	12	0.3	12	38.4
BD169-088	2	0.6	40	41	9.2	65.6	0.02	0.04	0.01	2	35	0.6	34	56
BD011-015	1	0.6	15	16	8.9	25.6	0.02	0.02	0.01	1	11	0.6	10	17.6
BD183-070	1	0.6	17	18	9.3	28.8	0.02	0.03	<0.01	1	13	0.6	12	20.8
BD183-148	2	2.5	60	62	9.2	24.8	0.08	0.04	0.06	2	60	2.5	58	24
BD109-040	2	<0.3	26	26	9.2	166.4	<0.01	<0.01	0.01	2	19	<0.3	19	121.6
BD187A-010	1	5.6	6	12	9.1	2.13	0.18	0.13	0.06	1	9	5.6	3	1.6
BD040-007	1	11.6	-2	10	9.2	0.86	0.37	0.38	0.01	1	6	11.6	-6	0.52
BD190-043	1	15.6	-6	10	9.3	0.64	0.5	0.51	0.02	1	7	15.6	-9	0.45
BD156-108	2	1.9	15	17	9.3	9.07	0.06	0.05	0.01	2	10	1.9	8	5.33
BD157-031	2	11.9	16	28	9.4	2.36	0.38	0.36	0.05	1	17	11.9	5	1.43

Table 2 Acid-Base Accounting Summary

SAMPLE	OA-VOL08				OA-ELE07	OA-VOL08	S-IR08	S-IR07	S-GRA06a	OA-VOL08m				
	FIZZ RATING	MPA	NNP	NP	pH	Ratio (NP:MPA)	S	Sulphide S	S	FIZZ RATING	NP	MPA	NNP	Ratio (NP:MPA)
	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity	Unity	%	%	%	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity
BD157-033	2	51.9	-12	40	9	0.77	1.66	1.48	0.04	2	31	51.9	-21	0.6
BD034-045	2	4.1	48	52	9.3	12.8	0.13	0.1	0.01	2	47	4.1	43	11.57
BD160-089	2	1.3	34	35	8.9	28	0.04	0.04	0.01	2	30	1.3	29	24
BD160-140	1	9.1	1	10	9.5	1.1	0.29	0.24	0.06	1	7	9.1	-2	0.77
BD085-046	1	24.4	-14	10	8.7	0.41	0.78	0.7	0.06	1	7	24.4	-17	0.29
BD049-140	1	0.9	10	11	9.4	11.73	0.03	0.04	<0.01	1	8	0.9	7	8.53
BD179-043	1	<0.3	14	14	9.3	89.6	<0.01	<0.01	0.01	1	9	<0.3	9	57.6
BD179-170	1	9.4	3	12	9.3	1.28	0.3	0.3	0.02	1	7	9.4	-2	0.75
BD006-013	1	38.1	-27	11	8.9	0.29	1.22	1.19	0.05	1	6	38.1	-32	0.16
BD169-136	3	3.8	189	193	9.1	51.47	0.12	0.12	<0.01	3	177	3.8	173	47.2
BD169-187	1	2.8	8	11	9.5	3.91	0.09	0.08	0.02	1	7	2.8	4	2.49
BD011-123	1	31.6	-19	13	8.8	0.41	1.01	0.94	0.02	1	8	31.6	-24	0.25
BD183-132	3	1.9	82	84	9	44.8	0.06	0.05	0.01	3	53	1.9	51	28.27
BD109-019	1	7.8	5	13	8.7	1.66	0.25	0.17	0.01	1	9	7.8	1	1.15
BD066-091	2	6.3	15	21	8.9	3.36	0.2	0.15	0.01	1	11	6.3	5	1.76
BD186-149	2	8.4	13	21	9.1	2.49	0.27	0.22	0.03	1	11	8.4	3	1.3

S-IR08 – Total Sulphur / S-IR07 – Sulphide Sulphur / S-GRA06a – Sulphate Sulphur (HCL Leachable) Methods

OA-VOL08m – Acid-Base Accounting Method

MPA – Maximum Potential Acidity / NP – Neutralizing Potential / NNP – Net Neutralizing Potential (NP – MPA)

4.3 Groundwater

The site is in a rural area of Halifax County that is sparsely populated. The nearest domestic well is likely to be, as recorded in a provincial well log database, 5.5 kilometres away from the site, up-gradient in a NE direction at a residence along Highway 224. 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 (NSDNR 2014). Domestic water supplies in the area are typically vulnerable to surface water entry and associated coliform bacteria issues and elevated iron and manganese concentrations (Lin 1970).

The site hydrogeology consists of a fractured rock aquifer system which is overlain by a thin aquifer in the till. Based on previous studies of the hydrogeology of this deposit and others in the area the degree of hydraulic connection amongst the smaller bedrock fracture systems is likely poor to moderate, and the main zones that are capable of storing and transmitting relatively large amounts of groundwater are the larger scale faults. The water table is close to the surface across the Beaver Dam site, reflecting flat lying terrain, low permeability bedrock and the 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 site was subjected to a hydrogeological investigation that consisted of a series of geotechnical/hydrogeological drill holes and monitored for groundwater quality. Given that the geology at Beaver Dam is similar to that at the Touquoy site it is anticipated that similar hydrogeological conditions exist. Results from Touquoy 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. 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. An ongoing testing program is expected to confirm earlier investigations that indicated the future mine operation will not negatively affect flow in the West River and tributaries.

4.3.1 Potential Environmental Effects

The physical nature and extent of interaction between the groundwater and surface water and how they might be affected by mining is not yet known. Given the distance to the nearest residence, it is improbable that any potable groundwater resources will be affected.

4.3.2 Work Planned

A drill and surface trenching program will be conducted to confirm existing information on groundwater levels, chemistry and permeability based on the regional knowledge of specific rock types and literature searches. Groundwater samples will be analyzed for general chemistry and metals. Groundwater aquifers will be characterized and a conceptual hydrogeological model will be developed that will be supported by water levels and flow measurements at the site. A site specific hydrogeological study is underway and results will be provided in the EIS and/or EARD

4.4 Surface Water

The Beaver Dam Mine lies within the West River – Sheet Harbour drainage basin, which is directly east of the large Musquodoboit River Valley system. The watershed occupies an area of roughly 576 square kilometres which makes it one of the moderately sized watersheds in the Province. 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 area can be further characterized as having relatively low relief, hummocky type terrain. Forests are predominantly coniferous of red and black spruce. According to NSDNR the site in the Eastern Interior ecodistrict, one of the largest in the province, is typified by areas of thin glacial till and exposed bedrock. Where the till is thicker, the ridged topography is masked and thick softwood forests occur. Freshwater lakes are abundant. The majority of the site is typified by hummocky topography with imperfectly drained, medium-coarse textured soils.

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 West River – Sheet Harbour drainage basin is drained by the West River and its tributaries, from north to south. Elevation range within the catchment is 0 to 165 masl (metres above sea level), which varies from approximately 135 to 165 masl in the headwater areas and gradually decreases to sea level at the final outlet at Sheet Harbour. The headwaters of the drainage basin are located along the topographic divide separating it from the Musquodoboit River valley to the northwest. In the vicinity of the site, the Killag River and Cameron Flowage are the main mapped watercourses along with Crusher Lake and Mud Lake as the major mapped lakes. The headwaters of Paul Brook are located directly southwest of the Project Area

The complex system of streams, lakes, bogs and wetlands is a direct result of the underlying bedrock geology of greywacke and slate found in the region. These relatively impermeable and poorly jointed rocks result in slow groundwater recharge and most of the excess surface water is retained on the surface, often called a ‘deranged’ drainage pattern. The basin ultimately drains to the south via the West River, and discharge peaks are likely attenuated to a large extent by the numerous lakes and wetlands through which runoff is routed.

The purpose of the surface water program is to establish a water quality baseline for comparison of water quality before and after site activities commence. Each sample is analyzed for general chemistry and metals (RCAp-MS), mercury (Hg), and total suspended solids (TSS). Dissolved oxygen (DO) and temperature are recorded in the field. Sampling, which began in October 2014, is conducted monthly and will continue throughout the life of the Project. Table 3 provides an overview of the sample locations.

Table 3 Environmental Baseline Sample Locations

Sample ID	Location	Rationale	Parameters
SW-1	Killag River	To characterize water quality downstream and east of Project activities	RCAp-MS, Hg, TSS, DO, temperature
SW-2A	Upstream of Cameron Flowage	To characterize water quality upstream and north of Project activities	
SW-4A	Wetland downstream of Mud Lake	To characterize water quality downstream and north of Project activities	
SW-5	Tailings pond outlet	To characterize water quality near Project activities	
SW-6A	Unnamed stream between Crusher Lake and Mud Lake	To characterize water quality downstream and west of Project activities	
SW-9	West River Sheet Harbour	To characterize water in a different watershed for reference	

4.4.1 Potential Environmental Effects

The physical nature and extent of interaction between surface water and groundwater resources and how they might be affected by mining is not yet known. Runoff from the site will be treated for TSS and monitored 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 mine will only include surface water runoff and from the pit and stockpiles. All water will be captured in settling ponds to reduce total suspended solids (TSS) prior to release to the environment. The areas of release will be into the Killag River system. 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.

4.4.2 Work Planned

Monthly surface water samples will be collected (started Oct 2014) and analyzed for general chemistry and metals. This baseline sampling provides a year-long “look” at seasonal variations in the natural flows. Watersheds will be delineated and all water bodies characterized within the Project Area. A site hydrological study will be completed to evaluate potential effects on water quality and quantity, including from storm water discharge. During final design the appropriate sized ponds will be engineered to accept site runoff for 1:100 year storm events.

4.5 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 are several mapped wetlands within or surrounding the Project Area. This information is used to assist wetland specialists to identify the potential locations of wetlands for further field survey and assessment. Wetland delineation surveys commenced in 2008. Additional field surveys will also be completed in 2015 to confirm and delineate all wetlands that are not “mapped wetlands”. Wetland surveys will consist of wetland delineation and evaluation including hydrological characterization, plant surveys, fauna surveys, species at risk surveys, and functions assessments. All of the mapped wetlands will be assessed during baseline environmental surveys (scheduled for the 2015 field season) and any additional wetland habitat within the Project Area will also be identified and evaluated. The following mapped wetlands have been identified:

- 7 hectare (ha) treed swamp (west of Project Area)
- 15 ha low shrub and aquatic vegetation fen system around Mud Lake
- 1.1 ha treed swamp south of Mud Lake
- 1 ha low shrub marsh east of Crusher Lake
- 1.35 ha low shrub marsh North of Crusher Lake
- 4.2 ha low shrub marsh south of Cameron Flowage
- 16.5 ha low shrub bog or fen west of Beaver Dam Mines Road

Several smaller additional wetlands were identified during the 2008 wetland assessment field program. All wetland habitats have been considered when planning the placement of project infrastructure.

4.5.1 Potential Environmental Effects

Some wetlands may be disturbed, 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

Potential impacts to the wetland systems may correlate to construction, operation and maintenance of projects within wetlands. Loss of wetlands in the proposed Project facilities footprint is expected to be the main effect to wetlands. Avoidance is the best policy and Atlantic Gold will make every effort to minimize the impact to wetlands.

Two general footprints were used: one to represent the area affected during Construction, and one to represent the additional area affected during Operations. Outside of these footprints, it can be assumed that direct loss of wetlands would not occur. However, a change in surface water drainage patterns could result in indirect impacts to wetlands outside of the Project area. Ecosystem mapping of wetlands will be used to establish the extent of the expected residual effects. However, any alteration/disturbance to wetlands (direct or indirect) will require alteration approval from Nova Scotia Environment (NSE) and possibly a serious harm to fish authorization from DFO (Fisheries Act Authorization 35 (2)) should wetlands be determined to support fish/fish habitat. The application and approval will detail the impacts and compensation approach to restoring or replacing impacted wetlands.

4.5.2 Work Planned

Survey work will begin in the 2015 field season and wetland delineation and evaluation will occur as per required methodologies between June 1 and September 30, 2015. Wetland assessments will provide information in accordance with the requirements as prescribed in the *Wetland Conservation Policy*.

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 Nova Scotia Wetland Evaluation Technique (NovaWET 3.0, NSE 2011b). Alteration applications will be submitted as required.

4.6 Habitat

Within the Project Area, there are six different ecosites. Ecosites identified within the Project Area were within the moist to fresh moisture regime, with poor to medium nutrient regimes. These ecosites generally support vegetation types from the Spruce-Pine and Spruce-Hemlock forest groups. In areas affected by natural or anthropogenic disturbance (such as wind throw or tree harvesting), early successional stands were determined to be in the mixed wood forest group. The dominant disturbance regime in the Project Area is timber harvesting, which is present in patches through upland forests. Generally speaking, uplands within the Project Area contain immature or uneven-aged coniferous stands or mixed wood stands. Several pockets of mature coniferous forests are scattered throughout the Project Area. Pure deciduous stands (including both tolerant and intolerant hardwood forests) are infrequent.

4.6.1 Potential Environmental Effects

The Project has the potential to affect habitat because of site clearing activities and disturbance from noise, dust, habitat fragmentation, and Project related traffic. Appropriate best management practices and strategies will be considered and implemented to the extent possible to minimize potential effects to wildlife or any habitat identified. There will be future wildlife studies conducted as part of the environmental assessment to inform the assessment of potential effects resulting from habitat changes.

Preliminary desktop and field analysis of habitats does not indicate the presence of unique habitat within the Project area, or that is regionally unique. All identified habitats appear to be continuous outside the Project area.

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.

4.6.2 Work Planned

Survey work will continue in the 2015 field season and further habitat delineation will occur as a function of other baseline environmental assessments.

4.7 Vegetation

Botanical surveys were completed throughout the Project Area during baseline assessments in 2008, primarily in wetlands. A total of 141 species were identified, 5 of which are ranked S2 or S3. No S1 ranked, provincially, or federally listed species were identified during baseline surveys completed in 2008. Ranked species identified in 2008 include Marsh Marigold, Dwarf Rattlesnake-Plaintain, Downy Willow-herb, Small Bur-reed, and Dry-Spike Sedge.

In the fall of 2014, late season phenology surveys were completed over a 2-day period by Dr. Nick Hill and Ms. Melanie MacDonald in a variety of habitat types across the Project Area. In total, 228 species were identified. No S1, S2 or S3 ranked species were identified, and none of the vascular plant species identified have legal status under provincial or federal species at risk legislation. Early season phenology surveys will be completed in June 2015 across the Project Area.

The dominant vegetation habitat types within the Project area are reasonably well understood. The vegetation within these habitat types is both regionally and locally common. The habitats identified, with the expected species therein, are understood to contain a low likelihood of vascular plant species at risk. However, the greatest likelihood for plant species at risk is known to occur within wetlands within the identified habitats. It is understood that wetlands typically contain the highest

level of species richness at an ecosite level. Vascular plant surveys completed in 2008 and 2014 did not identify any species at risk. Further surveys are planned for 2015.

Lichen surveys were completed within the Project Area on February 19, and May 2-4, 2015. Identified habitat across the Project Area with high potential to support rare or at-risk lichen species was evaluated, including mature hardwood and mixed wood stands, wetlands, and all Nova Scotia Department of Natural Resources (NSDNR) predicted Boreal Felt Lichen habitat. Preliminary assessment within the Project Area in 2008 had indicated potential sightings of Boreal Felt Lichen within the Project Area. The 2015 assessments were completed by Mr. Chris Pepper, a qualified and experienced lichenologist in Nova Scotia.

The lichen surveys identified no Boreal Felt Lichen (SARA endangered, NSESA endangered) within the Project Area. Several individual observations of Blue Felt Lichen (NSESA vulnerable) and Frosted Glass-whiskers (SARA special concern) were observed within the Project Area. No other listed lichen species at risk were identified within the Project Area. Three additional lichen species were identified within the Project Area that are ranked as sensitive (S1, S2 or S3) by the Atlantic Canada Conservation Data Centre (ACCDC) conservation status ranks.

4.7.1 Potential Environmental Effects

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 operational footprint but may be reduced for the ongoing maintenance and operations where possible.

Further vegetation studies and evaluations will help confirm or deny the presence of species at risk within the Project area. In order to mitigate the effects of the Project on species at risk, construction and operational footprints may continue to be altered. For example, correlating lichen surveys with habitat mapping has suggested that the presence of lichen within wetlands complexes on the southern reaches of the Project area was potentially high. Therefore, in these areas, the waste pile dimensions were changed such that the lateral surface area of the waste pile was reduced by increasing the height, and has allowed the Project to reduce overall footprint within potentially sensitive areas.

Introduction and spread of invasive and exotic species due to maintenance and operations will be of concern, but weed management programs will minimize the associated impacts.

To better categorize effects, 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 provide 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 fall 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 habitat loss. Despite application of mitigation measures, residual effects may be predictable. Residual effects are anticipated for the loss of vegetation and/or rare plants within the Project area.

4.7.2 Work Planned

In 2014, a detailed desktop review of known lichen observations and potential habitat for rare lichens within and surrounding the Project Area was completed. Lichen surveys have begun and will be completed in 2015 to identify priority lichen species both within and around the Project Area, and to continue to confirm presence/absence of priority species with the potential to occur within the Project Area

The Project Team will review past findings and new species identified in the 2015 field system under the S Rank system instead of the General Status Rank System. That work has begun and is being used to guide field studies.

Survey work will continue in the 2015 field season and further work will occur as a function of environmental assessments.

Consultation with the appropriate regulatory agencies will occur as species at risk are located and mitigation options are considered.

4.8 Birds

Breeding season surveys were completed in 2008, and opportunistic sightings of birds identified in wetland habitats were recorded. Thirty-five species were identified, including the following species of conservation interest and species at risk: Golden-crowned Kinglet (NSDNR yellow), Boreal Chickadee (NSDNR yellow), Olive-sided Flycatcher (NSESA and SARA threatened), Gray Jay (NSDNR yellow), Tree Swallow (NSDNR yellow), Eastern Wood Pewee (NSESA vulnerable), and Canada Warbler (NSESA endangered and SARA threatened).

Fall migration monitoring was completed in 2014 as part of an on-going avian use assessment. During fall migration monitoring, 817 individuals representing 47 species were identified in or near the Project Area. The following species at risk and species of conservation interest were identified: Boreal Chickadee (NSDNR yellow), Blackpoll Warbler (NSDNR yellow), Common Loon (NSDNR red), Golden-crowned Kinglet (NSDNR yellow), Gray Jay (NSDNR yellow), Peregrine Falcon (NSESA vulnerable and SARA special concern), Pine Siskin (NSDNR yellow), Ruby-crowned Kinglet (NSDNR yellow), and Rusty Blackbird (NSESA endangered and SARA special concern). However the ranking system is being updated to refer to the S Ranks as outlined by the ACCDC. When the original species list was created, the information was compiled by general status ranks.

Spring Bird Migration Survey Results

Fifty-two bird species (see Table 4) were observed during dedicated point count survey periods and within the 100m survey radius. An additional eight species were observed incidentally (see Table 4).

Total density of birds was estimated to be 832.89 birds/100 ha based on observations during the dedicated point count surveys. Density estimates for individual species are described in Table 4; the three most common species observed were Magnolia warbler (Setophaga magnolia; n=31), dark-eyed junco (Junco hyemalis; n=22) and white-throated sparrow (Zonotrichia albicollis; n=20).

Seven species of interest (see Table 4) were observed during the dedicated survey periods: Common loon (Gavia immer), spotted sandpiper (Actitis macularius), greater yellowlegs (Tringa melanoleuca), Wilson's snipe (Gallinago delicata), yellow-bellied flycatcher (Empidonax flaviventris), boreal chickadee (Poecile hudsonicus), and brown-headed cowbird (Molothrus ater). Three additional priority species were observed incidentally: Gray catbird (Dumetella carolinensis), blackpoll warbler (Setophaga striata), and Wilson's warbler (Cardellina pusilla).

Table 4 Species observed and calculated densities (birds/100 ha) from spring bird migration point count surveys

Family/Common name	Scientific name	Count	# points obs.	Density (birds/100 ha)
Anatidae				
Wood duck***	*Aix sponsa*	.	.	.
American black duck	*Anas rubripes*	1	1	31.83
Ring-necked duck	*Aythya collaris*	2	1	63.66
Duck spp.	.	1	1	31.83
Hooded merganser	*Lophodytes cucullatus*	1	1	31.83
Common merganser***	*Mergus merganser*	.	.	.
Phasianidae				
Ruffed grouse	*Bonasa umbellus*	7	3	74.27
Spruce grouse	*Falcipennis canadensis*	3	2	47.75
Gaviidae				
Common loon*	*Gavia immer*	1	1	31.83
Scolopacidae				
Spotted sandpiper*	*Actitis macularius*	2	1	63.66
Greater yellowlegs*	*Tringa melanoleuca*	2	2	31.83
Wilson's snipe*	*Gallinago delicata*	3	3	31.83
Alcedinidae				
Belted kingfisher	*Megaceryle alcyon*	1	1	31.83
Picidae				
Yellow-bellied sapsucker	*Sphyrapicus varius*	1	1	31.83
Downy woodpecker	*Picoides pubescens*	1	1	31.83
Hairy woodpecker	*Picoides villosus*	1	1	31.83
Northern flicker	*Colaptes auratus*	8	5	50.93
Pileated woodpecker	*Dryocopus pileatus*	2	2	31.83
Woodpecker spp.	.	4	3	42.44
Tyrannidae				
Yellow-bellied flycatcher*	*Empidonax flaviventris*	1	1	31.83
Alder flycatcher	*Empidonax alnorum*	3	2	47.75
Least flycatcher	*Empidonax minimus*	8	5	50.93
Vireonidae				
Blue-headed vireo	*Vireo solitarius*	5	5	31.83
Red-eyed vireo	*Vireo olivaceus*	5	5	31.83
Corvidae				
Blue jay***	*Cyanocitta cristata*	.	.	.
American crow***	*Corvus brachyrhynchos*	.	.	.
Common raven***	*Corvus corax*	.	.	.
Hirundinidae				
Tree swallow	*Tachycineta bicolor*	4	1	127.32
Paridae				
Black-capped chickadee	*Poecile atricapillus*	2	2	31.83
Boreal chickadee*	*Poecile hudsonicus*	2	1	63.66

Sittidae				
Red-breasted nuthatch	*Sitta canadensis*	1	1	31.83
Troglodytidae				
Winter wren	*Troglodytes hiemalis*	1	1	31.83
Regulidae				
Golden-crowned kinglet	*Regulus satrapa*	9	5	57.29
Ruby-crowned kinglet	*Regulus calendula*	18	7	81.85
Turdidae				
Swainson's thrush	*Catharus ustulatus*	3	3	31.83
Hermit thrush	*Catharus guttatus*	8	5	50.93
American robin	*Turdus migratorius*	13	6	68.97
Mimidae				
Gray catbird**	*Dumetella carolinensis*	.	.	.
Parulidae				
Northern waterthrush	*Parkesia noveboracensis*	1	1	31.83
Black-and-white warbler	*Mniotilta varia*	16	9	56.59
Nashville warbler	*Oreothlypis ruficapilla*	2	1	63.66
Common yellowthroat	*Geothlypis trichas*	16	10	50.93
American redstart	*Setophaga ruticilla*	5	3	53.05
Northern parula	*Setophaga americana*	1	1	31.83
Magnolia warbler	*Setophaga magnolia*	31	11	89.70
Yellow warbler	*Setophaga petechia*	1	1	31.83
Chestnut-sided warbler	*Setophaga pensylvanica*	1	1	31.83
Blackpoll warbler**	*Setophaga striata*	.	.	.
Palm warbler	*Setophaga palmarum*	11	7	50.02
Yellow-rumped warbler	*Setophaga coronata*	12	6	63.66
Black-throated green warbler	*Setophaga virens*	17	7	77.30
Wilson's warbler**	*Cardellina pusilla*	.	.	.
Emberizidae				
Chipping sparrow	*Spizella passerina*	1	1	31.83
Song sparrow	*Melospiza melodia*	3	3	31.83
Lincoln's sparrow	*Melospiza lincolnii*	4	2	63.66
Swamp sparrow	*Melospiza georgiana*	2	2	31.83
White-throated sparrow	*Zonotrichia albicollis*	20	9	70.73
Dark-eyed junco	*Junco hyemalis*	22	12	58.36
Icteridae				
Red-winged blackbird	*Agelaius phoeniceus*	3	1	95.49
Common grackle	*Quiscalus quiscula*	15	6	79.58
Brown-headed cowbird*	*Molothrus ater*	1	1	31.83
Fringillidae				
American goldfinch	*Spinus tristis*	5	4	39.79
Totals:		**314**	**12**	**832.89**

Notes: Birds are listed in taxonomic order according to the American Ornithologist's Union (AOU) Checklist of North American Birds, 7th edition; * Priority species observed during dedicated surveys;
** Priority species observed incidentally; *** Non-priority species that were observed incidentally (i.e. not during dedicated surveys or beyond the 100m survey radius); Total counts do not include unidentified species; Species numbers in the table are only for those observed within the 100 m point count radius and within the dedicated point count periods.

4.8.1 Potential Environmental Effects

Migratory birds (as defined in the *Migratory Birds Convention Act, 1994)* potentially impacted by the Project are being determined. Baseline studies/surveys are underway to better determine if and how the Project may affect some bird species. 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. Note that the Project does not introduce any new transmission lines. The discussion on potential effects relates only to existing lines as they are part of the existing conditions.

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 cause changes to 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. As is possible, during all stages of the Project, impact to migratory birds and their habitat should be minimized. The Proponent will work to eliminate 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. If possible, a buffer zone of trees and vegetation will be left intact surrounding project infrastructure to increase the distance between the operations and migratory birds. Changes to migratory birds and their habitat would occur if a deleterious substance was released into a body of water frequented by migratory birds. 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 and that are associated with the construction and operation phases of the Beaver Dam Gold Mine Project are as follows:

- Direct temporary and long-term loss of habitat for birds due to clearing and grubbing of the open pit and waste rock storage areas
- Destruction or displacement of birds in areas of excavation and piling of mine wastes
- 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 and vibrations
- Attraction and disorientation resulting from night-lighting

The associated mitigations for these effects, as they relate to the Project, are described in Table 5.

Table 5 Potential effects of activities on migratory birds during the construction and operation phases

Activity	Effects	Mitigation
CONSTRUCTION		
Open pit development		
Clearing and grubbing of open pit area	Direct temporary and long-term loss of habitat for birds. Destruction or displacement of species in areas of excavation and piling of mine wastes.	Undertake seasonally-appropriate surveys to identify key habitat and habitat features of priority species prior to starting construction. Conduct a pre-construction survey of known raptor nests in the Project area during the breeding season (beginning of April to end of August; EC 2015). Where active nests are recorded, follow timing restrictions or mitigation developed in consultation with Environment Canada and provincial regulators. Avoid construction on native vegetation during the breeding season for migratory birds (beginning of April to end of August for migratory birds; EC 2015). Where this is not possible, a bird nest mitigation plan should be developed prior to construction, and in consultation with Environment Canada and provincial regulators.
Heavy machinery operation	Increased dust emissions. Bird injury and mortality. Disturbance from anthropogenic noise.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified. Controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design.*
Vehicle activity for transportation of personnel and operating supplies	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Waste rock storage facility development		
Clearing and grubbing of rock storage areas	Direct temporary and long-term loss of habitat for birds.	Undertake seasonally-appropriate surveys to identify key habitat and habitat features of priority species prior to starting construction. Conduct a pre-construction survey of known raptor nests in the Project area

Activity	Effects	Mitigation
		during the breeding season (beginning of April to end of August; EC 2015). Where active nests are recorded, follow timing restrictions or mitigation developed in consultation with Environment Canada and provincial regulators. Avoid construction on native vegetation during the breeding season for migratory birds (beginning of April to end of August for migratory birds; EC 2015). Where this is not possible, a bird nest mitigation plan should be developed prior to construction, and in consultation with Environment Canada and provincial regulators.
Mine haul road construction		
Heavy machinery operation	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Mine infrastructure for crushing and haul-out		
Construction and commissioning of support infrastructure	Increased dust emissions.	Application of water obtained from settling ponds.*
Heavy machinery operation	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Road improvement		
Heavy machinery operation	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
OPERATIONS		
Open pit mining		
Open pit lighting	Attraction and disorientation.	Only use direct and focused light when needed for worker safety.
Blasting (once per week) and drilling of insitu rock	Increased dust emissions. Noise and vibration from blasting and equipment.	Application of water obtained from settling ponds.* Controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design.*

Activity	Effects	Mitigation
	Trapped wildlife in open pit.	Monitor the open pit for trapped wildlife before the daily start of construction, or prior to resuming work after a shutdown and remove wildlife before start-up.
Vehicle activity for transportation of personnel and operating supplies	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Use of diesel-powered generators	Disturbance from anthropogenic noise.	Controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design.*
Waste rock storage		
Vehicle activity for transportation of personnel and operating supplies	Increased dust emissions. Bird injury and mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Haul truck activity	Bird injury and mortality.	Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Heavy machinery operation	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.
Crushing and haul-out		
Primary crushing of ore	Increased dust emissions.	Application of water obtained from settling ponds.*
Vehicle activity from fleet of road trucks required to transport crushed ore	Increased dust emissions. Bird injury or mortality.	Application of water obtained from settling ponds.* Maintain speed limits on mine-haul roads. Reduce speed limit and install signage where specific wildlife concerns have been identified.

Notes: * Mitigations are outlined in the Project Description.

Upgrades to the private haul roads will have low potential for effects on migratory birds. The road network and associated edge habitat is currently present through this forested habitat. The proposed upgrades may cause a temporary displacement of birds during construction (from general activity, noise and dust), but a permanent change in habitat from its current state for migratory birds along the road is not expected. Based upon the existing road network and limited disturbance to habitat, the likelihood of significant effects are low.

4.8.2 Work Planned

Bird surveys have been completed. 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

There are relatively few perennial watercourses throughout the Project Area. The main watercourse system is from Crusher Lake north to Mud Lake, which continues and drains into Cameron Flowage (Killag River). This system is confirmed fish habitat upstream to Crusher Lake, and fish (Brook Trout and Northern Redbelly Dace) have been observed in 2015 within the inlet watercourse to Mud Lake from Crusher Lake. Brook Trout was observed in gill nets in 2008 within Crusher Lake. Upstream and south of Crusher Lake, fish habitat has been confirmed with Slimy Sculpin and other undetermined fish species observed. Project infrastructure has been planned to avoid the watercourse system draining from Crusher Lake to Mud Lake. No disturbances to the water quality or water quantity of Crusher Lake, Mud Lake or Cameron Flowage are expected.

Several ephemeral watercourses and small first order streams associated with Crusher/Mud Lake/Cameron Flowage system are present within the Project Area. There is a 16 ha headwater bog that drains south located at the southern end of the Project Area. This system will be largely avoided by project infrastructure; and fish habitat potential within this system is low. Fish were not observed in 2015 in first order stream systems associated with this headwater bog.

The man-made pond in the northeast section of the Project Area has been confirmed to be fish habitat. The Project Team observed Brook Trout, Northern Redbelly Dace and Lake Chub within the watercourse drainage channel leading east from this pond towards Cameron Flowage. There are no significant barriers to fish passage from Cameron Flowage to the man-made pond in the NE section of the Project Area. Brook Trout and Northern Redbelly Dace were also observed in 2015 west of the man-made pond in first order streams draining east into the pond. These systems will be impacted by the construction of pit infrastructure.

The final watercourse system is located on the southwest edge of the Project Area, in proximity to the waste rock storage location. This system is potential fish habitat, however will be avoided by project infrastructure. This watercourse drains south as Paul Brook, which is a tributary to the West River Sheet Harbour.

Surface water drainage is maintained by culverts of various sizes in the existing roads. The locations of culverts and bridges have been determined by surface water drainage and the need for road access to forest stands. To a large extent, surface water flow is maintained by these culverts which have been placed to prevent or reduce erosion and undermining. In some areas, surface water drainage which is interrupted by the presence of the woods roads is directed down-gradient in road side ditches. In most cases, these ditches direct the drainage to a culvert or stream. Such anthropogenic activities have altered the natural habitat of the area and resulted in modifications to natural ecosystems.

Wood Turtle habitat is not likely present within the Project Area. Evaluation of larger watercourses systems (Crusher Lake to Mud Lake, and unnamed watercourse in southwest corner of the Study Area) was completed in spring 2015 for Wood Turtle habitat and species presence. No wood turtles were observed. Potential Snapping Turtle habitat is present within Cameron Flowage (Killag River).

Consideration of this system for Snapping Turtle was included in all surveys during the field season 2015. No snapping turtle evidence was identified during the 2015 field season.

4.9.1 Potential Environmental Effects

The likelihood of residual effects to fish, fish habitat, and aquatic resources from the Project will be based upon impacts of the Project to surface water quantity and quality. The distribution of fish in Project-area waterbodies is affected by the presence of natural barriers preventing many species from occupying the upstream reaches of creeks. Direct impact to fish bearing watercourses and waterbodies is not expected to occur from project infrastructure. Direct effect to aquatic species at risk, if identified within the Project Area are not expected, as watercourse and lakes within the Project Area are not expected to be directly affected by project infrastructure.

The primary pathways of interaction between the Project and fish, fish habitat, and aquatic resources are expected to be a result of potential indirect:

1. changes in water quantity, due to alteration of natural drainage networks and construction of infrastructure; and,
2. 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 *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. .

Culverts will be upgraded as necessary during project development and new crossings will also be identified on the few new 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 effects resulting from Project development should be expected. The improvements to the various existing water crossings can be seen as a project benefit as many were not engineered and have resulted in increased sediment and erosion issues, hung culverts and many are collapsed or partially collapsed.

Fish and fish habitat is expected to be improved along the road network as culverts are replaced and installed in accordance with the DFO guidelines for the design of fish passage for culverts in Nova Scotia. Currently, eighteen culverts were identified at watercourse crossings in poor

condition with limitations present for fish passage and maintenance of fish habitat. Similarly, aquatic species that might be present within watercourses along the road network will also benefit from improved habitat and navigation through properly installed culverts/bridges along the upgraded road. Wetland alterations required for road widening and re-alignment may result in a loss of fish habitat in individual wetlands. The majority of wetlands observed during the initial road assessment were forested wetland habitats (shrub and treed swamps/bogs), which generally provide low fish habitat potential due to lack of surface water within these wetland habitats. However, some fish habitat loss is possible. Wetland compensation options will be identified allowing for replacement of lost wetland habitat and lost fish habitat.

4.9.2 Work Planned

Aquatic resources in the Project area will be further characterized in the baseline program occurring in 2015. Watercourse mapping and modelling will also be completed.

4.10 Mammals and Wildlife

Mainland Moose tracks have been observed in two locations within the Project Area during 2014 fall surveys. Winter moose surveys are currently being completed and a spring pellet pile survey for Moose is planned for spring 2015. No Mainland Moose signs were observed during winter track surveys. The Project team has observed incidental sightings of green frogs, wood frogs, red-backed salamanders, deer, coyote, raccoon, porcupine, rabbit, and squirrel.

Twelve abandoned mine openings (AMO) are present through the site. One AMO has been identified as having low potential for bat hibernacula based on current condition (debris filled) and shaft length (with presence of high water table). Bat hibernacula are highly non-random, and investigations of bat habitat potential will focus on habitat.

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, 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 altered to reduce effects to species.

Wildlife Species listed under the *Species at Risk Act,* COSEWIC, NSESA, or NS Wildlife Act have the potential to occur, within the Project area. The Project has the potential to affect wildlife through the loss of habitat because of site clearing activities and disturbance from noise and 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.

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. There will be future wildlife studies conducted as part of the environmental assessment to inform the assessment 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. How wildlife are affected by habitat availability, use, or fragmentation is determined by species habitat requirements (i.e. thermal, cover, security) and rates of movement through various habitats. 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. Then, the effect of habitat fragmentation on a species (population) would be primarily through not only habitat loss, but habitat changes.

Studies indicate that wildlife populations may be expected to disperse from the area during periods of construction and/or operation. Assuming wildlife species are displaced from the Project lands, this will reduce the available habitat. However, this displacement is generally of short temporal disturbance as most cases reveal that wildlife returned after human activity has ceased.

Based upon the vegetation characteristics in adjacent areas it is expected that displacement of wildlife will occur. 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.

4.10.2 Work Planned

Survey work will continue in the 2015 field season in accordance with agreed upon methodologies (See Section 5.1). The data collected during those assessments will 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 management strategies that avoid or protect species to the best extent that is possible.

Twelve abandoned mine openings are present through the site. One AMO has been identified as having low potential for bat hibernacula. Investigations of bat habitat potential will focus on habitat as described by Vanderwolf (2012) and Randall (2011). A video-snake could be used to take a closer look at the inner workings of the AMO to determine if bat habitat is present. If completed, this will not be done until after May 15.

4.11 SARA Listed Species

Prior to completion of biophysical studies within the Project area, 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 September 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.
3. Nova Scotia General Status of Wild Species: All species designated as Species of Conservation Concern (Red or Yellow).

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 Project footprint, this species would not be carried forward to the final list of priority species for field assessments.

Table 6 List of SARA Listed Species identified within the Project Area during 2015 Assessments*

Common Name	Scientific Name	SARA Status	COSEWIC Status	Period observed (2015)
Canada Warbler	*Wilsonia canadensis*	T	T	Summer (breeding) during dedicated surveys
	Habitat Requirements In Nova Scotia, the Canada warbler has only been found sparsely on Cape Breton Island and in the extreme southwest of the province. They are less predictable from habitat than most warblers, they are usually found in dense understory vegetation of mature to mid-aged mixed forest, most closely associated with broad-leafed trees and shrubs, but with conifers usually present too.			
Chimney Swift	*Chaetura pelagica*	T	T	Summer (breeding) incidentally
	Habitat Requirements The chimney swift is most often seen on the wing and while entering their nesting places; these are often in chimneys or old cabins in the forest, but most swifts originally nested, and still nest in hollow trees.			
Olive-sided Flycatcher	*Contopus cooperi*	T	T	Summer (breeding) during dedicated surveys
	Habitat Requirements The olive-sided flycatcher is found in open woodlands and other places where scattered trees remain after cutting or fire in forested regions. Found throughout the Maritimes, but not abundantly.			
Peregrine Falcon - anatum/ tundrius	*Falco peregrinus* pop. 1	SC	SC	Fall (migration) during dedicated surveys
	Habitat Requirements Preferred habitats include tundra, savannas, coasts, mountains, and tall buildings.			
Rusty Blackbird	*Euphagus carolinus*	SC	SC	Fall (migration) incidentally
	Habitat Requirements Rusty blackbirds use wet coniferous and mixed forests from northern edge of tundra southward to beginning of deciduous forests and grasslands. Frequents fens, alder (*Alnus*)–willow (*Salix*) bogs, muskegs, beaver ponds, and other openings in the forest such as swampy shores along lakes and streams. Exceptionally, on Cape Breton Island, Nova Scotia, drier sites such as pasture edges are used. During spring and fall migration, it forages in stubble,			

Common Name	Scientific Name	SARA Status	COSEWIC Status	Period observed (2015)
	pasture, plowed fields, and edges of swamps. Fall migrants also frequent wooded areas, particularly for roosting. Occasionally roosts on the ground in open fields.			
Frosted Glass-whiskers	*Sclerophora peronella*,	SC	SC	Identified outside mine feature areas.
	Habitat Requirements Frosted glass-whiskers is a stubble lichen with tiny, pale pink apothecia (spore-bearing structures), mounted on a 0.5-1 mm reddish-brown stalk. A powdery whitish to yellow brown substance covers ("frosts") the top of the lichen. The thallus (main body) is found within the tree, and is therefore not visible.			
Blue-Felt Lichen	*Degelia plumbea*	No status	SC	Identified outside mine feature areas.
	Habitat Requirements Grows as an epiphyte, predominately on hardwoods in woodlands and is vulnerable to disturbance that leads to a reduction in habitat humidity.			
American Eel	*Anguilla rostrate*	No status	T	Identified during 2008 electrofishing
	Habitat Requirements Use a variety of marine and freshwater habitat.			

*except American Eel – identified during 2008 electrofishing surveys

No SARA listed species of vascular plants were identified within the Project lands.

No SARA listed mammals were identified within the Project lands.

No SARA listed amphibians were identified within the Project lands.

No SARA listed reptiles were identified within the Project lands.

4.12 Air Quality, Noise, and Greenhouse Gases

4.12.1 Existing Conditions

4.12.1.1 Air Quality/Particulate Emission

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 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.

Four locations have been sampled for baseline air quality in October 2014 for a 24-hour period in accordance with USEPA CFR 40 part 50 -Regulations for Ambient Particulate Sampling. Sampling

equipment utilized by GHD consisted of high volume air samplers equipped with 8 inch X 10 inch glass fiber filters for sample collection.

Total suspended particulates 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 Compounds (VOCs) are also considered particulate matter.

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.

All calculated values report well below the maximum permissible ground level concentration of 120 ug/m^3 as outlined in Schedule A of the Nova Scotia Air Quality Regulations.

4.12.1.2 Noise and Vibration

Three locations were monitored in October 2014 and in November 2014 for 24-hour periods to gather data on daytime and night time noise levels utilizing a Quest Sound Pro SE/DL sound level meter with data logging capability. 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 excessive 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.

Average sound level values at each sample location for each time interval report below the maximum permissible sound levels of the Noise Measurement and Assessment Guidelines.

Baseline monitoring of particulates and noise in and around the proposed pit location and waste rock storage pile are well below applicable NSE criteria. Particulate concentrations and noise levels are typical of forested rural areas.

4.12.1.3 Climate Change and Greenhouse Gases

The local climate at the Project Site 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 normals 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. Recent guidance documents published by MSC, Atlantic Region will be examined and used to assist with the climate change impact assessment (*i.e.*, Lines *et al*. 2006; Pancura and Lines 2005).

The climate change and greenhouse gas discussion will address potential impacts during the all phases of operations including: emissions from heavy equipment operation and project traffic; accidental spills, and de-icing materials; adverse impacts to sensitive receptors; micro-climate modifications in the vicinity of the Project; and, potential human health related effects associated with the Project.

4.12.2 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 must centre on provision of moisture control measures, such as spraying with water as required. During construction, water from settling ponds and the ground water in-flow to the pit will be used for dust suppression.

In-pit operations will not generally have much direct offsite 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 in the coarser fraction (>2.5 microns). TSP values measured in and around the mine site all measured less than the EPA NAAQS standard. Hence it is most likely that baseline values of PM 2.5, although not measured, will be below the PM 2.5 NAAQS criteria value as well.

The National Air Pollution Surveillance (NAPS) network is a cooperative program that measures air quality across Canada. The closest NAPS monitoring location to the Moose River is at Lake Major, approximately 90 km away. At present NSEL monitors PM 2.5 levels at that location. Monthly PM 2.5 measurements for 2005 ranged from 3 $\mu g/m^3$ -7 $\mu g/m^3$. 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 $\mu g/m^3$.

Noise generated throughout the mining development and operation will included drilling and blasting, crushing and transport of ore that may negatively affect the behaviour of birds and mammals. The noise from mining will be generally contained to the Project site.

Greenhouse gasses will be generated through fuel consumption in on-site mining equipment, power generators and off-site trucking.

Given that there will be no residential buildings (6 km) located near the proposed open pit area, increases in suspended particulate matter and noise from operations, although adverse, will not affect residents in that area.

4.12.3 Work Planned

No further specific air quality testing is proposed. Baseline values for air quality and noise have been established. Additional air and noise monitoring would be required to measure the full effects once mine operations begin. Operational baseline monitoring may be undertaken as a condition of Industrial Approval. An audit program of the same sampling sites originally chosen for the baseline monitoring can be implemented. Mitigation strategies will be developed for dealing with the unacceptable air quality and noise results.

4.13 Archaeological & Heritage Resources

4.13.1 Existing Conditions

Site

In 2008, Acadian Mining undertook an archaeological screening and reconnaissance program at Beaver Dam Gold Mine. At that time, an open-pit mine was proposed as well as associated mine features including a crusher, a settling pond, stock piles of overburden and product, and service roads. The reconnaissance noted 6 features, of which Sites 1 to 5 were within close proximity to Crusher Lake. Site 6 was located northwest of the lake. Two areas along the Cameron Flowage were identified as being high potential for Precontact resources. In addition to these features and high potential areas, numerous industrial features were identified along the northern shore of Crusher Lake. The archaeologist (CRM Group) recommended that the features and the high potential areas be subject to shovel testing and the industrial features subject to detailed documentation if any of them fell within areas of future development.

CRM Group was again retained on behalf of Atlantic Gold to conduct archaeological screening and reconnaissance at Beaver Dam Gold Mine using the current site development plan. Building upon the research and reconnaissance undertaken on the property in 2008, CRM Group revisited several of the sites previously noted, as well as identified other features related to the mine (the location of a sawmill and a possible cookhouse). CRM Group again recommended that any development around the identified features would require shovel testing and intensified historical research. In addition, any development around Crusher Lake should be subjected to intensified reconnaissance. The Pit and Waste Rock Storage Pile study areas as they were oriented at the time of reconnaissance, were cleared of any requirement for further archaeological investigation.

The loss or destruction of archaeological or heritage resources is a potential environmental effect of the Project. Based on the current area, the Project may interact with areas of known historic resources. Recommendations to further survey these resources if threatened have been accepted by provincial regulatory authority.

As the Project footprint develops, some follow up survey work is required in areas of potential disturbance. If historic resources are encountered during project construction or operation further survey work may be required.

Haul Roads

The haul roads begin at the Beaver Dam Mine Site, following the existent Beaver Dam Mines Road southwest to Trunk 224; then Trunk 224 northwest to the Moose River Cross Road (so called); then generally southwest to the Mooseland Road; and then northwest to the Touquoy Mine Site. The sections along Trunk 224 and along Mooseland Road do not require any upgrades. It is proposed that the section between the Beaver Dam Mine Site and Trunk 224 (Beaver Dam Mines Road), and the section between Trunk 224 and Mooseland Road (Moose River Cross Road) require upgrades to prepare it for two lanes of truck travel.

Although the Maritime Archaeological Resource Inventory (MARI) does not identify any sites within the vicinity of the study area, this more likely reflects a lack of archaeological investigation within the area. Water was an important resource for the First Nations and early European-Canadians and the haul road crosses several small to major watercourses. Widening of the existing road could impact

areas of high archaeological potential. A pedestrian survey will be required assess these areas for high archaeological potential.

Faribault (1898) depicts a camp within three kilometres of the alignment of the haul road. It also notes several dams located in the vicinity of Moose River Cross Road. Although no other features are depicted within this section, dams would suggest further activity not noted on the Faribault map. Several houses and a First Nations reserve are located adjacent to what is now Trunk 224. The section along Mooseland Road passes two camps, several structures noted as “Icelanders huts” and a dam at the south end of Cope Lake. The review of Faribault indicates there is heavy activity in the area and that many of the modern road alignments follow closely to the historic alignments.

A number of areas of high archaeological potential have been noted based on a cursory review of the haul road. Once a Heritage Research Permit has been obtained from the Special Places Program, qualified archaeologists will conduct a full archaeological desktop review followed by a program of field truthing.

4.13.2 Potential Environmental Effects

The loss or destruction of heritage or archaeological resource material is a potential environmental effect of the Project. Based on the existing knowledge there is some small potential for the Project to interact with identified heritage resources that have been associated with historic mining at or near the site. The current project plan is to avoid said areas.

4.13.3 Work Plan

In addition to work that has been completed to date and in light of subsequent changes in the Project footprint, some follow up field reconnaissance work is required in 2015. If areas of heritage resources are to be impacted, further work will be undertaken to document these resources. If heritage resources are identified during construction or operation of the mine then all work will stop in the immediate vicinity until said resources can be further studied.

4.14 Traditional Use by First Nations People

4.14.1 Existing Conditions

A Mi’kmaq Ecological Knowledge Study (MEKS) completed according to the Mi’kmaq Ecological Knowledge Study Protocol (ANSMC 2007) was conducted in 2008 for Acadian Mining and updated in 2014 and 2015 for Atlantic Gold. The Confederacy of Mainland Mi’kmaq (CMM) provides advisory services to six Mi’kmaw communities in the province of Nova Scotia: Paqtnkek, Annapolis Valley, Bear River, Glooscap, Millbrook, and Pictou Landing First Nations.

Beaver Dam 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 Beaver Dam lies within this district.

Beaver Lake Indian Reserve 17 is located along Highway 224, approximately 6 km from the Mine site; and, is a satellite community associated with Millbrook First Nation. The reserve was established on March 2, 1867, is approximately 49.4 ha in size. There are five homes and 4 small seasonal cottages or hunting camps located on the property with an estimated population on

reserve of 22 people. Lands surrounding the Reserve are used for traditional hunting and gathering; however, this does not extend to the Project area.

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 Project area. 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, all work should be halted and immediate contact should be made with the Nova Scotia Museum and The Confederacy of Mainland Mi'kmaq. Should the proposed project site change or expand, additional research will be conducted. Atlantic Gold will continue to communicate with the Mi'kmaq on a mutual benefits agreement that is founded in the Memorandum of Understanding developed for its Nova Scotia mining interests.

The Project includes two road expansion along the Beaver Dam Mine Road and the Moose River Cross road, which is located adjacent to Beaver Lake IR #17. Concerns over increased traffic, loss of wetland habitat and the potential to damage Burial sites located on the western side of the Beaver Dam Mines Road have been noted. The location of these potential burial sites have not been verified.

4.14.2 Potential Effects

The Project will not require use of lands and resources that are reportedly used for traditional purposes by First Nations peoples. The MEKS concludes that it is unlikely the Project will have any negative effects on traditional land use provided that any recommended mitigation measures are implemented. The MEKS provided by CMM is instructive in outlining potential effects on aspects of the Project and have been described above. Health and socio-economic impacts were not clearly within the MEKS mandate or identified through consultation however Atlantic Gold can put forward possible impacts for these aspects and mitigation. Health is defined as overall health including mental, physical and spiritual for the Mi'kmaq and the Project does have the potential for negative and positive impacts. On the negative side there is the possibility that elevated levels (above background but not out of compliance with regulated limits) of particulate and noise associated with trucking could impact the Mi'kmaq residents in IR #17. This will be further examined during consultation with residents (some are seasonal) and with road design requirements from the Province.

There is also the possibility that reduced harvesting (game, furbearers and medicinal plants) opportunities would occur along the ore haul route due to the trucks being present (Figure 5). The footprint of the road proposed for the Project is minimally different from that at present day so if harvesting was occurring, the losses would relate to safety concerns more than loss of habitat. As previously described, the fish passage and habitat will be improved due to the Project and therefore a net benefit to the Mi'kmaq after the ore hauling (4 years) ceases.

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

Table 7 Significance of Potential Project Impacts on Mi'kmaq Land and Resource Use

POTENTIAL IMPACT	EVALUATION OF SIGNIFICANCE
The historic review of Mi'kmaq use and occupation documents Mi'kmaq use and occupation in the study area, and potentially the Project area. A potential impact of the Project is the disturbance of archaeological resources and burial site.	Mi'kmaq archaeological resources are extremely important to Mi'kmaq as a method of determining Mi'kmaq use and occupation of Mi'kma'ki and as an enduring record of the Mi'kmaq nation and culture across the centuries. Archaeological resources are irreplaceable. Any disturbance of Mi'kmaq archaeological resources is significant. The potential Burial sites are not located within the proposed project site, therefore, impact of the Project is not likely significant.
Several species of significance to Mi'kmaq have been identified in the study areas. Permanent loss of some specimens is an impact of the Project.	The plant species of significance to Mi'kmaq identified within the study area exists within the surrounding area. The destruction of some specimens within the study areas does not pose a threat to Mi'kmaq use of the species. The impact of the permanent loss of some specimens of plant species of significance to Mi'kmaq is evaluated as not likely significant.
Hunting and trapping activities have been identified in the study area in relation to the haul road. Permanent loss of habitat is an impact of the Project.	The potential for habitat loss is located around the wetlands around Tent Lake on the Beaver Dam Mine road. Habitat loss can be evaluated as significant.

4.14.3 Work Planned

Information collected, along with the current MEKS for the site and haul roads, will be form part of the Environmental Assessment Document that will address environmental and socio-economic effects as it relates to traditional use and other concerns raised by the community. Further consultation is required to understand the First Nation concerns and what mitigation is possible to build into the project design.

4.15 Socio-Economic Setting

4.15.1 Existing Conditions

The region is primarily dependent on resource industries, predominantly forestry, agriculture, and to a lesser extent, mining/quarrying. Mineral exploration activity in the region has been constant for decades but has grown and declined over the years depending on the economic conditions of the day. The mining industry represents a significant potential source of employment in this region that has historically seen considerable mining focus over the last 150 years. Forestry and tourism have fluctuated significantly in response to prevailing economic conditions. 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 locally and regionally. It could potentially reduce and possibly reverse an outward migration trend of people moving to larger centres. Atlantic Gold intends to work with local communities to maximize benefits through employment, business opportunities, training, and skills development.

Nova Scotia Community Counts (NSCC 2015) provides social, economic, environmental and cultural data on a common platform that have been categorized to particular communities. NSCC attributes the Beaver Dam Mine Project to fall almost exactly on the boundary between the Sheet Harbour and Upper Musquodoboit reporting areas. The demographics of the two areas are reported in Table 8 and compared to Municipal and Provincial figures. The number of people reported (2011) in the labour force is considerably lower than that of the rest of Halifax and Nova Scotia, however the population by age group shows the region to be skewed.

Table 8 Demographic Summary

Statistics (2011)	Sheet Harbour		Upper Musquodoboit		Regional Summary		Halifax Municipality	Nova Scotia
Total Population	1,563		1,052		2,615		390,285	921,725
Age 0-19	271	17.3%	207	19.7%	477	18.3%	21.4 %	21.2 %
Age 20-44	301	19.3	265	25.2	566	21.6	35.8	30.5
Age 44-64	558	35.7	380	36.1	938	35.9	39.7	31.6
Age 65+	433	27.7	200	19.0	633	24.2	13.1	16.6
Labour Force (%)	40.4		43.0		41.4		57.5	52.6
Average Family Income	$ 62,713		$ 70,444		$ 66,578		$ 78,189	$ 66,032

4.15.2 Potential Socio-Economic Effects

The Project would provide many opportunities for employment in this part of Halifax County. The area has a rich natural resource history including mining and forestry. Mining jobs pay a premium over many other occupations and ranks number one in Nova Scotia in terms of weekly wages. Due to the distance (more than 5km) of the proposed Project site from most residences and groundwater users, impacts on existing and future adjacent land uses are not expected.

4.15.3 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.

4.16 Summary of Proposed Environmental Management Plans

During the development of the Environmental Assessment and Industrial Approval Applications, relevant Environmental, Construction and Operational Management Plans will be developed, and

mitigative measures will be implemented where appropriate. These may include, but are not limited to:

- Surface water and groundwater quality /quantity monitoring plans;
- Erosion prevention and sediment control plan;
- Acid Rock Drainage management and monitoring plan;
- Soil and overburden management plans;
- Air quality monitoring and management plan;
- Water management plan;
- Habitat monitoring plans (wildlife, vegetation, fish, aquatic life);
- Solid waste management reduction and recycling plan;
- Emergency response plan;
- Contingency plan; and
- Reclamation and Closure plans.

5. Public Consultation

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

Primarily, public consultation with stakeholders has consisted of discussion with the land owner 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.

A public consultation program will commence in spring 2015 with planned information sessions whereby the project will be presented and feedback solicited.

5.1 Regulatory Consultation

5.1.1 One Window Meeting

The Touquoy project 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 the project progress. For the Beaver Dam Project, regulatory consultation began on 23rd October 2014 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 Atlantic Gold on the processes and timelines for regulatory approvals and other issues regarding development of the Touquoy and Beaver Dam gold properties.

5.1.2 Environmental Assessment Process

Discussions have begun with Nova Scotia Environment to scope the Project for Environmental Assessment requirements. It is assumed that any changes to the Touquoy Project affected by the

Beaver Dam Project (i.e. trucking, tailings, and processing) will be assessed as a function of the Beaver Dam Environmental Assessment.

5.1.3 Ecological Baseline Studies

A regulatory consultation was held on December 17th, 2014 to review the approach to the baseline studies for ecological components of the Project. The meeting was attended by representatives from NS Department of Natural Resources (NSDNR) (Wildlife Division) and Fisheries and Oceans Canada. Nova Scotia Environment was invited but did not attend.

Meeting attendees were presented with a map showing the study area and project area, and a clarification was given that the study area is larger than the proposed project area so the Project Team can understand indirect effects of project activities outside of the proposed project area. The following is a summary of that meeting.

A summary of past, present and future studies was presented. Environmental assessment work was completed by CRA in 2008. This work included assessment of wetlands and watercourses, botany, bird surveys, lichen surveys, surface water sampling, benthic invertebrate surveys, and preliminary fish surveys. McCallum Environmental Ltd. commenced fall monitoring in 2014, including fall migration bird surveys, overall habitat surveys, and late season botany surveys, along with recording incidental observations of reptiles, amphibians, and mammals. Through surveys completed in 2008 and 2014, the presence of the several species at risk (SAR) and species of conservation interest (SOCI) were confirmed as identified herein.

NSDNR provided the following comments.

- Document the decision making process related to placement of project infrastructure.
- Document conclusions related to low risk of Acid Rock Drainage potential.
- Species at risk legislation affords protection of habitat, so due diligence and protection of habitat is required for all species of conservation interest, regardless of the level of concern.
- No winter blasting within 1km of known bat hibernacula. As such the desktop evaluation should be extended to a 2 km radius.
- Bat hibernacula are highly non-random, and investigations of bat habitat potential should focus on habitat as described by Vanderwolf et al (2012).
- Concerns were expressed over the presence of Boreal Felt Lichen (BFL), as identified in surveys completed by CRA in 2008. Further study and potential effects will be required.

DFO commented that field surveys need to confirm whether there is any connectivity between Cameron Flowage and the existing disused tailings pond, particularly as it relates to the American Eel.

5.2 Community Engagement

A public consultation program to provide project details to local communities and provide an opportunity for public input to the proposed mine development will be undertaken once the Project preliminary design phase and feasibility studies are complete (July 2015). In completing this program, Atlantic Gold will gather important information on the public concerns and use this information in mine development planning. Project information will also be communicated to the

local residents in the form of a newsletter to provide overall project schedule and details in advance of the Public Information Session. Meetings with municipal officials and provincial and federal political leaders will also be important to gauge local support for the Project.

The proponent has a history of successful public engagement in Nova Scotia and is well aware of the high standard to conduct this component of the overall permitting program. Meetings are anticipated to occur with a variety of community groups as well as formalized public information sessions in communities such as Sheet Harbour, Upper Musquodoboit, Mooseland and Middle Musquodoboit.

6. First Nations Consultation

Since the initiation of the Touquoy Project, the proponent has engaged in a pro-active and mutually beneficial relationship with the Mi'kmaq of Nova Scotia. Beginning with a Mi'kmaq Ecological Knowledge Study (MEKS) for Touquoy, an updated MEKS for Beaver Dam (an initial MEKS was prepared for another proponent), hiring of Mi'kmaq workers during definition drilling at Beaver Dam and the development of an MOU detailed below. The relationship has been close to 10 years in the making and continues to be of mutual benefit. An overview of more recent and relevant engagement is noted below.

Since the Mi'kmaq Knowledge Study in respect of the Touquoy Mine Project was completed by the Confederacy of Mainland Mi'kmaq in December 2005 nine meetings between DDV Gold Ltd (the Proponent, now known as Atlantic Gold) and representatives of the Assembly of Mi'kmaq Chiefs and the KMK were held in advance of the signing of a Memorandum of Understanding between the Assembly and DDV Gold on 5 May 2014. The first of these meetings, between Chief Terry Paul and Wally Bucknell, took place on 24 September 2010. Most subsequent meetings were with representatives of the KMK (Jen MacGillivary and Twila Gaudet) though on three occasions Assembly Chiefs were also present – Chiefs Terry Paul and Rufus Copage (1 March 2013), Chief Gerard Julian (8 November 2013) and Chief Terry Paul (25 April 2014). It should be noted that what may appear to be the slow pace of negotiations leading to the signing of the MOU was largely influenced by the Company's experiencing unrelated delays, and total project risk, occasioned by the necessary and troublesome acquisition of surface titles, a matter which was eventually resolved through the Courts on 28 February 2014.

Following the phone conference (November 2014) and meeting (January 2015) with KMK representatives since the MOU was signed scheduled funding has been provided by DDV Gold to the KMK, as agreed, in order for the KMK to progress the development and negotiation of a Mutual Benefits Agreement. Progress has been steady and satisfactory with ongoing phone and email communications, along with a site inspection by the KMK (Jen MacGillivary and Valerie Bowers) in April 2015. Relations between the parties are cordial and respectful and both parties are working cooperatively towards a satisfying and exemplary outcome in the near future

As noted above the Memorandum of Understanding (MOU) between DDV Gold Ltd (Atlantic Gold's wholly-owned subsidiary) and the Assembly of Nova Scotia Mi'kmaq Chiefs has been concluded. The MOU establishes the mutual recognition and respect of each party's perspective in relation to the development of the Touquoy Project and Atlantic Gold's other potential resource developments (including the Beaver Dam Mine Project) elsewhere within Nova Scotia. In particular the MOU contemplates the negotiation and conclusion of a Mutual Benefits Agreement (MBA) between the

parties to engage further and specifically in terms of employment, training, provision of services and other opportunities and undertakings to the benefit of both parties. Formal meetings commenced in January 2015 with the goal of completing the document and having it put into force early in the fourth quarter of 2015.

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. It can therefore be said that the Mi'kmaq would have equal opportunity for engagement and input through either process.

Table 9 Summary of First Nations Consultation

Date	Meeting Summary
Dec-05	MEKS completed for Touquoy Gold Project. No relevant specific project impacts were identified.
21-Jul-08	P. Oram attends meeting at Membertou between Province and Assembly re wider consultation on behalf of DDV Gold.
24-Sep-10	Breakfast meeting Wally Bucknell with Chief Terry Paul at Prince George Hotel. First meeting. Chief Paul's almost first words were: "How can we help you".
29-Sep-10	Meeting Wally Bucknell with Twila Gaudet at Millbrook to further the relationship between KMK and DDV Gold. (Chief Gerard unable to attend).
17-Aug-11	Meeting Wally Bucknell, Peter Oram with Melissa Nevin (KMK) at Duke Tower, Halifax. Arranged by J Huston. Discuss permitting matters in influence on/input by KMK
16-Jul-12	Robert Murphy met with Jen MacGillivary to progress MOU. Draft sent to Robert.
1-Nov-12	Meeting Wally Bucknell and Peter Oram with Jen MacGillivary, Justin Huston (NSOAA) Duke Tower, Halifax. Developing MOU
1-Mar-13	Meeting Wally Bucknell with Chiefs Terry Paul and Rufus Copage, and Jen MacGillivary, Duke Tower, Halifax. Project described and involvement of Mi'kmaq discussed.
11-Jul-13	Meeting Wally Bucknell, Peter Oram, Don James and Jen MacGillivray at NSDNR offices. Spirited urging by Jen for MOU to be progressed….but Higgins matter at foot.
8-Nov-13	Meeting Wally Bucknell with Chief Gerard Julian (Assembly co-Chair, Millbrook Chief) and Jen MacGillivary to progress MOU.
25-Apr-14	Mtg Chief Terry, Twila and Jen in Dartmouth with Steven Dean, John Morgan, John Thomas. Discuss finalization of MOU and associated budget.
5-May-14	**MOU signed**. Many communications with KMKNO leading up to this point
19-Nov-14	Phone conference John Morgan, Wally Bucknell with Jen MacGillivary to discuss preparation of MBA template.
20-Jan-15	Meeting Jen MacGillivary, John Morgan, Wally Bucknell at Millbrook to discuss development of the MBA. Job list forwarded to J. MacGillivary

23-Apr-15	Jen MacGillivary and Valerie Bowers visit Moose River with WRB, JM to familiarize themselves further with the Project
15-Jul-15	Engagement on the Beaver Dam project included meeting with Sipekne'katik Band.
20-Aug-15	MEKS completed for Beaver Dam Project.

Formal consultation is expected to occur through 2015 and 2016 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 MOU negotiation process and through ongoing discussion relative to an MBA as previously noted.

7. References

7.1 Literature Cited

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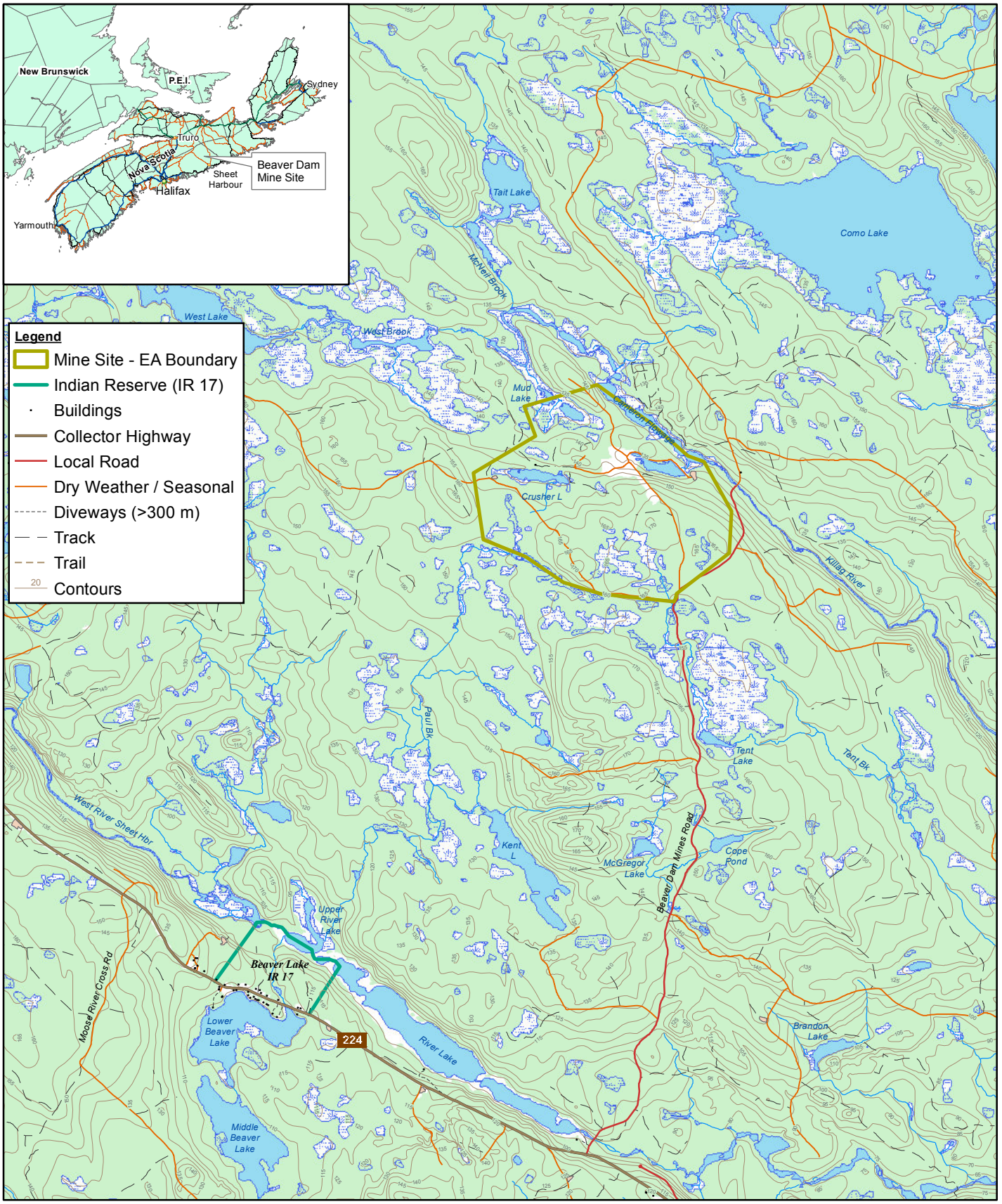
7.2 Personal Communications

Andrew Faulkner, Planning Technician, Halifax Regional Municipality, Pers. Comm. March 2015.



Source: Service Nova Scotia

0 500 1,000 1,500
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

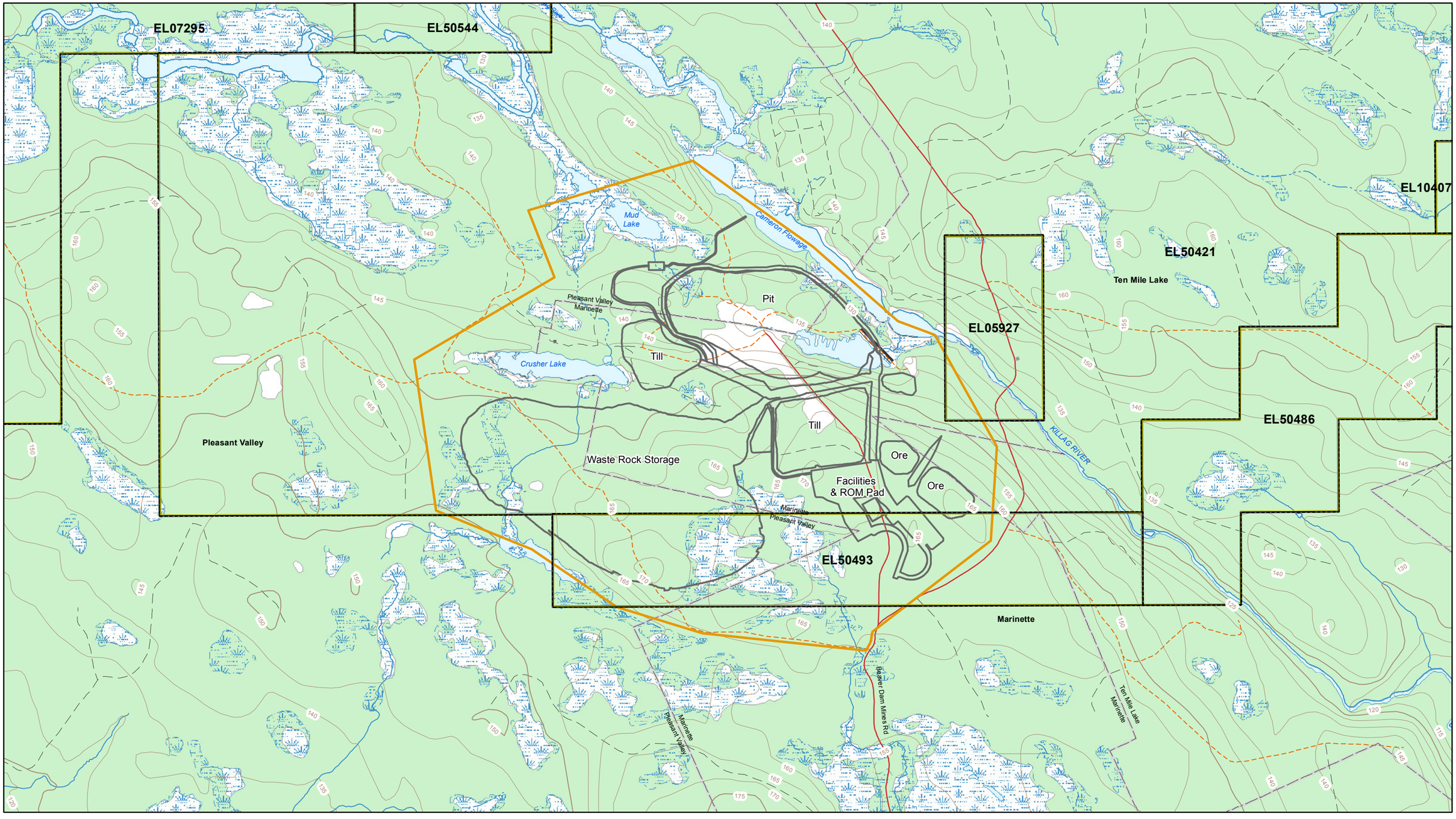
088664

Sep 28, 2015

MINE LOCATION

FIGURE 1

GIS File: I:\GIS_DATA\Projects\088xxx\088664 Atlantic BD\2015\1509Sep\088664 (001) GIS-DA001.mxd



Source: Service Nova Scotia, NS Natural Resources

0 100 200 300
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

Legend

- General Mine Features (June 11 2015)
- Environmental Baseline Study Area
- Community Boundary
- Mineral Exploration License

Roads

- Local
- Dry Weather / Seasonal
- Track

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

088664

Sep 28, 2015

GENERAL SITE MAP

FIGURE 2

GIS File: I:\GIS_DATA\Projects\088xxx\088664 Atlantic BD\2015\1509Sep\088664 (001) GIS-DA002.mxd

Mud Lake
Cameron Flowage
SETTLING POND
PIT PERIMETER BERM
WATER DIVERSION CHANNEL
Pleasant Valley
Marinette
EL50421
Crusher Lake
TILL STOCKPILE
PIT
Ten Mile Lake
EL05927
TOPSOIL STOCKPILE
KILLAG RIVER
Pleasant Valley
Waste Rock Storage
TILL STOCKPILE
TOPSOIL STOCKPILE
WATER DIVERSION CHANNEL
FACILITIES & ROM PAD
STOCKPILE
WATER DIVERSION STRUCTURE
STOCKPILE
EL50486
Marinette
Pleasant Valley
EL50493
Marinette
Beaver Dam Mines
Ten Mile Lake
Marinette

Legend

- Pit
- Plt Berm
- Waster Rock Storage
- Ore Stockpiles
- Till Stockpiles
- Topsoil Stockpiles
- Crusher Area
- Haul Roads
- Settling Ponds; Water Diversion; Drainage
- Environmental Baseline Study Area
- Community Boundary
- Mineral Exploration Licence (EL 50421)

Roads

- Local
- Dry Weather / Seasonal
- Track

Source: Atlantic Gold, Service Nova Scotia, NS Natural Resources, NS Environment

0 100 200 300
Metres

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

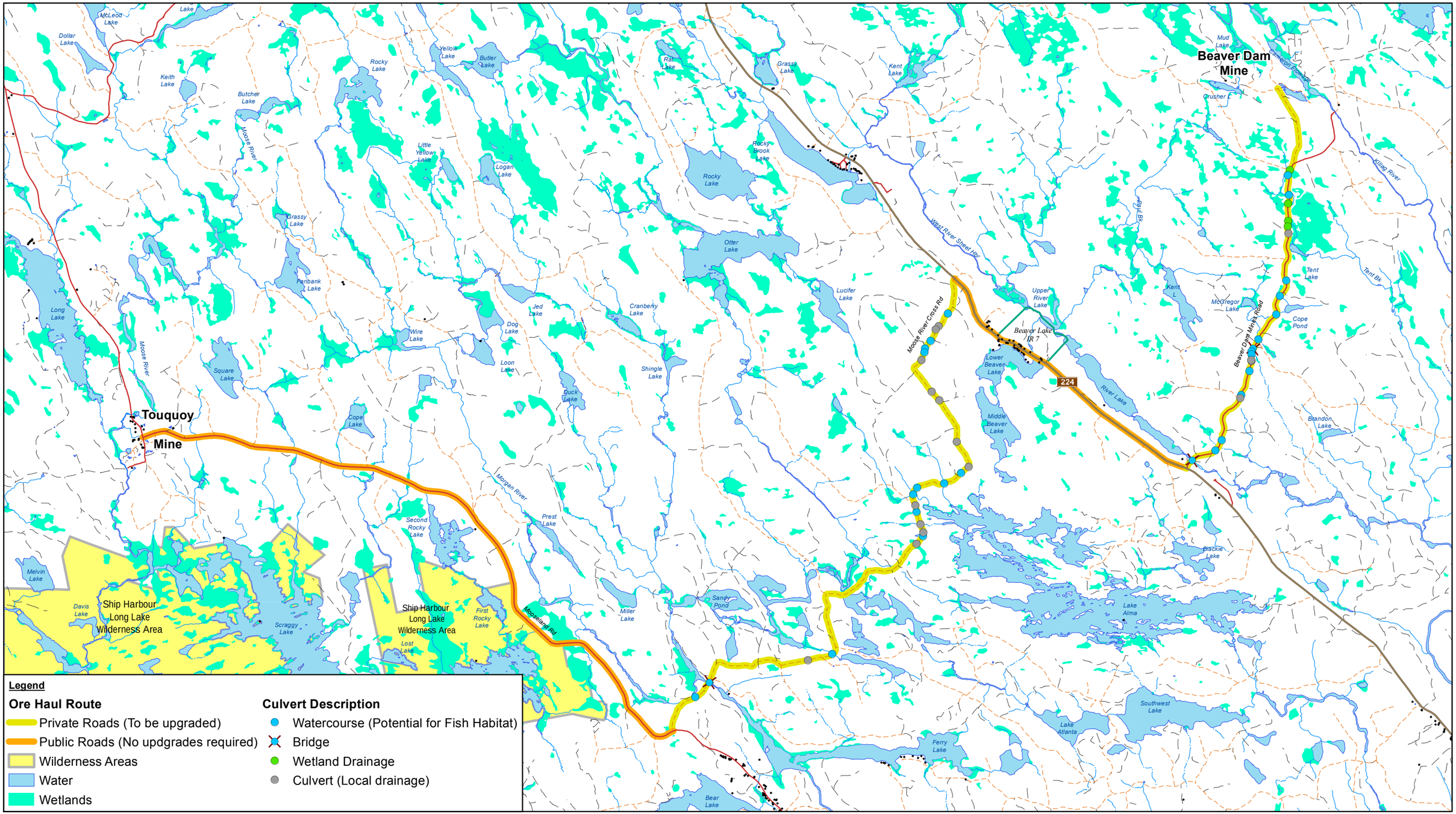
088664

Sep 28, 2015

GENERAL MINE ARRANGEMENT

FIGURE 3

GIS File: I:\GIS_DATA\Projects\088xxx\088664 Atlantic BD\2015\1509Sep\088664 (001) GIS-DA003.mxd



Source: Service Nova Scotia, NS Environment, GHD (Field)

0 250 500 750 1,000
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

GHD

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

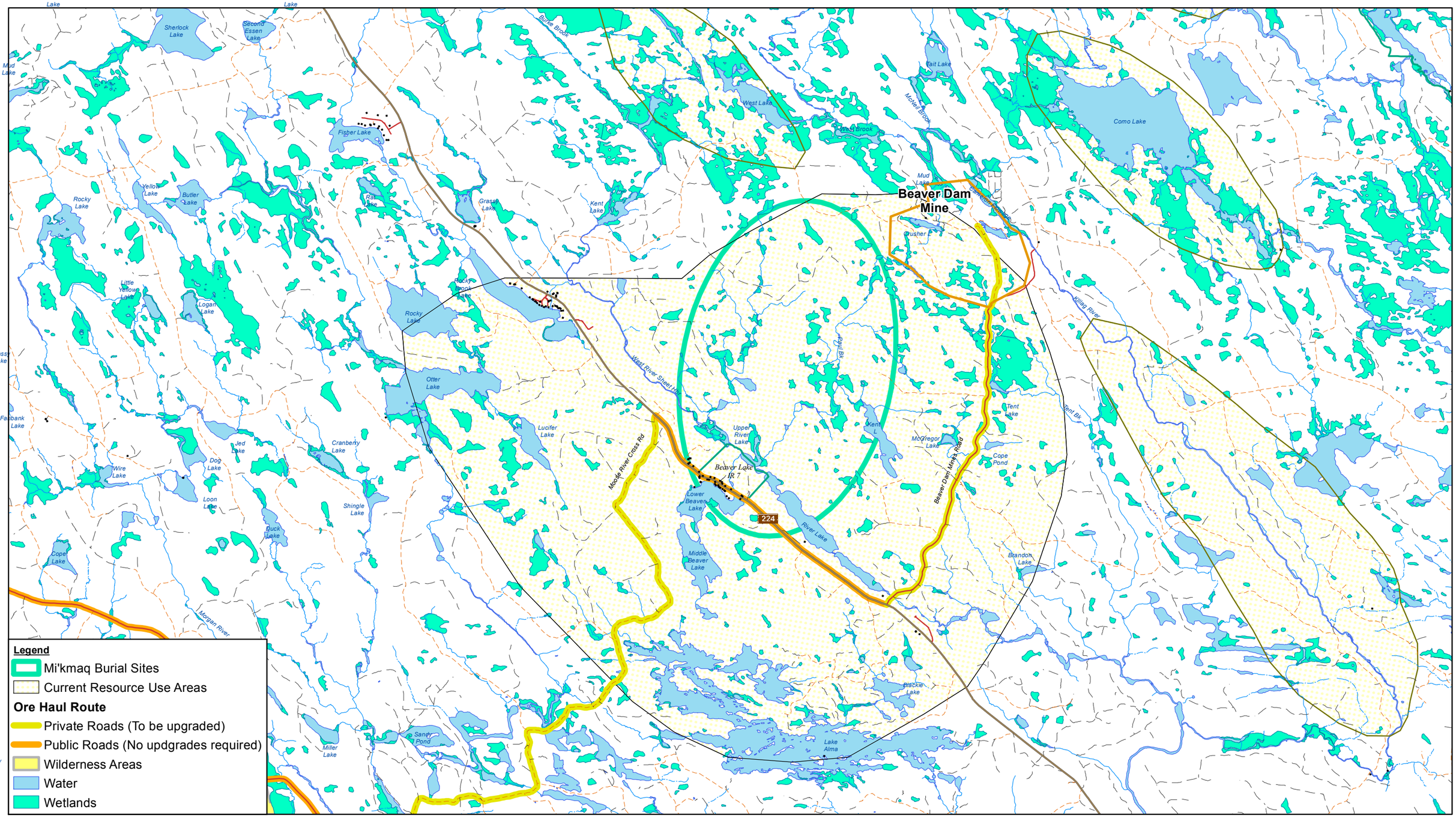
088664

Oct 15, 2015

HAUL ROAD CONFIGURATION

FIGURE 4

GIS File: I:\GIS_DATA\Projects\088xxx\088664 Atlantic BD\2015\1509Sep\088664 (001) GIS-DA004.mxd



Source: Service Nova Scotia, NS Environment, GHD (Field)

0 250 500 750 1,000
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

GIS File: I:\GIS_DATA\Projects\088xxx\088664 Atlantic BD\2015\1509Sep\088664 (001) GIS-DA005.mxd

ATLANTIC GOLD CORPORATION
MARINETTE, NOVA SCOTIA
BEAVER DAM MINE

088664

Oct 15, 2015

MI'KMAQ CULTURAL LAND USE

FIGURE 5

www.ghd.com