



Environmental Assessment Registration Document

Sporting Mountain
Quarry Expansion Seaview
Richmond County Nova Scotia

Nova Construction Co. Ltd.





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Table I: Abbreviations and Common Terms

Acronym	Expanded Use
ACCDC	Atlantic Canada Conservation Data Centre
AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AMO	Abandoned Mine Opening
ARD	Acid Rock Drainage
BFL	Boreal Felt Lichen
CEAA	Canadian Environmental Assessment Agency
CEPA	Canadian Environmental Protection Act
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dB / dBA	Decibel (A-scale)
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document
ECCC	Environment and Climate Change Canada
FEC	Forest Ecosystem Classification
GDP	Gross Domestic Product
ha	hectare
IA	Industrial Approval
IAA	Impact Assessment Agency
IBA	Important Bird Area
km	Kilometre
km/hr	Kilometre per hour
Lpm	Litres per minute
m	Metres
masl	Metres above sea level
MBBA	Maritime Breeding Bird Atlas
MBCA	Migratory Birds Convention Act
MBS	Migratory Bird Sanctuary
mg/L	Milligrams per litre
MPS	Municipal Planning Strategy
NO _x	Nitrogen oxides
NO ₂	Nitrogen dioxide
NPRI	National Pollutant Release Inventory
NRCan	Natural Resources Canada
NSDNR	Nova Scotia Department of Natural Resources
NSE / NSEL	Nova Scotia Environment, currently (since 2008), historically referred to as Nova Scotia Environment & Labour depending on timeframe
NSEA	Nova Scotia Environment Act



Table I: Abbreviations and Common Terms

Acronym	Expanded Use
NSESA	Nova Scotia Endangered Species Act
NSDL&F	Nova Scotia Lands and Forestry
PID	Property Identification Number
PM10	Particulate matter less than 10 microns
PM2.5	Particulate matter less than 2.5 microns
POL	Petroleum, Oil, and Lubricants
SARA	Species at Risk Act
SMP	Special Management Practice
SOx	Sulphur oxides
SO ₂	Sulphur dioxide
SPL	Sound pressure levels
t	Tonnes
TSP	Total Suspended Particulates
USEPA	United States Environmental Protection Agency
VC	Valued Component
VOC	Volatile Organic Compound
VT	Vegetation Type
WC	Watercourse
WESP	Wetland Ecosystem Services Protocol
WL	Wetland
µg/m ³	Microgram per cubic metre

Note: Both imperial and metric units may have been used throughout the document. Every effort has been made to standardize units; however units given are as reported.



1. Proponent Information

The Proponent is Nova Construction Co. Ltd. ("Nova Construction" or "Nova") – a Nova Scotia registered firm. The Nova Scotia Registry of Joint Stocks information of the Proponent is included in Appendix A.

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Donald Chisholm
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June 18, 2020



2. Project Information

2.1 Name

Name of the Undertaking: Sporting Mountain Quarry Expansion Project

2.2 Location

Location of the Undertaking:

The Project is located at 795 Morrison Road, Seaview, Richmond County, Nova Scotia, approximately 6.4 kilometres (km) north of the community of River Bourgeois, and 8.4 km west of the Village of St. Peter's. Access to Morrison Road is via Highway 104 at River Bourgeois to Sporting Mountain Road. Property – PID 75044156; NTS Map: 11D15; Latitude: 45° 41' 56", Longitude: 60° 58' 22" or UTM Zone 20 NAD 83 (CSRS): 657810E, 5062589N (Figure 1 and Figure 2).

3. Project Scope

3.1 Background

Nova Construction Co. Ltd. ('Nova') owns the property where their Sporting Mountain Quarry ('Quarry') is located. The property is situated north of Morrison Road, Richmond County, Nova Scotia and is accessed by way of a 0.5 km deeded right-of-way (See Access NS Plan P339). The Quarry operated under the Nova Scotia Transportation and Infrastructure Renewal (NSTIR) exemption for highway projects from July 2015 until the highway project completion in December 2015. An Industrial Approval (IA) (2016-096419) to operate, construct, and reclaim a quarry less than 4 hectares (ha) was granted by Nova Scotia Environment (NSE) in 2016 allowing Nova to operate the Quarry for future highway and private projects in the region. Operations at the Quarry to date have included the construction of an access road, logging of the quarry area, grubbing and removal of surficial overburden, blasting, crushing, stockpiling and trucking of aggregate in accordance with the IA.

3.2 Scope of the Undertaking

Nova proposes to expand their existing quarry in Sporting Mountain from the approved <4 ha to 10 ha to continue to extract and supply aggregate for road and local construction projects. The scope of the proposed quarry expansion is similar to other quarries in the region, and encompasses the activities associated with construction, operation, and decommissioning of a quarry, as follows:

- Site preparation (removal and stockpiling of overburden, vegetation)
- On-site processing (blasting, crushing, stockpiling aggregate)
- Transportation/trucking
- Reclamation
- Closure



The proposed expansion project will adhere to all setbacks and other requirements of the Nova Scotia Environment (NSE) Pit and Quarry Guidelines (1999) and as prescribed in the existing and future IAs or Amendments to the existing IA to operate as granted by NSE. There will be a mobile asphalt plant on the Project Site from time to time as required for projects in the area. Nova has two mobile plants that are subject to existing approvals.

The Project is located in the Sporting Mountain Planning Area and is zoned G-1 General Development (Richmond County Council, 2010), which allows for the permitted use of extractive facilities. The elevation range of the property is 147 to 177 metres above sea level (masl) and the expansion area elevation ranges from 147 to 157 masl. The current quarry floor has been established at about 125 masl throughout and will continue at this elevation in the expansion area. The approximate planned development area of the quarry, and proposed setbacks, are shown in Figure 3.

The Site requires blasting to extract rock for processing at the mobile facilities within the Quarry for crushing and screening to produce aggregate and associated rock products. Areas will be set aside for stockpiles, overburden storage, and use of temporary settling ponds to contain and treat (if necessary) site runoff.

The average production rate is estimated to be in the range of 20,000 to 30,000 tonnes per year (t/y) depending on local project demands. The proposed operating schedule for the lifetime of the project is 12 hrs/day, five-six days/week for 35 weeks/year, as required to meet the demand for aggregate and associated rock products in the area. The quarry will typically be active during construction season, and shut down for the winter. The extractable reserves in the Project footprint are estimated to last at least 30+ years depending on market demand.

The planned production levels proposed for the Quarry are well below the threshold limit (3,500,000 t/year) required for a federal impact assessment, therefore the Project is being submitted for consideration of a provincial Class 1 Environmental Assessment (EA) approval. Based on the baseline studies completed, there are no site specific aspects that require federal involvement such as federal species at risk (SAR) or fish habitat.

Site run-off will be collected and directed to existing on-site settling pond(s). Additional settling ponds will be constructed in advance of quarry development if required, to ensure adequate sedimentation control during site works and quarry development. Settling ponds will be constructed to ensure that the limits for maximum suspended solids in the discharge are not exceeded as stipulated in any IA that would be granted by NSE. Other devices/measures such as diversion ditches, check dams, siltation ponds, contour banks, cut-off ditches, straw, hay, mulch and hydro-seeding may also be used if necessary to control sedimentation.

Decommissioning and reclamation concepts are described in Section 4.5. Additional details on timelines will be developed as part of the IA Amendment process and conditions of an EA approval if granted. Reclamation will commence in a progressive manner to minimize the extent of the disturbed footprint and proceed as the quarry face advances.



3.3 Purpose and Need for the Undertaking

The purpose of the undertaking is to continue to meet local and regional aggregate and associated rock products demand by allowing Nova Construction to extend the existing quarry footprint and continue operations at their quarry in the Sporting Mountain area. The quarry currently operates under an existing IA (2016-096419), issued by NSE in 2016 and remains in effect until August 19, 2026.

Through this quarry expansion, Nova Construction will provide continued employment to their employees and indirect employment will continue in related industries. Mining and aggregate extraction are among the highest paying jobs in the natural resource industry, and the industry is among the highest paying average wage of all industries in the province (MANS, 2019).

Nova Construction takes prides in offering a wide array of services including, but not limited to: construction, asphalt (highways, roads, parking lots, and driveways) and quarry, concrete, earth moving and road building. The expansion of the Sporting Mountain Quarry provides Nova an opportunity to extract a viable aggregate deposit that will serve the needs of the local market for many years. This Environmental Assessment Registration Document (EARD) highlights Nova Construction's commitment to developing an environmentally sustainable quarry in compliance with current applicable legislation and best management practices. Nova has extensive experience and a strong track record in Nova Scotia with the sustainable development of pits, quarries and surface mines.

3.4 Consideration of Alternatives

Alternatives to an undertaking are defined as functionally different ways of achieving the same end.

The proposed expansion is located at Nova Construction's existing Sporting Mountain Quarry in Richmond County. This area was initially selected based on the aggregate resources dictated by favourable geologic conditions and considerable efforts (drilling, testing, and planning) by Nova. Nova Construction currently owns the land required for the proposed undertaking. Nova operates aggregate quarries throughout northeastern Nova Scotia, and uses industry standard methodologies in all phases of quarry development, extraction, processing, and delivery. Alternative processes are always being considered in terms of their efficiency, cost effectiveness, and environmental mitigation advantages. There are no practical or feasible alternatives to the proposed aggregate extraction method in this particular geology – intermittent drilling and blasting is required.

Few alternatives exist for the methods related to aggregate extraction and crushing. Operations that currently exist at the Sporting Mountain Quarry include; drilling and blasting, crushing/processing on-site, stockpiling into designated areas and hauling of aggregate. These methods have proven to be effective, and will continued to be used at the proposed quarry expansion.

One alternative to the undertaking is a 'do nothing' alternative. This approach results in no increase of aggregate extracted from this area and no benefits to Nova Scotians. The "do-nothing" alternative would have adverse effects on potential revenues not realized, and potential employment and associated skills development, and local business spinoffs that would not occur. Whereas there are limited employment opportunities in close proximity to the proposed Project, this project would add benefit to the community from a socio-economic standpoint as described herein.



3.4.1 Alternative Site

Alternative sites were not considered for this Project as the Sporting Mountain Quarry already exists on land owned by the proponent, and operates under an existing IA (2016-096419), issued by NSE in 2016, that will remain in effect until August 19, 2026. The Sporting Mountain Area in Richmond County already hosts quarry operations, and is located in a rural area of Nova Scotia with the nearest permanent residents approximately 1.2 km to the east, 1.5 km to the southeast, 1.6 km to the southwest, and 1.9 km to the northeast.

The Project Site was originally chosen because it provided an aggregate product that met the NSTIR specifications for highway projects.

3.4.2 Alternative Methods

The extraction methods, site layout and infrastructure configuration, and processing options at an aggregate quarry have standard practices and few alternatives exist. The planned process is to drill, blast, crush, stockpile, and transport material for sale. Nova has vast experience with tried and true methods for extracting and processing aggregate. Although other methods are available such as ripping rock, this is not possible on this site due to the hardness of the granodiorite. Blasting and a crushing program will be required to process rock. This rock is considered too hard to extract by mechanical means (ripping), thus the need for blasting.

Alternatives to processing aggregate on-site include off-site processing. Off-site processing would involve the transport of material via local roadways to other facilities. This may in effect move the material further away from the intended market thereby raising the cost of the product due to double handling and shipping costs. In addition, transporting material for processing would also increase GHG emissions entering the atmosphere, as well as potentially creating excess dust, noise, or light emissions. In conclusion, the proposed Project location and methods have been identified as the most feasible in terms of their efficiency, cost effectiveness, and environmental mitigation advantages.

3.5 Scope of the Environmental Assessment

The Nova Scotia *Environment Act* and *Environmental Assessment Regulations* regulate the format of a provincial EA. The proposed Project must be registered for EA as a *Class I* undertaking under Section 9(1) of the Regulations. This document serves to provide information required by NSE to review the proposed expansion of a quarry in Seaview, Nova Scotia.

The scope of this document has been determined by Nova Construction and GHD, based on the Project components, activities, and stakeholder and regulatory consultations. The *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia* (NSE, 2009) was also referenced to determine and focus the scope of the assessment. Provincial regulatory officials have been aware of the intention to submit the EARD for this undertaking. Provincial regulators have assisted in scoping by bringing forth issues of concern and/or uncertainty. No federal environmental triggers have been determined. Other relevant provincial and federal regulations and guidelines include the *Blasting Safety Regulations* made pursuant to the *Nova Scotia Occupational Health and Safety Act* (1996); *Nova Scotia Pit and Quarry Guidelines* (1999); *Canada Migratory Birds Convention*; *Species-At-Risk*; and *Fisheries Acts*.



Methodologies and approaches appropriate for current environmental and socio-economic conditions are contained in this EARD, as are results and implications of the completed formal public consultation program. Baseline data collection, public participation and Mi'kmaq engagement have been incorporated into a program to prepare the EARD. Additional information was found in publicly available documents related to the area and data collected by the Proponent and consultants on existing environmental conditions. The approach to site operations, including environmental management and monitoring, is based on knowledge gathered on similar projects. The GHD Team have experience in conducting EAs for similar projects. Nova Construction has experience in the design and construction of quarries and maintains staff with appropriate environmental expertise to effectively manage environmental aspects of this Project.

The Valued Component (VC) analysis is based on the Project proposal, the environmental setting, and input from stakeholders involved. The EA evaluates the potential effects of each project phase, (i.e., construction, operation and decommissioning), as well as malfunctions and accidents, with regard to each identified. The VCs identified for this Project are as follows:

- Geology, Soil, and Sediment
- Surface and Groundwater Resources
- Wetlands and Watercourse
- Flora, Fauna, Habitat, and Priority Species
- Air Quality, Noise, and Light
- Socio-economic including Community
- Indigenous Peoples, and
- Archaeological and Cultural Resources

Provincial environmental legislation and regulations apply to Nova Construction with regard to the design, site preparation, operation, and reclamation of the quarry. In addition to the environmental legislation, other acts and regulations relating to labour standards, best practices, and other phases are applicable to the Project. Nova Construction is aware of the applicable acts and regulations that pertain to the quarry, and has previously demonstrated the ability to prepare the necessary information and design plans required to obtain permits and approvals, as well as the ability to complete projects and operate within the requirements of such Acts and Regulations as demonstrated by past quarry work.

If the Project receives an EA Approval, it will be issued with Conditions of Release. The Project will also require a provincial IA for the site. An IA defines specific operational conditions and limitations, including dust, noise, surface water and groundwater discharge criteria and monitoring, and land reclamation. A request for an Amendment to the Project IA, would be submitted by Nova Construction following receipt of the EA Approval. The IA application is reviewed and approval granted by NSE.

Nova Construction is also familiar with the municipal legislation applicable to this Project and will continue to work with the local planning office (Richmond County Planning Applications) and staff as required.



3.6 Nova Construction Company Ltd. – Environmental Policy

Nova Construction Co. Ltd. is committed to progressive environmental management responsibilities in the execution of its contracts. It is imperative that we conduct all operations and perform all work in a manner that minimizes, to the greatest extent, any adverse impact on the environment.

Nova Construction Co. Ltd. pledges to adhere to the following principles in the conduct of its activities and operations:

- Protecting health and safety of employees of the company and members of the public who may be affected by the company's operations.
- Reducing the discharge or emission of toxic, hazardous or other contaminants, with a goal of working towards the ultimate elimination of such discharges or emissions.
- Striving to meet or exceed regulatory requirements applicable to the company's operations.
- Reducing the amount of waste; particularly hazardous waste, created by the company's operations.
- Ensuring that water is transported, handled, and disposed of in a safe and responsible manner, in accordance with regulatory requirements.
- Striving to prevent spills and other accidents.
- Ensuring the use of safe operating procedures and technology in order to minimize environmental, health and safety risks.
- Maximizing energy efficiency.

*Original signed by Donald Chisholm, President and Tara Alexander, Safety Coordinator on February 5, 2019.

4. Description of the Undertaking

4.1 Geographic Setting

The Project is located at 795 Morrison Road, Seaview, Richmond County, Nova Scotia approximately 6.4 km north of the community of River Bourgeois, and 8.4 km west of the community of St. Peter's. Access to Morrison Road is via Highway 104 at River Bourgeois to Sporting Mountain Road. The property is situated north of Morrison Road and is accessed by the right-of-way as described in a warranty deed to Nova Construction. The Project property (PID 75044156), is owned by Nova Construction Co. Ltd., and currently consists of the access road, settling ponds, existing quarry, previously logged areas and forested lands.

The Project is located in a rural area of Cape Breton Island, Nova Scotia, classified as Nova Scotia Uplands Ecoregion - the Cape Breton Hills Ecodistrict (310), encompasses the Project Site. These hardwood covered hills and slopes are typically 150 to 300 masl. This Ecodistrict is an assemblage of discontinuous land units that strike approximately NE-SW direction and is associated with a diverse geologic history resulting in the development of many sedimentary, igneous and



metamorphic bedrock formations including the granodiorite located on the Site. Topography is influenced by glacial till deposits that can range in thickness from <1 to 30 m (Neily et al., 2017).

Drainage is predominantly radial off the uplands via high gradient streams. Lakes are scattered and generally small. The Site Ecosection is described as IMHO – I: imperfectly drained, M: medium texture soil, HO: hummocky terrain (Neily et al., 2017).

The surrounding forested areas consist of a mixture of coniferous and deciduous trees of various height and age classes; however, the property contains mostly mixed regenerated forest species that include balsam fir, white and black spruce, yellow and white birch, and red maple.

The Site property slopes generally from northeast (177 masl) to southwest (147 masl). The elevation of the existing quarry, and the area encompassing the proposed quarry expansion is between 147 and 157 masl. Figure 2 provides local context of the Project, quarry configuration and identifies adjacent land ownership.

4.2 Project Components

This Project seeks an EA approval to expand an existing aggregate quarry from less than 4 ha to 10 ha in the community of Seaview, NS. Site activities will include the drilling, blasting, crushing, stockpiling, and transporting of aggregate for sale or for use in projects that are contracted to Nova Construction. The aggregate will be transported by trucks to markets in the southeastern Cape Breton area, and more specifically Richmond County. The operation will consist of a lay down area for the portable crushing equipment and screens, various aggregate stockpiles, and portable weigh scales, as well as the physical features of the site such as the quarry floor and active working faces, and site settling pond(s). Blasting will always be conducted by a fully certified and licensed blaster with expertise in the field and according to the *Blasting Safety Regulations*.

The proposed quarry footprint is separated from the following number of civic addresses (structures): 800 m – 0 (0); 1.0 km – 0 (0); 1.5 km – 6 (12); 2 km – 17 (37). Given the rural nature of the area, it can be assumed that most of these locations indicated by the civic address count are residential or have a well for potable water supply. The closest structure to the site is 1.2 km from the southern boundary of the quarry property. The provincial guidance states that blasting must occur more than 800 m from structures so the expanded quarry as proposed meets this guidance.

The proposed active area of the quarry has been determined by using setbacks, as defined by provincial policy and legislation, for water and wetland features (30 m), road right-of-ways (30 m), property lines where there is a structure on the adjoining property (30 m), property lines where no structure is on the adjoining property (15 m), and existing off-site houses/structures (800 m). Figure 3 identifies setbacks.

Estimated durations of project phases are as follows:

- Construction – 0 years (Site already exists).
- Operation - 30+ years depending on market demand.
- Decommissioning and Reclamation - up to 3 years and is dependent on follow-up monitoring duration and the success of reclamation activities.



4.3 Site Preparation and Construction

Site access is via a gravel road on an existing deeded right-of way from Morrison Road to the existing quarry. Equipment used for grubbing the site will be used throughout the project life as the quarry develops. Equipment will be brought to the site as required for development. Mobile equipment including drills, excavators, loaders, crushers, scale and scale house will be moved to other project sites as required during operations, thus the site will house no “permanent” equipment.

The proposed quarry expansion area has been previously harvested of timber. Any further requirement to harvest merchantable timber on the site will be done prior to grubbing in the appropriate seasons. Any remaining vegetation and wood/organic material will be saved and used to the greatest extent possible for reclamation activities on-site.

The removal of topsoil and grubbing will be completed in a progressive nature according to the site development plan. This will minimize the extent of disturbed area at any one time. This material will be removed by excavators, trucks and dozers and then stockpiled for use during reclamation activities. Run-off from the site will be directed to a settling pond to allow time for any suspended solids to settle prior to discharge to the surrounding environment.

No hazardous materials will be stored on site. There are no plans for bulk storage of liquid petroleum products on-site. Fuel will be transferred to quarry equipment by mobile fueling trucks as required. Should petroleum impacted soil or groundwater be identified, the affected material will be handled, transported and disposed of according to all applicable legislation.

4.4 Operation and Maintenance

The quarry (crushing, stockpiling, and loading) will operate during daylight hours, however other limited site activity may occur in predawn or twilight hours. Twenty-four hour operation is not envisioned for this site. Load and haul activities may occur approximately 8 months of the year – and is dependent on winter conditions and spring weight restrictions. Crushing and stockpiling operations will normally be conducted during the construction season (May – October).

Material will be drilled and blasted typically at least once annually; however, additional blasts may be required from time to time to meet market demand. Excavators and front end loaders will be the primarily used equipment to excavate blasted material from the active working faces and delivered to the on-site portable crushing plant. The various aggregate products will be stockpiled in adjacent areas within the quarry. Stockpiles will be constructed to reduce segregation of material and prevent mixing of differing classes. A combination of conveyor belts and front end loaders will be used to move material from the screens and classifier to the stockpiles. Front end loaders will be used to load stockpiled material onto trucks. Products will be weighed and transported from the quarry via highway class trucks. The average daily number of vehicle movements will be variable in keeping with current production volumes and future market demand.

Nova Construction is aware of spring weight restrictions and will adhere to them.



The equipment and accessories used in the operations will be fairly consistent through the life of the project and may include:

- Excavators; front end loaders (2)
- Portable crushing equipment (5)
- Dump trucks
- Utility and service vehicles (3)
- Tractor and float (2)

Final design of all aspects of the quarry will be in accordance with appropriate legislation and accepted best management practices.

Site Material

Site material will consist mainly of unusable aggregate, grubbings, and organics produced from the development of the quarry. This material will be used, as appropriate, berms, ponds and road ways and reclamation. All stockpiled materials will be stabilized as required.

Erosion and Sediment Control

Surface water management will be important during site development and operation to address erosion and sediment control. Sediment-laden runoff will be prevented from entering surface waterbodies. Surface water collected in the quarry will continue to be directed to sediment control ponds that are designed to allow sediment to settle from the water (treated) prior to the water being released to the environment.

Nova Construction is familiar with and routinely employs techniques recommended in NSE's Sediment and Erosion Control Handbook for Construction Sites. This document will be used in the design of all mitigative measures. In addition, industry best practices will be consulted and reviewed in the development of a comprehensive erosion and sedimentation prevention and control strategy. Typically, a 100-year return period storm event is used in design; however, this may be dependent on the life of the project. Design criteria would be reviewed with NSE during the IA amendment stage of the project to ensure adequacy.

Ditches may be constructed to direct surface water runoff to settling ponds on the site as part of surface water management. Ditches will be designed to minimize erosion. Temporary erosion and sedimentation control measures will be in place (e.g., rock dams with geotextile, hay mulching, etc.), as needed during the establishment of vegetative cover. Existing and new berms are used at the site for drainage control, noise buffering, and visual impact mitigation.

The maximum suspended solids concentration levels will be monitored for compliance.

An NSE approved Environmental Protection Plan and Spill Contingency Plan is currently in place for the operating quarry. Any requirement to amend these plans will be completed in conjunction with an Amendment to the IA.



Solid Waste

Waste produced on the site will be removed by Nova Construction for, or picked up by an approved licensed contractor for appropriate reuse or disposal to a provincially approved waste disposal facility.

Liquid Effluents

No on-site sewage treatment system is or will be installed. Portable toilets will be used on the Project Site as required and will be maintained by Nova Construction or their subcontractors.

Airborne Emissions

Equipment exhaust and dust will represent the majority of air emissions from the Site. Emissions produced will include carbon monoxide, carbon dioxide, oxides of nitrogen, sulphur dioxide, and dust. Emissions from the burning of hydrocarbons will be managed through the use of clean burning, low-sulphur diesel fuel and propane. All equipment will be properly maintained and inspected and engine idling will be reduced when not in use to further decrease emissions from the site.

Dust will be generated in the quarry through most activities. Nova Construction will implement operational dust reduction methods (primarily through the application of water) to reduce potential fugitive dust emissions at the site. Truck covers will be used to reduce the generation of dust during transportation of aggregate.

Noise Emissions

Noise emissions will result from drilling, extraction, processing, and transportation operations. The contributors to noise on-site will be heavy equipment such as crushers, excavators, loaders and trucks.

Nova Construction will control operations and maintain equipment to ensure that noise levels are kept within recommended limits for quarry operations. Site noise levels may be periodically measured at the property boundaries as directed by NSE. Certain equipment noises associated with extraction activities may have a specific regulated safety requirement such as back-up beepers. Other methods (e.g. strobes) could be used as warning indicators with the appropriate agency approval. Pre-blast warnings will be audible beyond the site for short durations within schedule timeframes.

Hazardous Waste

Materials needed for quarry site operations will be stored in accordance with applicable legislation. Explosives will be used on the site by Nova Construction as required. No explosives storage is required on-site.

Petroleum, Oil and Lubricants (POL)

Nova Construction is familiar with the requirements for petroleum management. The Project will require the use and handling of petroleum products such as fuel oil, gasoline and lubricants on-site. Mobile equipment will be fueled within the quarry from local fuel supplier's trucks. No liquid petroleum storage will be maintained on-site. Any location where refueling is taking place will be equipped with a spill kit and the operators will be trained in their use.



Within the context of the current site, the handling of bulk quantities of POL is administered by the following regulations that have been enacted within the *Nova Scotia Environment Act (NSEA)*:

- *Petroleum Management Regulations*
- *Emergency Spill Regulations*
- *Used Oil Regulations*

Federal legislation and regulations exist that apply to the storage and handling of POL, however, they generally only apply to federal sites and would not be applicable to the subject property. In general, the applicable provincial requirements mirror federal legislation and have been developed in consideration of them.

Nova Construction is aware of the legislation around POL and will comply with the current and any updated regulations.

4.5 Decommissioning and Reclamation

Reclamation, the final phase of the project, will return the area to a condition that is consistent with the natural surroundings and community use. Two types of reclamation could be completed - progressive (during operations on stable areas that are no longer required for production) and final reclamation (after the cessation of extraction and related activities), for any areas that are not reclaimed progressively.

The objective of reclamation is to produce a landscape that is safe, stable and compatible with the surrounding landscape and final land use. This is generally achieved by grading, contouring, capping with soil, revegetating, and time. Progressive reclamation is understood as an integral part of project planning that keeps potential future land uses in mind. Nova Construction considers the goal and responsibilities of reclaiming a quarry to be a key element of the project plan, and will return the land to a state equal to or better than that existed prior to disturbance within the scope of existing industry practices.

Nova Construction plans to use their resources for reclamation activities. Dozers and excavators will be used to grade and contour the side slopes of quarry walls to ensure that they are stable and meet the legislated slope requirements. Rock lined ditches and drainage channels will be constructed as necessary to control run-off and prevent erosion of the exposed soils. Steeper rock-face slopes will be blasted as required and graded to 45° (1H:1V). The rest of the site will consist of gradual slopes; however, slopes may be developed that are typical of the site prior to disturbance where practicable.

The reclaimed site will typically be seeded with an approved naturalization mix. Grubbing's and stockpiled topsoil/overburden will be used to the extent possible to facilitate natural regrowth of native species.

It is anticipated that the reclamation program (contouring, vegetation, monitoring) will be completed within a one to three year period from the end of the extraction phase being completed. Additional details on timelines will be developed as part of the IA Amendment process and conditions of an EA approval.



The reclamation plan will cover the following details:

- Site contouring and stabilization (for long term erosion control, to mitigate impacts of off-site drainage to adjacent lands / wetlands / or watercourses, and to blend with natural topography)
- Slope specifications which ensure a safe and stable site
- Use of overburden for revegetation purposes
- Use of native vegetation
- Specifications of any ponds, lake, or flood quarry features
- Removal of equipment

The reclamation program will include a management and monitoring plan for water features left on site to address quality and erosion and sediment control. A Reclamation Plan will be completed as part of the requirements for the IA.

5. Public and Mi'kmaq Involvement

Public consultation is a key element in the EA process in that it allows the Proponent to gather feedback from local communities and incorporate this information into final Project design. Nova Construction acknowledges the importance and value of effective public engagement and envisions a long and mutually beneficial public engagement program for the Project. GHD has worked closely with Nova Construction in identifying key stakeholders (public) and rightsholders (Mi'kmaq) and developing an effective public consultation and engagement programs. In addition, Nova Construction will continue to engage with those groups and key regulatory agency contacts and maintain ongoing communication regarding project activities and progress.

5.1 Methods of Involvement

The intent of the public consultation and engagement program is to (a) provide information about the intended project; (b) elicit questions, concerns, or suggestions from the local community, other stakeholders and rightsholders; and, (c) attempt to address those questions or concerns either through the provision of information or accommodating changes to the Project design.

The following listed activities have been undertaken by the Proponent with respect to consultation and engagement:

- Identification of key stakeholders, rightsholders and regulatory agencies
- Discussions with stakeholders, rightsholders and regulatory agencies
- Public Information Session
- Communication / discussions with the Mi'kmaq

The consultation program included one public session completed in St. Peter's in February of 2020, and discussions with KMKNO (Kwilmu'kw Maw-klusuaqn Negotiation Office) and providing information to the closest Mi'kmaw community identified by KMKNO as Potlotek located approximately 20 kilometres to the east of the Site.



5.1.1 Rationale for Consultation and Engagement

Nova proposes to expand their existing quarry (less than 4 ha) in Sporting Mountain, Nova Scotia in order to meet market demand and continue to extract and supply aggregate for road and local construction projects. The existing Sporting Mountain Quarry operated under the NSTIR exemption for highway projects from July 2015 until project completion in December 2015, and thus no formal consultation was required under this exemption. The project then operated under an Industrial Approval and some consultation was completed. As market opportunities further evolved, the operational footprint associated with the long term vision of the quarry increased to 10 ha (maximum), and therefore, consultation was conducted associated with the currently proposed Project as part of Nova's proactive approach and as required through the provincial EA process. Further information on activities and outcomes is outlined below.

5.1.2 Public Information Session

A Public Information Session was held on Thursday, February 27th 2020 (3:00 – 7:00 pm) at the Lion's Club in the Village of St. Peter's. The session was advertised by flyer-to-the-door delivery of approximately 730 civic addresses in St. Peter's, River Bourgeois, Sampsonville, French Cove, Cape George, and Seaview. Notice of the information session was posted at the venue, Canada Post in St. Peter's and River Bourgeois, and at the Foodland and Home Hardware in St. Peter's before the scheduled event.

A series of panels (Table 5-1 and Appendix B) provided an explanation of the Project.

Table 5-1 Public Information Panels

Panel Name	Panel Description
Environmental Assessment Process	Described the EA process as a tool and how the community input is important to the process.
Who is...?	Overview of Nova Construction.
The Project	Overview of the project being proposed and key components, including project timelines, site operations, and size of expansion.
Processing	Description and details of site activities associated with construction, operation, and decommissioning of the quarry, as well as details on processing aggregate at the quarry.
Environment	An overview of baseline studies completed and key preliminary results.
Reclamation	Preliminary reclamation plans describing slopes and results/goals.

Attendees were asked to sign into the Public Information Session upon arrival and introductions were exchanged. Attendees viewed the prepared panels and were assisted by Nova Construction company representatives and consultants with any questions they had. A summary of the number of participants and their home communities is provided in Table 5-2 below.



Table 5-2 Home Communities of Public Information Session Participants

Location	Number of People
St. Peter's	7
River Bourgeois	7
Seaview	5
Sampsonville	4
Oban	7
Barra Head	1
Cape George	1
St. George's Channel	1
River Tillard	1
Not Declared	4
Total	38

Comments from the attendees were discussed and recorded by Nova Construction company representatives and GHD. A summary of the comments is provided in Table 5-5.

Some feedback provided from the attendees at the Public Information Session indicated that additional people who were unable to attend the session wanted information that was presented. In response, Nova prepared a trifold pamphlet summarizing the information presented on the panels, and additional information on the provincial EA process and ways in which the public can be involved in the public comment period. The Community Information Update trifold (Appendix B) was distributed via way of flyer-to-the-door delivery on or before April 30, 2020 to approximately 964 civic addresses in the communities of West Bay, St. Peter's, including the Mercy Lane and Port Side Lane areas, as well as all residential addresses in River Bourgeois. This trifold encouraged the public to engage through the public review period, a process that will be on-line only during the pandemic.

5.1.3 Indigenous Groups and Communities

Table 5-3 provides a summary of Mi'kmaq consultation and engagement.

Table 5-3 Summary of Mi'kmaq Consultation and Engagement Sessions

Organizations	Session Date	Topics Discussed	Number of Attendees
Early Engagement			
KMKNO, OAA and Potlotek	August 21, 2019	Email contact only – Provided information package and requested meeting – included location, size, schedule, and proponent information.	N/A
Second Round of Engagement (following baseline studies and the Mi'kmaq Ecological Knowledge Study)			
KMKNO, OAA and Potlotek	February 14, 2020	Email contact only – Provided additional project information on EBS and MEKS, upcoming public information session in	N/A



Table 5-3 Summary of Mi'kmaq Consultation and Engagement Sessions

Organizations	Session Date	Topics Discussed	Number of Attendees
		St. Peters and requested meeting	
KMKNO and Potlotek	April 9, 2020	Provided additional project information and previously sent information in advance of session noted below	N/A
KMKNO	April 15, 2020	KMKNO asked questions relative to location of project Mi'kmaq communities, surface water monitoring plans, fish habitat surveys, MEKS results (provided to KMKNO), relationship with Potlotek, local hiring policy and timing for EARD submission. All questions were answered and KMKNO encouraged to provide comments on the EARD when registered. Surface water monitoring program will include a background sample as suggested by KMKNO and fish habitat surveys will be included in the EARD for review as requested by KMKNO.	1 – Aly Vandergrift Note: Chief Marshall invited but did not attend session – held by Video/Audio

5.1.4 Regulatory Agency Consultation

Table 5-4 provides a summary of discussions with regulatory agencies and local officials.

Table 5-4 Summary of Discussions – Regulators and Local Officials

Agency	Comment
Nova Scotia Environment – Environmental Assessment	July 2019 – Provided notice to NSE on the initiation of the Environmental Baseline Studies and overall schedule for EARD submission in Q1/2 2020. April – 2020 – discussions on COVID-19 procedures with regards to public review and Mi'kmaq consultation
Office of Aboriginal Affairs	See above plus email contact to inform OAA (Gillian Fielding) of upcoming registration and provide information packages sent to KMKNO and Potlotek as noted above.

5.2 Public Comments and Steps taken to Address Public Issues and Concerns

A key element of public consultation and engagement is to identify and address concerns that may arise and to incorporate that information into the final design of the Project where possible. Nova



Construction has recorded all comments made at the Public Information Sessions, and incorporated this feedback in the overall final design of the Project, as noted in the table and throughout this document.

Table 5-5 Summary of Comments and Concerns Raised by Stakeholders

Comments / Question	Response
<p>The majority of concerns are related to trucking along local routes (related to volume of truck traffic, speed, dust, noise, community safety, and wear on roads). Some citizens are looking for a specified, designated haul route.</p>	<p>Nova will use public roads at posted speed limits for the project. Routes from the site are determined by where the product is needed so all allowable routes could be used. Nova recognizes the need for proper adherence to speed limits and directs all staff and contractors to do so. As it is a public road Nova notes the role of NSTIR in maintenance dust control and posting of speed limits.</p>
<p>There is some concern around the protection of streams and wetlands. Residents expressed concern over perceived impacts that could result from discharge from the settling ponds or excess sedimentation caused by trucks.</p>	<p>At the site the dust control and sediment and erosion control is well managed by use of water if needed for dust and the on-site sediment and erosion control measures including setbacks from watercourses, settling ponds and proper monitoring of discharges. Dust control on roads is noted above and Nova commits to working with all parties to keep speeds and dust to acceptable levels in accordance with applicable legislation and road requirements.</p>
<p>Concern was expressed that flyers needed to be delivered earlier, and that some residents were not able to attend as they couldn't make transportation or child care arrangements in time given the short notice.</p>	<p>The first mail out on notification of the public meeting was advertised by flyer-to-the-door delivery of approximately 730 civic addresses in St. Peter's, River Bourgeois, Sampsonville, French Cove, Cape George, and Seaview.</p> <p>Notice of the information session was posted at the venue, Canada Post in St. Peter's and River Bourgeois, and at the Foodland and Home Hardware in St. Peter's before the scheduled event.</p> <p>Nova acknowledges that the distribution options in the area for flyers was problematic and therefore distributed a second mail out via way of flyer-to-the-door delivery on or before April 30, 2020 to approximately 964 civic addresses in the communities of West Bay, St. Peter's, including the Mercy Lane and Port Side Lane areas, as well as all residential addresses in River Bourgeois. This trifold provided all the information on panels from the Public Meeting and EA process and encouraged the public to engage through the public review period and process that will be on-line only during the Covid pandemic.</p>



6. Valued Components and Effects Management

The following section identifies current conditions of the environment and designates Valued Components (VCs) based on those aspects of the environment valued by all stakeholders and that may interact with or be influenced by the Project.

Methodology

The GHD team conducted field studies in 2019 to determine the current environmental baseline conditions of the site and surrounding area. From these studies, and in consultation with the Proponent and regulators, the team was able to determine appropriate mitigation measures, as required to minimize potential environmental effects from the proposed expansion of the quarry. The surveys consisted of: geology, acid rock drainage, surface and groundwater resources, wetlands and watercourses, flora, fauna, habitat, priority species, air quality, noise, and archaeological and cultural resources. Ecological surveys were undertaken by McCallum Environmental Ltd. A desktop assessment and field reconnaissance of potential archaeological and heritage resources was completed by Cultural Resource Management (CRM) Group Ltd., and Mi'kmaq Ecological Knowledge Study (MEKS) was conducted by Membertou Geomatics Solutions.

Additional information in support of the field studies was gathered through a review of publically available documents, including maps and other grey literature (i.e. government websites).

Project Boundaries

For the purposes of this Environmental Assessment (EA), the Study Area is located on a 40 ha privately owned property that includes the existing quarry (< 4 ha) and footprint of the proposed quarry expansion (additional 6 ha), previously logged areas, and forested land. Beyond the privately owned property, the EA Study Area includes the surface environment, air shed, noise shed, watershed, downstream receiving waterbodies, groundwater and communities within measurable zones of influence around the subject property as outlined in subsequent Sections of this Report. This delineation has been determined in relation to the Project footprint, as directed by prescribed setbacks, and the immediate area surrounding it, within which the VCs are likely to interact with, or be influenced by the Project. The Project Site is presented in Figures 2 and 3.

With respect to defining temporal boundaries, estimated phase durations, potentially expanding in 2020 pending regulatory approvals, are as follows: Construction – 0 years (Site already exists); Operation - 30+ years depending on market demand; Decommissioning - up to 3 years and is dependent on follow-up monitoring and the success of reclamation activities.

Determining Impact Significance

Table 6-1 outlines the criteria used to determine predicted impact significance in relation to VCs and Project interactions. The prediction of environmental effects is developed through professional judgment and the application of proposed mitigation measures. With respect to determining impact significance in relation to temporal boundaries outlined above, short-term impacts are defined in recognition of the intermittent nature of the proposed operation (i.e. blasting bi-annually, ongoing progressive reclamation).



Table 6-1 Impact Significance Criteria

Impact Significance	Type of Environmental Component		
	Physical	Biological	Socio-economic
Significant	Parameter affected within most of Ecozone for several decades	Whole stock or population of Ecozone affected over several generations	Whole population of region affected over several generations
Moderate	Parameter affected within most of Ecozone for one or more decades	Portion of population of eco-region affected over one or more generations	Community affected over one or more generations
Minor	Parameter affected within most of Ecozone for less than one decade	A specific group of individuals within an ecosystem affected during less than one generation	A specific group of individuals within a community affected during less than one generation
Negligible	Parameter affected within some part of eco-region for a short period of time	A specific group of individuals within an eco-region affected for a short time period	A specific group of individuals within a community affected for a short time period

Source: Noble, 2015, Pg. 169

6.1 Geology, Soil, and Sediment Quality

6.1.1 Existing Environment

Soils

The Project is located in a rural area of Cape Breton Island, Nova Scotia, classified as Nova Scotia Uplands ecoregion – Cape Breton Hills Ecodistrict – Spruce Pine Hummocks Ecoelement. The Tolerant Hardwood Hills Ecoelement mapped in the southern portion of the property are in an area already disturbed by the existing quarry. The Ecodistrict is located at 150 - 300 masl. The Spruce Pine Hummocks located throughout the expansion area is characterized by imperfectly drained soils of medium texture on hummocky topography (IMHO) (Neily et al., 2017).

The Project Site consists of the Thom (Tm) soil series (Figure 4), which accounts for about 19% of the soil type on Cape Breton Island. The parent material is characterized as grayish-brown sandy loam till derived largely from metamorphosed rock. The soil is rather porous and occasionally very stony. The topography is generally hilly to mountainous (Cann et al., 1963).

The Thom soil series is associated with the Forest Soil Types ST2. ST2 is described as “fresh, medium to coarse-textured soils, with near-surface soil texture dominated by sandy loam or coarser textures” (Keys et al., 2011). Site drainage is “usually well, but can be rapid or moderately well depending on slope position, slope percent, soil depth and subsoil permeability” (Keys et al., 2011).



Surficial Geology

The Project area is covered by one major till type - bedrock (Figure 5), characterized as rock of various types and ages; glacially scoured basins and knobs, overlain by thin, discontinuous veneer of till. This terrain is typically rolling to rugged, with ridges of rock exposed in thin till areas and undifferentiated patches of thin till covering up to 40% of the area. This is the result of glacial erosion and little or no deposition. This surficial deposit supports forest vegetation where soil/subsoil veneer is deep enough to support it, but is of little use for crops (Grant, 1988).

Bedrock Geology

Sporting Mountain Quarry is underlain by the Sporting Mountain Pluton (age ca. 620 Ma) which consists of granodiorite varying randomly to monzogranite and tonalite (Figure 6). The rocks are texturally homogeneous and medium grained. Major minerals are subhedral subporphyritic plagioclase, hornblende, and less abundant biotite in a groundmass of fine grained quartz and minor alkali feldspar. Some magnetite (Fe_3O_4), pyrite (FeS_2), and other non-ferric minerals may be present. Copper mineral showings are known at Oban, approximately 3 km northeast of the Project Site, along a shear zone in the Pluton with granitic and volcanic rocks at the edge of the pluton. (Barr et al., 1996)

Acid Rock Drainage

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.

Total Sulphur (S) and acid producing potential analysis was completed for rock at the quarry Site and results are shown in Table 6-2. Analysis certificates are provided in Appendix C.

Table 6-2 Acid Producing Potential

Sample	S (Total) Wt %	Acid Producing Potential (kg H_2SO_4/t)
#1 SportMtn Quarry	0.050	1.52
#2 SportMtn Quarry	0.020	0.63

Based on a review of information pertaining to acid generating potential, and available regional geological mapping there are no known occurrences of acid generating rocks in the immediate Study Area. Results of tests to determine acid producing potential indicate that the bedrock has less than 1.52 kg/t acid producing potential, well below the provincial threshold of 0.4% (12.51 kg H_2SO_4 /tonne) and is therefore not considered acid generating.



Paleontology

Fossils are not typically associated with volcanic or granitic rocks. There are no reports of fossils associated with the rocks in the immediate area.

6.1.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Due to the thin soils/overburden, low to moderate slopes, and poor site drainage, the erosion potential would be considered low and any effects would be directed to and managed in the quarry. Acid rock drainage (ARD) is not expected to be an issue at this quarry. No paleontological specimens or pre-historic remains have been reported on or near the Project Site and none are expected to be found. As such, potential impacts are expected to be negligible with the appropriate mitigation applied.

Proposed Mitigation

Progressive reclamation will return the land to a use approved by the property owner, regulators and the community. Stockpiles of soil/till will be allowed to revegetate to minimize dust and erosion potential. Overburden will be stored using appropriate angles of repose for the material. Although acid generating bedrock is not anticipated on the site as determined from testing, disposal/storage of potentially acid generating bedrock, if encountered, will be conducted in compliance with the *Sulphide Bearing Material Disposal Regulations*. Sedimentation and erosion control measures will be used to prevent erodible soils and materials from entering surface water bodies. The quarry design includes setbacks and vegetated buffers from watercourses that will be maintained through the operation of the facility.

Monitoring and Follow-up

Nova Construction regularly tests rock from its quarries to ensure that material meets specifications required in the construction industry. Nova Construction will report to, and work with, the Nova Scotia Museum and other interested parties if paleontological resources should be found on the Project Site. Visual monitoring of erosion and sedimentation control measures will be required to measure the effectiveness of mitigation activities.

6.2 Atmospheric Conditions and Air Quality

Total suspended particulates (TSP) include dust, dirt, soot, smoke, and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO₂ and Volatile Organic Compounds (VOCs) are also considered particulate matter.

Baseline particulate monitoring was conducted at three locations from August 20 through August 22, 2019. The monitoring locations were selected based on accessibility and the proximity to Site boundaries for the purpose of capturing baseline particulate concentrations surrounding the Site. Table 6-3 provides a description of the air monitoring locations. Monitoring locations are depicted on Figure 7.



Table 6-3 Particulate Monitoring Locations

Sample Location ID	Description
A1	795 Morrison Road – Quarry. Monitoring conducted in southeast corner of quarry, near main gate.
A2	1329 Morrison Road – private residence located 1.7 km northeast of quarry. Monitoring conducted in front yard.
A3	571 Morrison Road – private residence located 1.5 km south of quarry. Monitoring conducted in front yard.

The monitoring program for TSP was carried out in accordance with United States Environmental Protection Agency (USEPA) CFR 40 Part 50 - Regulations for Ambient Particulate Sampling. Sampling equipment utilized by GHD consisted of three high volume (Hi-Vol) air samplers equipped with 8 inch x 10 inch glass fiber filters for sample collection. Sampling methodologies are further described in Appendix D.

Upon completion of the program samples were shipped to an accredited laboratory, AGAT Laboratories in Dartmouth, Nova Scotia, for analysis in accordance with the EPA Method 5 as per the analytical report method. Additionally a blank unused filter was submitted to the laboratory for quality control/ quality assurance purposes. The laboratory results and certificate of analysis are provided in Appendix D.

6.2.1 Existing Environment

Climate

The Nova Scotia Uplands Ecoregion tends to have warm summers and long cold winters. The topography of the region causes local weather (i.e. temperature) to vary; it also creates microclimatic environments, where sheltered and exposed conditions occur (Neily et al., 2017).

Weather conditions in Nova Scotia are monitored using a network of 47 weather stations, owned and operated by Environment and Climate Change Canada (ECCC). Weather stations started collecting data in 1981 and consist of precipitation, relative humidity, temperature, wind direction, and wind speed. The Baddeck Weather Station (ID 8200300; Coordinates: 46.1 N, 60.75 W, Elevation: 7.6 m) is located approximately 48 km from the Sporting Mountain Quarry. Climate normals from 1981 to 2010 for the Baddeck Weather Station are presented in Table 6-4. Other weather stations operated by the ECCC are located closer to the quarry site (approx. 30 km); however, climate normals were not calculated for these stations, presumably due to lack of data or not collecting comprehensive data (i.e. no precipitation data). The climate normals calculated for Baddeck station indicate that the average temperature ranges from -5.8°C to 18.5°C. Historical records show that August, on average, is the hottest month and February is the coldest.



Table 6-4 Summarized Climate Data for Baddeck, NS (1981-2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
Temperature °C													
Daily Average	-5.4	-5.8	-2.3	3.2	9.0	13.9	18.1	18.5	14.6	8.9	3.8	-1.5	6.3
Standard Deviation	1.8	2.4	2.2	1.0	1.3	1.2	1.3	1.1	1.3	1.1	0.9	1.9	2.4
Daily Maximum	-1.1	-1.1	2.2	7.3	14	19	23	23.1	19.1	12.9	7.1	2	10.6
Daily Minimum	-9.6	-10.5	-6.8	-0.9	4	8.7	13.3	13.7	10	4.8	0.5	-4.9	1.9
Record High	17	12.2	17	25.6	30.6	33.9	35	36.7	32	28.9	22.8	17.2	
Record Low	-29	-32.2	-31.1	-15.6	-7.2	-5.6	-1.1	1.7	-2.2	-5.6	-14	-22.2	
Average Precipitation (mm) / Snow (cm) / Rainfall (mm)													
Precipitation	155	125.6	128.6	125.8	104	104.8	97.5	107.2	127.8	137.1	155	166.3	1534.7
Snowfall	81.7	66.6	48.9	19.4	1	0	0	0	0	1.1	22.5	71	312
Rainfall	73.3	59.1	79.7	106.5	103	104.8	97.5	107.2	127.8	136	132.5	95.4	1222.6
Precipitation days (>0.2 mm)	19.5	14.7	14.3	14.8	13.8	13	12.8	13.2	14.3	16.8	20.1	20.1	187.3
Snowy days (>0.2 cm)	14.6	10.6	7.2	3.5	0.26	0	0	0	0	0.47	4.8	12.4	53.9

Source: Government of Canada (2019)

Total Suspended Particulate (TSP) Monitoring

Quarry activities such as blasting, on-site vehicle operations, crushing, processing, and wind erosion on open ground and stockpiles can contribute to increased particulate levels. Based on *Nova Scotia Air Quality Regulations*; a significant adverse environmental effect with respect to TSP is one that would reduce air quality, such that the level of TSP matter exceeds 120 µg/m³ over a 24 hour averaging period or 70 µg/m³ over an annual averaging period. The total suspended particulate measurements made at three monitoring locations over a two day period ranged from 14.6 µg/m³ to 28.4 µg/m³. Recorded values are below the maximum permissible ground level concentration as noted above.

Total suspended particulate measurements compared to applicable criteria are presented in Appendix D.

Greenhouse Gases (GHG)

The Site is located in Nova Scotia's Eastern Air Zone. For this Project, on-site trucking, mobile equipment, and utility vehicles have the potential for producing emissions of air contaminants including sulphur dioxide (SO₂), nitrogen oxide (NO), carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter, ground level ozone (O₃) and other volatile organic components (VOCs). These contaminants are currently regulated under *Nova Scotia Air Quality Regulations* (N.S. Reg



187/2010) and with guidance through the Canadian Ambient Air Quality Standards (CAAQS). With respect to local conditions, the key air quality parameter of concern would be particulates (i.e. dust).

The closest applicable Ambient Air Quality Station to Sporting Mountain is located in Port Hawkesbury, Nova Scotia. Monthly average and minimum and maximum average monthly values for the 7-year period January 2011 to December 2017 are shown in Table 6-5.

Table 6-5 Summarized Air Quality Data for Port Hawkesbury

	PM2.5 ($\mu\text{g}/\text{m}^3$)	SO2 (ppb)	NOX (ppb)	NO (ppb)	NO2 (ppb)	O3 (ppb)
Minimum	13	0.19	1.42	0.17	0.72	18.98
Maximum	60	1.93	10.15	4.06	6.89	39.80
Average	26.5	0.77	3.74	1.11	2.60	28.01

While Port Hawkesbury may provide a geographic/topographic setting that is similar to Sporting Mountain, the data presented is likely influenced by industry in Port Hawkesbury, namely Port Hawkesbury Paper, and therefore air quality is likely better in the Sporting Mountain area. Both 24-hour and Annual PM2.5 CAAQS measured at Port Hawkesbury station show a decreasing trend.

6.2.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Construction, associated with the quarry expansion, and operational activities have the potential to result in changes in air quality (i.e. dust and particulates); and in GHG emissions with potential climate effects.

Dust and exhaust type emissions will be produced from equipment and machinery used for construction, operation, and reclamation. Mitigative measures, could include wet suppression of unpaved surfaces and roads, to help reduce dust impacts from these activities. Regular machinery maintenance, the use of low sulphur fuel, the overall distance of reclaimed areas from sensitive receptors and the natural buffers of the reclamation areas will help reduce emissions and dust impacts associated with the equipment utilized in the reclamation process.

Assuming appropriate mitigation to minimize dust generation and transport, minor effects on air quality are anticipated during development, operation, and active reclamation phases. Since no change in production is anticipated at the site there should be no net change in greenhouse gasses produced from quarry operations. Technology improvements over time may provide for lower emissions.

Proposed Mitigation

The following mitigative measures will be utilized to reduce Project emissions:

- During periods of heavy activity and/or dry or windy periods, water spray will be used to reduce dust.
- Consideration shall be given to the strategic placement of overburden and aggregate stockpiles to act as wind barriers to crushing activities.



- Appropriate truck loading and hauling procedures shall be followed to reduce the generation of dust during trucking activities.
- When not in use, machinery and light vehicles shall not be left idle so as to reduce emissions.
- All vehicles and machinery shall be maintained in proper working order to reduce emissions.

Monitoring and Follow-up

National Pollutant Release Inventory (NPRI) is a federally administrated program that collects data on annual on-site emissions of substances released to the air, water and land, as well as off-site transfers of substances for disposal or recycling. NPRI reporting is a requirement of sub section 46(1) of the *Canadian Environmental Protection Act (CEPA)*. Nova Construction is aware of the legislation and will comply with reporting requirements, as applicable. Monitoring of particulate emissions will be conducted as required by NSE.

6.3 Light

Light level limits are not directly regulated through the provincial regime. Changes (i.e. increases or changes to occurrence / timing) to ambient light levels have the potential to adversely affect fauna and birds, as well as increase level of light pollution experienced by the general public or specific populations.

Canada Occupational Health and Safety Regulations (SOR/86-304) direct the minimum illumination levels required at various workplace locations. To the extent that migrating birds may be affected by the Project, the *Migratory Birds Convention Act 1994*, and the *Species at Risk Act* could apply.

The adverse effects of light trespass on human receptors are due both to an increase in general illuminance that may cause annoyance and may disrupt sleeping patterns, and from the direct view of the light source that can cause glare issues. The adverse effects of light trespass from exterior lighting are influenced by a number of factors:

- Light trespass is more likely to be perceived as obtrusive if the lighting installation is located above the observer. Lighting installations are usually directed towards the ground and an observer could have a direct view of the luminaire.
- The surrounding topography and site infrastructure, including distance, hills, trees, and buildings generally have a positive effect by shielding the observer from the light source.
- Pre-existing lighting in the area. Light from a particular light source is seen as less obtrusive if it is located in, or perceived in, an area where the lighting levels are already high, e.g. along roads near built up areas.
- The zoning of the area. A residential area is seen as more sensitive compared to commercial areas where high lighting levels are seen as more acceptable.
- Time of use. Light will be seen as being more obtrusive during nighttime. This is generally considered to be between 11:00 pm and 6:00 am.



6.3.1 Existing Environment

The Project Site is located in a remote, rural and mostly forested location. Ambient nighttime light conditions would be minimal and typical of a relatively undeveloped rural area. The largest artificial light sources in the vicinity of the Project Site are from the nearest residences, approximately 1.2 km to the east, 1.5 km to the southeast, 1.6 km to the southwest, and 1.9 km to the northeast, and lighting from the scale house, mobile equipment / vehicle headlights, and the crusher and asphalt plant, if present, during operations.

The Sporting Mountain Quarry will continue to operate intermittently in response to market demand. The quarry will operate during daylight hours, to prevent nighttime disturbance, with the potential for other site activity to occur in predawn or twilight hours, if necessary. Twenty-four hour operation is not envisioned for this Site.

Light monitoring was not completed during the baseline study program, as ambient nighttime light conditions would be minimal and typical of a relatively undeveloped rural area, and are not anticipated to cause any effects on the nearest residences, located at a minimum 1.5 km away from the Project Site. Typically, site security is present overnight during crushing and paving operations, and a set of portable lights are kept running, pointed downward and away from local residences. Furthermore, there will be no new sources of light or changes to light intensity associated with the expansion as the operation will proceed as it has historically,

6.3.2 Potential Effects, Proposed Mitigation, Monitoring and Follow Up

Potential Effects

Light is a sensory disturbance that can impact fauna by potentially causing disturbance or displacement of species, disorientation and / or by impacting foraging, reproduction, and communication through behavior changes (Longcore and Rich, 2004; Da Silva et al., 2015). Further, behavior changes can also disrupt habitat connectivity (Bliss-Ketchum et al., 2016). For species which may be attracted to light, lights may increase potential for direct mortality of these species or may increase habitat suitability by supplementing their source of prey. Some opportunistic wild species may be attracted to the site as a result of increased access and available food sources (natural prey or anthropogenic food sources), potentially increasing interactions between site personnel and wildlife.

A significant impact is defined as direct light trespass that according to the affected resident; regularly interferes with the use and enjoyment of nearby residential properties on a permanent basis and/or evidence of unacceptable levels of bird mortality associated with Project lighting.

Ambient nighttime light conditions in the vicinity of the Project are expected to be minimal and typical of a relatively undeveloped rural area. Light impacts on-site result from temporary lighting systems (including portable lights) installed during active construction and operation, mobile equipment, and vehicle headlights moving around the site as well as entering and exiting the site. There is currently no permanent lighting on-site, and there will be no new sources of light or changes in light intensity associated with the expansion as the operation will proceed as it has historically. There are no new or additional effects from light anticipated.



Given the distance from residential properties, rural setting of the site, the topography / vegetative cover, and intermittency of operational activities in response to market demands, the light impacts on residences are expected to be negligible with the appropriate mitigation applied.

Proposed Mitigation

Appropriate mitigation measures will be taken when required. The key mitigation measures applied to the assessment of light are:

- Use of lights will be limited to the amount necessary to ensure safe operation.
- Lights on-site infrastructure will be installed downward facing, to reduce attraction to birds.
- Wherever possible, motion-sensing lights will be installed to ensure lights are not turned on when they are not necessary.
- Lighting, when required, should be shielded to shine down and only to where it is needed without compromising the safety of the employees.
- Lighting not in use will be turned off.
- Efficient sources of light, such as LED, will be utilized wherever practicable, to reduce overall magnitude of light.

Monitoring and Follow Up

Nova Construction will maintain a clear line of communication through their Project Manager during continued operations, and any complaints related to light trespass will be recorded and evaluated in accordance with NSE specific requirements.

6.4 Noise

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. Noise is measured as sound pressure levels (SPL) in decibels (dB). This scale is "A" weighted to approximate the way the human ear hears. Noise measurements are therefore represented as dBA units. In general an increase in noise levels from 1 to 3 dBA will not be noticeable, 3 to 5 dBA will be noticeable by most people, 5 to 7 dBA will be easily heard and an increase of 7 to 10 dBA will be considered by most to be twice as loud (USEPA, 1974). Because the decibel scale is logarithmic, doubling of the number of noise sources will increase noise levels by 3 dBA. A tenfold increase in the number of noise sources will add 10 dBA to the noise level.

Table 6-6 lists some common noises and typical sound levels (dBA). Extremely low levels of sound are in the 20 to 35 dBA range. A quiet location such as library or inactive residential area will register a sound level of approximately 35 dBA. Sounds causing immediate and noticeable disturbance start at 70 to 80 dBA. A tractor-trailer passing at a distance of 10 to 15 m will create 80 dBA, similar to that of shouting at a distance of one metre.



Table 6-6 Common Noise Levels

Noise Level (dBA)	Typical Outdoor Noise Levels	Typical Indoor Noise Levels
140	Threshold of pain on the human ear	
130	Jet Aircraft (65 m)	
120	Thunder	
110	Gas mower (1 m)	Nightclub music
100	Loud Street Noise	
90		Noisy factory
80	Tractor -trailer travelling 70 km/hr (15 m)	Cocktail party
70	Car travelling 70 km/hr (15 m)	Toilet flushing
60		Conversation
50		Private office
40	Light rain	
30	Countryside at night	Whisper
20		Recording studio
10	Rustle of leaves	
0	Threshold of hearing	

Table 6-7 provides typical noise ranges at 15 m from heavy construction equipment as may be found on the Site. Noise levels for stationary construction equipment will decrease by approximately 6 dBA at a doubling of the distance from the source.

Table 6-7 Typical Noise Levels (15 m from source - Heavy Equipment)

Type of Equipment	Noise Level Range (dBA)
Front Loaders	75-94
Backhoes	74-92
Trucks	85-95
Excavator	85-95
Reference: "Construction Noise Handbook" US Dept. of Transportation - Federal Highway Administration, 2006	

6.4.1 Existing Environment

Baseline noise monitoring was conducted at three locations, in proximity to the air sampling locations, between August 20 and 22, 2019. Table 6-8 provides a description of the noise monitoring locations.



Table 6-8 Noise Monitoring Locations

Sample Location ID	Description
N1	795 Morrison Road – Quarry. Monitoring conducted in a central area of quarry.
N2	1329 Morrison Road – private residence located 1.7 km northeast of quarry. Monitoring conducted in back yard.
N3	571 Morrison Road – private residence located 1.5 km south of the quarry. Monitoring conducted in back yard.

The noise metres were programmed to record continuous 5-minute sound level measurements taken with the detector in slow response using the A-weighting (dBA scale) and reported as average equivalent continuous level (L_{eq}) dBA readings at each of the three monitoring locations.

Sound level measurements at 1329 Morrison Road were collected using a Quest Sound Pro SE/DL sound level meter, and the sound level measurements at 795 Morrison Road (Quarry) and at 571 Morrison Road were collected using a Quest Sound Pro SE/DL sound level meter, both equipped with data-logging capabilities. The device was calibrated at 114 decibels (dBA) before and after each measurement period using a Quest QC-10 Calibrator. The sound level meters were equipped with an outdoor casing and foam covering to protect the microphone from adverse weather conditions and reduce sound disturbances caused by physical contact and wind disturbances. Sampling methodologies are further described in Appendix D.

Quarry operations such as blasting, on-site vehicle operations, and rock crushing can contribute to increased noise levels. As specified in the Noise Measurement and Assessment Guidelines (Nova Scotia Environment Pit and Quarry Guidelines, May 4, 1999, Revised August 20, 2003).

Average sound level values ranged from 23.22 dBA to 55.72 dBA at all locations. Average sound level values for each time interval were reported below the maximum permissible sound levels of the Noise Measurements and Assessment Guidelines.

The lowest sound levels were reported north of the quarry, at location N2 (1329 Morrison Road). The highest noise levels recorded during day time (07:00 – 19:00) hours were measured at location N1 (Quarry – 795 Morrison Road). The highest noise levels recorded during the evening (19:00 – 23:00) and overnight hours (23:00 – 07:00) were measured at location N3 (571 Morrison Road).

A complete summary of the results and the sound level measurements compared to applicable criteria are presented in Appendix D.

6.4.2 Potential Effects, Proposed Mitigation, Monitoring, and Follow-Up

Potential Effects

Given the setting of the Project, SPL in the vicinity of the Project are expected to be typical of levels in a Rural Resource development area. There will be no new sources of quarry related noise associated with the expansion as the operation will proceed as it has historically. Typical sources of quarry site related noise may include on-site blasting, heavy equipment, and truck traffic. The operational phase of the quarry life is expected to be 30 + years. Noise impacts will result from



heavy equipment and vehicle operations, and will occur during construction related with the expansion of the site, operation, and reclamation phases.

A significant adverse effect occurs where the Project increases background noise levels in a residential area above the NSE guidelines or by more than 10 dBA. An adverse effect that does not meet these criteria would be considered as negligible.

Significant residual effects for noise would be identified if there is an exceedance of NSE noise guidelines or noticeable increase above existing background levels at a sensitive receptor.

Operational noise impacts on residences are expected to be negligible with the appropriate mitigation applied.

Proposed Mitigation

Appropriate mitigation measures will be taken when required to ensure noise limits are met. The nearest residence is approximately 1.2 km from the quarry boundary (at minimum).

A technical blast design will be prepared by a qualified person who ensures that the prescribed ground vibration and air concussion limits are achieved.

The key mitigation measures applied to the assessment of noise are:

- Blasting and crushing will occur as market demand requires.
- Applicable guidelines and regulations will be followed as established by NSE approvals to operate.
- Regular maintenance of vehicles and equipment.
- Barrier berms will be established to minimize noise propagation where appropriate.

The level of noise will vary according to the type of activity. Noise from the blasting and equipment is a primary source of noise. Nova Construction will continue to control operations and equipment to ensure noise levels are kept within applicable guidelines as determined by NSE. The following are typical limits at any compliance monitoring stations at the site boundaries or at any other station identified by NSE.

- Day: 7 am to 7 pm – 65 dBA
- Evening: 7 pm to 11 pm - 60 dBA
- Night: 11 pm to 7 am - 55 dBA: maximum (instantaneous) levels

Monitoring and Follow-up

All blasts will be monitored to compare to the applicable limits (currently 128 dBL air blast and 12.4 mm/s ground vibration).

Nova Construction will maintain a clear line of communication through their Project Manager for noise complaints to be recorded and evaluated in accordance with legislation and NSE specific requirements.



6.5 Surface Water Resources and Wetlands

Surface water resources and wetlands were selected as VCs because of the potential for Project activities to interact with the freshwater environment. Indicators of the VCs include fish and fish habitat, surface water quality, as well as potential water uses for agriculture, recreation, industry, or potability.

Wetlands can have many functions, known as wetland functional attributes, which play important roles in natural ecosystems. Wetlands can minimize erosion, control flooding, and reduce contaminant loads. Wetlands may also be closely linked to local hydrogeology, in that they may play a role in groundwater recharge and discharge areas. They also perform various important biological functions, such as providing habitat for wetland species, as well as for upland species that require wetland habitat at some point in their life history. Humans also used wetlands for various recreational activities such as bird watching, hunting, and harvesting of wild plants. In Nova Scotia, wetlands are protected under the Provincial *Environment Act* and an Approval is required for their alteration.

The Project Team reviewed the Nova Scotia Topographic Database (NSTDB), mapped watercourses and waterbodies, provincial flow accumulation data, and depth to water table mapping to identify potential surface water features within or in proximity to the Study Area based on mapped systems, topography, and satellite imagery. Further, the desktop review also served to identify where the Study Area lies within primary and secondary watersheds, and potential fish habitat and fish species in nearby surface water features.

Watercourse delineation and characterization were completed throughout the Study Area in conjunction with wetland delineation and evaluation from July 28 - 30, 2019. Methodologies employed for wetland delineation and functional analysis, and watercourse locations and identification are detailed in Appendix E [Section 6.1 (Surface Water, Fish, and Fish Habitat) and Section 7.1 (Wetlands)].

Baseline surface water samples were collected on September 15, 2019 and March 23, 2020 at three locations indicated on Figure 7. The samples were analyzed for general chemistry and metals, and represent the general surface water chemistry around the Site. The water quality data is included as Appendix E.

6.5.1 Existing Environment

Regional Context

Nova Scotia contains an abundance of surface water features in all areas of the province. High annual rainfall, moderate to low evapotranspiration rates, thin soils with near surface bedrock and a short summer season combine to make a large volume of water available for surface water bodies. The past effects of glaciation have resulted in a multitude of wetlands and small lakes as well as a dense network of small streams. The province contains 46 primary watersheds whose networks of streams and 6,670 lakes together cover about 215,000 ha, or about 4% of the province.

The Project is located entirely within the River Tillard secondary watershed (1FH-2) and positioned within the western headwaters of the 1FH-2-B tertiary watershed, which discharge southeast to the Atlantic Ocean at St. Peter's Bay via River Tillard.



Local Context

The NSE Wetlands Inventory Database identified five wetlands within or partially within the Study Area. An area in the southwest and central-east was identified using the Wet Areas Database as having predicted groundwater within 0.5 m of the surface. No wetlands of special significance were identified within 5 km of the Study Area during the desktop review. Field studies identified 11 wetlands, nine (9) of which were swamps (four mixed wood treed swamps, three clear-cut swamps, two shrub swamps), one (1) was a complex, and one (1) was a marsh.

No watercourses or waterbodies were identified within the Study Area in the Nova Scotia Topographic Database. The closest mapped watercourses lie 400 m east and 575 m south of the Study Area boundary, respectively, and drain southeast towards East River Tillard. The closest mapped waterbody to the Study Area is Mountain Lake, located approximately 175 m west of the Study Area boundary, draining west (away from the Site) towards Hill Lake.

Drainage from the existing quarry infrastructure is captured within a settling pond located west of the quarry floor. A perched culvert at the end of the series direct overflow from the settling ponds southwest, towards a forest wetland. This is the predominant direction of overland flow within the southern half of the Study Area, while drainage within the northern half of the Study Area follows natural topographic lows towards the southeast.

Watercourses

During field surveys, two (2) watercourses (WC1 and WC2) (Figure 7) were identified in the Study Area. Both watercourses were classified as a first-order intermittent, headwater stream that originates from pockets of surface water that collect within the southern-most (WC1) / southeast (WC2) extent of Wetland 2 (WL2). No evidence of channelized flow indicating a regulated watercourse was identified based on NSE Guidance.

Watercourse 1 (WC1) is a first-order, intermittent, headwater stream that originates from pockets of surface water that collect within the southern-most extent of Wetland 2 (WL2). WC1 was channelized for approximately 45 m, before dechannelizing and dispersing as overland drainage through a natural vegetated strip between the existing quarry footprint to the southeast and a clear-cut to the northwest. The watercourse re-channelizes in WL1 and continues within the wetland as an entrenched stream, while receiving drainage inputs from the northwest portion of WL1. It is predicted that WC1 drains into the mapped watercourse south of the Study Area.

Based on the watercourse characteristics, multiple seasonal barriers to fish passage through WC1 exist in the form of debris blockages and an overall lack of connectivity between residual pools. Downstream and upstream fish passage was determined to be available, only during moderate to high flow. Fish habitat within WC1 is limited to a small channelized portion. There is no direct channel from the on-site settling pond to WC1. Water that is released to the environment is by overland flow.

Watercourse 2 (WC2) is a first-order, intermittent, headwater stream that originates from pockets of surface water that collect within the southeast extent of Wetland 2 (WL2). The watercourse is then channelized for 110 m, before dechannelizing into a swamp to the east, outside of the Study Area. No surface water or channelized flow through the wetland was observed during the low flow assessment. During the high flow assessment, WC2 was confirmed to disperse into the swamp, and



noted as pockets of surface water. No hydrological connection between these pockets were identified.

No evidence of channelized water or other forms of hydrological connectivity was observed through the wetland that WC2 flows into, during low flow and high flow periods. Based on the characteristics of the watercourse, WC2 does not support fish habitat.

Fish and Fish Habitat

The ACCDC report identified 180 records of 7 fish species within 100 km of the Study Area. No SAR fish species were identified. The report also identified the Scott's River drainage area as significant habitat for the Eastern Cape Breton Atlantic salmon population. The drainage area falls within 5 km of the Study Area, but is isolated from the 1FH-2-B tertiary watershed and drains northeast to Bras d'Or Lake, and is not hydrologically connected to identified surface water features within the Study Area.

The Nova Scotia Freshwater Fish Species Distribution Records contains historic documentation of the following naturally-occurring species in waterbodies within the River Tillard secondary watershed; brook trout, white sucker, golden shiner, three-spine stickleback, white perch, creek chub, and banded killifish (Nova Scotia Department of Fisheries and Aquaculture, 2019)

The potential for each watercourse and wetland to support fish and fish habitat were evaluated across the Study Area during field identification / evaluation. No fish surveys (i.e. electrofishing, trapping) were conducted within the Study Area due to the intermittency of water within the aquatic features of interest and low water levels observed during low flow conditions; however, 2-3 individual fish were observed approximately 275 m downstream, outside of the Study Area, stranded in residual pools.

Watercourse evaluations indicate that fish may be able to access lower portions of WC1 within the Study Area, but a lack of hydrological connectivity was observed during low and high flow conditions that prevents fish from being able to swim further north and in the vicinity of the quarry area. Further, the overall quality of fish habitat within WC1 that is accessible to fish was identified as low. WC2 was deemed to not support fish habitat due to lack of hydrologically connectivity with downstream, fish-bearing systems.

No wetlands were identified to provide fish habitat within the Study Area (i.e. no surface water connectivity and/or open water present within the wetlands). Wetland 1 (WL1) is the only wetland identified to contain a through flow surface water feature (WC1); however, WC1 is entrenched within the wetland and therefore, any potential fish habitat is confined to the channel of the watercourse.

Further details on the identification and characterization of fish species and fish habitat is provided in Appendix E (Section 6.0).

Surface Water Quality

Baseline field water quality measurements were recorded in-situ during watercourse delineation and fish habitat characterizations on July 31, 2019. Water quality parameters were compared against the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the Protection of Freshwater Aquatic Life (FWAL). Field results were only discussed for WC1, as WC2 was deemed to not support fish habitat (Appendix E).



Water temperatures, dissolved oxygen concentration, pH, conductivity and total dissolved solids were measured in WC1, and fell within a tolerable range acceptable for aquatic life.

Surface water samples were collected on September 15, 2019 at three (3) locations (SP-1 SW-1 SW-2) and on March 23, 2020 at two (2) locations (SW1 and SW2) - SP-1 was frozen during the second monitoring event. The samples were submitted for analysis of general chemistry and metals to Bureau Veritas Laboratories in Sydney, Nova Scotia, and represent the general baseline surface water chemistry around the Site. The sample locations are indicated on Figure 7, and the analytical results are presented in Appendix F. No activity had taken place on the site between the sampling timeframes.

The results from surface water analysis were compared to the CCME water quality guidelines for the Protection of Freshwater Aquatic Life (FWAL). All samples show pH conditions within appropriate guidelines (6.5 – 9.0), with the exception of SW-1 during the March sampling event which had a recorded pH of 6.43 and SW-2 during the September and March sampling events which had pH of 6.35 and 6.25 respectively, and falls below the CCME FWAL guideline.

Analysis shows that aluminum exceeded the CCME FWAL criteria (0.005 mg/L – 0.1 mg/L, based on water pH and temperature) for SP-1 and SW-2 during the September event and SW1 and SW2 during the March event, and iron exceeded applicable criteria (0.3 mg/L) for SP-1 and SW-2 during the September event. Analysis of samples collected from SW-1 also indicated an exceedance of copper (0.0049 mg/L) criteria (0.002 – 0.004 mg/L, based on water hardness) during the September sampling event and lead (0.0051 mg/L) criteria (0.001 – 0.007 mg/L, based on water hardness) during the March event.

The samples collected from SW-1 during the September 2019 and March 2020 monitoring events, are the only samples collected in an area where fish habitat and fish access are possible. SW-1 samples were within the CCME FWAL guidelines for the September event; however, the March event indicated low pH and exceedances of aluminum and lead above the applicable guidelines. Samples collected from SW-2 and SP-1 had results outside of the applicable guidelines during the September and March events, but were assumed to be collected in areas inaccessible to fish. A sample from SP-1 was not collected during the March monitoring event due to ice / snow cover.

Surface Water Quantity

Nova Construction conducted a visual surface water flow gauge monitoring event on March 23, 2020 at SW1 and SW2. Both locations were recorded as having a moderate flow. Moderate surface water flow is considered normal in this watercourse based on previous site visits in other seasons by Nova staff.

Wetlands

The NSE Wetlands Inventory Database identified five (5) wetlands within or partially within the Study Area. An area in the southwest and central-east was identified using the Wet Areas Database as having predicted groundwater within 0.5 m of the surface. No wetlands of special significance were identified within 5 km of the Study Area during the desktop review. Field studies identified 11 wetlands, nine (9) of which were swamps (four mixedwood treed swamps, three clear-cut swamps, two shrub swamps), one (1) was a complex (comprised of mixedwood treed swamps, alder



swamp, clear-cut swamp, and graminoid bog), and one (1) was a marsh. An overview of the wetland characteristics is provided in Table 6-9 below.

Table 6-9 Wetland Characteristics

Wetland Number	Wetland Type	Wetland Size (m ²)	Water Flow Path	Landscape Position	Landform	SAR/SOCI Observed/ Habitat Potential
WL1	Mixedwood Treed Swamp	17,998	Throughflow via WC1	Lotic – stream Entrenched	Basin	Corrugated shingles lichen (<i>Fuscopannaria ahlneri</i> ; ACCDC S3)
WL2	Complex - Mixedwood Treed Swamp, Alder Swamp, Clear-cut Swamp, treed/shrub big, open bog, and disturbed cattail – dominated bog	46,055	Outflow via WC1	Terrene	Basin	Canada warbler (<i>Cardellina canadensis</i> ; SARA & COSEWIC Threatened, NSESA Endangered, ACCDC S3B), gray catbird (<i>Dumetella carolinensis</i> ; ACCDC S3B), ruby-crowned kinglet (<i>Regulus calendula</i> ; ACCDC S3S4B), gray jay (<i>Perisoreus canadensis</i> ; ACCDC S3), blackpoll warbler (<i>Dendroica striata</i> ; ACCDC S3S4B), yellow-bellied flycatcher (<i>Empidonax flaviventris</i> ; ACCDC S3S4B) observed. Suitable Canada warbler habitat observed.
WL3	Shrub Swamp	487	Isolated	Terrene	Basin	None
WL4	Open Water Marsh	319	Isolated	Terrene	Basin	None
WL5	Mixedwood Treed Swamp	105	Isolated	Terrene	Basin	None
WL6	Clear-cut Swamp	1,549	Isolated	Terrene	Sloped Basin	None
WL7	Clear-cut Swamp	709	Isolated	Terrene	Basin	None
WL8	Clear-cut Swamp	929	Isolated	Terrene	Basin	Suitable Canada warbler habitat observed
WL9	Shrub Swamp	249	Isolated	Terrene	Basin	None
WL10	Mixedwood Treed Swamp	1,448	Isolated	Terrene	Basin	Suitable Canada warbler habitat observed
WL11	Mixedwood Treed Swamp	25,117	Throughflow via Drainage	Terrene	Sloped Basin	Blue felt lichen (<i>Pectenium plumbea</i> [syn. <i>Degelia plumbea</i>]; SARA & COSEWIC Special Concern, NSESA Vulnerable, ACCDC S3) observed. Slender monk's hood lichen (<i>Hypogymnia vittata</i> ; ACCDC S3S4) observed. Ruby-crowned kinglet, pine siskin (<i>Carduelis pinus</i> ; ACCDC S2S3), Swainson's thrush (<i>Catharus ustulatus</i> ; ACCDC S3S4B), yellow-bellied flycatcher, and blackpoll warbler were observed.

There are no NSE wetlands of Special Significance located within the Study Area. The closest such wetland is located approximately 5.25 km north of the Study Area, on the shore of the Bras d'Or Lakes.

The Wetland Ecosystem Services Protocol (WESP) process calculates the overall scores for the seven wetland functional groups including a functional and benefit rating for five of the groups



(Hydrologic, Water Quality, Aquatic Support, Aquatic Habitat, and Terrestrial Habitat) and the benefit rating for the Wetland Condition and Wetland Risk functional groups.

Of the 11 wetlands evaluated the average function and benefit scores was Moderate. WESP guidance states that the most valuable wetlands are those that possess high function and benefit scores. Benefits relate to the perceived worth of the wetland function to societal needs. Three (3) of the 11 assessed wetlands scored High in both function and benefit in a single specific wetland function: WL 1 (pollinator habitat), WL 2 (songbird, raptor, and mammal habitat), and WL 11 (pollinator habitat); however, overall these wetlands did not significantly differ from others on the landscape.

Wetland condition refers to the integrity or health of a wetland defined by its vegetative composition and richness of native species. All wetlands scored either Moderate or Higher for wetland condition indicating that currently these wetlands support relatively healthy vegetative communities. Wetland 9 (WL9) scored lower in this category, likely due to the historical logging evident within its boundaries.

Wetland Risk takes sensitivity and stressors into account by averaging the two. Stress relates to the degree to which the wetland is or has recently been altered by humans in a way that degrades its exposure to multiple stressors. Wetlands scored either Moderate or Higher for wetland risk benefit, possibly due to their small size, proximity to roads, and general lack of connectivity to water. Small wetlands run the risk of drying up especially when they are not adjacent to a pond, stream, or other waterbody. Proximity to roads, even if they are unpaved, may introduce invasive species and/or human activities that may alter their functions.

In general, wetlands within the Study Area have similar functions to each other and those within this region of Nova Scotia; they are not unique in their functional roles as analyzed by WESP. There are historical disturbances evident within some wetlands, mostly from forestry practices; however, this has not affected wetland functions in a major capacity. Site preparation and operations could cause direct and indirect impacts to wetlands. Potential hydrological and water quality related direct impacts have the potential to occur in the proposed quarry footprint from the removal of wetlands through quarry development or from suspended sediment in runoff. In addition, due to the nature of activities associated with operations (i.e. presence of vehicles and construction equipment) all wetlands identified within the Project Site have the potential to be indirectly impact as a result of accidents and malfunctions.

Detailed methodologies, descriptions of the wetland types, and the grouped and specific wetland functional analysis are provided in Appendix E (Section 7.0).

6.5.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Surface water is considered from the perspective of water quality and quantity in relation to fish habitat. No potable surface water supplies were identified in relation to the Study Area. Low potential for fish habitat was identified within the vicinity of the Project Site. Suspended sediment and silt in site runoff is the main concern that could potentially cause adverse effects to the receiving environment.



Operations and maintenance activities related to access road maintenance and vegetation removal also have potential to affect surface water quality. No winter operations are planned so potential impacts from road salting are not an issue.

Wetlands will be removed in the course of the expansion of the quarry. No wetlands were identified to provide fish habitat within the confines of the Study Area. Wetland 1 (WL1) is the only wetland identified to contain a throughflow surface water feature (WC1); however, WC1 is entrenched within the wetland, and as such, any potential fish habitat is confined to the channel of the watercourse. Wetland 7 (WL7) will be removed as result of the quarry development. A small portion (0.5 ha) of Wetland 2 (WL2) will be disrupted to maximize the effective quarry development; however, the disruption is unlikely to the change the dynamic and function of this wetland in relation to its overall size.

Wetland alteration requires an NSE Permit through the regional office. A Wetland Alteration Permit application will be submitted to NSE and approval granted prior to commencement of any wetland alteration to support quarry expansion development. Compensation to offset lost wetland habitat will be provided as part of the Permit process.

Residual impacts on surface water resources and fish habitat are expected to be negligible.

Proposed Mitigation

Potential adverse impacts will be mitigated or avoided through adherence to best practices, meeting IA requirements, and applicable regulations and guidelines. Nova Construction will use their previous experience with the existing quarry and best management practices to manage surface water runoff at the site, including;

- The amount of exposed soil shall be kept to a minimum.
- Working areas are stabilized / graveled.
- Surface overflow which does not infiltrate the quarry floor shall be directed to the settling pond.
- Off-site surface water flows shall be directed around the site to minimize the amount of runoff passing over the site.
- If aggregate washings is required, all wash water systems shall be arranged in closed circuit.

Water quality will be maintained through the use of re-vegetated slopes, drainage ditches, and temporary settling ponds to capture and re-direct surface water. Drainage ditches and swales will be utilized to the greatest extent practicable to divert surface water, originating up-gradient of the property, around the quarry perimeter, thereby minimizing contact of water with the quarry floor and working faces. Settling ponds will capture surface flow and allow for suspended sediment to settle out of the water column. An outflow is constructed in the settling pond to allow treated water to return to the surrounding environment. Reclamation will proceed incrementally as operations continue. The reclamation program will include a management plan for water features left on-site to address quality and erosion and sediment control. Additional details on timelines and a formal reclamation plan will be developed as part of the IA Amendment process as guided by conditions of an EA approval.



For wetlands that will be disturbed in the expansion of the quarry, a Wetland Compensation Plan will be developed as required. Compensation plans will be filed with NSE as part of the IA process if the EA approval is granted.

During operations, when areas that are currently vegetated are disturbed, it will be particularly important to follow the NSE Sediment and Erosion Control Handbook techniques for ensuring there is no potential for impact to surface water quality. If a malfunction of sediment and erosion control measures is observed, then available on-site materials will be used to remedy the issue.

Monitoring and Follow-up

Due to the location of identified watercourses and surface water bodies in relation to the proposed expansion footprint, significant changes to the surface water quality is not anticipated as a result of components of the proposed Project. Surface water in the vicinity of the Project will be monitored according to terms and conditions identified in any IA issued and the Pit and Quarry Guidelines. It is anticipated that the current baseline sampling locations (SW-1, SW-2, SP-1) will be used for long term monitoring and additional monitoring stations will be added as applicable. Visual monitoring will be conducted through all phases of the Project on erosion and sedimentation control measures to identify any potential pathways to surface water bodies and wetlands. If pathways are identified, water samples will be collected and analyzed for Total Suspended Sediment (TSS) to ensure there are no impacts to the surface water quality and that no additional mitigative measures are needed.

Any additional wetland surveying, monitoring, or follow-up will be developed in accordance with all approvals issued in consultation with NSE.

6.6 Groundwater Resources

Groundwater is an integral part of the hydrologic cycle that originates from surface water (rain, snow) infiltration that fills voids (pores, cracks and joints) in the substrate (till and bedrock). The water table, the upper portion of the saturated zone, intersects the surface at streams, springs, and lakes. Given the distance from the nearest residents and the density of the near field use of groundwater, this VEC was chosen because of its relationship with the surface water conditions. Groundwater is assessed in the context of potential project related effects on quality and quantity.

6.6.1 Existing Environment

The Site is located in a remote, rural area which was found to contain a mosaic of disturbed and intact forest, with the disturbances primarily consisting of an aggregate quarry and forestry activities. The Project Area is covered by soils of the Thom (Tm) soil series, found to be generally moderate in richness and one major till type – bedrock, which supports forest vegetation where soil/subsoil veneer is deep enough to support it, but is of little use for crops (Grant, 1988). The Project Site features 11 wetlands as mapped in the field in July of 2019, and two watercourses (WC1 and WC2). The closest mapped waterbody to the Study Area is Mountain Lake, located approximately 175 m west of the Study Area boundary. The elevation range of the property is 150 to 175 masl and the expansion area ranges from 150 to 160 masl.

The current quarry floor has been established at about 125 masl throughout and will continue at this elevation in the expansion area. The quarry will occupy a footprint of approximately 10 ha. Processing including crushing, screening, and washing will be undertaken in the quarry and,



material stockpiles at the south end of the site. The extracted aggregate will continue to supply aggregate for road and local construction projects.

Hydrogeology

The local hydrogeological regime can be characterized as two separate systems with the degree of interaction between the two systems highly dependent on the topography and local geology. In the surficial materials, groundwater movement is between the individual soil grains and moves under gradients controlled by topography. In the deeper bedrock aquifers, groundwater flow is dependent upon the degree to which fractures and voids within the strata are connected and the hydraulic head differences between these openings. In some areas, the bedrock groundwater system will receive direct recharge from the surface system as water migrates downward.

Hydrogeologic characterization of Nova Scotia's Groundwater Regions (Kennedy, 2009) gives indication of the bedrock groundwater regions of Nova Scotia and the chemistry of wells throughout the province. The Study Area is located entirely within the River Tillard secondary watershed (1FH-2) and position within the western headwaters of the 1FH-2-B tertiary watershed, which discharges southeast to the Atlantic Ocean at St. Peter's Bay via River Tillard. Groundwater flow direction is generally in a southeast direction.

The Project area is covered by one major till type - bedrock (Figure 5), characterized as rock of various types and ages; glacially scoured basins and knobs, overlain by thin, discontinuous veneer of till. The Sporting Mountain Quarry is underlain by the Sporting Mountain Pluton (age ca. 620 Ma) which consists of granodiorite varying randomly to monzogranite and tonalite (Figure 6). The rocks are texturally homogeneous and medium grained. Major minerals are subhedral subporphyritic plagioclase, hornblende, and less abundant biotite in a groundmass of fine grained quartz and minor alkali feldspar.

Well Water Records

According to the Nova Scotia Well Logs Database most residential homes in the area have drilled wells for water supply; however, it is noted that no residences, thus no wells, are located within 1.2 km of the Project Site. There are only three (3) available water well records within 2 km of the Project Site. Six (6) additional water well records from wells drilled in the same bedrock geology (granodiorite) underlying the Sporting Mountain Quarry Project Site were also reviewed from the database, for a total of nine (9) well records reviewed. Appendix G provides an overview of the wells from the water well record database.

A municipal system exists in the Sampsonville area that services a number of homes. This system is heavily monitored for water quality and water levels and is a significant distance (6 km) from the Site.

One dug well record was reviewed. The well had a depth of 3.7 m and a reported static water level of 1.5 m. The source of groundwater in the dug well is the overburden so the Sporting Mountain quarry is not likely to affect dug wells.

Well records for eight (8) drilled wells indicate depth to bedrock ranges from 5.5 m to 32.3 m. The well depths range from 24.1 m to 43.3 m, and average 33.6 m deep. Numerous lithologies are noted



on the well records, including clay, gravel, sandstone, shale, and granite. The well yield of the drilled wells varies from 22.7 L/min to 378.5 L/min.

The Nova Scotia Groundwater Observation Well Network was established in 1965 and has installed observation wells to monitor groundwater quality and quantity in different communities across Nova Scotia. Monitoring well “St. Peter’s 085” is the closest observation well (7.5 km SE) to the site; however, since the geology at the observation well is Cumberland group – conglomerate it does not provide any correlation to the site geology and thus is not used in any comparative analysis. There are no wells that can be considered as a surrogate for the groundwater regime as compared to the Study Area.

Seawater Intrusion Potential

Seawater (or saltwater) intrusion (SWI) is the movement of seawater (saline) into a freshwater aquifer. Under normal conditions, fresh water flows from inland aquifers and recharge areas, such as the quarry location, to coastal discharge areas due to the difference in elevation of “upland” areas and the lower coastline. Seawater intrusion is common and affects many coastal communities. This natural movement of freshwater towards the ocean prevents saline water from entering freshwater coastal aquifers (Barlow, 2003). Freshwater is less dense than seawater so it will float on top, forming a lens. The boundary between salt water and fresh water is not distinct; the zone of dispersion, transition zone, or seawater interface is brackish with salt water and fresh water mixing. In fractured bedrock, such as at the Site, the interface is even more irregular and mainly dependent on fracture orientation and depth.

Groundwater extraction causes a lowering of water levels which draws the seawater – freshwater interface inland and potentially impacts near coast drinking water wells. SWI is also influenced by factors such as tidal fluctuations, long-term climate and sea level changes, fractures in coastal rock formations and seasonal changes in evaporation and recharge rates.

Nova Scotia receives abundant precipitation (~1535 mm/year at Baddeck, NS – Weather Station ID 8200300), and projections indicate that this may increase with the effects of climate change. Groundwater resources are not overly susceptible to seawater intrusion in Nova Scotia. Glacial till is present either near or at the surface in most areas of the province. The relatively low permeability of this material increases the slope of the water table, thus forcing the freshwater-seawater interface further seaward (Ferguson and Beebe, 2013).

The model of vulnerability developed by the Province provides a snapshot of areas that may be at risk to seawater intrusion; however, the results of the model in some areas may be difficult to characterize due to the lack of available well water chemistry and water level monitoring data relative to the extent of unserviced coastline (Kennedy, 2012).

The provincial SWI vulnerability model was developed on a 250 m grid and based on several input layers and rankings: distance to coastline, slopes calculated from the 20 m elevation, civic address (residential) locations, large groundwater users, and water level elevation relative to mean sea level (Kennedy, 2012).

In the area of the Project Site at Sporting Mountain, the model does not provide a result; however, given that the site is: 1) approximately 150 masl elevation; 2) the quarry floor will be a maximum depth of 25 m; 3) it is more than 5 km from the coast, and; 4) the site will not extract water for its



operation, it is unlikely that seawater intrusion in wells at the coast would be a result of quarrying activities.

Groundwater Quality

The “Arsenic in Well Water Risk Map” (Interprovincial Arsenic Working Group, 2005) indicates that all of Nova Scotia is likely or very likely to have a risk of arsenic in groundwater wells, and the Sporting Mountain (Seaview, St. Peter’s) area is indicated as low risk of arsenic in well water (drilled wells) (Kennedy and Drage, 2017).

Summary

Because of the vertical separation between the proposed quarry and the private wells drilled into the bedrock and the typically low hydraulic conductivity of the bedrock there is limited potential for quarry activities to impact the private wells.

6.6.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Potential impacts to water wells from expanded quarry operations are generally a function of the quarry development plans, distance from the quarry, location of a well with respect to groundwater flow directions, and individual well construction details (dug vs. drilled). Potential impacts from an extraction operation may include water quality deterioration of down-gradient wells from surface runoff and/or accidental releases of deleterious substances, such as petroleum, oil or lubricants (POL) within quarry area.

No interactions are anticipated with groundwater resources from construction and operation of the Project. The quarry floor will be maintained at a minimum 1.0 m above the groundwater table. There are no residential wells within 1.2 km of the Project Site. Given the distance to wells, no impacts are anticipated. There is no predicted impact from the quarry operation on the Sampsonville system based on differing geology, distance from the site, and differing watersheds

Proposed Mitigation

Lowering of the groundwater table and decreasing well yield is not expected (either temporary or permanent). Any surface water resulting from precipitation or snowmelt events will be controlled by means of quarry floor grading, berms, and ditching and will contribute to groundwater recharge at this elevation.

Effects to the groundwater quality as a result of construction, operation and reclamation of the expanded quarry will be limited in extent. The key sensitive receptor is the closest residential well located approximately 1.5 km from the planned maximum extent of the expanded quarry boundary, as such no impacts to groundwater are anticipated. Any release of POL will be dealt with effectively and immediately removing the impacted sediments and disposing of in an approved manner and in accordance with provincial legislation.

Nova Construction will use best practices and past experience with the quarry to manage groundwater resources at the site. Proper fueling procedures shall be followed, and fueling shall



occur in designated areas, away from potential water receptors. Spill kits shall be maintained on-site while the site is operational in the event of an accidental spill or release.

Monitoring and Follow-up

Monitoring wells may be installed and monitored at the frequency required by conditions of any environmental approval or IA, as necessary.

Water quantity impacts are not predicted for domestic wells. Nova Construction will maintain a clear line of communication through their Project Manager for any complaints related to domestic wells, to be recorded and evaluated in accordance with legislation and NSE specific requirements.

6.7 Habitat Assessment

Habitat is considered a VC because of its contribution to regional biodiversity and potential interactions between project activities and the physical terrestrial environment.

The field components of the biophysical field programs took place between spring and fall 2019, and were completed in accordance with the requirements for a Class I undertaking under Section 9(1) of the *Nova Scotia Environmental Assessment Regulations*. These studies were aimed at highlighting the ecological linkages within the Study Area, as well as with the habitats surrounding the Area. This work included:

1. Botanical Surveys (Summer and Fall 2019)
2. Lynx Surveys (Spring and Fall 2019)
3. Avian Surveys
 - (1) Spring migration (Spring 2019)
 - (2) Breeding bird (Early summer 2019)
 - (3) Fall migration (Fall 2019)
 - (4) Common nighthawk (Early summer 2019)
4. Wetland and Watercourse Evaluations (Summer and Winter 2019)
5. Habitat Surveys (Summer 2019)
6. Species at Risk Surveys (Spring and Summer 2019)

A desktop review was conducted in July 2019 using the available GIS forestry (NSDNR, 2016) and wetland inventory layers (NSE, 2017). Habitat survey routes were created to cover all major forest cover types within the Study Area. A desktop review of the Ecological Land Classification database (NSDNR, 2015) was assessed prior to field surveys in order to understand ecosystem types in the Study Area.

Field surveys were completed in spring and fall 2019 (habitat field surveys were completed in July 2019). The surveys followed meandering transects within the Study Area, and habitat types were surveyed whenever noticeable habitat changes occurred. The surveyed locations are referred to as habitat assessment points (HAP). The habitat survey focused on assessing upland habitats, as detailed assessments of wetland habitat within the Study Area were survey during the wetland



assessments and information regarding stand type and vegetative community structure in these features were documented.

Vegetation Types (VTs) and ecosite types were recorded at each survey location as per the Forest Ecosystem Classification for Nova Scotia (FEC) guide (Neily et al., 2010) to identify the Ecosite and vegetation type for each habitat survey location. Further, approximate stand age and natural or anthropogenic disturbance was recorded at each location.

The habitat survey methods are presented with the acknowledgement of three biases built into the survey methods; bias towards upland habitats; forested landscape as opposed to non-forested landscapes; and, bias that habitat surveys were completed at discrete points and no effort was made to delineate the extent of that habitat type around those points. Further discussions of bias are summarized in Appendix E.

6.7.1 Existing Environment

The Study Area is located within the Cape Breton Hills Ecodistrict within the Nova Scotia Uplands ecoregion (NSDNR, 2010). The Cape Breton Hills Ecodistrict often has steep sloped hills, and can be found at 150 – 300 masl (NSDNR, 2010).

The Ecodistrict has well drained moderately coarse textured soils. Low lying areas in the Ecodistrict tend to have imperfectly drained, fine textured tills that are often nutrient rich and provide suitable habitat for vascular flora rarities. Within the Ecodistrict in lower elevations, karst topography exists which gives rise to calcium rich soil, often good habitat for vascular flora rarities. The Cape Breton Hills Ecodistrict is primarily tolerant hardwood forests with scattered softwood species (NSDNR, 2010).

Study Area investigated for the quarry expansion was found to contain a mosaic of disturbed and intact forest, with areas consisting primarily of the spruce hemlock forest group. The majority of the Study Area is disturbed by the existing quarry and timber clear-cuts, while the remainder consists of both regenerative and mature hardwood, softwood, and mixed wood canopies. The most prevalent VTs out of the HAPs surveyed is the Balsam Fir (*Abies balsamea*) / wood fern / Schreber's moss and the Red Spruce (*Picea rubens*) – balsam fir / Schreber's moss, both belonging to the spruce hemlock forest group. This group is a conifer dominant vegetative community which is typically indicative of soils of poor to medium nutrient regimes. The soils in the area were found to be generally moderate in richness.

A total of 11 wetlands and two (2) watercourses were identified within the Study Area. Wetlands habitats within the Study Area primarily consisted of treed swamps, consisting of trademark swamp species such as three-seeded sedge (*Carex tirsperma*), three-leaved Solomon's seal (*Maianthemum trifolium*), red maple and balsam fir, and have the highest potential for vascular rarities; however, there were no indication or observations of vascular rarities within the sites assessed during field surveys. The presence of disturbance and lack of relatively rich soils is likely a contributor to the lack of rare vascular plant species.

Fragmented habitats allow for weedy exotics, other non-invasive species and grass species to grow in edge habitats and trails. Exotic species were observed in the disturbed locations throughout the Study Area. Several priority lichen species were observed within the Study Area including two SAR



(Blue Felt Lichen (*Pectenium plumbeum*) and Frosted Glass-Whiskers (*Sclerophora peronella*) and four (4) SOCI.

6.7.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Habitat and wildlife species observed within and adjacent to the Study Area are consistent with conditions present in the adjacent regional landscape. The area proposed for impact is not unique within the landscape, and no unique habitat required to support species life cycle were identified during the Study. Therefore, the proposed quarry expansion is expected to impact localized habitat, and negligible impacts to the regional context are expected.

Localized impacts will occur in the footprint of the Project Site for the quarry expansion, where existing habitat will be eliminated through clearing and grubbing of approximately 6 ha, and available terrestrial habitat in the footprint will be reduced. Whereas terrestrial habitat is disturbed and fragmented in the existing environment and unique habitats were not observed in the Study Area, and in that habitat and species within and adjacent to the Study Area are consistent with the regional landscape; impacts to localized habitat are anticipated to be minor with the appropriate mitigation applied. A specific group of individuals within an ecosystem will be affected for generally less than one generation with respect to the relocation of fauna to adjacent habitat and progressive reclamation methods involving revegetation with endemic species.

Proposed Mitigation

Reclamation, both progressive and final, will see habitat reasonably restored to pre-existing conditions. As abandoned areas are progressively recovered and revegetated, areas proceeding through early forest succession will provide habitat for an intermediate diversity of species which will continue to diversify to similar distributions as existing conditions described throughout Section 6 of this report. Mitigation measures to reduce impacts on specific species, such as project planning to avoid critical breeding periods, are also detailed throughout Section 6.

Monitoring and Follow-up

The final phase of the Project will be to return the area to a condition that is consistent with the natural surroundings and reasonably restored to pre-existing conditions, thus restoring habitat. The reclamation plan, including any additional habitat surveying, monitoring, or follow-up, will be developed in accordance with the Pit and Quarry Guidelines, IA process, and with any NSE granted approvals.

6.8 Vegetation

The presence of rare flora may be indicative of rare habitats which may support unusual assemblages of plants and animals. For the purpose of this Study, vascular plant surveys aimed at assessing all major habitat types to create a species list of the general vascular species and communities present within the Study Area. Meandering transects of all major habitats were assessed to create a species list of the vascular species and communities present within the Study Area. Surveys were focused on wetlands and floodplain habitats, as these habitats often have an increased potential for rarities due to richer conditions.



Vascular plant surveys took place in early summer and fall on June 24 and September 6, 2019. A detailed desktop review of known flora observations and potential habitat for rare lichens was conducted prior to field assessments.

6.8.1 Existing Environment

As previously described in Section 6.7, the Study Area is a mosaic of disturbed and intact forests, with areas consisting primarily of the spruce hemlock forest group. The majority of the Study Area is forested, with disturbances consisting of an aggregate quarry and timber clear-cuts. In total, 175 vascular plant species were identified within the Study Area during the summer and fall surveys, with no priority vascular plant species identified.

The Study Area was surveyed for priority species during the field assessments in the spring and summer of 2019. No SAR or SOCI vascular plants were observed during the field surveys.

6.8.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Project related effects on vegetation are limited due to the fact that the vast majority of the proposed Study Area has already been disturbed through the operation of an aggregate quarry and historical forestry activities. Any disturbance related to Project activities, such as increased land clearing, is deemed minor in considering that by means of progressive reclamation, a specific group of individuals within a localized area will be affected for less than one decade when factoring in intermittent restoration methods involving revegetation with endemic species.

Proposed Mitigation

Site reclamation will return the area to a condition that is consistent with the natural surroundings. An appropriate combination of two types of reclamation will be completed - progressive (during operations on stable areas that are no longer required for aggregate production) and final reclamation (after the cessation of extraction and related activities when aggregate reserves have been exhausted). A final reclamation plan will be developed in line with the Pit and Quarry Guidelines, and will be in accordance with any Approvals or Permits granted by NSE.

The goal of reclamation is to produce a landscape that is safe, stable and compatible with the surrounding landscape and final land use. This is generally achieved by grading, contouring, capping with soil, revegetating, and time. A mix of native species of plants is recommended for revegetation efforts during the site reclamation process. Nova will stockpile available grubblings for use in final cover to create a diverse landscape in line with that represented locally. Progressive reclamation is understood as an integral part of project planning.

Monitoring and Follow-up

The final reclamation phase of the Project will return the area to a condition that is consistent with the natural surroundings and reasonably restored to pre-existing conditions, thus restoring vegetation. The reclamation plan will include any additional vegetation surveying, monitoring, or follow-up required.



6.9 Lichens

Prior to undertaking the field assessment, a detailed desktop review of known lichen observations and potential habitat for rare lichens within the Study Area was conducted. The desktop review process involved five components: a review of the ACCDC database results; the NSDNR predictive habitat mapping for Boreal Felt Lichen (*Erioderma pedicellatum*); the Mersey Tobeatic Research Institute (MTRI) vole ears (*Erioderma mollissimum*) and extant Boreal Felt Lichen (BFL) populations GIS databases, and the priority species list.

All suitable habitats within the Study Area were completed on June 24 and September 6, 2019. Mature trees that are appropriate for hosting priority lichen species were visually inspected by focused on tree trunks, branches, and twigs. BFL habitat polygons were visited to determine BFL presence and/or habitat suitability. The following information was collected for any priority lichen species identified during field surveys; site location, date, scientific name, count, size, habitat (substrate, general habitat), location, photograph and other relevant comments. Only priority lichen species were recorded during field surveys.

6.9.1 Existing Environment

The ACCDC report identified two priority lichen species within 5 km of the Study Area: Fringe Lichen (*Heterodermia neglecta*) and Corrugated Shingles Lichen (*Fuscopannaria ahlneri*). One BFL predictive habitat polygon was determined to be within the Study Area; however, according to the MTRI databases, no extant BFL populations are within 20 km and no Vole Ears lichens are within 120 km of the Study Area.

A total of six priority lichen species were observed within the Study Area, which included two SAR; Blue Felt Lichen (*Pectenium plumbeum*), Frosted Glass-whiskers (*Scelopora peronella*) and four SOCI; Fringe Lichen (*Heterodermia neglecta*), Powdered Fringe Lichen (*H. speciose*), Slender Monk's Hood Lichen (*Hypogymnia vittata*), and Corrugated Shingles Lichen (*Fuscopannaria cf. ahlneri*). No BFL (*Erioderma pedicellatum*) were observed during the field surveys.

One BFL habitat polygon was identified within the Study Area during the desktop review; however, it was determined to be unsuitable habitat as the area is currently a clear-cut. There was some indication of BFL habitat within the Study Area by the presence of indicator species; however, the proximity to clear cutting activities make the likelihood of BFL presence low.

The Study Area consists of disturbed, fragmented habitats with scattered intact mature forested wetlands and uplands. Forested swamps with mature hardwoods and softwoods, particularly canopies with balsam fir and red maple are suitable tree species and habitat for many priority lichen species such as Blue Felt Lichen and Frosted Glass-whiskers.

Additional information regarding the lichen Priority Species is provided in Section 6.12.

6.9.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Localized impacts to lichens within the expanded quarry site will occur due to land clearing and excavation. Effects are considered minor with the appropriate mitigation applied as a small, specific



group of individuals within an ecosystem would be affected, and mitigation measures such as management plans or transplantation and monitoring activities and studies will be applied.

Proposed Mitigation

Where disturbance of lichens is not avoidable with respect to extraction areas consultation with NSDL&F and NSE will take place regarding potential mitigation options such as management plans or transplantation and monitoring activities and studies.

The mitigation measures chosen will be consistent with the best available information included in any recovery strategy, action plan, or management plan, and will take into consideration the terms and conditions of the SARA regarding protection of individuals, residence, and critical habitat of all identified Priority Species.

Monitoring and Follow-up

The final reclamation phase of the Project will return the area to a condition that is consistent with the natural surroundings and reasonably restored to pre-existing conditions, thus restoring vegetation and its habitat. The reclamation plan will include any additional lichen surveys, monitoring, or follow-up required, developed in consultation with and approved by NSDL&F and NSE.

6.10 Wildlife

Wildlife including mammals, herpetofauna, and other priority species, in this survey are considered a VEC due to their role in biodiversity and ecological integrity. Many faunal species are protected under the *Nova Scotia Wildlife Act* (1989) or the *Migratory Bird Convention Act* (MBCA) (1994). In Nova Scotia, a species is considered rare when it is listed as rare or sensitive to anthropogenic disturbance by the province (NSDNR General Status Ranks of Wild Species or the NSESA), or listed nationally by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or *Species at Risk Act* (SARA). The details of the wildlife assessments, including methodologies, are provided in Appendix E (Section 4.0).

The GIS forestry database was used to determine the forest cover types within and surrounding the Study Area. The Canada lynx range and the lynx buffer Special Management Practice (SMP) zone layers were used on the NS Provincial Landscape Viewer to determine if Canada lynx (*Lynx Canadensis*) buffers were within and/or in close proximity to the Study Area. Based on habitat survey results, transects were placed within and surrounding the Study Area, focusing on land with habitat potential for lynx prey (i.e. snowshoe hare, American red squirrel).

Canada lynx surveys took place on March 7 and May 5, 2019. All wildlife sightings, tracks, and scat were recorded during the surveys. Any lynx scat or tracks were georeferenced, photographed, and the surrounding habitat was described. Potential signs of lynx were verified through consulting appropriate literature and/or contacting wildlife biologist from NSDNR. Further, all incidental wildlife was recorded during all field surveys completed.

Incidental observations of terrestrial fauna were documented during field surveys across the Study Area. Specific focus was given to searching for signs of Priority Species (i.e. Canada lynx), as the Study Area was confirmed to be within the Canada lynx range and within the lynx buffer SMP zones.



A desktop review for known bat hibernaculum nearby and within the Study Area was completed. The Nova Scotia Department of Energy and Mines records of abandoned mine openings (AMOs) were reviewed, as AMOs that are uncapped and unflooded may provide bat hibernacula.

6.10.1 Existing Environment

Habitat within the Study Area for the expanded quarry operations was found to contain a mosaic of disturbed and intact forest. Disturbances were largely related to human activity, including an aggregate quarry and forestry activities. The remainder of the Study Area consists of both regenerative and mature hardwoods, softwood and mixed wood canopies. Soils in the area were found to be generally moderate in richness.

Active quarry and timber clear-cut clearings do not provide ideal wildlife corridors (i.e. Canada lynx). Varied tree-age stands may provide some suitable habitat in the northern Study Area; however, a logging road is present, likely provides access to competitor species such as coyotes and bobcats.

Habitat within the Study Area is suitable for those wild species that thrive in fragmented, diverse landscapes, such as White-tailed Deer, Coyote, and Snowshoe Hare. This fragmented diverse landscape provides edge habitat for foraging and patches of full canopy coverage for refuge and cover through all seasons. Wildlife habitat observed was neither unique nor rare in the local or regional landscape context.

The ACCDC report states that there are known bat hibernaculum present within 5 km of the Study Area; however, bat hibernaculum were not observed in the field. No known critical habitat for little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*) and tri-colored bat (*Perimyotis subflavus*) are within 20 km of the Study Area (EC, 2015). The NSDNR records of AMOs were reviewed, and indicated that there are no AMOs located within the Study Area, therefore there is no potential for bats to be using uncapped and unflooded AMOs as hibernacula.

A total of six mammal species were observed, or signs of their presence (scat, tracks, etc.) were observed, during field surveys: Canada lynx (*Lynx canadensis*), Snowshoe hare (*Lepus americanus*), American red squirrel (*Tamiasciurus hudsonicus*), Short-tailed weasel (*Mustela ermine*), White-tailed deer (*Odocoileus virginianus*), and Coyote (*Canis latrans*). The Canada lynx (*Lynx canadensis*, COSEWIC Not at Risk; NSESA Endangered; S1) was the only Priority Species identified.

Optimal habitat for deer species occurs within young forest stands, cut blocks and riparian and shoreline areas and within drainage systems within the Study Area. White-tailed deer forage on grasses, forbs, and shrubby browse, and require large amounts of easily digested food.

It is expected that common carnivore/omnivore species such as Raccoon (*Procyon lotor*), Bobcat (*Lynx rufus*), American Mink (*Mustela vison*), and Striped Skunk (*Mephitis mephitis*) may inhabit the Study Area or surrounding areas, at least periodically, however, they were not observed during the field surveys.

Within the Study Area, confirmed and potential evidence (both scat and tracks) within and beyond the Study Area, were observed during the winter or spring surveys. Canada lynx habitat and their prey's habitat are both present within the northern section of the Study Area, although in small, lower quality patches. Given the poor-quality prey habitat, deterring qualities of the current quarry, and



access to the area by competitor species, the Study Area does not present high quality habitat for Canada lynx. Details of the dedicated Canada Lynx surveys are provided in Appendix E (Section 4.0).

6.10.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Project-related effects on fauna and habitat are limited due to the fact that the vast majority of the proposed area has already been disturbed through forestry activities. Loss of habitat will occur in the extraction area, but will have minimal impact due to the availability of similar replacement habitat in the general area.

Habitat and wildlife species observed within and adjacent to the Study Area are consistent with conditions present in the adjacent regional landscape.

Increased vehicle and heavy equipment traffic during all phases of the Project may result in collisions with terrestrial wildlife. Collisions, should they occur, will be infrequent and will not have a significant effect on population levels.

The area proposed for impact is not unique within the landscape, and therefore no unique habitats required to support species life cycle were identified during the Study. As such, the proposed expansion of the quarry is anticipated to impact localized habitat at a minor level with the appropriate mitigation applied, and negligible impacts may potentially occur in the regional context.

Proposed Mitigation

Proposed mitigation measures for all project phases include:

- Minimize the Project footprint to the absolute necessary delineation
- Clearing of vegetation and overburden will be restricted to areas absolutely necessary to carry out the Project
- Implement erosion and sediment control measures, and dust prevention / abatement measures
- Good housekeeping practices (no food waste or garbage left exposed to attract animals)
- When not in use, machinery and light vehicles shall not be left idle so as to reduce emissions and noise
- Lighting, when required, should be shielded to shine down and only to where it is needed without compromising the safety of employees
- Standard mitigation measures for noise (including blasting)
- Reclamation of disturbed areas through progressive reclamation
- Avoidance of disturbance to Canada lynx dens during denning in line with the Monitoring Plan noted below

Monitoring and Follow-up

Nova Construction in consultation with NSDL&F will develop a site specific monitoring program to identify lynx denning areas in the area within and adjacent to the proposed expansion. Project



personnel will report any evidence of Canada lynx to NSDL&F. Regular site monitoring will be required to ensure nothing is left to attract terrestrial fauna. The final reclamation phase of the Project will return the area to a condition that is consistent with the natural surroundings and reasonably restored to pre-existing conditions, thus restoring habitat temporarily disturbed by the Project. The reclamation plan will include any additional wildlife surveying, monitoring, or follow-up, as required.

6.11 Birds

In Nova Scotia, legislation protecting birds includes the *Migratory Birds Convention Act* (MBCA) and the *Nova Scotia Wildlife Act*. The MBCA protects migratory birds and their nests. Most bird species present in Nova Scotia are listed under the MBCA; however, it does not include avian predators such as raptors and introduced species such as European starlings (*Sturnus vulgaris*). The *Nova Scotia Wildlife Act* specifically protects raptors including eagles, ospreys, falcons, hawks, and owls.

A review of the Canada Important Bird Areas (IBA) database, ACCDC, Maritime Breeding Bird Atlas (MBBA) Square (20PR55), old forest GIS database, and Canada Wildlife Service Migratory Bird Sanctuary (MBS) was reviewed to support bird survey design and methodology. ACCDC further categorizes bird species using breeding bird status qualifiers that determine whether a species is a Priority Species, based on the time of year in which the species was observed.

The following surveys were completed:

- Spring migration (Spring 2019)
- Breeding bird (Early summer 2019)
- Fall migration (Fall 2019)
- Common nighthawk (Early summer 2019)

Surveys took place at 11 point count (PC) locations within and surrounding the Study Area in a variety of habitats including closed canopy forests, mature hardwoods, wetlands and open areas [Appendix E (Figure 4)]. During each survey, weather conditions (i.e. precipitation and visibility) were monitored and bird observations were recorded at four distance regimes: within a 50 m radius, 50 to 100 m radius, outside of the 100 m radius, and flyovers.

Bird species were identified based on functional bird groups to understand how each group of birds is using the Study Area. These functional groups [detailed in Appendix E (Section 5.1)] include:

1. Waterfowl
2. Shorebirds
3. Other waterbirds
4. Diurnal Raptors
5. Nocturnal Raptors
6. Passerines
7. Other land birds



Appendix E (Section 5.0) provides details on the bird survey methodologies, location summaries, and species lists.

6.11.1 Existing Environment

The nearest Important Bird Area (IBA) is the Basque Islands and Michaud Point (IBA NS045), located approximately 35 km southeast of the Study Area (Bird Studies Canada, 2012). The IBA lies 1.5 to 3 km east of the southern tip of Point Michaud, on the southern coast of Cape Breton Island. The climate of this region is typical of the Maritimes, mild, damp, and foggy weather for a lot of the year. The tidal range is about 3 – 4 m.

The habitats provided within this IBA are not consistent with habitat present within the Study Area. The IBA contains small, rocky islands with gravel and sand beaches and hosts nesting cormorants. No cormorants were observed in the Study Area, nor was their nesting habitat present.

The closest MBS is Big Glace Bay Lake Migratory Bird Sanctuary, located approximately 140 km northeast of the Study Area. This MBS is located on a lake containing salt marshes and intertidal flats. The habitats provided within this MBS are not consistent with habitat present within the Study Area.

The Study Area falls within primarily tolerant hardwood forests with scattered softwood species (NSDNR, 2010). The Study Area contains a mosaic of disturbed and intact forest, with the disturbances primarily consisting of an aggregate quarry and forestry activities. Habitat fragmentation currently on the landscape may have decreased habitat quality for avian species that rely on interior forest conditions. Further, the habitats within the Study Area were not found to significantly concentrate foraging activities.

There are no significant water bodies within the Study Area that would attract large flocks of migrating birds, with the nearest waterbodies Mountain Lake and Hill Lake are 175 m and 1.5 km west of the Study Area, respectively. The proposed Study Area for the expansion of the quarry is also not located along a ridge, valley, or coastline, and therefore not a significant migratory bird pathway.

The ACCDC database identified seven avian SAR species within 5 km of the Study Area. These results are discussed further in Section 6.12.

6.11.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

Potential effects to migratory birds include direct habitat loss or nest disturbance through clearance and maintenance as well as indirect disturbance to their habitat such as noise, changes to the local environment or habitat fragmentation. The attraction of ground nesting birds may occur through unsuitable waste management and unattended or unvegetated stockpiles of material left during the breeding season.

Most migratory bird species construct nests in trees and shrubs, but several species nest at ground level (e.g. Common Nighthawk). Some bird species may nest on cliffs or in stockpiles of overburden material in the banks of quarries. Some migratory birds (including certain waterfowl species) may nest in settling ponds if they are large enough and remain undisturbed for a period of time.



Negligible effects on birds from project activities are anticipated with standard mitigation applied.

Mitigation

Measures that will be utilized to mitigate potential impacts to birds include:

- Clearing activities will occur outside of the nesting season (April 1 to August 15) or as determined by regulators.
- If clearing is required during the nesting time frame, ECCC will be consulted for appropriate protocol, which likely would involve pre-construction nest surveys and the requirement to leave barriers around nests, if identified.
- Stockpiles will be examined during the nesting season to ensure that ground-nesting birds are not present, and disturbance avoided until after the nesting season.
- No one shall disturb, move or destroy migratory bird nests. If a nest or young birds are encountered, work shall cease in the immediate area of the nest and Nova Scotia Lands and Forestry (NSDL&F) contacted.

Monitoring and Follow-up

If priority birds are located within the Project footprint of the proposed expanded quarry and would potentially be impacted during the construction, operation, or reclamation phases of the Project, a management plan will be created in discussion with NSDL&F and if necessary, such species would be avoided.

6.12 Priority Species

The list of Priority Species was developed by first identifying broad geographic general habitat areas, and then identifying specific habitat requirements for each species and isolating those found within the Study Area.

A desktop priority species list was created to inform biophysical field programs by identifying species that have the potential to be present within the Study Area. Databases provided by MTRI were assessed to identify the potential for priority lichen species including Vole Ears and BFL. The provincial records of AMOs were also reviewed as AMOs that are uncapped and unflooded may provide bat hibernacula. Further, the NSDL&F significant species and habitats database was reviewed.

An in-text shortlist was created using the Priority Species List and the ACCDC report to outline those SAR with the highest potential of occurring within the Study Area, based on habitat. The ACCDC report is provided in Appendix E.

Targeted priority species surveys, included lichens, vascular plants, and Canada lynx surveys. Botanical surveys took place in the spring and summer of 2019, while Canada lynx surveys took place on March 7, May 5, and November 28, 2019. Incidental priority species were also noted during all field surveys.

Appendix E (Section 8.0) provides further information, assessment lists, and species locations related to Priority Species surveys conducted in the Study Area.



6.12.1 Existing Environment

The ACCDC report completed as part of the desktop review identified the following records of SAR, SOCI, and Special Areas within 5 km of the Study Area; 2 records of 2 non vascular flora, and 64 records of 26 vertebrates. Of the ACCDC records, seven SAR were determined to have the highest potential of occurring within the Study Area; Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Canada Warbler (*Cardellina canadensis*), Eastern Wood-pewee (*Contopus virens*), Olive-sided flycatcher (*Contopus cooperi*), Rusty blackbird (*Euphagus carolinus*), and Canada lynx (*Lynx Canadensis*).

Priority species were observed during targeted surveys and incidentally during other field surveys. In total, no vascular plant priority species, six lichen priority species, 17 avian priority species, and one mammalian priority species were observed or in evidence. These include the following:

- Blue Felt Lichen (*Pectenia plumbea*; SARA Special Concern; COSEWIC Special Concern; NSESA Vulnerable; S3)
- Frosted Glass-Whiskers Lichen (*Sclerophora peronella*)
- Fringe Lichen (*Heterodermia neglecta*; ACCDC S3S4)
- Powdered Fringe Lichen (*Heterodermia speciose*; ACCDC S3)
- Slender Monk's Hood Lichen (*Hypogymnia vittata*; ACCDC S3S4)
- Corrugated Shingles Lichen (*Fuscopannaria cf. ahlneri*; ACCDC S3)
- Canada lynx (*Lynx Canadensis*; NSESA Endangered; S1)
- Barn Swallow (*Hirundo rustica*; SARA Threatened; COSEWIC Threatened; NSESA Endangered; S2S3B)
- Canada Warbler (*Cardellina canadensis*; SARA Threatened; COSEWIC Threatened; NSESA Endangered; S3B)
- Northern Goshawk (*Accipiter gentilis*; S3S4)
- Spotted Sandpiper (*Actitis macularius*; S3S4B)
- Pine Siskin (*Carduelis pinus*; S2S3)
- Swainson's Thrush (*Catharus ustulatus*; S3S4B)
- Bay-breasted Warbler (*Dendroica castanea*; S3S4B)
- Blackpoll Warbler (*Dendroica striata*; S3S4B)
- Gray Catbird (*Dumetella carolinensis*; S3B)
- Yellow-bellied Flycatcher (*Empidonax flaviventris*; S3S4B)
- American Kestrel (*Falco sparverius*; S3B)
- Fox Sparrow (*Passerella iliaca*; S3S4B)
- Gray jay (*Perisoreus canadensis*; S3)
- Pine Grosbeak (*Pinicola enucleator*; S2S3B, S5N)



- Boreal Chickadee (*Poecile hudsonica*; S3)
- Ruby-crowned Kinglet (*Regulus calendula*; S3S4B)
- Red-breasted Nuthatch (*Sitta Canadensis*; S3)

A number of the species are considered “location sensitive” by the NSDNR. A bat hibernaculum was identified to be within 5 km of the Study Area; however, the exact location of this feature was not provided.

The following sections outline the presence and absence of species from the above list based on field surveys that are detailed throughout Section 6 and in Appendix E.

6.12.1.1 Flora

During field studies, no SAR or SOCI vascular plants were observed. The disturbance and fragmentation in the local landscape likely contributes to the lack of vascular rarities, despite a higher nutrient observed at one of the HAP (HAP5) during habitat assessment field surveys.

6.12.1.2 Mammals

Canada lynx

Dedicated fauna surveys led to the identification of Canada lynx (*Lynx canadensis*: NSESA Endangered, ACCDC S1) confirmed and potential evidence (both scat and tracks) within and beyond the Study Area.

The Canada lynx field surveys focused on assessing the presence or absence of lynx prey species habitat, i.e. snowshoe hare (primary prey) and American red squirrel (alternate prey). Lynx habitat and their prey’s habitat are both present within the northern section of the Study Area, in small lower quality patches.

No lynx signs have been documented within the proposed expanded quarry development area or within the active quarry footprint. Given the poor-quality prey habitat, deterring qualities of the current quarry, and access to the area by competitor species, the Study Area does not present high quality habitat for Canada lynx. Furthermore, the existing quarry operations likely act as a deterrent to Canada lynx use of the area. See Appendix E (Section 8.2) for a detailed account of Canada lynx survey observations.

Bats

The ACCDC report states that there are known bat hibernaculum present within 5 km of the Study Area; however, bat hibernaculum were not observed in the field. No known critical habitat for little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*) and tri-colored bat (*Perimyotis subflavus*) are within 20 km of the Study Area (Environment Canada (EC), 2015).

The Study Area may provide roosting and foraging habitat for various bat species. Treed, forested habitat within the Study Area may provide roosting habitat, especially where there are increased snags and foraging habitat with a relatively closed canopy (Barclay and Kurta, 2007; EC, 2015; Jung et al., 1999). This type of habitat can be found in the northern section of the Study Area beyond the proposed quarry expansion area.



The NSDNR records of AMOs were reviewed, and indicated that there are no AMOs located within the Study Area, therefore there is no potential for bats to be using uncapped and unflooded AMOs as hibernacula.

6.12.1.3 Avifauna

ACCDC findings confirm the presence of several priority species in proximity to the Study Area. A short list was created using the priority species list and the ACCDC report, to outline those SAR with the highest potential of occurring within the Study Area, based on habitat. A total of six (6) avian SAR were included on the list; Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Canada Warbler (*Cardellina Canadensis*), Eastern Wood-pewee (*Contopus virens*), Olive-sided Flycatcher (*Contopus cooperi*), and Rusty Blackbird (*Euphagus carolinus*).

Based on the desktop review and habitat present within, and surrounding the Study Area, bird survey protocols were established to identify the diversity of species using the Study Area, particularly Priority Species. This included focused surveys for the Common nighthawk, in addition to point count (PC) surveys (spring, breeding and fall).

A total of 17 priority avian species were documented in the vicinity of the Study Area during field surveys. Of the 17 priority avian species observed, two were Species at Risk (Canada warbler (*Cardellina canadensis*; SARA Threatened; COSEWIC Threatened; NSESA Endangered; S3B) and barn swallow (*Hirundo rustica*; SARA Threatened; COSEWIC Threatened; NSESA Endangered; S2S3B), 15 were Species of Conservation Interest.

All observations of the SAR and SOCI species occurred outside of the proposed quarry development area; however, they may still use this location. All of the species observed are native in the region, and commonly found within the Study Area habitat and surrounding area. No obvious concentrations of one particular bird group was observed, nor was an identifiable migratory pathway noted. Given the mobile nature of the avifauna, and the non-unique nature of the landscape proposed for impact, it is believed that any displaced SAR or SOCI species will be able to utilize equivalent habitat if displacement occurs.

Details of the species identified during field surveys are included in Appendix E (Section 8.2.2.4).

6.12.1.4 Lichens

Six priority species of lichens were recorded during lichen surveys within the Study Area, two were SAR (Blue Felt Lichen (*Pectenia plumbea*; SARA & COSEWIC Special Concern; NSESA Vulnerable; ACCDC S3) and Frosted Glass-Whiskers (*Sclerophora peronella*; SARA & COSEWIC Special Concern; ACCDC S1?) and four SOCI (Fringe Lichen (*Heterodermia neglecta*; ACCDC S3S4), Powdered Fringe Lichen (*Heterodermia speciosa*; ACCDC S3), Slender Monk's Hood Lichen (*Hypogymnia vittata*, ACCDC S3S4), Corrugated Shingles Lichen (*Fuscopannaria cf. ahlneri*, ACCDC S3). No BFL was identified in the Study Area. Furthermore, quarry expansion is not proposed to affect the lichens priority species identified.

Details of the Species identified during field surveys are included in Appendix E (Section 8.2.2.1).



6.12.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

With respect to priority lichen species, localized direct impacts to lichens within the proposed quarry footprint will occur due to land clearing and excavation. Effects are considered minor as a small, specific group of individuals within an ecosystem would be affected and mitigation measures such as management plans or transplantation and monitoring activities and studies will be applied.

Potential effects to migratory birds include direct habitat loss or nest disturbance through clearance and maintenance as well as indirect disturbance to their habitat such as noise, changes to the local environment, or habitat fragmentation. The attraction of ground nesting birds could occur through unsuitable waste management and unattended or unvegetated stockpiles of material left during the breeding season. Negligible effects, to a specific group of individuals within an eco-region for relatively short and intermittent intervals, are anticipated with standard mitigation applied.

With regards to Canada lynx, no lynx signs have been documented within the proposed expanded quarry development area or within the existing active quarry footprint. Given the lack of ideal Canada lynx prey habitat within the Study Area, quality habitat conditions for Canada lynx within the proposed quarry development area is not present. Potential effects are considered negligible.

Proposed Mitigation

Where disturbance of lichens is not avoidable with respect to extraction areas, consultation with NSDL&F and NSE will take place regarding potential mitigation options such as management plans or transplantation and monitoring activities and studies.

Detailed mitigation measures applied to ensure negligible impacts to priority avian species, such as work scheduled outside of nesting season, and to wildlife (i.e. Canada lynx), such as minimizing the Project footprint and impacted area to the absolute necessary delineation, as outlined in Section 6.11.2 and 6.10.2, respectively.

Monitoring and Follow-up

Nova Construction recognizes the value of priority species and will take steps as required to mitigate those species found on-site through consultation with ecologists and NSDL&F. Ongoing issues of importance to local flora and faunal species will likely be brought forward by the community, academia, and regulators. Nova Construction commits to an open and consultative approach to seeking resolutions on all issues raised.

6.13 Socio-Economic Environment

Economic growth in Nova Scotia has seen a slow and steady trend prior to the COVID-19 pandemic. In 2019, the economy grew by 1.3%, a slowdown from 2018 (1.5%). It was predicted that Nova Scotia's economy would continue to grow at a slower rate of 1.1% in 2020 and 1% in 2021. This prediction will likely change post pandemic. Employment growth in Nova Scotia is at 2.3%, the highest it has been in 15 years. The unemployment rate in Nova Scotia continues to drop, resting at 7.2% in 2019, down from 7.5% in 2018 (Province of Nova Scotia, 2020). Real Gross Domestic Product (GDP) grew by 1.5% in 2018, and is forecasted to change by 1.0-1.3% in 2019-2021. The nominal GDP growth in 2018 was 3.3% - limited by strong exports and consumer spending;



accelerated nominal GDP growth was expected in 2019 (3.5%), while 2020 and 2021 is expected to see a slightly slower, forecasted at 3.1% and 3.0% respectively (RBC, 2019). Business investment is identified as a downfall in Nova Scotia's economy, as decommissioning associated with offshore natural gas projects that stopped production in 2018 wind down. However, the province is increasing infrastructure spending for major highway projects and healthcare investments in the upcoming years, supporting economic activity (RBC, 2019).

6.13.1 Existing Conditions

Population and Employment

The Project is located in a rural setting approximately 6.4 km north of the community of River Bourgeois and 8.4 km northwest of the Village of St. Peters in Richmond County, Nova Scotia.

The Study Area is located in the Municipality of the County of Richmond, on Cape Breton Island, which is comprised of approximately 86 communities. With the exception of the Villages of Evanston, St. Peter's and Arichat, communities are rural. The First Nations community of Potlotek (Chapel Island IR 5) is located approximately 15 km east of the Project Site. The nearest urban center is Port Hawkesbury, Inverness Co. 30 km west southwest of the Sporting Mountain Quarry.

The Richmond County Census Division (CTY) includes all communities noted above. The total population base of this CTY was 8,964 in the 2016 Census, a decline of 3.5% from 2011. In comparison, the population of Nova Scotia increased by 0.2% and Cape Breton Regional Municipality (CBRM), the largest Municipality on the island, also decreased by 3.2%. The population density in the CTY is 7.2 people per square kilometer (38.8 in CBRM and 17.4 in NS) (Statistics Canada, 2019).

The age distribution in the Richmond CTY indicates an older population with a median age of 52.7, (Nova Scotia – 45.5, CBRM – 50.0). In 2016, 17.5% of the population were under the age of 20, and 27.6% of the population was 65 years or older. The male (48.7%) and female (51.3%) population is nearly equal. The area is predominantly English (first language) speaking (79.7%) (Statistics Canada, 2019).

The cultural origins of the area are mainly European (71%); North American Aboriginals (23%) identify as either First Nations (10%) or Métis (13%); and approximately 6% are of other ethnic origins (Statistics Canada, 2019). The population of this CTY remained relatively immobile noting 6.6% having moved within the previous year as compared to 17% having moved in the area 5 years previously (Statistics Canada, 2019).

Of the population between 25 and 64 years of age, at least 20.5% have attained a high school diploma only and 63.6% have received a post-secondary education (apprenticeship or trade certificate - 27%, college diploma/university certificate – 54%, university degree (bachelor's or higher) – 19%) (Statistics Canada, 2019).

The average full time employment income in 2015 of people 15 years or older \$35,687. The average family income is \$66,556 (after tax average - \$56,952) (Statistics Canada, 2019).

Unemployment rates in Richmond County in 2016 averaged 16.4%. Nearly half of the population (48%) did not participate in the labour force.



Richmond County's industry is largely rooted in agriculture, forestry, hunting and fishing, mining and oil and gas extraction. The primary sectors of employment are sales and service (22.9%), trades, transport and equipment operators and related occupations (20.1%), business, finance and administration (10.7%), and education, law and social community and government services (9.3%). The remaining 37% of employment sectors includes; management, natural and applied sciences, health, occupations in art, culture, recreation and sport, manufacturing and utilities, and natural resources, agriculture and related production occupations (Statistics Canada, 2016). Port Hawkesbury Paper and NuStar Energy are recognized as some of the largest employers in the area (Municipality of the County of Richmond, 2016)

The quarry currently employs approximately 30+people, which is not expected to increase with the expansion unless market demand requires additional resources. The number of employees drawn from the local area will increase as aggregate production and market demand increases. The quarry will continue to provide employment to local employees and indirect employment will continue in related industries such as heavy equipment supply and maintenance. Hauling activity varies according to market demand. The quarried material is typically used for local construction projects, such as road building and municipal, transportation, infrastructure, residential, and commercial developments. Employment and financial spin-off activities will occur predominantly in the Richmond County area, which can be seen as a benefit in that economic development in rural areas is a priority in strengthening the Nova Scotia economy.

Land Use

Land use within 800 m of the Project consists of forested lands and previously logged areas on private and Crown land. Adjacent to the Study Area are two other quarry operations.

The quarry is located within the Sporting Mountain Plan Area as designated by the Municipal Planning Strategy (MPS) approved by Richmond County Council (2010). Generalized future land use and zoning designation of the Study Area is General Development (G-1). This base zone as designated by the MPS shall permit various uses ranging from residential to light-intensity industrial uses. The purpose of this zone is to only exclude heavy industrial uses which are considered obnoxious, or which present an environmental threat, or which receive or treat hazardous product. The zone is intended to regulate medium-intensity industrial uses. Larger medium-intensity industrial uses may be considered in the plan area subject to rezoning criteria.

Given the rural nature of the area it can be assumed that most of the structures on properties in proximity to the Project are residential or seasonal dwellings and associated out buildings. Therefore, within a distance of the proposed quarry footprint, the following number of civic addresses (and associated structures) have been surmised: 800 m – 0 (0); 1.0 km – 0 (0); 1.5 km – 6 (12); 2 km – 17 (37).

Extractive Industries

A review of the NSDNR Abandoned Mine Opening (AMO) Database, Nova Scotia Mineral Occurrences Database, and the Mineral Resource Land Use Atlas indicate that there are no former mine shafts or other mineral resource operations within 800 m of the Study Area. Mineral occurrences of copper and salt are known within 3 km of the Project Area. Currently there are no Mineral Claims in proximity of the site.



Two other aggregate quarries exist in the vicinity of the Sporting Mountain Quarry. Dexter Construction Quarry and Chapman Bros. Quarry, both of which are located approximately 750 m from site, respectively. The Dexter Quarry is partially reclaimed and nearing the end of its productive life. Dexter indicates that there is enough material for one additional project, and then the quarry will be closed (pers. comm. G. Isenor, April 2019).

Agriculture

Agricultural operations have not been identified in the region within or surrounding the Study Area. There are two small properties (<10 ha) with 1.7 km that have hay/pasture lands but no commercial operations are present.

Forestry

The regional area is primarily forested with some residences and farms found sporadically along the main roads. There is evidence of recent and historic forest harvesting. Forested lands are mainly privately owned and on provincial Crown land.

Transportation

The Project is located near Highway 4 and Trans-Canada Highway 104. The site can be accessed via both Highway 104 and 4, in Sporting Mountain. The quarry access road leads to the public highway. The truck volume on public roads is anticipated to not change significantly with the expansion of the Sporting Mountain Quarry, and therefore the traffic will stay in line with the existing volumes for aggregate in the local area. Truck volume for the expanded quarry is expected to remain the same as for the current quarry - project driven based on demand in the area. A Transportation Assessment was not completed as part of this registration document, as the Project is not expected to have a significant impact on preexisting traffic volumes in the area.

The Project Site is accessible via Highway 4 and Highway 104. Records of traffic on Highway 4 for nine years between 2008 and 2017 show Average Daily Traffic (ADT) and Annual Average Daily Traffic (AADT) between Grand Anse-Kempt Road Line To Highway 104 (River Tillard) have been relatively consistent within their respective sections as per the Nova Scotia Department of Transportation and Infrastructure Renewal Traffic Engineering and Road Safety Census (NSTIR, n.d.), with the exception of 2014 which had a noticeable drop in ADT and AADT in the respective sections (Grand Anse-Kempt Road Line to Exit 47 Highway 104 and Exit 47 Highway 104 to River Tillard Highway 104), and low traffic recorded in 2008 on the Grande Anse-Kempt Road Line to Highway 104 section. The ADT on the section that extended from Grande Anse-Kempt Rd to Highway 104 (Exit 47) ranged from 233-642, and extending from Highway 104 (Exit 47) to Highway 104 (River Tillard) ranged from 438-1038, with 438 accounting for the low recorded year of 2014.

Records of traffic on Highway 104 over a nine year period between 2008 and 2017 show ADT and AADT between Exit 46 (Louisdale Inter/C) to TK 4 (River Tillard) have been relatively consistent within their respective sections with the exception of a noticeably high traffic year between Exit 46 (Louisdale Inter/C) to Exit 47 (Sporting Mountain Inter/C) in 2008 (ADT 3161) and 2014 (ADT 2946), and a low recorded traffic volume between Exit 47 (Sporting Mountain Inter/C) and TK 4 (River Tillard) in 2008. The ADT on the section from Exit 46 (Louisdale Inter/C) to Exit 47 (Sporting Mountain Inter/C) ranged from 1671-3161 between 2008 and 2017, and 1671-1701 with the exclusion of the 2008 and 2014 higher recorded traffic years. The ADT ranged from 1411-3603 from



2008 to 2017 on Highway 104 between Exit 47 (Sporting Mountain Inter/C) and TK 4 (River Tillard), and from 2902 to 3603 with the exclusion of 2008.

The ADT on the combined sections of Highway 4 that extend from Grande Anse-Kempt Road Line to Highway 104 (River Tillard) ranges from 233 to 1038 from 2008 to 2017, while the combined sections of Highway 104 extending from Exit 46 (Louisdale Inter/C) to TK 4 (River Tillard) range from 1411 to 3414 over the same nine year timespan (2008 to 2017).

The Project will use an existing 0.5 km access road (Figure 1), that will extend from Morrison Road to the Project Site.

Spring weight restriction periods on roads will reduce site activity for that period.

Recreation and Tourism

The Project Site is located in Richmond County, which provides access to the Atlantic Ocean and Bras d'Or Lakes. St. Peter's Canal, divides Richmond County and joins the Atlantic Ocean to the Bras d'Or Lakes which are known as a popular sailing destination in eastern Nova Scotia.

Due to Richmond County's access to Nova Scotia coastline and lakes, it is well used for surfing, boating and its beaches throughout the summer months. The unpaved access road and region surrounding the Project Site is potentially used for recreational activities including hiking, birdwatching, and ATV usage.

Richmond County has several Provincial Park Trails, including Battery Park in St. Peters, and ten identified hiking trails. There are few known groomed ATV trails maintained by snowmobile associations throughout the province in close proximity to the Project Site; however, usage by local community members may exist. Three ATV clubs exist in Richmond County (L'Ardoise ATV Club, Ile Madame ATV Club, and East Richmond ATV Club), with the East Richmond ATV Club work to manage a 15 km Grand Anse to River Tillard abandoned rail line as a shared use trail.

Recreational activities including Battery Provincial Park, and various programs/events (i.e. yoga, learn-to-skate, hockey, etc.) offered through Richmond County Recreation are located in communities nearby Sporting Mountain. In addition, there are also organized walking clubs in the Richmond County area. The nearest recreational facility is in River Bourgeois, is the Tara Lynne Community Centre which offers exercise classes.

Recreational fishing and hunting are permitted in the area surrounding the Site. The Project Site falls under Recreational Fishing Area 1 (River Tillard, Richmond County, downstream from the bridge at Sporting Mountain) as per the *Recreational Fishing Regulations*, Schedule "A" under Section 81 of the *Fisheries and Coastal Resources Act, S.N.S. 1996, c.25*. Nova Scotia's recreational fish stocking program was reviewed. Cook Lake and Cranberry Lake, located approximately 6 km and 7 km southeast of the Project Site, have been stocked in the past. Deer hunting season in Nova Scotia extends from the last Friday in October to the first Saturday in December inclusive. Deer hunting on Sundays is prohibited, with the exception of the first two Sundays in the season (last Sunday in October and first Sunday in November). Atlantic Lobster Fishing District 29 is located in the vicinity of the Study Area, and extends from May 10 to July 10.

Several protected areas are located within 25 km of the Project Site, including; Battery Provincial Park, Farley's Ark Conservation Lands, False Bay Provincial Park. In addition, the UNESCO



designated Bras d'Or Lake Biosphere Reserve established in 2011, is located within 10 km of the Project Site and consists of a salt water estuary watershed inland sea with passages to the Atlantic Ocean. The Project Area is near the boundary of the Bras d'Or Lake Biosphere Reserve; however, there is no interaction between Project activities and the watershed of the Reserve nor does the Study Area fall within the reserve.

Human Health and Public Safety

The Nova Scotia Health Authority provides a variety of medical, elder care, and out-patient services at the Strait Richmond Hospital, Evanston.

This part of Nova Scotia is protected by the Royal Canadian Mounted Police (RCMP), based in St. Peter's, and Cape Breton Regional Police Service. The total crime severity index, including violent and non-violent crime, ranged from 49-72 crimes per year from 2010 to 2017. The severity of crime reported in Cape Breton has decreased by 22% from 2015 to 2017. Statistics also indicate a 17% decrease in violent crime while property crime was down by 14%.

Regional Fire & Emergency Service has fire stations located in St. Peter's (St. Peter's Volunteer Fire Department) that is in close proximity to the site. They also have several other stations in Richmond County that can be called out depending on the complexity and severity of an incident.

Impacts to human health as a result of project related activities include potential effects to air quality, specifically fugitive dust on country foods, and from accidents and malfunctions.

6.13.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

The effects of the Project to the local socio-economic conditions may be observable in several key areas. No significant adverse effects are anticipated from the Project on land use.

Local Employment and Economic Activity

The socio-economic impacts of the quarry expansion to the local economy will be limited because of the relatively small nature of the site. Given the existing quarry and relative life of expanded operations, the conceptual reclamation plan, and the presence of other nearby extractive resource operations, it is unlikely the Project will impact current land values. The quarry is designed to meet the needs of the proponent in servicing the local market. Nova Construction uses local trucking contractors in its operation. Since the operational requirement of the expanded quarry will not be changing, it is not anticipated that there will additional opportunities for local employment.

Recreation and Tourism

Recreational use of the site has been limited to local use, including fishing and/or hunting in the vicinity of the Project Site. Limited tourist sites are located in close proximity to the Study Area, and the expansion of the quarry is not expected to impact tourism in the area. The future final land use of the site will be determined in conjunction with the needs of the local community and other stakeholders.

Visual Impacts

Effects to visual quality of the local area that result from the quarry expansion, and the operation, de-commissioning and reclamation of the Quarry include changes to the short-term and long-term



viewscales in the local area. Settling pond and stockpiles will result in a potential change in the visual environment; however, a barrier of trees within the prescribed setbacks will shield the site from view. Given the topography, forest cover, quarry depth, and distance from all the residential/viewer locations, it is not anticipated that the quarry and operations will be visible from any residential location or open vista.

Land Use

Quarry operations often involve changing the land use of an area. In some cases a quarry will require lands that may have been used for recreation, agriculture or other purposes. In the case of this Project, a pre-existing quarry is being expanded from an approved 4 ha quarry to a 10 ha quarry on lands owned by the proponent. After closure of the quarry, final reclamation is intended to return the site to a condition that reflects the surrounding landscape. Disturbed areas will be regraded and revegetated or put to other uses as warranted by future plans for the site.

Transportation

The average number of trucks transporting aggregate from the quarry will vary depending on market demand. The average number of trucks hauling aggregate from the quarry is currently less than 10/day, with the expansion of the quarry from 4 ha to 10 ha it is anticipated that the number of trucks transporting aggregate will not increase. The number of trucks needed will depend on the market demand in the area, and will presumably be offset by the closure of existing quarries in the area in the future. Flow of traffic is primarily north of the quarry towards Highway 4/104 on Morrison Road, which turns into Sporting Mountain Road but this is dependent on the demand location for products and contractor choice for haulage.

Operation of the expanded quarry is not anticipated to result in significant impact to pre-existing levels of traffic. Nova Construction will maintain a clear line of communication through their Project Manager for any complaints to be recorded and evaluated in accordance with legislation and permit requirements.

6.14 Archaeological and Cultural Resources

Archaeological screenings and reconnaissance of the Project Site was conducted by CRM Group Ltd., in accordance to the terms of Heritage Research Permit Number A2019NS026, to research, locate and identify archaeological resources within the proposed impact area, and to offer resource management recommendations. Background research was conducted in the Spring of 2019 to identify the archaeological potential based on environmental setting, site history, and Native land use. Reconnaissance fieldwork, consisting of a visual inspection, was undertaken on May 6, 2019. The Archaeological Screening and Reconnaissance Report (Appendix H) summarizes the findings and recommendations for the Project Site.

6.14.1 Existing Conditions

CRM Group Ltd. archaeologists conducted background research to review the environmental conditions and cultural history of the Sporting Mountain Quarry Expansion Project Study Area, with the primary purpose of identifying zones of archaeological potential. In addition, a visual inspection of the site was used to evaluate the archaeological potential of the proposed development area and to investigate any topographical or cultural features identified during the background study.



Sub-surface testing was not completed as part of the 2019 archaeological reconnaissance for the Study Area.

Vegetation within the Study Area is characterized by a mix of young and mature hardwood and softwood species, typical of Nova Scotian forests, while a mix of moss, ferns, and small shrubs were also noted. The Study Area falls within the Cape Breton Hills Ecodistrict, which is predominately characterized by mixed stands of sugar maple, red maple, beech and yellow birch trees, while shade tolerant hardwoods, typical of the Acadian Forest are present, although less common. Visual site inspection indicated that much of the Study Area has previously been clear cut.

The Study Area is regarded as having elevations ranging from approximately 150 to 160 masl (Neily et al., 2017). The higher steep-sloped hills in this area are underlain with older, erosion resistant rocks, while the lower sloped hills are underlain by coarse sandstone, shale and conglomerate (Neily et al., 2017). The topography of the Nova Scotia Uplands (300) ecoregion is geographically complex, consisting of rounded submits and plateaus separated by lower elevation uplands. The terrain throughout the Study Area was noted as a mix of low lying wet and marshy areas, undulating boulder fields and steep slopes. The Study Area gradually slopes down from north to south across the area with an average slope of approximately 2 m over every 100 m.

The Sporting Mountain Quarry area is located between two branches of the River Tillard, which flow southeast into St. Peter's Bay. The Study Area is located to the southeast of several small lakes associated with the river system, the nearest of which is Mountain Lake, located approximately 400 m to the west.

Based on the environmental setting (non-arable land and low, wet area), Mi'kmaq land use, property history, and the field reconnaissance, the Sporting Mountain Quarry Study Area is considered to exhibit low potential for encountering Pre-contact and/or early historic Mi'kmaw archaeological resources, and low potential for encountering historic Euro-Canadian archaeological resources.

6.14.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

The Project is not likely to encounter archaeological and historical features in the area.

Proposed Mitigation

Based on the results noted above, the following management recommendations are offered for the Quarry area:

1. It is recommended that the Study Area be cleared of any requirements for further archaeological investigation.
2. In the unlikely event that archaeological deposits or human remains are encountered during activities associated with the expansion of the Sporting Mountain Quarry, all work in the associated area(s) should be halted and immediate contact made with the Special Place



Program of the Nova Scotia Department of Communities, Culture, and Heritage
(Sean Weseloh Mckean: 902-424-6475).

Monitoring and Follow-up

Personnel involved in all ground disturbances related to site preparation and quarry activities will be made aware of the unlikely potential for archaeological and/or cultural resources to be encountered during development activities, as required. The appropriate actions to be taken in identifying and reporting such features will be discussed with site personnel.

No additional work or mitigation relative to archaeological and historical features is required to allow the Project, as described, to proceed.

6.15 Mi'kmaq Ecological Knowledge Study (MEKS)

Membertou Geomatics Solutions (MGS) conducted, in accordance with the Mi'kmaq Ecological Knowledge Study Protocol 2nd edition, a Mi'kmaq Ecological Knowledge Study (MEKS) of an area defined by a 5 km radius (MEKS Study Area) extending around the Project Site in 2019. The MEKS will focus on the Project Site, which is defined as the proposed quarry expansion and the existing quarry location, while the Study Area will consist of a larger area that falls within a 5 km radius around the Project Site.

The purpose of the MEKS is to identify and document land and resource use, which is recognized as holding great importance to the Mi'kmaq people. Historical review and research of the Project Site and surrounding area was conducted to identify which, if any, areas are significant to the Mi'kmaq people. In addition, this research and review allowed MGS to gain an understanding of Mi'kmaq use of the lands. The MEKS consisted of two major components:

- *Mi'kmaq Traditional Land Use Activities*, both past and present
- *Mi'kmaq Significance Species Analysis*, considering the resources that are important to Mi'kmaq use.

Interviews were conducted with Mi'kmaq knowledge holders from the communities of Potlotek, We'koqma'q, and Membertou First Nations, seeking ecological knowledge and information on the most recent and historic Mi'kmaq traditional land use in this area. The interviews took place between October and December 2019. The interviewees were shown maps of the Project Site and Study Area and asked to identify where they undertake activities as well as to identify where and what activities were undertaken by other Mi'kmaq communities, if known.

MGS conducted a Mi'kmaq Significant Species Survey to gather information on Mi'kmaq significant species, which are used in their community in variety of ways including food/sustenance, medicinal/ceremonial, and/or arts/tools; and helps determine potential impacts of the project in the Study Area and surrounding area included in the MEKS. The resources were also considered for their use and importance to the Mi'kmaq as well as their availability or abundance within or adjacent to the Study Area. The complete MEKS Report is found in Appendix I.



6.15.1 Existing Conditions

MGS conducted background research to identify which areas are of historical significance to the Mi'kmaq communities in the Study Area, and the surrounding areas including the MEKS Study Area. In addition, a Significant Species Survey was conducted to determine the presence of plant and animal species that play a key role to the Mi'kmaq community.

Based on the historical review and data documented from the MEKS, it is concluded that there is some Mi'kmaq use reported within the Project Site. Activities occurring in the Project Site include deer, rabbit, partridge hunting, as well as tree root and sweetgrass picking areas. There were no fishing areas identified within the Project Site.

The Mi'kmaq traditional use data were gathered from interviews with Mi'kmaq individuals who reside in the surrounding Mi'kmaq communities: Potlotek, We'koqma'q, and Membertou First Nations. The Mi'kmaq traditional use findings for the Project Site identified 5 deer hunting areas, 4 areas for rabbit hunting, and 2 areas for partridge hunting. One area each of roots and sweetgrass were identified as being harvested within the Project Site. No fishing areas were identified within the Project Site by knowledge holders interviewed as part of the MEKS.

Trout fishing and deer hunting were the predominant traditional use activities reported in the Study Area. Overall, these activities took place primarily in the Current Use timeline categories, with some hunting areas identified as used historically. A total of 38 trout fishing areas (including; Pringle Lake, McDonald Lake, Rocky Lake, Paddy's Lake, Donnelly's Lake, Hill Lake, Bras d'Or Lake from St. George's Channel to The Points West Bay, Long Lake, and Kyte Lake) and 30 deer hunting areas (including; The Points of West Bay, St. George's Channel, Near Paddy Lake and Rocky Lake, South of Hill Lake, Camerons Mountain, Areas around Sporting Mountain and Seaview to Oban through to Long Lake) were noted during the interviews. There were other fishing, hunting, and gathering activities reported, as well.

Other activities reported in the Study Area included fishing for bass, eel, lobsters, salmon, and scallop, hunting of rabbit, partridge, and coyotes, and gathering of tree roots, berries, birch bark, nuts, cranberries, and sweetgrass. All gathering and fishing activities identified were found to be Current Use activities, while some hunting areas were also used historically as defined in the MEKS Report (Appendix I).

Mi'kmaq Significance Species Analysis considers the type of use, availability, and important of resources. Species of significance to the Mi'kmaq are associated with three categories; food/sustenance, medicinal/ceremonial, tools/art. The number of areas and species noted for the three types of use are summarized in Table 6.10 below, based on work completed as part of the MEKS in 2019.

Table 6-10 Resource Use within Study Area

Type Of Use	Number of Areas	Number of Species
Food/Sustenance	99	15
Medicinal/Ceremonial	8	3
Tools/Art	9	4



Fishing for eels was noted during the information gathering as part of the MEKS. The American Eel, while not listed on the Nova Scotia species at risk registry, is considered a threatened species by the federal species registry. American Eels are considered a threatened species in Canada and the Mi'kmaq still rely on these species for sustenance and for cultural ceremonies and activities. Any disturbances to their habitats could have an impact on Mi'kmaq use. No other rare or endangered species were identified during the interview process.

6.15.2 Potential Effects, Proposed Mitigation, Monitoring and Follow-Up

Potential Effects

The overlap in Project activities with Traditional and Current Use areas is minimal in comparison with the broader Area of Use as presented in Appendix I (Map A), particularly when considering the size of the overall Project.

Findings of the MEKS revealed that some Mi'kmaq Traditional Use Activities occur in the Project Site, and larger Study Area. There is the potential that operations associated with the quarry expansion at the Site could affect Mi'kmaq traditional use, as well as some fishing and hunting, identified in both the Project Site and larger Study Area; however, engagement and discussions with Mi'kmaq will aid in minimizing, and where possible, eliminating any potential impacts to traditional land and resource use. Traditional use activities of the Mi'kmaq identified within the Study Area will be considered and reflected upon throughout the overall EA process.

Proposed Mitigation

As outlined in Section 5.0, discussions and engagement with Mi'kmaq communities and organizations is ongoing in order to minimize, and where possible, eliminate any potential impacts to traditional land and resource use. These discussions will continue beyond the EA stage, should the EA be granted.

Monitoring and Follow-up

Discussion and engagement with Mi'kmaq organizations is ongoing in order to minimize and, where possible, eliminated any potential impacts to traditional land and resources use. Nova acknowledges the importance and value of effective engagement and envisions a long and mutually beneficial engagement program for the Project.

6.16 Other Projects in the Area

Nova Construction is aware of several existing extraction operations within approximately 25 km of the site, including: Dexter Construction Quarry (750 m), Chapman Bros. Quarry (750 m) and Burke Brothers Trucking (Lynche Rver - ~13 km). At approximately 30 km from the site, several industrial projects exist or have been approved for development in the Port Hawkesbury/Point Tupper area. These include the Bear Head LNG (export facility), Cabot Manufacturing (gypsum wallboard), Exxon Mobil (natural gas operations), Georgia Pacific (bulk handling facility), Nova Scotia Power (power generation), NuStar Terminals (bulk oil storage and shipping facility), Port Hawkesbury Paper (pulp and paper products, industrial landfill), Savage Canac (bulk handling facility), Zutphen Equipment (ready mix concrete).



Several other quarries and mines exist within 35 km of the project site: Municipal Group (Irish Cove - 27 km), CGC Inc. - Little Narrows Gypsum (32 km), Georgia Pacific (30 km), Dexter Construction (Campbell Mountain Quarry – 35 km), Zutphen (Whycocomagh Quarry– 32 km).

With the exception of the Georgia Pacific and Little Narrows Gypsum projects (both are currently in care and maintenance), all other extraction operations mentioned have a relatively small footprint and environmental impact, except for GHG emitted into the atmosphere. Other industries noted in the Port Hawkesbury/Point Tupper area would be larger GHG contributors. Significant adverse project-related effects in conjunction with other undertakings in the area are not likely to occur since this is an on-going project and assuming the effective application of mitigative measures as outlined in this document.

7. Effects of the Project on the Environment

Activities associated with operation of the expanded quarry operation will be conducted in accordance with terms and conditions of the EA, an IA, adherence to the Pit and Quarry Guidelines, and specific mitigative measures described in this assessment and all other applicable legislation, policies, and guidelines.

Assuming the mitigative, monitoring, and progressive reclamation measures specified in this report are implemented, and the expanded quarry is operated according to provincial guidelines and approvals, no significant adverse residual environmental or socio-economic effects are likely. Effects are expected to be of small magnitude, low frequency, short duration, and/or of limited geographical extent. Operation of the quarry will result in economic benefits, including continued employment and an economic source of quality aggregates to local demand markets.

Environmental effects will include the loss of some habitat and wetlands within the proposed quarry property area. The property has been the subject of past forestry activities.

Localized impacts on air quality can be expected through the formation of airborne particulate matter. These impacts are readily controlled through standard mitigative measures (e.g., dust suppression) and follow-up monitoring as necessary.

A summary of anticipated impacts and associated mitigation measures is provided below.



Table 7-1 Summary of Potential Impacts and Mitigation Measures

VC	Project Phase	Type of Potential Effect	Mitigation, Monitoring, and Natural Limiting Factors	Significance Including Mitigation and Natural Limitations
Geology	O,C	Erosion Acid Rock Drainage	<ul style="list-style-type: none"> • Erosion potential considered low due to the soils/overburden, low slopes, and poor site drainage • Implementation of Erosion and Sediment Control Plan • ARD not expected based on-site geology • Ongoing acid generating potential monitoring of site aggregate • Progressive reclamation 	Negligible
Atmospheric Conditions and Air Quality	O	Dust, particulates, GHG emissions	<ul style="list-style-type: none"> • During periods of heavy activity and/or dry or windy periods, water spray may be used to reduce the re-suspension of dust crushing activities, or on unpaved roads and work areas; • Consideration shall be given to the strategic placement of overburden and aggregate stockpiles to act as wind barriers to crushing activities; • Appropriate truck loading and hauling procedures shall be followed to reduce the generation of dust generated during trucking activities; • When not in use, machinery and light vehicles shall not be left idle so as to reduce emissions; • All vehicles and machinery shall be maintained in proper working order to reduce emissions generated from worn parts. 	Minor
Light	O,C	Increased intermittent ambient light	<ul style="list-style-type: none"> • Install lights downward facing, to reduce attraction to birds • Motion-sensing lights will be installed, wherever possible • Limit use of lights to the amount necessary to ensure safe operation • Lighting not in use will be turned off 	Negligible
Noise	O,C	Increase in intermittent background noise levels	<ul style="list-style-type: none"> • Blasting and crushing will occur as market demand requires • Applicable Guidelines and Regulations will be followed as established by NSE Approvals to operate 	Minor



Table 7-1 Summary of Potential Impacts and Mitigation Measures

VC	Project Phase	Type of Potential Effect	Mitigation, Monitoring, and Natural Limiting Factors	Significance Including Mitigation and Natural Limitations
			<ul style="list-style-type: none"> Regular maintenance of vehicles and equipment, where appropriate, will reduce noise levels Barrier berms will be established to minimize noise propagation where appropriate 	
Surface Water Resources and Wetlands	O,C	Loss of wetland habitat Erosion and increased sediment loading	<ul style="list-style-type: none"> Avoid disruption to wetlands as much as possible Compensation plan for replacement of lost wetlands Monitoring wetlands in proximity to the quarry development Erosion and sedimentation control Progressive reclamation 	Negligible
Groundwater Resources	O,C	Lowering of groundwater table Decreasing well yields Contamination via accidental spill	<ul style="list-style-type: none"> Quarry excavations will not enter the deep groundwater table without NSE approval Proper fueling procedures will be followed; Fueling shall occur in designated areas (away from potential aqueous receptors) Spill kits will be maintained on-site Groundwater will be monitored, as required by an environmental approval or IA 	Negligible
Habitat	O,C	Localized habitat disturbance or removal	<ul style="list-style-type: none"> Existing habitat is disturbed and fragmented No unique habitat in Study Area Habitat and species within and adjacent to the Study Area are consistent with the regional landscape Progressive reclamation Potentially additional surveys and monitoring Mitigation measures specific to each species 	Minor
Vegetation	O,C	Localized habitat disturbance or removal	<ul style="list-style-type: none"> Existing habitat is disturbed and fragmented No unique habitat in Study Area Habitat and species within and adjacent to the Study Area are consistent with the regional landscape Progressive reclamation Potentially additional surveys and monitoring 	Minor
Lichens	O	Localized habitat disturbance or removal	<ul style="list-style-type: none"> Existing habitat is disturbed and fragmented No unique habitat in Study Area 	Minor



Table 7-1 Summary of Potential Impacts and Mitigation Measures

VC	Project Phase	Type of Potential Effect	Mitigation, Monitoring, and Natural Limiting Factors	Significance Including Mitigation and Natural Limitations
			<ul style="list-style-type: none"> • Habitat and species within and adjacent to the Study Area are consistent with the regional landscape • Progressive reclamation • Potential mitigation options such as management plans or transplantation • Potentially additional surveys and monitoring 	
Wildlife	O	Localized habitat disturbance or removal	<ul style="list-style-type: none"> • Existing habitat is disturbed and fragmented • No unique habitat in Study Area • Habitat and species within and adjacent to the Study Area are consistent with the regional landscape • Progressive reclamation • Potentially additional surveys and monitoring • Minimize the Project footprint to the absolute necessary delineation • Erosion and sediment control measures as outlined in Section 4.4 • Measures that will be utilized to mitigate potential impacts to birds as detailed in Section 6.11.2 • When not in use, machinery and light vehicles shall not be left idle so as to reduce emissions 	Minor
Birds	O	Localized habitat or nest disturbance or removal	<ul style="list-style-type: none"> • Clearing activities will occur outside of the nesting season (April 1 to August 15) or as determined by regulators • If clearing is required during the nesting time frame, regulators will be consulted for appropriate protocol, which likely would involve pre-construction nest surveys and the requirement to leave barriers around nests, if identified • Stockpiles will be examined during the nesting season to ensure that ground-nesting birds are not present, and disturbance avoided until after the nesting season • No one shall disturb, move or destroy migratory bird nests. If a nest or young birds are encountered, work 	Negligible



Table 7-1 Summary of Potential Impacts and Mitigation Measures

VC	Project Phase	Type of Potential Effect	Mitigation, Monitoring, and Natural Limiting Factors	Significance Including Mitigation and Natural Limitations
			shall cease work in the immediate area of the nest and NSDL&F contacted	
Priority Species	O	Localized habitat disturbance or removal	<ul style="list-style-type: none"> • Lichen mitigation measures as detailed in section 6.9.2 • Wildlife (i.e. Canada Lynx) mitigation measures as detailed in 6.10.2. • Avian mitigation measures as detailed in 6.11.2 	Minor (Lichen), Minor (Wildlife), Negligible (Avian)
Socio-Economic	O, C	Potential viewscape impacts Potential increase in truck traffic	<ul style="list-style-type: none"> • Prescribed setbacks and topography will limit impacts to the viewscape. • Truck traffic is routed primarily along an access road and not in close proximity to residences, no additional trucks are anticipated for the area. • Nova Construction will maintain a clear line of communication through their Project Manager for any complaints to be recorded and evaluated in accordance with legislation and permit requirements 	Minor
Archaeological and Cultural Resources	O	Damage to archaeological and/or cultural resources	<ul style="list-style-type: none"> • Project is not likely to encounter archaeological resources and/or historical features on or near the Project Site • In the event that archaeological deposits or human remains are encountered during activities associated with the Sporting Mountain Quarry, all work in the associated area should be halted and immediate contact made with the Special Places Program of the Nova Scotia Department of Communities, Culture, and Heritage 	Negligible
Mi'kmaq Traditional Use	O,C	Impacts to traditional land and resource use	<ul style="list-style-type: none"> • Discussion and engagement with Mi'kmaq organizations is ongoing in order to minimize and where possible eliminate any potential impacts to traditional land and resource use 	Minor

Project Phases: D= Development (or Construction), O = Operation, C= Closure (and Reclamation).

Note: There is no Development (or Construction) phase for this Project as the Site already exists.



8. Accidents and Malfunctions

Possible malfunctions or accidents that could potentially arise during aggregate extraction projects include slope failures, fuel spills, extreme weather events, vehicle accidents, and fire.

Slope Failure

Causative factors related to slope failures are typically:

- Failure of quarry faces or stockpiles due to improper design
- Operational procedures

Improperly designed and operated quarries can pose a safety hazard to workers during construction and operation. Mitigating factors to prevent accidents are:

- Slopes will be established using a standard of best management practices and methodologies, combined with the Nova's experience in aggregate extraction
- The quarry will be operated in accordance with legislated health and safety requirements
- Face height limits and minimum setbacks will be established
- Quarry face inspections will occur regularly
- A site specific Emergency Response Plan will be prepared

The risk of slope failure resulting from construction and operation is expected to be low. The risk during operations will be reduced further by preventive measures, monitoring and the utilization of standardized methods in the quarry design. With mitigative measures and the low probability of slope failure, the effects of slope failure during construction and operation are not considered to be significant.

Fuel Spills

Petroleum, oils or lubricants (POL) will be used on the Project Site to power and operate equipment such as trucks, generators, crushers, loaders, etc. There are no plans for the bulk storage of liquid petroleum fuels on-site. No hazardous materials will be permanently stored on site. Fuel will be transferred to quarry equipment by mobile fueling trucks as required. Small quantities of oils and lubricants may be on site during crushing to maintain equipment but will be removed once that activity is completed.

Spills may contaminate soils and groundwater and, through runoff contaminate watercourses. Contaminants may adversely affect the local habitat and migratory birds. Loss of POLs may volatilize and adversely impact the ambient air quality.

Fueling will not occur within 30 m of a waterbody or wetland. Oils and lubricants will be stored, if required, in accordance to manufacturer's recommendations and applicable legislation. Contractors and staff who undertake refueling and maintenance activities will be encouraged to do so on level terrain and at a suitable distance from environmentally sensitive areas. Nova has established policies for Contingency and Emergency Response (Appendix J) on its work sites and quarry operations. These plans, filed with NSE for the Sporting Mountain Site in the original IA application,



has been developed to address the potential loss of POL on-site. The Contingency and Emergency Response policies provided in Appendix J will be submitted for the IA Amendment with site specifics. Minor spills can usually be remediated effectively with minimal effects to the environment.

The risk of a spill during site activities is expected to be low. Should petroleum impacted soil or groundwater be identified, the affected material will be handled, transported and disposed of according to all applicable legislation. The effects of accidental spills of POL during construction and operation of the quarry are not considered to be significant.

Extreme Weather

Heavy or extreme rainfall has the potential to overwhelm erosion and sediment control measures, thus causing threat of impact to nearby waterbodies and wetlands. Contingency Plans may include monitoring surface runoff during heavy rainfall to evaluate the need for improvements in controls. The risk of an extreme weather event to cause an impact on the environment is not considered to be significant given the appropriate controls are in place.

Vehicle Accidents

The quarry is accessible via Morrison Road. Vehicle accidents are possibly a risk to worker health and safety, and interactions with birds and wildlife through collisions. Road design including sight lines and speed limits will minimize the potential for vehicle accidents. The risk of a vehicle accident to cause an impact on the environment is not considered to be significant with the appropriate planning, training and mitigation implemented.

Fires

Accidental fires may be caused by site equipment or affect the site during any quarry phase. Fires have the potential to effect worker health and safety, wildlife, surface water quality and air quality. Mitigating factors include compliance with site specific health and safety guidelines, regular equipment maintenance, adhering to fire bans, and contingency planning. The risk of accidental fires and impacts from a fire in a quarry are low and is considered not significant.

9. Effects of the Environment on the Project

Climate Change

The surrounding environment may contribute to adverse effects on the Project; however discussions on potential environmental effects on the Project are usually limited to climate and meteorological conditions. Climate change is more likely to affect projects with longer duration or higher intensity climate events. Reclaimed areas or temporary storage piles may be affected by future severe weather events if not planned for properly. Climate change is not anticipated to significantly affect the operation of the quarry over its lifetime. Short period events, e.g. heavy rainfall, blizzards or thunder storms, may temporarily shut down operations for safety reasons. Precipitation (rain, snow) and associated runoff may cause temporary delays in some activities such as construction, operation (extraction, processing, transportation), and reclamation.

The national average annual temperature has increased by 2.1°C since records began in 1948, however, in Atlantic Canada, the annual average temperature has only increased by 0.7°C



(the lowest trend) for the same period (1948 – 2016) (Cohen et al., 2019; NRCan, 2019). The Atlantic Region has experienced slight cooling in the last 50 years due in part to the melting of the ice caps in Greenland and Northern Canada. The cooler air and water temperatures associated with the melted ice have been flowing past Atlantic Canada causing the cooling trend. As oceans warm and water expands, the melting ice may accelerate sea-level rise in the region, however given the elevation of this Project related impacts are highly unlikely. Annual precipitations have tended to be wetter since the mid-1970s (NRCan, 2019).

During the various project phases (construction, operation, reclamation) numerous mitigation measures may be employed to minimize potential effects of the environment on the Project. These measures may reduce the risk to acceptable levels through the installation of engineered controls that account for projected storm events. Scheduling of activities should also account for weather interruptions and since the activities of this Project are all conducted out-of-doors the weather has been and will be a factor.

Earthquakes

Earthquakes are mapped by Natural Resources Canada (NRCan). Eastern Canada is located in a stable continental region and has a relatively low rate of seismic activity. On average about 30 seismic events exceed magnitude 3 annually in Eastern Canada (NRCan, 2016). Although Nova Scotia is a relatively quiet earthquake zone, larger quakes have been reported historically. Only 48 events were felt (greater than M 2) to maximum magnitude (M) of 3.8 (near Yarmouth, NS in 2015) have been recorded in Nova Scotia or near shore between Nov 2000 and April 2019 (NRCan, 2019). Sporting Mountain does not fall within a designated seismic zone and the closest recorded event to the project was a magnitude 2.7 in October 1983 located offshore 37 km from the site. No significant earthquakes (M <5.0) have occurred in Nova Scotia between 1600 and 2006 (Lamontagne et al., 2007). There is, therefore, little likelihood of earthquakes being an effect on the Project.

Wildfires

Wildfires are limited in Nova Scotia but there is the potential for this to affect the Project by limiting when work may be conducted during such an event. On-site equipment may be lost if it cannot be evacuated / removed before an approaching fire. Fire protection may be available from water in on-site ponds.

Flooding

The site is elevated from major waterbodies thus will not be affected by any seasonal flooding events. Extreme precipitation may cause a temporary rise in local groundwater elevations – thus affecting operations.



10. Other Approvals Required

The Proponent is required to register this Project as a Class I Undertaking pursuant to the Nova Scotia *Environment Act* and *Environmental Assessment Regulations*. Other relevant provincial regulations include the *Activities Designation Regulations*, which may require an amendment to the existing Industrial Approval (IA) from NSE for the operation of the quarry.

No additional municipal approvals are known to be required.

There are no known triggers for EA under the *Canadian Environmental Assessment Act* (CEAA).

11. Funding

No public or government funding is involved in the execution of this undertaking. All costs will be borne by Nova Construction Co. Ltd.

12. Additional Information

No additional information is provided in support of this document.

All of Which is Respectfully Submitted,

GHD

A handwritten signature in blue ink, appearing to read 'Jeff Parks'.

Jeff Parks, P.Geo, FGC

A handwritten signature in blue ink, appearing to read 'Peter Oram'.

Peter Oram, P.Geo.



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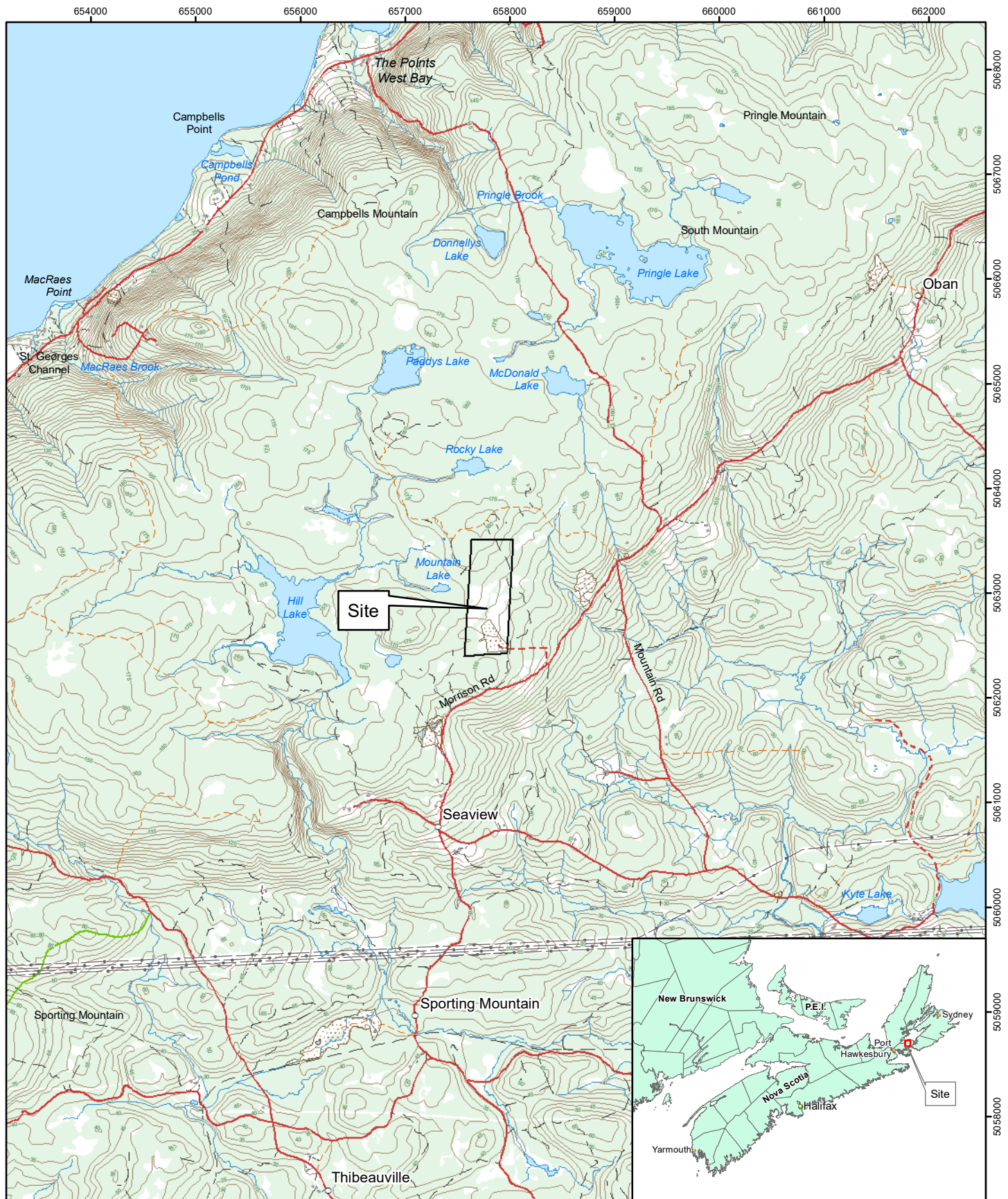
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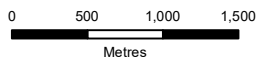
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Source: GeoNova



Coordinate System:
NAD 1983 CSRS UTM Zone 20N

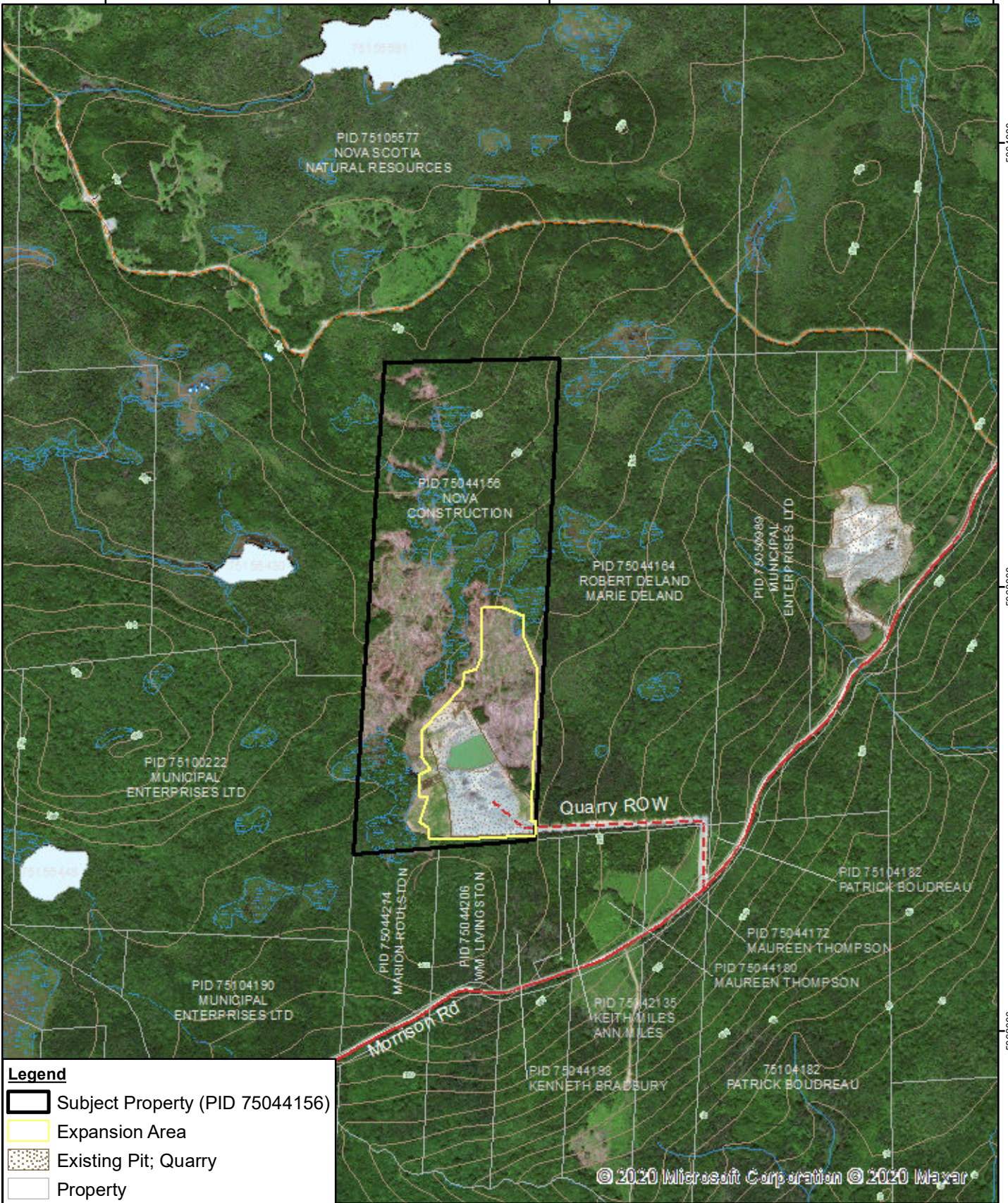


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SEAVIEW, RICHMOND CO, NOVA SCOTIA
SPORTING MOUNTAIN QUARRY EXPANSION

11194492-01
May 5, 2020

SITE LOCATION

FIGURE 1



Legend

- Subject Property (PID 75044156)
- Expansion Area
- Existing Pit; Quarry
- Property

Source: GeoNova

0 120 240 360
Metres

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

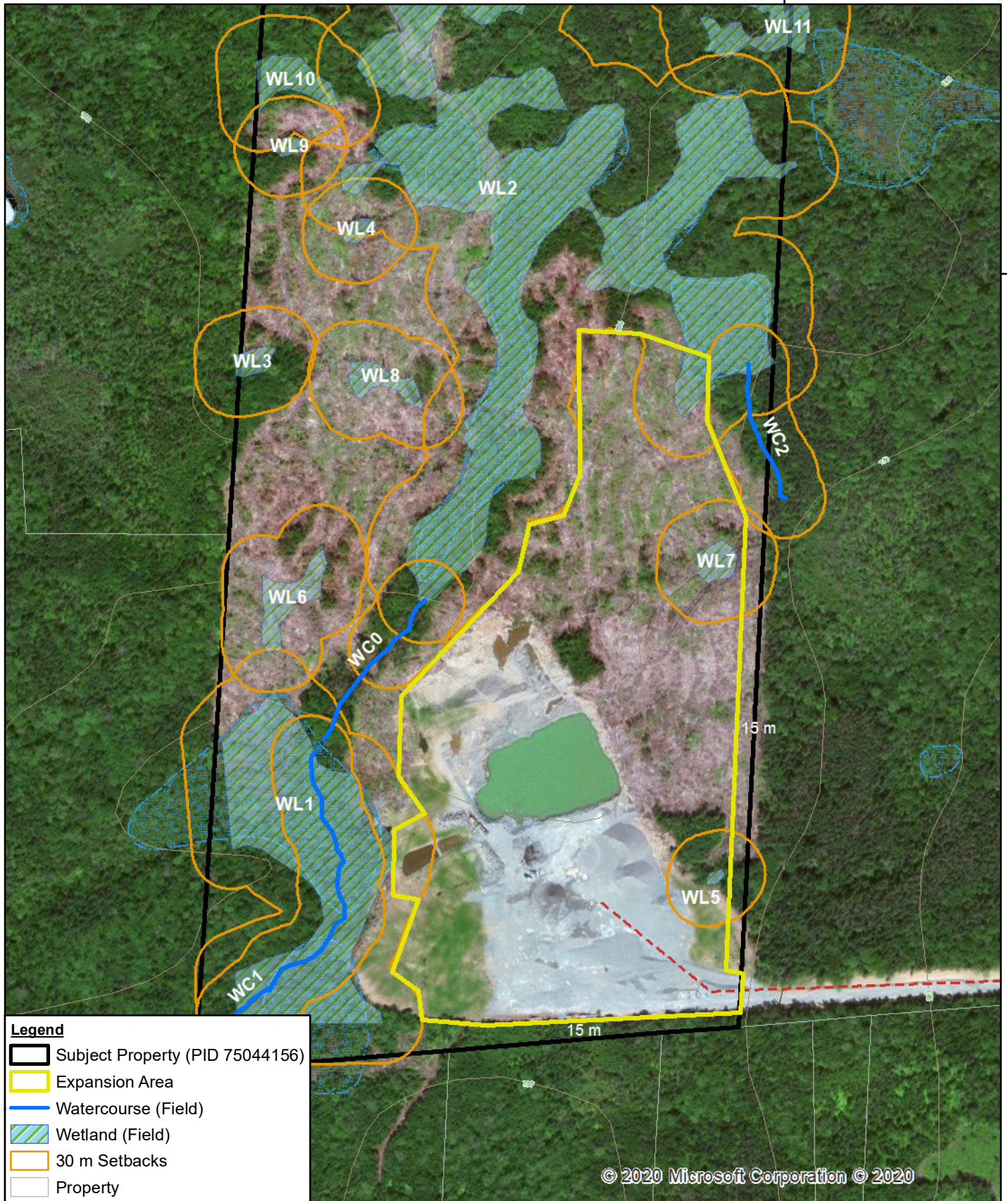


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EXPANSION

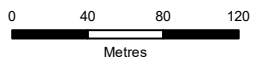
11194492-01
Jun 18, 2020

LOCATION PLAN (AERIAL)

FIGURE 2



Source: GeoNova, GHD, Nova Construction, Bing 2020 Microsoft Corp



Coordinate System:
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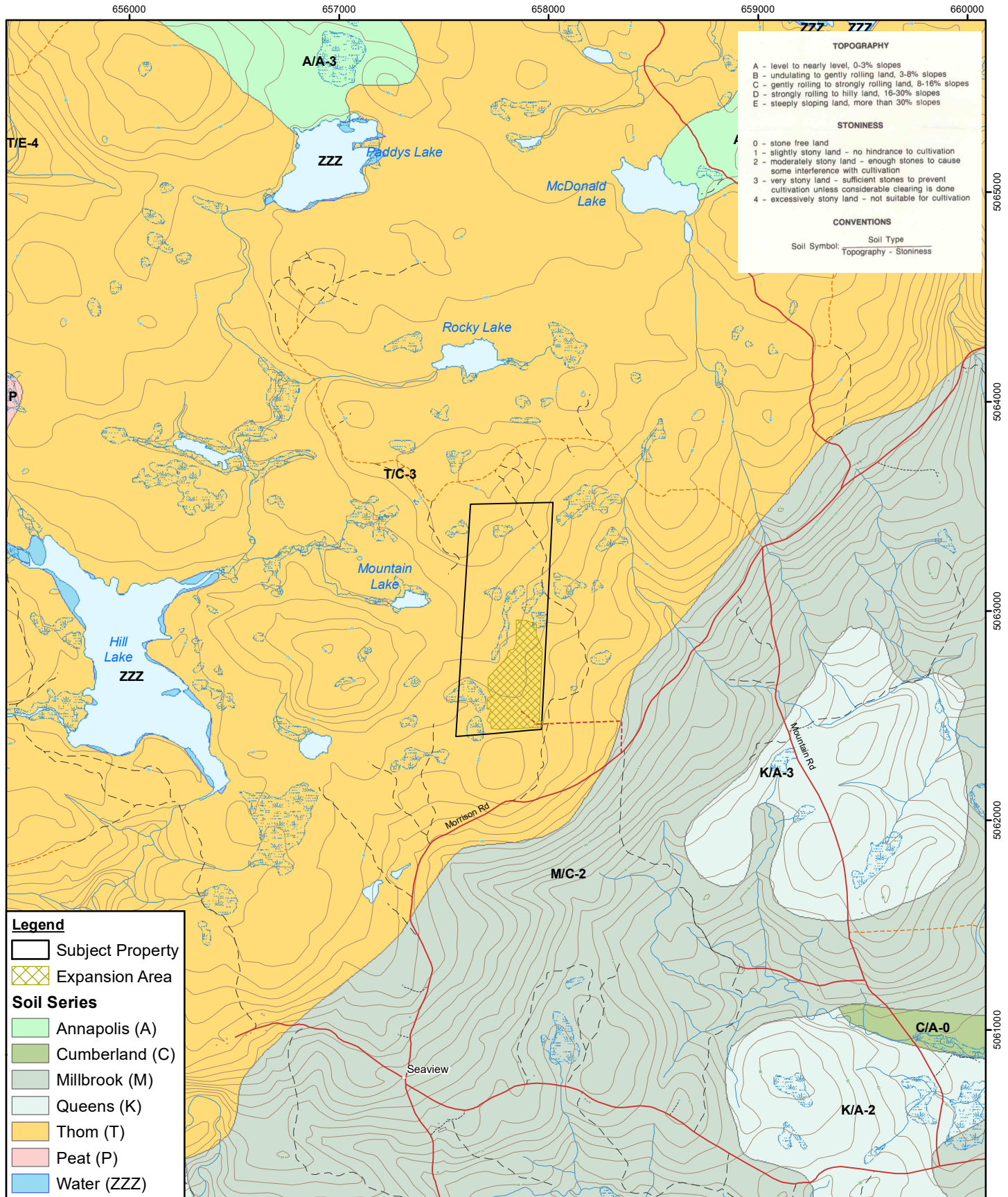


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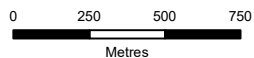
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 May 5, 2020

QUARRY SITE PLAN

FIGURE 3



Source: GeoNova, NSLF



Coordinate System:
NAD 1983 CSRS UTM Zone 20N



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SPORTING MOUNTAIN QUARRY EXPANSION

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REGIONAL SOILS

FIGURE 4

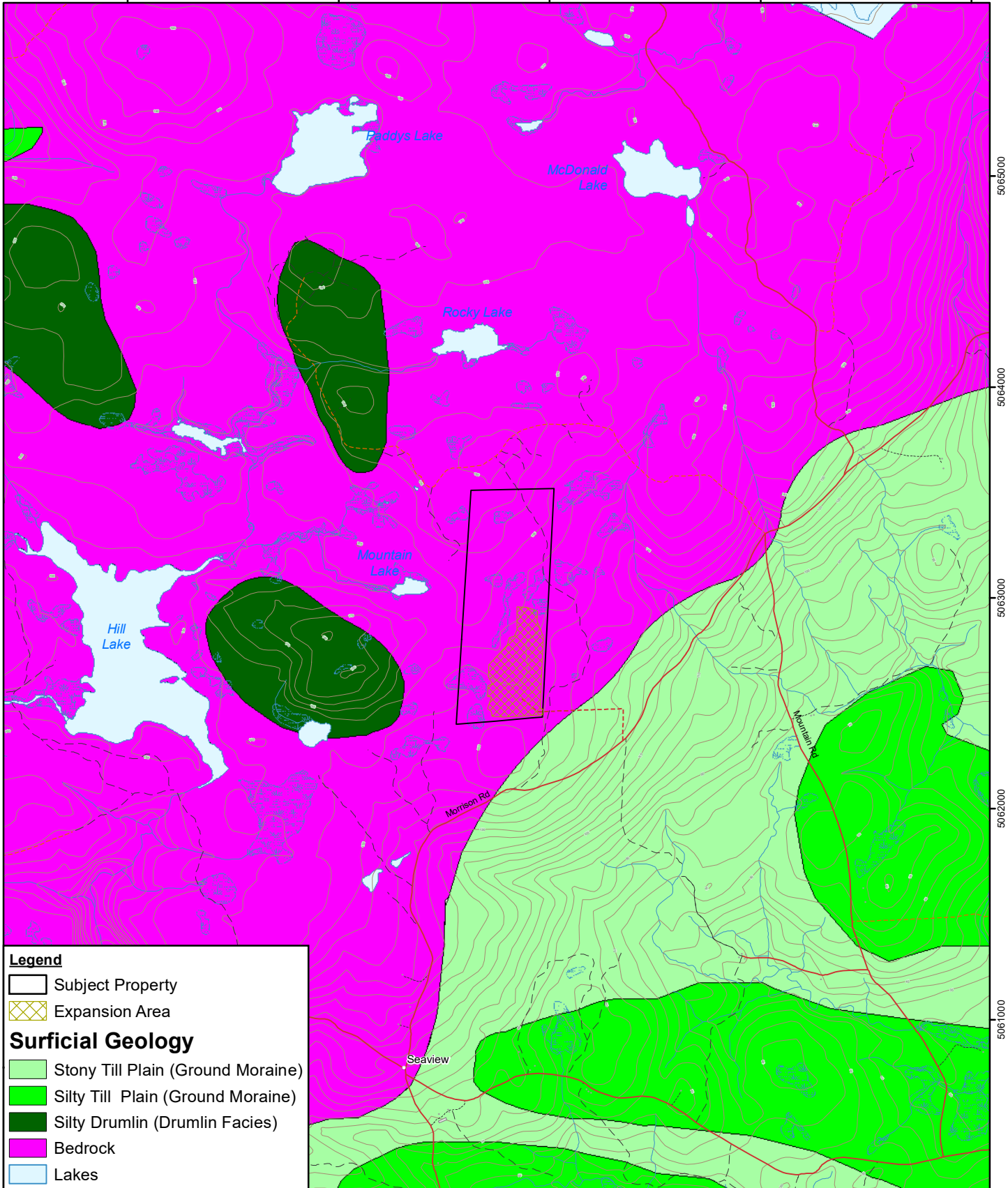
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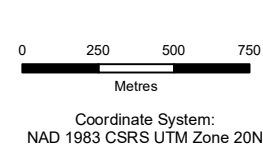
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Source: GeoNova, NSLF

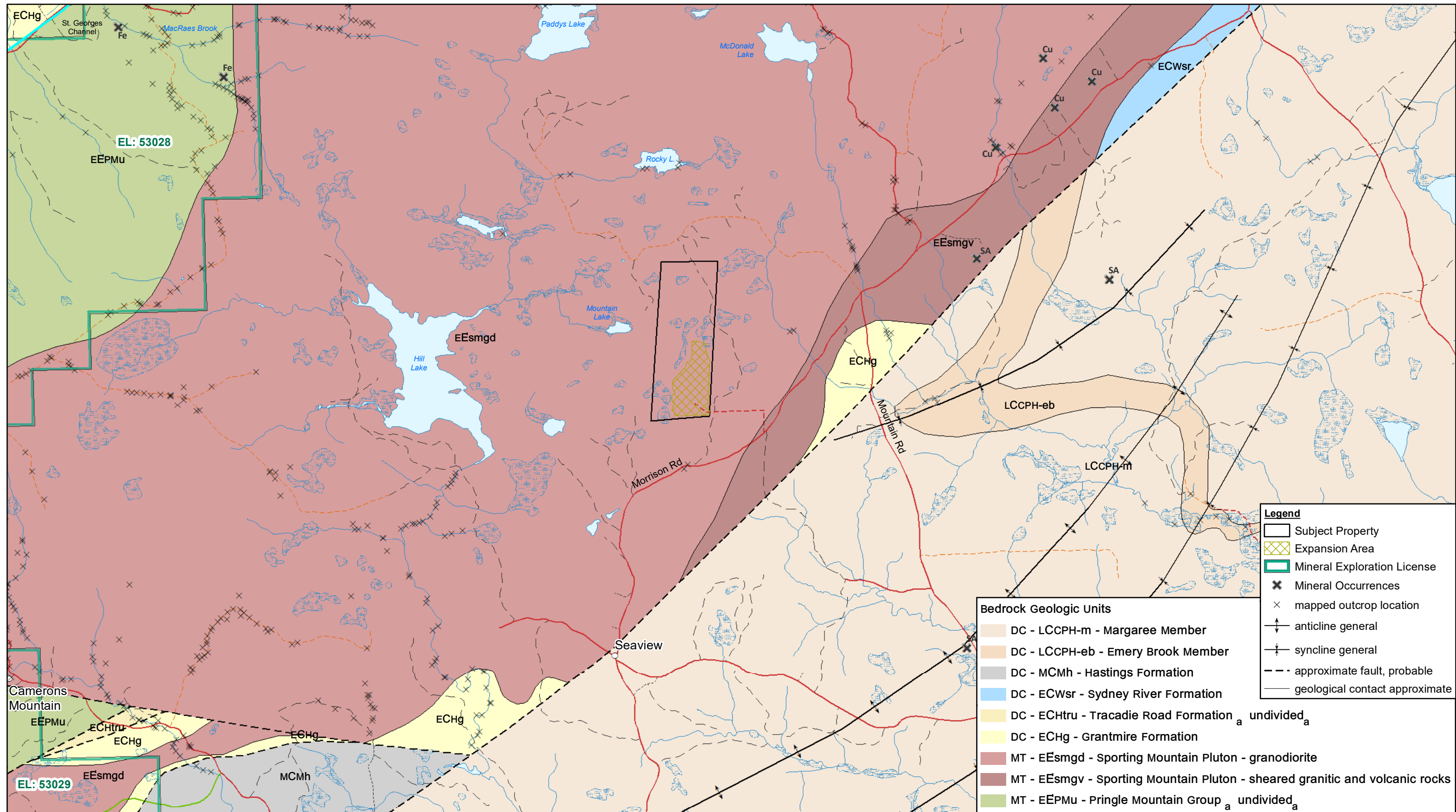


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SPORTING MOUNTAIN QUARRY EXPANSION

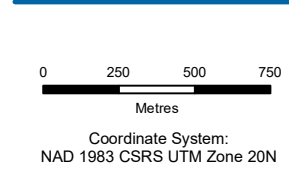
11194492
May 5, 2020

SURFICIAL GEOLOGY

FIGURE 5



Source: NS Energy & Mines

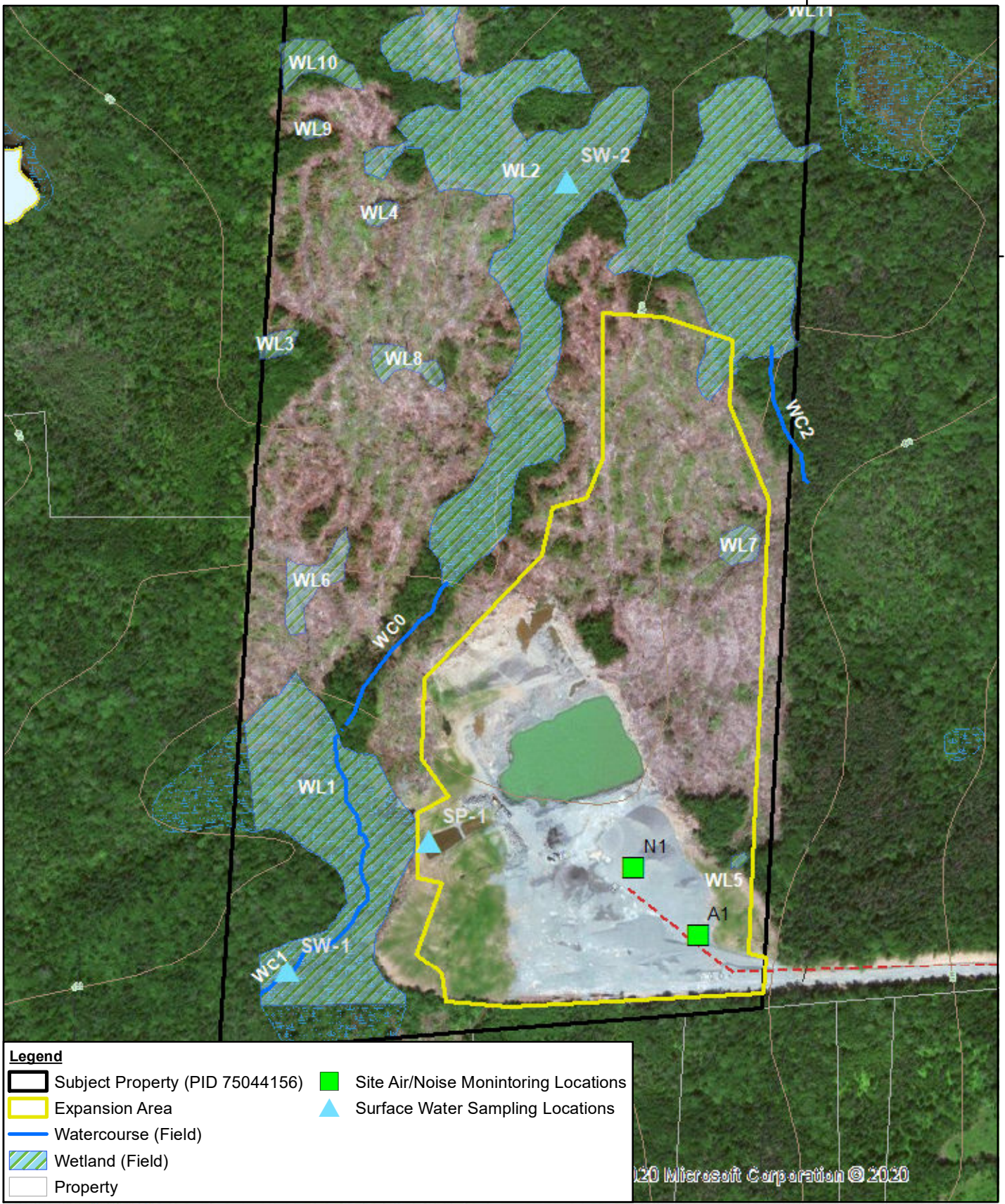


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REGIONAL GEOLOGY

11194492
May 5, 2020

FIGURE 6

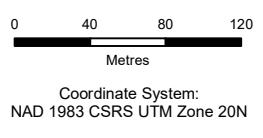


Legend

Subject Property (PID 75044156)	Site Air/Noise Monitoring Locations
Expansion Area	Surface Water Sampling Locations
Watercourse (Field)	
Wetland (Field)	
Property	

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Source: GeoNova, GHD, Nova Construction, Bing 2020 Microsoft Corp



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 SPORTING MOUNTAIN QUARRY
**ENVIRONMENTAL BASELINE
 MONITORING LOCATIONS**

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FIGURE 7



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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