



**DEXTER CONSTRUCTION COMPANY LIMITED
GABARUS QUARRY EXPANSION,
GABARUS LAKE, CAPE BRETON REGIONAL MUNICIPALITY,
NOVA SCOTIA**

**Registration Document for a Class 1 Undertaking Under Section 9 (1)
of the Nova Scotia Environment Assessment Regulations**

February 2020

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 - Existing Industrial Approval
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- Appendix D** Biophysical Assessment Report (Envirosphere 2018/19)
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- Appendix F** Public Consultation Documentation

1.0 INTRODUCTION

Dexter Construction Company Limited (herein after referred to as “Dexter”) of Bedford, Nova Scotia is proposing to expand an existing aggregate quarry located at 605 Grand Mira Gabarus Road, Gabarus Lake, Cape Breton Regional Municipality (CBRM), Nova Scotia. An approval to expand the quarry is required under the Nova Scotia Environmental Assessment Regulations. The registration of this Environmental Assessment (“EA”) is in response to Schedule A of the Environmental Assessment Regulations, Undertaking B.2., “*A pit or quarry that is larger than 4 ha. in area for extracting building or construction stone.*”

Dexter is a private Canadian company. It is incorporated under the laws of Nova Scotia and registered to do business in Nova Scotia under the Nova Scotia Corporations Registration Act. Dexter’s Registry of Joint Stock Certificate is attached in **Appendix A** “Property Information.” Municipal Enterprises Limited is the parent company of Dexter Construction Company Limited and may be referred to within the appendices.

Address:

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Bedford, NS, B4A 3Z2
Phone: 902-835-3381

Proponent Contact:

Gary Rudolph, P. Eng.
927 Rocky Lake Drive,
P. O. Box 48100
Bedford, NS, B4A 3Z2
Phone: 902-832-6346

Consultant Contact:

Mr. J. H. Fraser, M. A. Sc., P. Geo.
H2O GEO Environmental Services Inc.
Phone: 902-497-5597 (Cell)

The Gabarus quarry operates under an existing Industrial Approval (Approval No. 2014-088454-01), which has a current expiry date of November 14, 2024. A copy of the Industrial Approval (NSE File # 92100-30-SYD-2014-088454) is also attached in **Appendix A** “Property Information”.

2.0 THE UNDERTAKING

2.1 Description of the Undertaking

Dexter proposes to expand its existing Gabarus quarry for the production of aggregate, primarily used in the local highway and construction industry. The proposed undertaking (“*the quarry*”) involves the expansion of an existing Nova Scotia Environment approved quarry from a less than four hectare permit area to a 13.0 hectare permit area. A plan showing the dimensions of the existing quarry is included in **Appendix A**. The proposed quarry boundaries are illustrated in **Appendix B**.

2.2 Location

The quarry property is located on private land leased to Dexter at 605 Grand Mira Gabarus Road (PID #'s 15852478 and 15351539) in Gabarus Lake, CBRM, Nova Scotia, 5077530 Northing, 713940 Easting, UTM Zone 20, NAD 83, Air Photo 20080306-251/252, July 7, 2008 (**Figures 1 & 2 (below) and Drawing 1, Appendix B**). The CBRM zoning for these properties is RCB (Rural Cape Breton Zone).

PID 15852478 and 15351539 are adjacent properties leased from Anne Marie MacLean/Matthew Van Larkin and Donald/Veronica MacLean respectively. The proposed 13-hectare quarry permit area covers approximately 5 hectares of PID 15852478 and approximately 8 hectares of PID 15351539.

Figure 1 – Project Location

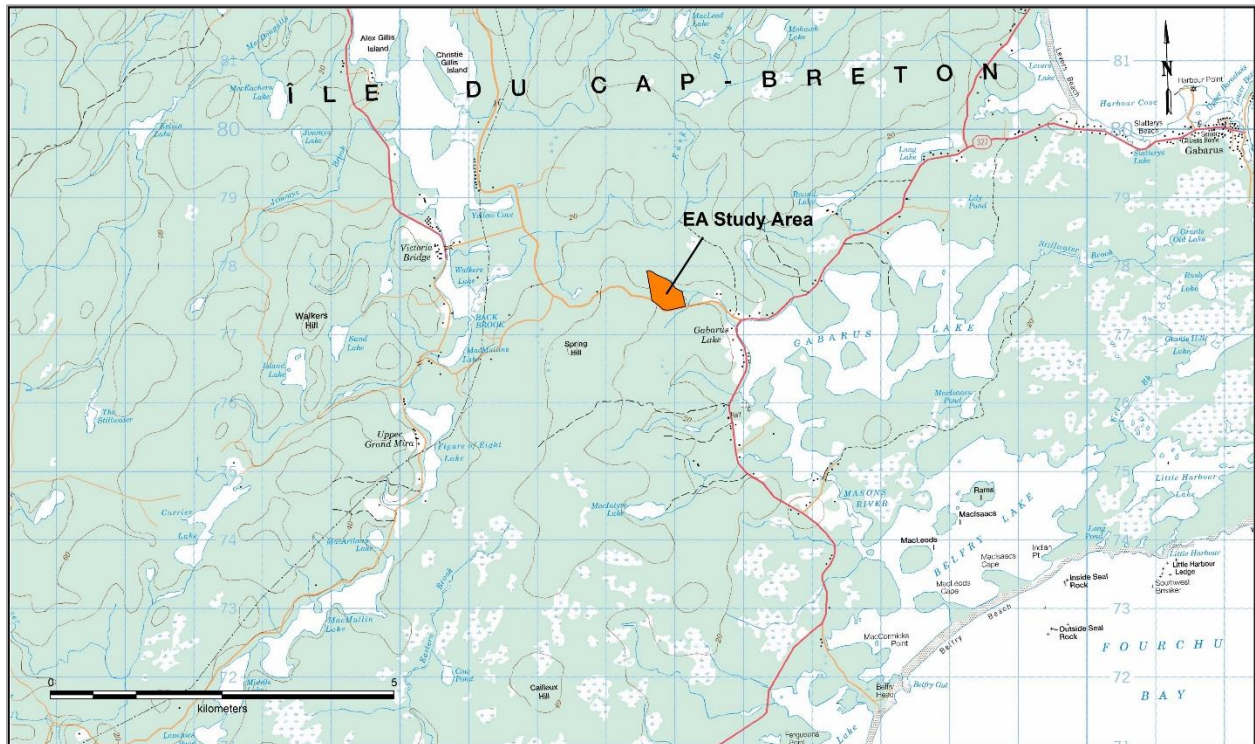


Figure 2 – Site Location and Adjacent Land Uses



3.0 SCOPE OF THE UNDERTAKING

Dexter intends to expand the existing Gabarus quarry for the continuing purpose of extracting and supplying aggregate for the local construction industry. The existing quarry has been in operation for approximately 25 years and is currently operating under a NSE Industrial Approval (2014-088454-01) for a less than four hectare quarry. The scope of this application is for expansion of the existing quarry to a 13.0 hectare permit area. The existing active area includes on-site related facilities including a scale house as well as a staging area for a portable asphalt plant, portable crushing spread, and stockpiling areas. Dexter has a current development agreement with CBRM which allows for the placement and use of the asphalt plant on the property. During past operations, Dexter has extracted an average of approximately 25,000 to 50,000 tonnes of aggregate per year from the quarry during years in which the quarry was active. There are no off-site related support facilities, other than the provincial highway network.

It is Dexter's intent to continue quarry operations on the property, using existing infrastructure. It is anticipated that future operations will involve the extraction of approximately 25,000 to 50,000 tonnes/year for the foreseeable future. However, the annual quantity may vary depending on local demand and associated project requirements.

3.1 Purpose/Need of the Undertaking

Dexter proposes to expand the existing Gabarus quarry for the production of aggregate, primarily used in the road and local construction industry. The primary benefit will be to the people of Nova Scotia via the continued construction and maintenance of the Provincial highway system.

3.2 Consideration of Alternatives

Dexter operates rock quarries throughout Nova Scotia and Atlantic Canada and uses modern industry standard methodologies in all phases of the extraction, processing and delivery processes. Alternative processes are always being considered in terms of their efficiency, cost effectiveness and environmental mitigation advantages. Continuing operations of the Gabarus quarry will be assessed on an on-going basis to ensure that the best available techniques are being utilized in all phases of day to day operations.

3.3 Scope of the Environmental Assessment

The scope of the environmental assessment is in keeping with the Nova Scotia Environment document entitled "Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia" as well as Dexter's experience with respect to similar projects over the past several decades. The scope also takes into consideration that the quarry is, at present, operational, and subject to an existing Industrial Approval. Additional approvals that will be required for the project include amending the existing Industrial Approval, and wetland alteration approvals. No other licenses, certificates, permits, or approvals specific to the proposed quarry expansion are expected to be required for the project. The following sections of this document provide a description of the project and an overview of the human uses and biophysical features of the local environment; outlines the key "Valued Environmental Components" addressed by the EA document; and presents an evaluation and summary of the benefits and potential drawbacks to the environment during all phases of the proposed undertaking.

4.0 PUBLIC INVOLVEMENT

4.1 Methods of Involvement

Dexter has engaged various public entities, as outlined below, and as the EA requirements do not include a direct public involvement program, public notification to date has focussed on notifying local officials and residents of Dexter’s intent to file an EA application to expand the existing Gabarus quarry. In this regard, the following persons have been engaged regarding the intent of this EA document:

Stakeholder	Description of Engagement	Summary of Engagement	Concerns Identified	Concerns Addressed
Kwilmu'kw Maw-klusuaqn Negotiation Office Ms. Twila Gaudet	June 21, 2019 - Notification Letter	<ul style="list-style-type: none"> • Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss 	<ul style="list-style-type: none"> • No concerns received 	N/A
	August 1, 2019 - Letter Response (received via email)	<ul style="list-style-type: none"> • Letter response received from KMK confirming that consultation under the <i>Terms of Reference Mi'kmaq-Nova Scotia-Canada Consultation Process</i> is expected • Requested a copy of the Archaeological Resource Impact Assessment (ARIA) completed for the project 		
	August 14, 2019 - Email Response	<ul style="list-style-type: none"> • Email response to letter received from KMK providing a copy of the ARIA, including an offer to meet to discuss the project. 		
	February 6, 2020 - Notification Letter	<ul style="list-style-type: none"> • Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and electronic copies available for review, deadline for submission of comments, offer to meet to discuss 		
Membertou First Nation Chief Terrance Paul	June 21, 2019 - Notification Letter	<ul style="list-style-type: none"> • Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss • No response received 	<ul style="list-style-type: none"> • No concerns received 	N/A
	February 6, 2020 - Notification Letter	<ul style="list-style-type: none"> • Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and 		

Table 1. Gabarus Quarry Environmental Assessment - Stakeholder Engagement Summary				
Stakeholder	Description of Engagement	Summary of Engagement	Concerns Identified	Concerns Addressed
		electronic copies available for review, deadline for submission of comments, offer to meet to discuss		
Eskasoni First Nation Chief Leroy D.C. Denny	June 21, 2019 - Notification Letter	<ul style="list-style-type: none"> • Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss • No response received 	• No concerns received	N/A
	February 6, 2020 - Notification Letter	<ul style="list-style-type: none"> • Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and electronic copies available for review, deadline for submission of comments, offer to meet to discuss 		
Millbrook First Nation Chief Bob Gloade	June 21, 2019 - Notification Letter	<ul style="list-style-type: none"> • Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss • No response received 	• No concerns received	N/A
	February 6, 2020 - Notification Letter	<ul style="list-style-type: none"> • Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and electronic copies available for review, deadline for submission of comments, offer to meet to discuss 		
Native Council of Nova Scotia Chief Lorraine Augustine	June 21, 2019 - Notification Letter	<ul style="list-style-type: none"> • Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss • No response received 	• No concerns received	N/A
	September 9, 2019 - Meeting	<ul style="list-style-type: none"> • Meeting with NCNS (Dan Jewell, Roger Hunka) to provide an update on the project. Discussed project location, scope of project, anticipated EA timelines. 		
	February 6, 2020 - Notification Letter	<ul style="list-style-type: none"> • Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and electronic copies available for 		

Table 1. Gabarus Quarry Environmental Assessment - Stakeholder Engagement Summary				
Stakeholder	Description of Engagement	Summary of Engagement	Concerns Identified	Concerns Addressed
		review, deadline for submission of comments, offer to meet to discuss		
	February 7, 2020 - Email	• Forwarded copy of Second notification letter via email to Dan Jewell (NCNS)		
Office of Aboriginal Affairs Ms. Gillian Fielding Consultation Advisor	June 21, 2019 - Notification Letter	• Advance notification letter, including brief description of project, summary of findings from CRM Archaeological Screening and Reconnaissance Report, offer to meet to discuss	• No concerns received	N/A
	June 21, 2019 - Email	• Forwarded copy of Notification letter via email		
	July 11, 2019 - Meeting	• Meeting with OAA to provide update on project and discuss First Nation Consultation Approach		
	August 14, 2019 - Email	• Copied OAA on email response to letter received from KMK providing a copy of the ARIA.		
	February 6, 2020 - Notification Letter	• Second notification letter, including EA registration date, copy of public notice and publish locations, location of hard and electronic copies available for review, deadline for submission of comments, offer to meet to discuss		
	February 7, 2020 - Email	• Forwarded copy of Second notification letter via email		
Local Community - Elected Officials Mr. Brian Comer MLA - Sydney River / Mira / Louisbourg	September 13, 2019 - Meeting	• High level discussion on the EA process and scope of the proposed quarry expansion.	• General questions regarding production volumes and truck traffic. • Requested to be notified of concerns from local stakeholders. • No concerns received	N/A
	February 5, 2020 - Email	• Email to notify of registration date and placement of public notices.		
Local Community - Elected Officials Mr. Ivan Doncaster Councilor - CBRM Distric 7	September 13, 2019 - Meeting	• High level discussion on the EA process and scope of the proposed quarry expansion.	• General questions regarding production volumes and truck traffic. • No concerns received	N/A
	February 5, 2020 - Email	• Email to notify of registration date and placement of public notices.		

Stakeholder	Description of Engagement	Summary of Engagement	Concerns Identified	Concerns Addressed
Local Community - Elected Officials Mr. Alfie MacLeod MP Candidate Former MLA - Sydney River / Mira / Loisbourg	September 16, 2019 - Email	<ul style="list-style-type: none"> • Email notification, including a brief history of quarry, description of project, overview of EA process, offer to meet to discuss further. • No response received. 	<ul style="list-style-type: none"> • No concerns received 	N/A

With respect to the First Nations Community, Dexter has followed the Proponent’s Guide: The Role of Proponents in Crown Consultation with the Mi’kmaq of Nova Scotia. In this regard Dexter has advised Chief Terrance Paul (Membertou); and Chief Leroy D. C. Penny (Eskasoni) of its intent to file the Registration Document for a Class 1 Undertaking under Section 9 (1) of the NS Environmental Assessment Regulations in a letter dated June 21, 2019. Dexter also sent this letter to Ms. Twila Gaudet of the Kwilmu’kw Maw-klusuaqn Negotiation Office (KMKNO), Chief Lorraine Augustine of the Native Council of Nova Scotia, Chief Bob Gloade of Millbrook First Nation, and Ms. Gillian Fielding of the Office of Aboriginal Affairs. A copy of this letter is included in **Appendix F**. A follow up letter was also sent to all noted First Nation representatives on February 6, 2020 advising of the EA registration date, public viewing locations, and timelines for the submission of comments. A copy of these letters is included in **Appendix F**. No concerns regarding the project have been received from the First Nations Community to date. Dexter will continue to liaison with the First Nation Community when appropriate, and forward any comments received regarding the Project to NSE.

4.2 Public Concerns

No public concerns regarding the project have been received to date. General questions regarding production volumes and truck traffic were received from local community elected officials, who also requested to be notified should Dexter receive any concerns from local stakeholders and community members. Dexter will document any concerns received during the public consultation portion of the EA process, and provide a copy to NSE.

4.3 Future Steps

The public will be notified of the EA Registration by an advertisement in the Chronicle Herald and the Cape Breton Post on March 3, 2020. A copy of the newspaper advertisement is included in **Appendix F**.

5.0 DESCRIPTION OF THE UNDERTAKING

5.1 Existing Quarry Operations

The existing quarry operations involve blasting, crushing, and stockpiling of aggregate and associated trucking on an as required basis. In addition, a portable NSE approved asphalt plant is occasionally situated on the property. The quarry is operated in accordance with an existing Industrial Approval (Approval No. 2014-088454-01), which was most recently amended and re-

issued on August 21, 2017 by NSE. A copy of the Industrial Approval (NSE File # 92100-30-SYD-2014-088454) is also attached in **Appendix A**. The quarry also operates in accordance with the Nova Scotia Pit and Quarry Guidelines. These Guidelines apply to all pit and quarry operations in the Province and provide separation distances for operations, including blasting, liquid effluent discharge limits, suspended particulate matter limits, sound level limits and requirements for a reclamation plan and security bond. Dexter is committed to the utilization of Best Management Practices in all phases of their operations, including the on-site management of air quality, greenhouse gas emissions, noise, dust, and water quality and will operate in accordance with applicable Federal and Provincial legislation and standards.

Blasting, crushing and trucking of aggregate products have occurred on an as-required basis, with blasting occurring on an average of one to two times per year for years in which the site is active. As the quarry expands, surface water controls will be maintained and associated surface water monitoring will be implemented to ensure that surface water leaving the site meets all applicable water quality guidelines

With respect to the characteristics of the quarry bedrock, Dexter arranged for the collection and analysis of a rock sample for sulphur content to determine if the material was sulphide bearing. The results of this analysis yielded a sulphur concentration of 0.009 % (0.29 kg H₂SO₄/tonne), which is well below the minimum (0.4 % S; 12.51 kg H₂SO₄/tonne) defined by NSE as sulphide bearing material and is therefore not acid producing. The laboratory results of this sample, and an associated lab duplicate, are included in **Appendix C**.

5.2 Future Quarry Operations

Dexter proposes to expand the Gabarus quarry for the extraction, storage and removal of aggregate, primarily used in the road and local construction industry. This EA is focussing on current needs, but also future needs; therefore Dexter is requesting the EA approval for approximately 13.0 hectares, which includes a production and operational footprint, storage (stockpiles) and provisions for surface water control.

Although totally dependent on local market conditions, it is anticipated, at this time, that future development will involve the production of approximately 25,000 to 50,000 tonnes of aggregate per year, for a period of approximately 20 to 40 years. The quarry highwall would be initially advanced in a west-northwest direction from the existing face (**Drawing # 2, Appendix B**). **Drawing # 2, Appendix B** identifies the total 13.0 hectare expansion area.

Quarry operations will generally coincide with the road construction season; therefore it would be reasonable to anticipate periodic, seasonal operations within a similar time frame (April – December). The quarry will operate when and as required within the typical 32 week construction season, depending on local demand and project requirements. A typical project (often an NSTIR Contract) will require crushing activities at the quarry for a period of two to three weeks at a time. During crushing activities the site may be operated 24 hours per day, possibly 7 days per week. Following crushing activities, aggregate products would be loaded and hauled from the quarry for several weeks, or as required by the project. During load and haul activities the site is typically operated during daylight hours (approx. 12 hours per year), possibly 7 days per week. Dexter is committed to the utilization of Best Management Practices in all phases of their operations, including the on-site management of air quality, greenhouse gas emissions, noise, dust and water quality, and will operate in accordance with applicable Federal and Provincial legislation and standards.

Consistent with current operations, aggregate production would commence with drilling and blasting, utilizing a qualified blasting contractor to conduct this work. The blasting contractor would be responsible for blast designs and methods in accordance with the General Blasting Regulations contained in the Nova Scotia Occupational Health and Safety Act, 1996. Blasting would also be conducted in accordance with the Pit and Quarry Guidelines. Blasting and noise level guidelines respecting the time of day/day of the week will be followed and blast monitoring will be conducted for every blast event. The existing Industrial Approval stipulates blasting control and monitoring requirements.

The blasted rock will be excavated with an on-site excavator and processed by on-site portable crushing equipment. The various aggregate products will be stockpiled in designated areas within the quarry. Material, within the quarry, will be hauled and moved with a front-end loader. Products will be transported from the quarry via tandem and tractor trailer trucks via the Grand Mira Gabarus Road and will be routed as necessary through the provincial highway and roadway network to support local projects. The number of trucks hauling aggregate will be determined on a job by job basis, however as the site is not expected to increase in level of activity, trucking activity is not expected to increase from past use. Employment numbers are also not expected to vary significantly from past use.

It is important to note that aggregate excavation will not take place below the current quarry floor elevation and therefore will not intercept the deep bedrock water table. In addition, there will be no pumping of groundwater and therefore no dewatering of associated bedrock aquifer.

6.0 EXISTING ENVIRONMENT

6.1 Physical Environment

6.1.1 Climate and Winds

The Gabarus Quarry study site is a moderately exposed, low elevation location, approximately 7 km from the Atlantic Coast and therefore influenced strongly by onshore winds and sea temperatures. The marine influence leads to the occurrence of short cool summers and relatively mild, wet winters (Webb and Marshall 1999). Average daily temperatures are moderate¹ ranging from a low of -5.2 °C in February to 17.6 °C in August (Canadian Climate Normals 2019 (Figure 3)). The area has a high annual average precipitation of 1646 mm (measured at Louisbourg), about 15% coming as snow, mainly in January-February (Canadian Climate Normals 2019). Rain falls predominantly in April – May and secondarily in October-November. Extreme daily precipitation events can be expected, as in most parts of Nova Scotia, in particular due to a tendency for more extreme weather events to occur as a result of global climate change. A high daily rainfall of 112.8 mm was recorded in Louisbourg in October 2000. Fog is common, associated with southerly winds, and is a major problem in coastal areas, particularly in late spring and early summer (Environment Canada 2016), leading to visibilities of 0.3 km or less 10-20% of the time. Wind patterns are similar to other locations on the east coast of Nova Scotia—generally strongest in winter, predominantly from the west and south quadrants, occurring mainly from the west (November-February), shifting to north and northwest (February-April), and southwest (spring to late summer, May-August), and returning to the west in September-October (TDC Atlas

¹ Climate conditions are measured at Louisbourg and summarized for 1981 to 2010 (Canadian Climate Normals 2019).

1991). In particular the site is potentially exposed to winds in strong north easterly gales which move along the Nova Scotia coast predominantly in winter. Southerly sea breezes are a feature of weather at the site (Environment Canada 2016).

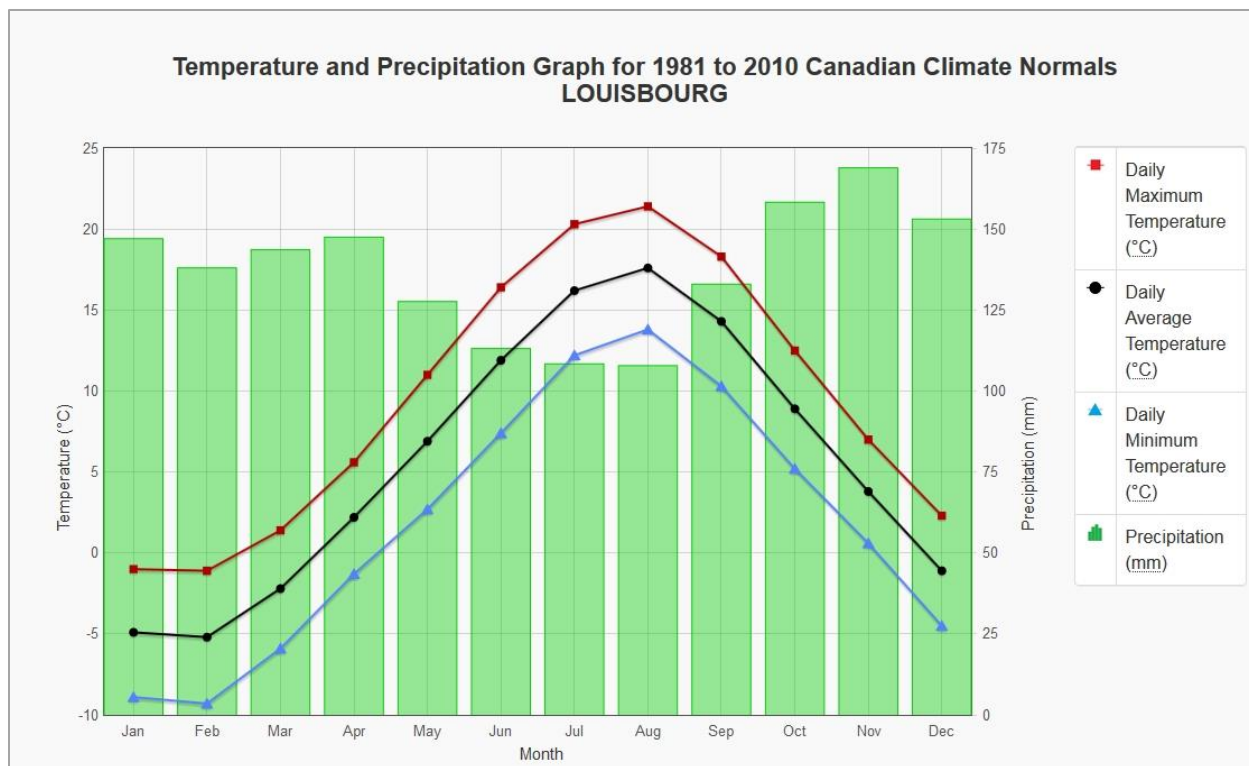


Figure 3. Annual precipitation and temperature cycle, Louisbourg (1981-2010) (Canadian Climate Normals 2019).

6.1.2 Topography and Geology

Landscape

Gabarus Quarry is located near the southeast coast of Cape Breton Island, on the level to gradually sloping Atlantic coastal plain which extends from Mira Bay to Point Michaud and Red Head near Isle Madame (Davis and Browne 1997). The landscape is gently rolling over varying depths of surficial glacial till deposits, covering the generally level bedrock strata in the area, punctuated by occasional higher elevations in drumlins which are scattered through the area (Figures 4 & 5). Elevations reach approximately 40 m above sea level at the quarry site. Low elevations near the Atlantic coast lead to the formation of irregular coastal lakes and shallow embayment's protected by coastal barrier beaches such as Gabarus Bay and Belfry Lake (Figures 6 & 7). Mixed forest dominated by softwoods form the predominant cover (Figures 4 & 5), and lately logging has created extensive areas of clear cut, while there are limited lands developed as agricultural fields and other open areas, largely restricted to the vicinity of occupied properties (Appendix D, Maps A-2 & A-3).



Figure 4. Forest landscape at Gabarus Quarry, June 2019.



Figure 5. Topography at Gabarus Quarry, June 2019.



Figure 6. Coastal barrier at Harris Beach along Gull Cove Hiking Trail, Gabarus Wilderness Area, located approximately 12 km east of Gabarus Quarry. June 11, 2019.



Figure 7. Cobble beach at MacGillivray's Cove, Gabarus Bay, Gabarus, located approximately 10 km east of Gabarus Quarry. June 11, 2019.

Bedrock Geology

Bedrock at the site is predominantly Fourchu Group, Main-a-Dieu and Stirling group volcanics (tuff, basalt, rhyolite) and metamorphosed sedimentary rocks (slate, quartzite and greywacke) (Barr et al. 1996). These formations are overlain by Carboniferous age rocks to the west in the vicinity of Mira River and immediately to the east towards Gabarus Lake (Figure 8) where conglomerate, limestone, shale and sandstone of the Grantmire Formation of the Windsor Group occur (Keppie 2000; Weeks 1954; Weeks and Cameron 1954).

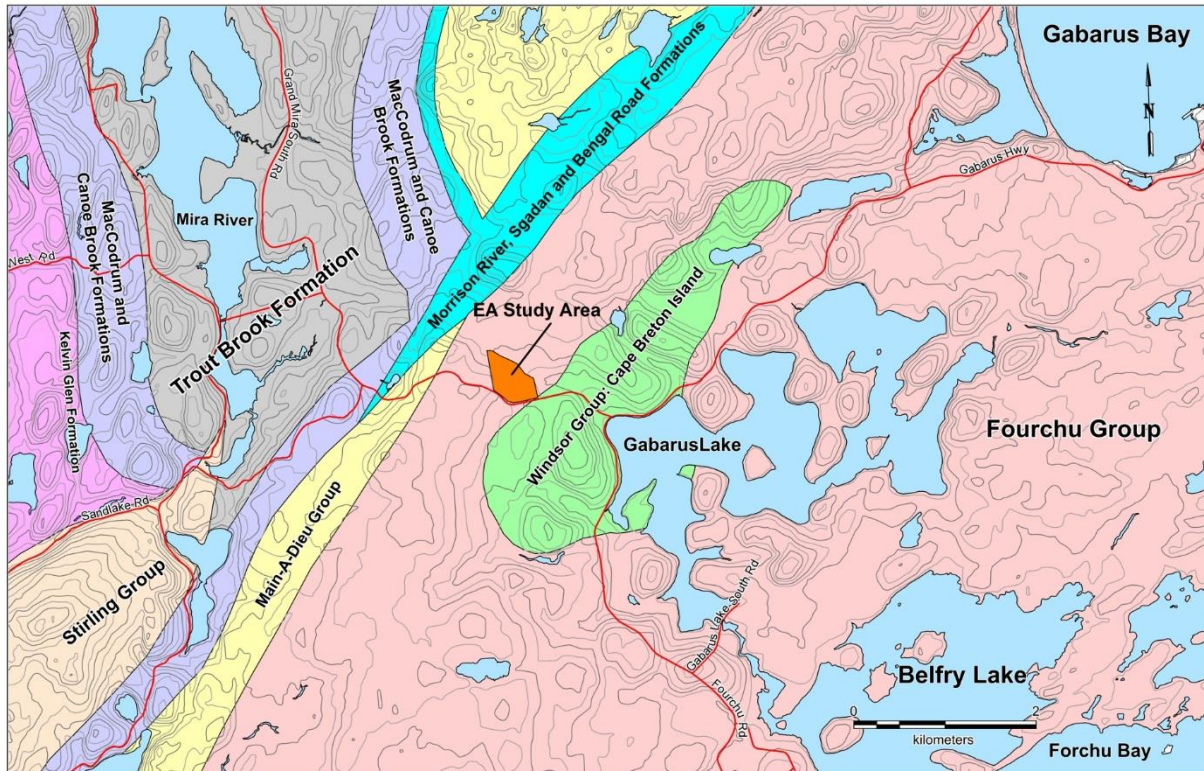


Figure 8. Bedrock formations in the vicinity of the Gabarus Quarry (Keppie 2000).

Surficial Geology

Landscape in the area is a gradually sloping to slightly rolling till plain incised by local watercourses and punctuated by locally prominent drumlin features. Surface material is shallow to moderately deep over bedrock depressions and in drumlins, and bedrock is often exposed (Figure 9). Surficial material is a mixed till derived from local bedrock and organic deposits (peat) through influence of wetlands and peatland features (Figure 9).

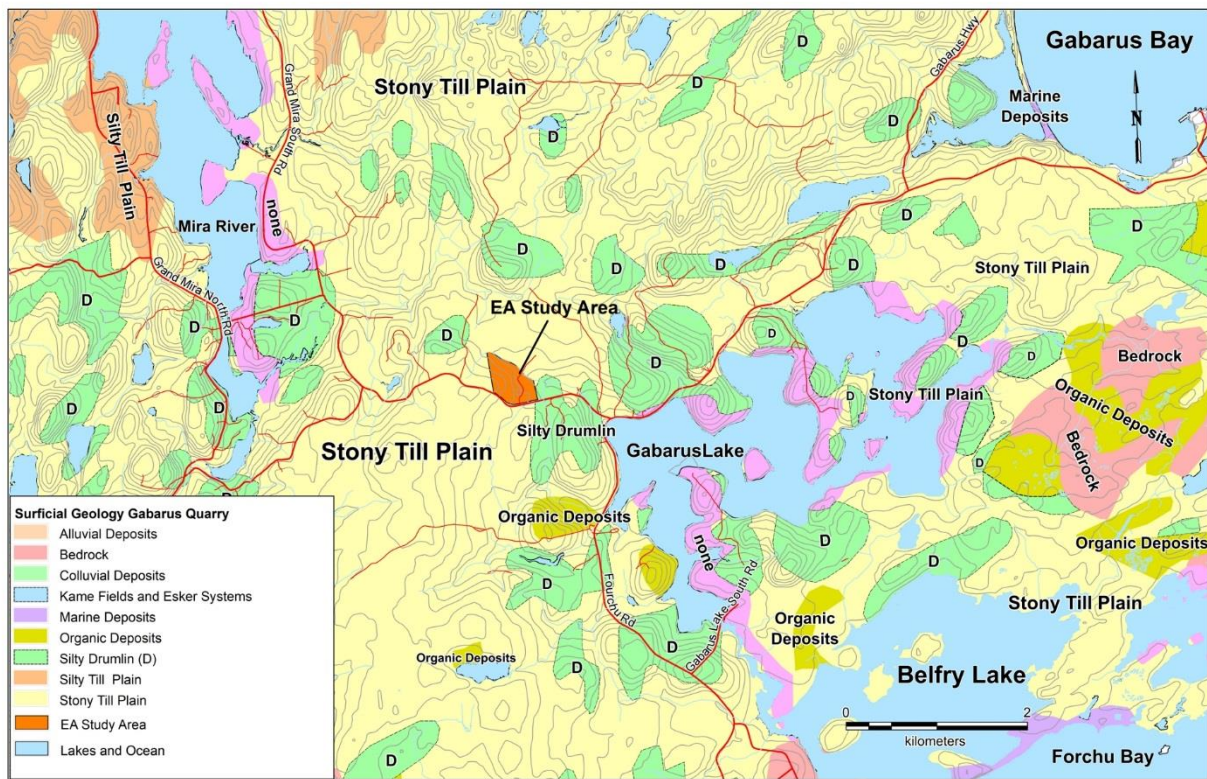


Figure 9. Surficial geology of the study area. From Stea et al. (1992) and digital version (2016).

6.1.3 Air Quality, Noise & Light

The Gabarus Lake area experiences low levels of artificial light, low levels of ambient noise, and high air quality. There are few sources of artificial light in the area; ambient noise levels reflect local vehicle traffic and operations of the quarry; and air quality is expected to be good due to the rural location and predominantly forested setting.

House and yard lights as well as vehicle lights are the main sources of artificial light at the site. However due to the few residences near the site and the low traffic volumes, light from local residences and traffic traveling on the secondary Gabarus Grand Mira Road, are expected to be minor sources. Lights at the quarry, as well as 'skyshine' from operations when low cloud occurs, can probably be seen from a distance including offshore areas; however nearby residents of Gabarus Lake interviewed noted that light from the quarry was not noticeable while it was in operation.

The Gabarus Lake area is expected to have a relatively high natural baseline air quality typical of areas with high proportions of natural landscape such as neighbouring forested wilderness areas to the west. Low levels of human activity, including vehicle traffic along the Gabarus Grand Mira Road, as well as that associated with quarry activities, have little impact on overall air quality at the site. The Grand Mira Gabarus Road is the main road that passes by the site and vehicle use is relatively low along this route. As a gravel road, it is expected that dust will be generated by vehicles traveling along it. Fourchu Road, a paved highway joining the communities Fourchu and Gabarus along the eastern coast of Cape Breton, passes approximately 1 km east of the site. Periodic dust and vehicle exhaust emissions from quarry activities as well as regular residential vehicle traffic are the main contributors to particulates and exhaust emissions, which are expected to be at low levels. A resident of Grand Mira Gabarus Road between the quarry and the Fourchu Road indicated that dust was not a significant issue.

The scope of operations, including annual usage, for the quarry are not expected to change and ambient noise levels in general are expected to be low due to the relatively isolated location of the quarry. Peak vehicle noise on the highway is expected to coincide with vehicle traffic patterns. Peak traffic and noise levels through the day, as well as seasonal (summer) peaks in traffic noise corresponding to tourist activities, are expected. Occasionally, operations at the quarry can be heard from nearby Gabarus (about 5 km northeast)(F. Carswell, local resident, pers. comm., July 2019). The quarry and associated movement of trucks and equipment would continue to provide a minor and periodic source of noise in the area and noise levels reaching the nearest residences are minor². Operations at the quarry are periodic in response to demand for product and are likely one of the main noise sources in the area. Blasting occurs typically one to two times per year; operation of a portable crusher and heavy equipment may take place periodically and add to noise levels when the quarry is in operation; a portable asphalt plant may operate at the site periodically; and trucks are used to transport the product and move the portable equipment as required. Typical noise includes blasting and sounds from crusher and other heavy equipment operations (e.g. motors, generators, back-up signals etc.). All trucks leaving the site are required to follow Company best operational practices, as well as those established by Truckers Association of Nova Scotia (TANS) and the Nova Scotia Road Builders Association (NSRBA), to minimize

² Residents interviewed did not indicate a problem with operational noise from the quarry. Noise from engine braking was not noted to be a problem at the intersection of Gabarus Grand Mira Road and Fourchu Road (J. Hancock, local resident, pers. comm. 2019).

emissions. Noise levels arising from the quarry in the future will continue to meet the limits established in the Pit and Quarry Guidelines and are expected to be consistent with those produced by the existing quarry operations at the site.

6.1.4 Hydrology

Gabarus Quarry is located in headwaters of a permanent, first order, unnamed stream in the 1FJ-SD12 secondary watershed which drains through Gabarus and Belfry Lakes into Fourchu Bay in the Atlantic Ocean (Figure 1, 10 & 11). Catchment area above the quarry is approximately 0.5 km², which is 1% of the watershed as a whole. Major contributors to flow are expected to be surface water runoff and groundwater flow. The unnamed stream is formed from two small tributaries located north and south of the quarry and joining northeast of it (Appendix D, Map A-2 and Map A-5). The watershed of the two tributaries above the junction is approximately 1.1 km² in area (0.6 km² for the northern and 0.5 km² for the southern tributary) (Appendix D, Map A-5).

Slope and surface water runoff from the quarry site is predominantly northeast with a small component draining southeast and east. The quarry floor drains east, exiting at the northeast corner via a constructed subsurface French drain into several small wetlands and then into a wetland complex through which both northern and southern tributaries flow. Some runoff also originates from precipitation reaching the outer slopes of berms and grubbings piles which surround the quarry. In addition, some precipitation is expected to continue to enter the water table by percolation through the quarry floor where it will contribute to groundwater flow towards the streams. The area proposed for expansion drains mainly northeast towards the northern tributary and the proposed expanded quarry footprint of 13.0 ha makes up approximately 15% of the watershed area of the northern tributary. Surface water drainage on the south between the quarry and the Grand Mira Gabarus Road is southeast to east and is blocked by the Grand Mira Gabarus Road and where it enters a ditch and flows east, eventually to join the south tributary. Precipitation and associated groundwater flows are expected to be highest in spring (April-May) and fall (October-November).



Figure 10. Unnamed stream at northwest corner of study area, Gabarus Quarry, June 12, 2019.



Figure 11. Unnamed stream downstream of Gabarus Quarry, June 12, 2019.

6.1.5 Hydrogeology

Groundwater develops predominantly subsurface in cracks and fractures, on horizontal surfaces between strata in bedrock, and in till which can accumulate to significant depth at some locations in the area. The water table at the site is expected to be considerably below the floor of the quarry. Most precipitation reaching the quarry leaves via the quarry drainage system and a small proportion enters the groundwater as seepage through cracks and fractures. There is one confirmed drilled well within 800 m, but no wells listed in the NS Well Log database within approximately 1 km of the site.

The site is immediately underlain by unconsolidated surficial materials specifically glacial till with a stony, sandy matrix derived from local bedrock sources, and the depth to bedrock at the site is small. Where drumlins occur, the matrix is siltier due to erosion and incorporation of older till units by glaciers. The till plain is estimated to be between 2 and 20 meters thick, whereas the drumlin overlain areas may be between 4 and 30 meters thick (NS Department of Natural Resources, (Stea et al 1992).

Bedrock in the general area consists of igneous and metamorphic rocks and subsurface flow is likely to be through fractures in the bedrock. Surficial and shallow groundwater flow is anticipated to mirror the topographic slope, which is towards the north and northeast. It is anticipated that the bedrock aquifer will exhibit fracture flow. Some precipitation is expected to percolate through cracks and spaces in the quarry floor.

Potable water wells in the general vicinity will utilize the deeper bedrock groundwater regime, although locally, dug wells potentially could support adequate flows. Both drilled and dug wells are variously used by residents in the Gabarus Lake area. The actual depth of the bedrock water table at the quarry site is not known, but it has not been encountered during previous quarry operations, and it is not anticipated that the quarry expansion will reach the bedrock water table.

6.1.6 Soils

The site is located on Thom soils—well-drained, pale brown sandy loams developed from till derived from local metamorphosed volcanic and sedimentary bedrock. Topography is rolling with gradual slopes, and soils are typically stony, often forming a shallow layer over bedrock or coarse subsurface deposits (Cann et al 1963). Millbrook soils extend to near the study site from the vicinity of Gabarus Lake. In contrast to the Thom soils, these are imperfectly drained, dark reddish brown gravely clay loams which are moderately stony, occurring on rolling topography. Neither soil type is particularly suited to agriculture, and typically have been used for pasture.

6.2 Biological Resources and Habitat

6.2.1 Terrestrial Environment

The study site is located in the southeastern lowlands of Cape Breton near the Atlantic Coast where the damp and cool environment leads to the development of mixed and coniferous forests dominated by Balsam Fir, Larch, White Spruce, Red Maple and White Birch, which are common throughout much of coastal Nova Scotia. Much of the forest has been cut and is currently in stages of cutting. Low relief and gradual slopes over poorly drained soil lead to a patchwork of forest communities related to elevation and drainage, favouring development of wetlands in many areas (Davis and Browne 1997) (Appendix D, Map A-4).

Around the margins of the quarry, where forest cover has been removed and drainage has been affected by quarry activities, a disturbed vegetated community occurs. These modified areas either drop abruptly or are level to gently sloping down to the surrounding woodland and are usually mesic or moderately dry and vegetated with a mixture of graminoids (grasses), forbs and scattered shrubs and young trees (Figure 12). One of these modified areas on the east side of the quarry had a small area of wet open marsh habitat (Figure 13) with drainage occurring eastwards. Common species in the marshy area included Broad-leaved Cattail (*Typha latifolia*), Speckled Alder (*Alnus incana*, spp. *rugosa*), Purple-stemmed Aster (*Symphyotrichum puniceum*), Balsam Willow (*Salix pyrifolia*) and Soft Rush (*Juncus effusus* s.l.).

In other parts of the disturbed area surrounding the quarry, remnants of pre-existing wetlands (prior to Dexter's quarry operations) were evidenced by the occurrence of Large Cranberry in a sphagnum dominated area; and woodland areas apparently flooded due to diversion of surface flow by quarry berms (see Section 4.2.3) (Figures 14 & 31).



Figure 12. Mesic buffer zone between quarry (on left) and woodland.



Figure 13. Marshy buffer zone between quarry (on left) and woodland.

Much of the quarry expansion area is occupied by mixed and coniferous mesic woodland (woodland with a moderate amount of moisture present in the soil/substrate). Mesic woodland, both mixed (mixture of deciduous and coniferous species) (Figures 15 & 16) and coniferous (Figure 17), occurs primarily in the southeast corner of the survey area and on the lower west side of the property. Mixed woodlands had an overstorey of Balsam Fir (*Abies balsamea*), White Spruce (*Picea glauca*), Red Maple (*Acer rubrum*) and White Birch (*Betula papyrifera*) with occasional Larch (*Larix laricina*) present. Common shrubs included several blueberry species including Lowbush Blueberry (*Vaccinium angustifolium*) and Velvet-leaved Blueberry (*V. myrtilloides*), as well as Lambkill (*Kalmia angustifolia*) and Mountain Holly (*Ilex mucronata*). Common herbaceous species present included Bunchberry (*Cornus canadensis*), Twinflower (*Linnaea borealis*), Cinnamon Fern (*Osmundastrum cinnamomeum*), and Starflower (*Lysimachia borealis*). Common mosses in these woods included Schreber's Red-stemmed Feather Moss (*Pleurozium schreberi*) and Stair Step Moss (*Hylocomium splendens*). The coniferous woodland areas generally were occupied by Balsam Fir, White Spruce, and Larch with limited herbaceous ground cover and similar mosses present as in the mixed woodland. Both habitats described above have scattered to occasional damp pockets of sphagnum moss (*Sphagnum* spp.) (Figure 18). Regenerated coniferous forest (Balsam Fir) occurs on the western margin of the quarry expansion area (Figure 19).



Figure 14. Wet flooded mature woods on edge of disturbed area near northwest quarry berm, June 10, 2019.



Figure 15. Mixed, mesic woodland with both coniferous and deciduous trees present and a variety of herbaceous plant species. Dominant mosses in this habitat include Red-stemmed Feather Moss (*Pleurozium schreberi*) and Stairstep Moss (*Hylocomium splendens*) (R. Newell).



Figure 16. Mixed wood showing paper birch (*Betula papyrifera*) and balsam fir (*Abies balsamea*) with the wood fern *Dryopteris intermedia* (N. Hill).



Figure 17. Mesic coniferous woodland showing general scarcity of herbaceous species on the forest floor with mosses as dominant ground cover (R. Newell).



Figure 18. One of several damp woodland openings north of the current quarry footprint (R. Newell).



Figure 19. Coniferous forest on west side of study area, June 12, 2019.

Open woodland (woodland with scattered openings from which the overstorey has been removed, occurs in several small openings in the northwest section of the quarry expansion area (Figure 20). These openings have conditions ranging from mesic to somewhat boggy or damp. Forest openings may be the result of past disturbance such as localized cutting for hunting purposes to improve sightlines (CRM 2019) or for forest trails. These openings range from relatively dry (mesic) (Figure 20) to somewhat wet or damp (Figure 21 & 22). Common species in the dryer openings include Bracken Fern (*Pteridium aquilinum*), Meadowsweet (*Spiraea alba* var. *latifolia*), Rough Goldenrod (*Solidago rugosa*), Canada Goldenrod (*Solidago canadensis*), Pearly Everlasting (*Anaphalis margaritacea*), Wild Strawberry (*Fragaria virginiana*), Wild Raspberry (*Rubus idaeus*, *R. strigosus*) and patches of reindeer lichen (*Cladonia* spp.). Common species in the damper openings include Sphagnum mosses (*Sphagnum* spp.), Cinnamon Fern (*Osmundastrum cinnamomeum*), New York Fern (*Thelypteris noveboracensis*), Balsam Willow (*Salix pyrifolia*) and Beaked Willow (*Salix bebbiana*).



Figure 20. Mesic woodland opening in woods north of the current quarry (R. Newell).



Figure 21. Species in open wet areas, including the exotic *Ranunculus repens*, reflect disturbance history (N. Hill).

Wet woodlands occur in the vicinity of the unnamed stream, which forms the northeast boundary of the survey area, and scattered throughout the forested area northwest of the quarry (Figures 22 & 23). The woodland in this area showed signs of past disturbance (possibly cutting) as there are wide, heavy vehicle ruts present. Tree species include Red Maple (*Acer rubrum*), Black Spruce (*Picea mariana*), Balsam Fir (*Abies balsamea*), Larch (*Larix laricina*) and several birch species (*Betula* spp.). The substrate is dominated primarily by sphagnum mosses (*Sphagnum* spp.) and numerous ferns. Common herbaceous plants and shrub species present include Cinnamon Fern (*Osmundastrum cinnamomeum*), Interrupted Fern (*Claytosmunda claytoniana*), Sensitive Fern (*Onoclea sensibilis*), Beech Fern (*Phegopteris connectilis*), Lady Fern (*Athyrium filix-femina*), a variety of Wood ferns (*Dryopteris* spp.), Sheep Laurel (*Kalmia angustifolia*), Bunchberry (*Cornus canadensis*), Wood Aster (*Oclemena acuminata*), Wild Sarsaparilla (*Aralia nudicaulis*), sedges (*Carex* spp.), Mountain Holly (*Ilex mucronata*), Woodland Horsetail (*Equisetum sylvaticum*), and Small Enchanter's Nightshade (*Circaea alpina*).



Figure 22. Area of wet woodland occurring in northwest corner of proposed expansion area (R. Newell).



Figure 23. Alder swamp beside the unnamed stream along north side of study area (N. Hill).

6.2.2 Aquatic Environment

The study area is in the headwaters of the watershed of Gabarus Lake and is bordered on the north by an unnamed first-order stream which flows into Gabarus Lake, about 1 km east (Figures 10 & 12, 24 to 26). The unnamed stream originates west to northwest of the study site (Appendix D, Map A-2) and flows along the northern boundary of the study area, converging east of the quarry site with a second unnamed stream arising in the south, and the combined flow discharges into Gabarus Lake. The stream supports bottom types ranging from gravel to cobble and organic peat and debris, with a high proportion of woody debris, and slow to fast flowing environments, and containing riffles to pools. It is restricted in places by culverted crossings (Figures 24 to 26).



**Figure 24. Unnamed stream at WS2, June 11, 2019.
For location see Appendix D, Map A-2.**



Figure 25. Unnamed stream at Fourchu Road, June 11, 2019.



Figure 26. Unnamed stream upstream of forest road, June 12, 2019.

6.2.3 Water Quality

Surface water quality measured in the unnamed stream (WS1; WS2; and WS3), which flows along the northeast perimeter of the quarry site, as well as in a tributary, which joins the unnamed stream below the quarry site (WS4), were typical of relatively undisturbed natural environments in upper watershed areas of northern Nova Scotia (Appendix D, Map A-2). Site WS4 is in a tributary that combines with the unnamed stream below the quarry site and empties into Gabarus Lake. Site WS4 is not associated with surface water runoff from quarry activities and is considered a reference site with which to compare water quality of the unnamed stream. On the floor of the quarry site is an area of temporary depressions, created by grubbing, which have accumulated surface water to form small ponds (WS5) (Appendix D, Map A-4). These are areas of exposed bedrock previously covered by till where fractures have been blocked by fine till constituents, and all are above the permanent water table. Water quality here also exhibited seasonal characteristics typical of standing shallow water bodies, including the presence of amphibian larvae (e.g. tadpoles).

Water samples taken in streams adjacent to the quarry in June 2019 showed moderate to high oxygen levels, slightly acidic conditions characteristic of headwaters, low conductivities, and low suspended sediment levels, with the exception of Site WS4 (84.5 mg/L) (Appendix D, Map A-2). High suspended sediment levels at WS4 are not associated with quarry operations and reflect recent runoff from Grand Mira Gabarus Road adjacent to the stream and forest clearing south of Gabarus Quarry. Water quality measurements for pH and dissolved oxygen levels were within guideline ranges for the protection of freshwater aquatic life for downstream sites WS2 and WS3 (CCME 1999)(Table 1).

Site Location & Date	June 11, 2019				
	WS1	WS2	WS3	WS4	WS5
Site Description	Unnamed stream	Unnamed stream	Unnamed stream	Tributary Reference Site	Quarry Pond
Temperature °C	9.9	8.0	7.9	8.6	16.6
Dissolved Oxygen (mg/L)	4.0	8.0	8.7	8.2	5.9
Dissolved Oxygen (% saturation)	35.9	67.2	73.6	81.8	61.2
Conductivity (µs/cm)	23.9	22.2	30.3	18.3	40.5
Specific Conductivity (25°) (µs/cm)	33.6	32.8	44.5	26.7	48.2
pH	6.1	6.1	6.6	6.2	7.0
TSS (mg/L)	2.0	4.5	9.5	84.5	12.0
Sample Time	11:50 AM	10:35 AM	10:10 AM	9:10 AM	9:38 AM

Note: TSS = Total Suspended Solids. WS4 is in a tributary of Unnamed stream. WS5 is a pond.

6.2.4 Wetlands

The proposed expansion area for the Gabarus Quarry impinges on several wetlands, including several areas which are artificially 'wet' as a result of rutting from previous cutting in the area and impacts of the quarry on surface drainage patterns. Level to gradual slopes in places, in particular in the extreme northwest section of the study area, have resulted in the occurrence of flat and slope swamps, which join wetlands occurring along the unnamed stream (Figure 27). In these areas the upper, flat swamps form where the topography is more level, with slope swamps forming on increasingly-sloping land surfaces. Wetlands are summarized in Figure 27 and Table 3. Land at the quarry is presumed, prior to construction, to have been level to gradually sloping with a shallow depth to bedrock, possibly supporting wetlands through imperfect surface drainage through the bedrock. Remnants of the earlier pre-construction wetlands take the form of small swamps and marshy areas in the cutover marginal areas of the quarry (e.g. Figure 13). Wetlands within the study area include fen (low stature vegetation on flowing peatland) and swamps (shrub- or tree-dominated) draining toward a northern boundary stream (WL1)(Figures 27 to 33)(Appendix D-Appendix B). Most of these wetlands have a layer of peat from *Sphagnum* moss species (e.g. *S. magellanicum*, *S. rubellum*, *S. girgensohnii*) and a clear demarcation from upland areas based on soil cores. The treed swamps were either yellow birch slope swamps with balsam fir understorey or were dominated by black spruce and tamarack (larch). In the riparian area next to the stream, treed swamps give way to alder shrub swamps dominated by *Alnus incana* but featured herbs including Meadow Rue (*Thalictrum pubescens*), Lady Fern (*Athyrium felix-femina*), Water Avens (*Geum rivale*), and Manna grasses (*Glyceria canadensis* and *G. striata*). Fens—open peatlands with water flowing through the surface layer—were *Sphagnum*-dominated and these supported small sedges (*Carex trisperma*, *C. echinata*, *C. magellanicum*, and *Eriophorum virginicum*), grasses (e.g. *Glyceria* spp.), and forbs (*Geum rivale*, *Rubus pubescens*, *Viola* spp., *Lycopus uniflorus*, *Maianthemum trifolium*, *Iris versicolor*, and *Galium* spp.) (Appendix D-Appendix B).

A remnant treed sphagnum swamp influenced by ground and/or surface water flows (WL2, Figure 27), occurs on the disturbed margin of north edge of the quarry with species including Large Cranberry (*Vaccinium macrocarpon*) as well as dominant *Sphagnum* species (Figures 27 & 28). WL3 near the northeast corner of the existing quarry, is a disturbed marsh and fen wetland supporting a diverse plant community that included species typical of disturbance (e.g. *Juncus effusus*, *Juncus brevicaudatus*, *Carex nigra*, *Equisetum arevense*, *Tussilago farfara*) but also native wetland species. The presence of *Carex flava* as well as the orchid *Platanthera aquilonis* indicates that these wetlands are calcium-rich.

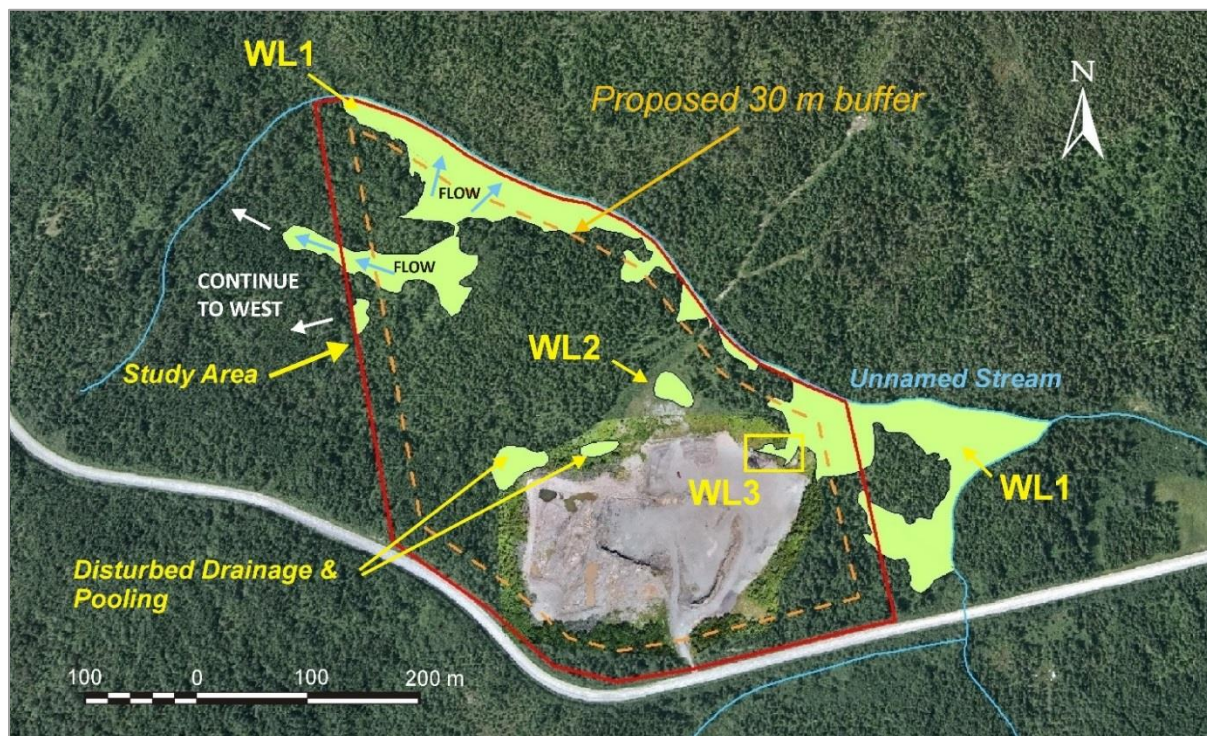


Figure 27. Wetlands (WL) in proposed expansion area, Gabarus Quarry.

Table 3. Wetlands, Gabarus Quarry Expansion. Locations shown in Figure 29. Approximate boundaries and surface area which occurs within the study area.

Identification	Area (ha)	Wetland Type and Comments
WL1	2.61	Fen / Riparian Swamp / Slope Swamp/ Flat Swamp Complex
WL2	0.09	Remnant Sphagnum Swamp
WL3	0.04	Disturbed Marsh / Open Marsh to Fen



Figure 28. Remnant treed sphagnum swamp on northeast edge of Gabarus Quarry, June 10, 2019.



Figure 29. Flat swamp/fen along unnamed stream at northwestern extent of study area, June 12, 2019.



Figure 30. Small intermittently wet *Sphagnum* patch in woods north of Gabarus Quarry, June 11, 2019.



Figure 31. (Left) Transition from dry woods to riparian swamp along north margin of study area. (Right) Temporary ponds arising from intermittent flooding in woods north of quarry, June 11, 2019.

6.2.5 Fish & Fish Habitat

Streams or other surface waters which could support fish, occur along the northern boundary and southeast of the EA study area. Both surface and groundwater discharge originating from the quarry may contribute to flows in the unnamed stream north of the site and in a tributary that passes the quarry to the south, but there are no direct surface water connections from the quarry to these areas. Streams in the area form from a combination of groundwater and precipitation, and because they form in upper watershed areas can be seasonally intermittent. The unnamed stream passing along the northeastern margin of the study area potentially provides habitat for fish. Sampling during the current study found Brook Trout (*Salvelinus fontinalis*) at several locations (WS3 & WS4, Map A-2)³ and immediate upstream areas are passible by fish but there are no lakes or other surface waters upstream of the site which could be used by migratory species. The stream potentially provides acceptable nursery habitat for salmonids, and could contain juveniles of various species which occur in the Gabarus Lake area, including Brook Trout, Rainbow Trout and Brown Trout; including Atlantic salmon (*Salmo salar*); Rainbow Smelt; Sticklebacks (Three-spine, Four-spine and Nine-spine); and American Eel. Gabarus Lake supports landlocked salmon also known as *ouananiche* (NS Anglers Handbook 2018). Occurrence of landlocked salmon is uncommon in Nova Scotia and in other Eastern Canadian provinces. Individuals never leave freshwater and are smaller than salmon which spend part of their lives at sea. Other species such as Alewife, Striped Bass and Atlantic Sturgeon have been observed in the general area (ACCDC, 2018), but are more likely to occur in water bodies such as Gabarus Lake and Belfry Lake downstream and in the Mira River. Chain Pickerel, a widespread invasive in Nova Scotia, have not invaded the Gabarus Lake system, according to locals. The Mira River system (to the northwest of the quarry site and not connected with it), has recorded Lake Whitefish (*Coregonus clupeaformis*), and Atlantic salmon (COSEWIC listed as Endangered from the Eastern Cape Breton population), for both of which special restrictions (regarding water quality and habitat maintenance) would apply (S. Weseloh-McKeane, Nova Scotia Museum, 2018).

6.2.6 Birds

Birds are an important component of the ecosystem in the vicinity of the Gabarus Quarry. One hundred sixteen species of birds have been recorded as potentially breeding in the study area (Maritimes Breeding Bird Atlas 2019, Eastern Cape Breton Island Region 25, Table 5), but additional species may breed at the site from time to time. Olive-sided Flycatcher, a rare species in Nova Scotia (listed federally and provincially as *Threatened*) favours open swampy mature softwood and an individual was heard in woods northeast of the study area. Boreal Chickadee, which is also uncommon and whose numbers are regionally declining, was heard at all sites. Yellow-bellied Flycatcher and Black-backed Woodpecker, both species with sensitive status, were present during bird survey. Two Important Bird and Biodiversity (IBA) Areas (NS047 Rocks off Fourchu Island and NS049 Harbour Rocks (Gabarus Bay) occur approximately 10 km southeast and northeast respectively)⁴.

³ Two 8-10 cm and one 12- 14 cm brook trout were captured in the Unnamed stream after a 23-hr set of a minnow trap on June 11-12, 2019.

⁴ The *Important Birdlife and Biodiversity Areas Program Canada* (IBA) is a joint project of Bird Studies Canada and Nature Canada coordinated by BirdLife International.

Habitat types in and around the study site include regenerated softwood (Balsam Fir, White Spruce and Larch) in the southwest corner; and mixed forest. Surveys at the site included: a site walkover on June 24, 2019; a night owl survey on June 23, 2019; and ten-minute dawn point count surveys at seven sites on June 25, 2017 (Appendix D, Map A-2). A single Long-eared Owl was heard at the site during the owl survey. Three Wilson's Snipe and an American Woodcock were also heard during the night observations. The June point-count survey documented 35 species (Table 4). Gabarus Lake currently supports nesting pairs of Common Loon and Canada Geese (A.M. MacLean, local resident, personal communication 2019).

The most common and abundant species at the site observed in the point-count survey were: Alder Flycatcher, Magnolia Warbler, American Robin, Red-eyed Vireo, Hermit Thrush, Common Yellowthroat, Yellow-bellied Flycatcher, and Boreal Chickadee which occurred in all habitat types (Table 4); while Swainson's Thrush, Black-capped Chickadee, Ruby-crowned Kinglet, American Redstart, and American Crow were also relatively abundant (Table 4). Most species (25 – 27) occurred in sites associated with mixed forest, where the dominant species (most common and abundant) included Alder Flycatcher, Magnolia Warbler, American Robin, Red-eyed Vireo, Dark-eyed Junco, Black-capped Chickadee, and Swainson's Thrush (Table 4).

Relatively high abundances of several species, but lowest number of species overall were observed in the regenerated softwood area (14 species)(Table 5, and Site 4, Appendix D, Map A-2)), where important species included Alder Flycatcher, Magnolia Warbler, American Robin, Hermit Thrush, Mourning Warbler, White-throated Sparrow and Red-eyed Vireo (Table 5). All birds were expected based on the Maritimes Breeding Bird Atlas (2019) records for the area.

Table 4. Bird species heard or observed during dawn point count bird survey conducted June 25, 2019 between 0520 and 0725 hrs at the Gabarus Quarry study site. For locations, see Appendix D, Map A-2.

Bird Species	Regenerated Softwood (Site 4)		Mixed Forest – South (Sites 5 & 10)		Mixed Forest – Northwest (Sites 1-3 & 7)	
	Number of sites	Average/ 10 mins	Number of sites	Average/ 10 mins	Number of sites	Average/ 10 mins
PASSERIFORMES						
Alder Flycatcher	1	20.0	2	8.0	3	2.75
American Crow	0	0.0	1	2.0	3	1.25
American Goldfinch	0	0.0	1	1.0	1	0.25
American Redstart	0	0.0	2	8.0	2	1.75
American Robin	1	15.0	2	5.5	4	2.25
Bay-breasted Warbler	0	0.0	1	0.5	1	0.25
Black-capped Chickadee	0	0.0	2	4.0	2	3.00
Blue-headed Vireo	0	0.0	1	0.5	3	2.25
Blue-winged Warbler	0	0.0	2	1.5	0	0.00
Boreal Chickadee	1	1.0	1	1.0	3	2.75
Blue-throated Green Warbler	0	0.0	1	1.0	1	2.50
Cedar Waxwing	0	0.0	1	0.5	0	0.00
Common Loon	0	0.0	0	0.0	1	0.50
Common Yellowthroat	1	2.0	1	1.5	4	2.00
Dark-eyed Junco	0	0.0	2	5.0	0	0.00
Golden-crowned Kinglet	0	0.0	1	0.5	1	0.25
Hermit Thrush	1	10.0	1	2.0	4	3.00
Lincoln's Sparrow	0	0.0	0	0.0	2	0.75
Magnolia Warbler	1	20.0	2	5.5	4	7.75
Mourning Warbler	1	7.0	1	2.5	1	0.25
Northern Parula Warbler	0	0.0	2	1.5	0	0.00
Olive-Sided Flycatcher	0	0.0	0	0.0	1	0.25
Red-breasted Nuthatch	0	0.0	2	1.5	1	0.75
Red-eyed Vireo	1	5.0	2	2.0	4	3.50
Ruby-crowned Kinglet	0	0.0	1	2.0	3	3.00
Song Sparrow	1	1.0	0	0.0	1	0.25
Swainson's Thrush	0	0.0	2	3.5	3	6.75
White-throated Sparrow	1	6.0	0	0.0	3	0.75
Yellow-bellied Flycatcher	1	2.0	1	0.5	3	4.50
Yellow-rumped Warbler	1	1.0	0	0.0	3	1.00
CHARADRIIFORMES						
American Woodcock	1	1.0	0	0.0	0	0.00
Wilson's Snipe	1	1.0	1	0.5	2	0.75
PICIFORMES						
Hairy Woodpecker	0	0.0	1	0.5	0	0.00
Northern Flicker	0	0.0	1	1.0	1	0.50
FALCONIFORMES						
Sharp-shinned Hawk	0	0.0	0	0.0	1	0.25
SUMMARY						
Average Abundance Per Site	92.0		63.5		55.8	
Total Species In Habitat	14		27		29	
Average Number Of Species Per Site	14		18.5		16.5	

Table 5. Birds potentially breeding in the Gabarus Lake Area of the Cape Breton Regional Municipality, Cape Breton Island (Maritime Breeding Bird Atlas-Online 2019).

Swans, Geese & Ducks (Anseriformes: Anatidae)	
Canada Goose	Green-winged Teal
Wood Duck	Ring-necked Duck
American Wigeon ‡	Common Eider §
American Black Duck	Common Goldeneye ‡
Mallard	Hooded Merganser ‡
Mallard x Am. Black Duck	Common Merganser
Blue-winged Teal	Red-breast Merganser
Northern Pintail ‡	
Pheasants, Grouse and Turkeys (Galliformes, Phasianidae)	
Ruffed Grouse	Ring-necked Pheasant
Spruce Grouse	
Loons and Grebes (Gaviidae and Podicipedidae)	
Common Loon	Pied-billed Grebe ‡
Storm-Petrels, Cormorants, Wading Birds (Hydrobatidae, Phalacrocoracidae, Ardeidae)	
Leach's Storm-Petrel ‡§	American Bittern
Double-crest Cormorant §	Great Blue Heron §
Great Cormorant ‡§	
Hawks & Falcons (Falconiformes: Accipitridae, Falconidae)	
Osprey	Broad-winged Hawk
Bald Eagle ♂	Red-tailed Hawk
Northern Harrier	American Kestrel
Sharp-shinned Hawk	Merlin
Northern Goshawk	
Rails (Gruiformes, Rallidae)	
Sora	
Shorebirds	
Sandpipers & Snipes (Charadriiformes, Scolopacidae)	
Piping Plover †	Willet
Killdeer	Wilson's Snipe
Spotted Sandpiper	American Woodcock
Greater Yellowlegs †	
Gulls, Terns, Kittiwake (Charadriiformes, Laridae)	
Black-legged Kittiwake ‡§	Common Tern §
Herring Gull §	Arctic Tern ‡§
Great Black-backed Gull §	
Auks, Murres, Puffins (Charadriiformes, Alcidae)	
Razorbill ‡§	Atlantic Puffin ‡§
Black Guillemot §	
Pigeons & Doves (Columbiformes: Columbidae)	
Rock Pigeon	Mourning Dove
Owls (Strigiformes)	
Great Horned Owl	Boreal Owl †
Barred Owl	North Saw-whet Owl
Short-eared Owl †	
Swifts (Apodiformes, Apodidae) and Hummingbirds (Apodiformes, Trochilidae)	
Common Nighthawk †	Ruby-throated Hummingbird
Chimney Swift †	
Kingfishers (Coraciiformes, Alcedinidae)	
Belted Kingfisher	
Woodpeckers (Order Piciformes, Picidae)	

Table 5. Birds potentially breeding in the Gabarus Lake Area of the Cape Breton Regional Municipality, Cape Breton Island (Maritime Breeding Bird Atlas-Online 2019).

Yellow-bellied Sapsucker	Black-back Woodpecker
Downy Woodpecker	Northern Flicker
Hairy Woodpecker	Pileated Woodpecker
Songbirds (Passeriformes)	
Olive-sided Flycatcher †	Common Yellowthroat
Eastern Wood-Pewee	American Redstart
Yellow-bellied Flycatcher	Cape May Warbler ‡
Alder Flycatcher	Northern Parula
Least Flycatcher	Magnolia Warbler
Eastern Phoebe ‡	Bay-breasted Warbler
Eastern Kingbird	Blackburnian Warbler
Blue-headed Vireo	Yellow Warbler
Philadelphia Vireo ‡	Chestnut-sided Warbler
Red-eyed Vireo	Blackpoll Warbler
Gray Jay	Black-throated Blue Warbler
Blue Jay	Palm Warbler
American Crow	Yellow-rumped Warbler
Common Raven	Black-throated Green Warbler
Tree Swallow	Canada Warbler †
Bank Swallow §	Wilson's Warbler
Cliff Swallow §	Chipping Sparrow
Barn Swallow	Savannah Sparrow
Black-capped Chickadee	Nelson's Sh.-tail Sparrow
Boreal Chickadee	Fox Sparrow
Red-breast Nuthatch	Song Sparrow
White-breast Nuthatch	Lincoln's Sparrow
Brown Creeper	Swamp Sparrow
Winter Wren	White-throat Sparrow
Golden-crown Kinglet	Dark-eyed Junco
Ruby-crown Kinglet	Rose-breast Grosbeak
Eastern Bluebird †	Bobolink
Veery	Red-wing Blackbird
Bicknell's Thrush †	Rusty Blackbird †
Swainson's Thrush	Common Grackle
Hermit Thrush	Brown-head Cowbird ‡
American Robin	Pine Grosbeak
Gray Catbird	Purple Finch
Northern Mockingbird †	Red Crossbill †
European Starling	Pine Siskin
Cedar Waxwing	American Goldfinch
Ovenbird	Evening Grosbeak
North Waterthrush	House Sparrow
Black-white Warbler	White-winged Crossbill
Tennessee Warbler	American Goldfinch
Nashville Warbler	Evening Grosbeak
Mourning Warbler	House Sparrow
<p>This list includes all species found during the Maritimes Breeding Bird Atlas (1st atlas: 1986-1990, 2nd atlas: 2006-2010) in the region #25 (East Cape Breton Island).</p> <p>Rare/Colonial Species Report Forms should be completed for species marked: § (Colonial), ‡ (regionally rare), † (rare in the Maritimes) or ♂ (rare in the Maritimes, documentation only required for confirmed records). Current as of 2/07/2019. 20 QR17 & 20QR18</p>	

6.2.7 Mammals

Various large and small mammal species, including game and furbearing species, are found in Cape Breton Regional Municipality and may occur at the quarry site. Mammals expected to occur regularly or occasionally reflect the communities typical of the dominant terrestrial habitat in the surrounding area, which includes coniferous and mixed forest. White-tailed Deer, Snowshoe Hare, and Eastern Coyote occur in the general vicinity of the quarry, and occasional scat and sign were observed at the site on June 11 - 12, 2019. Moose and Canada Lynx (the latter provincially listed as Endangered) are known to occur in the general area of the study site. Other species likely to occur in the general area include carnivores such as American Fisher; as well as rodents and small mammals including lemmings (Southern Bog Lemming), voles (Rock Vole), shrews (Long-tailed Shrew, a species designated federally as Special Concern), and bats (Little Brown Myotis) (ACCDC, 2018). Of these species, Rock Vole occur in upland areas in western Cape Breton but are sparsely distributed elsewhere within Nova Scotia. Little Brown Myotis and Northern Myotis (both are federally and provincially listed as Endangered) occur in the area (S. Weseloh-McKeane, Nova Scotia Museum, 2019). Bat populations are diminished at present due to the White Nose Syndrome in North America.

6.2.8 Reptiles and Amphibians

Some of the common Nova Scotian amphibians and reptiles are expected to occur at the site although there is little open water habitat present. The unnamed stream and adjacent riparian area that runs along the northern border of the study area is likely to support amphibian species such as Leopard Frog, Wood Frog, Green Frog, Pickerel Frog, American Toad, Spring Peeper and salamanders (e.g. Red-spotted newt, Eastern Redback Salamander, Yellow-spotted Salamander); and an uncommon species, Four-toed Salamander has been found on Cape Breton Island (Gilhen 1984). Tadpoles were observed in pools on the upper north and northwest quarry site. Lands around the quarry will support snakes, including the Maritime Garter Snake, seen during June 11- 12, 2019 site visits. Northern Redbelly Snake, Northern Ringneck Snake, and Eastern Smooth Green Snake also may occur in the general area (Gilhen 1984); all have all been recorded elsewhere in Cape Breton (Parks Canada 2019). Habitat is not present at the site for species of conservation concern such as Wood Turtle or Snapping Turtle, although the latter, which is a federally and provincially listed species (Special Concern and Vulnerable, respectively), has been observed recently nesting in the Mira River watershed (S. Weseloh-McKeane, Nova Scotia Museum, 2019).

6.2.9 Species at Risk

Species at Risk are plants or animals whose existence is threatened, or which are in danger of being threatened, by human activities or natural events. The Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC) presently recommends species to be listed for legal federal protection under the federal *Species at Risk Act* (SARA). At the provincial level, the Nova Scotia Species at Risk Working Group completes assessments and recommendations for a species' status. Nova Scotia maintains a list of legally protected species under the *Nova Scotia Endangered Species Act*. A third status list is the *Nova Scotia General Status of Wild Species*, which is a provincial system used as a "first-alert tool" for identifying and prioritizing species potentially at-risk and does not provide legal protection. General status rankings are assigned by a provincial General Status Species Assessment process based on expert scientific evaluation of a set of criteria. Species listed as "Red" (any species known to be, or believed to be, at risk), and "Yellow" (any species known to be, or believed to be, particularly sensitive to human activities or

natural events) are considered priority species. Species that may be at risk of extirpation or extinction are candidates for a detailed risk assessment by COSEWIC, or provincial or territorial equivalents.

Species of conservation concern listed under federal or provincial legislation as well as with general status that occur within five kilometres of the Gabarus Quarry study site include both animals and plants (Table 5). There are no animals *per se* of particular conservation concern in the study area, however, Canada Lynx and American Marten, which are currently listed as “Endangered” under the NS Endangered Species Act, are of concern due to low numbers and may occasionally occur. Bird species of particular conservation concern occurring within 5 km of the Quarry include: Canada Warbler and Barn Swallow (both listed under the federal *Species at Risk* and provincial *Endangered Species* acts as Threatened and Endangered, respectively); and Olive-sided Flycatcher (listed federally and provincially as Threatened) (ACCDC 2018). Potential breeding of Olive-sided Flycatcher was identified in forest northeast of the study site. Plant species of concern reported within five kilometers of the study area includes, the New Jersey Rush (*Juncus Caesariensis*), listed federally as Special Concern and provincially as Vulnerable (ACCDC 2018).

Suitable habitat for both Canada Warbler and Olive-Sided Flycatcher are found on the site. Canada Warbler prefers wetland habitats, including treed and shrubby grassy swamps around bog/fen wetlands; and Olive-Sided Flycatcher is found in treed (black spruce) sphagnum bogs. Olive-sided Flycatcher, in particular, was heard in woods northeast of the site during the spring bird survey on June 24 – 25, 2019. Canada Warbler was not observed during survey visits, but the habitat is suitable (F. Lavender, personal communication, 2019). Open areas such as fields and ponds are typical habitat for Barn Swallow, none of which occur at the site. There are records of nesting or potential nesting in the general area for Barn Swallow, Canada Warbler, Olive-sided Flycatcher, Bobolink, and Common Nighthawk (S. Weseloh-McKeane, Nova Scotia Museum, 2019).

Other animals of conservation concern potentially occurring at the site include Little Brown Myotis and Northern Myotis (both are federally and provincially listed as Endangered) (S. Weseloh-McKeane, Nova Scotia Museum, 2019). Neither of these animals are documented within a 5 km radius of the study site (ACCDC, 2018).

Botany surveys of the site did not detect any plant species of conservation concern. One federally- and provincially-listed plant species of concern—the New Jersey Rush—has been reported within five kilometres of the study area (ACCDC 2018). Two other plant species, Peppered Moon Lichen (*Sticta fuliginosa*) and Moor Rush (*Juncus stygius* spp. *americanus*), both with a general status within Nova Scotia as Sensitive (Yellow), also potentially occur, having been found within 5 km of the study area (Table 6) (ACCDC 2018). None of these species were noted during the spring and fall botany surveys of the study area (Appendix D-Appendix B). A list of plants and animals of concern within a 100-kilometer radius of the study site is included in Appendix D-Appendix C.

Boreal Felt Lichen, a rare species in Nova Scotia, may occur in forested habitats in the Gabarus Lake area, but none have been found there, and no suitable modeled habitat occurs within 1 km of the site (Figure 32).



Figure 32. Modeled areas of forest habitat (areas in brown northwest of the Gabarus Quarry) suitable for Boreal Felt Lichen (*Erioderma pedicellatum*), 2018. Mapping courtesy of Brad Thoms, Mersey Tobeatic Research Centre, Kempt, Queens County, Nova Scotia.

Table 6. Records of species of concern within a 5 km radius of Gabarus Quarry, Cape Breton County. Atlantic Canada Conservation Data Centre (ACCCDC) Database, December 2018.

Family/Scientific Name	Common Name	Status/Rank					General Status of Wild Species Rankings ³	AC CDC ⁴ Rankings (GRANK, SRANK ⁵)
		SARA	COSEWIC (NPROT ¹)	NS ESA (SPROT ²)				
FLORA								
Juncaceae	<i>Juncus caesariensis</i>	New Jersey Rush	Special Concern	Special Concern	Vulnerable	3 Sensitive	G2G3, S2	
	<i>Juncus stygius ssp. americanus</i>	Moor Rush	-	-	-	3 Sensitive	G5T5, S2	
Lobariaceae	<i>Sticta fuliginosa</i>	Peppered Moon Lichen	-	-	-	3 Sensitive	G3G5, S3	
Schizaeaceae	<i>Schizaea pusilla</i>	Little Curlygrass Fern	-	-	-	4 Secure	G3G4, S3S4	
ANIMALS-BIRDS								
Ardeidae	<i>Botaurus lentiginosus</i>	American Bittern	-	-	-	3 Sensitive	G4, S3S4B	
Corvidae	<i>Perisoreus canadensis</i>	Gray Jay	-	-	-	3 Sensitive	G5, S3	
Falconidae	<i>Falco sparverius</i>	American Kestrel	-	-	-	4 Secure	G5, S3B	
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Endangered	1 At Risk	G5, S2S3B	
Laridae	<i>Sterna hirundo</i>	Common Tern	-	Not at Risk	-	3 Sensitive	G5, S3B	
Paridae	<i>Poecile hudsonica</i>	Boreal Chickadee	-	-	-	3 Sensitive	G5, S3	
Parulidae	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Endangered	1 At Risk	G5, S3B	
Regulidae	<i>Regulus calendula</i>	Ruby-crowned Kinglet	-	-	-	3 Sensitive	G5, S3S4B	
Scolopacidae	<i>Gallinago delicata</i>	Wilson's Snipe	-	-	-	3 Sensitive	G5, S3B	
	<i>Actitis macularius</i>	Spotted Sandpiper	-	-	-	3 Sensitive	G5, S3S4B	
Sittidae	<i>Sitta canadensis</i>	Red-breasted Nuthatch	-	-	-	4 Secure	G5, S3	
Turdidae	<i>Catharus ustulatus</i>	Swainson's Thrush	-	-	-	4 Secure	G5, S3S4B	
	<i>Catharus fuscescens</i>	Veery	-	-	-	4 Secure	G5, S3S4B	
Tyrannidae	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	-	-	-	3 Sensitive	G5, S3S4B	
	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Special Concern	Threatened	1 At Risk	G4, S2B	
Other								
Clupeidae	<i>Alosa pseudoharengus</i>	Alewife	-	-	-	3 Sensitive	G5, S3	
Margaritiferidae	<i>Margaritifera margaritifera</i>	Eastern Pearlshell	-	-	-	3 Sensitive	G4, S2	
Salmonidae	<i>Salmo salar</i>	Atlantic Salmon	-	-	-	2 May Be at Risk	G5, S1	
	<i>Salvelinus fontinalis</i>	Brook Trout	-	-	-	3 Sensitive	G5, S3	

1. NPROT, National conservation status of species, as designated by COSEWIC.

Extinct (X) – A wildlife species that no longer exists.

Extirpated (XT) - A wildlife species that no longer exists in the wild in Canada but exists elsewhere.

Endangered (E) - A wildlife species facing imminent extirpation or extinction.

Threatened (T) - A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Special Concern (SC) - A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Data Deficient (DD)- A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

Table 6. Records of species of concern within a 5 km radius of Gabarus Quarry, Cape Breton County. Atlantic Canada Conservation Data Centre (ACDC) Database, December 2018.

Not at Risk (NAR) - A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.	
2. SPROT=Provincial Rank/Status of Taxon.	
3. General Status of Wild Species Rank listed for Nova Scotia: 0.2=Extinct (Blue); 0.1=Extirpated (Purple); 1=At Risk (Red); 2=May be at Risk (Orange); 3=Sensitive (Yellow); 4=Secure (Green); 5=Undetermined (light grey); 6=Not Assessed (dark grey); 7=Exotic (Black); 8=Accidental (Aqua).	
4. Atlantic Canada Conservation Data Centre (ACDC).	
5.	
<u>GRANK, Global rarity rank of species, using CDC/NatureServe methods</u>	
G1	Critically Imperiled—At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled—At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable—At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently Secure—At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure—At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
GU	Unrankable—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.
GNR	Unranked—Global rank not yet assessed.
G#G#	Range Rank—A numeric range rank (e.g., G2G3, G1G3) is used to indicate the range of uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).
Q	Questionable taxonomy that may reduce conservation priority—Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The “Q” modifier is only used at a global level and not at a national or subnational level.
C	Captive or Cultivated Only—Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The “C” modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to “Extinct” in the Wild (EW) in IUCN’s Red List terminology (IUCN 2001).
T	Intraspecific Taxon (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species’ global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species. For example, a G1T2 subrank should not occur. A vertebrate animal population, (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T-rank; in such cases a Q is used after the T-rank to denote the taxon’s informal taxonomic status.
<u>SRANK, Sub-National (Provincial) Rarity Ranks</u>	
S1	Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.
S2	Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3	Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations (21 to 100 occurrences).
S4	Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).
S5	Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.
S#S#	Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).
SH	Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species) and suspected to be still extant.
SU	Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.
SX	Extinct/Extirpated: Element is believed to be extirpated within the province.
S?	Unranked: Element is not yet ranked.
SA	Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.
SE	Exotic: An exotic established in the province (e.g., Purple Loosestrife or Coltsfoot); may be native in nearby regions.
SE#	Exotic numeric: An exotic established in the province that has been assigned a numeric rank.

Table 6. Records of species of concern within a 5 km radius of Gabarus Quarry, Cape Breton County. Atlantic Canada Conservation Data Centre (ACDC) Database, December 2018.

SP	Potential: Potential that Element occurs in the province, but no occurrences reported.
SR	Reported: Element reported in the province but without persuasive documentation, which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.
SRF	Reported falsely: Element erroneously reported in the province and the error has persisted in the literature.
SZ	Zero occurrences: Not of practical conservation concern in the province, because there are no definable occurrences, although the species is native and appears regularly. An NZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.

6.2.10 Natural Areas & Wilderness

The Gabarus Lake area of Eastern Cape Breton Island is a relatively remote location in Nova Scotia. Situated near the southeastern coast, the area has a relatively high proportion of wilderness and natural areas both inland and along its largely untouched coast. A low population density is spread along a few major travel routes, connecting it with Marion Bridge on the north and the coastal fishing communities of Gabarus and Fourchu on the northeast and southeast respectively, some 10 km distant. Although settlement and consequent agricultural expansion and logging in past changed the character of the landscape, much of the land has returned to forest in most areas, although logging activity is currently taking place in a recent stage of forest harvesting. A high proportion of Crown Land in the area has been devoted to protected and managed wildlife areas, leaving many natural and untouched areas. Gabarus Wilderness Area and Fourchu Coast Wilderness area have been set aside not far from the study site to represent these wild coastal ecosystems. In addition to preservation for wildlife, hunting and outdoor recreation are important experiences of locals and visitors to the area. People living in these areas are exposed to the natural environment day-to-day and appreciate the presence of, and access to, undeveloped land and nature, while accepting the usual activities needed to use the resources (e.g. aggregate quarries, forestry operations) on which many of them depend for their livelihood.

6.3 Human Uses of the Environment

6.3.1 Mi'kmaq

The Mi'kmaq maintain aboriginal claim to all of the landmass of Nova Scotia, and the Province of Nova Scotia maintains a policy that proponents of industrial development projects consult with the Mi'kmaq concerning their activities. Dexter Construction has contacted First Nations representatives concerning the present Gabarus Quarry expansion project. The study area is in what was once the Mi'kmaq territory known as *Unama'kik*. Streams, lakes and wetlands, and in particular coastal embayment's and waters of this area would have provided hunting and transportation opportunities for the Mi'kmaq, their ancestors and predecessors prior to the arrival of European settlers; however, no archaeological evidence of earlier Mi'kmaq occupation in the area has been found in the immediate vicinity of the quarry. There are no registered Mi'kmaq archaeological sites within or surrounding the study area perimeter, and the vicinity of the quarry is considered to have low potential for precontact and early historic archaeological resources due to the absence of findings and the low and wet landscape (Cultural Resource Management Group (CRM), 2019). Several registered archeological sites representing Mi'kmaq fishing camps are located approximately 6 kilometers southeast of the study area along Belfry Beach, at the head of Fourchu Bay. The Mira River would have also been a historically important area as a resource base and transportation route (Cultural Resource Management Group (CRM), 2019). Presently, no significant Mi'kmaq cultural activities occur in or around the study area although traditional fishing and hunting continues in the general area of Gabarus Lake.

Many of Nova Scotia's Mi'kmaq reside in Cape Breton and access lands throughout the region for various uses such as hunting and fishing, as well as traditional ceremonial activities. The nearest First Nations communities to the study area are Eskasoni, situated in Cape Breton County along the eastern side of the Bras d'Or Lakes about 32 km west of the study area, as the crow flies; and Membertou First Nation, located in Cape Breton Regional Municipality near Sydney, about 34 km north, as the crow flies. Five of the thirteen Nova Scotian First Nations are located on Cape Breton Island.

Two tribal councils exist in Nova Scotia: The Confederacy of Mainland Mi'kmaq (CMM) and Union of Nova Scotia Indians (UNSI). CMM is a not-for-profit organization incorporated in 1986, whose mission is to promote and assist Mi'kmaq communities. The UNSI, created in 1969, was formed to provide a cohesive political voice for Mi'kmaq people. The Native Council of Nova Scotia (NCNS) represents Mi'kmaq people living off reserve. The NCNS is a self-governing agency located in Truro. The Office of Aboriginal Affairs in Nova Scotia estimates that approximately 35% of Mi'kmaq live off reserve. The goal of NCNS is “to operate and administer a strong and effective Aboriginal Peoples Representative Organization that serves, advocates and represents our community.”

The Mi'kmaq Rights Initiative (Kwilmu'kw Maw-klusuaqn; KMK) also represent a number of the First Nations in Nova Scotia. The mission of KMK—whose name means, “we are seeking consensus”— is “to address the historic and current imbalances in the relationship between Mi'kmaq and non-Mi'kmaq people in Nova Scotia and secure the basis for an improved quality of Mi'kmaq life.” KMK's objective is to negotiate between the Mi'kmaq of Nova Scotia whom it represents, the province and the Government of Canada, and operates from its main office in Millbrook. The Atlantic First Nations Environmental Network (AFNEN) is an environmental organization of Mi'kmaq communities and organizations. The CMM and UNSI are members of the AFNEN, with the Mi'kmaq Confederacy of PEI in Charlottetown currently the acting coordinator. The AFNEN includes a representative from each Mi'kmaq organization and community interested in environmental issues. The Network meets regularly during the year through meetings, conferences, and the Internet to discuss environmental matters or concerns.

6.3.2 Population and Economy

Gabarus Lake is located in the Cape Breton Regional Municipality (CBRM), the municipal unit occupying the north eastern region of Cape Breton Island. CBRM is the second largest municipality in Nova Scotia, with a population of approximately 94,285, and has been declining over the past several decades, dropping 3.2% between 2016 and 2011 (Statistics Canada, 2016). Over three quarters of the Island's population reside in the CBRM. The main population centres in CBRM are Sydney (population 29,904 (2011)), Sydney Mines (population 14,135 (2011)), and Glace Bay (population 19,100 (2011)). Sydney is the largest population centre, located approximately 43.5 km north of Gabarus Lake. Despite a relatively diverse industrial economy, the CBRM has an unemployment rate of 13.7% (Statistics Canada, 2017).

Traditionally, the main industry in the CBRM was coal and industrial mining. From the mid-1960s to early 2000, the coal and steel industries were phased out. Today, fishing, forestry, and tourism are the primary industries, along with education, health care, and other business and support services. Tourism has become an important local industry in recent years with attractions such as the Cabot Trail, Cape Breton Highlands National Park, Bras d'Or Lakes, and the Fortress of Louisbourg (Parks Canada) contributing to Cape Breton Island being named as a top island destination in North American by a leading American industry magazine (Travel and Leisure, 2016). The CBRM has benefited from growing culinary, boutique accommodation, and cruise ship (Port of Sydney) businesses as well as increased infrastructure development.

The Fourchu Road is a scenic highway (*Fleur-de-lis Trail*) that passes through Fourchu and Gabarus Lake and connects to the Gabarus Highway (Route 327), which leads to the coastal fishing community of Gabarus. Visitors reach Marion Bridge along Hwy 327 to make a highway

connection the Fortress of Louisbourg⁵. Visitors to the area utilize recreational and scenic features including coastal and wooded hiking trails, cobble and sandy beaches, Gabarus Lake sport fishing, and paddling and boating opportunities. Local businesses in the general area include cottage rentals, bed & breakfasts, privately owned campgrounds and RV resorts, a Gabarus Community Center/Fire Hall and Canada Post outlet.

6.3.3 Water Supply and Residential Wells

Both drilled and dug wells are used as drinking water sources in the Gabarus Lake area. Two homes, which would use groundwater wells, are located within 1 km of the study area, including one of which is a drilled well belonging to the residents of 769 Grand Mira Gabarus Road. Dexter Construction has a blasting waiver agreement with both. There are no municipal water supplies in the area.

6.3.4 Land Use

Land in the vicinity of the quarry is predominantly wilderness and undeveloped forest land, with rural residential use concentrated along the Fourchu Road (*Fleur-de-lis Trail*) and in the coastal communities of Gabarus Lake, and Gabarus to the east. A handful of residences are also located along Grand Mira Gabarus Road. Limited forestry and commercial use (e.g. quarries) as well as residences, small woodlots, and home-operated businesses are found nearby. Travel routes are used by tourists and outdoor recreational enthusiasts. Hunting, trapping and commercial fishing based in Gabarus are important local activities. Land ownership in the vicinity is a mix of privately-owned land and Crown land in the general vicinity (Appendix D, Map A-3).

6.3.5 Hunting and Trapping

The Gabarus quarry site supports many of the common game and fur-bearing species characteristic of Nova Scotia in general, including some less common fur-bearing species, such as Canada Lynx and American Marten. Some hunting or trapping activity may take place in the general vicinity of the site, although trapping statistics indicate that the CBRM has a small harvest of most species. White-tail Deer are common, although the county typically ranks among the lowest for deer harvest by county, as it does for Black Bear, in Nova Scotia. The main furbearers trapped in the five-year period (2014 to 2018) were beaver, muskrat, otter, and fox. No lynx, marten, or fisher were reported trapped. Snowshoe Hare, Ruffed Grouse, and Ring-Necked Pheasant are the commonly hunted upland game (Table 7). Moose are an important contributor to the hunting economy both for Mi'kmaq and for non-natives in Cape Breton, however the eastern region of Cape Breton, including Cape Breton County, is not zoned for moose hunting.

⁵ A direct coastal road connection between Gabarus and Louisbourg through Oceanview has been abandoned.

Table 7. Five-year summary of wildlife harvested in Cape Breton Regional Municipality and Nova Scotia.			
Animal	CBRM Reported Harvest	Provincial Reported Harvest	Percent (%) of total for province
LARGE MAMMALS			
Deer (Zone 111)	1,746	45,711	3.8%
Bear	7	1,511	0.5%
UPLAND GAME			
Snowshoe Hare	17,388	376,317	4.6%
Ruffed Grouse	16,516	220,954	7.5%
Ring-necked Pheasant	795	21,866	3.6%
FUR HARVEST			
Skunk	0	279	0.0%
Canada Lynx*	0	28	0.0%
American Marten*	0	26	0.0%
Fisher	0	610	0.0%
Raccoon	53	7417	0.7%
Squirrel	62	4490	1.4%
Mink	145	5673	2.6%
Coyote	249	9374	2.7%
Bobcat	92	3322	2.8%
Weasel	47	1689	2.8%
Beaver	556	15855	3.5%
Muskrat	2135	59642	3.6%
Otter	70	1747	4.0%
Fox	236	2000	11.8%
Total Furbearers	3645	112,152	3.3%
*Trapped incidentally. Trappers Association of Nova Scotia prepares incidental pelts for auction and all proceeds go to the NS Species at Risk Conservation Fund.			

6.3.6 Forestry & Agriculture

Forestry and farming contribute to the mix of industries in the CBRM, but the impact here is relatively small compared with the rest of Nova Scotia. Farming is not a large economic sector in CBRM, including in the immediate study area, accounting for only 2% of all registered farms in Nova Scotia for 2018-2019 (Nova Scotia Open Data Portal 2019). Cape Breton County farms reported a total of over \$8 million in gross farm receipts in 2006, excluding forestry products. Main

agricultural activities are cattle ranching and animal production (NS Federation of Agriculture, online, 2019).

6.3.7 Recreational, Commercial, and Mi'kmaq Fishing

Commercial fishing takes place from the communities of Gabarus and Fourchu. Approximately 40 jobs are tied directly to commercial fishing in Gabarus, with another 30 or so jobs tied indirectly (T. Menk; E. Kersey, pers. comm. 2019). Recreational fishing provides an important resource and pastime for residents of the CBRM and marine fisheries are the mainstay of coastal communities such as Gabarus and Fourchu. The study area itself is not particularly important for freshwater recreational fishing but rivers in the area (e.g. Mira River), are fished recreationally, and Gabarus Lake supports ice fishing for Rainbow Smelt and trout (F. Carswell, resident of Gabarus, pers. comm. 2019; A.M. MacLean, Gabarus Lake, pers. comm. 2019), Striped Bass fishing, and a recreational fishery from April 15 – 30 for landlocked salmon (NS Anglers Handbook 2018). Mi'kmaq residing in the area likely use the limited recreational fishing resource as well. Other streams in the area are either too small, are not accessible, or have too steep a gradient to promote fishing.

6.3.8 Historical, Archaeological and Palaeontological Resources

The study area is part of the once greater Mi'kmaw territory known as *Unama'kik* (CRM 2019). Mi'kmaq originally occupied the area, with Europeans entering the shores of Cape Breton from the early sixteenth century, mainly in the areas of St. Peter's and St. Ann's to pursue fishing, until formal establishment of fishing stations in the early seventeenth century (CRM 2019). As supply centers for the Fortress of Louisbourg, the trading posts attracted Acadian settlers to the area until British military rule in 1745 and again in 1763, when Cape Breton was annexed to Nova Scotia. Beginning in the early 1800's, Scottish settlers moved into the area, settling mainly along the Bras D'or Lake and established farming as the dominant economic activity, replacing fishing. As early as the 1820's, the Scottish had become the dominant ethnic group in Cape Breton (CRM 2019).

The communities of Gabarus Lake and Gabarus, approximately one kilometer and eight kilometers east of the study area, respectively, appear on seventeenth century maps. Historical documents indicate the French settled the villages as early as 1714. Early census data shows 47 inhabitants of Gabarus in 1774. Shipbuilding occurred between 1854 and 1900, during which time the village was home to numerous craftsmen and business establishments. The nearest registered archaeological site is located approximately 11 kilometers southeast of the study area on Fourchu Island.

Prior to the arrival of European settlers, Mi'kmaq would have used the surrounding streams, lakes and wetlands of the study area as a means of transportation and resource base. The Gabarus Quarry site, however, likely lacks the environmental features that would have been suitable for encampments and there are no registered Mi'kmaq archaeological sites within the study area or surrounding the perimeter. Several nearby areas, however, are registered archeological sites representing Mi'kmaq fishing camps, approximately 6 kilometers southeast of the study area along Belfry Beach, at the head of Fourchu Bay. The Mira River would have also been a historically important area as a resource base and transportation route (CRM, 2019).

Archaeology database searches show no records of archaeological sites within the study area (CRM 2019). Based on the lack of evidence of historic land use in the vicinity of the Gabarus Quarry site; site reconnaissance and the absence of signs of settlement; and other limiting

physical factors such as the low and wet landscape, the study area is considered to have low potential for encountering precontact and/or early historic Mi'kmaq and/or Euro-Canadian archaeological resources (CRM 2019). Cemeteries, including Lakeview Cemetery in Gabarus provide a record of recent life in the area (Figure 33).



Figure 33. Lake View Cemetery, Gabarus, Nova Scotia

6.3.9 Parks and Protected Areas

The Province of Nova Scotia actively protects natural landscapes and promotes and supports nature-based recreation and conservation through its Provincial Parks and Wilderness Areas system, and through other management and protection means. Several wilderness and protected areas, and provincial parks, have been designated in the general area of the quarry site: Gabarus Wilderness Area; The Stillwaters Wilderness Area; Middle River - Framboise Wilderness Area; Fourchu Coast Wilderness Area; Belfry Beach Park Reserve; Gaspereau River Provincial Park; and Framboise Intervale Nature Reserve (pending). Parks Canada operates the Fortress of Louisbourg National Historic Site of Canada, located approximately 20 kilometers, as the crow flies, from the study site (Figure 34).

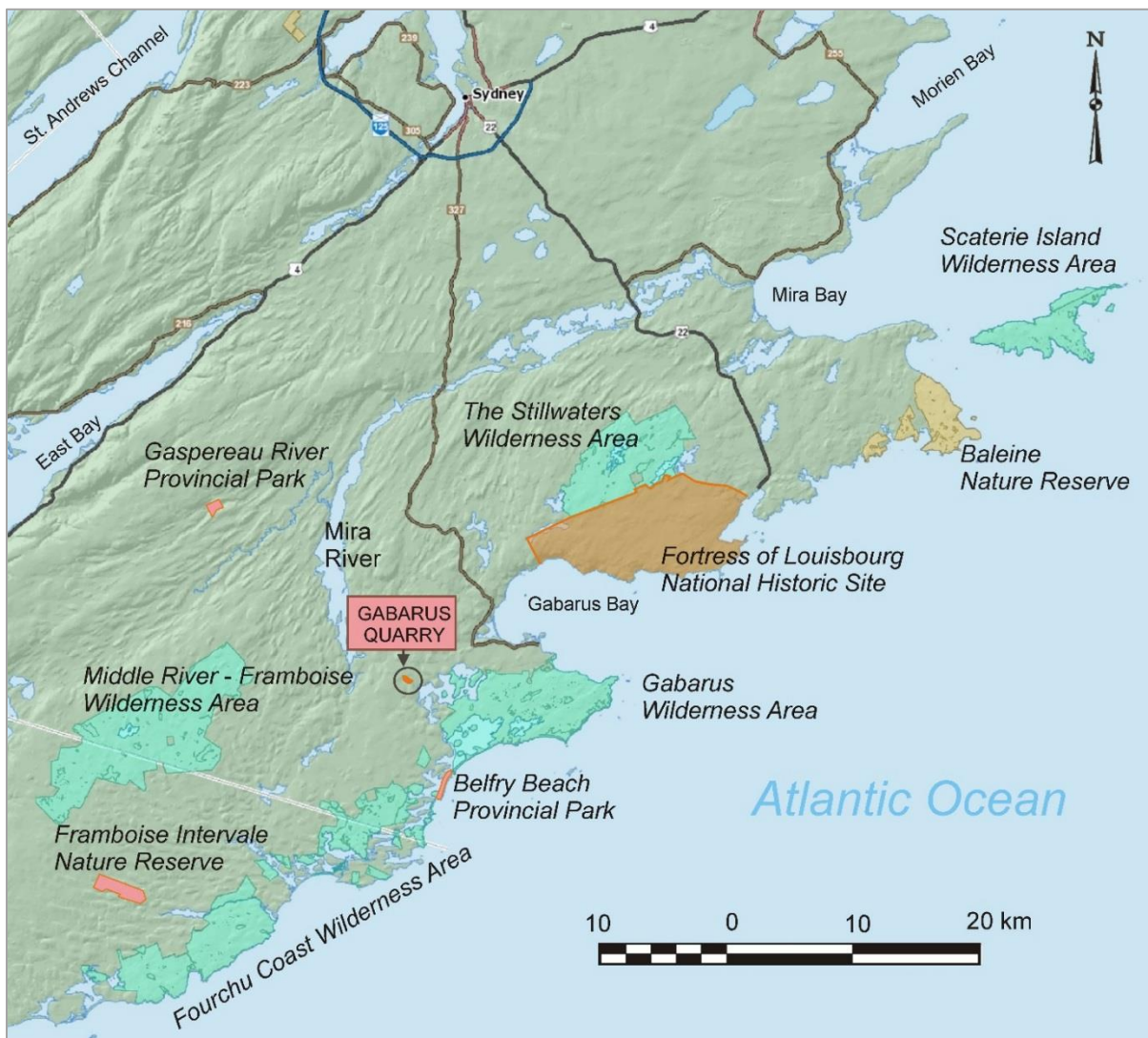


Figure 34. Parks and protected areas in the general vicinity of the Gabarus Quarry.

6.3.10 Recreational/Cultural Features

Residents and visitors to Cape Breton County access natural areas for a wide range of outdoor recreation activities. In the Gabarus Lake area, the predominant outdoor recreational activities are sightseeing, hiking and snow shoeing, beachcombing, snowmobiling and ATV use, as well as hunting and angling. Locals use ATVs in summer and snowmobiles in winter to access trails running in the vicinity of the quarry. A 3-km stretch of the Fourchu Road between Gabarus and Marion Bridge has been opened to ATVs on a trial basis to accommodate ATV users in the area and provide a link for forest trails in the area. Locals can pull over onto an old section of highway on the edge of Gabarus Lake as a rest stop and to picnic; and Gabarus Lake is used for boating by some residents in summer and for ice-fishing in winter. There is a frequently used hiking trail on the north shore of the Gabarus Wilderness area – Gull Cove Trail – which features coastal views, local flora unique to the area, and historical remnants of a late 1800’s fishing community

on Gull Cove. Belfry Beach Park Reserve, a two-kilometer beach on Fourchu Bay, provides access to the southern region of the Gabarus Wilderness Area as well as paddling opportunities and enjoyment of other beach activities along the shores of Fourchu Bay. The Fourchu Coast Wilderness Area, which extends from Belfry Beach about 20 kilometers south along the coast and surrounding coastal lakes, provides a variety of recreational opportunities including hiking, beachcombing, bird watching, paddling routes, angling and hunting. Two privately owned tourist accommodations exist in the immediate area, with a greater density of campgrounds and RV resorts, Bed & Breakfasts, and cottage rentals located west of the Mira River and along the Bra D'or Lake, as well as near Louisbourg.

6.3.11 Residential Use

There are few residences in Gabarus Lake in the vicinity of the quarry, located mainly along the Fourchu highway (Appendix D, Map A-3). Lot sizes are large and may include surrounding tracts of forested land. Lifestyles of the residents of the general area include younger individuals engaged in economic activities such as fishing in the area, retirees maintaining their homes and properties, and residents working locally, including for the quarry. Residents use the area and backcountry for recreation such as walking or hiking, and use of ATVs and winter snowmobiling, as well as for access to natural resources (e.g. firewood).

6.3.12 Commercial/Industrial Development

No active businesses operate in the immediate vicinity of the study area, with the exception of a Christmas tree farm, located on Gabarus Lake South Road (MacDonald's Family Christmas Tree Farm, 19 Gabarus Lake South Road). Most commercial activity in the Gabarus Lake area centres on fishing and tourism, including rental cottages (Mira River Cottages, 856 Grand Mira South Road) and a Bed & Breakfast (Fiddlerslake B&B and Holiday Apartment, 21 Joanne Langford Drive). A Canada Post outlet is located in Gabarus, on the Gabarus Highway (8841 NS-327, Gabarus).

6.3.13 Tourism and Viewscape

Tourism in the area of Gabarus Lake and Gabarus center on nature and outdoor recreational activities, including angling and hunting, hiking, paddling, and beachcombing. Historical significance of the area as a trading post and fishing village, originally by French settlers in the seventeenth century, and ultimately by the British in 1763 also occasionally attracts tourists to the area. The area offers significant coastal views including along the Gull Cove Hiking Trail (Gabarus Wilderness Area), from several cobble and sand beaches, and along the coastal Fourchu Road (*Fleur-de-lis Trail*). A small nature park exists in the fishing village of Gabarus and the decommissioned Gabarus Lighthouse still stands, although is not open to the public. The quarry is not visible from the Grand Mira Gabarus Road or from nearby areas of the countryside (Figure 35).



Figure 35. Gabarus Quarry entrance along Grand Mira Gabarus Road, facing east, June 11, 2019.

6.3.14 Transportation

Grand Mira Gabarus Road, which runs past the quarry site, is a local provincial connector gravel road connecting communities along the Mira River (Grand Mira North and South, Marion Bridge, and Victoria Bridge) with the Fourchu Road and Gabarus Highway (Route 327) at Gabarus Lake, the main coastal route in the area. Gabarus Grand Mira Road supports mainly traffic arising from the quarry, and some local traffic, although most locals use the paved Fourchu Road for local activities and to access more populous areas like Sydney which is a short 35 minutes away. Local industries using the highway include shipping fish products, pulp logs and gravel operations in addition to the traffic associated with the quarry, which is typically seasonal. Roads in the area support moderate traffic compared to Trunk 4, the main highway from the mainland to Sydney on the eastern side of the Bras d'Or Lakes. Traffic volumes on Fourchu Road and Route 327 have ranged from 269 to 520 vehicles per day (annual average of from 260 to 420 vehicles per day) in the 2011 to 2017 period, lowest in the spring (May) and increasing in summer to fall, reflecting tourist traffic. In contrast, traffic on Trunk 4, the main provincial trunk highway connecting the mainland to Sydney on the east side of the Bras d'Or lakes, shows approximately twice to five times the traffic volume depending on season, from 872 to 2545 vehicles per day (annual averages of 880 to 2040 vehicles per day) over a comparable period (Nova Scotia Open Data Portal 2019). When operating, the quarry will contribute truck traffic and some heavy equipment traffic (e.g. trucks, crushers, asphalt trucks etc.) in the vicinity of the site, typically in the summer / fall construction season. Most of the trucks leaving the quarry, and production equipment moved to the Gabarus Quarry, takes place along Fourchu Road to and from Marion Bridge, a paved route in contrast to Grand Mira Gabarus Road of which only the west end is paved. "The Crossroads" where the section of Fourchu Road leading to Marion Bridge Road branches from the road to

Gabarus, and along which the truck traffic from the quarry passes, can experience a slowing of traffic at the intersection, particularly of tourists unfamiliar with the area, which can be a safety consideration⁶. Access to the quarry from Grand Mira Gabarus Road is unobstructed with good sight lines (Figure 35), and similarly the nearby intersection with Fourchu Road is clear despite being on a curve (Figure 36). Neither are expected to be hazardous.



Figure 36. Intersection of Grand Mira Gabarus Road and Fourchu Road (*Fleur-de-lis Trail*). Gabarus Lake is on the left.

⁶ Noted by a resident living at the intersection (July 2019).

7.0 ENVIRONMENTAL IMPACTS, SIGNIFICANCE, AND MITIGATION 5

7.1 Assessment Approach And Methods

Information for the assessment was obtained from consultants' personal knowledge, from reviews of available information, and knowledge of the purpose and proposed design of the project. The environmental assessment follows Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia (NSE September 2009) and uses assessment methodology typical for environmental assessment screenings of this kind. For this assessment a list of valued environmental components (VECs) (also known as VCs) , and project activities and outcomes for the expansion of the existing quarry were developed, and the potential for interactions of these activities with VECs was identified. Where interactions were identified, and there was potential for significant impacts if mitigation was not undertaken, mitigating actions or activities have been suggested that will avoid the impact or reduce it to acceptable levels before the project proceeds. The process ensures that all potentially significant impacts on VECs are identified and all potential impacts on them have been considered, and sufficient mitigation planned.

7.2 Valued Environmental Components

The list of Valued Environmental Components considered for the assessment, and interactions with project components, are presented in Table 8. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following and are summarized in Tables 9 and 10.

Table 8. Valued Environmental Components (VECs) for Gabarus Quarry Expansion.	
BIOPHYSICAL	SOCIO-ECONOMIC
Air Quality, Noise and Light	Mi'kmaq
Groundwater	Recreation, Tourism & Viewscape
Hydrology	Recreational, Commercial & Mi'kmaq Fishing
Water Quality	Archaeological, Cultural and Historical
Freshwater Aquatic Environments and Wetlands	Economy, Land Use and Value
Terrestrial Environments	Transportation
Fish & Fish Habitat	Residential Use
Flora & Fauna & Habitat	Commercial /Industrial Use
Species at Risk	Water Supplies & Residential Wells
Natural Areas & Wilderness	Parks & Protected Areas
	Forestry, Hunting & Trapping

7.3 Socioeconomic Impacts

7.3.1 Mi'kmaq

The Mi'kmaq maintain a general interest in all lands in Nova Scotia and claim they have never surrendered, ceded, or sold the Aboriginal title, and that they claim all of Nova Scotia. As co-

owners of the land and its resources, they expect that any potential impacts to rights and title be addressed. Mi'kmaq occupied much of Nova Scotia prior to European contact, and lands were used to varying degrees for habitation, hunting and fishing, as noted in Section 6.3.1. In more recent times, treaties made with the British and continued through Canadian law have maintained their rights. Coastal areas, freshwater bodies such as Gabarus Lake, and the Mira River system may have been used by Mi'kmaq, including as a transportation route as Mi'kmaq migrated between areas; however, there is low potential for occurrence of Mi'kmaq archaeological resources at the quarry site (CRM 2019).

Operation of the Gabarus Quarry will use land that would otherwise be occupied by terrestrial ecosystems and would not likely be used for Mi'kmaq activities or by other residents for activities such as nature walks and hunting or fishing (either recreationally or for subsistence). Best management practices used at the site will reduce any potential impacts quarry activities may have on water quality and quantity. The land area affected is small in relation to the available wildlife habitat in the area, and would not likely affect wildlife or fish populations, potentially used by Mi'kmaq, and there are unlikely to be cumulative effects of other activities in the area; consequently none of these effects are considered significant.

7.3.2 Recreational Activities

Recreational use and nature appreciation of the environment in the vicinity of the site consists principally of walking/hiking, camping, hunting, fishing, and general enjoyment of home-based recreation (e.g. gardening) concentrated around Gabarus Lake. Only hiking and nature appreciation, which takes place in the summer, would be affected by quarry activities—principally by vehicle traffic—and then principally when the quarry is operating. Operations at the quarry would be cyclic, likely occupying several weeks during the construction season during the years in which the site is active, and the facilities are well maintained. Although quarry operations could likely be heard and residents would experience truck traffic and other effects of quarry operations, the frequency and scope of the quarry is not expected to increase from past use, and any impact on normal activities of residents as a result of the proposed quarry expansion are expected to be negligible.

7.3.3 Tourism And Viewscape

The Gabarus Quarry would have little influence on tourism and viewscape. The property is located approximately one kilometer from Gabarus Lake and Fourchu Road and is not currently visible from either the Gabarus Grand Mira Road, on which the quarry is located, or from or from the Fourchu Road. Truck and equipment traffic accessing and exiting the Grand Mira Gabarus Road onto the Fourchu Road is expected to be the main interaction with tourists. This traffic is expected to be occasional, will be similar now as in the future, and would likely be only a minor impediment to tourist vehicle traffic in the area. Both intersections have good sightlines, are well maintained, and do not present a particular safety concern; however, use of signage (e.g. “Trucks Turning”) during periods of onsite activity, would improve safety by alerting travelers. Lights and dust, if present, at the site can be seen from immediate residents, but would be controlled by proper environmental management practices at the site. Overall the impacts on viewscape and tourism are expected to be negligible.

7.3.4 Recreational, Commercial & Mi'kmaq Fishing

The watercourses in the immediate vicinity of the Gabarus Quarry support fish potentially used by the recreational fishery; however, they will not be altered by the quarry expansion and presence

of the quarry will not result in significant changes in flow regime or water quality in waterways downstream of the site. A minimum 30 m buffer will be maintained between the quarry site and adjacent watercourses. There is no direct runoff from the quarry into adjacent streams, and waters are expected to remain to be good for salmonids, including low turbidity and neutral pH, which would lead to good quality of waters downstream for fish. Overall a negligible impact of the quarry on fishing is expected.

7.3.5 Archaeological/Cultural/Historical

The land proposed for the quarry expansion has low potential for pre-contact and/or early historic native or European archaeological resources (CRM 2019). The area was not settled by Europeans until late in the seventeenth century and not intensely settled until more recently, and then generally along travel routes. The quarry is set back from the Grand Mira Gabarus Road and from Fourchu Road, and the adjacent land has not been used for agriculture and likely was used only for resource removal such as logging, trapping and hunting. If an archaeological feature of significance is encountered during quarry activities, particularly evidence of Mi'kmaq occupation, the effects can be reduced by halting operations and consulting with experts in the field to ensure the artifact or feature is not disturbed and is adequately documented and preserved.

7.3.6 Economy, Land Use And Value

Forestry, hunting and trapping, marine fisheries, tourism, as well as rural-residential activities, are the major economic activities in the vicinity of the site and the study area as a whole. The land on the site is not suitable for agriculture or subsurface mining, and aggregate production is among the only potential commercial uses of the area. Land within 12 km (as the crow flies) of the site is also designated for conservation and wildlife management (e.g. Gabarus Wilderness Area, Fourchu Coast Wilderness Area) and contains habitat for game species such as White-tailed Deer, which support hunting—an important activity for locals, visitors and Mi'kmaq alike. The expanded quarry will remove only a small fraction of available land for these purposes in the area, and therefore won't have a significant impact on these uses. Areas not required for the quarry will be preserved if possible, to assist in maintaining forest ecosystems and wetlands for wildlife, and to buffer adjacent areas from quarry activities. Quarry activities are also not expected to impact existing residential, industrial or conservation and scientific use of nearby areas. As the quarry has been in operation for some time, and the scope and frequency of activities are not expected to change from past use, residential property values in the area are not expected to change significantly. The existing quarry has been operating at the site with little to no impact, while providing economic development and a source of aggregate for local construction projects.

7.3.7 Transportation

The quarry generates a low level of truck traffic on highways in the area, but activity levels are not expected to increase significantly, and consequently the quarry is not expected to change the existing traffic volumes significantly. Suitable signage for truck and equipment operators, as well as the surrounding communities, would help avoid dangerous situations both at the quarry entrance, and at the intersection of Grand Mira Gabarus Road and Fourchu Road. Safe use of the road and avoidance of accidents is essential, both for human impacts and the potential impacts of vehicle accidents and spills on the local watercourses and environments. Warning signs and speed limits can be placed in areas leading to the quarry, in particular when the quarry is operating, to improve safety. Equipment and truck operators for the quarry can be given

instruction on safe and environmentally acceptable procedures. With suitable foresight and care, overall the impact of the project on transportation and safety is expected to be minimal.

7.3.8 Residential Use

Quarry activities can potentially interfere with normal use and enjoyment of nearby residential properties by creating background noise, and through truck and equipment traffic, which some residents may find objectionable. The property is located approximately one kilometer from the community of Gabarus Lake and is not visible. Noise from routine operations in the quarry would not normally disturb residents living nearby; truck movements along the Grand Mira Gabarus Road and Fourchu Road are responsible, however, for periodic elevated noise and dust levels. Mitigation measures such as controlling vehicle speed and engine braking, securing equipment to prevent banging (e.g. doors and chains), covering loads, etc. will be practiced ensuring quarry operations comply with noise and dust limits according to the Pit and Quarry Guidelines. Normal traffic noise on Fourchu Road would likely exceed any noise coming from the quarry for homes located nearby. Traffic volumes from the site would be moderate, and a high frequency of truck traffic would be an irregular occurrence, depending on the supply requirements for particular projects. Dust from operations is unlikely to reach residential areas. Quarry activities such as blasting, are not expected to impact residential water supplies, as homes are located at a significant distance from the site, but a monitoring program for water supplies could be implemented to ensure changes, if any, suspected to be due to the quarry, are detected. Most operations at the site occur during daylight hours. On rare circumstances when they are undertaken at night, activities will involve minimal additional lighting and noise, and is unlikely to be a serious disturbance to residents. The quarry will include signage with phone numbers and contact persons should any members of the community wish to register complaints or concerns. A complaint resolution procedure will be put in place by Dexter Construction to address complaints and concerns.

7.3.9 Commercial/Industrial Use

There are no businesses near the quarry which could be affected. The quarry contributes to net economic benefit in the community through supporting local trucking operations and providing access to aggregate and other quarry products.

7.3.10 Water Supplies And Residential Wells

Nearby residents use drilled wells and dug surface wells for potable water supply, and there are few wells in the general vicinity of the quarry. Dexter Construction will implement a groundwater monitoring program and will respond as necessary to input from residents and CBRM to ensure water quality and supply is maintained. Groundwater recharge generated by the quarry is likely to be of high quality (low conductivity and dissolved solids and neutral in pH). Additionally, best management practices for operations will be implemented to mitigate potential impact on aquifers at the site.

7.3.11 Parks And Protected Areas

The Gabarus Quarry site is not expected to be visible by tourists traveling by road, and road traffic activity due to the quarry is not expected to be high enough in volume to disrupt tourist traffic. Occasional blasting may be heard in the community of Gabarus Lake and Gabarus Wilderness Area, but occurrences are likely to be brief, and distant, and not likely to be a significant concern to visitors/users of those areas. The quarry will be restored at the end of its useful life. Expansion

of the quarry will not affect the integrity of any nearby protected areas. The quarry will not affect Important Bird Areas located in Fourchu and Gabarus Bays, and the potential effect of noise on birds will not be increasing over that which has occurred in the past.

7.3.12 Resource Use—Forestry, Hunting & Trapping

Use of the land for a quarry will remove the potential for logging the site, at least until after the quarry is closed and rehabilitated in the future; however the area occupied by the quarry is relatively small in relation to the available forest resources in the area, and the overall impact on economic return is expected to be small. The quarry will occupy a relatively small area of habitat for furbearing and game species and will not have a significant impact on hunting and trapping.

7.4 Biophysical Impacts—Impacts Of The Project On The Environment

7.4.1 Air Quality, Noise, And Light

Quarry activities are not expected to change from the previous scope of operations, however various project activities have the potential to generate dust, combustion emissions, noise, and light. In particular, operation of heavy equipment (e.g. earth movers, crushers), rock drilling and blasting, operation of an asphalt plant, as well as onsite routine operations contribute to increased dust and particulate levels. Noise levels can impact human use and enjoyment of the environment. Dust emissions during the construction phase will be localized and short term and are expected to be minimal from routine operations. Dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Monitoring of airborne particulate emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines and the Nova Scotia Air Quality Regulations. Industry standards and best practices will be followed during all phases of operations.

Exhaust emissions and potential air-borne odours will occasionally be generated by the operation of vehicles and equipment and may be detected at a distance from the site; however prevailing winds are generally from the southwest to northwest and the general direction of travel of such emissions would be into unpopulated areas and offshore. Given the scope of the planned operations, these emissions will be minimal (i.e. restricted to several pieces of heavy equipment, earth movers, trucks etc. as well as operation of crushers and asphalt plant) and will be localized and similar in type and amount to those produced during previous operations. Ambient air quality monitoring may be conducted at the request of NSE.

Noise levels from the expanded quarry are expected to be similar to those already produced at the site, since the operations are expected to be similar in size at a given time. The operator should ensure that they do not exceed those specified in the Nova Scotia Pit and Quarry Guidelines. Blasting is expected to occur infrequently (1-2 times per year).

Light during nighttime operations— particularly during times of low-hanging cloud and fog—can attract migrating birds traveling over water towards the rest of the mainland of Nova Scotia. Measures can be taken to ensure use of directional lighting, which minimizes emanation of light upward and laterally over the horizon.

7.4.2 Groundwater

Activities associated with the project including forest clearing, grubbing and removal of overburden, and blasting, influence groundwater flow locally in the vicinity of the quarry, but are

not expected to influence groundwater aquifers over a broader area (e.g. in Gabarus Lake). The amount of recharge area involved in project activities is moderate in relation to the overall size of the aquifers in the general vicinity; however the quarry floor will continue to add recharge in approximately the same amount as at present, although the response time in influencing groundwater flow would be shorter and the flows would be more sudden; overall, the effect on overall groundwater flow patterns will be negligible.

It is important to note that the quarry floor will remain at the current elevation and therefore that the deep bedrock water table will not be intercepted by extraction activities. In addition, there will be no pumping of groundwater and therefore no dewatering of associated bedrock aquifer. A minimal amount of unconsolidated material and upper fractured bedrock water may be encountered and it has been concluded that this water quantity will have little to no effect on groundwater and surface water resources in the general area of the quarry. This conclusion is based on the fact that the removal and stockpiling of the thin overburden to expose the rock will have little to no effect on the amount of surficial groundwater in the general area and the fact that the minimal quantity of groundwater encountered in the upper bedrock fractured zone is not utilized as a groundwater resource due to its proximity to the surface and distinct potential to be impacted by surface related contaminants (i.e. this zone is always cased off during the construction of deep bedrock water wells to prevent the ingress of this potential impacted near surface groundwater). This minimal amount of unconsolidated and fractured zone groundwater, if encountered, will be directed to a surface water and sedimentation control system for treatment and controlled release. This system will include associated on-site and downstream water quality monitoring as required by NSE in association with the Industrial Approval stipulations for the operational quarry. Similarly, groundwater levels and associated subsurface water quality will also be monitored via the construction and installation of groundwater monitoring wells in the area surrounding the quarry, again as required by stipulations associated with the Industrial Approval (IA) to be issued by NSE prior to quarry operation. These stipulated baseline and on-going monitoring programs are directly intended to foresee and address any concerns related to any potential adverse effects potentially caused by quarry operation. It is noted that at the present time Dexter is operating a total of ten (10) quarries (2014 – Present) that have been approved by the EA/IA process and have not, to date, encountered any surface or groundwater quantity or quality issues as a result of their operations.

Based on the fact that the quarry while operating above the deep bedrock water table will have little to no effect on the area surface and groundwater resources, in concert with the fact that these aspects of the environment will be monitored prior to and during on-going operations of the quarry as a result of the stipulations provided in the operational Industrial permit it is concluded that the provision of a area water balance and associated surface-groundwater modelling is not warranted or required for this application.

7.4.3 Hydrology

Expansion of the quarry will result in an artificial though managed regime of surface water movement and runoff at the site, and slightly altered flow conditions in the tributary stream passing north of the site. The proposed expansion area is entirely within the watershed of the northern tributary and will reduce surface water runoff and groundwater supply to portions of that tributary slightly. The reduction is expected to be small since the maximum expanded area of the quarry is no more than 15% of the associated watershed area. Runoff from the outside areas of the quarry such as the surrounding berms will be managed to ensure that it meets acceptable environmental standards. Presence of the quarry will reduce the amount of surface water leaving

the site off the undisturbed land surface; however, the contribution of surface water runoff and groundwater recharge from the quarry as a source for the nearby streams will likely balance these losses. Dexter Construction will maintain the drainage management system which is currently in place and continue to manage the flow in a natural way and minimize damage to the local landscape.

7.4.4 Water Quality

Water quality downslope of the site is important for fish habitat in the unnamed stream that runs along the north side of the study area, in particular as a water supply to Gabarus Lake. Quality of water leaving the site and entering groundwater is high, due both to the onsite management and the low-contaminant characteristics of the bedrock. Quarry rock is within acceptable limits for sulphur and acid-generating potential. Blasting is not expected to result in groundwater quality changes, particularly with efforts to reduce releases of other chemicals such as nitrates used in blasting. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels but little surface water flow from grubbed areas is expected off the site and sediments may settle out before the water enters nearby streams. All quarry site activities will be maintained at a minimum distance of 30 m from adjacent watercourses. Release of other contaminants such as oils and lubricants from operating equipment, as well as contaminants which may be found in material, such as recycled asphalt, which may be stored at the site, is expected to be mitigated by normal precautions on equipment operations and fuelling locations. Contaminants arising from operations of the quarry are expected to be exceedingly low. All activities will conform to the Nova Scotia Erosion and Sedimentation Control Handbook (NSE 1988) and the Nova Scotia Pit & Quarry Guidelines (NSE 1999). Runoff from road surfaces potentially can lead to elevated suspended sediment levels in flows in ditches adjacent to them, although effects would be short term. Impact of the quarry on water quality in adjacent streams and other waters is expected to be negligible.

7.4.5 Freshwater Aquatic Environments And Wetlands

The only permanent stream at the site expected to be affected by the quarry expansion is located on the outer margin of the study area to the northeast. Wetlands at the site are chiefly on the margins of the proposed expansion area although approximately 0.7 ha of wetlands in the northwest and up to 0.2 ha in the northeast may be removed or altered when the quarry has been fully developed.. Any wetland removal will be negotiated with Nova Scotia Environment following the normal legal process and all wetlands which are removed or altered are expected to be compensated for as development proceeds. Surface runoff from the quarry floor is managed on site to control sediment levels before leaving the site. Quantities of runoff arising from the site in future will be approximately the same as at present and will remain in the same watershed. The quarry is unlikely to generate significant quantities of contaminants or suspended sediments that could impact any freshwater habitat.

7.4.6 Terrestrial Environments

Proposed expansion will utilize areas which are mainly medium-aged softwood and mixed forest—types which are common in the general vicinity, and in particular locally at the site—and the quarry will not remove a large proportion of either type. Land at the quarry will be reclaimed and revegetated, and will eventually return to a functioning ecosystem, possibly similar to that which occurs at the site at present.

7.4.7 Fish And Fish Habitat

None of the proposed project activities will physically impact potentially fish bearing streams. Reductions in flow in parts of the northern stream adjacent to the quarry are expected to be small, and flows will largely be restored downstream via surface water drainage from the quarry floor. Blasting occurs infrequently at the site and will be sufficiently separated in distance from the unnamed stream and adhere to seasonal timing as per Fisheries and Oceans Canada (DFO) recommendations for use of explosives near fish bearing habitat (Wright and Hopkey 1998) to eliminate any harm to fish. Water quality typically found in runoff from the quarry will be monitored and is expected to meet guidelines for maintenance of Freshwater Aquatic Life. All guidelines for activities and timing of blasting in the quarry will be followed. Overall the effects of the quarry construction and operations are expected to be negligible.

7.4.8 Flora And Fauna And Habitat

The effect of expanding the Gabarus Quarry will be the removal of existing terrestrial ecosystem (plants and animals) in those areas, to be covered by the footprint of the quarry. With time, areas no longer suitable for quarry operations will be remediated, according to agreements made with the Nova Scotia government as a condition of quarry approval. Plant and animal communities that arise in remediated areas will likely differ to some degree from those at present; however, a goal of remediation will be to ensure that conditions (e.g. soil types and topography) are reasonably restored to pre-existing conditions. During recovery and revegetation of abandoned areas, the forest succession will provide habitat for a moderate diversity of species. Removal of forest cover is a feature that quarry development shares with logging activities, which affects local ecosystems to a moderate degree, and is allowed in Nova Scotia. Areas of the site where Olive-sided Flycatcher was heard during the baseline survey, will be revisited prior to any expansion of the quarry into that area, or the area will be avoided. No other species of conservation concern, which were highlighted, were in the proposed expansion area or areas immediately adjacent. Normal management practices regarding forest clearing, such as avoidance of cutting or major clearing activities during critical breeding periods of songbirds from mid-April to mid-September, will reduce loss of nesting birds in forest areas. Several species of migratory birds are in decline in Nova Scotia, in particular interior forest birds, which rely on large expanses and continuity of intact forest. Other wildlife species need large areas of undisturbed forest to live and reproduce naturally. Expansion of the Gabarus Quarry will result in only a comparatively small change in the coverage of natural and mature forest stands in the area and is expected to have comparatively small impact on interior forest birds and wildlife. During operations, modified areas of the quarry offer potential nesting sites for certain species of birds and other wildlife, including hunting spaces for species such as owls and nesting for ground nesting birds such as nighthawks. Quarry employees should be educated on the need to check areas for activity and nests including both ground- and tree-nesting birds, before undertaking activities which would disturb established surfaces. Night operations and use of lights have various effects, including attracting insects which otherwise would need darkness to mate and reproduce; light pollution is considered to be an important factor globally in decline of songbird populations, through declines in populations of some insects. Night operation lighting during migration periods (August – September) would attract migrating birds. Lighting used at the site should focus downward and below the normal horizon, to limit visibility by birds and insects from a distance. Expansion of the quarry will result in only a small change in the amount of softwood and mixed forest at the site, and therefore is likely to have a negligible potential impact on Olive-sided Flycatcher.

7.4.9 Species At Risk

Olive-sided Flycatcher, an endangered bird species, was identified as potentially breeding in forest northeast of the study area. The proposed expansion of the quarry is not expected to extend into this area and the potential for impact on habitat is minor. However, the buffer in this area may be enlarged to reduce the potential for impact on the habitat. Quarry activities are not expected to impact water balance in wetlands which form the habitat, and so will not affect the species.

Apart from Olive-sided Flycatcher, no species at risk were found or heard at the site. Common Nighthawk, a ground-nesting endangered bird species, potentially could nest in grubbed and marginal but open areas of the quarry; employees should be made aware of the need to check areas for activity and nests before undertaking activities which would disturb established surfaces. Lights during night operations during migration periods (May – June, August – September) would attract various bird species and insects, which could include species at risk. Lighting used at the site should focus downward and below the normal horizon, to limit visibility from a distance.

7.4.10 Natural Areas & Wilderness

Natural areas in the vicinity of the site are appreciated by locals and tourists alike, and the Gabarus Lake area is dominated by natural areas, including some of the most remote and wild areas of Nova Scotia. The pockets of human development along the Fourchu Road, and in the communities of Gabarus and Fourchu, contrast with the coastal wilderness in those areas. The quarry affects a small proportion of the natural landscape at the site and has a limited effect on visitors to the area who are looking for nature experiences. Efforts will be made to minimize the effects of the quarry, in particular to reduce traffic, noise, dust and light from operations. Restoration should also consider values important in conservation of biological communities and ecosystems, as well as changes in physical conditions that could affect those communities. Normal procedures such as dust control and light management will help to minimize impacts on natural and wilderness values at the site.

8.0 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

The operating quarry will not be impacted in general by weather, including high rainfall and precipitation, through its nature and design, which includes site water management. Aggregate and other rock products stored at the site are stable under varying conditions of rainfall and wind. Integrity of any runoff management structures at the site must be appropriately designed, inspected, and maintained. Changing climate may increase the operating season for transportation projects, and the need for aggregates produced by the quarry.

9.0 CUMULATIVE IMPACTS

Because of the remoteness of the location, all the potential impacts of the quarry operation (dust, noise, lights, blasting, traffic volume) are unlikely to be compounded by other development or human activity. Since site operations are not expected to increase in frequency or scope from past use, the cumulative effect of other local human activity is not expected to increase from past levels.

10.0 MONITORING

In accordance with Pit and Quarry Guidelines under the NS Environmental Act and the Industrial Approval for the quarry site, Dexter will implement surface and groundwater monitoring programs

to monitor hydrological conditions as well as water quality. Routine monitoring of noise levels and particulate levels will be conducted in accordance with the site Industrial Approval.

11.0 PUBLIC CONSULTATION

Informing the public and Mi'kmaq about proposed industrial activities which potentially affect them is an important part of environmental and project management. Potential benefits include exposure to local knowledge, which may improve environmental performance, and overall operations of the project; and public involvement and support in subsequent operations. In addition to contacts already made in developing this assessment and in conducting operations in the Gabarus area, Dexter will be undertaking consultations with the local community through public notices in locally and provincially circulated newspapers. Stakeholders are encouraged to forward comments regarding this application to NSE to be considered as part of the regulatory review process.

12.0 PROJECT CLOSURE

Remediation of the affected environment during the closure or decommissioning phase of the quarry will involve the execution of a Rehabilitation Plan developed in consultation with the NSE as part of the Industrial Approval process.

13.0 APPROVAL OF UNDERTAKING

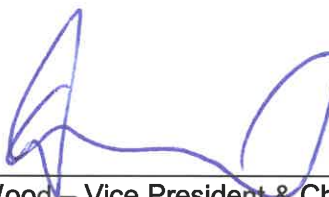
Dexter will comply with all provisions of the Nova Scotia Environment Act and Regulations. An application for an amendment to the existing Industrial Approval will be submitted to Nova Scotia Environment.

14.0 FUNDING

No public or other government funding is involved in the execution of this undertaking. All costs are borne by Dexter.

15.0 SIGNATURE OF CEO AND DATE

FEB 11 2020



Date

David Wood – Vice President & Chief Financial Officer
Dexter Construction Company Limited