Dexter Construction Company Limited

DEXTER CONSTRUCTION COMPANY LIMITED
MIDDLEWOOD QUARRY EXPANSION, MIDDLEWOOD, NS

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

April, 2013

WMR Environmental Services Inc. & Associates

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1.0 INTRODUCTION

Dexter Construction Company Limited (herein after referred to as "Dexter") of Bedford, Nova Scotia is proposing to expand an existing quarry located at 890 Hirtle Road, Middlewood, Lunenburg County, Nova Scotia. An approval to expand the quarry is required under the Nova Scotia Environmental Assessment Regulations. The registration of this Environmental Assessment 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".

Address:

927 Rocky Lake Drive,
P.O. Box 48100
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: 902-835-6346

Consultant Contact:

Mr. J. H. Fraser, M. A. Sc., P. Geo.
H2O GEO Environmental Services Inc.
Phone: 902-443-4227 (Office); 902-497-5597 (Cell)

It is noted that the existing quarry operates under an existing "Industrial Waste Permit Approval #94-027, as attached to a letter dated July 18, 1994 to Mr. Dave Shupe (Dexter Construction) from Mr. D. E. Hiltz, P. Eng., Manager, Industrial Pollution Control, Nova Scotia Environment. This letter and Approval (NSE File # 11-94-0035) is also attached in **Appendix A** "Property Information".

2.0 THE UNDERTAKING

2.1 NAME

Dexter proposes to expand the existing Middlewood quarry for the production of aggregate, primarily used in the road and local construction industry. The proposed undertaking will be referred to in this document as the quarry.

2.2 LOCATION

The site is located in Middlewood, Nova Scotia at 890 Hirtle Road (PID # 60302304) in Lunenburg County, Nova Scotia, 1:50000 NTS 21A-2, 4894300 Northing, 375440 Easting, Air Photo 251, L-044, 13 August 2010 (**Figures 1 & 2 (below) and Drawing 1, Appendix B**). The

site is positioned within an un-zoned area along the south side of Hirtle Road. A letter identifying area zoning is also attached in **Appendix A**, "Property Information". The property that is being expanded has previously been developed as a result of quarrying and construction material processing activities.

The property is wholly owned by Municipal Enterprises Limited, which is the parent company of Dexter, and is presently un-zoned. The existing and expanded quarry property encompasses approximately 71.0 hectares.

Figure 1 - Project Location

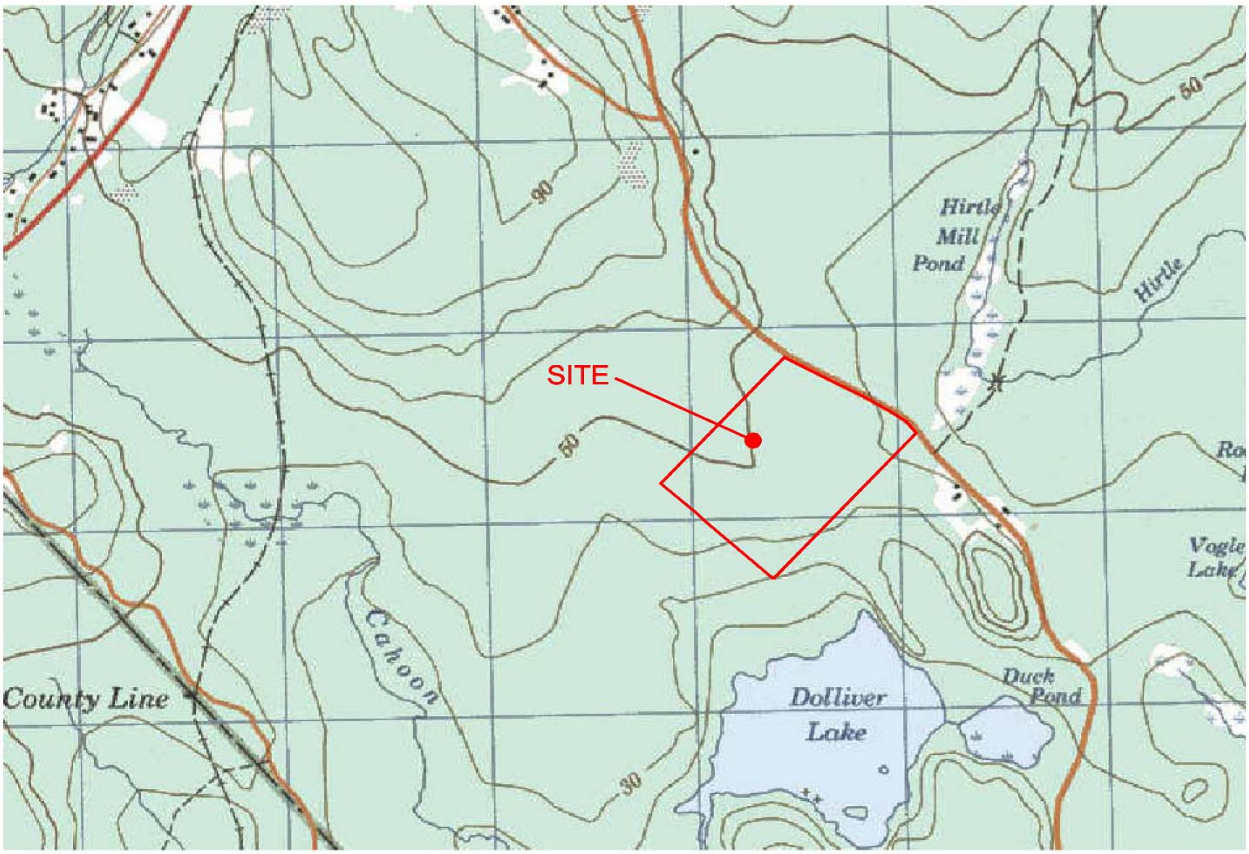
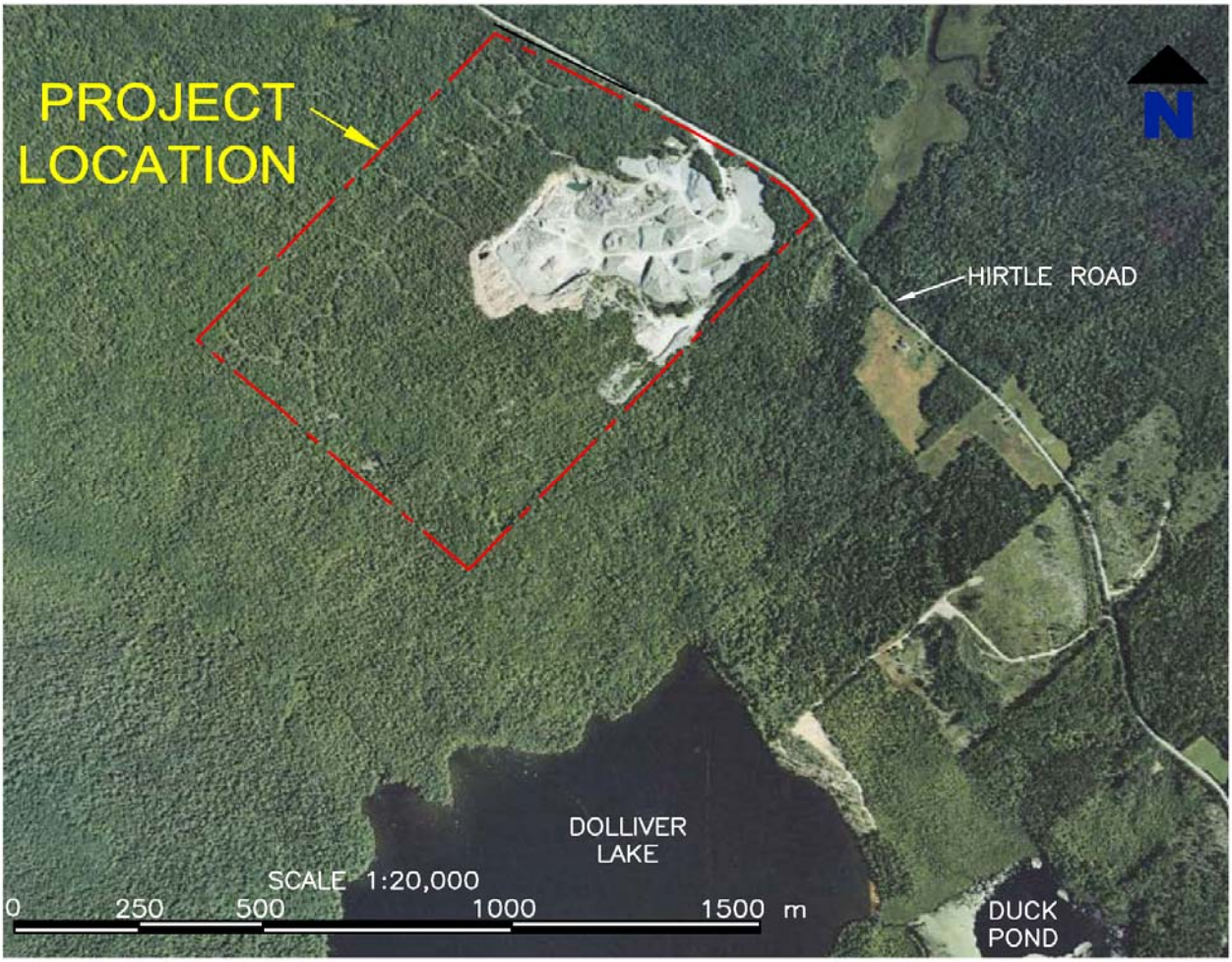


Figure 2 – Site Location and Adjacent Land Uses



3.0 SCOPE OF THE UNDERTAKING

As noted previously, Dexter intends to expand the existing Middlewood quarry for the continuing purpose of extracting and supplying aggregate for the road and local construction industry. The existing quarry has been in operation since 1994 and encompassed approximately 42 ha. in total, of which approximately 17 ha. was actively developed. The existing quarry face is approximately 15 meters (m) in height and the disturbed area includes on-site related facilities including crushing, washing and stockpiling areas. From 1994 through the present Dexter has extracted an average of approximately 140,000 tonnes of aggregate per year from the Quarry. There are no off-site project related support facilities, other than Hirtle Road and related transportation corridors used to transport the product to local destinations.

In 2011 Dexter executed a land trade with the Nova Scotia Department of Natural Resources and acquired approximately 29 ha. of land immediately to the northwest of the existing Quarry. It is Dexter's intent to continue quarry operations to the northwest, using existing infrastructure. It is anticipated that future operations will involve the extraction of approximately 150,000 to 200,000 tonnes/year for between 15 and 20 years.

3.1 PURPOSE/NEED FOR THE UNDERTAKING

Dexter proposes to expand the existing Middlewood 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 Middlewood quarry expansion will be assessed on an ongoing 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 Waste Permit Approval. Follow on sections of this document outline 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

As the EA requirements do not include a direct public involvement program, public notification to date has been restricted to notifying local officials of Dexter’s intent to file an EA application to expand the existing Middlewood quarry. In this regard, the following persons have been briefed regarding the intent of this EA document:

Mr. Gary Ramey; MLA Lunenburg West

Ms. Vicky Conrad MLA Queens County

Mayor Don Downe; Municipality of the District of Lunenburg

Mr. Lee Nauss, Councillor, Municipality of the District of Lunenburg

Mr. Eric Hustvedt, Councillor, Municipality of the District of Lunenburg

Ms. Tammy Wilson, CAO, Municipality of the District of Lunenburg

Contact was also made with Chief Deborah Robinson of the Acadia First Nation to inform this community of Dexter's intent to file the Registration Document for a Class 1 Undertaking Under Section 9 (1) of the NS Environmental Assessment Regulations. A letter outlining the details of the project was sent to Chief Robinson on October 17, 2012 and is included in **Appendix F**. A follow-up letter was also sent to Chief Deborah Robinson on March 7, 2013 (also included in **Appendix F**). This letter outlines the new dates for officially filing the EA document with NSE and also, by way of copy, informs both the Annapolis Valley First Nation and the Mi'kmaq Rights Initiative.No responses from these has been received to date.

4.2 Public Concerns

No public concerns regarding the project have been received to date.

4.3 Future Steps

Future public involvement will involve official notification of the public through two newspaper advertisements (one in the local paper and one with province wide circulation). This will occur in concert with the official submission of this document to the NSE. The proposed newspaper advertisement is included in this document as **Appendix F**.

5.0 DESCRIPTION OF THE UNDERTAKING

5.1 Human Uses of the Environment

5.1.1 Mi'Kmaq

Southwestern Nova Scotia was important for the Mi'kmaq before European settlement and continued for some time after. The Medway River to the west and the LaHave to the east were travel routes, and pre-contact Mi'kmaq campsites and petroglyphs can be found in Kejimkujik National Park northwest of the project site, and along the Medway River at McGowan Lake, dating back to over 3000 to 4000 years before present. However, no registered pre-contact sites occur in the general area of the project (CRM 2012). The main Mi'kmaq First Nation closest to the project area is the Acadia First Nation, which has five component First Nations in three counties: G*old River* in Lunenburg County; *Medway*, *Wildcat*, and *Ponhook* in Queens County; and *Yarmouth* in Yarmouth County. The closest is *Medway* 24 km from the site, and next closest Wildcat near Molega Lake (33 km). Bear River First Nation has three communities, the closest about 100 km north of the project site.

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 that was incorporated in 1986, and their mission is to promote and assist Mi'kmaw communities. The UNSI, created in 1969, was formed to provide a cohesive political voice for Mi'kmaq people. Acadia First Nations belongs to UNSI and Bear River First Nation is a member of CMM. The Native Council of Nova Scotia (NCNS), represents Mi'kmaq people living off-reserve. The NCNS is a self-governing agency located in Truro. Statistics Canada estimated that in 2006 approximately 48% of the Mi'kmaq populations lived 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 represents Mi'kmaq. 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." The initiative is to negotiate between the Mi'kmaq of Nova Scotia, the province and the Government of Canada. KMK's main office is located 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 and CMM is 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.

The Middlewood quarry site has no known Mi'Kmaq ceremonial or cultural uses, nor is the area known to be used for other purposes, based on discussions with locals and through the archaeological resources survey of the site (CRM 2012) and the Nova Scotia Museum search (L. Bennett, NS Museum, pers. comm 2012). There are no fishable waters on the project site and no specific Mi'Kmaq fisheries have been identified. Fishing by individual Mi'Kmaq from bands located in Queens and Lunenburg Counties likely occurs alongside the recreational fisheries by other residents. Mi'kmaq fish from the wharf in Vogler's Cove, which is located approximately 5 km to the south east of the site.

5.1.2 Water Supply Areas

The site is not located on or near any water supply areas for the Municipality District of Lunenburg County.

5.1.3 Land Use

Land in the vicinity of the quarry is primarily forest resource, with several abandoned farms and residences in the vicinity of the property.

5.1.4 Hunting

The site is expected to have similar wildlife species to those observed in nearby areas of Lunenburg and Queens Counties. Hunting for deer, rabbit, and coyotes occurs throughout the local area, off the Hirtle Rd. and from adjacent logging roads or ATV trails and beaver, river otter, and muskrat are common in the area (S. Dagley, local resident, pers. comm. 2012). Deer harvest in Lunenburg County is highest in Nova Scotia, making up 23.9% of all deer captured in the Province. Upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant) are harvested but Lunenburg and Queens Counties both rank ninth or lower compared with other counties. The main furbearers harvested for both counties in terms of harvest numbers are: beaver, raccoon, muskrat, coyote, squirrel and mink. Furbearers are comparatively more important in Lunenburg County than Queens County, though neither county has a significant harvest (Lunenburg represents 3.2% and Queens represents 1.6% of the total harvested furbearers in Nova Scotia). Lunenburg County has the third largest harvest for otter from 2005-2010, representing 8.9% of the provincial total; the fourth highest harvest for fisher; and the fifth highest harvests for beaver, bobcat, fox, and squirrel. Queens County has the third largest harvest for marten, representing 6.3% of the Nova Scotia total.

5.1.5 Recreational Fishing

Some recreational fishing takes place in Hirtle Mill Pond and Hirtle Brook, and Dolliver Lake, as well as in areas further downstream. Brook Trout is the most common target species, with

Smallmouth Bass also caught in Dolliver Lake. Other game species include brown trout, and yellow perch.

5.1.6 Archaeological Resources

No records of archaeological resources of significance occur in the study area, although recorded sites occur in that area of the Province, and the potential for First Nations and historic archaeological resources is moderate. (L. Bennett, Coordinator, Special Places, pers. comm., 2012; CRM 2012). A more-detailed archaeological/cultural assessment was done for the quarry expansion (CRM 2012), and determined, in turn, that the study area exhibited low potential for archaeological and/or historical resources, and no areas of high archaeological potential were identified during a site visit (August 31, 2012). (**Appendix E**)

5.1.7 Parks and Protected Areas

There are no parks or protected areas in the immediate vicinity of the site, and no significant habitats listed in the NSDNR Significant Habitats Database, within 3 km of the site. From 3-5 km, there are three designated sites: Hubbards/Danesville Rail Corridor and Danesville/Brooklyn Rail Corridor, west of the project site, both former railway lines converted to trails managed by NSDNR; and the Vogler's Cove Conservation Land and South Shore-East Queens Co. Sector, an 8.5 ha. parcel of coastal land managed by the Nova Scotia Nature Trust. An Important Bird Area (IBA) encompasses coastal areas between the towns of Bridgewater and Liverpool, where it includes tidal rivers/estuaries, mud or sand flats, open sea, inlets/coastal features (marine), and coastal cliffs/rocky shores (marine).

5.1.8 Recreational/Cultural Activities

The site is in an unpopulated and remote part of Lunenburg County and there are no recreational facilities or recreational/cultural activities carried out in the immediate vicinity of the site. Lands are used locally for hunting, and Dolliver Lake, located about 400 m from the quarry, is used recreationally for fishing, swimming, canoeing, kayaking in summer and skating in winter; in addition, several cabins (~3) are maintained on the lake (S. Dagley, local resident, pers. comm. 2012). Recreational fishing for yellow perch and brook trout is a significant local activity and occurs on both Dolliver Lake and the Hirtle Mill Pond. Vogler's Cove Community Hall, is a local meeting place, with an adjacent playground and known walking trails. Also in the vicinity of Vogler's Cove is the United Community Marine Park, a seaside park adjacent to the waterfront and a known picnicking area (L. Barkhouse, pers. comm. 2012). Mi'kmaq fish from the wharf in Vogler's Cove, and likely also hunt in the Middlewood area.

5.1.9 Residential/Commercial Development

The land near the Middlewood Quarry has a low population density and no commercial operations. Several cabins are occupied seasonally on Dolliver Lake, while there are several unoccupied residences along Hirtle Road near the site. Four abandoned properties are located in the vicinity of the quarry and include a mobile home (628 Hirtle Road, PID 60302478); a bungalow (PID 60302247); a farmhouse and outbuildings (1016 Hirtle Road, PID 603696); and a farmhouse and buildings at 1068 Hirtle road (PIDs 60369600 and 60650900). One of these properties (the abandoned split entry home) is located within 800 m of the proposed expansion area, However, waivers with respect to the quarry expansion, have been obtained from the two (2) owners of the abandoned split entry home. Therefore, this dwelling does not impact or

restrict quarry development. Copies of the applicable signed waivers are included in this document, in **Appendix F** "Public Consultation Documentation".

5.1.10 Tourism and Viewscape

Hirtle Road is a connector road which is expected to carry mostly local vehicle traffic, with most of the tourist traffic in the area moving along Highway 103 and coastal Highway 331 through coastal communities such as Vogler's Cove, Port Medway and Cherry Hill. Hirtle Road is in a heavily forested area and there are no panoramas or scenic views with which the quarry development would interfere.

5.2 Existing Quarry Operations

The existing quarry operations involved blasting, crushing, washing, stockpiling of aggregate and associated trucking on an as required basis. The quarry has operated in accordance with an existing "Industrial Waste Permit Approval #94-027, as attached to a letter dated July 18, 1994 to Mr. Dave Shupe (Dexter Construction) from Mr. D. E. Hiltz, P. Eng., Manager, Industrial Pollution Control, Nova Scotia Environment (**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.

Blasting, crushing, washing and trucking has occurred on an as required basis, however it is noted that blasting has occurred on an average of 1 to 2 times per year. In 2008, Dexter, in consultation with the NSE (Mr. Michael MacDonald, Bridgewater Office), upgraded quarry operations to include the washing area, surface water drainage and sedimentation control, stockpile areas, slope reclamation and general site clean-up (**Drawing 1, Appendix B**). Dexter has also conducted surface water sample collection and analysis from 2007 through 2012, which involved grab sampling for hydrogen ion concentration (pH) and, Total Suspended Solids (TSS), the results of which are outlined in **Table 1**.

TABLE 1 - MIDDLEWOOD WATER SAMPLING ANALYSIS (2007 – 2012)

	pH (units)		TSS (mg/L)	
Sampling Date	**Grab Sample (5-9[A])**	**Monthly Mean (6-9)**	**Grab Sample (70[A])**	**Monthly Mean (35)**
18-Apr-07	7.39	7.19	56	28
24-Apr-07	6.99		ND	
18-June-07	7.34		ND	
9-Aug-07	7.17		ND	
14-Dec-07	6.85		ND	
22-May-08	7.03		2	

16-June-08	6.98		12	
5-July-08	7.01		ND	
25-Apr-11	7.35		ND	
2-Aug.-11	6.98		ND	
8-Sept.-11	7.63		ND	
4-Oct.-11	7.62		ND	
3-Nov.-11	7.03		ND	
9-Dec.-11	7.35		ND	
11-Jan.-12	7.49		ND	
3-Feb.-12	7.50		ND	
7-Mar.-12	7.42		ND	
4-Apr.-12	7.61		ND	
12-July-12	7.74		ND	

A – Final Effluent Discharge Limits for Middlewood Quarry Ind. Waste Discharge Permit App. # 94-027

In addition to the above noted data, Dexter also 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 % (0.28 kg H_2SO_4/tonne), which is well below the minimum (0.4 % S; 12.51 kg H_2SO_4/tonne) defined by NSE as sulphide bearing material and is therefore not acid producing. The laboratory results of this sample are included in **Appendix C.**

5.3 Future Quarry Operations

Dexter proposes to expand the Middlewood quarry for the extraction, storage and removal of aggregate, primarily used in the road and local construction industry. To achieve this goal, Dexter executed a land trade with Nova Scotia Natural Resources and acquired lands located immediately to the northwest (PID's 60492022 and 60506319) of their existing property and intend to expand the existing quarry onto to the newly acquired property. The project will continue to provide Dexter and other local projects within the area with a long term source of aggregate to be used in the road and local construction industry.

Although totally dependent on local market conditions, it is anticipated, at this time, that future development will involve the production of approximately 100,000 to 200,000 tonnes of aggregate per year, moving in a northerly direction from the existing face (**Drawing # 2, Appendix B**). Given an approximate rock face height of 15 m this would involve a block of

approximately 40 x 70 m for the 100,000 tonnes and a block of 60 x 90 m for 200,000 tonnes per year and would either involve 1 or 2 blasts per year, respectively. **Drawing # 2, Appendix B** identifies the proposed expansion area and represents an area of approximately 134,016 m^2 or a total volume of 2,010,240 m^3 and a total tonnage of 5,025,600 tonnes, which based on an average annual tonnage removed of 150,000 tonnes represents a project life of approximately 33.5 years. It is noted that this estimate does not take into consideration wetlands and associated twayblade occurrences identified within the crosshatched area. If the quarry is expanded into this area, contact will be made with NSE to open negotiations regarding appropriate compensation and/or the creation of replacement habitat. Aggregate production would commence with drilling and blasting and is consistent with current operations. A qualified blasting contractor would 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. Blast monitoring will be conducted for every blast event and submitted to NSE upon request.

It is anticipated that aggregate excavation will not take place below the deep bedrock water table. A small amount of unconsolidated material and upper fractured bedrock groundwater may be encountered as in previous operations, however this water, if encountered, will be directed to the existing surface water and sedimentation control system for treatment and controlled release.

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 (See **Drawing # 1, Appendix B**). 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 along Hirtle Road, north to Highway # 103. The number of trucks hauling aggregate will be determined on a job by job basis, but currently averages approximately 5000 per year or 0 to 40 per day.

The existing quarry currently employs one to two seasonal employees, however additional employees are on-site during aggregate production. These employment numbers are expected to remain consistent throughout the on-going operation. Drilling, blasting and trucking will require additional resources; however these activities are generally subcontracted on a job by job basis.

6.0 VALUED ENVIRONMENTAL COMPONENTS AND EFFECTS MANAGEMENT

The list of Valued Environmental Components considered for the assessment, and interactions with project components, are presented in **Table 2**. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following sub-sections and are summarized in **Table 3**.

6.1 Socioeconomic Impacts

6.1.1 Mi'Kmaq

The Mi'Kmaq occupied much of Nova Scotia prior to European contact and rivers such as the Medway to the west and the LaHave to the east of the site were travel routes. In more recent times, treaties made with the British and continued through Canadian law have maintained their rights to fish, and harvest wildlife and forest resources. The site does not have a cultural historical significance for the Mi'Kmaq and no artefacts indicating prehistoric or historical use were identified at the site (CRM 2012). (**Appendix E**)

Quarry operations would interact with any use of natural resources through hunting or fishing, either recreationally or for subsistence; however the area affected is small in relation to the available wildlife habitat in the area, and there are no likely cumulative effects of other activities in the area, and consequently none of these effects are considered significant.

6.1.2 Recreational Activities

Recreational use of the environment in the vicinity of the site consists principally of hunting and fishing, as well as water-based recreation and seasonal residences (cabins) on Dolliver Lake. Cleared trails for logging equipment and clear-cuts on site are likely used by local hunters. The relatively small footprint of the site in relation to available wildlife habitat in the area, and the lack of forestry pressure on the local resources suggest that there are no likely cumulative effects on other activities in the area. Recreational activities on Dolliver Lake are buffered visually. Noise from quarry operations will reach the lake, and may be mitigated by suitable hours of operation, weekday and seasonal restrictions to avoid overlapping with night and times of peak recreational usage.

6.1.3 Tourism and Viewscape

Tourists use the highway adjacent to the site to access the coast from Highway 103, but the road does not have particular significance nor is it promoted as a tourist route. Only the entrance to the quarry is visible from the highway and the expanded quarry will also not be visible from the road.

6.1.4 Recreational Fishing

Freshwater streams and ponds in the vicinity of the quarry, including Dolliver Lake and Hirtle Mill Pond are fished recreationally. The quarry expansion will not affect recreational fishing as changes in hydrology—which include an increased freshwater movement from the site into the Hirtle Mill Pond system and a slightly reduced flow into Dolliver Lake—are insignificant. Water quality of the runoff from the quarry is good for salmonids, including low turbidity and neutral pH, which would tend to improve the acidity of waters downstream for fish.

6.1.5 Archaeological/Cultural/Historical

A description of the Existing Cultural/Historical Environment is provided in the report *Cultural Resource Assessment of the expanded Middlewood Rock Quarry – 890 Hirtle Road, Middlewood, N.S.* (Cultural Resource Management, 2012) found in **Appendix E**. It is noted that the existing developed area of the proposed undertaking was extensively disturbed through quarrying and related activities from 1994 through 2012.

The land proposed for the quarry expansion has low potential for pre-contact and/or early historic native archaeological resources. The site was not settled by Europeans and has no on-site structures which could have cultural significance. Consequently the project will not have an impact on cultural/historical/archaeological features.

6.1.6 Land Use and Value

The land at the site is not suitable for agriculture or forestry due to the absence of good soil and presence of bedrock near the surface. Forest types removed by the quarry are not productive would have a small impact on overall forest use in the area.

6.1.7 Transportation

The quarry generates a low level of truck traffic on the highway but is not expected to change the existing traffic volumes. There are not likely to be any changes in private traffic on the highway over the course of the project. Consequently no impact of the project on transportation is expected.

6.1.8 Residential Use

No occupied permanent residences occur within 800 m of the quarry, however there is one (1) abandoned split entry home located inside the 800 m limit for blasting events. However, waivers with respect to the quarry expansion, have been obtained from the two (2) owners of the abandoned split entry home. Therefore, this dwelling does not impact or restrict quarry development. Copies of the applicable signed waivers are included in this document, in Appendix F “Public Consultation Documentation”. Blasting at the site will occur infrequently during daylight hours and will be unlikely to disturb owners of residences and cabins. Activities will not impact wells as they are located at a significant distance from the site. Most operations at the site occur during daylight hours, and on rare occurrences when they are undertaken at night, will involve minimal additional lighting and noise, which will be unlikely to be a serious disturbance to local residents.

6.2 Biophysical Environment

A description of the Existing Environment is provided in the report *Biophysical Assessment of the Expansion of the Municipal Group Aggregate Quarry – 890 Hirtle Road, Middlewood, Lunenburg County, N.S.* (Envirosphere, 2013) found in **Appendix D**. It is noted that the existing developed area of the proposed undertaking was extensively developed through quarrying and related activities from 1994 through 2012.

This report contains the results of the overview and assessment. It presents a description of the methodology and scope, existing environment, environmental effects, cumulative effects, discussions and conclusions. The level of detail of the assessment is sufficient to ensure that all information necessary to allow adequate review of the project is provided; and to demonstrate how the assessment was conducted and the information on which the conclusions were based.

6.2.1 Air Quality and Noise

Various project activities have the potential to generate dust, combustion emissions, and noise. In particular operation of tree-clearing and grubbing equipment, rock drilling and blasting, as well as onsite routine operations contribute to increased dust and particulate levels. Noise levels

can impact human uses of the environment and blasting and loud noise can harm birds and bats which have sensitive hearing. Dust emissions during the construction phase will be localized and short term, and from the routine operations are expected to be minimal, and dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Any stockpiled topsoil and overburden will be seeded and/or covered with hay. 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 Guidelines.

Combustion emissions will be generated from the operation of vehicles and equipment. Given the scope of the planned operations, these emissions will be minimal (i.e. restricted to one/two pieces of heavy equipment), localized and similar to those produced during previous operations. Ambient air quality monitoring will be conducted at the request of NSE.

Noise levels from the quarry expansion are expected to be similar to those produced during the previous operation, and the proponent will 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) and will occur only during daylight hours.

Sound levels, as per the Pit and Quarry Guidelines and the existing permit, will be maintained at a level not to exceed the following levels (Leq) at property boundaries:

Leq 65dBA 0700-1900 (days)

60dBA 1900-2300 (evenings)

55dBA 2300-0700 (nights)

6.2.2 Geology/Hydrology/Hydrogeology

The site is immediately underlain by unconsolidated surficial material described by the Surficial Geology of Nova Scotia; Department of Natural Resources (Map # 92-3; Scale 1:500,000) as bedrock of various types and ages, glacially scoured basins and knobs, overlain by a thin, discontinuous veneer of till, shaped by glacial erosion. The till veneer, based on visual observations, appears to be less than 1 m thick, with significant areas of boulder terrain and/or bedrock outcropping. Bedrock geology consists of greywacke, metasandstone, slate, schist and migmatite of the Meguma Group, Goldenville Formation, which has been metamorphosed and therefore will exhibit fracture flow in terms of groundwater movement.

The site topography is generally rolling with the slope predominantly to the southwest toward a stream trending southeast to Dolliver Lake and to Dolliver Lake, itself. It is anticipated that the surficial and shallow groundwater flow mirror the topographic flow. Therefore, it is anticipated that the local/site specific shallow groundwater will flow towards Dolliver Lake (southeast). It also anticipated that the bedrock aquifer will exhibit fracture flow. The pre-existing quarry area has been previously disturbed and altered for surface and shallow groundwater control, thereby altering the water flow regime in the immediate area, which has been directed off-site to the northeast, across Hirtle Road and into Hirtle Brook, which eventually flows westwards into Voglers Brook, which flows south into Voglers Cove, which is part of Medway Harbour. However, it is anticipated that ultimate deep bedrock groundwater flow would be to the south towards Dolliver Lake.

The site work will not alter the groundwater flow as the area has been previously developed. Shallow groundwater is expected to discharge to the on-site surface water control structures; where ultimately it would become part of the surface water regime. The deeper bedrock groundwater regime in the general area is used for potable water source. However, a search of the NSE well log database notes that there are no well log records for the subject site or within 1 km. of the Quarry property. The nearest wells noted by the database are located at 233 Hirtle Road, 4 km. northwest of the subject property, and at 1707 Hirtle Road, located 4 km. southeast of the subject property.

6.2.3 Water Quality

Water quality downstream of the site is important for fish habitat and recreational uses. Blasting is not expected to result in groundwater quality changes. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. There are no watercourses on site in the vicinity of the proposed expansion for direct transmission of suspended sediments to nearby surface waters, and which potentially could reach downstream areas. Existing, on-site water and sedimentation management including settling ponds and artificial wetlands are expected to be capable of handling any suspended sediment issues.

The quarry has onsite sedimentation and flow management, which effectively mitigates release of fines from normal quarrying operations. Release of other contaminants such as oils and lubricants from operating equipment potentially can impact downstream areas, but is expected to be mitigated by normal precautions related to equipment operations.

6.2.4 Freshwater Aquatic Environments

There are no permanent streams on the quarry property; an intermittent flowage drains the eastern side of the property, leading to the wash ponds. Drainage from the quarry floor forms into a stream on the east corner of the property which flows towards Hirtle Mill Pond. None of the proposed quarry expansion will be in the vicinity of the flowage and consequently there are not expected to be impacts. Use of woods trails for heavy equipment should be done with a view to minimizing impact on swales which are surface water collectors for the flowage, and logging of areas not proposed for quarry development, including the eastern corner of the property, are not recommended, to avoid impacts on water quality.

6.2.5 Wetlands

Several wetlands occur on the quarry property but none are in areas intended for immediate quarry development. Future quarry construction may result in the removal of any wetlands in the footprint of the pit where avoidance is generally not practical. In the case of the unique Black Spruce-*Sphagnum* swamp containing occurrences of the rare Southern Twayblade, located near the northwestern boundary of the property, avoidance may be possible, on consultation with the Province. Another such swamp located just west of the proposed western extent of the quarry may have to be dealt with in a similar manner. None of these wetlands are larger than 0.3-0.4 ha and will not trigger further Provincial environmental assessments, but will require a wetland delineation and functional assessment, and submission of a wetland compensation plan to the province, if development proceeds into those areas.

6.2.6 Fish and Fish Habitat

None of the proposed project activities will physically impact the stream to the east of the quarry and changes in flow regime (i.e. increased runoff and increased extremes) resulting from expansion of the pit elsewhere at the site will be minor and positive for fish and fish habitat downstream due largely to the relatively small footprint of the project in relation to the watershed.

6.2.7 Flora and Fauna and Habitat

The existing terrestrial ecosystem (plants and animals) will be removed by the quarry expansion. If at all possible, activities such as logging on the lands outside the pit will be avoided, or if required for pit expansion, be conducted using access through the already developed roads in the quarry proper.

6.2.8 Species at Risk

Areas for potential future quarry development at the site may include Black Spruce-*Sphagnum* swamps which contain populations of Southern Twayblade. It is important, because of the rare status of the species, that development in these areas be avoided, and that the local hydrology not be disrupted. The species is sensitive to changes in hydrology and translocation is unlikely to be successful. However, it may be possible to engineer suitable habitats in unused parts of the project site where they are not currently present and to attempt to translocate habitat containing the Twaybladeand this possibility will be investigated. Mitigation for projects encountering the species is avoidance and continued monitoring of populations, as single surveys can misrepresent occurrences and actual distribution. Management includes setbacks, measures to maintain hydrology of the site, control of dust, and water quality. Any plans to extend the quarry into areas of Twayblade occurrence will include consultation with NSE and NS DNR on the best ways to proceed. Information on habitat and locations of Twayblade will be transferred to NS DNR in georeferenced form compatible with Provincial GIS systems.

6.3 Other Undertakings in the Area

There are no known undertakings in the study area, with the exception of the proposed uarry expansion, as described herein.

7.0 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

The operating quarry will not be impacted 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.

8.0 CUMULATIVE IMPACTS

No cumulative impacts (impacts arising from the project in combination with ongoing or foreseen activities) are likely to be caused by the project. The quarry essentially encompasses the available bedrock structure and other quarries will not locate around the periphery. There are other areas of potential for quarries in Lunenburg and Queens Counties but they are several kilometres from the site. The project itself occupies a small footprint in the landscape, and removes a relatively small amount of biological landscape, and other quarries would similarly have a relatively small footprint on the natural landscape.

9.0 MONITORING

Monitoring of the Southern Twayblade populations and the Spruce-*Sphagnum* swamp will be undertaken as required, during future development. The proponent will also contract a qualitifed botanical consultant to undertake monitoring for the occurrence of invasive species around the quarry margins and to recommend and institute control programs if necessary.

Routine monitoring for the project will be defined in stipulations, issued by NSE, associated with the follow up Industrial Waste Discharge and Water Withdrawal Permits. It is anticipated that monitoring for air quality and operational noise will be required on an as requested basis. Blast monitoring will be carried out on a per event basis, with the results provided to NSE upon request. The installation of groundwater monitoring points and associated groundwater quality monitoring is not anticipated, due to the low potential of impact to this resource. Surface water quality monitoring is anticipated to be required and involve on-site sedimentation control infrastructure as well as downstream water courses.

Table **2**
Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Middlewood Quarry Expansion.

General Category of VEC	Biophysical								Socioeconomic							
	Air Quality and Noise	Hydrogeology & Hydrology	Water Quality	Aquatic Environments	Wetlands	Fish and Fish Habitat	Flora & Fauna Species & Habitat	Species at Risk	Mi'Kmaq	Cultural/ Historical	Recreation, Tourism & Viewscape	Recreational Fishing	Land Use and Value	Transportation	Residential Use	Parks & Protected Areas
Construction																
Tree-Clearing/Grubbing	□	□	□		□		□	□			□		□		□	
Drilling	□										□				□	
Blasting	□	□					□				□	□			□	
Operation																
Moving/Transporting Rock and Product	□														□	

Crushing	□														□	
Washing	□	□	□	□		□	□								□	
Trucking	□											□		□	□	
Accidents (Oil/ Fuel Spills)		□	□	□	□	□	□				□					

Table 3.
Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
BIOPHYSICAL COMPONENTS						
Air Quality/ Noise	Construction	Noise from heavy equipment during logging and grubbing.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of outdoor use by locals and wildlife.	Not significant
	Operation	Drilling and blasting; equipment for moving rock; crusher operation.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of outdoor use by locals and wildlife.	Not significant
Hydro-geology/ Hydrology	Construction	Blasting fractures bedrock and changes shallow ground-water flow patterns. Forest and soil removal changes surface water flow.	Negligible	Negative	Likely small changes in shallow groundwater and runoff patterns.	Not significant
	Operation	Some runoff redirected from Dolliver Lake watershed to Hirtle Mill Pond. Increased peak storm-water flows.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant
Water Quality	Construction	Increased surface water flows and turbidity in watershed flowages	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant
	Operation	Dust & suspended sediment from operations potentially enter eastern outlet stream.	Negligible	Negative	Onsite dust control and water management to moderate surface water runoff and suspended sediment levels.	Not significant
Freshwater Aquatic Environments	Construction	Reduced and more variable surface water flow in water-course on site.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant
	Operation	Retention of flow from water-course for aggregate washing.	Significant	Negative	Preserve woodland in headwater areas of onsite watercourse and marginal areas of quarry.	Not significant
	Construction & Operation	Routine releases and accidental spills of hydro-carbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant
Wetlands	Construction	Removal of wetlands; change hydrology which affects wetland distribution.	Significant	Negative	Avoid areas with wetlands. Compensate for wetland loss through NSE wetland alteration approval process.	Not significant
	Construction	Routine releases and accidental spills of hydro-carbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant

Table 3.
Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	Change in flow regime in swamp/ marsh near highway east of site.	Significant	Negative	Provide a buffer for wetlands. Manage surface runoff to maintain adequate supply to wetland areas.	Not significant
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent water-sheds.	Negligible	Negative	Quarry affects small area relative to watersheds as a whole.	Not significant
	Operation	Change in flow regime in water-course east of site.	Negligible	Negative	Settling and retention ponds & onsite water management moderate flows.	Not significant
	Construction & Operation	Routine releases and accidental spills of hydro-carbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant
Terrestrial Flora & Fauna & Habitat	Construction	Removal of Existing Communities	Negligible	Negative	Restore damaged and unused parts of the site (e.g. grubbings and waste rock piles) as soon as possible. Long-term site rehabilitation plan developed with NSE.	Not significant
	Construction	Accidental releases, contamination of habitat.	Significant	Negative	Provide pollution prevention and emergency measures & response capability.	Not significant
Species at Risk-Southern Twayblade	Construction	Remove habitat.	Significant	Negative	Monitor for presence of species. Compensate for wetland loss through NSE wetland alteration approval process. Experimental habitat recreation in unused areas of site.	Not significant
SOCIOECONOMIC COMPONENTS						
Mi'Kmaq	Construction and Operation	No interactions or impacts.	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Recreation	Construction & Operation	Noise affects use of Dolliver Lake.	Significant	Negative	Schedule activities to take place during off peak usage and daylight hours.	Not significant
Tourism and Viewscape	Operation	View of site and industrial character	Significant	Negative	Maintain forested buffer from the highway.	Not significant
Recreational Fishing	Construction & Operation	Accidental hydrocarbon spills contaminate groundwater	Significant	Negative	Provide pollution prevention, emergency measures & response capability.	Not significant
Land Use and Value	Construction & Operation	Removal of potential forest and wildlife resource.	Negligible	Negative	Small area affected relative to total available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant

Table 3.
Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Parks and Protected areas	Construction & Operation	No local interactions	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Residential Use	Construction & Operation	Noise affects enjoyment of cabins on Dolliver Lake	Significant	Negative	Schedule activities to take place during off peak usage and daylight hours.	Not significant
	Operation	Truck and recreation-al traffic interact.	Negligible	Negative	Ensure awareness of truck operators of local traffic and uses.	Not significant
Transportation	Operation	Wear on highway	Negligible	Negative	Current levels low and will not increase.	Not significant
Health and Safety - Traffic Levels	Operation	Transport trucks on Hirtle Road	Not Significant	No Change	Use good directional signs, viewing pull-offs, posted speed limits and speed policy in vicinity of quarry.	Not significant

10.0 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.

11.0 APPROVAL OF UNDERTAKING

Dexter will comply with all provisions of the Nova Scotia Environment Act and Regulations. Applications for Water Rights and Industrial Approvals will be submitted to the Bridgewater Regional office of Nova Scotia Environment.

12.0 FUNDING

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

13.0 SIGNATURE OF CEO AND DATE

APRIL 2, 2013
Date

Stephen Damp
CEO & President Dexter Construction Company Limited

APPENDIX A

PROPERTY INFORMATION

Environmental Assessment Registration
Document for Middlewood Quarry Expansion

Profile

Printer Version

Profile Info | People Info | Activites Info | Related Reg's Info

PROFILE - DEXTER CONSTRUCTION COMPANY LIMITED - as of: 2012-10-18 11:22 AM

Business/Organization Name:	DEXTER CONSTRUCTION COMPANY LIMITED
Registry ID:	1109762
Type:	Extra-Provincial Corporation
Nature of Business:	
Status:	Active
Jurisdiction:	New Brunswick
Registered Office:	1800-1801 HOLLIS ST HALIFAX NS Canada B3J 3N4
Mailing Address:	1800-1801 HOLLIS ST HALIFAX NS Canada B3J 3N4

PEOPLE

Name	Position	Civic Address	Mailing Address
Carl B. Potter	Director	927 Rocky Lake Drive Bedford NS B4A 3Z2	
Cecil G. Vance	General Manager	927 Rocky Lake Drive Bedford NS B4A 3Z2	
Carl Vincent	Comptroller	927 Rocky Lake Drive Bedford NS B4A 3Z2	
Sondra Clegg	Assistant Secretary	927 Rocky Lake Drive Bedford NS B4A	

		3Z2	
Hugh Smith	President	927 Rocky Lake Drive Bedford NS B4A 3Z2	
Carl B. Potter	CHAIRMAN	927 Rocky Lake Drive Bedford NS B4A 3Z2	
David A. Wood	CHIEF FINANCIAL OFFICER & SECRETARY	927 Rocky Lake Drive Bedford NS B4A 3Z2	
DAVID PANGMAN	VICE PRESIDENT, FINANCE	927 Rocky Lake Drive Bedford NS B4A 3Z2	
ALAN G. HAYMAN	Recognized Agent	1800-1801 HOLLIS ST. HALIFAX NS B3J 3N4	1800-1801 HOLLIS ST. HALIFAX NS B3J 3N4

ACTIVITIES

Activity	Date
Change of Directors	2012-06-22
Annual Statement Filed	2012-01-05
Annual Renewal	2011-12-14
Annual Renewal	2010-11-08
Annual Statement Filed	2010-11-08
Change of Directors	2010-05-14
Annual Renewal	2009-12-22
Annual Statement Filed	2009-12-22
Change of Directors	2009-07-21
Annual Renewal	2008-12-04
Change of Directors	2008-02-01
Annual Renewal	2007-11-23
Annual Statement Filed	2007-11-23

Annual Renewal	2006-11-14
Annual Statement Filed	2006-11-14
Change of Directors	2006-09-25
Annual Renewal	2005-11-22
Annual Statement Filed	2005-11-22
Annual Renewal	2004-11-04
Annual Statement Filed	2004-11-04
Annual Renewal	2003-11-13
Annual Statement Filed	2003-11-13
Annual Renewal	2002-12-17
Annual Statement Filed	2002-12-17
Change of Directors	2002-04-03
Annual Renewal	2002-01-21
Annual Statement Filed	2002-01-21
Annual Renewal	2000-11-27
Annual Statement Filed	2000-11-27
Annual Renewal	1999-11-29
Annual Statement Filed	1999-11-29
Annual Renewal	1998-11-16
Annual Statement Filed	1998-11-16
Annual Renewal	1997-12-03
Annual Statement Filed	1997-12-03
Annual Renewal	1997-01-30
Annual Statement Filed	1997-01-30
Annual Report Filed	1995-12-27
Registered Office Change	1994-12-29
Reinstated	1989-03-07
Revoked for Non-Payment	1988-12-30
Agent Filed	1983-04-28
Change of Directors	1981-03-09
Registered	1977-11-18
In Business Since	1977-11-18

	1961-12-22

Show All Collapse

RELATED REGISTRATIONS

This Company ...	
DEXTER PAVING	Registered
NOVA SCOTIAN UTILITY CONSTRUCTION CORP.	Registered

Municipality of the District of Lunenburg

Planning & Development Services

November 14, 2012

Dexter Construction Company Limited
P.O. Box 48100
Bedford, NS
B4A 3Z2

Attention: Gavin Isenor

Dear Mr. Isenor:

RE: Zoning Confirmation – PID 60302304
890 Hirtle Road, Middlewood, NS

Further to your request of November 1, 2012, I can provide the following information in relation to Zoning and Land Use By-laws:

1) The above noted property is in an area where no Land Use By-laws or zoning controls apply.
2) As there is no zoning or land use by-law in place, the use of the property for a quarry is permitted.

This does not relieve the owner or constructor from compliance with the Building Code Act, Fire Prevention Act, or any other applicable codes and/or standards. Please contact the appropriate Provincial Department to inquire about their regulations.

If you have any further questions, please contact me at 541-1334.

Kindest Regards,

Norma Schiefer
Municipal Development Officer

210 Aberdeen Road Bridgewater Nova Scotia Canada B4V 4G8
Phone: 902.541.1325 / Fax: 902.527.1135 / Web Site: www.modl.ca

Nova Scotia

Department of
the Environment

PO Box 2107
Halifax, Nova Scotia
B3J 3B7

Our file no:

11-94-0035

July 18, 1994

Mr. Dave Shupe
Dexter Construction Company Ltd.
P. O. Box 48100, Bedford
Nova Scotia B4A 3Z2

Dear Mr. Shupe:

Re: Industrial Waste Permit Approval #94-027

Enclosed please find your approved Industrial Permit #94-027 for the operation of a Quarry at Middlewood, Lunenburg County.

Strict adherence to the attached stipulations is imperative in order to validate your permit.

Should you have any questions please contact the Western District Office in Liverpool at 354-5784, or in writing.

Yours truly,

D. E. Hiltz, P. Eng.,
Manager
Industrial Pollution Control

/lk

cc: W. Crouse
D. Steele

Enclosure

NOVA SCOTIA

DEPARTMENT OF THE ENVIRONMENT

Industrial Waste Permit

Pursuant to the Environmental Protection Act, the Water Act and Regulations made pursuant thereto, and subject to the terms and conditions contained in the permit, this permit is granted to Dexter Construction Company Limited to construct and/or operate a Rock Quarry at or near Middlewood, in the County of Lunenburg, in the Province of Nova Scotia.

Granted at Halifax, in the County of Halifax, Province of Nova Scotia, this 15th day of July, A.D. 1994.

94-027
PERMIT NUMBER

MINISTER OR PERSON DESIGNATED BY THE MINISTER

STIPULATIONS SHEET

Nova Scotia Department of the Environment

PROJECT: Dexter Construction Company Limited
Rock Quarry
Middlewood, Lunenburg County

APPROVAL NO: 94-027

FILE NO: 11-94-0035

GRID REFERENCE: 757 942

MAP SERIES: 21 A/2

STIPULATIONS:

This application is recommended for approval subject to the following stipulations:

1. **Scope of Approval**

   This approval relates to Dexter Construction Company Limited hereafter called the "proponent" and their application to continue to operate a rock quarry located 3.5 km south of highway 103 along highway # 570 in the community of Middlewood, Lunenburg County

2. **General Stipulations**

   a) The proponent shall conduct its' rock quarry in accordance with provisions of the:

      i) Environmental Protection Act, RSNS 1989, C.150;
      ii) Water Act, RSNS 1989, C.500;
      iii) Dangerous Goods and Hazardous Waste Management Act, RSNS 1989, C.118;
      iv) Regulations pursuant to the above Acts, and
      v) Local municipal environmental bylaws, and zoning restrictions.

   b) The Minister reserves the right to modify, amend, or add stipulations to this Industrial Permit at any time.

   c) This Industrial Permit is not transferrable without the written permission of the Minister.

d) If the Minister determines that there has been non-compliance with any or all of the stipulations provided in this Permit, issued pursuant to Section 23 of the Environmental Protection Act, the Minister may cancel or suspend the permit until such time as the Minister is satisfied that all stipulations have been met.

e) The proponent shall notify the Nova Scotia Department of the Environment prior to any process changes or waste disposal practices which are not approved under authorization of this permit.

f) The proponent shall bear all expenses incurred in carrying out the environmental monitoring required under stipulations of this permit.

g) The proponent shall provide a copy of the deed to the Department which proves that they now own the land which was previously owned by S. W. Weeks Construction.

h) The proponent shall develop the site in such a manner as to expose only the areas that are being actively used/excavated.

i) The proponent shall ensure that this permit or a copy is kept on-site or at their head office at all times and that personnel directly involved in the project are made fully aware of the conditions which pertain to this approval.

j) The proponent shall notify the Regional Office prior to operating the site so that a final inspection can be conducted.

k) The proponent shall operate the quarry in a manner consistent with S.W. Weeks Environmental Assessment registration document dated April 28, 1994.

3. **Particulate Emissions (Dust)**

a) Particulate emissions shall not exceed the following limits at the site property boundaries:

Annual Geometric Mean	70 $\mu g/m^3$
Daily Average (24 hr.)	120 $\mu g/m^3$

b) The generation of fugitive dust from the site will be suppressed by the application of water sprays, or the application of other suitable dust suppressants approved.

c) Site access road(s) shall be maintained to minimize dust generation. The use of waste oil is <u>not</u> permitted.

Note: Monitoring of Particulate Emissions shall be at the request of the Nova Scotia Department of the Environment.

4. **Sound Levels**

Sound levels measured at the property boundaries shall not exceed the following equivalent sound levels (Leq):

Leq 65 dBA 0700-1900 hours (Days)
60 dBA 1900-2300 hours (Evenings)
55 dBA 2300-0700 hours (Nights)

Note: Monitoring shall be conducted at the request of the Nova Scotia Department of the Environment.

5. **Surface Water**

a) The site shall be maintained to prevent siltation of the surface water which is discharged from the property boundaries into the nearest watercourse. This includes the installation of soil erosion and sedimentation control designed to meet the specification of this Department.

b) All erosion and sedimentation control devices shall be installed prior to any excavation of material.

c) If it becomes necessary to drain the quarry workings, the wastewater shall be drained to settling ponds for appropriate treatment to meet the suspended solids limits.

d) The proponent shall sample and ensure the following liquid effluent levels are met:

Final Effluent Discharge Limits

Parameters	Maximum in a Grab Sample	Monthly Arithmetic Mean	Monitoring Frequency
Total Suspended Solids	70 mg/l	35 mg/l	upon request
pH	5 - 9	6 - 9	upon request

e) Non-compliance of the above final effluent discharge limits shall be immediately reported to the Regional Office of the Nova Scotia Department of the Environment*.

f) Monitoring stations for liquid effluent shall be determined by the Regional Office of the Nova Scotia Department of the Environment* following a final inspection of the site. Monitoring shall be at the request of the Nova Scotia Department of the Environment.

g) A monthly summary of results of monitoring shall be submitted to the Regional Office of the Nova Scotia Department of the Environment* if sampling is required.

h) The proponent shall wash aggregate 4-6 weeks a year at the quarry site.

i) The proponent shall use a coagulant to improve efficiency of the settling ponds if necessary.

j) The proponent shall maintain a closed loop wash system and there will be no liquid discharge from the wash plant or settling ponds.

6. **Groundwater**

The proponent shall replace at their expense any water supply which has been lost or damaged as a result of extracting aggregate.

7. **Blasting**

a) The proponent shall call the nearest weather office, to assess the climatic conditions prior to conducting any blasting. No blasting will be permitted if a thermal inversion is anticipated at the time of the proposed blast.

b) The proponent shall ensure that all blasts are monitored at the nearest structure (residential, commercial, institutional) and a second monitor to be placed 800 metres downwind of the quarry site. The following limits for blasting shall not be exceeded:

Air blast	128 dBL
Ground Vibration	0.5 inches/second
	12.5 mm/second

c) The proponent has conducted a pre-blast survey of all structures within 800 m of the quarry development.

d) The proponent shall have a blast design prepared by a qualified consultant and the design sent to the Nova Scotia Department of the Environment for review prior to any blasting.

* Nova Scotia Department of the Environment
Liverpool District Office
P. O. Box 9001,
Liverpool, N. S.
B0T 1K0
(902) 354-5784

Note: All blasts are to be monitored by a qualified professional and the results sent to the Regional Office of the Nova Scotia Department of the Environment on a monthly basis.

8. **Reclamation:**

a) The site shall be progressively reclaimed and rehabilitated where possible by grading, contouring, and revegetating the disturbed land.

b) The proponent shall submit a rehabilitation plan to the Nova Scotia Department of the Environment for approval by December 31, 1994.

c) The proponent shall rehabilitate the site within six months of abandonment and in accordance with the approved rehabilitation plan or other terms as specified by the department.

d) The proponent shall post a security in a form acceptable to the Nova Scotia Department of the Environment in the amount of $20,000.00 on or before September 1, 1994.

e) The Nova Scotia Department of the Environment shall release the security to the proponent after rehabilitation of the active area has been completed to the satisfaction of the Minister of the Environment.

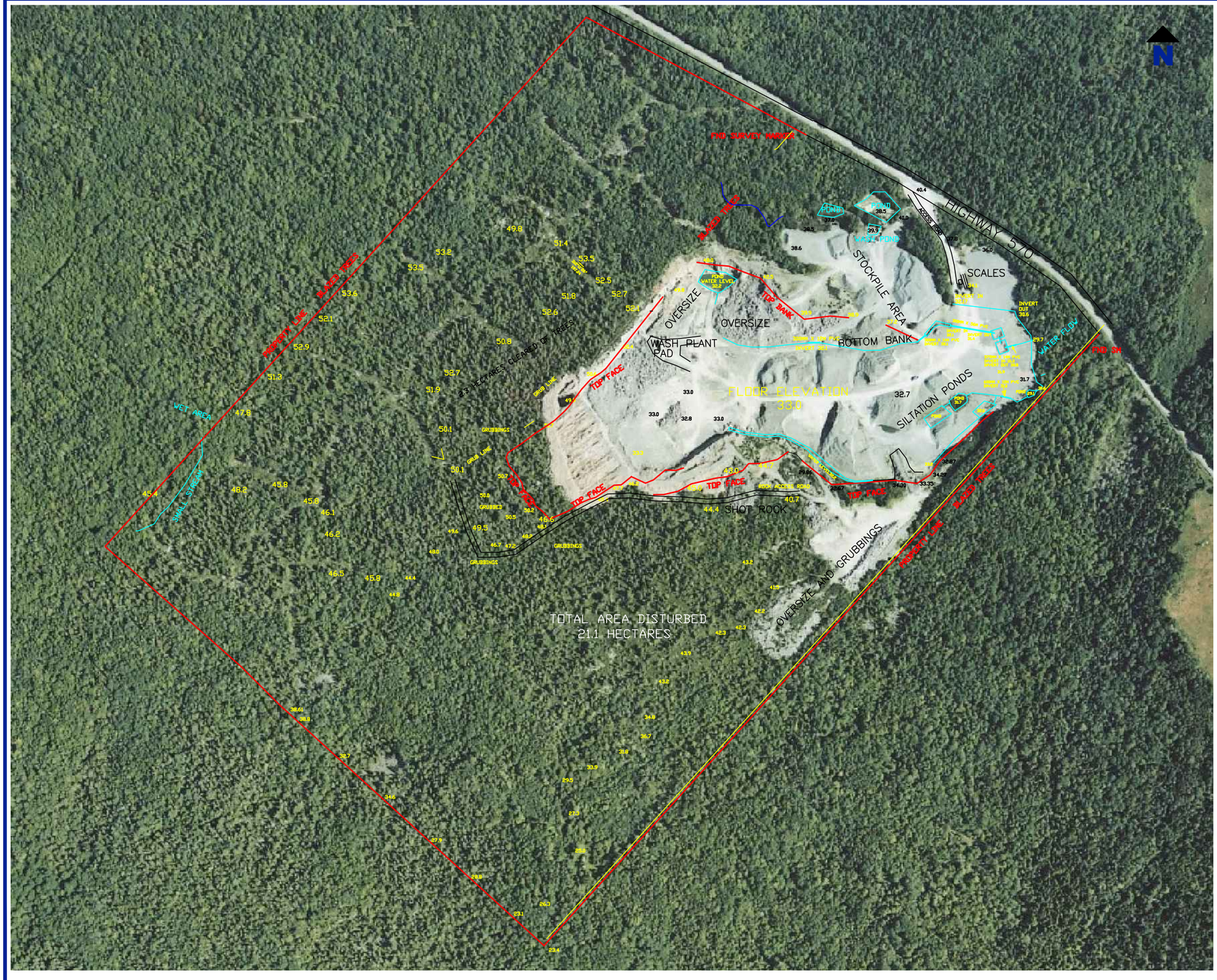
f) The proponent shall ensure that any security posted for rehabilitation be kept valid for the term of the permit.

DBF/lk

APPENDIX B

FIGURES AND DRAWINGS

Environmental Assessment Registration
Document for Middlewood Quarry Expansion



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SCALE 1:5000
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 100 200 300 m

NOTES

DRAWING COMPILED FROM PROPOSED TEMPORARY 4 HECTARE QUARRY AREA MIDDLEWOOD QUARRY DRAWING BY DEXTER CONSTRUCTION COMPANY LIMITED. PID 60302304 MIDDLEWOOD, LUNENBURG COUNTY. SURVEYED MARCH 2012. ELEVATIONS AND CO-ORDINATES ATS 77

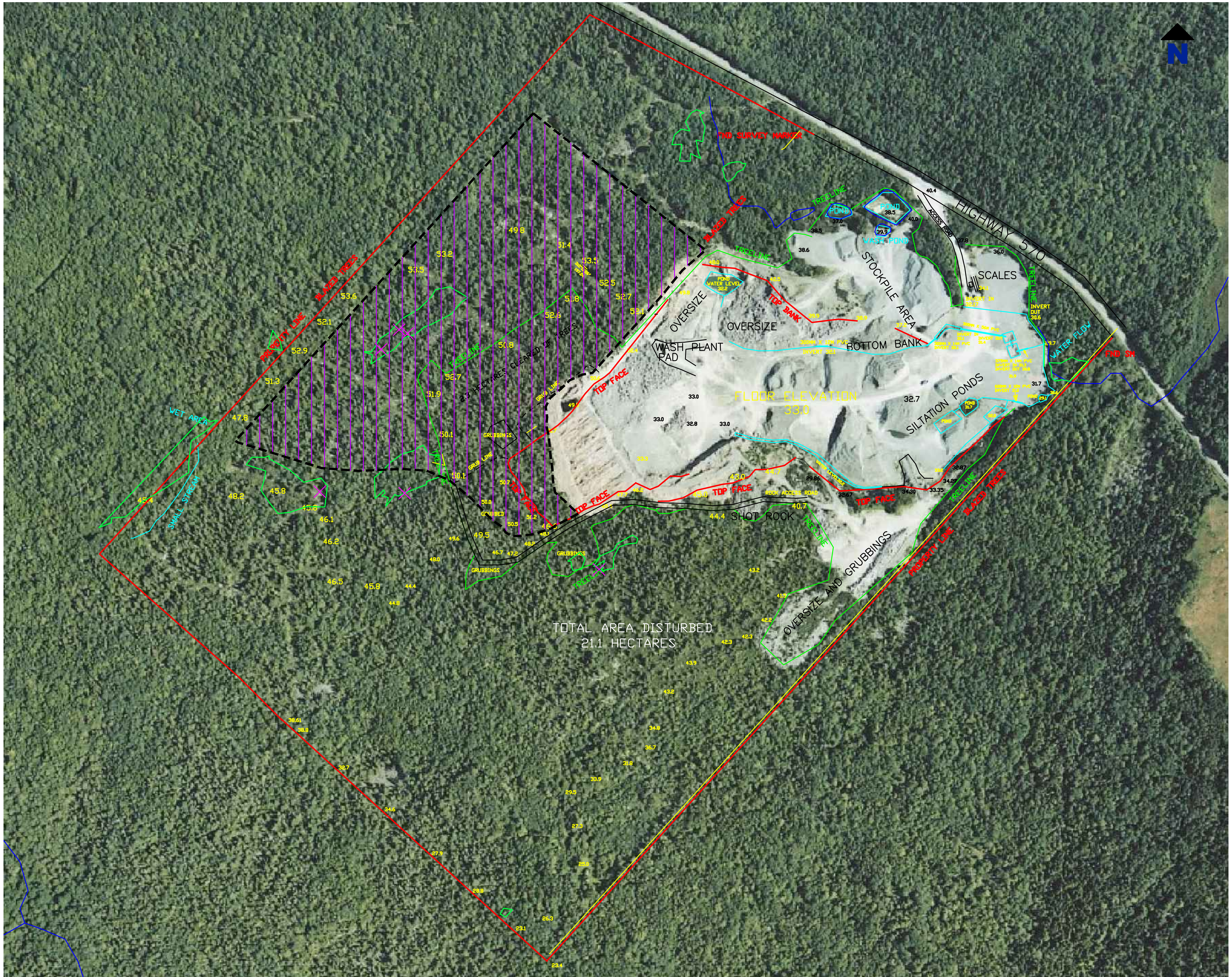
LEGEND

DEXTER CONSTRUCTION COMPANY LIMITED
MIDDLEWOOD QUARRY
PID 60302304
MIDDLEWOOD, NOVA SCOTIA

Report
ENVIRONMENTAL ASSESSMENT

Drawing
DETAILED SITE PLAN

Date April 2, 2013	Scale AS SHOWN	Drawing No. 1
File Name S_210-05839-00-A1-3	Project No. 210.05839.00000	



NOTES

DRAWING COMPILED FROM PROPOSED TEMPORARY 4 HECTARE QUARRY AREA MIDDLEWOOD QUARRY DRAWING BY DEXTER CONSTRUCTION COMPANY LIMITED. PID 60302304 MIDDLEWOOD, LUNENBURG COUNTY. SURVEYED MARCH 2012. ELEVATIONS AND CO–ORDINATES ATS 77

LEGEND

- WETLANDS
- WATER FEATURES
- TWAYBLADE
- PROPOSED FUTURE EXPANSION AREA

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SCALE 1:5000
WHEN PLOTTED AT 11 x 17 PAGE SIZE
0 100 200 300 m

DEXTER CONSTRUCTION COMPANY LIMITED
MIDDLEWOOD QUARRY
PID 60302304
MIDDLEWOOD, NOVA SCOTIA

Report
ENVIRONMENTAL ASSESSMENT

Drawing
PROPOSED FUTURE BUILD OUT

Date April 2, 2013	Scale AS SHOWN	Drawing No. 2
File Name S_210-05839-00-A1-4	Project No. 210.05839.00000	

APPENDIX C

ROCK SULPHUR CONTENT ANALYSIS RESULTS

Environmental Assessment Registration
Document for Middlewood Quarry Expansion

DALHOUSIE
University

MINERALS ENGINEERING CENTRE

Dalhousie University
1360 Barrington Street
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5-Sep-12

H2OGEO Environmental Services
508-1343 Hollis Street
Halifax, NS
B3J 1T8
Attention: J. Fraser

Re: Results of analysis on submitted samples.

Sample	Wt. % S (Total)	kg H2SO4/t Acid Producing Potential
Middlewood Aug 7/12	0.009	0.28

Reference Sample: Sample	% S (Total)
NBM-1	0.281
Recommended Value	0.280

Daniel Chevalier, MASc
Manager, Minerals Engineering Centre

APPENDIX D

BIOPHYSICAL ASSESSMENT REPORT (ENVIROSPHERE, 2013)

Environmental Assessment Registration
Document for Middlewood Quarry Expansion

Biophysical Assessment of the Expansion of the Municipal Group Aggregate Quarry— 890 Hirtle Road Middlewood, Lunenburg County, N.S.

Submitted to:

WMR Environmental Services Inc. & Associates
Dartmouth, Nova Scotia

March 14, 2013

Envirosphere CONSULTANTS LIMITED

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1 INTRODUCTION

Municipal Group of Companies, Waverley, Nova Scotia, is proposing a 31 ha expansion of its quarry in the Middlewood area of Lunenburg County, near Bridgewater, Nova Scotia. An approval to expand the quarry is required under the Nova Scotia Environment Assessment Act. WMR Group and Associates, acting on behalf of the proponent, contracted Envirosphere Consultants Limited of Windsor, Nova Scotia, to prepare a biophysical overview and assessment in support of the application. This report contains the results of the overview and assessment. It presents a description of the methodology and scope, existing environment, environmental effects, cumulative effects, discussions, and conclusions. The level of detail of the assessment is sufficient to ensure that all information necessary to allow adequate review of the project is provided; and to demonstrate how the assessment was conducted, and the information on which the conclusions were based.

2 INFORMATION SOURCES

Information for the biophysical overview and assessment was collected from a variety of sources, including interviews with representatives of the Department of Natural Resources, Fisheries and Oceans Canada, local municipal organizations and individuals, review of existing published information including soil surveys, geology, natural history (e.g. *Natural History of Nova Scotia*), relevant websites (DNR Significant Habitat and Wetland Databases, Atlantic Canada Conservation Data Centre, and Nova Scotia Museum of Natural History) as well as technical documentation such as aerial photos and 1:50,000 topographic maps and digital land use data. A flyover by helicopter was carried out on May 3, 2012; site visits and walkovers by project personnel were carried out on May 28, June 5 (spring botany survey), June 8 & 10 (owl and breeding bird survey), and September 24 (botany and amphibians) and 27 (fall botany survey). Botany surveys were conducted by Mr. Jim Jotcham, M.Sc. (Marbicon Inc.) and bird surveys by Mr. Fulton Lavender, Halifax, Nova Scotia.

3 SITE LOCATION AND STUDY AREA

The site is located ~17 km southwest of Bridgewater, Nova Scotia, ~4-5 km south of Hwy 103 (Exit 16) and along Hirtle Rd. between the communities of Middlewood and Voglers Cove, 1:50000 NTS 21A-02, 375440 Northing, 4894300 Easting, Zone UTM Zone 20, Google Maps-Air Photo 2004 (Figures 1, 2 & 3).

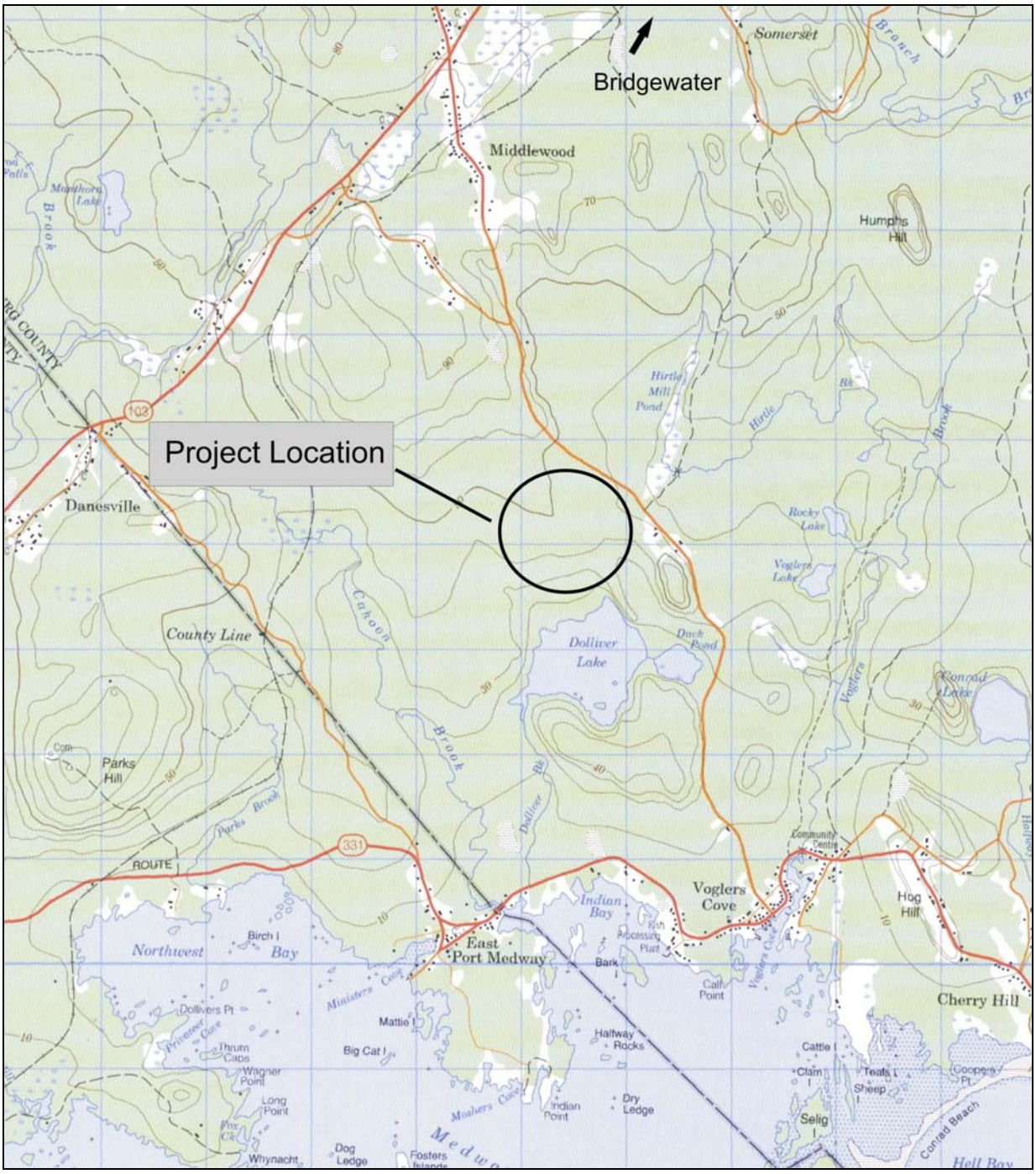

Figure 1. Project location.

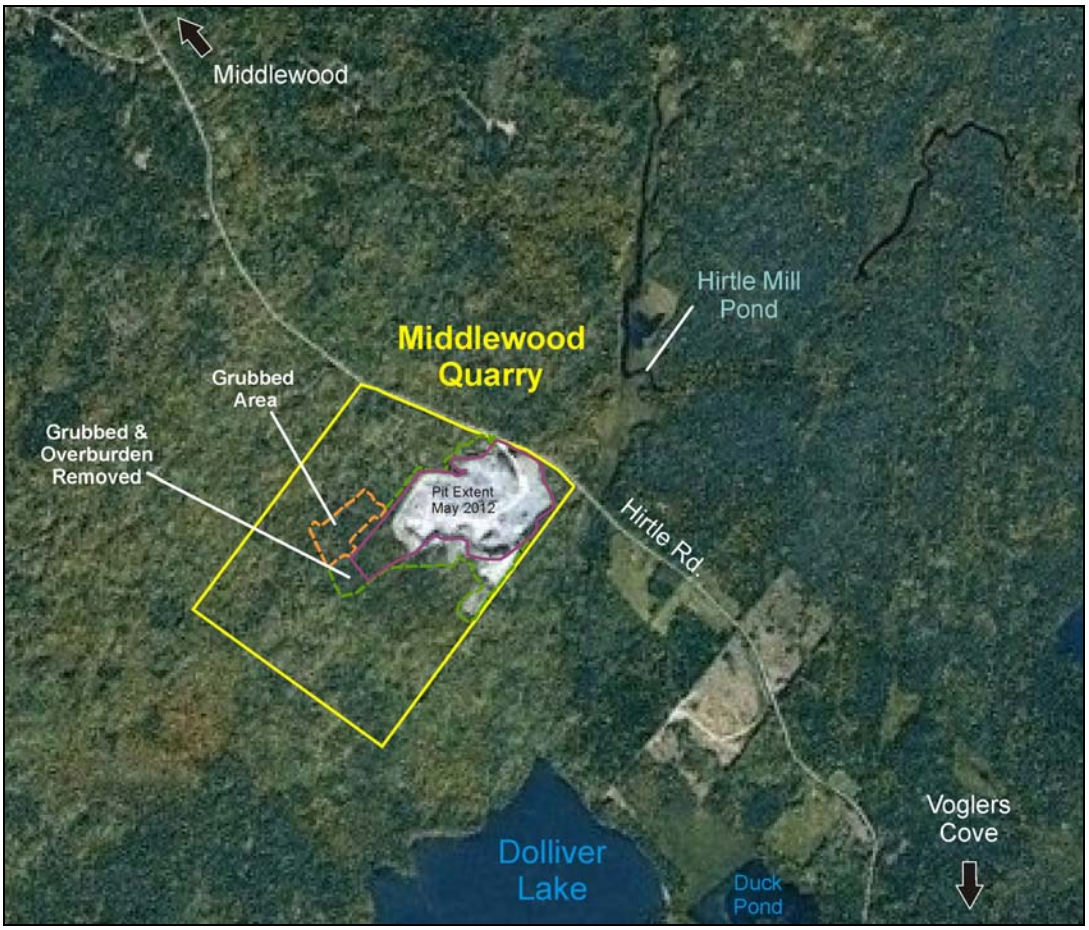

Figure 2. Project location and features. Present pit extent outlined in purple. Source: 2004 GoogleEarth.

Figure 3. View of quarry showing development in May 2012.

Figure 4. View of quarry, Dolliver Lake and Duck Pond, and Atlantic Coast May 2012.

4 EXISTING ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 CLIMATE

The site is located near the Atlantic coast and is subject to moderating influences which would reduce extremes in temperature. Annual average temperature at Milton near Liverpool is 7.3º C., averaging 19.3º in July and –4.6ºC. in January, the coldest month (Canadian Climate Normals, *www.climate.weatheroffice.gc.ca/climate_normals*). The area receives high total precipitation (annual average of 1650 mm) mostly as rain (1486 mm) and is the highest in the Province (Cann and Hilchey 1958). Peak precipitation occurs in winter November-January, and is lowest in the June to August period (Figure 5).

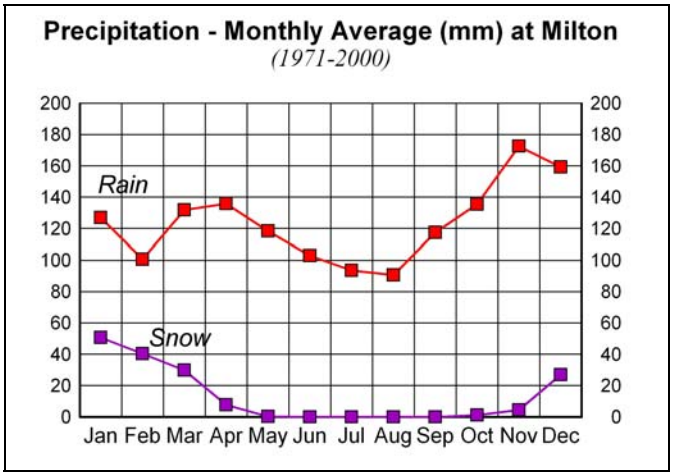

Figure 5. Precipitation for Middlewood Quarry, observed at Milton (1971-2000).

4.1.2 TOPOGRAPHY AND GEOLOGY

The study area is in southwest Lunenburg County north of Medway Harbour and lies between the communities of Middlewood and Vogler's Cove in southwestern Nova Scotia. Topography on the site is gently undulating to gently rolling, comprised of a series of low quartzite bedrock ridges separated by shallow swales characterized by an accumulation of boulder fields in the troughs and exposed bedrock in the ridges. The area is underlain by quartzite and metasandstones and metasiltstone of the Lake Rossignol Unit within the Goldenville formation. Soils in the area are Goldenville type—thin, well-drained stony sandy loam till, derived from quartzite and metasandstone in the underlying Goldenville formation bedrock—with rockland soils predominating at the site (Cann and Hilchey 1958). None of the rock at the site is acid-bearing. Slope is generally to the southwest towards Dolliver Lake, and east to the Hirtle Mill Pond watershed. The till veneer appears to be typically less than 1 m thick, with significant areas of boulder terrain and/or bedrock outcropping (J. Fraser, H2OGEO Environmental Services Inc., pers comm. 2012). Bedrock consists of greywacke, metasandstone, slate, schist and migmatite of the Meguma Group, Goldenville Formation.

4.1.3 AIR QUALITY AND NOISE

The Middlewood Quarry is surrounded by a large area of forest and is expected to have natural baseline air quality typical of areas unimpacted by human activities. No other industrial activities occur in the immediate vicinity of the project, with the nearest large industries operating in the Liverpool and Bridgewater areas and separated at a significant distance from the project. For similar reasons, noise levels are small and the levels generated by the quarry will be relatively limited and similar to those produced by the previous quarry operations at the site. Trucks transporting product from the quarry along the Hirtle Road will contribute to vehicle-generated noise, but the number of trips is relatively small and not expected to exceed levels which have been experienced recently at the site.

4.1.4 HYDROLOGY

There are no first order streams appearing on 1:50,000 mapping, and little surface flow on the quarry property, and runoff exits the site largely subsurface at the base of rock-filled swales or as surface flow to the west and southeast. A small stream originates in the northeastern portion of the property, flowing into wash ponds at the site; while a flowage is located several hundred metres offsite to the west and southwest, which flows south into Dolliver Lake. The small on-site flowage consists of a largely subsurface flow through a boulder-filled swale, but emerges and overflows at the surface at several locations; however the flow volume is small and mainly the underground flow occurs in summer. This stream has been cut off in its lower portions by the ponds and quarry pit area; no visible outflow from the ponds suggests that remaining flow percolates into the ground at the site. A former streambed continues, however, below the quarry, where it is supplied by groundwater and site runoff, flowing through a swamp east of the property, into a tributary of Hirtle Mill Pond. Most of the runoff from the existing pit is channelled through a series of settling ponds, collection basins, and artificial wetlands into the stream at this point.

4.1.5 SOILS

Soils in the area have developed from underlying till and bedrock and reflect largely glacial processes and subsequent weathering and peat development. Main types near the site reflect the parent surficial materials (shown in Map A3) with stoney till forming the Halifax soil type, as well as a 'drumlin' phase, observed in drumlins in the area (e.g. southeast of the site along the highway); organic or peat deposits; and rock land soils, the latter which show a similar distribution to the thin discontinuous till over bedrock which is the dominant material on the quarry property (Cann and Hilchey 1958). The Halifax soils are light brown sandy loams over yellowish brown sandy loam. In drumlins, this soil is typically less stoney. Rock land soils occur in thin layers over bedrock and bedrock derived materials and is the dominant soil type at the quarry.

4.2 BIOLOGICAL RESOURCES AND HABITAT

4.2.1 TERRESTRIAL ENVIRONMENT

Undeveloped land over most of the quarry property has a barren-like character with frequent exposures of quartzite bedrock and boulders and occurrence of mosses and heath communities, although supporting mixed forest development[1]. The land at the site is classified unspecified forest with some modified forest types (Map A4). Forest type reflects the local topography and drainage of the site. Parts of the site have been clear-cut and grubbed in preparation for development (Figure 3). The northwest part of the site, which is proposed for ongoing development, consists of a poorly-drained, level to gently sloping plateau roughly centred on the clear-cut shown in Figure 3, but also extending to the northwest, surrounded by downslopes with better drainage to the west, southwest and east, although west and southwest areas tend to have small terraces which are poorly-drained and support moss development. The plateau area is formed by the massive bedrock feature targeted by the quarry, overlain by a thin layer of till or organic deposits and occasionally exposed, typically as parallel, low, ridges of bedrock, reflecting structure of the underlying bedrock surface.

Poor drainage and ponding of water on the top of the plateau have created several Black Spruce and *Sphagnum* dominated swamps which were found during the field surveys for the project. In the northern corner of the property, ridges are less frequent, and the swales between ridges are seasonally wet and support growth of *Sphagnum* moss and occasional seasonal pools. Areas surrounding the main 'plateau' commonly include swales filled with boulder fields consisting large angular boulders exposed at the surface and extending downslope, occurring both on the east, west and southwest of the main plateau feature, but also over extensive areas on the quarry property to the south of the current pit. These rocky swales typically are either barren or develop heath-type shrub communities (Figure 7). On steeper slopes between bedrock outcrops and boulders, such as the southwest slope of the property, small local poorly drained terraces may occur with development of mosses and Cinnamon Fern (Figure 8).

1 A botanical survey of the site was conducted on June 4, September 24 & 27 (Appendix B).

Figure 6. Logging trail on plateau of property, June 4, 2012.

Poorly-drained, level to slightly sloping areas on the plateau are occupied by a mixed forest dominated by Black Spruce, with White and Grey Birch, Red Maple, and Bigtooth Aspen, with Red Spruce and White Pine in the drier areas. Two small (0.3-0.4 ha) Black Spruce-*Sphagnum* swamps, characterized by Cinnamon Fern and Huckleberry as common understorey species, occur northwest and west of the

Figure 7. Boulder field with bedrock outcrops and ericaceous communities, June 4, 2012.

clearcut for the present phase of development (Figure 3)[2]. Margins of the plateau and rock-filled swales have a barren-like character with thin Black and Red Spruce and White Pine and heath communities

2 These Black Spruce-*Sphagnum* swamps support occurrences of Southern Twayblade (*Listera australis*), a Provincially red-listed species.

(Figure 7). Heath vegetation at the site includes *Rhodora,* Sheep Laurel, Labrador Tea and Huckleberry. Terraces between bedrock and boulder outcrops on west, southwest and south slopes are occupied by occasional Black Spruce-*Sphagnum* development often with meadows of Cinnamon Fern, with dominant overstorey species Black and Red Spruce, bigtooth aspen, red maple, and white and grey birch (Figure 8). The northeast corner of the property is occupied by mixed forest typical of the region over a deeper, stoney till, including Maple, Bigtooth Aspen, Red Spruce, Balsam Fir, White Pine, White and Grey Birch (Figure 9).

Figure 8. Typical forest on west to southwest slopes of property, June 4, 2012.

Figure 9. Forest near highway on northeast corner of the property, June 4, 2012.

4.2.2 AQUATIC ENVIRONMENT

Open or flowing water is uncommon at the quarry site and a large proportion of drainage is expected to be through groundwater. Several small, natural ponds as wells as settling ponds used by the quarry are associated with a small stream that drains the northern corner of the site (Figure 7) and ends at a pond

used for washwater by the quarry (Map A-5), with any overflow going either into the ground or into the pit area. The original streambed was removed for about 100 m below this point during the early development of the quarry, but remnants of the streambed are found below the pit. In its upstream portions, the stream flows largely underground through boulder fields, but surfaces periodically in several small swamps and meadows, finally entering an elongate washwater pond separated from the work areas of the quarry by a berm. The continuation of the former streambed downstream of the quarry is a linear pond along a gravel berm at the lower work area boundary. Flow appears to be provided by site drainage only. This pond has a population of water plants more characteristic of established ponds, including pond lily (*Nuphar variagata)* and Bog Cranberry, suggesting it may be a remnant of a pond that had been present before quarry development. Other site drainage from several points combines with flow from the pond, forming a flowage which passes through an alder swamp, eventually flowing out of the area under Hirtle Road where it forms a tributary of Hirtle Mill Pond and Hirtle Brook. The latter flows into Volger's Brook and Vogler's Cove on the Atlantic coast.

In addition to the stream, two small (< 5 m diameter and 1-2 m deep (est.)) natural sink-hole-like pools were observed at the northeast corner of the site, and may be characteristic of the landscape in the area. These contained brown water and were in an area of mixed forest. The ponds do not have potential as habitat for amphibians of concern such as four-toed salamander, based on examination during a site visit (J. Gilhen, NS Museum of Natural History, pers. comm. 2012) although unidentified frogs were seen in them. The remaining surface waters at the site are represented by several rainwater ponds which have developed on the exposed bedrock near the pit from which the overburden has been removed.

The west and southwest portions of the property drain towards a stream located about 300 m west of the property (not investigated) which flows into Dolliver Lake, into which the south portion of the property also drains. Dolliver Lake in turn drains into the lower watershed of Cahoon Brook, which empties into Indian Bay. Dolliver Lake and the adjacent Duck Pond, 400 m south of the quarry, and Hirtle Mill Pond, a fen, approximately 400 m east, are the nearest open waters to the site (Figure 2).

4.2.3 WATER QUALITY

Surface waters at the quarry are low in conductivity, neutral in acidity, and low in suspended sediments. Measurements during site visits showed pHs of 6.5 to 7 (Table 1). Routine monitoring of discharges from the quarry from 2007 to 2012 showed a range of pH of from 6.9 to 7.6, and total suspended solids from not detectable to 12 mg/L, which are within acceptable ranges for freshwater aquatic life (J. Fraser, H2OGEO Environmental Services Inc., pers. comm. 2012).

Table 1. Water quality measurements at Municipal Group Quarry, Middlewood, Nova Scotia.

Site Location	May 28, 2012			June 5, 2012
	Stream Below Quarry[1]		Bedrock Pond [2]	Stream above wash ponds[3]
	At Quarry	Highway		
Temperature ºC	12.7	11.5	18.8	10.9
Oxygen Saturation (%)	71.9	85.5	45.1	73.0
Dissolved Oxygen (mg/L)	7.6	9.3	4.2	9.6
Conductivity (µs)	31.0	108.9	25.8	21.4
Specific Conductivity (25°) (µs)	40.7	147.0	29.5	29.3
TSS (mg/L)	1.0	0.0	--	--
pH	6.5	7.0	--	--
Turbidity & Colour	Clear & Colourless	Clear & Colourless	Clear & Colourless	--

1. Stream flows from quarry property, joins another small flowage and eventually flows into Hirtle Mill Pond.
2. Sample from a typical depression in bedrock prepared for removal.
3. Northing 4,894,639; Easting 375,609.

4.2.4 WETLANDS

A number of small wetlands were identified on the property, as well as a number of smaller wet areas typically associated with poorly-drained topographic lows along logging trails and along the small watercourse draining the property to the east (Figures 10 & 11, Table 2). Two Black Spruce-*Sphagnum* swamps, occurring northwest and west of the current development area occupied 0.3 and 0.4 ha. In addition to the dominant species, these areas also include Red Maple in the overstorey and Huckleberry and Cinnamon Fern in the understorey (Figure 10). This habitat type supports occurrences of Southern Twayblade, a provincially red-listed plant species[3], which was observed at several locations on the quarry property. Patches of Black Spruce-*Sphagnum* development also occur on downslopes where terraces retaining water support *Sphagnum* development. An area in the clear-cut approximately 0.3 ha is rutted from logging activity and has standing water in the ruts and some obligate wetland species (e.g. bulrushes, sedges, *Sphagnum*) (Figure 11, "Wet Area") likely caused by disturbance of drainage patterns by logging equipment during site clearing. Spruce-*Sphagnum*-Huckleberry (wetland) associations occasionally occur in small, linear areas between bedrock ridges on the northern corner of the property. All but one of the wetlands were Spruce-*Sphagnum* Swamps while Wetland 7, identified on Figure 11, was a sedge dominated swale with other obligate wetland species occurring.

3 Southern Twayblade, *Listera australis*, is a rare species in Nova Scotia and is not abundant locally when found. Rarity reflects a combination of the lack of observational data from typical habitats, and the difficulty in detecting the species through its diminutive appearance and the short time period when it is visible. The species has been found increasingly, however, when typical habitats are investigated and the habitat type is not uncommon in Nova Scotia.

Figure 10. Black Spruce-*Sphagnum* swamp northwest of clear-cut on property, June 4, 2012.

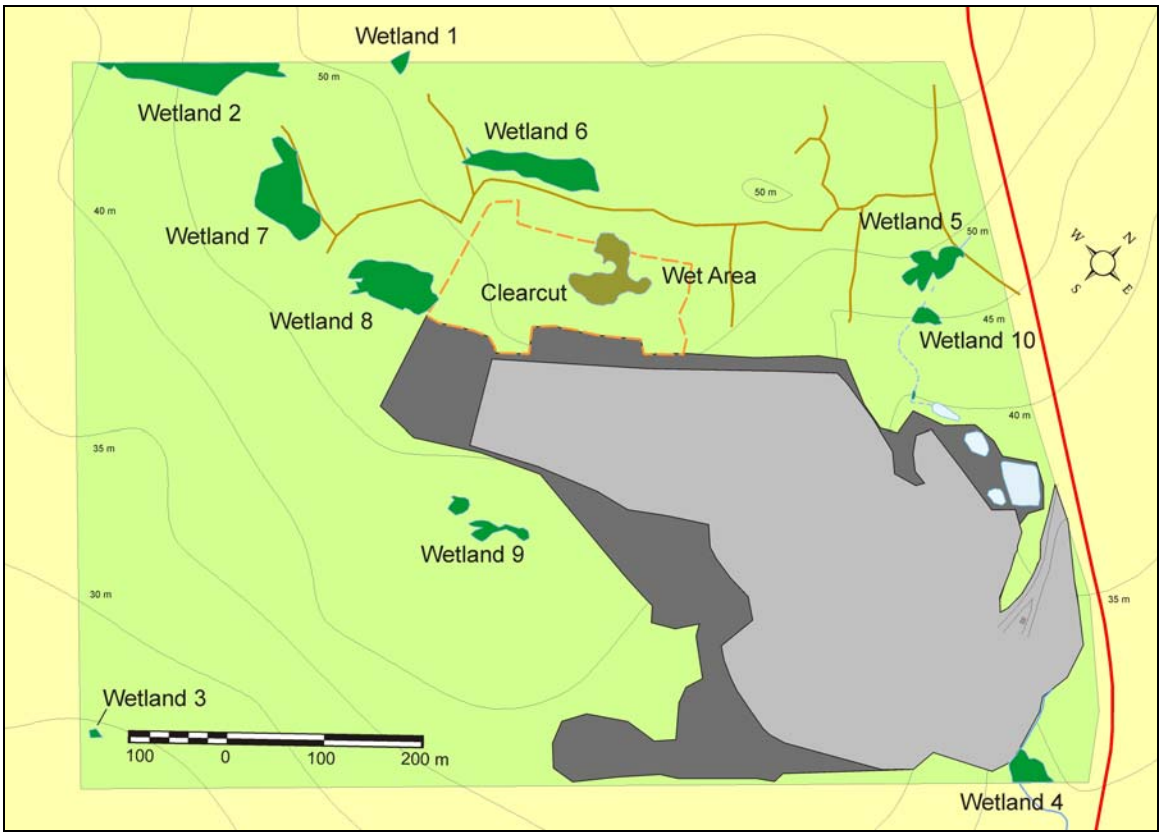

Figure 11. Wetlands and surface water features, including Black Spruce-*Sphagnum* swamp on quarry property.

Table 2. Wetlands, Middlewood Quarry Expansion. See Figure 11 for locations.		
Identification	Area (ha)	Type and Comments
1	0.02	Black Spruce-*Sphagnum*-Red Maple Swamp
2	0.33[1]	"
3	0.01	"
4	0.08[1]	"
5	0.14	"
6	0.31	"
7	0.36	Marshy, sedgy swale.
8	0.31	Black Spruce-*Sphagnum*-Red Maple Swamp
9	0.06	Area northwest at base of steep slope and not measured
10	0.04	Alder-Red Maple Swamp
1. Area of portion of the wetland on quarry property.		

4.2.5 BIRDS

Seventy-eight (78) bird species are suspected or have been confirmed to breed in the general vicinity of the quarry (i.e. in adjacent 10 x 10 km survey squares encompassing the site, Maritime Breeding Bird Atlas, 2012) (Table 2). A night survey for owls by an experienced bird observer[2] on June 8, 2012 between 2225 hrs and 0010 hrs on June 9, detected Common Loon (probably on Dolliver Lake), American Bittern, American Woodcock, Barred Owl (including a pair) and Long-Eared Owl from observation points at the Quarry; and Barred and Long Eared Owl on the upland area in the northern part of the property (Map A-5). A 10-minute point count survey on June 10, 2012 (Table 3, Map A-5)[4] detected 43 species including: 34 species of various terrestrial birds (thrushes, sparrows, warblers, finches,, flycatchers, chickadee, raven, crows, etc.); three species of woodpecker (Hairy, Northern & Pileated); two owls (Barred & Long-eared); one raptor (Red-tailed Hawk); and a Common Loon. The most common and abundant species occurring in the northwest section of the property (Table 4 & M A-5) were Hermit Thrush, Common Yellowthroat, Yellow-Rumped Warbler, and Chestnut-Sided Warbler, with other species including Red-eyed Vireo, Dark Eyed Junco, and American Robin observed at seven or more locations. In south and southwest portions of the site, warblers were less common and abundant, with American Robin, Pine Siskin, Song Sparrow, Common Raven, White Throated Sparrow, Yellow-Rumped Warbler and Hermit Thrush important (Table 4). Raptor species such as bald eagles and osprey are also likely to frequent the area and feed from nearby waterways and lakes (Dollliver Lake), and adjacent surface waters likely host various species of waterfowl, including coastal birds in marine areas.

4 Bird Observer, Fulton Lavender from 0440 hrs to 0850 hrs, June 10, 2012.

Table 3. Bird species with potential to breed in the vicinity of the project site, based on presence of suitable habitat. Source: Maritimes Breeding Bird Atlas[1].

Bird Species Blue = associated with water; Green = associated with terrestrial areas		
Breeding Evidence[2]		
Confirmed and Probable in Area		**Possible in Area**
Alder Flycatcher	Mourning Dove	American Goldfinch
American Black Duck	Nashville Warbler	Black-throated Blue Warbler
American Crow	Northern Flicker	Blue-winged Teal
American Redstart	Northern Parula	Cedar Waxwing
American Robin	Northern Waterthrush	Eastern Wood-Pewee
American Woodcock	Olive-sided Flycatcher	Golden-crowned Kinglet
Barn Swallow	Ovenbird	Gray Catbird
Barred Owl	Palm Warbler	Great Horned Owl
Belted Kingfisher	Pileated Woodpecker	Herring Gull[3]
Black-and-white Warbler	Red Crossbill	Merlin
Black-capped Chickadee	Red-breasted Merganser	Northern Saw-whet Owl
Black-throated Green Warbler	Red-breasted Nuthatch	Osprey
Blue Jay	Red-eyed Vireo	Purple Finch
Blue-headed Vireo	Red-winged Blackbird	Rock Pigeon
Broad-winged Hawk	Ring-necked Duck	Ruby-throated Hummingbird
Chestnut-sided Warbler	Ruby-crowned Kinglet	Spotted Sandpiper
Common Grackle	Ruffed Grouse	Veery
Common Loon	Song Sparrow	Wilson's Snipe
Common Raven	Spruce Grouse	
Common Yellowthroat	Swainson's Thrush	
Dark-eyed Junco	Swamp Sparrow	
Downy Woodpecker	Tennessee Warbler	
European Starling	Tree Swallow	
Evening Grosbeak	White-breasted Nuthatch	
Gray Jay	White-throated Sparrow	
Hairy Woodpecker	White-winged Crossbill	
Hermit Thrush	Willet	
Hooded Merganser	Winter Wren	
Magnolia Warbler	Yellow Warbler	
Mallard	Yellow-rumped Warbler	

[1]Breeding evidence was determined from the "Maritimes Breeding Bird Atlas" website (http://www.mba-aom.ca). Data was obtained for the 10 X 10 km survey area that covers the project site. Bird species highlighted in blue have breeding requirements that involve water (e.g., river banks, coastline, marshes and bogs); birds highlighted in green have breeding habitats that require terrestrial setting (e.g., forests and grasslands).

[2]Observed evidence confirms breeding or that breeding is probable (highly likely) in the area. Breeding is categorized as possible in the area due to the presence of suitable habitat and the species being observed during breeding season.

[3]The breeding evidence data was missing for the Herring Gull, however it was listed as a breeding species in the area. The minimum breeding evidence category (i.e., possible) was assigned by Envirosphere Consultants, Ltd to reflect the possibility of this species breeding in the area.

Table 4. Bird species present (heard or seen) during a site visit conducted on June 10, 2012. For locations of observation points, see Map A5.

	Northwest (Sites 1-10)		South (Sites 11-15)			Northwest (Sites 1-10)		South (Sites 11-15)	
	no./10 min.	no. of sites	no./10 min.	no. of sites		no./10 min.	no. of sites	no./10 min.	no. of sites
Passeriformes					**Passeriformes (cont.)**				
Alder Flycatcher	0.1	1	0	0	Red-eyed Vireo	1.2	9	0.8	3
American Crow	0.7	6	0.6	3	Song Sparrow	0.3	2	1.2	4
American Goldfinch	0.2	2	1.4	3	Swainson's Thrush	0	0	0.2	1
American Redstart	1.2	6	2.2	3	White Throated Sparrow	1.2	5	1	4
American Robin	0.9	8	1.2	5	Yellow-bellied Flycatcher	0.1	1	0	0
Black and White Warbler	1.3	6	0.25	1	Yellow-bellied Sapsucker	0.4	4	0.2	1
Black-capped Chickadee	0.3	3	0.4	2	Yellow-rumped Warbler	2.3	9	1	4
Black-throated Green Warbler	0	0	0.4	2	Yellow Warbler	0	0	0.6	1
Blue-headed Vireo	0.2	2	0.2	1	**Columbiformes**				
Blue Jay	0.3	3	0.2	1	Mourning Dove	0	0	0.4	2
Cedar Waxwing	0.2	1	0.2	1	**Piciformes**				
Chestnut-sided Warbler	2.4	8	0.4	2	Hairy Woodpecker	0.1	1	0.2	1
Common Raven	0.7	5	1	4	Northern Flicker	0.3	2	0.2	1
Common Yellowthroat	3	10	0.2	1	Pileated Woodpecker	0.1	1	0	0
Dark Eyed Junco	1.4	7	0.4	1	**Charadriiformes**				
Golden Crowned Kinglet	0.8	5	0.8	3	Herring Gull	0	0	0.2	1
Hermit Thrush	5.6	9	1	4	**Strigiformes**				
Least Flycatcher	0.1	1	0	0	Barred Owl	0.2	1	0	0
Magnolia Warbler	0.2	2	0.2	1	Long-eared Owl	0.1	1	0	0
Nashville Warbler	0	0	0.2	1	**Falconiformes**				
Oven Bird	1	6	0.4	2	Red-tailed Hawk	0.1	1	0.2	1
Palm Warbler	1.8	8	0	0	**Gaviiformes**				
Pine Siskin	0.9	7	1	5	Common Loon	0.2	1	0	0
Purple Finch	0.2	2	0.4	2	**Apodiformes**				
Red-breasted Nuthatch	0	0	0.2	1	Ruby Throated Hummingbird	0.1	1	0.2	1
Red Crossbill	0.2	2	0	0					

4.2.6 MAMMALS

No significant or unique concentrations of mammals are known from the site. A range of species typical of mixed to coniferous forests are expected. Unidentified bats and voles, red squirrel and Eastern Chipmunks, as well as sign of White-tailed Deer were observed at the site. The vicinity of the washwater pond were occupied by beaver in 2012, and an attempted den was present in the pond; signs of beaver activity were also present in the vicinity of the stream east of the quarry near the highway. Bats were also seen on the June 8 avifauna survey, feeding in the open area over one of the rock-filled swales near the edge of the plateau in the northern part of the quarry property.

4.2.7 FISH

The stream on the site does not contain fish, but downstream of the quarry supports Brook Trout[5] and is considered to be fish habitat. Smallmouth bass, brown trout, brook trout, white suckers, yellow perch and Atlantic Salmon are all expected in nearby waterways (C. Munro, NS Fisheries & Aquaculture, pers.comm. 2012). Federally-listed Atlantic Whitefish is known to occur in the Petite Rivière watershed to the east, but not downstream in the quarry watershed.

4.2.8 REPTILES AND AMPHIBIANS

Most of the common Nova Scotian amphibian and reptile species are expected to occur at the site. Species seen during site visits were generally common ones including: American toad, Wood Frog, Green Frog, Pickerel Frog, and Eastern Smooth Green Snake. The site also probably supports Ring-Necked Snake, Maritime Garter Snake, Northern Red Belly snake, and Red-backed, Yellow-spotted and Four-toed Salamanders (J. Gilhen, NS Museum, pers. comm. 2012). The habitat at the site lacks open and running water and therefore is not suitable for several of the rare reptile and amphibian species which occur in the general area, although Four-toed Salamander are likely to occur on site. Federally-listed species, Blandings Turtle and Northern Ribbonsnake have been observed within 50 km and 10 km, respectively, of the project site (L. Bennett, Coordinator, Special Places, personal communication, 2012). Northern Ribbonsnake has been reported in the Petite Rivière watershed (Italy Cross) east of the study area (J. Gilhen, pers. comm. 2012), as well as to the northwest in the Medway River watershed, where it co-occurs with the Blandings Turtle, and potentially could occur in the quarry watershed.

Four-toed salamander have been reported in various locations both east and west of the site, including Cherry Hill (near Vogler's Cove) as well as Wildcat Brook and New Elm, Lunenburg County, and Mill Village, Queens county (John Gilhen, NS Museum of Natural History, pers, comm. 2012). The species typically breeds in areas with abundant *Sphagnum* development with associated pools in the moss, habitats which occur at the quarry but are not common. A site visit by John Gilhen on September 24, 2012 verified that type habitat occurred only occasionally and was limited in quality and extent, the sites having the greatest potential occurring in the extreme northern corner of the quarry property. The Black Spruce-*Sphagnum* swamp northwest of the clear-cut on the site was specifically examined and determined to be marginal habitat for the species.

4.2.9 SPECIES AT RISK

Species at Risk are those 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 under the federal *Species at Risk Act*, and species are also listed at the provincial level. Nova Scotia maintains a list of endangered species under the *Endangered Species Act.*

5 A small brook trout was captured in minnow traps at Hirtle Road during the site visit on May 28, 2012.

One provincially red-listed plant species, the Southern Twayblade (*Listera australis*) was found at the site during early summer plant surveys (Marbicon 2012, Appendix B) (Figure 12). The species is an uncommon, provincially red-listed orchid species, occurring in Black Spruce and *Sphagnum* dominated bogs and wet areas, commonly with Cinnamon Fern present. Seven locations, frequently with more than one plant per site were identified (Figure 12).

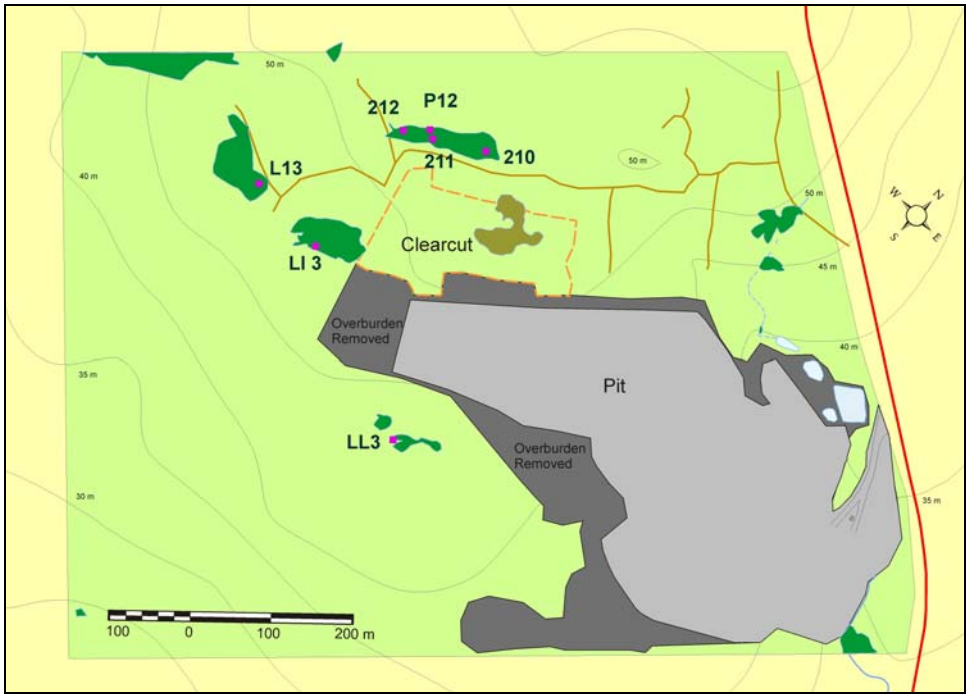

Figure 12. Locations of Southern Twayblade (*Listera australis*) at the quarry site in relation to wetlands shown in Figure 11.

Other species at risk, both plant an animal, can occur in the general area of the Middlewood Quarry, but were not found at the project site. Within a 100 km radius of the study site there are 1917 documented occurrences (database records) of vascular plants (257 species), 199 records of non-vascular flora (26 species), 3711 records of vertebrate animal species (119 species) and 319 records of invertebrate taxa (55 species) (ACCDC, 2012) (Appendix C). Within 10 km of the study site, there are records of three provincial red status plant species (Eastern White Cedar, Intermediate Mermaidweed and American Cancer-Root), as well as records of eighteen federally-listed species at risk—Eastern Lilaeopsis, Harlequin Duck, Common Nighthawk, Piping Plover, Long's Bulrush, Barn Swallow, Bobolink, Rusty Blackbird, Northern Bobwhite, Canada Warbler, Red Knot, Roseate Tern, Olive-sided Flycatcher, Monarch Butterfly, American Eel, Snapping Turtle, Wood Turtle and Atlantic Whitefish (ACCDC, 2012)(Tables 4 & 5). In addition, five of the bird species of concern (Piping Plover, Common Loon, Rusty Blackbird, Barn Swallow and Gray Jay) have been observed nesting within 10 km of the site; Blandings Turtle and Northern Ribbonsnake have been reported within 50 km and 10 km, respectively [the Northern Ribbonsnake occurrence was in the Petite Rivière watershed, which is an adjacent watershed to the eastern drainage of the quarry site], and several species of bats (Little Brown Bat,

Northern Long-eared Bats, and Pipistrelles) could potentially occur if caves or 'dry' mine shafts are present (L. Bennett, Coordinator, Special Places, pers. Comm., 2012) (Table 4) [bats occur on the quarry lands and unidentified species were observed on the site during bird surveys]. Of the federally listed species at risk, none are likely to commonly occur or breed on the Quarry property, based on the absence of suitable habitat. Characteristics of federally listed species at risk observed within 10 km of the quarry are summarized in Table 6.

Most of the Provincial red status plant species are unlikely to occur because habitats at the project site are not typical for the species—Eastern White Cedar requires lakeside/swamp or old-field/pasture habitat and Cancer-root is associated with dry pine and oak woods on steep slopes. Intermediate Mermaidweed, however, which is associated with small depressions that are damp or partially filled with water, could occur in the vicinity of the site due to the presence of such habitat, although ponds occur infrequently at the site and are small sink-hole types. Most of the bird species are coastal (e.g. Piping Plover, Red Knot, Roseate Tern, and Harlequin Duck) and Northern Bobwhite is only a chance occurrence, its main range in Canada being Ontario. Common Nighthawk, Barn Swallow, Bobolink, Rusty Blackbird, Canada Warbler and Olive-sided Flycatcher could occur in the area, due to the presence of mixed habitats (i.e. wetlands, watercourses, conifers and open terrain habitat); none were noted during the bird survey (June 10, 2012) (Table 3); and Common Loon occurs in adjacent surface waters, including Dolliver Lake, and was noted during the bird survey (Table 3). Snapping and Wood Turtles, American eel and the Monarch butterfly, are unlikely to occur on the project site, the turtles because the existing quarry would be a barrier to movement from the Hirtle Mill Pond flowages and waters to the south; American eel because of the absence of a stream of significance and no open water upstream; and the Monarch because of the absence of open fields and meadows suitable for the species. Other plants species—Long's Bulrush and Eastern Lilaeopsis—and Atlantic Whitefish are largely highly localized outside of the project study area and thus are not likely to be found.

Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (L. Bennett, NS Museum, pers. comm., 2012).

Scientific Name	Common Name	General Status of Wild Species Rankings National (numerical)[1] & Nova Scotia (color)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]
PLANTS			
Alnus serrulata	Brook-side Alder	3, yellow	G5, S3, -
Bidens connata	Purple-stem Swamp Beggar Ticks	4, yellow	G5, SH, -
Botrychium simplex	Least Grape Fern	3, yellow	G5, S2S3, -
Cephalanthus occidentalis	Common Buttonbush	3, yellow	G5, S3, -
Epilobium coloratum	Purple-leaf Willow-herb	3, yellow	G5, S2?, -
Epilobium strictum	Downy Willow-herb	3, yellow	G5, S3, -
Euthamia tenuifolia	-	-	-

Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (L. Bennett, NS Museum, pers. comm., 2012).

Scientific Name	Common Name	General Status of Wild Species Rankings National (numerical)[1] & Nova Scotia (color)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]
Fraxinus nigra	Black Ash	3, yellow	G5, S2S3, -
Isotes acadiensis	Acadian Quillwort	3, yellow	G3Q, S3, -
Lilaeopsis chinensis	Eastern Lilaeopsis	3, yellow	G5, S2, Special Concern
Limosella australis	Mudwort	3, yellow	G4G5, S3, -
Lophiola aurea	Golden Crest	1, red	G4, S2, Threatened
Panicum rigidulum, var. pubescens	Redtop Panic Grass	3, yellow	G5T5?, S3, -
Platanthera flava, var. flava	Southern Rein-orchid	-, yellow	G4T4?Q, S2, -
Salix pedicellaris	Bog Willow	3, yellow	G5, S2, -
Samolus valerandi, spp. parviflorus	Valerands's Brookweed	-, yellow	G5T5, S2, -
Spiranthes ochroleuca	Yellow nodding ladies-tresses	3, yellow	G4, S2S3, -
Teucrium canadense	American Germander	3, yellow	G5, S3, -
BIRDS			
Charadrius melodus	Piping Plover	1, red	G3TNR, S1B, Endangered
Gavia immer	Common Loon	2, yellow	G5, S3B/ S4N, NAR
Euphagus carolinus	Rusty Blackbird	2, yellow	G4, S2S3B, Special Concern
Hirundo rustica	Barn Swallow	3, yellow	G5, S3B, Threatened
Perisoreus Canadensis	Gray Jay	3, yellow	G5, S3S4, -
FISH			
*Coregonus huntsmani**	Atlantic Whitefish	1, red	G1, S1, Endangered
OTHER			
Myotis lucifugus	Little Brown Bat**	3, yellow	G5, S1, Endangered
Myotis septentrionalis	Northern Long-eared Bat**	3, yellow	G4, S1, Endangered
Piermyotis subflavus	Pipistrelles**	-	-
Glaucomys volans	Southern Flying Squirrels	3, yellow	G5, S2S3, N-A
REPTILES & AMPHIBIANS			
Emydoidea blandingi	Blandings Turtles	1, red	G4, S1, Endangered
Thamnophis sauritus	Northern Ribbonsnake	1, yellow	G5, S2S3, Threatened

Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (L. Bennett, NS Museum, pers. comm., 2012).

Scientific Name	Common Name	General Status of Wild Species Rankings National (numerical)[1] & Nova Scotia (color)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]

1. National General Status of Wild Species Ranks: 1=At Risk; 2=May be at Risk; 3=Sensitive; 4=Secure; 5=Undetermined; 6=Not Assessed; 7=Exotic; 8=Accidental.
2. NS General Status of Wild Species Ranks: Blue (Extinct/Extirpated)=No longer in Nova Scotia or extinct in the wild; Red=Known to be or thought to be at risk; Yellow=Sensitive to human activities or natural events; Green=Not to believed to be sensitive or at risk; Grey (Undetermined)=Insufficient data exists to assess the status; Not assessed=Known or believed to be present in Nova Scotia but yet unassessed; Exotic=Introduced as a result of human activity; Accidental/vagrant=Occurring infrequently and unpredictability, outside their usual range.
3. Atlantic Canada Conservation Data Centre (ACCDC).
4. GRANK, Global rarity rank of species, using CDC/Nature Serve methods; SRANK, Sub-National (Provincial) Rarity Rank-; NPROT, National conservation status of species, as designated by COSEWIC.
* Present in Petite Riviere Watershed and potentially could be in adjacent watersheds (i.e. Medway).
** Hibernating populations may occur if caves occur in the area.

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT) [4]
			Provincial (color)[1]	National (numerical) [2]	
Plants					
Apiaceae	*Lilaeopsis chinensis*	Eastern Lilaeopsis	Yellow	3	G5, S2, SC
Asclepiadaceae	*Asclepias incarnata*	Swamp Milkweed	Green	4	G5, S3, -
	Asclepias incarnata ssp. pulchra	Swamp Milkweed	?	-	G5T5, S2S3, -
Butulaceae	*Alnus serrulata*	Smooth Alder	Yellow	3	G5, S3, -
Cupressaceae	*Thuja occidentalis*	Eastern White Cedar	Red	2	G5, S1S2, -
Cyperaceae	*Carex pensylvanica*	Pensylvania Sedge	Undetermined	5	G5, S1S2, -
	Carex swanii	Swan's Sedge	Yellow	3	G5, S2S3, -
	Cyperus dentatus	Toothed Flatsedge	Green	4	G4, S3S4, -
	Eleocharis olivacea	Yellow Spikerush	"	-	G5, S2S3, -
	Scirpus longii	Long's Bulrush	Red	3	G2G3, S2S3, SC
Haloragaceae	*Proserpinaca intermedia*	Intermediate Mermaidweed	Red	2	G4?Q, S1, -
	Proserpinaca palustris var. crebra	Marsh Mermaidweed	Green	-	G5T5, S3, -
	Proserpinaca pectinata	Comb-leaved Mermaidweed	"	4	G5, S3, -

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT) [4]
			Provincial (color)[1]	National (numerical) [2]	
Iridaceae	*Sisyrinchium atlanticum*	Eastern Blue-Eyed-Grass	"	4	G5, S3S4, -
Isoetaceae	*Isoetes acadiensis*	Acadian Quillwort	Yellow	3	G3Q, S3, -
Lamiaceae	*Teucrium canadense*	Canada Germander	"	3	G5, S3, -
Lentibulariaceae	*Utricularia radiata*	Little Floating Bladderwort	Green	4	G4, S3, -
	Utricularia subulata	Zigzag Bladderwort	"	4	G5, S3, -
Melastomataceae	*Rhexia virginica*	Virginia Meadow Beauty	"	4	G5, S3, -
Orobanchaceae	*Conopholis americana*	American Cancer-root	Red	2	G5, S1S2, -
Oleaceae	*Fraxinus nigra*	Black Ash	Yellow	3	G5, S2S3, -
Orchidaceae	*Liparis loeselii*	Loesel's Twayblade	Green	4	G5, S3S4, -
	Platanthera flava	Tubercled Orchid	Yellow	3	G4, S2, -
	Platanthera flava var. flava	Tubercled Orchid	?	-	G4T4?Q, S2, -
Orchidaceae	*Platanthera flava var. herbiola*	Tubercled Orchid	?	-	G4T4Q, S1S2, -
	Platanthera orbiculata	Small Round-leaved Orchid	Green	4	G5, S3, -
	Spiranthes ochroleuca	Yellow Ladies'-tresses	Yellow	3	G4, S2S3, -
Poaceae	*Dichanthelium spretum*	Eaton's Witchgrass	Green	-	G5, S3S4, -
	Dichanthelium clandestinum	Deer-tongue Panic Grass	"	4	G5, S3, -
	Panicum rigidulum var. pubescens	Redtop Panic Grass	Yellow	3	G5T5?, S3, -
Polygonaceae	*Polygonum raii*	Sharp-fruited Knotweed	Undetermined	5	G3G5Q, S2S3, -
Potamogetonaceae	*Potamogeton pulcher*	Spotted Pondweed	"	5	G5, S1S2, -
Primulaceae	*Samolus valerandi*	Seaside Brookweed	Yellow	3	G5, S2, -
	Samolus valerandi ssp. parviflorus	Seaside Brookweed	"	-	G5T5, S2, -
Ranunculaceae	*Anemone canadensis*	Canada Anemone	"	3	G5, S2, -
Rosaceae	*Rosa palustris*	Swamp Rose	Green	4	G5, S3, -

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Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT) [4]
			Provincial (color)[1]	National (numerical) [2]	
Rubiaceae	*Cephalanthus occidentalis*	Common Buttonbush	Yellow	3	G5, S3, -
Salicaceae	*Salix pedicellaris*	Bog Willow	"	3	G5, S2, -
	Salix sericea	Silky Willow	"	3	G5, S2, -
Scrophulariaceae	*Limosella australis*	Southern Mudwort	"	3	G4G5, S3, -
Verbenaceae	*Verbena hastata*	Blue Vervain	Green	4	G5, S3, -
Animals-Birds					
Accipitridae	*Accipiter gentilis*	Northern Goshawk	Yellow	4	G5, S3S4, NAR
Alcidae	*Cepphus grylle*	Black Guillemot	Green	4	G5, S3S4, -
Anatidae	*Anas acuta*	Northern Pintail	"	3	G5, S2B, -
	Anas discors	Blue-winged Teal	"	4	G5, S3B, -
	Bucephala clangula	Common Goldeneye	"	4	G5, S2B/ S5N, -
	Histrionicus histrionicus	Harlequin Duck	Yellow	3	G4T4, S2N, SC
Anatidae	*Mergus serrator*	Red-breasted Merganser	Green	4	G5, S3B, S5N
Caprimulgidae	*Chordeiles minor*	Common Nighthawk	Yellow	3	G5, S3B, T
Cardinalidae	*Pheucticus ludovicianus*	Rose-breasted Grosbeak	Green	4	G5, S3S4B, -
	Piranga olivacea	Scarlet Tanager	"	4	G5, S2B, -
Charadriidae	*Charadrius melodus melodus*	Piping Plover melodus ssp	Red	1	G3TNR, S1B, E
	Charadrius semipalmatus	Semipalmated Plover	Green	4	G5, S1S2B/S5M, -
	Charadrius vociferus	Killdeer	"	4	G5, S3S4B, -
	Pluvialis dominica	American Golden Plover	"	4	G5, S3M, -
Corvidae	*Perisoreus canadensis*	Gray Jay	Yellow	3	G5, S3S4, -
Emberizidae	*Passerella iliaca*	Fox Sparrow	Green	4	G5, S3S4B, -
	Pooecetes gramineus	Vesper Sparrow	Yellow	3	G5, S2S3B, -
Fringillidae	*Carduelis pinus*	Pine Siskin	Green	4	G5, S3S4B/ S5N, -
	Pinicola enucleator	Pine Grosbeak	"	4	G5, S3?B/ S5N, -

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT) [4]
			Provincial (color)[1]	National (numerical) [2]	
Gaviidae	*Gavia immer*	Common Loon	Yellow	2	G5, S3B/ S4N, NAR
Hirundinidae	*Hirundo rustica*	Barn Swallow	Yellow	3	G5, S3B, T
	Petrochelidon pyrrhonota	Cliff Swallow	Green	4	G5, S3B, -
	Riparia riparia	Bank Swallow	"	4	G5, S3B, -
Icteridae	*Dolichonyx oryzivorus*	Bobolink	Yellow	3	G5, S3S4B, T
	Euphagus carolinus	Rusty Blackbird	Yellow	2	G4, S2S3B, SC
	Icterus galbula	Baltimore Oriole	Green	4	G5, S2S3B, -
	Molothrus ater	Brown-headed Cowbird	"	4	G5, S2S3B, -
Laridae	*Larus atricilla*	Laughing Gull	"	4	G5, SHB, -
Mimidae	*Dumetella carolinensis*	Gray Catbird	"	4	G5, S3B, -
Mimidae	*Mimus polyglottos*	Northern Mockingbird	"	4	G5, S3B, -
Odontophoridae	*Colinus virginianus*	Northern Bobwhite	Exotic	7	G5, -, E
Paridae	*Poecile hudsonica*	Boreal Chickadee	Yellow	3	G5, S3, -
Parulidae	*Dendroica castanea*	Bay-breasted Warbler	Green	4	G5, S3S4B, -
	Dendroica striata	Blackpoll Warbler	"	4	G5, S3S4B, -
	Vermivora peregrina	Tennessee Warbler	"	4	G5, S3S4B, -
	Wilsonia canadensis	Canada Warbler	Yellow	1	G5, S3B, T
	Wilsonia pusilla	Wilson's Warbler	Green	3	G5, S3S4B, -
Scolopacidae	*Actitis macularius*	Spotted Sandpiper	"	4	G5, S3S4B, -
	Calidris canutus rufa	Red Knot rufa ssp	Yellow	3	G4T1, S2S3M, E
	Calidris maritima	Purple Sandpiper	"	4	G5, S3N, -
	Calidris minutilla	Least Sandpiper	Green	4	G5, S1B/S5M, -
	Calidris pusilla	Semipalmated Sandpiper	"	4	G5, S3M, -
	Gallinago delicata	Wilson's Snipe	"	4	G5, S3S4B, -
	Limosa haemastica	Hudsonian Godwit	Undetermined	5	G4, S3M, -
	Phalaropus lobatus	Red-necked Phalarope	Green	4	G4G5, S2S3M, -
	Tringa melanoleuca	Greater Yellowlegs	"	4	G5, S3B/S5M, -
	Tringa semipalmata	Willet	"	4	G5, S2S3B, -
	Tringa solitaria	Solitary Sandpiper	"	4	G5, S1?B/ S4S5M, -

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT) [4]
			Provincial (color)[1]	National (numerical) [2]	
Sternidae	*Sterna dougallii*	Roseate Tern	Red	1	G4, S1B, E
	Sterna hirundo	Common Tern	Yellow	3	G5, S3B, NAR
Tyrannidae	*Contopus cooperi*	Olive-sided Flycatcher	"	3	G4, S3B, T
	Contopus virens	Eastern Wood-Pewee	Green	4	G5, S3S4B, -
	Empidonax flaviventris	Yellow-bellied Flycatcher	"	4	G5, S3S4B, -
	Sayornis phoebe	Eastern Phoebe	"	4	G5, S3S4B, -
	Tyrannus tyrannus	Eastern Kingbird	"	4	G5, S3S4B, -
Animals-Dragonflies & Damselflies					
Corduliidae	*Somatochlora tenebrosa*	Clamp-Tipped Emerald	Yellow	3	G5, S3, -
Libellidae	*Erythrodiplax berenice*	Seaside Dragonlet	"	2	G5, S3, -
Animals-Butterflies					
Lycaenidae	*Feniseca tarquinius*	Harvester	Green	4	G4, S3S4, -
	Satyrium liparops	Striped Hairstreak	Undetermined	5	G5, S3, -
Nymphalidae	*Danaus plexippus*	Monarch	Yellow	3	G5, S2B, SC
Other					
Anguillidae	*Anguilla rostrata*	American Eel	Green	2	G4, S5, SC
Chelydridae	*Chelydra serpentina*	Snapping Turtle	"	4	G5, S5, SC
Emydidae	*Glyptemys insculpta*	Wood Turtle	Yellow	3	G4, S3, T
Mustelidae	*Martes americana*	American Marten	Red	1	G5, S1, -
	Martes pennanti	Fisher	Yellow	3	G5, S2, -
Plethodontidae	*Hemidactylium scutatum*	Four-toed Salamander	Green	4	G5, S3, NAR
Salmonidae	*Coregonus huntsmani*	Atlantic Whitefish	Red	1	G1, S1, E
	Salmo salar	Atlantic Salmon	Red	2	G5, S2, -

1. NS General Status of Wild Species Ranks: Blue (Extinct/Extirpated)=No longer in Nova Scotia or extinct in the wild; Red=Known to be or thought to be at risk; Yellow=Sensitive to human activities or natural events; Green=Not to believed to be sensitive or at risk; Grey (Undetermined)=Insufficient data exists to assess the status; Not assessed=Known or believed to be present in Nova Scotia but yet unassessed; Exotic=Introduced as a result of human activity; Accidental/vagrant=Occurring infrequently and unpredictability, outside their usual range.

2. National General Status of Wild Species Ranks: 1=At Risk; 2=May be at Risk; 3=Sensitive; 4=Secure; 5=Undetermined; 6=Not Assessed; 7=Exotic; 8=Accidental.

3. Atlantic Canada Conservation Data Centre (ACCDC).

4.

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name	Common Name	Rank		
		General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT)[4]
		Provincial (color)[1]	National (numerical)[2]	

GRANK, Global rarity rank of species, using CDC/NatureServe methods

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 or 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 **Infraspecific 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.

SRANK, Sub-National (Provincial) Rarity Ranks

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

Table 6. Records of species of concern within a 10 km radius of Middlewood Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Family/Scientific Name	Common Name	Rank		
		General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK,SRANK & NPROT)[4]
		Provincial (color)[1]	National (numerical)[2]	

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.

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.

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.

Not At Risk (NAR)- A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

Table 7. Characteristics of federally-listed plant and animal species occurring within 10 km of Middlewood quarry.

Species	Description
Eastern Lilaeopsis (*Lilaeopsis chinensis*)	Eastern Lilaeopsis is a small herbaceous plant, found in Canada along the southern coast of Nova Scotia. It prefers to grow in the intertidal waters of long narrow estuaries at the mouths of large rivers and on a muddy substrate. Patchy distributions of the species have been observed within three specific Nova Scotian estuaries, at the mouths of Tusket, Medway and LaHave rivers. It is federally listed as a species of *special concern* due to declining numbers from human disturbance along shorelines.
Harlequin Duck (*Histrionicus histrionicus*)	Harlequin Duck is a small sea duck found in coastal waters of Nova Scotia most of the year. They are known to forage along rocky shorelines, move to inland waters in spring to breed (i.e. in fast flowing rivers), and to prefer rocky coastlines, headlands and offshore islands in winter. They are federally listed as a species of *special concern* largely due to declines in population possibly from hunting and human disturbances (contamination, loss of habitat and hydro & mining projects).
Common Nighthawk (*Chordeiles minor*)	Common Nighthawk is a medium-sized bird, which is known to breed across Canada in open areas with little to no vegetation such as sand dunes, beaches, logged areas, forest clearings, rocky outcrops, etc. It is federally listed as a *threatened* species due to declining numbers from reforestation, agricultural use and forest fire suppression.
Piping Plover (*Charadrius*	Piping Plover is a small shorebird that has been observed nesting all along the South Shore, extending to Cape Sable. The species nests on sand-gravel beaches usually above the normal high-water mark, breeding first in the April-May period and

Table 7. Characteristics of federally-listed plant and animal species occurring within 10 km of Middlewood quarry.

Species	Description
melodus melodus)	leaving by the end of July, but some plovers from a second nesting may occur in the area until late August. In only rare cases are the young flightless plovers likely to be present in beach areas in August, from nesting in early July. They are federally listed as an *endangered* species at risk largely due to declines in population from habitat loss. Human disturbance, predators such as gulls, crows, foxes etc. and sea level rise are their main threats. The southwestern coastline between Bridgewater and Liverpool is recognized as an important bird area, in which Piping Plovers in particular are monitored (i.e., Cap Bay, Crescent, Green Bay, Broad Cove, Cherry Hill and Beach Meadows beaches).
Long's Bulrush (*Scirpus longii*)	Long's Bulrush is a vascular plant, which is federally listed as a species of *special concern*. It is rare in Canada and known to occur in nine particular areas in southwestern Nova Scotia (a meadow near Shingle Lake, lakeshore bogs along the Medway River system, etc.) preferring peat wetlands, peaty shores of lakes, small bogs related to lakes and/or rivers, still-water meadows and inland fens. Human disturbance (highway construction, ATV's, cottage development) and muskrat grazing are the main threats.
Barn Swallow (*Hirundo rustica*)	Barn Swallows are medium-sized songbirds often seen in flocks, which is listed by COSEWIC as a *threatened* species. None were seen during the site survey in June. The species is known to breed across Canada and migrate south to Central and South America for winter. They prefer open habitats for foraging such as grassy fields, pastures, lake and river shorelines, agricultural crops, islands, wetlands and cleared areas (farmland, cottage land, rights-of-way). Possible causes of declining populations are: loss of nesting and foraging habitat, declines in their food source (insect populations) and mortalities due to fluctuating temperatures (i.e., cold snaps).
Bobolink (*Dolichonyx oryzivorus*)	Bobolink is a medium-sized grassland bird which breeds in Canada and is listed by COSEWIC as a *threatened* species. It is known to arrive in May, nesting and associating with pastures and hayfields. Numbers have been declining since the late 1960s and continue to decline largely due to mortality from agricultural operations, habitat loss and fragmentation and pesticide exposure.
Rusty Blackbird (*Euphagus carolinus*)	Rusty Blackbird is federally listed as a *species of concern* species that is known to nest and breed in forested wetlands, some woodlands and cultivated fields across Canada. Threats to the species include: loss of habitat due to conversion of wetlands (i.e., wintering grounds) to agriculture and/or human use land, human disturbance (wetland degradation) and possibly bird control programs used to protect crops.
Northern Bobwhite (*Colinus virginianus*)	Northern Bobwhite is a grouse-like bird, which is federally listed as an *endangered* species and its occurrence is primarily restricted to Ontario though the occasional bird has been observed in Nova Scotia. It prefers open habitats of grassland, crops and brush and its main threats are loss of habitat due to agriculture and urbanization.
Canada Warbler (*Cardellina canadensis)*	Canada Warbler is a small songbird that is known to nest on or close to the ground in ferns or fallen logs within wet, mixed forests with shrubbery undergrowth, or in riparian shrub forests on slopes, in ravines, in old-growth forests, and/or in areas that are regenerating. The species arrives in May and June to breed and return south for a fall migration during July to September. The species population is thought to be declining, possibly due to habitat loss and alteration, herbicide spaying, and decrease in spruce budworm outbreaks since 1970. It is federally listed as a *threatened* species under the Species at Risk Act.
Red Knot (*Calidris canutus)*	Red Knot is a medium-sized shorebird that has a brownish red colour during breeding season. It breeds on arctic islands and winters in southern coastal areas, stopping to feed on mollusks, crustaceans and other invertebrates on sand beaches with adjacent mudflats in Nova Scotia during migration. Red Knot can occasionally be seen in spring (mid-April to May); however they are more commonly noted in Nova Scotia during their fall migration from July to September, although some birds have been documented on Cape Sable Island (Southwestern NS) as late as January. Red Knot are listed by COSEWIC as an *endangered* species, largely due to declines in population. Threats to the species include: over-fishing of their food sources, habitat loss and alteration on their migratory route, human disturbance, pollution, and the effects of climate change.
Roseate Tern (*Sterna dougallii*)	Roseate Tern is federally listed as an *endangered* seabird under the *Species at Risk Act*. The Roseate Tern is a medium-sized tern, known to feed in salt water on small fish such as sand lance, white hake, juvenile herring and several other species and commonly nests with other terns (Common and Arctic). Roseate Terns arrive at their breeding colonies on coasts and islands in Nova Scotia during early to mid-May and move to staging areas such as Sable Island in late July. Several weeks later they migrate south to warmer climates such as South America. Roseate Terns nesting in Canada are part of northeastern North America breeding population, which ranges from Nova Scotia to New York (Rock et. al, 2007).
Olive-sided Flycatcher (*Contopus cooperi*)	The species is a songbird found in coastal forests in Canada, as well as some parts of the United States. It is often observed in open areas such as forest clearings, forest edges near rivers or wetlands, or areas altered by man (due to logging or development) where it forages for food (flying insects). The forest areas tend to be coniferous or mixed woods that have a combination of mature trees and deadwood. The species is known to breed between April and June, mainly in mid-to-late May. After fledging, they begin their fall migration in late July reaching South America (the Andes from Panama to Bolivia) between mid-August and early September. They are federally listed as a *threatened* species at risk largely due to declines in population since the 1960s. Threats to the species may be related to habitat loss and alteration of breeding and wintering grounds, as well as declining insect populations.
Monarch Butterfly (*Danaus plexippus)*	The Monarch is federally listed as a species of *special concern*. It can occur wherever its food source occurs (i.e. milkweed and wildflowers-asters, goldenrod, purple loosestrife), often in the open (abandoned farmland and along roadsides) and is threatened by loss of habitat and use of herbicides.
American eel *(Anguilla rostrata)*	American Eel are commonly found in estuaries and coastal freshwater, American eel enter freshwater streams as small juveniles (elvers) where they mature. Some overwinter in estuaries while others migrate (August – December) to the mid-Atlantic ocean (Sargasso Sea) to spawn. The population is listed by COSEWIC as *special concern* and is susceptible to

Table 7. Characteristics of federally-listed plant and animal species occurring within 10 km of Middlewood quarry.

Species	Description
	habitat alteration, dams, fishery harvest, oscillations in ocean conditions, acid rain and contaminants.
Snapping Turtle (*Chelydra serpentina*)	Snapping Turtle is federally listed as a species of *special concern* and is the largest freshwater turtle in Canada. It's preferred habitat is slow-moving water with soft mud substrate and dense aquatic vegetation. Females nest on sand or gravel banks adjacent to waterways and hatchlings emerge in the fall, move to water and overwinter buried under leaf litter or debris. Numbers have been declining largely due to adult mortality (legal and illegal harvesting, & road mortality) and loss of habitat-alteration of wetlands due to agriculture and/or urban development.
Wood Turtle (*Glyptemys insculpta*)	Wood Turtle is federally listed as a *threatened* species that has been observed within a 10 km radius of the study site (ACCDC 2012). Wood Turtles are generally active between April to October and nest in the late-June to July period, with hatchlings emerging in September to October. This species is generally found near rivers and streams with sandy or gravel to sand bottom and known to prefer clear meandering watercourses with a moderate current. Declining populations are due to increased mortality of adults (due to road traffic, agricultural machinery, destruction of nests by all-terrain vehicles (ATVs) and snowmobiles, loss of habitat and predation of nests by mammals).
Blandings Turtle (*Emydoidea blandingi*)	Blandings Turtle is federally listed as an *endangered* species that has been observed within a 50 km radius of the study site (L. Bennett, Coordinator, Special Places, personal communication, 2012). Blanding's Turtles are generally active between April to October and nest in the early-June to early-July period, with hatchlings emerging in September to October. This freshwater species is generally found near bogs, vegetated coves and/or inlets, lakes, ponds, swamps or marshes. Declining populations are due to increased mortality of adults (due to road traffic, cottage building near lakeshores, destruction of nests, fragmentation and degradation of habitats). Though none have been observed within a 10 km radius, they are known to be co-located with Northern Ribbonsnake which has been observed within this radius.
Northern Ribbonsnake (*Thamnophis sauritus*)	Northern Ribbonsnake is federally listed as a *threatened* species that has been observed within a 10 km radius of the study site (L. Bennett, Coordinator, Special Places, personal communication, 2012). This species is semi-aquatic and commonly found near shallow ponds, streams, marshes, swamps or bogs adjacent to dense vegetation used as 'cover'. Generally, they are active (April- October) during the day and known to feed mainly on frogs. Hatching of young occurs in the fall (i.e. September) and they are known to hibernate in rock crevices and animal burrows in the winter (October- April). They have been observed within a 10 km radius of the project site.
Atlantic Whitefish (*Coregonus huntsmani*)	The species is federally listed as an *endangered* species and is only found in Canada, specifically within Petite Riviere watershed (east of study site); was known to occur within the Tusket River Watershed in Yarmouth County but since has been extirpated from this part of the province. Normally an anadromous species (spawn in freshwater then return to the ocean), it landlocked within the Petite Riviere watershed and is known to occur in three connected lakes above Hebb Dam.
Little Brown Bat (*Myotis lucifugus*), Northern Long-eared Bat (*Myotis septentrionalis)* and Pipistrelles (*Perimyotis subflavus*)	These species have recently been placed on an emergency COSEWIC listing as *endangered* species' due to the appearance of 'White Nose Syndrome' in the area, which is related to incidences of death in bats. These three species may hibernate in 'dry' mines or caves in the study area, if present.

4.3 HUMAN USES OF THE ENVIRONMENT

4.3.1 MI'KMAQ

Southwestern Nova Scotia was important for the Mi'kmaq before European settlement and continued for some time after. The Medway River to the west and the LaHave to the east were travel routes, and pre-contact Mi'kmaq campsites and petroglyphs can be found in Kejimkujik National Park northwest of the project site, and along the Medway River at McGowan Lake, dating back to over 3000 to 4000 years before present. However no registered pre-contact sites occur in the general area of the project (CRM 2012). The main Mi'kmaq First Nation closest to the project area is the Acadia First Nation, which has five component First Nations in three counties: G*old River* in Lunenburg County; *Medway, Wildcat*, and

Ponhook in Queens County; and *Yarmouth* in Yarmouth County. The closest is *Medway* 24 km from the site, and next closest *Wildcat* near Molega Lake (33 km). Bear River First Nation has three communities, the closest about 100 km north of the project site.

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 that was incorporated in 1986, and their mission is to promote and assist Mi'kmaw communities. The UNSI, created in 1969, was formed to provide a cohesive political voice for Mi'kmaq people. Acadia First Nations belongs to UNSI and Bear River First Nation is a member of CMM. The Native Council of Nova Scotia (NCNS), represents Mi'kmaq people living off-reserve. The NCNS is a self-governing agency located in Truro. Statistics Canada estimated that in 2006 approximately 48% of the Mi'kmaq populations lived 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 represents Mi'kmaq. 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." The initiative is to negotiate between the Mi'kmaq of Nova Scotia, the province and the Government of Canada. KMK's main office is located 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 and CMM is 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.

The Middlewood Quarry site has no known Mi'Kmaq ceremonial or cultural uses, nor is the area known to be used for other purposes, based on discussions with locals and through the archaeological resources survey of the site (CRM 2012) and the Nova Scotia Museum search (L. Bennett, NS Museum, pers. comm 2012). There are no fishable waters on the project site and fishing by individual Mi'Kmaq from bands located in Queens and Lunenburg Counties likely occurs alongside the recreational fisheries by other residents. Mi'kmaq fish from the wharf in Vogler's Cove.

4.3.2 WATER SUPPLY AREAS

The site is not located on or near any water supply areas for the Municipality District of Lunenburg County.

4.3.3 LAND USE

Land in the vicinity of the quarry is primarily forest resource, with several abandoned farms and residences in the vicinity of the property (Map A-4).

4.3.4 HUNTING

The site is expected to have similar wildlife species to those observed in nearby areas of Lunenburg and Queens Counties. Hunting for deer, rabbit, and coyotes occurs throughout the local area, off the Hirtle Rd and from adjacent logging roads or ATV trails and beaver, river otter, and muskrat are common in the area (S. Dagley, local resident, pers. comm. 2012). Deer harvest in Lunenburg County is highest in Nova Scotia, making up 23.9% of all deer captured in the Province. Upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant) are harvested but Lunenburg and Queens Counties both rank ninth or lower compared with other counties. The main furbearers harvested for both counties in terms of harvest numbers are: beaver, raccoon, muskrat, coyote, squirrel and mink. Furbearers are comparatively more important in Lunenburg County than Queens County, though neither county has a significant harvest (Lunenburg represents 3.2% and Queens represents 1.6% of the total harvested furbearers in Nova Scotia). Lunenburg County has the third largest harvest for otter from 2005-2010, representing 8.9% of the provincial total; the fourth highest harvest for fisher; and the fifth highest harvests for beaver, bobcat, fox, and squirrel. Queens County has the third largest harvest for marten, representing 6.3% of the Nova Scotia total.

4.3.5 RECREATIONAL FISHING

Some recreational fishing takes place in Hirtle Mill Pond and Hirtle Brook, and Dolliver Lake, as well as in areas further downstream. Brook Trout is the most common target species, with Smallmouth Bass also caught in Dolliver Lake. Other game species include brown trout, and yellow perch.

4.3.6 ARCHAEOLOGICAL RESOURCES

No records of archaeological resources of significance occur in the study area, although recorded sites occur in that area of the Province, and the potential for First Nations and historic archaeological resources is moderate. (L. Bennett, Coordinator, Special Places, pers. comm., 2012; CRM 2012). A more-detailed archaeological/cultural assessment was done for the quarry expansion (CRM 2012), and determined, in turn, that the study area exhibited low potential for archaeological and/or historical resources, and no areas of high archaeological potential were identified during a site visit (August 31, 2012).

4.3.7 PARKS AND PROTECTED AREAS

There are no parks or protected areas in the immediate vicinity of the site, and no significant habitats listed in the NSDNR Significant Habitats Database, within 3 km of the site. From 3-5 km, there are three designated sites: Hubbards/Danesville Rail Corridor and Danesville/Brooklyn Rail Corridor, west of the project site, both former railway lines converted to trails managed by NSDNR; and the Vogler's Cove Conservation Land and South Shore-East Queens Co. Sector, an 8.5 ha parcel of coastal land managed by the Nova Scotia Nature Trust. An Important Bird Area (IBA) encompasses coastal areas between the towns of Bridgewater and Liverpool, where it includes tidal rivers/estuaries, mud or sand flats, open sea, inlets/coastal features (marine), and coastal cliffs/rocky shores (marine).

4.3.8 RECREATIONAL/CULTURAL ACTIVITIES

The site is in an unpopulated and remote part of Lunenburg County and there are no recreational facilities or recreational/cultural activities carried out in the immediate vicinity of the site. Lands are used locally for hunting, and Dolliver Lake, located about 400 from the quarry, is used recreationally for fishing, swimming, canoeing, kayaking in summer and skating in winter; in addition, several cabins (~3) are maintained on the lake (S. Dagley, local resident, pers. comm. 2012). Recreational fishing for yellow perch and brook trout is a significant local activity and occurs on both Dolliver Lake and the Hirtle Mill Pond. Vogler's Cove Community Hall, is a local meeting place, with an adjacent playground and known walking trails. Also in the vicinity of Vogler's Cove is the United Community Marine Park, a seaside park adjacent to the waterfront and a known picnicking area (L. Barkhouse, pers. comm. 2012). Mi'kmaq fish from the wharf in Vogler's Cove, and likely also hunt in the Middlewood area.

4.3.9 RESIDENTIAL/COMMERCIAL DEVELOPMENT

The land near the Middlewood Quarry has a low population density and no commercial operations. Several cabins are occupied seasonally on Dolliver Lake, while there are several unoccupied residences along Hirtle Road near the site. Four unoccupied properties within 800 m of the quarry include a mobile home (628 Hirtle Road, PID 60302478); a bungalow (PID 60302247); a farmhouse and outbuildings (1016 Hirtle Road, PID 603696); and a farmhouse and buildings at 1068 Hirtle road (PIDs 60369600 and 60650900) (Map A-4). The Proponent owns the mobile home property and has a waiver from the owner of the bungalow. The other properties and buildings are on the side of the quarry opposite to the proposed expansion and conditions at those sites will not change as a result of the project.

4.3.10 TOURISM AND VIEWSCAPE

Hirtle Road is a connector road which is expected to carry mostly local vehicle traffic, with most of the tourist traffic in the area moving along Highway 103 and coastal Highway 331 through coastal communities such as Vogler's Cove, Port Medway and Cherry Hill. Hirtle Road is in a heavily forested area and there are no panoramas or scenic views with which the quarry development would interfere.

5 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 under the federal Canadian Environmental Assessment Act (CEAA)[6]. For this assessment a list of valued environmental components (VECs)[7], and project activities

6 A new CEAA was introduced in 2012 but the methodology for screening assessment did not change.

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 significant impacts were likely to occur, mitigating actions or activities have been suggested to 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.

6 PREDICTING ENVIRONMENTAL EFFECTS / SIGNIFICANCE AND MITIGATION OF IMPACTS ON VALUED ECOSYSTEM 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 Table 9.

Table 8. Valued Environmental Components (VECs) for Middlewood Quarry Expansion.

Biophysical	Socioeconomic
Air Quality	Mi'Kmaq
Hydrogeology	Archaeological, Cultural and Historical
Hydrology	Recreation, Tourism & Viewscape
Water Quality	Recreational Fishing
Freshwater Aquatic Environments/ Wetlands	Land Use and Value
Fish &Fish Habitat	Transportation
Flora & Fauna Species & Habitat	Residential Use
Species at Risk	

6.1 SOCIOECONOMIC IMPACTS

6.1.1 MI'KMAQ

The Mi'Kmaq occupied much of Nova Scotia prior to European contact and rivers such as the Medway to the west and the LaHave to the east of the site were travel routes. In more recent times, treaties made with the British and continued through Canadian law have maintained their rights to fish, and harvest wildlife and forest resources. The site does not have a cultural historical significance for the Mi'Kmaq and no artefacts indicating prehistoric or historical use were identified at the site (CRM 2012).

7 Valued Environmental Components (VECs) are features or things in the environment, which are important either ecologically, socially, economically or culturally. The environmental assessment addresses potential impacts of the project on each VEC identified. To do so involves identifying all the activities or outcomes of the project which interact with each VEC, and then determining and rating the magnitude of the impact in a standard way, in this case in a manner guided by standard approaches which have been developed for assessments under CEAA.

Quarry Operations would interact with any use of natural resources through hunting or fishing, either recreationally or for subsistence; however the area affected is small in relation to the available wildlife habitat in the area, and there are no likely cumulative effects of other activities in the area, and consequently none of these effects are considered significant.

6.1.2 RECREATIONAL ACTIVITIES

Recreational use of the environment in the vicinity of the site consists principally of hunting and fishing, as well as water-based recreation and seasonal residences (cabins) on Dolliver Lake. Cleared trails for logging equipment and clear-cuts on site are likely used by local hunters. The relatively small footprint of the site in relation to available wildlife habitat in the area, and the lack of forestry pressure on the local resources suggest that there are no likely cumulative effects of other activities in the area. Recreational activities on Dolliver Lake are buffered visually. Noise from quarry operations will reach the lake, and may be mitigated by suitable hours of operation, weekday and seasonal restrictions to avoid overlapping with night and times of peak recreational usage.

6.1.3 TOURISM AND VIEWSCAPE

Tourists use the highway adjacent to the site to access the coast from Highway 103, but the road does not have particular significance nor is it promoted as a tourist route. Only the entrance to the quarry is visible from the highway and the expanded quarry will also not be visible from the road.

6.1.4 RECREATIONAL FISHING

Freshwater streams and ponds in the vicinity of the quarry, including Dolliver Lake and Hirtle Mill Pond are fished recreationally. The quarry expansion will not affect recreational fishing as changes in hydrology—which include an increased freshwater movement from the site into the Hirtle Mill Pond system and a slightly reduced flow into Dolliver Lake—are insignificant. Water quality of the runoff from the Quarry is good for salmonids, including low turbidity and neutral pH, which would tend to improve the acidity of waters downstream for fish.

6.1.5 ARCHAEOLOGICAL/CULTURAL/HISTORICAL

The land proposed for the quarry expansion has low potential for pre-contact and/or early historic native archaeological resources. The site was not settled by Europeans and has no on-site structures which could have cultural significance. Consequently the project will not have an impact on cultural/historical/archaeological features.

6.1.6 LAND USE AND VALUE

The land at the site is not suitable for agriculture or forestry due to the absence of good soil and presence of bedrock near the surface. Forest types removed by the quarry are not productive would have a small impact on overall forest use in the area.

6.1.7 TRANSPORTATION

The quarry generates a low level of truck traffic on the highway but is not expected to change the existing traffic volumes. There are not likely to be any changes in private traffic on the highway over the course of the project. Consequently no impact of the project on transportation is expected.

6.1.8 RESIDENTIAL USE

No occupied permanent residences occur within 800 m of the quarry, but some homes occur at some distance both north and south of the quarry site. Blasting at the site will occur infrequently during daylight hours and will be unlikely to disturb owners of residences and cabins. Activities will not impact wells as they are located at a significant distance from the site. Most operations at the site occur during daylight hours, and on rare occurrences when they are undertaken at night, will involve minimal additional lighting and noise, which is unlikely to be a serious disturbance to local residents.

6.2 BIOPHYSICAL IMPACTS—IMPACTS OF THE PROJECT ON THE ENVIRONMENT

6.2.1 AIR QUALITY AND NOISE

Various project activities have the potential to generate dust, combustion emissions, and noise. In particular operation of tree-clearing and grubbing equipment, rock drilling and blasting, as well as onsite routine operations contribute to increased dust and particulate levels. Noise levels can impact human use of the environment. Dust emissions during the construction phase will be localized and short term, and from the routine operations are expected to be minimal, and dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Any stockpiled topsoil and overburden will be seeded and/or covered with hay. 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 Guidelines.

Combustion emissions will be generated from the operation of vehicles and equipment. Given the scope of the planned operations, these emissions will be minimal (i.e. restricted to one/two pieces of heavy equipment), localized and similar to those produced during previous operations. Ambient air quality monitoring will be conducted at the request of NSE.

Noise levels from the Quarry expansion are expected to be similar to those produced during the previous operation, and the proponent will 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) and will occur only during daylight hours.

6.2.2 HYDROGEOLOGY

Activities associated with the project including forest clearing, grubbing and removal of overburden, and blasting, influence groundwater flow both spatially and temporally. Groundwater flows in soil layers will be reduced to the west and southwest towards the Dolliver Lake watershed, resulting in a decreased supply to those areas, but flows into the bedrock aquifer will likely not decrease significantly. The effect on overall groundwater patterns will be small, however, due to the small area of the pit in relation to the area of landscape. The overall impact on hydrogeology at the site is therefore expected to be negligible.

6.2.3 HYDROLOGY

Runoff from the pit surfaces in the quarry has probably increased flows slightly in the stream originating at the eastern edge of the existing pit, and the quarry expansion will lead to further increases both in annual runoff as well as peak flows resulting from storms and runoff events. Quarry expansion could reduce flow in the watercourse on site, which would also reduce availability of washwater. Quality of water leaving the site and entering the stream is high, due both to the onsite flow management and the bedrock quality. Both factors have probably not impacted the quality of the surface waters in downstream areas significantly, and may have had a positive impact due to the neutral pH of water leaving the site. Expansion of the quarry will result in further increases in annual runoff and peak flows to the stream; however the overall change will be extremely small due to the small size of the quarry relative to the overall watershed area of the adjoining surface waters.

6.2.4 WATER QUALITY

Water quality downstream of the site is important for fish habitat and recreational uses. Blasting is not expected to result in groundwater quality changes. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. There are no watercourses on site in the vicinity of the proposed expansion for direct transmission of suspended sediments to nearby surface waters, and which potentially could reach downstream areas. Existing, on-site water and sedimentation management including settling ponds and artificial wetlands are expected to be capable of handling any suspended sediment issues.

The quarry has onsite sedimentation and flow management, which effectively mitigates release of fines from normal quarrying operations. Release of other contaminants such as oils and lubricants from operating equipment potentially can impact downstream areas, but is expected to be mitigated by normal precautions on equipment operations.

6.2.5 FRESHWATER AQUATIC ENVIRONMENTS

The quarry property has a small freshwater stream on the eastern extremity, which continues below the quarry property to Hirtle Mill Pond. None of the proposed quarry expansion will be in the vicinity of the stream and consequently there are not expected to be impacts. Use of woods trails for heavy equipment should be done with a view to minimizing impact on swales through which source water for the streams passes, and logging of areas not proposed for quarry development, including the eastern corner of the property, are not recommended, to avoid impacts on the water quality of this stream.

6.2.6 WETLANDS

Several wetlands occur on the quarry property but none are in areas intended for immediate quarry development. Quarry construction will result in the removal of any wetlands in the footprint of the pit and avoidance is generally not practical. In the case of the unique Black Spruce-*Sphagnum* swamp containing occurrences of the rare Southern Twayblade, located near the northwestern boundary of the property, avoidance may be possible, on consultation with the Province. Another such swamp located just west of the proposed western extent of the quarry may have to be dealt with in a similar manner. None of these wetlands are larger than 0.3-0.4 ha and will not trigger further Provincial environmental assessments, but will require a wetland delineation and functional assessment, and submission of a wetland compensation plan to the province, if development proceeds into those areas.

6.2.7 FISH AND FISH HABITAT

None of the proposed project activities will physically impact the stream to the east of the quarry and changes in flow regime (i.e. increased runoff and increased extremes) resulting from expansion of the pit elsewhere at the site will be minor and positive for fish and fish habitat downstream, including Dolliver Lake, due largely to the relatively small footprint of the project in relation to the watershed.

6.2.8 FLORA AND FAUNA AND HABITAT

The existing terrestrial ecosystem (plants and animals) will be removed by construction of the facilities. If at all possible, activities such as logging on the lands outside the pit should be avoided, or if required for pit expansion, be conducted using access through existing roads in the quarry proper. Invasive species can be a problem around pit margins and a monitoring and control program will be undertaken in these areas. The proponent will engage a qualified botanist to conduct annual inspections to determine the presence of invasive alien plants & effect controls as required. A botanical survey will be conducted on the fringe of the newly developed quarry area and around clear cuts done in advance of grubbing and blasting. A report will be prepared and submitted to NSDNR for their review and with recommendations as to the severity if any of colonization of these areas by new species and weeds. If there is a significant concern about any of the species, a plan will be developed to control the species.

6.2.9 SPECIES AT RISK

Areas for potential future quarry development at the site may include two Black Spruce-*Sphagnum* swamps which contain populations of Southern Twayblade. It is important, because of the rare status of the species, that development in these areas be avoided, and that the local hydrology not be disrupted. Mitigation for projects encountering the species is avoidance and continued monitoring of populations, as single surveys can misrepresent occurrences and actual distribution. It may also be possible to engineer suitable habitats in unused parts of the project site where they are not currently present and this possibility should be investigated, particularly with a view to developing approaches to be used in mitigating impacts on the species for application to projects in other areas where disturbance of the species is a problem. Such a program to translocate the species, may also involve moving large intact sections of the supporting sphagnum mat to an area of suitable hydrology in the area. The species is sensitive to changes in hydrology, however, and translocation is unlikely to be successful. Other management includes setbacks, measures to maintain hydrology of the site, control of dust, and water quality. Any plans to extend the quarry into these swamps should include consultation with Nova Scotia Environment and NS DNR on the best ways to proceed.

7 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

The operating quarry will not be impacted 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.

8 CUMULATIVE IMPACTS

No cumulative impacts (impacts arising from the project in combination with ongoing or foreseen activities) are likely to be caused by the project. The quarry essentially encompasses the available bedrock structure and other quarries will not locate around the periphery. There are other areas of potential for quarries in Lunenburg and Queens Counties but they are several kilometres from the site. The project itself occupies a small footprint in the landscape, and removes a relatively small amount of biological landscape, and other quarries would similarly have a relatively small footprint on the natural landscape.

9 MONITORING

Monitoring of the Southern Twayblade populations and the Spruce-*Sphagnum* swamp will be undertaken as required during future development. Routine monitoring of runoff from the site as well as noise levels is proposed for the present project.

10 PUBLIC CONSULTATION

The Proponent contacted local municipal officials and First Nations bands in the area about the proposed expansion of the Middlewood Quarry, but no public meetings were undertaken nor were they required for the EA registration. The proponent briefed local officials including: Mr. Gary Ramey; MLA Lunenburg

West; Ms. Vicky Conrad, MLA Queens County; Mayor Don Downe, Municipality of the District of Lunenburg; Mr. Lee Nauss, Councillor, Municipality of the District of Lunenburg; Mr. Eric Hustvedt, Councillor, Municipality of the District of Lunenburg; and Ms. Tammy Wilson, CAO, Municipality of the District of Lunenburg.

A letter outlining details of the project and of Dexter's intent to submit an EA Registration for the quarry expansion was sent to Chief Deborah Robinson of the Acadia First Nation (October 17, 2012 and a follow-up letter March 7, 2013) and forwarded to the Annapolis Valley First Nation and the Mi'kmaq Rights Initiative. No responses from these groups has been received to date.

11 LIMITING CONDITIONS

The American Society for Testing and Materials Standards of Practice and the Canadian Standards Association state that no environmental assessment can wholly eliminate uncertainty regarding the recognition of potential environmental liabilities. The intent of the assessment is to reduce, but not eliminate, uncertainty regarding projects, giving reasonable limits of time and costs.

The conclusions of this report are based in part on the information provided by others, which is assumed to be correct. The potential exists that unexpected environmental conditions may be encountered at the site and with the project, not specifically investigated. Should this occur, the proponent and regulatory authorities must be notified so that we may decide if modifications to our conclusions are necessary.

The findings of this investigation are based on research and investigations carried out in May-September 2012 and the generally accepted assessment practices of our industry. No other warranty is made.

Table 9. Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Middlewood Quarry expansion.

General Category of VEC	Biophysical								Socioeconomic							
Project Component (potential interactions shown by ✓)	Air Quality and Noise	Hydrogeology & Hydrology	Water Quality	Aquatic Environments	Wetlands	Fish and Fish Habitat	Flora & Fauna Species & Habitat	Species at Risk	Mi'Kmaq	Cultural/ Historical	Recreation, Tourism & Viewscape	Recreational Fishing	Land Use and Value	Transportation	Residential Use	Parks & Protected Areas
Construction																
Tree-Clearing/Grubbing	✓	✓	✓		✓		✓	✓			✓		✓		✓	
Drilling	✓										✓				✓	
Blasting	✓	✓					✓				✓	✓			✓	
Operation																
Moving/Transporting Rock and Product	✓														✓	
Crushing	✓														✓	
Washing	✓	✓	✓	✓		✓	✓								✓	
Trucking	✓											✓		✓	✓	
Accidents (Oil/ Fuel Spills)		✓	✓	✓	✓	✓	✓				✓					

Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
BIOPHYSICAL COMPONENTS						
Air Quality/Noise	Construction	Noise from heavy equipment during logging and grubbing.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of outdoor use by locals and wildlife.	Not significant.
	Operation	Drilling and blasting; equipment for moving rock; crusher operation.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of outdoor use by locals and wildlife.	Not significant.
Hydrogeology/ Hydrology	Construction	Blasting fractures bedrock and changes groundwater flow patterns. Forest and soil removal changes surface water flow.	Negligible	Negative	Likely small changes in groundwater and runoff patterns.	Not significant.
	Operation	Some runoff redirected from Dolliver Lake watershed to Hirtle Mill Pond. Increased peak stormwater flows.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.
Water Quality	Construction	Increased surface water flows and turbidity in watershed flowages	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.
	Operation	Dust & suspended sediment from operations potentially enter eastern outlet stream.	Negligible	Negative	Onsite dust control and water management to moderate surface water runoff and suspended sediment levels.	Not significant.
Freshwater Aquatic Environments	Construction	Reduced and more variable suface water flow in watercourse on site.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	Retention of flow from watercourse for aggregate washing.	Significant	Negative	Preserve woodland in headwater areas of onsite watercourse and marginal areas of quarry.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
Wetlands	Construction	Removal of wetlands; change hydrology which affects wetland distribution.	Significant	Negative	Avoid areas with wetlands. Compensate for wetland loss through NSE wetland alteration approval process.	Not significant.
	Construction	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
	Operation	Change in flow regime in swamp/marsh near highway east of site.	Significant	Negative	Provide a buffer for wetlands. Manage surface runoff to maintain adequate supply to wetland areas.	Not significant.
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent watersheds.	Negligible	Negative	Quarry affects small area relative to watersheds as a whole.	Not significant.
	Operation	Change in flow regime in watercourse east of site.	Negligible	Negative	Settling and retention ponds & onsite water management moderate flows.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
Terrestrial Flora & Fauna & Habitat	Construction	Removal of Existing Communities	Negligible	Negative	Restore damaged and unused parts of the site (e.g. grubbings and waste rock piles) as soon as possible. Long-term site rehabilitation plan developed with NSE.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, Middlewood Quarry expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Construction	Accidental releases, contamination of habitat.	Significant	Negative	Provide pollution prevention and emergency measures & response capability.	Not significant.
Species at Risk—Southern Twayblade	Construction	Remove habitat.	Significant	Negative	Monitor for presence of species. Compensate for wetland loss through NSE wetland alteration approval process. Experimental habitat recreation in unused areas of site.	Not Significant
SOCIOECONOMIC COMPONENTS						
Mi'Kmaq	Construction and Operation	No interactions or impacts.	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Recreation	Construction & Operation	Noise affects use of Dolliver Lake.	Significant	Negative	Schedule activities to take place during off peak usage and daylight hours.	Not significant.
Tourism and Viewscape	Operation	View of site and industrial character	Significant	Negative	Maintain forested buffer from the highway.	Not significant.
Recreational Fishing	Construction & Operation	Accidental hydrocarbon spills contaminate groundwater	Significant	Negative	Provide pollution prevention, emergency measures & response capability.	Not significant.
Land Use and Value	Construction & Operation	Removal of potential forest and wildlife resource.	Negligible	Negative	Small area affected relative to total available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant.
Parks and Protected areas	Construction & Operation	No local interactions	Not Applicable	Not Applicable	Not Applicable	Not Applicable.
Residential Use	Construction & Operation	Noise affects enjoyment of cabins on Dolliver Lake	Significant	Negative	Schedule activities to take place during off peak usage and daylight hours.	Not significant.
	Operation	Truck and recreational traffic interact.	Negligible	Negative	Ensure awareness of truck operators of local traffic and uses.	Not significant.
Transportation	Operation	Wear on highway	Negligible	Negative	Current levels low and will not increase.	Not significant.
Health and Safety - Traffic Levels	Operation	Transport trucks on Hirtle Road	Not Significant	No Change	Use good directional signs, viewing pull-offs, posted speed limits and speed policy in vicinity of quarry.	Not significant

12 REFERENCES

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Cultural Resource Management Group Limited (CRM). 2012. Middlewood Quarry Expansion Archaeological Screening & Reconnaissance, Lunenburg County, Nova Scotia. Report to Dexter Construction Ltd. and the Nova Scotia Department of Communities, Culture and Heritage, Heritage Division. October 2012. 14 p.

Keppie, J.D., 2000. Geological Map of the Province of Nova Scotia. Halifax, N.S.: Department of Natural Resources. [Map 2000-1]

Stea, R.R., H. Conley and Y. Brown, 1992. Surficial Geology of the Province of Nova Scotia. Halifax, N.S.: Department of Natural Resources. [Map 92-3]

13 PERSONAL COMMUNICATIONS

Mr. John Gilhen, Associate, Nova Scotia Museum of Natural History.

Ms. Cathy Munro, NS Fisheries and Aquaculture.

Mr. Randy Milton, NSDNR, Wildlife Division, NS

Ms. Laura Bennett, Coordinator, Special Places, Nova Scotia Museum of Natural History

Mr Greg Kenny, Fisheries Officer, Department of Fisheries and Oceans, Liverpool, NS

Ms. Laura Barkhouse, Open Space and Trail Coordinator, Municipality of the District of Lunenburg.

APPENDIX A
MAPS

THE MUNICIPAL GROUP OF COMPANIES

MIDDLEWOOD QUARRY EXPANSION
Middlewood, N.S.

Land Use Classification
(based on NS Forestry Inventory, 2006)

- Building
- Urban
- Brush
- Clear-cut
- Partial Depletion
- Treated
- Agriculture
- Gravel Pit
- Inland Water
- Lake Wetland
- Open Bog
- Treed Bog
- Wetland
- Natural Stand
- 800m Buffer
- Roads
- Contours
- Quarry Property
- Clear Cut-2012
- Pit Boundary 2012
- Pit Boundary 2009
- Grubbed Area
- Secondary Road

500m 0 500m 1km

WMR Environmental Services Inc. & Associates

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
September 2012

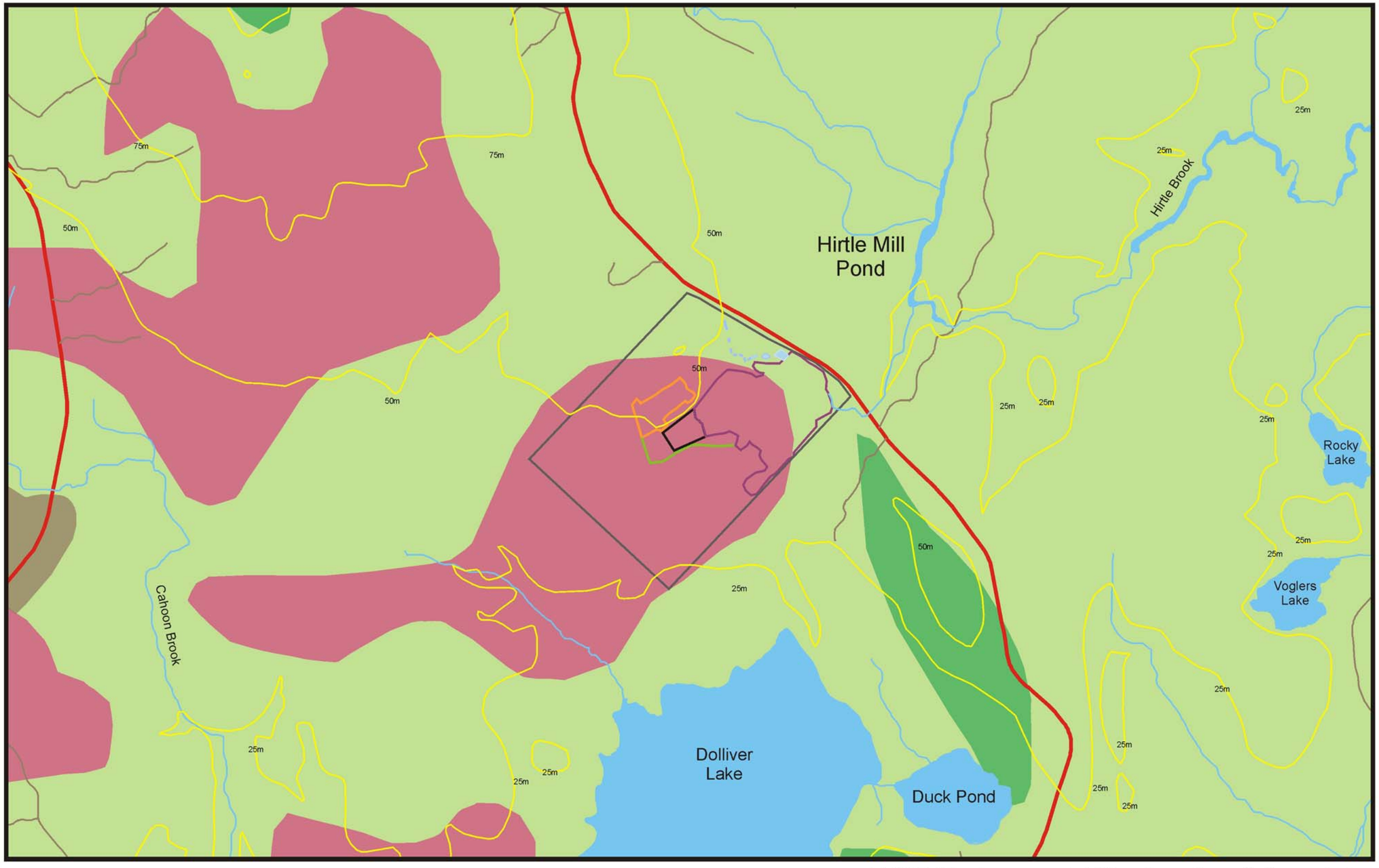
Map A-1

THE MUNICIPAL GROUP OF COMPANIES

MIDDLEWOOD QUARRY EXPANSION
Middlewood, N.S.

Surficial Geology
(Stea et al, 1992)

- Stoney Till
- Drumlin
- Bedrock overlain by thin, discontinuous, till
- Organic
- Roads
- Contours
- Clear-cut 2012
- Quarry Property
- Pit Boundary 2009
- Pit Boundary 2012
- Grubbed Area
- Secondary Road
- Streams
- Open Water



WMR Environmental Services Inc. & Associates

500m 0 500m 1km

Map A-2

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
September 2012

THE MUNICIPAL GROUP OF COMPANIES

MIDDLEWOOD QUARRY EXPANSION
Middlewood, N.S.

Bedrock Geology
(Keppie, 2000)

Meguma Group
- Green-Bay Formation
- Goldenville Formation
- Halifax Formation

- Roads
- Contours
- Clear-cut 2012
- Quarry Property
- Pit Boundary 2009
- Pit Boundary 2012
- Grubbed Area
- Secondary Road
- Streams
- Open Water

WMR Environmental Services Inc. & Associates

500m 0 500m 1km

Map A-3

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
September 2012

THE MUNICIPAL GROUP OF COMPANIES

MIDDLEWOOD QUARRY EXPANSION
Middlewood, N.S.

Property Ownership

- Quarry Property
- Open Water
- Roads
- Contours
- Existing Quarry
- Secondary Road
- Streams

WMR Environmental Services Inc. & Associates

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
September 2012

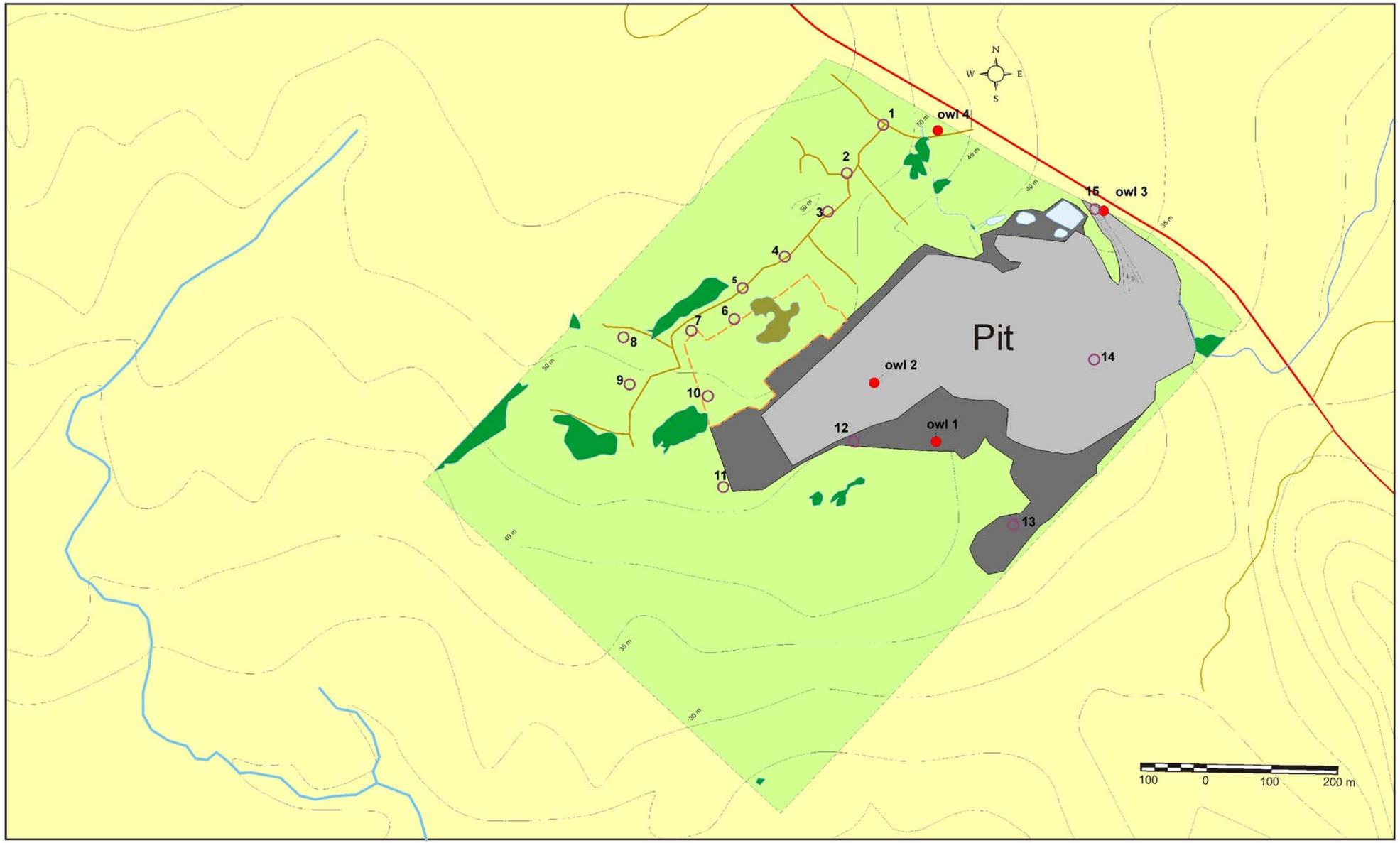
Map A-4

THE MUNICIPAL GROUP OF COMPANIES

MIDDLEWOOD QUARRY EXPANSION
Middlewood, N.S.

Bird Observation Sites

(June 8-10, 2012)



- 10-minute Point Count
- Owl Observation Site
- Wetland
- Overburden Removed
- Pit Boundary 2012
- Secondary Road
- Contours
- Clear-cut 2012
- Local Lane
- Stream

WMR Environmental Services Inc. & Associates

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
September 2012

Map A-5

APPENDIX B
WETLAND/BOTANTICAL SURVEY
Marbicon Inc.

Botanical Survey

FOR

Middlewood Quarry
Dexter Construction Co. Ltd.

Middlewood, Lunenburg County, Nova Scotia

October 4, 2012

Prepared By:
Jim Jotcham, Marbicon Inc.

Marbicon Inc. was contracted in 2012 to perform a botanical survey of a property located on the east side of Hirtle Road, about midway between Middlewood and Vogler's Cove, Lunenburg County, at approximately 44^{o} 11’ 32” North and 64^{o} 33’ 21” West. Figure 1 is an aerial view of the study area. The site includes an active crushed stone quarry. The property is roughly rectangular shape, is approximately 71 hectares, and is bounded by Hirtle road to the northeast, and on all other sides by forest. The quarry is about 0.6 km north of Dolliver Lake.

The site (outside the active quarry) was inventoried by botanist Jim Jotcham on June5, September 17, and September 24, 2012. Dr. Nicholas Hill assisted on June 5. The list of plant species identified and their provincial (NSDNR) status is presented in Appendix 1.

The property was generally a mixed red maple (*Acre rubrum*) - red spruce (*Picea rubra*) and black spruce (*Picea mariana*) forest (Figure 2) interspersed with occasional clearings (Figure 3) dominated by black huckleberry (*Gaylussacia baccata*). The huckleberry became more dominant towards the southern portions of the property. There were also small patches of open barrens (Figure 4) and small boulder fields (Figure 5). Several wetlands were found (Figure 6), mostly treed swamps dominated by black spruce and red maple, with a sphagnum moss ground cover. Where a logging road cut through a wetland area, the road portion of the wetland tended to become a fen-like sedge meadow (Figure 7). There were also occasional ponds along the quarry edges (Figure 8), often dominated by cattails (*Typha latifolia*). Three streams were noted - one towards the west corner of the property (flowing southwest), one at the east corner (flowing southeast), and one flowing into a cattail pond on the north side of the quarry.

Common hardwood species on the property included red maple, gray birch (*Betula populifolia*), and big-toothed poplar (*Populus grandidentata*). The softwood species were mostly red and black spruce, but also included some larch (*Larix laricina*) and white pine (*Pinus strobus*). The dominant shrub was black huckleberry, but other common shrubs include speckled alder (*Alnus incana*) and possum-haw viburnum (*Viburnum nudum*). Upland areas often had bracken fern (*Pteridium aquilinum*), whereas in wetland areas the dominant fern was cinnamon fern (*Osmunda cinnamomea*).

The wetlands contained a red-listed orchid species, southern twayblade (*Listera australis*). The specific habitat preferred by this species, shaded sphagnum moss of bogs or damp woods (Zinck, 1998), was found in several wetlands on site. At least 3 of these wetlands contained southern twayblade. In all, about 30 specimens were found during the survey in June. Figure 9 is an image of a southern twayblade found on site; Figure 10 is a close-up of the inflorescence, showing the unique flower structure.

No other rare plant species or special habitats were identified on the site. All parts of the site were examined.

It must be noted that no conclusions may be drawn as to the presence or absence of species more easily seen or identified in other seasons.

Appendix 1 shows the list of plant species identified on site, sorted by habitat. Scientific and common names are from NSDNR.

Appendix 2 is a table from the Atlantic Conservation Data Centre (ACCDC) summarizing the species of concern that might exist nearby (within 10 km). Because the site is about 3.5 km from the Atlantic shore, several coastal plants are included within a 10 km radius. Loesel's Twayblade (*Liparis loeselii*) is the first species on the list, and is the only species found within a 5 km radius. Southern twayblade is listed at 51 km (data not shown). This location is therefore an important record for this rare species.

In conclusion, no rare or unusual plants or habitats were identified. Any proposal for work at this site should include a reference to mitigating impact to both the wetlands and the rare Southern Twayblade.

Jim Fotheram

October 4, 2012

Figure 1. Site and Vicinity. Google Earth Image, 2012

Figure 2. Mixed woods typical of the site: gray birch, red maple, red spruce.

Figure 3. Black huckleberry-dominated site. This habitat was more common to the south side.

Figure 4. A small rocky barren.

Figure 5. One of several boulder fields on the property.

Figure 6. Black spruce-sphagnum swamp; typical southern twayblade habitat.

Figure 7. Marshy fen in logging road, surrounded by black spruce swamp.

Figure 8. Cattail dominated pond along the edge of the quarry.

Figure 9. Southern twayblade (centre) in a sphagnum mat.

Figure 10. Close-up image of Southern Twayblade flowers.

REFERENCES

NS Department of Natural Resources:
http://www.gov.ns.ca/natr/wildlife/genstatus/background.asp#Ranks

Zinck, M. 1998. Roland's Flora of Nova Scotia. Nimbus Publishing and the Nova Scotia Museum. Halifax, Nova Scotia. 2 Vols, 1297 pp.

APPENDIX 1

Site vegetation inventory (wetland and directly adjacent upland) surveyed June 5, September 17, and 24, 2012.

Abies balsamea	Balsam Fir	GREEN
Acer pensylvanicum	Striped Maple	GREEN
Acer rubrum	Red Maple	GREEN
Acer spicatum	Mountain Maple	GREEN
Agrostis perennans	Perennial Bentgrass	GREEN
Alnus incana	Speckled Alder	GREEN
Alnus viridis	Green Alder	GREEN
Amelanchier sp.	Serviceberry	NA
Anaphalis margaritacea	Pearly Everlasting	GREEN
Anthoxanthum odoratum	Sweet Vernal Grass	SE
Apocynum androsaemifolium	Spreading Dogbane	GREEN
Aralia hispida	Bristly Sarsaparilla	GREEN
Aralia nudicaulis	Wild Sarsaparilla	GREEN
Betula papyrifera	Paper Birch	GREEN
Betula populifolia	Gray Birch	GREEN
Bidens frondosa	Devil's Beggar-Ticks	GREEN
Brachyelytrum septentrionale	Bearded Short-Husk	GREEN
Carex canescens	Hoary Sedge	GREEN
Carex crinita	Fringed Sedge	GREEN
Carex debilis	White-Edge Sedge	GREEN
Carex echinata	Little Prickly Sedge	GREEN
Carex gracillima	Graceful Sedge	GREEN
Carex intumescens	Bladder Sedge	GREEN
Carex lurida	Shallow Sedge	GREEN
Carex scoparia	Pointed Broom Sedge	GREEN
Carex trisperma	Three-Seed Sedge	GREEN
Centaurea nigra	Black Starthistle	SE
Clintonia borealis	Clinton Lily	GREEN
Comptonia peregrina	Sweet Fern	GREEN
Coptis trifolia	Goldthread	GREEN
Cornus canadensis	Dwarf Dogwood	GREEN
Cypripedium acaule	Pink Lady's-Slipper	GREEN
Danthonia compressa	Flattened Oat-grass	GREEN
Danthonia spicata	Poverty Oat-Grass	GREEN
Daucus carota	Wild Carrot	SE
Dennstaedtia punctilobula	Eastern Hay-Scented Fern	GREEN

Diervilla lonicera	Northern Bush-Honeysuckle	GREEN
Doellingeria umbellata	Parasol White-Top	GREEN
Dryopteris carthusiana	Spinulose Shield Fern	GREEN
Dryopteris cristata	Crested Shield-Fern	GREEN
Dryopteris intermedia	Evergreen Woodfern	GREEN
Epigaea repens	Trailing Arbutus	GREEN
Epilobium palustre	Marsh Willow-Herb	GREEN
Equisetum arvense	Field Horsetail	GREEN
Equisetum sylvaticum	Woodland Horsetail	GREEN
Eriophorum virginicum	Tawny Cotton-Grass	GREEN
Eupatorium perfoliatum	Common Boneset	GREEN
Eurybia radula	Rough-Leaved Aster	GREEN
Euthamia graminifolia	Flat-Top Fragrant-Golden-Rod	GREEN
Fallopia japonica	Japanese Knotweed	SE
Fragaria virginiana	Virginia Strawberry	GREEN
Fraxinus americana	White Ash	GREEN
Galeopsis tetrahit	Brittle-Stem Hempnettle	SE
Gaultheria hispidula	Creeping Snowberry	GREEN
Gaultheria procumbens	Teaberry	GREEN
Gaylussacia baccata	Black Huckleberry	GREEN
Glyceria canadensis	Canada Manna-Grass	GREEN
Gnaphalium uliginosum	Low Cudweed	SE
Hamamelis virginiana	American Witch-Hazel	GREEN
Hieracium pilosella	Mouse-ear	SE
Hieracium x floribundum	Smoothish Hawkweed	SE
Ilex glabra	Ink-Berry	GREEN
Ilex verticillata	Black Holly	GREEN
Iris versicolor	Blueflag	GREEN
Juncus effusus	Soft Rush	GREEN
Juncus tenuis	Slender Rush	GREEN
Juncus canadensis	Canada Rush	GREEN
Juniperus communis	Ground Juniper	GREEN
Kalmia angustifolia	Sheep-Laurel	GREEN
Larix laricina	American Larch	GREEN
Ledum groenlandicum	Common Labrador Tea	GREEN
Leontodon autumnalis	Autumn Hawkbit	SE
Leucanthemum vulgare	Oxeye Daisy	SE
Linnaea borealis	Twinflower	GREEN
Listera australis	Southern Twayblade	**RED**
Lupinus polyphyllus	Large-Leaved Lupine	SE
Lycopus uniflorus	Northern Bugleweed	GREEN

Maianthemum canadense	Wild Lily-of-The-Valley	GREEN
Malus pumila	Common Apple	SE
Matricaria discoidea	Pineapple-Weed Chamomile	SE
Mitchella repens	Partridge-Berry	GREEN
Monotropa uniflora	Indian-Pipe	GREEN
Myrica pensylvanica	Northern Bayberry	GREEN
Nemopanthus mucronatus	Mountain Holly	GREEN
Oclemena acuminata	Whorled Aster	GREEN
Oenothera biennis	Common Evening-Primrose	GREEN
Onoclea sensibilis	Sensitive Fern	GREEN
Osmunda cinnamomea	Cinnamon Fern	GREEN
Osmunda claytoniana	Interrupted Fern	GREEN
Osmunda regalis	Royal Fern	GREEN
Oxalis montana	White Wood-Sorrel	GREEN
Oxalis stricta	Upright Yellow Wood-Sorrel	GREEN
Photinia (= Aronia) melanocarpa	Black Chokeberry	GREEN
Picea mariana	Black Spruce	GREEN
Picea rubens	Red Spruce	GREEN
Pinus strobus	Eastern White Pine	GREEN
Plantago major	Nipple-Seed Plantain	SE
Poa pratensis	Kentucky Bluegrass	GREEN
Polygonum (Fallopia) convolvulus	Black Bindweed	SE
Polygonum persicaria	Lady's Thumb	SE
Polypodium virginianum	Rock Polypody	GREEN
Populus grandidentata	Large-Tooth Aspen	GREEN
Populus tremuloides	Quaking Aspen	GREEN
Potentilla simplex	Old-Field Cinquefoil	GREEN
Prenanthes trifoliolata	Three-Leaved Rattlesnake-root	GREEN
Pteridium aquilinum	Bracken Fern	GREEN
Quercus rubra	Northern Red Oak	GREEN
Rhododendron canadense	Rhodora	GREEN
Rhus typhina	Staghorn Sumac	GREEN
Rosa virginiana	Virginia Rose	GREEN
Rubus allegheniensis	Allegheny Blackberry	GREEN
Rubus hispidus	Bristly Dewberry	GREEN
Rubus idaeus	Red Raspberry	GREEN
Rubus pubescens	Dwarf Red Raspberry	GREEN
Rumex crispus	Curly Dock	SE
Salix bebbiana	Bebb's Willow	GREEN
Scirpus cyperinus	Cottongrass Bulrush	GREEN

Solidago bicolor	White Goldenrod	GREEN
Solidago puberula	Downy Goldenrod	GREEN
Solidago rugosa	Rough-Leaf Goldenrod	GREEN
Spiraea alba	Narrow-Leaved Meadow-Sweet	GREEN
Symphyotrichum lateriflorum	Farewell-Summer	GREEN
Symphyotrichum novi-belgii	New Belgium American-Aster	GREEN
Symphytum asperum	Prickly Comfrey	SE
Taraxacum officinale	Common Dandelion	SE
Thelypteris noveboracensis	New York Fern	GREEN
Trientalis borealis	Northern Starflower	GREEN
Trifolium arvense	Rabbit-Foot Clover	SE
Trifolium pratense	Red Clover	SE
Tussilago farfara	Colt's Foot	SE
Typha latifolia	Broad-Leaf Cattail	GREEN
Vaccinium angustifolium	Late Lowbush Blueberry	GREEN
Vaccinium macrocarpon	Large Cranberry	GREEN
Vaccinium myrtilloides	Velvetleaf Blueberry	GREEN
Veronica officinalis	Gypsy-Weed	GREEN
Viburnum nudum	Possum-Haw Viburnum	GREEN

Rankings:

Green (Secure) - Species that are not believed to be at risk, or sensitive. This category includes some species that have declined in numbers but remain relatively widespread or abundant.

Yellow (Sensitive) - Species that are not believed to be at risk of immediate extirpation or extinction, but which may require special attention or protection to prevent them from becoming at risk.

Red (at Risk or Maybe at Risk) - Species for which a formal detailed risk assessment has been completed (COSEWIC assessment or a provincial equivalent) and that have been determined to be at risk of extirpation or extinction. Species that maybe at risk of immediate extirpation or extinction and are therefore candidates for interim conservation action and detailed risk assessment by COSEWIC or the Province.

APPENDIX 2

Plant Species at Risk near the Middlewood quarry (ACCDC, May 15 2012).

Scientific Name	Common Name	S-RANK	DIST-KM
Liparis loeselii	Loesel's Twayblade	S3S4	05 ±1
Teucrium canadense	Canada Germander	S3	06 ±1
Asclepias incarnata	Swamp Milkweed	S3	06 ±10
Isoetes acadiensis	Acadian Quillwort	S3	06 ±10
Panicum rigidulum var. pubescens	Redtop Panic Grass	S3	06 ±10
Platanthera orbiculata	Small Round-leaved Orchid	S3	06 ±10
Spiranthes ochroleuca	Yellow Ladies'-tresses	S2S3	06 ±10
Eleocharis olivacea	Yellow Spikerush	S2S3	06 ±5
Samolus valerandi ssp. parviflorus	Seaside Brookweed	S2	07 ±0.1
Fraxinus nigra	Black Ash	S2S3	07 ±0.5
Lilaeopsis chinensis	Eastern Lilaeopsis	S2	07 ±1
Platanthera flava	Tubercled Orchid	S2	07 ±5
Dichanthelium spretum	Eaton's Witchgrass	S3S4	08 ±0
Utricularia radiata	Little Floating Bladderwort	S3	08 ±0
Anemone canadensis	Canada Anemone	S2	08 ±0.1
Limosella australis	Southern Mudwort	S3	08 ±0.5
Proserpinaca intermedia	Intermediate Mermaidweed	S1	08 ±1
Alnus serrulata	Smooth Alder	S3	09 ±0
Carex swanii	Swan's Sedge	S2S3	09 ±0
Cephalanthus occidentalis	Common Buttonbush	S3	09 ±0
Cyperus dentatus	Toothed Flatsedge	S3S4	09 ±0
Platanthera flava var. herbiola	Tubercled Orchid	S1S2	09 ±0
Rosa palustris	Swamp Rose	S3	09 ±0
Samolus valerandi	Seaside Brookweed	S2	09 ±0
Platanthera flava var. flava	Tubercled Orchid	S2	09 ±0.1
Potamogeton pulcher	Spotted Pondweed	S1S2	09 ±0.1
Asclepias incarnata ssp. pulchra	Swamp Milkweed	S2S3	09 ±0.5
Salix pedicellaris	Bog Willow	S2	09 ±1
Salix sericea	Silky Willow	S2	09 ±1
Sisyrinchium atlanticum	Eastern Blue-Eyed-Grass	S3S4	09 ±1
Thuja occidentalis	Eastern White Cedar	S1S2	09 ±1
Verbena hastata	Blue Vervain	S3	09 ±1
Utricularia subulata	Zigzag Bladderwort	S3	10 ±0

APPENDIX C
SPECIES AT RISK FOUND WITHIN 100 KM OF MIDDLEWOOD QUARRY

Atlantic Canada Conservation Data Centre, May 2012

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Accipiter gentilis	Northern Goshawk	Yellow	4	G5	NAR	S3S4
Acipenser oxyrinchus	Atlantic Sturgeon	Red	2	G3	T	S1?
Actitis macularius	Spotted Sandpiper	Green	4	G5		S3S4B
Adiantum pedatum	Northern Maidenhair Fern	Red	2	G5		S1
Aeshna clepsydra	Mottled Darner	Green	4	G4		S3
Aeshna constricta	Lance-Tipped Darner	Undetermined	4	G5		S3
Agalinis neoscotica	Nova Scotia Agalinis	Green	4	G4		S3
Agrimonia gryposepala	Hooked Agrimony	Green	4	G5		S3
Alasmidonta undulata	Triangle Floater	Yellow	4	G4		S2S3
Alasmidonta varicosa	Brook Floater	Yellow	3	G3	SC	S1S2
Alca torda	Razorbill	Yellow	3	G5		S1B,S4N
Alces americanus	Moose	Red	1	G5		S1
Allium tricoccum	Wild Leek	Red	2	G5		S1
Alnus serrulata	Smooth Alder	Yellow	3	G5		S3
Aloina rigida	Aloe-Like Rigid Screw Moss	-	2	G3G5		S1
Alopecurus aequalis	Short-awned Foxtail	Yellow	3	G5		S2S3
Amblyscirtes hegon	Salt and Pepper Skipper	Green	4	G5		S2
Amblyscirtes vialis	Common Roadside-Skipper	Green	4	G5		S2
Amelanchier fernaldii	Fernald's Serviceberry	Undetermined	5	G2G4Q		S2?
Amelanchier nantucketensis	Nantucket Serviceberry	Red	2	G3Q		S1
Amelanchier stolonifera	Running Serviceberry	Green	4	G5		S3?
Anagallis minima	Chaffweed	Red	2	G5		S1
Anas acuta	Northern Pintail	Green	3	G5		S2B
Anas clypeata	Northern Shoveler	Green	2	G5		S2B
Anas discors	Blue-winged Teal	Green	4	G5		S3B
Anas strepera	Gadwall	Green	2	G5		S2B
Anemone canadensis	Canada Anemone	Yellow	3	G5		S2
Anemone quinquefolia	Wood Anemone	Yellow	3	G5		S2
Anemone virginiana	Virginia Anemone	Yellow	3	G5		S2
Anguilla rostrata	American Eel	Green	2	G4	SC	S5
Antennaria parlinii	Parlin's Pussytoes	Red	2	G5?		S1
Anzia colpodes	a Lichen	-	3	G3G5		S3?
Arabis glabra	Tower Mustard	Undetermined	5	G5		S1
Asclepias incarnata	Swamp Milkweed	Green	4	G5		S3
Asclepias incarnata ssp. pulchra	Swamp Milkweed	-	-	G5T5		S2S3
Asio flammeus	Short-eared Owl	Yellow	2	G5	SC	S1S2
Asio otus	Long-eared Owl	Green	2	G5		S2
Asplenium trichomanes	Maidenhair Spleenwort	Yellow	3	G5		S2
Bartonia virginica	Yellow Bartonia	Green	4	G5		S3

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Betula michauxii	Newfoundland Dwarf Birch	Yellow	3	G3G4		S2
Bidens discoidea	Swamp Beggarticks	Yellow	4	G5		SH
Boehmeria cylindrica	Small-spike False-nettle	-	2	G5		S1
Botaurus lentiginosus	American Bittern	Green	3	G4		S3S4B
Botrychium dissectum	Cut-leaved Moonwort	Green	4	G5		S3
Botrychium lanceolatum var. angustisegmentum	Triangle Moonwort	Yellow	3	G5TNR		S2S3
Botrychium simplex	Least Moonwort	Yellow	3	G5		S2S3
Boyeria grafiana	Ocellated Darner	Undetermined	3	G5		S3
Branta bernicla	Brant	Yellow	3	G5		S3M
Bucephala clangula	Common Goldeneye	Green	4	G5		S2B,S5N
Calidris canutus rufa	Red Knot rufa ssp	Yellow	3	G4T1	E	S2S3M
Calidris maritima	Purple Sandpiper	Yellow	4	G5		S3N
Calidris minutilla	Least Sandpiper	Green	4	G5		S1B,S5M
Calidris pusilla	Semipalmated Sandpiper	Green	4	G5		S3M
Callophrys henrici	Henry's Elfin	Green	4	G5		S2
Callophrys lanoraieensis	Bog Elfin	Red	2	G3G4		S1S2
Callophrys niphon	Eastern Pine Elfin	Green	4	G5		S2
Callophrys polios	Hoary Elfin	Green	4	G5		S3S4
Campanula aparinoides	Marsh Bellflower	Yellow	3	G5		S3
Caprimulgus vociferus	Whip-Poor-Will	Green	1	G5	T	S1?B
Cardamine parviflora var. arenicola	Small-flowered Bittercress	Yellow	3	G5T5		S2
Cardamine pratensis	Cuckoo Flower	Red	2	G5		S1
Cardinalis cardinalis	Northern Cardinal	Green	4	G5		S3S4
Carduelis pinus	Pine Siskin	Green	4	G5		S3S4B,S5N
Carex adusta	Lesser Brown Sedge	Yellow	3	G5		S2S3
Carex argyrantha	Silvery-flowered Sedge	Green	4	G5		S3S4
Carex atlantica ssp. capillacea	Atlantic Sedge	Green	4	G5T5?		S2
Carex bebbii	Bebb's Sedge	Red	2	G5		S1S2
Carex comosa	Bearded Sedge	Yellow	3	G5		S2
Carex cryptolepis	Hidden-scaled Sedge	Green	4	G4		S3?
Carex digitalis	Slender Wood Sedge	Red	2	G5		S1
Carex foenea	Fernald's Hay Sedge	Green	4	G5		S3?
Carex granularis	Limestone Meadow Sedge	Undetermined	5	G5		S1
Carex haydenii	Hayden's Sedge	Red	2	G5		S1
Carex houghtoniana	Houghton's Sedge	Yellow	3	G5		S2?
Carex hystericina	Porcupine Sedge	Red	2	G5		S2
Carex laxiflora	Loose-Flowered Sedge	Red	2	G5		S1
Carex laxiflora var. laxiflora	Loose-Flowered Sedge	-	-	G5T5		S1

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Carex livida var. radicaulis	Livid Sedge	Red	2	G5T5		S1
Carex longii	Long's Sedge	Extirpated	2	G5		S1?
Carex lupulina	Hop Sedge	Green	4	G5		S3
Carex ormostachya	Necklace Spike Sedge	Red	2	G4		S1
Carex pensylvanica	Pennsylvania Sedge	Undetermined	5	G5		S1S2
Carex rosea	Rosy Sedge	Green	4	G5		S3
Carex swanii	Swan's Sedge	Yellow	3	G5		S2S3
Carex tenera	Tender Sedge	Yellow	3	G5		S1S2
Carex tribuloides	Blunt Broom Sedge	Green	4	G5		S3?
Carex tuckermanii	Tuckerman's Sedge	Red	2	G4		S1
Cathartes aura	Turkey Vulture	Accidental	3	G5		S2S3B
Caulophyllum thalictroides	Blue Cohosh	Red	2	G4G5		S2
Cephalanthus occidentalis	Common Buttonbush	Yellow	3	G5		S3
Cepphus grylle	Black Guillemot	Green	4	G5		S3S4
Ceratophyllum echinatum	Prickly Hornwort	-	2	G4?		S2?
Chaetura pelagica	Chimney Swift	Yellow	1	G5	T	S2S3B
Chamaesyce polygonifolia	Seaside Spurge	Green	4	G5?		S3
Charadrius melodus melodus	Piping Plover melodus ssp	Red	1	G3TNR	E	S1B
Charadrius semipalmatus	Semipalmated Plover	Green	4	G5		S1S2B,S5M
Charadrius vociferus	Killdeer	Green	4	G5		S3S4B
Chelydra serpentina	Snapping Turtle	Green	4	G5	SC	S5
Chenopodium rubrum	Red Pigweed	Red	2	G5		S1?
Chlosyne nycteis	Silvery Checkerspot	Undetermined	5	G5		S2
Chordeiles minor	Common Nighthawk	Yellow	3	G5	T	S3B
Clethra alnifolia	Sweet Pepperbush	Yellow	3	G5	SC	S1
Coccyzus erythropthalmus	Black-billed Cuckoo	Green	2	G5		S3?B
Coeloglossum viride var. virescens	Long-bracted Frog Orchid	Red	2	G5T5		S2S3
Colinus virginianus	Northern Bobwhite	Exotic	7	G5	E	
Collema furfuraceum	a lichen	Green	3	G5		S3?
Collema leptaleum	a lichen	Undetermined	3	GNR		S2S3
Collema nigrescens	a lichen	Yellow	3	G5?		S2S3
Conioselinum chinense	Chinese Hemlock-parsley	Yellow	3	G5		S2
Conopholis americana	American Cancer-root	Red	2	G5		S1S2
Contopus cooperi	Olive-sided Flycatcher	Yellow	3	G4	T	S3B
Contopus virens	Eastern Wood-Pewee	Green	4	G5		S3S4B
Corallorhiza trifida	Early Coralroot	Green	4	G5		S3
Coregonus huntsmani	Atlantic Whitefish	Red	1	G1	E	S1
Cornus suecica	Swedish Bunchberry	Yellow	3	G5		S1S2
Crassula aquatica	Water Pygmyweed	Yellow	3	G5		S2
Crataegus submollis	Quebec Hawthorn	Undetermined	5	G5		S1?

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Cryptogramma stelleri	Steller's Rockbrake	Red	2	G5		S1
Cuscuta cephalanthi	Buttonbush Dodder	Red	2	G5		S1
Cynoglossum virginianum var. boreale	Wild Comfrey	Red	2	G5T4T5		S1
Cyperus dentatus	Toothed Flatsedge	Green	4	G4		S3S4
Cypripedium arietinum	Ram's-Head Lady's-Slipper	Red	2	G3		S1
Cypripedium parviflorum	Yellow Lady's-slipper	Yellow	3	G5		S2S3
Cypripedium parviflorum var. makasin	Yellow Lady's-slipper	-	-	G5T4Q		S2
Cypripedium parviflorum var. pubescens	Yellow Lady's-slipper	-	-	G5T5		S2
Cystopteris bulbifera	Bulblet Bladder Fern	Green	4	G5		S3S4
Danaus plexippus	Monarch	Yellow	3	G5	SC	S2B
Decodon verticillatus	Swamp Loosestrife	Yellow	3	G5		S3
Degelia plumbea	Blue Felt Lichen	Yellow	4	GNR	SC	S2
Dendroica castanea	Bay-breasted Warbler	Green	4	G5		S3S4B
Dendroica striata	Blackpoll Warbler	Green	4	G5		S3S4B
Dendroica tigrina	Cape May Warbler	Green	3	G5		S3?B
Dermochelys coriacea	Leatherback Sea Turtle	-	1	G2	E	S1S2N
Desmodium canadense	Canada Tick-trefoil	Red	2	G5		S1
Desmodium glutinosum	Large Tick-Trefoil	Red	2	G5		S1
Dichanthelium acuminatum var. lindheimeri	Woolly Panic Grass	Green	4	G5T5		S1?
Dichanthelium clandestinum	Deer-tongue Panic Grass	Green	4	G5?		S3
Dichanthelium linearifolium	Narrow-leaved Panic Grass	Yellow	3	G5		S2?
Dichanthelium spretum	Eaton's Witchgrass	Green	-	G5		S3S4
Dichanthelium xanthophysum	Slender Panic Grass	Red	2	G5		S1
Dirca palustris	Eastern Leatherwood	Red	2	G4		S1
Dolichonyx oryzivorus	Bobolink	Yellow	3	G5	T	S3S4B
Drosera filiformis	Thread-leaved Sundew	Red	1	G4	E	S1
Dumetella carolinensis	Gray Catbird	Green	4	G5		S3B
Eleocharis nitida	Quill Spikerush	Green	4	G4		S3
Eleocharis olivacea	Yellow Spikerush	Yellow	-	G5		S2S3
Eleocharis ovata	Ovate Spikerush	Yellow	3	G5		S2?
Eleocharis rostellata	Beaked Spikerush	Yellow	3	G5		S3
Eleocharis tuberculosa	Tubercled Spike-rush	Red	1	G5	SC	S2
Empetrum eamesii	Pink Crowberry	Yellow	3	G5		S3
Empetrum eamesii ssp. atropurpureum	Pink Crowberry	-	-	G5T5		S2S3
Empetrum eamesii ssp.	Pink Crowberry	-	-	G5TNR		S2S3

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
eamesii						
Empidonax flaviventris	Yellow-bellied Flycatcher	Green	4	G5		S3S4B
Empidonax traillii	Willow Flycatcher	Accidental	3	G5		S2B
Emydoidea blandingii	Blanding's Turtle - Nova Scotia pop.	Red	1	G4	E	S1
Enallagma signatum	Orange Bluet	Undetermined	2	G5		S1
Enallagma vesperum	Vesper Bluet	Undetermined	3	G5		S2S3
Enodia anthedon	Northern Pearly-Eye	Green	4	G5		S3
Epilobium coloratum	Purple-veined Willowherb	Yellow	3	G5		S2?
Epilobium strictum	Downy Willowherb	Yellow	3	G5?		S3
Epitheca princeps	Prince Baskettail	Yellow	3	G5		S2
Equisetum hyemale var. affine	Common Scouring-rush	Green	4	G5T5		S3S4
Equisetum palustre	Marsh Horsetail	Undetermined	2	G5		S1
Equisetum scirpoides	Dwarf Scouring-Rush	Green	4	G5		S3S4
Equisetum variegatum	Variegated Horsetail	Green	4	G5		S3
Eremophila alpestris	Horned Lark	Green	4	G5		S1S2B,S4N
Erigeron hyssopifolius	Hyssop-leaved Fleabane	Yellow	3	G5		S3
Erioderma mollissimum	Vole Ears	Red	2	G4G5	E	S1S2
Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen - Atlantic pop.	Red	1	G1G2Q	E	S1S2
Eriophorum chamissonis	Russet Cotton-Grass	Green	4	G5		S3S4
Eriophorum gracile	Slender Cottongrass	Yellow	3	G5		S2
Erynnis juvenalis	Juvenal's Duskywing	Green	4	G5		S2S3
Erythrodiplax berenice	Seaside Dragonlet	Yellow	2	G5		S3
Eupatorium dubium	Coastal Plain Joe-pye-weed	Red	2	G5		S2
Euphagus carolinus	Rusty Blackbird	Yellow	2	G4	SC	S2S3B
Euphydryas phaeton	Baltimore Checkerspot	Green	4	G4		S3
Everniastrum catawbiense	a Lichen	-	2	G2G4		S1S2
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius	Red	3	G4T4	SC	S1B
Feniseca tarquinius	Harvester	Green	4	G4		S3S4
Floerkea proserpinacoides	False Mermaidweed	Yellow	3	G5	NAR	S2
Fratercula arctica	Atlantic Puffin	Yellow	3	G5		S1B,S4S5N
Fraxinus nigra	Black Ash	Yellow	3	G5		S2S3
Fraxinus pennsylvanica	Red Ash	Red	2	G5		S1
Fulica americana	American Coot	Green	5	G5	NAR	S1B
Fuscopannaria leucosticta	a lichen	Yellow	2	G3G5		S1S2
Galium aparine	Catchweed Bedstraw	Exotic	7	G5		S1
Galium boreale	Northern Bedstraw	Red	2	G5		S2
Galium obtusum	Blunt-leaved Bedstraw	Red	2	G5		S1S2
Gallinago delicata	Wilson's Snipe	Green	4	G5		S3S4B

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Gallinula chloropus	Common Moorhen	Green	5	G5		S1B
Gavia immer	Common Loon	Yellow	2	G5	NAR	S3B,S4N
Geocaulon lividum	Northern Comandra	Yellow	3	G5		S3
Geranium bicknellii	Bicknell's Crane's-bill	Green	4	G5		S3
Glaucomys volans	Southern Flying Squirrel	Yellow	3	G5	n-a	S2S3
Glyptemys insculpta	Wood Turtle	Yellow	3	G4	T	S3
Gomphaeschna furcillata	Harlequin Darner	Yellow	3	G5		S3
Gomphus ventricosus	Skillet Clubtail	Red	2	G3	E	S1
Goodyera pubescens	Downy Rattlesnake-Plantain	Red	2	G5		S2
Goodyera repens	Lesser Rattlesnake-plantain	Yellow	3	G5		S3
Haematopus palliatus	American Oystercatcher	Accidental	5	G5		S1B
Hedeoma pulegioides	American False Pennyroyal	Yellow	3	G5		S2S3
Helianthemum canadense	Rockrose	Red	2	G5		S1
Hemidactylium scutatum	Four-toed Salamander	Green	4	G5	NAR	S3
Hepatica nobilis	Round-Lobe Hepatica	Red	-	G5		S1S2
Hepatica nobilis var. obtusa	Round-lobed Hepatica	Red	-	G5T5		S1S2
Hesperia comma	Common Branded Skipper	Green	4	G5		S3
Hesperia comma laurentina	Laurentian Skipper	-	-	G5T5		S3
Heterodermia squamulosa	a Lichen	-	3	G3G5		S2S3
Hieracium kalmii	Kalm's Hawkweed	Undetermined	5	G5		S2?
Hieracium kalmii var. fasciculatum	Kalm's Hawkweed	-	-	G5T3T5		S1?
Hieracium kalmii var. kalmii	Kalm's Hawkweed	-	-	G5T5?		S2?
Hieracium paniculatum	Panicled Hawkweed	Green	4	G5		S3
Hirundo rustica	Barn Swallow	Yellow	3	G5	T	S3B
Histrionicus histrionicus pop. 1	Harlequin Duck - Eastern pop.	Yellow	3	G4T4	SC	S2N
Hudsonia ericoides	Pinebarren Golden Heather	Yellow	3	G4		S2
Hydrocotyle umbellata	Water-pennywort	Red	1	G5	T	S1
Hylocichla mustelina	Wood Thrush	Green	5	G5		S1B
Hypericum dissimulatum	Disguised St John's-wort	Yellow	3	G5		S2S3
Hypericum majus	Large St John's-wort	Red	2	G5		S1
Icterus galbula	Baltimore Oriole	Green	4	G5		S2S3B
Iris prismatica	Slender Blue Flag	Red	2	G4G5		S1
Isoetes acadiensis	Acadian Quillwort	Yellow	3	G3Q		S3
Isoetes prototypus	Prototype Quillwort	Red	3	G2G3	SC	S2
Juncus acuminatus	Sharp-fruited Rush	Undetermined	3	G5		S3S4
Juncus dudleyi	Dudley's Rush	Yellow	3	G5		S2?
Juncus greenei	Greene's Rush	Red	2	G5		S1S2
Juncus marginatus	Grass-leaved Rush	Yellow	3	G5		S3

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Juncus secundus	One-sided Rush	Undetermined	2	G5?		S1
Juncus subcaudatus	Woodland Rush	Undetermined	3	G5		S3
Juncus subcaudatus var. planisepalus	Woodland Rush	-	-	G5TNR		S3
Lachnanthes caroliniana	Redroot	Red	1	G4	SC	S2
Lactuca hirsuta var. sanguinea	Hairy Lettuce	Yellow	3	G5?T5?		S2
Lagenorhynchus acutus	Atlantic White-sided Dolphin	-	4	G4	NAR	S3S4
Laportea canadensis	Canada Wood Nettle	Yellow	3	G5		S3
Larus atricilla	Laughing Gull	Green	4	G5		SHB
Larus delawarensis	Ring-billed Gull	Green	4	G5		S1?B,S5N
Lasiurus cinereus	Hoary Bat	Undetermined	5	G5		S1
Leptogium corticola	a lichen	Yellow	3	G3G5		S2S3
Leptogium lichenoides	a lichen	-	2	G5		S1S2
Leptogium milligranum	a lichen	Red	3	G5		S2S3
Leptogium subtile	a Lichen	Red	3	GNR		S1S3
Liatris spicata	Dense Blazing Star	-	-		T	
Lilaeopsis chinensis	Eastern Lilaeopsis	Yellow	3	G5	SC	S2
Lilium canadense	Canada Lily	Yellow	3	G5		S2S3
Limosa haemastica	Hudsonian Godwit	Undetermined	5	G4		S3M
Limosella australis	Southern Mudwort	Yellow	3	G4G5		S3
Lindernia dubia	Yellow-seeded False Pimpernel	Green	4	G5		S3S4
Liparis loeselii	Loesel's Twayblade	Green	4	G5		S3S4
Listera australis	Southern Twayblade	Red	2	G4		S2
Lophiola aurea	Golden Crest	Red	1	G4	T	S2
Lycopodiella appressa	Southern Bog Clubmoss	Green	4	G5		S3S4
Lycopodium complanatum	Northern Clubmoss	Green	4	G5		S3S4
Lynx canadensis	Canada Lynx	Red	1	G5	NAR	S1
Lysimachia quadrifolia	Whorled Yellow Loosestrife	-	-	G5		S1
Martes americana	American Marten	Red	1	G5		S1
Martes pennanti	Fisher	Yellow	3	G5		S2
Megalodonta beckii	Water Beggarticks	Yellow	3	G4G5		S3
Melanerpes erythrocephalus	Red-headed Woodpecker	Accidental	8	G5	SC	SNA
Mergus serrator	Red-breasted Merganser	Green	4	G5		S3B,S5N
Mimus polyglottos	Northern Mockingbird	Green	4	G5		S3B
Minuartia groenlandica	Greenland Stitchwort	Yellow	3	G5		S2
Molothrus ater	Brown-headed Cowbird	Green	4	G5		S2S3B
Montia fontana	Water Blinks	Red	2	G5		S1
Morone saxatilis	Striped Bass	Red	1	G5	T	S1
Morus bassanus	Northern Gannet	Green	4	G5		SHB,S5M

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Myiarchus crinitus	Great Crested Flycatcher	Green	2	G5		S2B
Myotis lucifugus	Little Brown Myotis (Little Brown Bat)	Yellow	3	G5	E	S1
Myotis septentrionalis	Northern Long-eared Bat	Yellow	3	G4	E	S1
Myriophyllum farwellii	Farwell's Water Milfoil	Yellow	3	G5		S2
Najas gracillima	Thread-Like Naiad	Undetermined	2	G5?		S1S2
Nannothemis bella	Elfin Skimmer	Green	4	G4		S3
Nephroma bellum	a lichen	Green	3	G3G5		S3?
Nephroma resupinatum	a lichen	Undetermined	2	G3G5		S1S2
Nymphalis l-album	Compton Tortoiseshell	Green	4	G5		S1S2
Nymphalis milberti	Milbert's Tortoiseshell	Green	-	G5		S2
Nymphalis vaualbum j-album	Compton Tortoiseshell	Green	4	G5T5		S1S2
Oeneis jutta	Jutta Arctic	Red	2	G5		S1
Oenothera fruticosa ssp. glauca	Narrow-leaved Evening Primrose	Undetermined	5	G5T5		S2
Ophioglossum pusillum	Northern Adder's-tongue	Yellow	3	G5		S2S3
Ophiogomphus aspersus	Brook Snaketail	Red	2	G4		S1
Ophiogomphus carolus	Riffle Snaketail	Green	4	G5		S3
Ophiogomphus mainensis	Maine Snaketail	Red	2	G4		S1
Ophiogomphus rupinsulensis	Rusty Snaketail	Red	2	G5		S1S2
Osmorhiza longistylis	Smooth Sweet Cicely	Yellow	2	G5		S2
Packera paupercula	Balsam Groundsel	Green	4	G5		S3
Panicum dichotomiflorum var. puritanorum	Fall Panic Grass	Green	4	G5T4		S1?
Panicum rigidulum var. pubescens	Redtop Panic Grass	Yellow	3	G5T5?		S3
Panicum tuckermanii	Tuckerman's Panic Grass	-	3	G5		S2S3
Pannaria lurida	a lichen	Red	2	G3G5		S1?
Pantala hymenaea	Spot-Winged Glider	Green	3	G5		S2B
Parmeliella parvula	a lichen	-	2	GNR		S1?
Parmelinopsis horrescens	a Lichen	-	2	G5		S1?
Passerella iliaca	Fox Sparrow	Green	4	G5		S3S4B
Passerina cyanea	Indigo Bunting	Green	5	G5		S1S2B
Perimyotis subflavus	Eastern Pipistrelle	Yellow	3	G5		S1
Perisoreus canadensis	Gray Jay	Yellow	3	G5		S3S4
Petrochelidon pyrrhonota	Cliff Swallow	Green	4	G5		S3B
Phalacrocorax carbo	Great Cormorant	Green	3	G5		S3
Phalaropus fulicaria	Red Phalarope	Green	3	G5		S2S3M
Phalaropus lobatus	Red-necked Phalarope	Green	4	G4G5		S2S3M
Pheucticus ludovicianus	Rose-breasted Grosbeak	Green	4	G5		S3S4B
Phocoena phocoena (NW	Harbour Porpoise - Northwest	-	3	G4G5	SC	S4

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Atlantic)	Atlantic pop.					
Physconia detersa	a Lichen	-	3	G5?		S2S3
Picoides arcticus	Black-backed Woodpecker	Green	3	G5		S3S4
Pieris oleracea	Mustard White	Undetermined	3	G4G5		S2
Pinicola enucleator	Pine Grosbeak	Green	4	G5		S3?B,S5N
Piptatherum canadense	Canada Rice Grass	Yellow	3	G5		S2
Piptatherum pungens	Slender Rice Grass	Yellow	3	G5		S2
Piranga olivacea	Scarlet Tanager	Green	4	G5		S2B
Plantago rugelii	Rugel's Plantain	Undetermined	5	G5		S2
Platanthera flava	Tubercled Orchid	Yellow	3	G4		S2
Platanthera flava var. flava	Tubercled Orchid	-	-	G4T4?Q		S2
Platanthera flava var. herbiola	Tubercled Orchid	-	-	G4T4Q		S1S2
Platanthera grandiflora	Large Purple Fringed Orchid	Green	4	G5		S3
Platanthera hookeri	Hooker's Orchid	Green	4	G4		S3
Platanthera macrophylla	Large Round-Leaved Orchid	Yellow	3	G5T4		S2
Platanthera orbiculata	Small Round-leaved Orchid	Green	4	G5		S3
Plebejus saepiolus	Greenish Blue			G5		S1
Pluvialis dominica	American Golden-Plover	Green	4	G5		S3M
Podilymbus podiceps	Pied-billed Grebe	Green	3	G5		S3B
Podostemum ceratophyllum	Horn-leaved Riverweed	Red	2	G5		S1
Poecile hudsonica	Boreal Chickadee	Yellow	3	G5		S3
Polychidium muscicola	a lichen	Yellow	2	G3G5		S1S2
Polygala polygama	Racemed Milkwort	Undetermined	5	G5		S1
Polygala sanguinea	Blood Milkwort	Yellow	3	G5		S2S3
Polygonia comma	Eastern Comma	-	-	G5		S2
Polygonia faunus	Green Comma	Green	4	G5		S3
Polygonia interrogationis	Question Mark	Green	4	G5		S3B
Polygonia progne	Gray Comma	Green	4	G4G5		S3S4
Polygonia satyrus	Satyr Comma	Yellow	3	G5		S1
Polygonum achoreum	Leathery Knotweed	Undetermined	5	G5		S1
Polygonum buxiforme	Small's Knotweed	Undetermined	4	G5		S2S3
Polygonum pensylvanicum	Pennsylvania Smartweed	Green	4	G5		S3
Polygonum raii	Sharp-fruited Knotweed	Undetermined	5	G3G5Q		S2S3
Polygonum robustius	Stout Smartweed	Green	4	G4G5		S3S4
Polygonum scandens	Climbing False Buckwheat	Yellow	?	G5		S3
Polypodium appalachianum	Appalachian Polypody	Undetermined	5	G4G5		S3?
Pooecetes gramineus	Vesper Sparrow	Yellow	3	G5		S2S3B
Potamogeton friesii	Fries' Pondweed	Undetermined	2	G4		S2
Potamogeton praelongus	White-stemmed Pondweed	Undetermined	3	G5		S3?

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Potamogeton pulcher	Spotted Pondweed	Undetermined	5	G5		S1S2
Potamogeton richardsonii	Richardson's Pondweed	Undetermined	2	G5		S2S3
Potamogeton zosteriformis	Flat-stemmed Pondweed	Yellow	3	G5		S2S3
Progne subis	Purple Martin	Red	2	G5		S1B
Proserpinaca intermedia	Intermediate Mermaidweed	Red	2	G4?Q		S1
Proserpinaca palustris var. crebra	Marsh Mermaidweed	Green	-	G5T5		S3
Proserpinaca palustris var. palustris	Marsh Mermaidweed	Green	-	G5T5		S1?
Proserpinaca pectinata	Comb-leaved Mermaidweed	Green	4	G5		S3
Pseudevernia cladonia	Ghost Antler Lichen	-	3	G2G4	NAR	S2S3
Pseudognaphalium obtusifolium	Eastern Cudweed	Green	4	G5		S3S4
Puccinellia fasciculata	Saltmarsh Alkali Grass	Extirpated	5	G3G5		S1
Puma concolor pop. 1	Cougar - Eastern pop.	Undetermined	5	G5THQ	DD	SH
Pyrola asarifolia	Pink Pyrola	Green	4	G5		S3
Rallus limicola	Virginia Rail	Green	5	G5		S2B
Ranunculus flammula var. flammula	Lesser Spearwort	Green	4	G5T4T5		S2
Ranunculus sceleratus	Cursed Buttercup	Red	2	G5		S1S2
Rhamnus alnifolia	Alder-leaved Buckthorn	Yellow	3	G5		S3
Rhexia virginica	Virginia Meadow Beauty	Green	4	G5		S3
Rhynchospora macrostachya	Tall Beakrush	-	2	G4		S1
Ribes americanum	Wild Black Currant	Undetermined	5	G5		S1
Riparia riparia	Bank Swallow	Green	4	G5		S3B
Rissa tridactyla	Black-legged Kittiwake	Green	3	G5		S2B,S4S5N
Rosa palustris	Swamp Rose	Green	4	G5		S3
Rubus flagellaris	Northern Dewberry	Undetermined	5	G5		S1?
Rudbeckia laciniata var. gaspereauensis	Cut-Leaved Coneflower	Yellow	3	G5TNR		S2
Rumex salicifolius var. mexicanus	Triangular-valve Dock	-	3	G5T5		S2
Sabatia kennedyana	Plymouth Gentian	Red	1	G3	T	S1
Sagina nodosa	Knotted Pearlwort	Green	4	G5		S2S3
Sagina nodosa ssp. borealis	Knotted Pearlwort	-	-	G5T5		S2S3
Salix pedicellaris	Bog Willow	Yellow	3	G5		S2
Salix petiolaris	Meadow Willow	Green	4	G5		S3
Salix sericea	Silky Willow	Yellow	3	G5		S2
Salmo salar	Atlantic Salmon	Red	2	G5		S2
Salmo salar pop. 1	Atlantic Salmon - Inner Bay of Fundy pop.	-	2	G5TNR	E	S2

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Samolus valerandi	Seaside Brookweed	Yellow	3	G5		S2
Samolus valerandi ssp. parviflorus	Seaside Brookweed	Yellow	-	G5T5		S2
Sanicula odorata	Clustered Sanicle	Red	2	G5		S1
Satyrium calanus	Banded Hairstreak	Undetermined	5	G5		S2
Satyrium calanus falacer	Banded Hairstreak	-	-	G5T5		S2
Satyrium liparops	Striped Hairstreak	Undetermined	5	G5		S3
Satyrium liparops strigosum	Striped Hairstreak	-	-	G5T5		S3
Sayornis phoebe	Eastern Phoebe	Green	4	G5		S3S4B
Schizaea pusilla	Little Curlygrass Fern	Green	4	G3G4		S3
Schoenoplectus robustus	Sturdy Bulrush	Undetermined	5	G5		S1?
Schoenoplectus torreyi	Torrey's Bulrush	-	2	G5?		S1
Scirpus longii	Long's Bulrush	Red	3	G2G3	SC	S2S3
Scrophularia lanceolata	Lance-leaved Figwort	Undetermined	5	G5		S1
Selaginella rupestris	Rock Spikemoss	Red	2	G5		S1
Senecio pseudoarnica	Seabeach Ragwort	Yellow	3	G5		S2
Shepherdia canadensis	Soapberry	Yellow	3	G5		S2
Sialia sialis	Eastern Bluebird	Yellow	3	G5	NAR	S3B
Silene antirrhina	Sleepy Catchfly	Red	2	G5		S1
Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass	Green	4	G5		S3S4
Sisyrinchium atlanticum	Eastern Blue-Eyed-Grass	Green	4	G5		S3S4
Sisyrinchium fuscatum	Coastal Plain Blue-eyed-grass	Undetermined	2	G5?		S1
Smilax rotundifolia (Atlantic pop.)	Round-leaved Greenbrier	Green	4	G5	NAR	S3
Solidago latissimifolia	Elliott's Goldenrod	Green	4	G5		S3
Somatochlora forcipata	Forcipate Emerald	Undetermined	2	G5		S2
Somatochlora franklini	Delicate Emerald	Undetermined	3	G5		S1
Somatochlora kennedyi	Kennedy's Emerald	Undetermined	2	G5		S1S2
Somatochlora tenebrosa	Clamp-Tipped Emerald	Yellow	3	G5		S3
Sorex maritimensis	Maritime Shrew	Green	4	GNR		S3
Sparganium natans	Small Burreed	Green	4	G5		S3
Speyeria aphrodite	Aphrodite Fritillary	Green	4	G5		S3S4
Sphagnum wulfianum	a Peatmoss	-	3	G5		S2S3
Spiranthes casei	Case's Ladies'-Tresses	Yellow	3	G4		S2
Spiranthes casei var. casei	Case's Ladies'-Tresses	-	-	G4T4		S1
Spiranthes casei var. novaescotiae	Case's Ladies'-Tresses	-	-	G4TNR		S2
Spiranthes lucida	Shining Ladies'-Tresses	Red	2	G5		S2
Spiranthes ochroleuca	Yellow Ladies'-tresses	Yellow	3	G4		S2S3
Stellaria crassifolia	Fleshy Stitchwort	Red	2	G5		S1
Sterna dougallii	Roseate Tern	Red	1	G4	E	S1B

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Sterna hirundo	Common Tern	Yellow	3	G5	NAR	S3B
Sterna paradisaea	Arctic Tern	Yellow	2	G5		S3B
Sticta fuliginosa	a lichen	Yellow	3	G3G5		S3?
Sticta limbata	a lichen	Red	2	G3G4		S1S2
Strymon melinus	Gray Hairstreak	Green	4	G5		S2
Stuckenia filiformis ssp. alpina	Thread-leaved Pondweed	Undetermined	5	G5T5		S2S3
Sturnella magna	Eastern Meadowlark	Green	3	G5	T	S1B
Stylurus scudderi	Zebra Clubtail	Undetermined	2	G4		S1S2
Suaeda calceoliformis	Horned Sea-blite	Green	4	G5		S2S3
Symphyotrichum boreale	Boreal Aster	Yellow	3	G5		S2?
Symphyotrichum undulatum	Wavy-leaved Aster	Yellow	3	G5		S2
Symplocarpus foetidus	Eastern Skunk Cabbage	Green	4	G5		S3S4
Teucrium canadense	Canada Germander	Yellow	3	G5		S3
Thamnophis sauritus pop. 3	Eastern Ribbonsnake - Atlantic pop.	Yellow	1	G5	T	S2S3
Thuja occidentalis	Eastern White Cedar	Red	2	G5		S1S2
Torreyochloa pallida var. pallida	Pale False Manna Grass	Green	4	G5T5?		S1
Toxicodendron vernix	Poison Sumac	Red	2	G5		S1
Toxostoma rufum	Brown Thrasher	Green	5	G5		S1?B
Tramea carolina	Carolina Saddlebags	Undetermined	5	G5		S1B
Trichostema dichotomum	Forked Bluecurls	-	-	G5		S1
Triglochin gaspensis	Gasp€ Arrowgrass	Undetermined	5	G3G4		S1?
Tringa melanoleuca	Greater Yellowlegs	Green	4	G5		S3B,S5M
Tringa semipalmata	Willet	Green	4	G5		S2S3B
Tringa solitaria	Solitary Sandpiper	Green	4	G5		S1?B,S4S5M
Tyrannus tyrannus	Eastern Kingbird	Green	4	G5		S3S4B
Utricularia gibba	Humped Bladderwort	Yellow	4	G5		S3S4
Utricularia radiata	Little Floating Bladderwort	Green	4	G4		S3
Utricularia resupinata	Inverted Bladderwort	Red	2	G4		S1S2
Utricularia subulata	Zigzag Bladderwort	Green	4	G5		S3
Vaccinium boreale	Northern Blueberry	Red	2	G4		S2
Vaccinium caespitosum	Dwarf Bilberry	Yellow	3	G5		S2
Vaccinium corymbosum	Highbush Blueberry	Green	4	G5		S3
Vaccinium uliginosum	Alpine Bilberry	Yellow	3	G5		S2
Verbena hastata	Blue Vervain	Green	4	G5		S3
Vermivora peregrina	Tennessee Warbler	Green	4	G5		S3S4B
Viola canadensis	Canada Violet	Extirpated	0.1	G5		S1
Viola nephrophylla	Northern Bog Violet	Yellow	3	G5		S2
Viola sagittata	Arrow-Leaved Violet	Green	4	G5		S3S4

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK
Viola sagittata var. ovata	Arrow-Leaved Violet	-	-	G5T5		S3S4
Vireo gilvus	Warbling Vireo	Green	5	G5		S1?B
Vireo philadelphicus	Philadelphia Vireo	Green	5	G5		S2?B
Williamsonia fletcheri	Ebony Boghaunter	Red	2	G4		S1
Wilsonia canadensis	Canada Warbler	Yellow	1	G5	T	S3B
Wilsonia pusilla	Wilson's Warbler	Green	3	G5		S3S4B
Woodwardia areolata	Netted Chain Fern	Yellow	3	G5		S2S3

1. NS General Status of Wild Species Ranks: Blue (Extinct/Extirpated)=No longer in Nova Scotia or extinct in the wild; Red=Known to be or thought to be at risk; Yellow=Sensitive to human activities or natural events; Green=Not to believed to be sensitive or at risk; Grey (Undetermined)=Insufficient data exists to assess the status; Not assessed=Known or believed to be present in Nova Scotia but yet unassessed; Exotic=Introduced as a result of human activity; Accidental/vagrant=Occurring infrequently and unpredictability, outside their usual range.

2. National General Status of Wild Species Ranks: 1=At Risk; 2=May be at Risk; 3=Sensitive; 4=Secure; 5=Undetermined; 6=Not Assessed; 7=Exotic; 8=Accidental.

3. Atlantic Canada Conservation Data Centre (ACCDC).

4. GRANK, Global rarity rank of species, using CDC/NatureServe methods

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 or 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 **Infraspecific 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.

SRANK, Sub-National (Provincial) Rarity Ranks

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

Table C1. Records of species of concern within a 100 km radius of Middlewood Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2012.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC[3,4]		
		NS (color)[1]	National (numerical)[2]	GRANK	NPROT	SRANK

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.

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.

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.

Not At Risk (NAR)- A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

APPENDIX D
NOVA SCOTIA MUSEUM REPORT
HERITAGE AND BIOLOGICAL RESOURCES

NOVA SCOTIA **Communities, Culture & Heritage**

1747 Summer Street
Halifax, Nova Scotia
B3H 3A6

Tel: (902) 424-6475
Fax: (902) 424-0560

July 10, 2012

Heather Levy
Envirosphere Consultants Ltd

PO 2906 Unit 5 - 120 Morison Dr.
Windsor, NS. B0N 2T0

Dear Ms. Levy:

RE: Environment Screening 12-05-03
Middlewood Aggregate Quarry
Envirosphere Ltd

Further to your request of May 3, 2012, staff of the Department of Communities, Culture and Heritage have reviewed their files for reference to the presence of heritage resources in the study area. Please be aware that our information is not comprehensive, in that it is incomplete and of varying degrees of accuracy with respect to the precise location and condition of heritage resources.

Archaeological and Historical Site Remains

There are no recorded archaeological sites on file for the study area. There are recorded archaeological sites on file to the north east of the study area. The potential for First Nation archaeological resources can be considered moderate. There is a water course running through the study area. The potential for historic archaeological resources can be considered moderate. Historic maps indicate settlement.

It is recommended that an assessment for archaeological resources take place.

Botany

Staff have reviewed the database of species-at-risk known from the 10km surrounding this location. All species-at-risk are listed below that are found within the square or adjacent (marked with an *) irrespective of habitats.

Alnus serrulata (provincially yellow-listed)Yellow
Bidens connata (provincially yellow-listed)
Botrychium simplex (provincially yellow-listed)
Cephalanthus occidentalis (provincially yellow-listed)

Epilobium coloratum (provincially yellow-listed)

Epilobium strictum (provincially yellow-listed)
Euthamia tenuifolia (provincially yellow-listed)
Fraxinus nigra (provincially yellow-listed)
Isotes acadiensis (provincially yellow-listed)
Lilaeopsis chinensis (provincially yellow-listed)
Limosella australis (provincially yellow-listed)
Lophiola aurea (provincially yellow-listed)
Panicum rigidulum, var. *pubescens* (provincially yellow-listed)
Platanthera flava, var. *flava* (provincially yellow-listed)
Salix pedicellaris (provincially yellow-listed)
Samolus valerandi, ssp. parviflorus (provincially yellow-listed)
Spiranthes ochroleuca (provincially yellow-listed)
Teucrium canadense (provincially yellow-listed)

The presence/absence of these species should be determined when the species can be positively identified and presented in the report generated.

Zoology

Staff have reviewed zoological records for the site and immediate area and offer the following observations:

There are no records for the site or area immediately adjacent to the existing quarry. However, there are some records of species of concern and note some issues within the general area.

The principle one is the presence of the (SARA) Endangered Atlantic Whitefish (*Coregonus huntsmani*) in the Petite Riviere System to the East. Although this species has only been confirmed within that small watershed, its historical range probably included watersheds down as far as the Medway. Based on that historical perspective and the re-establishment of a sea-run option for the species, it is possible they may use (or may be using) the drainage waters in the area of the proposed expansion as habitat. This should be kept in mind when considering issues such as particulate run off (siltation) and contingencies for chemical spill and containment. Even if an endangered species moves into a new area, it is still afforded the full protection of the Act.

In addition, the following species may occur:

Birds - nesting records:

Coastal occurrence of Piping Plover (*Charadrius melodus*) (provincially red-listed)
Common Loon (*Gavia immer*) (provincially yellow-listed)
Rusty Blackbird (*Euphagus carolinus*) (provincially yellow-listed)
Barn Swallow (*Hirundo rustica*) (provincially yellow-listed)
Gray Jay (*Perisoreus canadensis*) (provincially yellow-listed)

Mammals

If there are any exiting "dry" mines (non-flooded shafts) or caves in the area, these may support hibernating populations of Little Brown Bats (*Myotis lucifugus*), Northern Long-eared Bats (*Myotis septentrionalis*) and Pipistrelles (*Perimyotis subflavus*). These are noted due to their emergency listing as Endangered by COSEWIC- triggered by the appearance of White Nose

Syndrome in the Region. This may be an issue to consider if "blasting" occurs near such hibernation sites.

There are Southern Flying Squirrels (*Glaucomys volans*) - provincially Yellow-listed - in the general area

Reptiles

There are records of Blandings Turtles (*Emydoidea blandingi*) - provincially Red-Listed within 50 km of the site, and recent records of Northern Ribbonsnakes (*Thamnophis sauritus*) within 10 km of the site, so the potential for these is high in the development area. We note that both these species are usually co-located, so both could be an issue in the immediate area.

Palaeontology

The quarry is located in an area of rocks from the Meguma Supergroup, and no fossils are known nor expected from this area.

I have attached an invoice for the staff time spent reviewing our records and compiling this response. If you have any questions, please contact me at 424-6475.

Sincerely,

Laura Bennett,
Coordinator, Special Places

APPENDIX E
LABORATORY RESULTS
TSS & pH

Envirosphere Consultants Limited
Unit 5—120 Morison Drive, Box 2906, Windsor, Nova Scotia, B0N 2T0
ph: (902) 798-4022, fax: (902) 798-2614, e-mail: enviroco@ns.sympatico.ca, website: www.envirosphere.ca

Envirosphere Consultants Limited
Unit 5-120 Morison Drive
Windsor, Nova Scotia
B0N 2T0

Environmental Sample Analysis Report
Report Date: 29-May-12 Report Number: A0341

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	pH	Type of Sample	Detection Limit	Sample Comments
L2012-27	CRM	CRM	Stream Water	5/29/2012	5/29/2012	7.0	STD	0.1	CRM = 7.01
L2012-27	Quarry Site 1	Quarry Site 1	Stream Water	5/28/2012	5/29/2012	6.5	REG	0.1	
L2012-27	Quarry Site 1	Quarry Site 1	Stream Water	5/28/2012	5/29/2012	6.5	DUP	0.1	
L2012-27	Upstream Hirtle Mill Pond	Upstream Hirtle Mill Pond	Stream Water	5/28/2012	5/29/2012	7.0	REG	0.1	

Name of Analyst: P. Stewart Analyses reviewed by: HL Director / Lab Manager (circle one)

This laboratory applies standard practice in conformance with ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories".

Validation Range: 3-10 units The results in this report relate only to the items tested. ***More information is available upon request.***

The quality of the results is dependent on the quality of sample provided.

Comment: Samples for pH should be kept cool until delivery to the lab unless the samples are analyzed immediately. Preferably samples should be analyzed within 24 hours. Hach manual recommends filling bottle completely and capping tightly; cooling to 4°C for storage and analyzing within 6 hours. If this can't be done, Hach manual recommends reporting the holding time with results.
Method: Standard Methods for the Examination of Water and Wastewater 21st Edition. 2005 and online version., 4500-HB. Electrometric measurement of pH. ECL Method 8, pH.

Type of Sample: REG = regular; STD = standard; DUP = duplicate; CRM = certified reference material.

Sample Comments: BDL = Below Detection limit; QR = Qualified result; NR = No result, damaged or insufficient sample; MAC = Maximum Allowable Concentration.

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Envirosphere Consultants Limited
Unit 5-120 Morrison Drive
Windsor, Nova Scotia
B0N 2T0

Environmental Sample Analysis Report
Report Date: 11-Jun-12 Report Number: A0343

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comments
L2012-27	Blank	Middlewood Quarry	Distilled Water	5/28/2012	5/30/2012	0.0	BLANK	0.5 mg/L	
L2012-27	CRM	Middlewood Quarry	CRM (PeCheck)	5/28/2012	5/30/2012	223.0	STD	0.5 mg/L	CRM=213mg/L
L2012-27	Quarry Site 1	Middlewood Quarry	Stream water	5/28/2012	5/30/2012	1.0	REG	0.5 mg/L	
L2012-27	Quarry Site 1 (Dup)	Middlewood Quarry	Stream water	5/28/2012	5/30/2012	1.0	DUP	0.5 mg/L	
L2012-27	Upstream of Culvert	Middlewood Quarry	Upstream of pond	5/28/2012	5/30/2012	0.0	REG	0.5 mg/L	

Name of Analyst: Matthew MacLean Analyses reviewed by: ML Director / Lab Manager (circle one)

This laboratory applies standard practice in conformance with ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories".

Validation Range: 1-1000 mg/L The results in this report relate only to the items tested. More information is available upon request.

The quality of the results is dependent on the quality of sample provided.

Samples for TSS analysis should be kept cool until delivery to the lab unless they are analyzed immediately. A minimum sample volume of 500 ml is preferred. Place sample in a clean plastic container free of cracks or contamination. Fill the bottle to the top and then cap. Samples should reach the lab within 24 hours of sampling, but will be accepted up to 7 days.

Methods: Standard Methods for the Examination of Water and Wastewater 21st Edition. 2005 and online version. 2540D. Total Suspended Solids. ECL method 3, Total Suspended Solids.

Type of Sample: REG = regular; STD = standard; DUP = duplicate; CRM = certified reference material.

Sample Comments: BDL = Below Detection limit; QR = Qualified result; NR = No result, damaged or insufficient sample; MAC = Maximum Allowable Concentration.

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Envirosphere Consultants Limited
Unit 5-120 Morison Drive
Windsor, Nova Scotia
B0N 2T0

Environmental Sample Analysis Report
Report Date: 06-Jun-12 Report Number: A0346

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	pH	Type of Sample	Detection Limit	Sample Comments
L2012-30	CRM	Middlewood Quarry	CRM	6/5/2012	6/6/2012	7.0	STD	0.1	CRM=7.0
L2012-30	MW Quarry-Head of Stream	Middlewood Quarry	Stream Water	6/5/2012	6/6/2012	5.8	REG	0.1	
L2012-30	MW Quarry-Head of Stream (Dup)	Middlewood Quarry	Stream Water	6/5/2012	6/6/2012	5.7	DUP	0.1	

Name of Analyst: Analyses reviewed by: Director / Lab Manager (circle one)

This laboratory applies standard practice in conformance with ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories".

Validation Range: 3-10 units ***The results in this report relate only to the items tested.*** ***More information is available upon request.***

The quality of the results is dependent on the quality of sample provided.

Comment: Samples for pH should be kept cool until delivery to the lab unless the samples are analyzed immediately. Preferably samples should be analyzed within 24 hours. Hach manual recommends filling bottle completely and capping tightly; cooling to 4°C for storage and analyzing within 6 hours. If this can't be done, Hach manual recommends reporting the holding time with results.
Method: Standard Methods for the Examination of Water and Wastewater 21st Edition. 2005 and online version., 4500-HB. Electrometric measurement of pH. ECL Method 8, pH.

Type of Sample: REG = regular; STD = standard; DUP = duplicate; CRM = certified reference material.

Sample Comments: BDL = Below Detection limit; QR = Qualified result; NR = No result, damaged or insufficient sample; MAC = Maximum Allowable Concentration.

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Envirosphere Consultants Limited
Unit 5-120 Morrison Drive
Windsor, Nova Scotia
B0N 2T0

Environmental Sample Analysis Report
Report Date: 11-Jun-12 Report Number: A0347

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comment
L2012-30	Blank	Middlewood Quarry	Distilled Water	6/5/2012	6/6/2012	0.0	REG	0.5 mg/L	
L2012-30	CRM	Middlewood Quarry	CRM	6/5/2012	6/6/2012	218.0	STD	0.5 mg/L	CRM=213 mg/L
L2012-30	MW Quarry-Head of Stream	Middlewood Quarry	Stream Water	6/5/2012	6/6/2012	11.5	REG	0.5 mg/L	
L2012-30	MW Quarry-Head of Stream (Dup)	Middlewood Quarry	Stream Water	6/5/2012	6/6/2012	11.0	DUP	0.5 mg/L	

Name of Analyst: [signature] Analyses reviewed by: [signature] Director / Lab Manager (circle one)

This laboratory applies standard practice in conformance with ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories".

Validation Range: 1-1000 mg/L. The results in this report relate only to the items tested. ***More information is available i***

The quality of the results is dependent on the quality of sample provided.

Samples for TSS analysis should be kept cool until delivery to the lab unless they are analyzed immediately. A minimum sample volume of 500 ml is preferred. Place sample in a clean plastic container free of cracks or contamination. Fill the bottle to the top a then cap. Samples should reach the lab within 24 hours of sampling, but will be accepted up to 7 days.

Methods: Standard Methods for the Examination of Water and Wastewater 21st Edition. 2005 and online version. 2540D. Total Suspended Solids. ECL method 3, Total Suspended Solids.

Type of Sample: REG = regular; STD = standard; DUP = duplicate; CRM = certified reference material.

Sample Comments: BDL = Below Detection limit; QR = Qualified result; NR = No result, damaged or insufficient sample; MAC = Maximum Allowable Concentration.

APPENDIX E

CULTURAL RESOURCE MANAGEMENT REPORT (CRM, 2012)

Environmental Assessment Registration
Document for Middlewood Quarry Expansion

DEXTER CONSTRUCTION LTD.

MIDDLEWOOD QUARRY EXPANSION ARCHAEOLOGICAL SCREENING & RECONNAISSANCE LUNENBURG COUNTY, NOVA SCOTIA

2012 ARCHAEOLOGICAL
SCREENING AND RECONNAISSANCE REPORT

Submitted to:
Dexter Construction Ltd.
and the
Heritage Division

Prepared by:
Cultural Resource Management Group Limited
6040 Almon Street
Halifax, Nova Scotia
B3K 1T8

Consulting Archaeologist: Steve Garcin
Report Preparation: Steve Garcin

Heritage Research Permit Numbers: A2012NS113

CRM Group Project Number: 2012-0009-01

OCTOBER 2012

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MIDDLEWOOD QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE
LUNENBURG COUNTY, NOVA SCOTIA

1.0 INTRODUCTION

Dexter Construction Limited is proposing an expansion of its Middlewood Quarry at 890 Hirtle Road in Lunenburg County. In order to investigate the potential for encountering archaeological resources during any development of the facility, Cultural Resource Management (CRM) Group has been retained by Dexter Construction Limited through H2O Geo Environmental Services Incorporated to undertake archaeological screening and reconnaissance of the proposed quarry expansion.

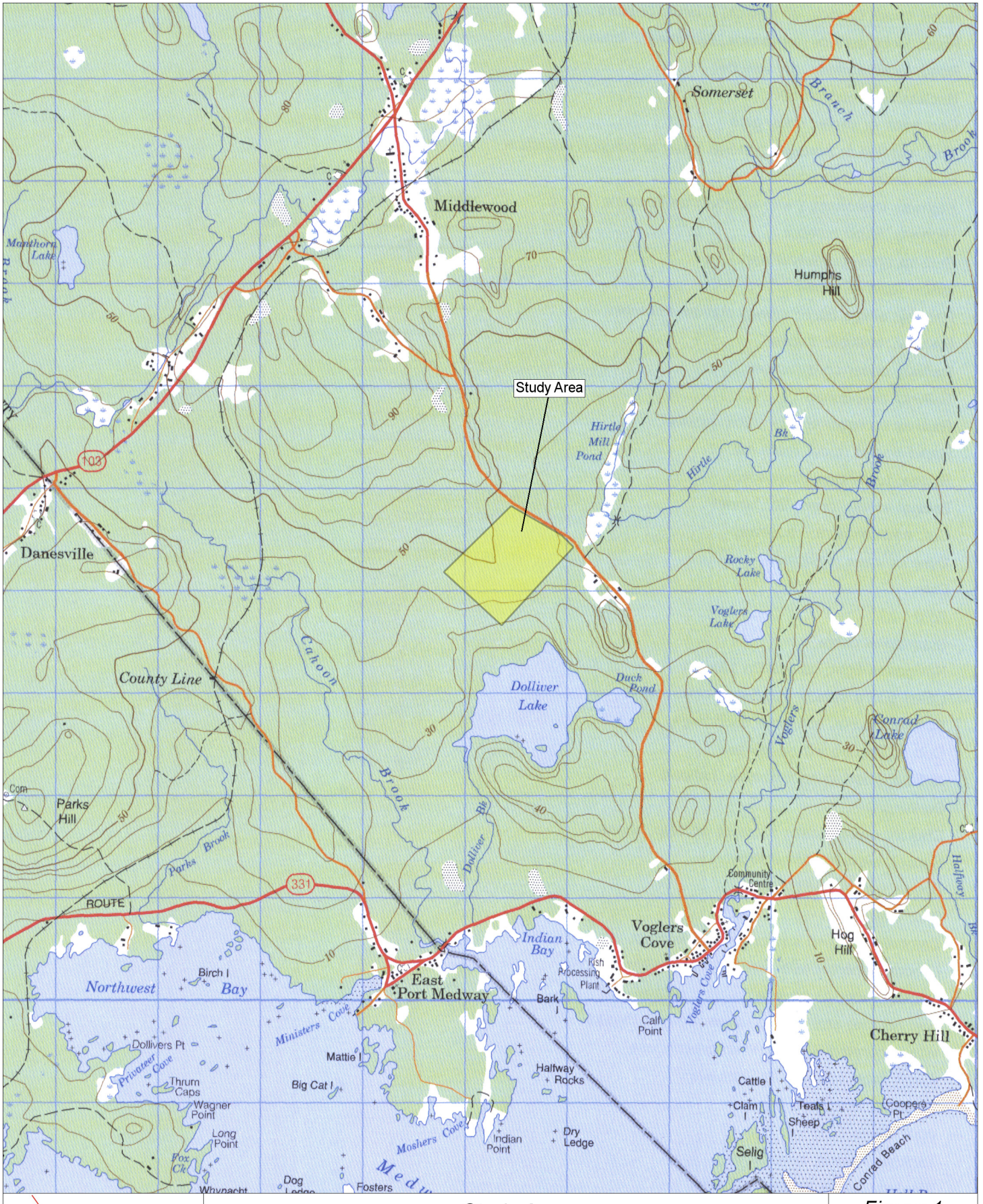
The archaeological screening and reconnaissance was directed by Staff Archaeologist, Steve Garcin with technical assistance provided by Staff Archaeologist Sara Beanlands. Reconnaissance was conducted on August 31, 2012.

The archaeological investigation was conducted according to the terms of Heritage Research Permit A2012NS113 (Category 'C'), issued to Garcin by the Heritage Division. This report describes the archaeological screening and reconnaissance of the Dexter Middlewood Quarry Expansion study area, presents the results of these efforts and offers cultural resource management recommendations.

2.0 STUDY AREA

Dexter Construction Ltd's Middlewood Quarry is located at 890 Hirtle Road in Lunenburg County, approximately 4 kilometres north-northwest of Voglers Cove and 4 kilmoetres south-southeast of Middlewood (***Figures 1 & 2***). Access to the area can be gained off Hirtle Road.

PLATE 1. View north over study area. August 31, 2012.



CRM Group
Cultural Resource Management Group Ltd.

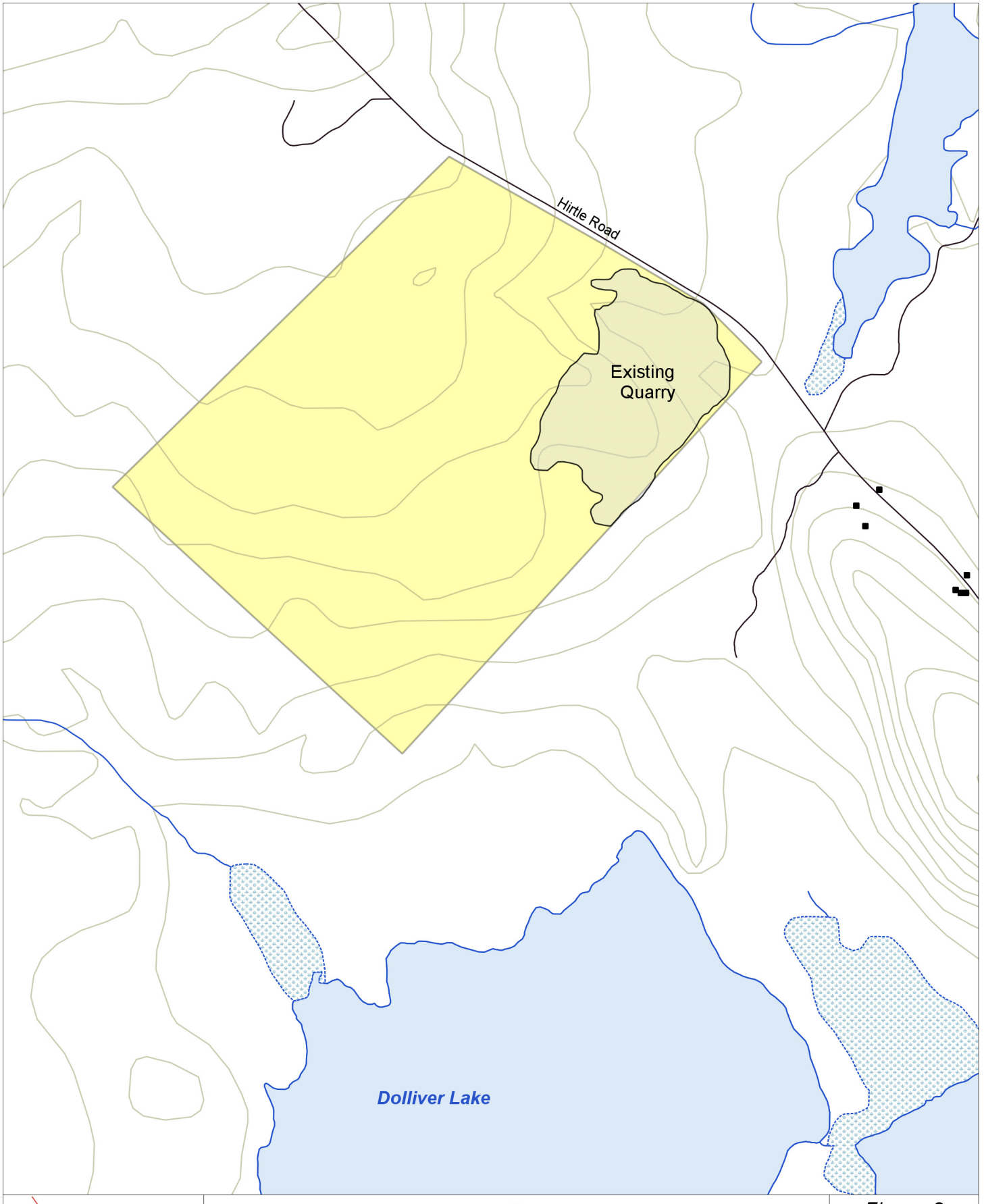
Study Area

MIDDLEWOOD QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING AND RECONNAISSANCE
LUNENBURG COUNTY

Figure 1

October 2012

Scale 1:50,000



CRM Group
Cultural Resource Management Group Ltd.

Detailed Study Area

MIDDLEWOOD QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING AND RECONNAISSANCE
LUNENBURG COUNTY

Figure 2

October 2012

Scale 1:10,000

3.0 METHODOLOGY

In the summer of 2012, H2O Geo Environmental Services Inc. retained CRM Group, on behalf of Dexter Construction Ltd., to undertake archaeological screening and reconnaissance of the proposed Middlewood Quarry Expansion. The objective of the archaeological assessment was to evaluate archaeological potential within the area that may be disturbed by subsequent quarrying activities. To address this objective, CRM Group developed a work plan consisting of the following components: a review of relevant site documentation to develop an archaeological potential model (screening); archaeological reconnaissance of the areas that may be impacted by development activities; and, a report summarizing the results of the background research and field survey, as well as providing cultural resource management recommendations.

3.1 Background Study

The archival research component of the archaeological screening and reconnaissance was designed to explore the land use history of the study area and provide information necessary to evaluate the area's archaeological potential. To achieve this goal, CRM Group utilized the resources of various institutions including documentation available through the Nova Scotia Archives, Nova Scotia Land Information Centre, the Department of Natural Resources and the Heritage Division.

The background study included a review of relevant historic documentation incorporating land grant records, legal survey and historic maps, as well as local and regional histories. Topographic maps and aerial photographs, both current and historic, were also used to evaluate the study area. This data facilitated the identification of environmental and topographic features that would have influenced human settlement and resource exploitation patterns. The historical and cultural information was integrated with the environmental and topographic data to identify potential areas of archaeological sensitivity.

3.2 Field Reconnaissance

The goals of the archaeological field reconnaissance were to conduct a visual inspection of the study area, document any areas of archaeological sensitivity or archaeological sites identified during the course of visual inspection, and design a strategy for testing areas of archaeological potential, as well as any archaeological resources identified within the study area. Although the ground search did not involve sub-surface testing, the researcher was watchful for topographic or vegetative anomalies that might indicate the presence of buried archaeological resources. The process and results of the field reconnaissance were documented in field notes and photographs.

A hand-held Global Positioning System (GPS) unit was used to record UTM coordinates for all survey areas, as well as any identified diagnostic artifacts, formal tools, isolated finds and site locations.

4.0 RESULTS

4.1 Background Study

The following discussion details the environmental and cultural setting of the study area. This background study provides a framework for the evaluation of archaeological potential and the initial interpretation of any resources encountered during the field component of the assessment.

4.1.1 Environmental Setting

A number of environmental factors such as water sources, physiographic features, soil types and vegetation have influenced settlement patterns and contribute to the archaeological potential of the area.

Water Sources

Proximity to water, for both drinking and transportation, is a key factor in identifying Precontact and historic Native, as well as early Euro-Canadian, archaeological potential. The Middlewood Quarry is situated approximately 400 metres to the north of Dolliver Lake, which drains through Dolliver Brook into Indian Bay of Medway Harbour. Additionally, Hirtle Brook is located approximately 500 metres to the northeast of the study area. Hirtle Brook is a tributary to Voglers Brook, which flows into Voglers Cove, over 3 kilometres to the south.

Topography

The Middlewood Quarry study area is located within the greater terrestrial region known as the LaHave Drumlins and is characterized by the presence of drumlins with a predominantly northwest-southeast alignment. (Davis & Browne 1996: 196-197). These drumlins are the coastal equivalent of the Kejimkujik Drumlins and Lunenburg Drumlins. The former are composed of grey-brown clay till and the latter of red-brown sandy till (Davis & Browne 1996: 196).

Soils

The study area is located in an area classified as Rock Land. This area is composed of thin layers of soil over bedrock and occurs in areas where granite or quartzite is the underlying rock. Within these areas, rock outcrops can account to up to 60 to 90 percent of the land surface. The thin soils in this area are generally lithosols ranging in depth from 6 to 10 inches. These areas are not suitable for agriculture (Cann et al. 1958: 36).

Vegetation

The forest growth within this ecological region is dominated by white spruce and balsam fir with some maple and birch. Spruce, fir and pine forests occur further inland (Davis & Browne 1996: 196).

Fauna

The diversity of coastal habitats in the area provides important habitat for a range of waterfowl. Sheltered inlets also support a range of marine fauna. (Davis & Browne 1996: 196-197).

4.1.2 Native Land Use

The land within the study area was once part of the greater Mi'kmaw territory known as *Sipekne'katik*, meaning 'wild potato area'. A review of the Maritime Archaeological Resource Inventory (MARI), the provincial archaeological site database maintained by the Heritage Division, identified no registered Precontact sites in the immediate area. The closest registered Precontact site is located approximately seven kilometers to the south-southeast and is identified as a Ceramic Period (3,000 – 500 BP) site. The lack of archaeological data in the vicinity of the study area reflects a lack of archaeological investigation, rather than an absence of archaeological sites.

4.1.3 Property History

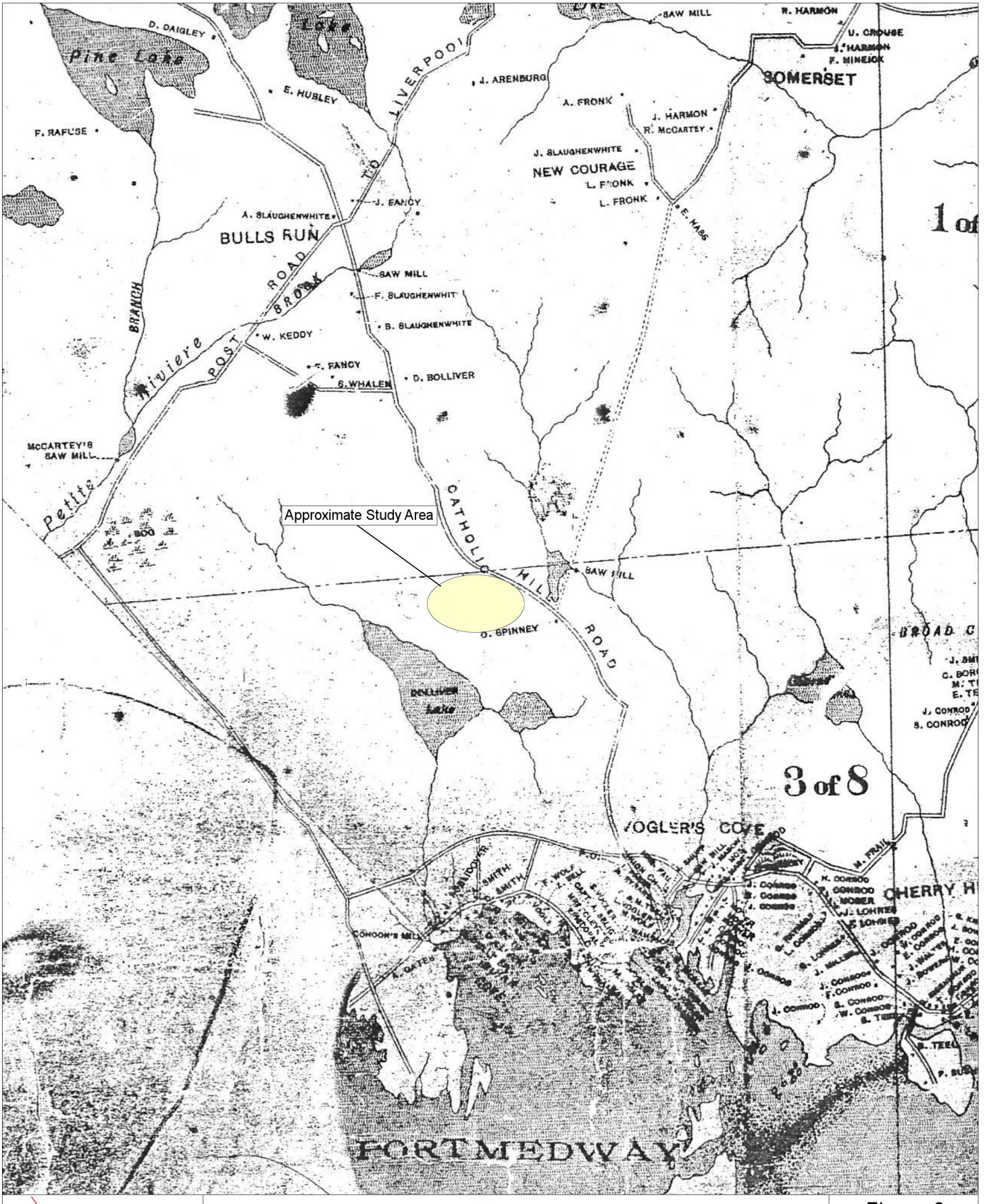
The property is located along Hirtle Road in between Middlewood and Voglers Cove in Lunenburg County. The town of Middlewood was originally named Bull Run, but was renamed to Middleton around 1890 as it was approximately midway between Liverpool and Bridgewater. The name was later changed to Middlewood to distinguish it from Middleton in Annapolis County (PANS 1967: 436).

The study area is located primarily on land granted to Reuben Wentzell. However, it does not appear that the land was ever settled. A review of historic mapping shows little in the way of development within the study area. The 1883 *Topographical Township Map of Lunenburg County, Nova Scotia* produced by A.F. Church indentifies one dwelling, attributed to O. Spinney, just to the south of the study area (***Figure 3***). A 1924 map by E.R. Faribault shows additional buildings along the road, named Catholic Hill Road at this time, but these are located well outside the study area.

There is some evidence that a mill was located on the other side of Hirtle Road on Hirtle Brook. A small stillwater on the brook is named "Pickles Mill Pond" and is located near land granted to Jacob Pickles. The 1924 Faribault geological map identifies this as "Hirtle Mill Pond" and indicates that a sawmill was present on the eastern side of the pond.

4.1.4 Archaeological Potential

Based on the various components of the background study, including environmental setting, Native land use and property history, the vicinity of the study area is considered to exhibit low potential for encountering Precontact and/or early historic Native archaeological resources.



CRM Group Cultural Resource Management Group Ltd.	*A.F. Church 1883*	*Figure 3*
	MIDDLEWOOD QUARRY EXPANSION ARCHAEOLOGICAL SCREENING AND RECONNAISSANCE LUNENBURG COUNTY	October 2012
		Scale 1:50,000

4.2 Field Reconnaissance

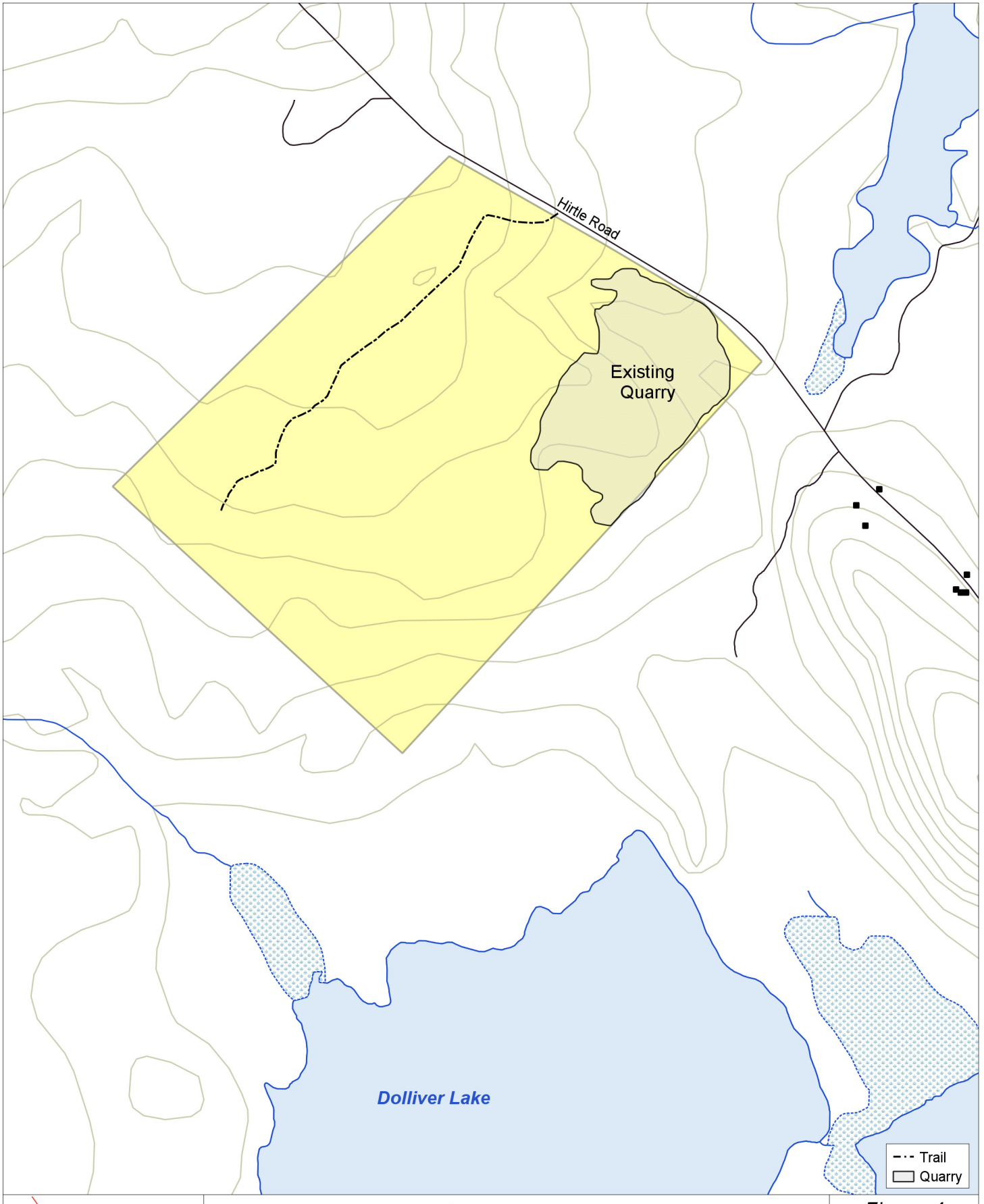
The archaeological reconnaissance was undertaken on August 31, 2012 under clear, sunny conditions. The goal of the visit was to assess the area for archaeological potential and investigate any topographical and/or cultural features that had been identified as areas of elevated potential during the background research.

Overall, the study area exhibited low potential for archaeological and/or historical resources. The majority of the eastern and southeastern portions of the property have been impacted by ongoing quarrying activities (***Figure 4; Plate 2***). Immediately north of the active quarrying, a portion of the study area has also been cleared of trees (***Plate 3***), which allowed for greater visibility during archaeological reconnaissance. An existing road/trail has also been cut through the northern portion of the property, which facilitated access through the study area and provided greater visibility for inspection (***Plate 4***).

The remaining undisturbed portions of the study area consisted of undulating to hummocky, rocky terrain, largely unsuitable for human habitation (***Plates 5&6***). Numerous areas of bedrock exposure were noted throughout the study area. Vegetation consisted of a mix of hardwood and softwood species, with a mix of blackberries, blueberries, bunchberries, ferns and other small shrubs as ground cover.

No areas of high archaeological potential areas were identified during the 2012 archaeological reconnaissance. Furthermore, no historical features or artifacts were noted during the survey.

PLATE 2. View of quarrying activities within the southeastern portion of the study area. Facing east. August 31, 2012.



CRM Group
Cultural Resource Management Group Ltd.

Survey Results

MIDDLEWOOD QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING AND RECONNAISSANCE
LUNENBURG COUNTY

Figure 4

October 2012

Scale 1:10,000

PLATE 3. **Area cleared of trees to north of active quarrying. Facing southwest. August 31, 2012.**

PLATE 4. **View west along trail in northern portion of study area. August 31, 2012.**

PLATE 5. Uneven, rocky terrain typical of the study area. August 31, 2012.

PLATE 6. Rocky terrain within the study area. August 31, 2012.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2012 archaeological screening and reconnaissance of the Middlewood Quarry Expansion project consisted of historical background research and a visual inspection of the study area. It did not involve sub-surface testing. The background research and field reconnaissance conducted by CRM Group determined the study area to exhibit low potential for encountering Precontact and/or early historic Native archaeological resources

Based on these results, CRM Group offers the following management recommendations for the study area:

1. It is recommended that the study area, as defined and depicted in this report, be cleared of any requirement for future archaeological investigation.

2. In the unlikely event that archaeological deposits or human remains are encountered during activities associated with the Middlewood Quarry Expansion, all work in the associated area(s) should be halted and immediate contact made with the Heritage Division (Laura Bennett: 902-424-6475).

6.0 REFERENCES CITED

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APPENDIX F

PUBLIC CONSULTATION DOCUMENTATION

Environmental Assessment Registration
Document for Middlewood Quarry Expansion

H2OGEO ENVIROMENTAL SERVICES INC.
#508 – 1343 HOLLIS STREET
HALIFAX, NOVA SCOTIA B3J 1T8

(902) 443-4227 (Office)
(902) 497-5597 (Cell)
Email: fraserconsult@eastlink.ca

March 7, 2013

Chief Deborah Robinson
Acadia First Nation
10526 Highway # 3
Yarmouth, Nova Scotia
B5A 4A8

H2OGEO INC FILE # 2012-001

Dear Chief Robinson,

Re: Dexter Construction Company Ltd., Middlewood Quarry Expansion, Middlewood Lunenburg County, NS – Registration Document for a Class 1 Undertaking Under Section 9 (1) of the NS Environment Assessment Regulations.

On behalf of Dexter Construction Company Ltd. (Dexter), this correspondence is a follow up to a letter sent to you on October 17, 2012 (attached), which was intended to inform you about a project Dexter is undertaking on their property (PID # 60302304) located at 890 Hirtle Road, Lunenburg County, NS. In the previous correspondence we indicated that we were in the process of filing a Registration Document and that the document was to be submitted to Nova Scotia Environment (NSE) in early November, 2012. This EA document was indeed submitted to NSE, however it was submitted as a Draft for comment, and now we are at the stage of officially submitting the final EA.

At the present time, it is our intent to submit the final document to NSE in late March, 2013. As noted in our previous correspondence, the submission will be accompanied by public notification via the placement of an advertisement (Notice) in a local newspaper as well as the provincial edition of the Chronicle Herald. The notices will provide a brief outline of the project and identify locations where the document can be accessed and reviewed by interested members of the public. From this point comments may be submitted in writing to NSE, which will also be made available for public review. It is noted that this correspondence, as well as that dated October 17, 2012, has also been sent to the Annapolis Valley First Nation as well as the Mi'kmaq Rights Initiative for their information.

In conclusion, we trust that this information is sufficient for your reference at this time. However, if you have any questions or comments, please contact the undersigned, at you convenience.

Sincerely,
H2OGEO Environmental Services Inc.

J. H. Fraser, M.A.Sc., P. Geo.
President

Attachment – Letter dated October 17, 2012

cc: Annapolis Valley First Nations
Mi'kmaq Rights Initiative

H2OGEO ENVIROMENTAL
SERVICES INC.

#508 – 1343 HOLLIS STREET
HALIFAX, NOVA SCOTIA
B3J 1T8
PHONE: (902) 443-4227 (Office)
(902) 497-5597 (Cell)
Email: fraserconsult@eastlink.ca

October 17, 2012

H2OGEO INC. FILE # 2012-001

Acadia First Nation
10526 Highway # 3
Yarmouth, Nova Scotia
B5A 4A8

Attention: Chief Deborah Robinson

Re: Dexter Construction Company Ltd., Middlewood Quarry Expansion, Middlewood Lunenburg County, NS – Registration Document for a Class 1 Undertaking Under Section 9 (1) of the NS Environment Assessment Regulations.

Dear Chief Robinson:

On behalf of Dexter Construction Company Ltd. (Dexter), this correspondence is to let you know about a project Municipal is undertaking on their property (PID # 60302304) located at 890 Hirtle Road, Lunenburg County, NS (See Map Attached). The project is an expansion of an existing rock quarry, which has operated on the southern portion of the property since 1992. The proposed expansion is to the north of the existing quarry, which will enable Dexter to continue the production of aggregate, primarily used in the road construction industry, for approximately 20 years into the future.

To facilitate the proposed expansion, Dexter has completed the above noted Registration Document and plans to submit it to Nova Scotia Environment (NSE) in early November, 2012. The document was prepared by WMR Environmental Services & Associates (Mr. Wayne MacRae; H2OGEO Environmental Services Inc.; Envirosphere Consultants Limited; and Cultural Resource Management (CRM) Group Limited) and follows the NS Environment "Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia". It includes sections detailing the Undertaking; Public Involvement; Human Uses of the Environment; Existing and Future Operations; Valued Environmental Components and Effects Management including Socioeconomic and Biophysical Impacts and concludes by identifying Impacts of the Environment on the Project, Cumulative Impacts and recommended Environmental Monitoring.

Of particular significance to the Acadia First Nations community is the inclusion in this document of an Archaeological Screening and Reconnaissance Report prepared by CRM Group Ltd., which has also been submitted to the Heritage Division, with the associated

work conducted under Heritage Research Permit Number A2012NS113. The CRM report concluded that:

> "No records of archaeological resources of significance occur in the study area, although recorded sites occur in that area of the province, and the potential for First Nations and historic archaeological resources is moderate (L. Bennett, Coordinator, Special Places, pers. Comm., 2012). A more detailed archaeological/cultural assessment was done for the quarry expansion, and determined, in turn, that the study area exhibited low potential for archaeological and/or historical resources, and no areas of high archaeological potential were identified during a site visit conducted on August 31, 2012.

CRM went on to offer the following management recommendations for the study area:

1. It is recommended that the study area, as defined and depicted in this report, be cleared of any requirement for future archaeological investigation.

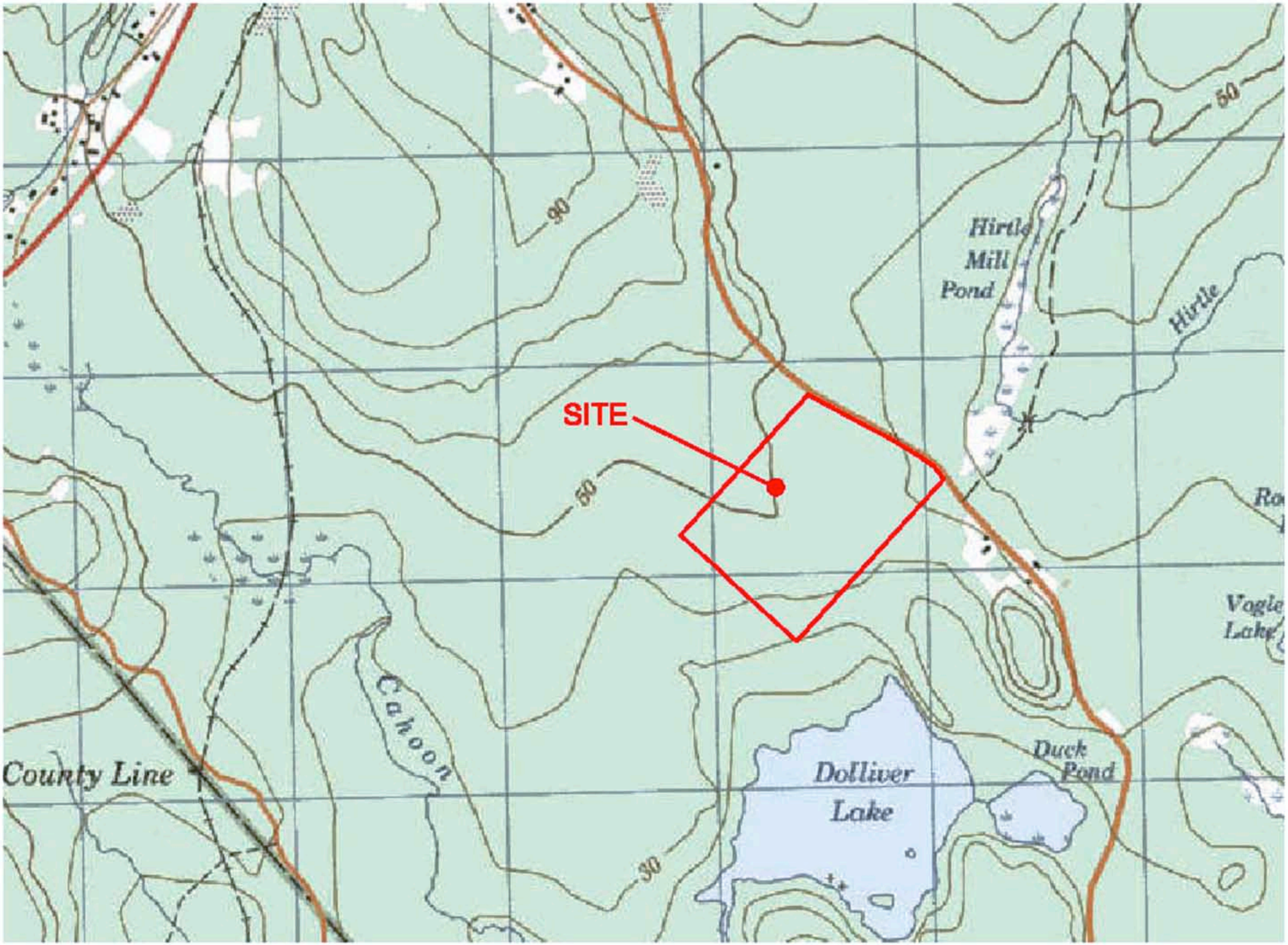
2. In the unlikely event that archaeological deposits or human remains are encountered during activities associated with the Middlewood Quarry Expansion, all work in the associated area(s) should be halted and immediate contact made with the Heritage Division (Laura Bennett: 902-424-6475).

As noted it is our intent to submit the document to NSE in early November, 2012. In tandem with this submission, will be public notification via the placement of an advertisement (Notice) in a local newspaper as well as the provincial edition of the Chronicle Herald. The notices will provide a brief outline of the project and identify locations where the document can be accessed and reviewed by interested members of the public. From this point comments may be submitted in writing to NSE, which will also be made available for public review.

In conclusion, we trust that this information is sufficient for your reference at this time. However, if you have any questions or comments, please contact the undersigned, at you convenience.

Sincerely;
H2OGEO Environmental Services Inc.

J. H. Fraser, M.A.Sc., P. Geo.
President


SITE
90
60
60
30
Hirtle
Mill
Pond
Hirtle
Cahoon
County Line
Dolliver
Lake
Duck
Pond

NOTICE

Registration of Undertaking for Environmental Assessment ENVIRONMENT ACT

On, or about, April 9, 2013, Dexter Construction Company Limited of 927 Rocky Lake Drive, P.O. Box 48100, Bedford, Nova Scotia, B4A 3Z2 registered a Class 1 Undertaking Under Section 9(1) of the NS Environmental Assessment Regulations for the Expansion of the Existing Middlewood Quarry, located 890 Hirtle Road near Middlewood, Lunenburg County, NS. It is noted that the existing Quarry has been in operation at this location since 1994.

The purpose of the proposed undertaking is to provide additional rock aggregate, primarily used in the road construction industry in south western Nova Scotia. It is intended that the ongoing use of the Quarry will be identical, or very similar, to what has taken place at the site since 1994.

Copies of the registration information may be examined at the following locations:

- United Communities Fire Hall, c/o Fire Chief Wayne Smith, 7987 Highway 331, Cherry Hill, Nova Scotia, B0J 2H0
- A & B Country Store, 4 Camperdown School Road, Middlewood Nova Scotia, Attention: Avery
- EA website (when available) http://www.gov.ns.ca/nse/ea/

The public is invited to submit written comments to:
Environmental Assessment Branch, Nova Scotia Environment
P.O. Box 442, Halifax, NS, B3J 2P8
on or before May 9, 2013 or contact the department at (902) 424-3230, (902) 424-0503 (Fax), or e-mail at EA@gov.ns.ca.

All submissions received, including personal information, will be made available for public review in the Nova Scotia Environment Library, 5th floor, Halifax Office, 5151 Terminal Road.

Published by The Municipal Group of Companies.

CONSENT TO BLAST

I hereby consent to Municipal Enterprises Limited ("Municipal") and / or Dexter Construction Company Limited ("Dexter") blasting within 800 meters of my residential home at 668 Hirtle Road, Middlewood, Lunenburg County, Nova Scotia, being identified as PID 60302247.

Municipal and Dexter shall be responsible for any blasting damage caused to my property.

This consent shall be binding upon my heirs, successors and assigns.

Dated at HEBBVILLE in the county of Lunenburg province of Nova Scotia this 28TH day of February 2013.

Witness
Name:

JENNIFER ROBIN LLEWELLYN

DEXTER CONSTUCTION COMPANY LIMITED and MUNICIPAL ENTERPRISES LIMITED

Witness
Name:

Per:
Name:

CONSENT TO BLAST

I hereby consent to Municipal Enterprises Limited ("Municipal") and / or Dexter Construction Company Limited ("Dexter") blasting within 800 meters of my residential home at 668 Hirtle Road, Middlewood, Lunenburg County, Nova Scotia, being identified as PID 60302247.

Municipal and Dexter shall be responsible for any blasting damage caused to my property.

This consent shall be binding upon my heirs, successors and assigns.

Dated at HEBBVILLE in the county of Lunenburg province of Nova Scotia this 28th day of February 2013.

Witness
Name:

ROBERT TERRY LLEWELLYN

DEXTER CONSTUCTION COMPANY LIMITED and MUNICIPAL ENTERPRISES LIMITED

Witness
Name:

Per:
Name: