Dexter Construction Company Limited

NICTAUX QUARRY EXPANSION, NICTAUX, ANNAPOLIS CO.,NS,

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

April, 2015

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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 the existing Nictaux quarry located at 93 Wanda Lynn Drive, Nictaux, Annapolis 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*." The existing active quarry area encompasses 3.93 ha. and the proposed total EA area is 21.9 ha.

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".

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Proponent Contact:

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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 has held an Industrial Approval from Nova Scotia Environment (NSE) since 1999 and currently operates under "Industrial Waste Permit Approval # 2009-066020-R01, as attached to a cover page dated April 30, 2009 to Mr. Christopher Hankinson signed by Janet MacKinnon, on behalf of NSE. This cover page and Approval is also attached in **Appendix A** "Property Information". It is also noted that Dexter has a current lease agreement with Christopher Hankinson which extends through 2019. In addition, Dexter and Hankinson are in the process of finalizing a long term lease which will enable the current agreement to be extended well into the future.

2.0 THE UNDERTAKING

2.1 Name

Dexter proposes to expand the existing Nictaux 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 Nictaux, Annapolis County, Nova Scotia at 93 Wanda Lynn Drive (PID # 5085279) 1:50000 NTS 21A/14, 4974400 Northing, 354565 Easting, Air Photo 2012 309_026; August 2012 (**Figures 1 & 2 (below) and Drawing 1, Appendix B**). The site is positioned at the end of Wanda Lynn Drive, approximately 1.0 km south of Highway 201. 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 Christopher Hankinson. The existing and expanded quarry property encompasses approximately 21.9 hectares.

Figure 1
Project Location

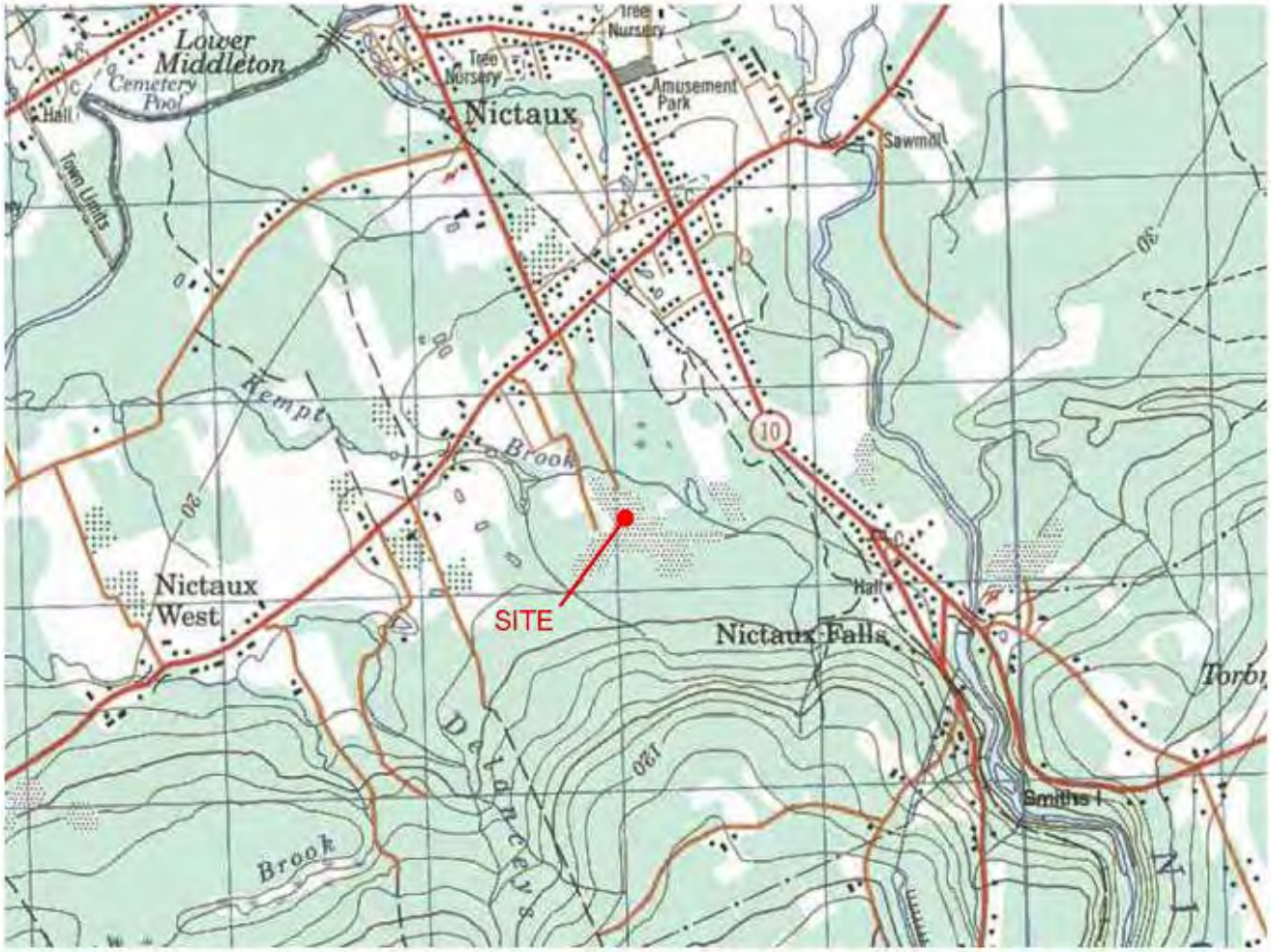

Figure 2
Site Location and Adjacent Land Uses

3.0 SCOPE OF THE UNDERTAKING

As noted previously, Dexter intends to expand the existing Nictaux quarry for the continuing purpose of extracting and supplying aggregate for the road and local construction industry. The existing quarry has been in operation for many years and encompassed a total of approximately 3.93 ha. The existing quarry face is approximately 17 meters (m) in height and the disturbed area includes on-site related facilities including a scale house, sedimentation infrastructure, as well as a portable asphalt plant, crushing, washing and stockpiling areas. Over the years of operation, an average of approximately 50,000 tonnes of aggregate per year has been extracted from the quarry. There are no off-site project related support facilities, other than related transportation corridors used to transport the product to local destinations.

It is Dexter's intent to continue quarry operations on the property, using existing infrastructure. It is anticipated that future operations will involve the extraction of approximately 50,000 tonnes/year for 20 years, however the annual quantity and timeframe will vary depending on local demand and associated project requirements.

3.1 Purpose/Need for The Undertaking

Dexter proposes to expand the existing Nictaux 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 Nictaux 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. It is noted that the proposed quarry is an expansion of an existing quarry, which has been in operation for many years. The expansion and continued operation of the existing quarry would therefore provide less of a disruption to the community then would a new quarry in the same general area.

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. This document is supported by two separate reports; Biophysical Assessment Report, prepared by Envirosphere and included as **Appendix D**; and the Archaeological Screening and Reconnaissance Report, prepared by CRM and included as **Appendix E**.

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 Nictaux quarry. In this regard, the following persons have been briefed regarding the intent of this EA document:

Mr. Reginald “Reg” Ritchie; District # 8 & Warden Annapolis County

Mr. Frank Chipman, Councillor, District # 9

Albert Dunphy, Director of Planning and Protective Services

Stephen McInnis, Deputy CAO/Director of Engineering & Public Works

Chief Janette Peterson; Annapolis Valley First Nation

Mr. Roger Hunka, Native Council of Nova Scotia

Twila Gaudet, KMKNO

Beata Dera, Office of Aboriginal Affairs

With respect to the First Nations Community, Dexter has followed the Proponent's Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia. In this regard, Dexter has advised Chief Janette Peterson of the Annapolis Valley First Nation of Dexter's intent to file the Registration Document for a Class 1 Undertaking Under Section 9 (1) of the NS Environmental Assessment Regulations in a letter dated November 1st, 2013. This letter included all relevant information, as follows:

- The proponents' name and representatives;
- The project location;
- The type of work to be carried out;
- Any potential short and long term impacts;
- Project and regulatory timelines;
- An offer to provide all relevant reports, studies and reviews, and
- And offer to meet and discuss the project at their convenience.

Dexter also copied this letter to Twila Gaudet of the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), Mr. Roger Hunka of the Native Council of Nova Scotia and Beata Dera of the Office of Aboriginal Affairs (OAA). A letter outlining the details of the project was sent to Chief Peterson on November 1, 2013 and copied to the other three (3) agencies noted above. This letter is included in **Appendix F**. Dexter has continued the liaison process with the above First Nations community representatives via the provision of a follow-up letter, dated April 1, 2015 outlining the timeline associated with both the draft and final submission of the EA Document and the associated governmental and public review process. No responses from any of these agencies have been received to date. Any responses received during the EA review process will be provided to NSE.

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, the Annapolis County Spectator, and one in the provincial edition of the Chronicle Herald. 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

The Annapolis River Valley and its tributaries and the surrounding lands are included in territory traditionally occupied by the Mi'kmaq. Mi'kmaq would have used all areas in the valley to some degree, although the upland areas, such as those occupied by the Nictaux quarry, have a lower potential for archaeological resources. Modern Mi'kmaq are likely to participate in the same activities in the study area as the general population of Annapolis County, including recreational use, hunting and fishing, gathering of ceremonial foods, etc. The project site is not near any of the Mi'kmaq communities in Annapolis County. The closest Mi'kmaq community, located over 35 km from the site, is the Cambridge 32 Community (near Cambridge Station in Kings County), which is part of the Annapolis Valley First Nation. Other Mi'kmaq communities within about 65 km include: Bear River 6A & B (near Annapolis Royal) and Bear River 6 (near Digby) of the Bear River First Nation; New Ross 20 and Pennal 19 (north of the town of New Ross in Lunenburg County) of the Indian Brook First Nation (also known as Shubenacadie First Nation); and Wildcat 12 (near Caledonia in Queens County) of the Acadia First Nation.

Two tribal councils exist in Nova Scotia: the Confederacy of Mainland Mi'kmaq (CMM) and Union of Nova Scotia Indians (UNSI). CMM is a not-for-profit organization incorporated in 1986, whose mission is to promote and assist Mi'kmaw communities. The UNSI, created in 1969, was formed to provide a "cohesive political voice for Mi'kmaq people". Both Annapolis Valley First Nation and Bear River First Nation are members of CMM, and Acadia First Nation and Indian Brook First Nation are members of the UNSI. 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 KMK negotiates between Nova Scotia Mi'kmaq, 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 of AFNEN, for which the Mi'kmaq Confederacy of PEI in Charlottetown is currently 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.

No Mi'kmaq ceremonial or cultural uses have been identified for the Nictaux quarry site or vicinity. Additionally, the area is not known to be used for other Mi'kmaw purposes, based on the background archaeological review for the project (CRM 2013, **Appendix E**) and the Nova Scotia Museum database search (Peter Christmas, NS Museum, pers. comm 2013).

5.1.2 Population and Economy

Population density in the area is higher than average for Nova Scotia; the town of Middleton and Census subdivision C of Annapolis County (which includes the quarry and lands on the west side of Highway 10) have population densities of 24.2 and 321.6 people per km^2, respectively, while the population density for Nova Scotia is 17.4 people per km^2 (Statistics Canada, 2011). Population density and number of residences decreases away from Middleton and Nictaux. Employment rate and average salaries are typical of Nova Scotia—similar to the average for the Province (57% and $35,478, respectively; Statistics Canada, 2011). The top three industries for employment (in terms of number of people in that industry) for Middleton are the retail trade, educational services and public administration, while the top three for Annapolis County (which are also the top three for the Province) are the retail trade, social/health care and public administration (Statistics Canada, 2011).

5.1.3 Water Supply and Residential Wells

The site is not located in or near any water supply areas for Annapolis County and the Town of Middleton obtains its water from groundwater wells located within Town limits north of the Annapolis River. Residences and farms in the Nictaux area rely on groundwater wells, both drilled and dug. It is noted that, although the existing quarry has been in operation for 16 years, there have been no reports of any negative effects to local groundwater well users either in terms of water quality or quantity. Measures to ensure the protection of area groundwater resources and associated users will be discussed further in Section 6.1.9.

5.1.4 Land Use

Land in the vicinity of the quarry is used primarily for forest resource, sand and gravel extraction, agriculture, and residential/commercial activity. Highways 10 & 201 in the area form a corridor for residential development zoned for a mixture of R1, R2 and R3 (low, medium and high density) and Highway 10 is zoned for R1 & R3 with commercial zoning. To the west along Highway 201, Nictaux West is predominantly agricultural, including orchards, mixed farms and livestock.

5.1.5 Hunting

The quarry site is expected to support wildlife species characteristic of Annapolis and Kings Counties, with a possibility for some of the more uncommon species to occur due to the proximity to the protected wilderness areas to the south. Predominant fur-bearing species reported in trapping catch for Annapolis and Kings Counties likely occur near the project and include muskrat, mink, raccoon, squirrel, weasel, coyote, beaver and fisher. Annapolis County reported the second highest catch provincially for weasel and third highest catch for squirrel for the period between 2007-2012. Kings County reported the fourth highest catch provincially for muskrat, mink and raccoon, and the fifth highest catch for squirrel between 2007-2012. Of upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant), only the former two are significantly harvested in Annapolis and Kings Counties. Between 2007-2012, Kings County ranked first and Annapolis County ranked second provincially for the harvest of Ring-necked Pheasant. Ruffed Grouse is an important game species in Annapolis County, with county harvest ranking second provincially in 2007-2012; the species is not as important here as in Kings County (ranked 12th in 2007-2012). Both counties report Snowshoe Hare harvest, but the species represents a small proportion of the numbers harvested in the province. The area supports White-tailed Deer, and Annapolis County and Kings County reported slightly above the median (4.6%), and at the median (3.9%), respectively, of the provincial harvest values from 2007-2012 (http://novascotia.ca/natr/hunt/deer-stats.asp). Black

Bear harvest in Annapolis and Kings Counties is expected to follow the increasing trend occurring lately in the Province.

5.1.6 Recreational, Commercial and Mi'Kmaq Fishing

Annapolis County is in Provincial Recreational Fishing Area 5, and supports recreational fishing in inland and tidal waters, from April 1 to September 30 (Nova Scotia Anglers' Handbook and 2013 Summary of Regulations). Brook trout and striped bass are commonly fished in local tributaries and an ice fishery for smelts occurs from January-March in tidal waters just above the Annapolis River causeway (L. Cromwell, Conservation and Protection DFO, personal communication 2013). Brook Trout likely are fished in the lower reaches of Kempt Brook.

Commercial licenses are issued for American Eel in the Annapolis River. Mature eels are caught in eel pots near Bridgetown (between Lawrencetown & Hebb's Landing) and elvers may be caught in one tributary of Annapolis River; however catch is minor compared to larger fisheries in Southwest Nova Scotia (L. Cromwell, Conservation and Protection DFO, personal communication 2013).

Mi'Kmaq communal fishing licenses are used by the Bear River Band (Digby Area) and Glooscap Band (Annapolis Royal) for food, social and ceremonial uses.

5.1.7 Archaeological and Paleontological Resources

No records of archaeological resources of significance occur in the study area, and the potential for pre-contact sites and historic archaeological resources is low and low to moderate, respectively (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013; CRM 2013, **Appendix E**).

Some of the rock formations at the site in the Elderkin Brook Formation (Halifax Group & Meguma Supergroup) can contain trace fossils and the Triassic to Jurassic undivided sedimentary and volcanic rocks (Wolfville Formation) can contain rare and important fossils (amphibians, capitosaurs; reptiles, rauisuchids; & plant fossils) (S. Weseloh-Mckeane, Coordinator, Special Places, personal communication, 2013).

5.1.8 Parks and Protected Areas

There are no parks or protected areas in the immediate vicinity of the site but the abandoned rail corridor which runs to the northeast of the site is part of the Bridgetown/Springfield Rail Corridor, which forms part of the Trans Canada Trail.

5.1.9 Recreational/Cultural Activities

Residents in the vicinity of the quarry can be expected to be, and were observed using Highways 201 and 10 for walking, jogging, and bicycling. The abandoned rail line running parallel to Highway 10 is being developed as a section of the Trans Canada Trail. In the future this area will be used as a walking, hiking and recreational travel route.

5.1.10 Residential/Commercial Development

The communities of Nictaux, Nictaux Falls and Nictaux West near which the Nictaux quarry is situated contain a low to moderate density of residential properties and farms, and supporting commercial infrastructure, largely centred on the Town of Middleton and spread out along

Highways 10 and 201. Only three residences are within an 800 m radius of proposed active blasting[1]. Additional development occurs outside this radius with the majority along Highway 201, including one subdivision occupied by 17 homes on Wanda Lynn and Vendora Drive immediately north, and the home of the quarry owner which is at the north end of the Hankinson property. Homes along Highway 10 extending to Nictaux Falls are approximately 1 km from the quarry property and one farm on South Mountain is 550 m south of the south boundary of the property. Access to the quarry site along Gravel Pit Road is through a small subdivision of five homes.

A variety of commercial services for the communities of Nictaux, Nictaux Falls and West Nictaux are situated along Highway 201 and Highway 10 in Nictaux, including: an apartment building, a gas bar, a Needs convenience store and Ben's Bakery Outlet; Nictaux United Baptist Church and Christian Family Centre; a ceramics centre and craft club (B & J Ceramics Shop and Club); the Nictaux Volunteer Fire Department, a Car Quest auto parts dealership, Albert F. Veinot Auto Sales (used cars); the Twelve Baskets food bank, and a restaurant. The commercial district is about 1.2 km from the quarry site.

The Nictaux quarry site is adjacent to the Balcom Brothers sand and gravel pit operation (PID5058763) and further to the east to the former Ward Aggregates Property (PID 5058748) which is not presently being used. The quarry provides a valuable source of aggregate and paving materials for the local economy, as well as employment and spinoffs locally.

5.1.11 Tourism and Viewscape

The Nictaux-Middleton area of the Annapolis Valley is an important one for visitors, in particular due to the presence of Highway 10, one of the Trunk Highways crossing the province from New Germany and Bridgewater. Nictaux River and the decommissioned power plant at Nictaux Falls are interesting features of the area, and the Town of Middleton has many tourist attractions and services. The quarry will probably not be noticed by visitors to the area, either on foot or in vehicles. The quarry is about 1 km from Highway 10 and cannot be seen by travellers; the quarry and development is located about 1 km from Highway 201, and angle of elevation will be comparatively low, with maximum top face of the quarry probably not more than 110 m (about 40 m above the present top of the face) compared with maximum elevations greater than 150 m beyond on South Mountain. Due to the separation distance from Highway 201, the quarry will not have a high visibility from the highway and the subdivision on Wanda Lynn Drive. While on site an attempt was made to find a location where the existing quarry could be seen from Wanda Lynn Drive and Gravel Pit Road but it is not easily visible from either area. In addition, the more gradual slope behind the quarry will mean that it can extend further back for some distance without substantially increasing its visibility from Highway 201 and adjacent areas. Although it may be possible to see the quarry from North Mountain, the maximum size is comparatively small laterally in the view plane (375 m east-west) and would not be particularly visible from a great distance.

5.1.12 Transportation

Highway 10 is a major travel route across province between Bridgewater-New Germany and Middleton including tourist and regional commercial traffic. Highway 201 is used more for local use by residents, and for transportation of agricultural products and aggregate. When in

[1] The proponent has signed agreements from the owners of the three residences located within 800 m of the proposed location of blasting and has completed well water surveys, including water quality testing

operation, the quarry will generate additional truck traffic in the vicinity of the site. Safety concerns arise when traffic along Highway 201 meets the crossroads with Highway 10 at Nictaux, leading to periodic congestion. Depending on location of delivered product, any of the roads leading from the site could experience added traffic. After passing through Nictaux, Highway 10 passes directly into central Middleton, from where it must pass through town to access Highway 101 in the area.

5.2 Existing Quarry Operations

The existing quarry operations involve blasting, crushing, washing, stockpiling of aggregate and associated trucking on an as required basis. In addition, a portable asphalt plant is occasionally situated on the property. The quarry has operated in accordance with an existing "Industrial Waste Permit Approval #2009-066020-R01, as attached to a cover page dated April 30, 2009 to Mr. Christopher Hankinson from Janet MacKinnon, 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 have occurred on an as required basis, however it is noted that blasting has occurred on an average of 1 to 2 times per year. Surface water sample collection is completed at the request of NSE. No samples have been requested or collected to date.

However, the collection and analysis of a rock sample for sulphur content to determine if the material was sulphide bearing, was completed. The results of this analysis yielded a sulphur concentration of 0.017 % (0.53 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 Nictaux quarry for the extraction, storage and removal of aggregate, primarily used in the road and local construction industry. 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. The active footprint, including all related operational, storage and surface water control facilities, of the quarry will be approximately 20 ha.

Although totally dependent on local market conditions, it is anticipated, at this time, that future development will involve the production of approximately 50,000 tonnes of aggregate per year, moving in a south-easterly direction from the existing face (**Drawing # 2, Appendix B**). Given an annual extraction of 50,000 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 77,000 m^2, which based on an average annual tonnage removed of 50,000 tonnes represents an estimated reserve of approximately 20 years.

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 noted that there are three (3) residences within an 800 m radius of areas proposed for blasting. In this regard, Dexter has acquired the appropriate sign offs from these residents and has also conducted pre-blast surveys on all three (3) properties in question. This information is included in this document in **Appendix F**, Public Consultation Documentation.

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. 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 Pit Road to Highway 201, a distance of approximately 1.0 km. It is noted that Dexter currently has a right-of-way agreement with Mr. Bert Balcom which allows the haulage of material through his property, along Pit Road. This avoids the use of Wanda Lynn Drive and the movement of trucks through the associated subdivision. From the end of Pit Road, trucks would either exit north to Highway 1 and Highway 101, or south to Trunk 10. The number of trucks hauling aggregate will be determined on a job by job basis, but currently averages approximately 1800 per year.

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 1**. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following and are summarized in **Tables 2 & 3**.

Table 1
Valued Environmental Components (VECs) for Nictaux Quarry Expansion

Biophysical	Socioeconomic
Air Quality and Noise	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	Parks and Protected Areas
Northern Redbelly Dace	Water Supplies & Wells
	Industrial/Commercial

6.1 Socioeconomic Impacts

6.1.1 Mi'Kmaq

The Mi'Kmaq occupied much of Nova Scotia prior to European contact and would have used river valleys in particular in the area for habitation, hunting and fishing. 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. Based on available literature, the site does not appear to have any cultural historical significance for the Mi'Kmaq and no artifacts indicating prehistoric or historical use were identified at the site (CRM 2013, **Appendix E**). The site has been largely disturbed by the sand and gravel operations, the current quarry, as well as various cycles of logging.

Quarry operations would interact with any use of natural resources through hunting or fishing, either recreationally or for subsistence, through modifications of the headwaters of Kempt Brook, which is a tributary to the Annapolis River; 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 walking, cycling and home-based recreation in residential areas. Some nature appreciation may also take place. The quarry is a significant distance from roads and residences and would be cyclic, likely occupying mainly the summer construction season. Although the operations could likely be heard and residents would experience truck traffic and other effects of quarry operations, the impacts on these activities are expected to be negligible.

6.1.3 Tourism and Viewscape

The property is located some distance from any of the major roads and the rails-to-trails corridor, and would be both poorly visible and relatively little heard by passers-by. Only the entrance to the quarry is visible from the highway and the expanded quarry will also not be visible from the road. The quarry viewed from great distance, such as on North Mountain, is not expected to be particularly noticeable. Use of the area by truck traffic and workers at the quarry would help to support commercial services such as the convenience store. Overall the impacts on viewscape and tourism would be expected to be negligible.

6.1.4 Recreational Fishing

The lower reaches of Kempt Brook, which originates in the vicinity of the quarry, are probably used from time to time by locals for fishing. The quarry expansion will not affect recreational fishing as it is not expected to change the hydrology significantly. Water quality of the runoff from the quarry is good for salmonids, including low turbidity and neutral pH, which would lead to good quality of waters downstream for fish. Overall a negligible impact of the quarry on recreational fishing is expected.

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 on the site is not suitable for agriculture or forestry due to the terrain and the prior removal of sand and gravel deposits found at the site. Most of the forest at the site has been logged and disturbed. Areas containing remnant forest will be preserved if possible to assist in maintaining wetlands at the site and to provide a buffer of adjacent areas from quarry activities. Quarry activities are not expected to impact existing uses of nearby areas for agriculture or for commercial and residential use. Values for residential properties will likely be only minimally affected by the presence of the quarry. Residential development in the area may proceed at a slower pace than it would in the absence of the sand and gravel and quarry operations. The quarry and other sand and gravel pits have been operating in the area for many years with little impact on the local residential and farm community.

6.1.7 Transportation

The quarry generates a low level of truck traffic on the highways in the area, but activity levels are not expected to increase significantly, and consequently the quarry is not expected to change the existing traffic volumes significantly. Traffic in the area could increase because of increasing residential development in Nictaux as well as a general improvement in the economy and industrial activity, but the rate of change as well as the overall traffic volume is not expected to be influenced significantly by the quarry expansion. Use of other traffic corridors such as Highway 201 to access Highway 101 through Brickton and Wilmot would reduce congestion in Nictaux and Middleton. Overall the impact of the project on transportation is expected to be minimal.

6.1.8 Residential Use

Quarry activities have the potential to interfere with normal use and enjoyment of nearby residential properties by creating background noise and through truck and equipment traffic which some residents may find objectionable. Nictaux is among the most desirable areas for urban expansion in the Middleton area, and presence of the lands for the quarry, as well as a group of properties occupying the sand and gravel deposits to the east of the Hankinson property, may reduce the rate of residential development in the immediate future. Aspects of the quarry operation which interact with residential property owners in the Nictaux area include occasional noise from blasting (1-2 times per year), equipment noise both on site and from trucks travelling to and from the site; noise and light pollution from operation of portable plants such as crushers and asphalt plants on the site; and dust. The existing separation of the quarry from most of the properties is around 800 to 1000 m. The closest areas which could be developed for housing on the northeast side in the future are approximately 500 m from the northeast parts of the quarry property (and beyond 800 m from the active blasting area). The west and south areas bordering the quarry property are not likely to be developed for some time.

In general there will be sufficient separation from residences and commercial operations to minimize the impacts of noise on adjacent residential properties. Activities at the quarry would be limited in time seasonally (approximately March to November) and during the day, although night time operations, but not blasting, will be required under some circumstances. Speed limits on trucks would be set in residential areas to limit noise and dust production. Traffic volumes from the site would be moderate, and frequency would depend on the supply requirements for particular projects. Dust management will be practiced. 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 circumstances when they are undertaken at night, will involve minimal additional lighting and noise, which is unlikely to be a serious disturbance to local residents. It is expected that at some point in the future, the deposits used by the quarry will run out and the properties in the area may be available for other uses.

6.1.9 Water Supplies and Residential Wells

The water supply for the Town of Middleton is from groundwater wells located within the Town Limits. Residences, commercial properties, and farms in Nictaux, Nictaux Falls and Nictaux West rely on groundwater wells. The project is remote from Town wells and occasional blasting at the quarry is not expected to impact existing wells in the area, in particular since it is located in a separate bedrock unit from the main groundwater resources used in the area. Runoff from the quarry, which flows over sandy surface deposits which overly the aquifers in the area, and can potentially percolate through them, is of high quality (low conductivity and dissolved solids and neutral in pH). Best management practices for operations will be undertaken to eliminate the potential for release of contaminants such as hydrocarbons from vehicles, and from chemicals contained in explosives, to enter aquifers at the site. Overall, activities at the quarry are not expected to impact wells in the area. As noted in Section 5.1.3, the existing quarry has been in operation for 16 years, and during this time there have been no reports of any negative effects to local groundwater well users either in terms of water quality or quantity. However, the on-going quarry development will include the creation of a surface water monitoring program and the installation of groundwater monitoring wells, in consultation with NSE, to provide information on baseline water quality in the area. The surface water stations and groundwater monitoring wells will be sampled on a regular basis to ensure that the quarry operations are not creating adverse effects to the surrounding surface water and groundwater resources.

6.1.10 Parks and Protected Areas

The Trans Canada Trail which occupies the abandoned rail corridor between Middleton and Bridgewater is located approximately 1 km east of the site. Activities at the quarry may be heard from the trail, but the quarry is comparatively distant, is not visible from the trail and noise levels will be low. The trail is not far from Highway 10, which is one of the major travel routes across the province, and traffic on the road which would typically be louder than the quarry. Users of the trail would also become acclimatized to the distant background noise, and not be disturbed by it. Overall the impacts on use of the trail would be negligible.

6.1.11 Resource Use—Forestry & Trapping

The site of the quarry has been logged to permit quarry operations, and so will not be available for logging in future; however the area occupied by the quarry is relatively small in relation to the available forest resources in the area, and the overall impact is expected to be small. Wetlands not in the footprint of the quarry are expected to be avoided, providing habitat for occasional use by wildlife, which could contribute to utilization in the undeveloped lands surrounding the quarry.

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 heavy equipment (e.g. earth movers, crushers), 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 routine operations are expected to be minimal, and dust management will be undertaken, including use of water spray and covering working and lay down areas with blasted rock. Monitoring of airborne particulate emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines and the Nova Scotia Air Quality Guidelines.

Exhaust 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 several pieces of heavy equipment, earth movers, trucks etc. as well as operation of crushers and asphalt plant), which will be localized and similar in type and amount 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 already produced at the site, since the operations are expected to be similar in size at a given time, 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).

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 contributes to increased dust and particulate levels. Activities at the quarry including crushing, equipment use, and truck movement, back-up alarms etc. will generate dust and noise at the quarry. 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 lay down 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. In particular, Particulate Emissions shall not exceed the following limits at or beyond the Site property boundary:

Annual Geometric Mean 70ug/m^3

Daily Average (24 Hr.) 120ug/m^3

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 current operations, and the proponent will ensure that they do not exceed those specified in the Nova Scotia *Pit and Quarry Guidelines*.

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)

Blasting is expected to occur infrequently (1-2 times per year) and will occur only during daylight hours (0800 and 1800 hours). Concussion (air blast) is limited to 128dBl as measured within 7 m of the nearest structure not located on the site. Ground vibration is limited to 0.5 in/sec (12.5 mm/sec) as measured below grade or less than 1 m above grade in any part of the nearest structure not located on the site.

6.2.2 Geology /Hydrogeology

The study area is in eastern Annapolis County on the slope of South Mountain. The main bedrock geological formations at the site include: Wolfville Formation consisting of interbedded red and grey conglomerate, sandstone, siltstone and claystone; Elderkin Formation, a sub-unit of the Halifax and Goldenville Formations which occupies most of the site, containing light grey to red-brown laminated slate and mudstone and the greywackes and quartzite forming the target deposit; and the South Mountain Batholith, an igneous formation located to the south and southwest and which locally intrudes into other formations with granodiorite (Keppie 2000; Trescott 1968; White 2009). Quarry rock has a low sulfur content (sulphur 0.017%) and low acid-generating potential (12.51 kg/tonne), which is well below acceptable regulatory limits.

The site slopes abruptly towards the north from South Mountain to the floor of the Annapolis Valley, which at the site is level to undulating, comprised of sand and gravel deposited as kame moraines and eskers from a melting glacier, as well as outwash deposits of sand and gravel (Stea et al 1992; Trescott 1968). At the site most of the sand and gravel in the glacial deposits has been removed, levelled, or excavated approximately 5 m below the original land surface. A shallow veneer of glacial till occurs on slopes.

Activities associated with the project including forest clearing, grubbing and removal of overburden, and blasting, influence groundwater flow locally in the vicinity of the quarry, but are not expected to influence groundwater aquifers elsewhere on the property or in adjacent areas. The amount of recharge area involved in project activities is extremely small in relation to the overall size of the aquifers in the Nictaux area. The effect on overall groundwater patterns will be small, however, due to the small area of the quarry in relation to the area of the adjacent landscape. The overall impact on hydrogeology at the site is therefore expected to be negligible.

6.2.3 Hydrology

Expansion of the quarry will result in an increasingly artificial and managed regime of surface water movement and runoff at the site, mainly near the quarry but potentially affecting the entire active area of quarry operations. With the quarry present, peak runoff flows at the site have likely increased over natural levels, and will do so in the future as the quarry expands. This will affect downstream flows in Kempt Brook, into which the site drains, and will affect the hydrological balance in a wetland and two branches of Kempt Brook which arise below the quarry, having at some time in past diverted runoff away from the wetland and from the southwestern tributary of the Brook into the northern tributary. The wetland is important ecologically and the productive ecosystem of a sand pit pond on the north end of the Hankinson property—the pond which contains the Northern Redbelly Dace which is a species of interest at the site, as well as having a productive ecosystem—relies in part on the diverted runoff from the quarry. The present runoff management system also leads to movements of fish from the north end of the Hankinson Property through settling ponds and ditches, to upstream areas near the quarry, where they can be stranded when the flows subside. Thus the present runoff management approach has both positive and negative aspects which could impact the local environment.

A plan for runoff management from the quarry can be instituted which allows for sufficient retention and slowed release of runoff to avoid major impacts to downstream areas, as well as having barriers for fish passage to prevent movements upstream into the artificial drainage system. Ideally the present artificial diversion of runoff between branches of Kempt Brook should be maintained, because of the unknown consequences for species in the pond of major changes in flow.

6.2.4 Water Quality

Water quality downstream of the site is important for fish habitat in the lower watershed of Kempt Brook, and the porous sand and gravel deposits on the property are important for recharge of local groundwater aquifers. Quality of water leaving the site and entering the stream is high, due both to the onsite flow management, settling ponds, etc. and the bedrock quality. Quarry rock is within acceptable limits for sulphur and acid-generating potential. Presence of the quarry probably has 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. Blasting is not expected to result in groundwater quality changes, particularly with efforts to reduce releases of other chemicals such as nitrates used in blasting. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. On-site water and sedimentation management both existing and to be established, including settling ponds are expected to be capable of handling any suspended sediment issues. Release of other contaminants such as oils and lubricants from operating equipment can potentially impact downstream areas, but is expected to be mitigated by normal precautions on equipment operations and fuelling locations, established Contingency Plans and

measures to reduce runoff from storage piles, and in any case, the concentrations of any contaminants are expected to be exceedingly low.

6.2.5 Freshwater Aquatic Environments

The intermittent stream on the site, as well as the complex of temporary ponds, settling ponds and streams on the north end of the Hankinson Property form a productive ecosystem in the area. Activities at the quarry have the potential to impact these features chiefly through changes in patterns, timing, and amount of runoff from the site. In particular, the diversion in the past of runoff from a wetland on the property and the southwest branch of Kempt Brook, into the north branch, has been such a change. However the present state of Kempt Brook north of the Hankinson Property appears to be healthy, in part due to the increased flow it is receiving from the quarry. The ponds in the sand and gravel pits at this site and in the gravel/sand body in this area in general, have interfered with natural flows, but the result has been a fairly productive ecosystem. The expansion of the quarry, as proposed, could only affect the state of this ecosystem if runoff management seriously altered the present patterns. Runoff management plans to be developed in consultation with NSE, will ensure that this existing ecosystem will be protected.

6.2.6 Wetlands

Several wetlands occur on the quarry property but only two seepage swamps disturbed during logging the site (0.28 & 0.04 ha) in the area to the south proposed for quarry expansion will be affected. Compensation for loss of the wetlands will likely be required; however the disturbance of these wetlands will not trigger a requirement for a separate environmental assessment, due to their small size. A seepage swamp and shrub/graminoid swamp at the foot of the slope is not planned to be disturbed. There are opportunities for improvement in the lower wetland, which have been partly disturbed through previous activities. Overall the impact of the quarry expansion will be relatively minor and potentially lead to an improvement in conditions in wetlands at the site.

6.2.7 Fish and Fish Habitat

None of the proposed project activities will physically impact Kempt Brook, the main surface water stream in the area, although the flow regime may be changed slightly to reflect additional runoff. A small intermittent stream running down the slope at the site will likely be removed as the quarry expands and all the runoff from the upper slope will be managed.

The unique (for Annapolis County) occurrence of Northern Redbelly Dace in a pond on the northern section of the Hankinson property requires that particular care be taken in runoff management from the quarry property, at least until it can be determined that the species occurrence is more widespread in the area. At present the quarry is only one of several sources for the pond, but it appears to be an important one. In developing the quarry, runoff management should be planned carefully to ensure that the present flow regime is duplicated as closely as possible, to ensure that flow patterns at the pond are maintained. The runoff management system should also include construction of a fish passage barrier between the main settling pond and the Hankinson pond, to reduce the possibility that fish (both dace and other species found in the pond) do not move upstream into drainage ditches and become stranded. With appropriate mitigation, the impacts on the Redbelly Dace are expected to be negligible.

6.2.8 Flora and Fauna and Habitat

The existing terrestrial ecosystem (plants and animals) will be removed in areas covered by the footprint of the quarry. Most of the land on the South Mountain slope within the property boundary has been cut by the landowner but has potential for re-growth. Several wooded or partially wooded habitats, including wetland areas, are still in place on the property and, in particular, the wooded areas could serve as buffers, wildlife habitat, and assist in runoff management and control. Maintaining these areas would have an important positive impact on the overall ecosystem at the site, and help to compensate for the removal of forest habitat in the vicinity of the quarry. As the quarry expands, areas not needed will be reclaimed and re-vegetated, in consultation with Nova Scotia Environment and in response to likely approval requirements. Reclamation will reduce the overall impact of the project on loss of terrestrial ecosystems at the site.

6.2.9 Species at Risk

Areas which have been undisturbed for long periods and have been allowed to return to a semi-natural state, have the potential to support less common species with unique environmental requirements, including rare and uncommon species. The environments at the quarry site, in particular the sand and gravel features found here and woods which develop on them are relatively unique, but, for the most part have been completely removed by the actions of previous sand and gravel operations. The wetlands and some of the landscape on the site may contain some of the features, characteristics and unique conditions. A goal of development of the quarry is to avoid damage to the adjacent terrestrial ecosystems and to allow them to re-vegetate.

No species at risk were found at the site; however the occurrence of Northern Redbelly dace in the ponds at the north end of the Hankinson property is significant as it represents the only occurrence of the species yet known in the Annapolis River watershed and the furthest west in Nova Scotia. Quarry activities can only affect the species if the present runoff management system changes; therefore efforts should be made to ensure that the runoff management includes a component which looks at the flow requirements of the Dace, as well as other species in the sand pit ponds on the Hankinson property; and also includes measures to prevent movement of fish from these ponds upstream past the settling ponds.

6.3. Other Undertakings in the Area

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

Table 2

Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Nictaux 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	Residential Use	Recreational & Mi'Kmaq Fishing	Water Supply	Land Use and Value	Transportation	Industrial, Agricultural	Parks & Protected Areas	Resource Use Forestry /Trapping
Construction																			
Site Clearing/Grubbing	√	√	√	√	√		√	√	√		√	√		√	√			√	√
Drilling	√										√	√						√	
Blasting	√	√	√	√		√	√				√	√	√	√				√	
Operation																			
Moving/Transporting Rock and Product	√										√	√	√	√	√	√	√	√	
Crushing	√											√		√	√			√	
Washing	√	√	√	√	√	√	√		√			√						√	
Site Runoff Management		√	√	√	√	√			√						√		√	√	
Portable Asphalt Plant	√		√									√			√	√		√	
Onsite Materials Storage (e.g. recycled asphalt)			√																
Accidents (Oil/ Fuel Spills)		√	√	√	√	√	√		√		√	√	√		√		√		

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

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
BIOPHYSICAL COMPONENTS						
Air Quality/Noise	Construction	Noise and dust from heavy equipment during logging and grubbing.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of use by residents in the Nictaux community.	Not significant.
	Operation	Drilling and blasting; equipment for moving rock; crusher & heavy equipment operation.	Significant	Negative	Monitor noise levels and undertake to avoid exceedances of regulatory levels. Institute measures for dust control.	Not significant.
Hydrogeology/ Hydrology	Construction	Forest and soil removal changes surface water flow.	Negligible	Negative	Likely small changes in groundwater and runoff patterns.	Not significant.
	Operation	Blasting fractures bedrock and changes groundwater flow patterns.	Significant	Negative	Bedrock not in same aquifer used by Nictaux. Monitor groundwater hydrology to determine changes.	Not significant.
	Operation	Quarry and work areas change surface water flows. Increased peak stormwater flows.	Significant	Negative	Onsite water management to moderate extreme surface water runoff and suspended sediment levels; measures to maintain normal flow regime.	Not significant.
	Operation	Accidental hydrocarbon spills and blasting residues contaminate groundwater	Significant	Negative	Measures to minimize danger of spills; on-site emergency numbers, spill kits etc. Avoid refueling near watercourses and in sand and gravel deposits.	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.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Water Quality	Operation	Dust & suspended sediment from operations potentially enter headwaters of Kempt Brook. Chemicals (e.g. nitrates) from explosives entering runoff.	Significant	Negative	Onsite dust control and water management to moderate surface water runoff and suspended sediment levels. Closely monitor explosive residues after blasting.	Not significant.
	Operation	Chemicals in runoff from materials (e.g. recycled asphalt) stored on site.	Negligible	Negative	Best management practice allows leaving piles exposed to the environment.	Not significant.
Freshwater Aquatic Environments	Construction	Higher peak flows and suspended sediment during activities.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.
	Operation	Retention of runoff for aggregate washing. Lower normal flows in watercourses adjacent to site.	Significant	Negative	Onsite water management to store additional wash water during off peak season, Preserve woodland in buffer areas of quarry.	Not significant.
	Operation	Flows from quarry affect different branches of Kempt Brook	Significant	Negative	Ensure present balance of onsite runoff flows are maintained to preserve sand pit ponds, as well as wetland on site.	Not significant.
	Operation	Releases of chemicals from blasting and runoff from materials stored on site.	Negligible	Negative	Measures to isolate chemical releases and runoff from stored materials piles.	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 several small wetlands.	Significant	Negative	Compensate for wetland loss through NSE wetland alteration approval process. Maintain vegetated buffer for wetlands as long as possible before removal.	Not significant.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Construction	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent watersheds.	Negligible	Negative	Quarry affects small area relative to Kempt Brook watershed as a whole; however present balance between branches and ponds should be maintained.	Not significant.
	Operation	Change in flow regime in branches of Kempt Brook	Negligible	Negative	Settling and retention ponds & onsite water management moderate flows; fish movement barriers to prevent exchange from Kempt Brook to quarry ditches.	Not significant.
	Construction & Operation	Change in flow regime could affect pond containing Northern Redbelly Dace	Significant	Negative	Ensure that major changes to runoff regime and management at the quarry do not take place.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
	Operation	Accidental spills into Kempt Brook and other waters from truck accidents on Hwy 210 & 10.	Negligible	Negative	Recommend truck traffic use safe driving practices and reduce speed in vicinity of quarry and Nictaux community. 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 & Operation	Accidental releases, contamination of habitat.	Significant	Negative	Provide pollution prevention and emergency measures & response capability. Remediate any permanent areas affected by spills.	Not significant.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Construction & Operation	Removal of potential forest and wildlife resource (i.e. wildlife habitat)	Negligible	Negative	Small area affected relative to total available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant.
Species at Risk	Construction	No species at risk in the proposed footprint of the quarry.	Negligible	Negative	Leave mature standing trees where possible as nest cavities.	Not significant.
SOCIOECONOMIC COMPONENTS						
Mi'Kmaq	Construction and Operation	Any land use conflicts with Mi'Kmaq Right to Use Land	Significant	Neutral	Consult with Mi'Kmaq First Nations.	Not significant.
		Contamination of local watershed affects Mi'Kmaq Food Fishery in Annapolis River Watershed	Negligible	Negative	Surface water monitoring program will be developed in consultation with NSE. Follow company Best Practices to avoid accidental release of contaminants to headwaters of Annapolis River.	Not significant.
Recreation	Construction & Operation	Noise and sightlines to walking and cycling use of Hwy 10 & 201	Not significant	Negative	Users will be aware of activity at quarry but will not be otherwise impacted by it.	Not significant.
Tourism and Viewscape	Construction & Operation	View of site and industrial character	Significant	Negative	Rehabilitate areas no longer needed for activity and future development.	Not significant.
Residential Use	Construction & Operation	Noise; light pollution; operation of trucks and transportation of heavy equipment. Restrict expansion of urban area.	Significant	Negative	Use best management practices to reduce disturbance to nearby residents. Rehabilitate areas no longer needed for activity and future development.	Not significant.
Recreational and Mi'Kmaq Hunting and Fishing	Construction & Operation	Accidental hydrocarbon spills and blasting residues contaminate surface waters	Significant	Negative	Provide pollution prevention, emergency measures & response capability. Identify and control contaminant releases.	Not significant.
	Construction	Loss of forested area under quarry footprint.	Not significant	Negative	Rehabilitate areas no longer needed for activity and future development.	Not significant.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Water Supply	Construction and Operation	Blasting potentially impacts aquifers.	Not significant	Negative	Develop groundwater monitoring plan in consultation with NSE.	Not significant.
Land Use and Value	Construction & Operation	Removal of potential forest and wildlife resource (e.g. forestry & trapping).	Negligible	Negative	Small area affected relative to total land available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant.
Transportation	Operation	Wear on highway	Negligible	Negative	Current levels low and will not increase.	Not significant.
	Operation	Truck traffic	Not significant	No Change	Use good directional signs, viewing pull-offs, posted speed limits and speed policy in vicinity of quarry.	Not significant
Residential, Industrial, Agricultural Use	Construction & Operation	Noise for local residents	Not 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.
	Operation	Competition with other Quarries	Negligible	Neutral	Could affect sales of other quarries but could also result in efficiencies for both.	Not significant.
Parks and Protected areas	Construction & Operation	No local interactions	Not applicable	Not applicable	Not applicable.	Not applicable.

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. Development of other quarries, in the vicinity, is unlikely. Dexter owns a property east of the site towards Nictaux Falls, but there would be no need to develop it while the Nictaux quarry is operating. The adjacent sand and gravel deposits, while contributing to occasional excavating activity at the site, are largely spent and so levels of activity would continue to be small and not conflict with the Nictaux quarry operations. Residential/commercial development potentially could disrupt the natural environment surrounding parts of the quarry site, and logging of the adjacent forests, which is an ongoing activity in Annapolis County, if it takes place, could for a time, disrupt the forest ecosystems in the area.

9.0 MONITORING

None of the Valued Environmental Components in the vicinity of the Nictaux quarry will be significantly impacted by the quarry expansion. In consultation with NSE, a plan will be developed for the monitoring of hydrological and hydrogeological conditions at the site as well as water quality and fish habitat in Kempt Brook, including the population of Red Belly Dace in the sand pit pond.

Noise levels are not expected to change as the quarry will not increase significantly in activity or withdrawals and similar levels of noise will be expected in future. However, monitoring will be conducted at the request of NSE.

10.0 PUBLIC CONSULTATION

The Proponent has not held public or Mi'Kmaq consultations in the area about the proposed expansion of the Nictaux quarry—public meetings are not required for the EA registration. As noted previously however, briefings have been held with local public officials and a notification of the EA filing will appear in both local and Provincial editions of the Chronicle Herald as well as the Annapolis County Spectator.

11.0 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.

12.0 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 Annapolis Valley District office of Nova Scotia Environment.

13.0 FUNDING

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

14.0 SIGNATURE OF CEO AND DATE

April 15, 2015
Date

Cecil Vance
Cecil Vance – General Manager
Dexter Construction Company Limited

APPENDIX A
Property Information

Environmental Assessment Registration
Document for Nictaux Quarry Expansion

Profile

Printer Version

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

PROFILE - DEXTER CONSTRUCTION COMPANY LIMITED - as of: 2015-04-10 09:41 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 Street Halifax NS Canada B3J 3N4
Mailing Address:	1800-1801 Hollis Street Halifax NS Canada B3J 3N4

PEOPLE

Name	Position	Civic Address	Mailing Address
Carl B. Potter	Director	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	
Kurt Jacobs	President	927 Rocky Lake Drive Bedford NS B4A 3Z2	
David A. Wood	Chief Financial Officer & Secretary	927 Rocky Lake Drive	

		Bedford NS B4A 3Z2	
Cecil G. Vance	General Manager	927 Rocky Lake Drive Bedford NS B4A 3Z2	
Carl B. Potter	Chairman	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 Street Halifax NS B3J 3N4	1800-1801 Hollis Street Halifax NS B3J 3N4

ACTIVITIES

Activity	Date
Annual Renewal	2014-12-09
Annual Statement Filed	2014-12-09
Annual Statement Filed	2013-11-29
Annual Renewal	2013-11-26
Change of Directors	2013-09-12
Change of Directors	2013-03-18
Annual Statement Filed	2012-11-26
Annual Renewal	2012-11-26
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
Incorporated in Other Jurisdiction	1961-12-22

Show All Collapse

RELATED REGISTRATIONS

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

NOVA SCOTIA
Environment

APPROVAL

Province of Nova Scotia
***Environment Act*, S.N.S. 1994-95, c.1**

APPROVAL HOLDER: Christopher Hankinson

SITE PID: 5085279

APPROVAL NO: 2009-066020-R01

EXPIRY DATE: April 30, 2019

Pursuant to Part V of the *Environment Act*, S.N.S. 1994-95, c.1 as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:

Construction and operation of a Quarry, and associated works, at or near 93 Wanda Lynn Drive, Nictaux, Annapolis County in the Province of Nova Scotia.

Administrator Janet MacKinnon

Effective Date April 30, 2009

TERMS AND CONDITIONS OF APPROVAL

Nova Scotia Environment

Approval Holder:	Christopher Hankinson
Project:	Quarry
Site:	93 Wanda Lynn Drive Nictaux, Annapolis County PID # 5085279
Approval No:	2009-066020-R01
File No:	92100-30
Map Series:	21 A/14
Grid Reference:	E354565 N4974400

Reference Documents:

- Application dated February 19, 2009 and attachments.
- Plan showing Mark Hankinson Rock Quarry, dated February 2009 and signed by H. Daniel Baillie

1. **Definitions**

a) "Abandonment" means cessation of production of aggregate for a period of twelve (12) months.

b) "Act" means the *Environment Act* S.N.S. 1994-1995, c.1 and includes all regulations made pursuant to the Act, and updated from time to time.

c) "Active Area" means the area required to operate a quarry and includes the working face and associated works.

d) "Associated works" means any building, structure, processing facility, pollution abatement system or stockpiles of aggregate.

e) "Department" means the Western Region, Kentville Office, of Nova Scotia Environment currently located at the following address:

Nova Scotia Environment
Environmental Monitoring and Compliance Division
Western Region, Kentville Office
136 Exhibition St. 2nd Floor
Kentville, NS B4N 4E5
Phone: (902) 679-6086
Fax: (902) 679-6186

f) "Disturbed Area" means any area on a quarry site that has been stripped of vegetation and is susceptible to erosion.

g) "Facility" means the Quarry and associated works.

h) "Minister" means the Minister of Nova Scotia Environment or Minister responsible for the Environment Act.

j) "Rehabilitation" means restorative work performed or to be performed in accordance with the rehabilitation plan.

j) "Structure" includes but is not limited to a private home, a cottage, an apartment building, a school, a church, a commercial building or a treatment facility associated with the treatment of municipal sewage, industrial or landfill effluent, an industrial building, infrastructure or construction, a hospital, and a nursing home, etc.

2. Scope of Approval

a) This Approval (the "Approval") relates to the Approval Holder and their application and supporting documentation, as listed in the reference documents above, to construct and operate the Facility, situated at or near 93 Wanda Lynn Drive, Nictaux, Annapolis County (the "Site").

b) The Facility shall be constructed and operated as outlined in the application for industrial approval dated February 19, 2009 and supporting documentation.

c) The Site shall not exceed the area as outlined in the application and supporting documentation.

d) Should the work authorized by this Approval not be commenced within a year, this Approval shall automatically be null and void, unless extended in writing by an Administrator.

3. **General Terms and Conditions**

a) The Approval Holder shall construct, operate and reclaim its Facility in accordance with provisions of the:

i) *Environment Act* S.N.S. 1994-1995, c.1, as amended from time to time;
ii) Regulations, as amended from time to time, pursuant to the above Act;
iii) Pit and Quarry Guidelines, revised August 20, 2003 and as amended from time to time.

b) The Approval Holder is responsible for ensuring that they operate the Facility on lands which they own or have a lease or written agreement with the landowner or occupier. The Approval Holder shall be responsible for ensuring that the Department has, at all times, a copy of the most recent lease or written agreement with the landowner or occupier. Breach of this condition may result in cancellation or suspension of the Approval.

c) If there is a discrepancy between the reference documents and the terms and conditions of this Approval, the terms and conditions of this Approval shall apply.

d) The Minister or Administrator may modify, amend or add conditions to this Approval at anytime pursuant to Section 58 of the Act.

e) This Approval is not transferable without the consent of the Minister or Administrator.

f) (i) If the Minister or Administrator determines that there has been non-compliance with any or all of the terms and conditions contained in this Approval, the Minister or Administrator may cancel or suspend the Approval pursuant to subsections 58(2)(b) and 58(4) of the Act, until such time as the Minister or Administrator is satisfied that all terms and conditions have been met.

(ii) Despite a cancellation or suspension of this Approval, the Approval Holder remains subject to the penalty provisions of the Act and regulations.

g) The Approval Holder shall notify the Department prior to any proposed extensions or modifications of the Facility, including the active area, process changes or waste disposal practices which are not granted under this Approval. An amendment to this Approval will be required before implementing any change. Extensions or modifications to the Facility may be subject to the Environmental Assessment Regulations.

h) Pursuant to Section 60 of the *Act*, the Approval Holder shall submit to the Administrator any new and relevant information respecting any adverse effect that actually results, or may potentially result, from any activity to which the Approval relates and that comes to the attention of the Approval Holder after the issuance of the Approval.

i) The Approval Holder shall immediately notify the Department of any incidents of non-compliance with this Approval.

j) The Approval Holder shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this Approval.

k) Unless specified otherwise in this Approval, all samples required to be collected by this Approval shall be collected, preserved and analysed, by qualified personnel, in accordance with recognized industry standards and procedures.

l) Unless written approval is received otherwise from the Administrator, all samples required by this Approval shall be analysed by a laboratory that meets the requirements of the Department's "Policy on Acceptable Certification of Laboratories" as amended from time to time.

m) The Approval Holder shall submit any monitoring results or reports required by this Approval to the Department. Unless specified otherwise in this Approval, All monitoring results shall be submitted within 30 days following the month of monitoring.

n) The Approval Holder shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the Facility operation are made fully aware of the terms and conditions which pertain to this Approval.

o) The Approval Holder will be required to register their project under Part IV of the *Environment Act* should the Facility and associated works exceed an area of four (4) hectares.

4. Construction of Facility

a) Erosion and sedimentation controls shall be in place prior to construction at this facility. Additional controls shall be implemented if Site runoff exceeds the discharge limits contained herein.

b) Erosion and sedimentation controls are to be maintained and remain in place until the disturbed areas are stabilized.

c) The Approval Holder shall ensure that the following discharge limits are met for any water which is discharged from the Site to a watercourse or wetland:

Clear Flows (Normal Background Conditions):

i) Maximum increase of 25 mg/l from background levels for any short term exposure (24 hours or less)
ii) Maximum average increase of 5 mg/l from background levels for longer term exposure (inputs lasting between 24 and 30 days)

High Flow (Spring Freshets and Storm Events)

i) Maximum increase of 25 mg/l from background levels at any time when background levels are between 25 mg/l and 250 mg/l
ii) Shall not increase more than 10% over background levels when background is > 250 mg/l

d) Signage including emergency telephone numbers and contacts are to be posted at the entrance to the Facility prior to start-up of the facility.

5. **Particulate Emissions (Dust)**

a) Particulate emissions shall not exceed the following limits at or beyond the Site property boundaries:

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

b) The use of used oil as a dust suppressant is strictly prohibited. The generation of dust from the Site shall be suppressed as required.

c) Monitoring of particulate emissions shall be conducted at the request of the Department. The location of the monitoring station(s) for particulate will be established by a qualified person retained by the Approval Holder and submitted to the Department for approval, this may include point(s) beyond the property boundary of the Site.

d) When requested, suspended particulate matter shall be measured by the EPA standard; EPA/625/R-96/010a; Sampling of Ambient Air for Total Suspended Particulate Matter (SPM) and PM_{10}. Using High Volume (HV) Sampler.

6. Sound Levels

a) Sound levels measured at the Site 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)

b) Monitoring of sound levels shall be conducted at the request of the Department. The location of the monitoring station(s) for sound will be established by a qualified person retained by the Approval Holder and submitted to the Department for approval, this may include point(s) beyond the property boundary of the Site.

7. Surface Water

a) The site shall be developed and maintained to prevent siltation of the surface water which is discharged from the property boundaries into the nearest watercourse or beyond the property boundary. Additional controls shall be implemented if site runoff exceeds the discharge limits contained herein.

b) No authority is granted by this Approval to enable the Approval Holder to discharge surface water from the quarry beyond the property boundary and onto adjoining lands without the authorization of the affected landowner(s). It is the responsibility of the Approval Holder to ensure that the authorization of said landowner(s) is current and valid. Failure to maintain said authorization will result in this Approval being null and void. The Approval Holder shall provide, to the Department, proof of the continued authorization of the adjoining landowner(s) when the current agreement has expired.

c) Erosion and sedimentation control devices shall be installed prior to any excavation of material.

d) The Approval Holder shall ensure the following liquid effluent levels are met and that the effluent is monitored at the frequency and locations indicated.

i) **Total Suspended Solids**

Clear Flows (Normal Background Conditions):

1) Maximum increase of 25 mg/l from background levels for any short term exposure (24 hour or less)

2) Maximum average increase of 5 mg/l from background levels for longer term exposure (inputs lasting between 24 hours and 30 days)

High Flow (Spring Freshets and Storm Events):

1) Maximum increase of 25 mg/l from background levels at any time when background levels are between 25 mg/l and 250 mg/l
2) Shall not increase more than 10% over background levels when background is > 250 mg/l

ii) **pH**

1) Maximum 5 to 9 in grab sample
2) Maximum 6 to 9 as a Monthly Arithmetic Mean

iii) **Monitoring Locations**

1) The Approval Holder shall sample at locations determined by the Department, upon request.

iv) **Sampling Frequency**

1) The Approval Holder shall sample at a frequency determined by the Department, upon request.

e) If it becomes necessary to drain the Site, the runoff water shall be treated to meet the suspended solids limits outlined in this Approval.

f) All wash water systems shall be arranged in closed circuit.

g) Additional monitoring stations for liquid effluent may be specified as required by the Department.

h) A monthly summary of results of monitoring shall be submitted to the Department upon request. Results shall be included in an annual report.

8. **Groundwater**

a) The Approval Holder shall replace at their expense any water supply which has been lost or damaged as a result of extracting aggregate and rectify the problem to the satisfaction of the Department.

b) The Approval Holder shall not excavate below the water table. An amendment to this Approval, authorizing excavation below the water table, must be secured from the Minister prior to excavating below the watertable.

9. **Separation Distances**

a) The Approval Holder shall not locate the Active Area of the quarry within:

i) 30 m of the boundary of a public or common highway.

ii) 30 m of the bank of any watercourse or ordinary high water mark or wetland.

iii) 30 m of the boundary of the quarry property.

b) The Approval Holder shall not blast within:

i) 30 m of the boundary of a public or common highway.

ii) 30 m of the bank of any watercourse or ordinary high water mark or wetland.

iii) 800 m of the foundation or base of a structure located off site.

iv) 15 m of the property boundary when a structure on the abutting property is not involved.

10. **Blasting**

a) The Approval Holder shall have a technical blast design prepared by a qualified person which ensures the ground vibration and air concussion limits in this Approval can be achieved. Copies of these should be included in the annual report.

b) The Approval Holder shall conduct a pre-blast survey including a water quality analysis of all structures within 800 metres of the Facility. The survey shall be conducted in accordance with the Department's 'Procedure For Conducting a Pre-Blast Survey" and the results of this survey sent to the Department prior to any blasting on the Site. Water quality parameters will be determined by NSE staff.

c) The Approval Holder 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.

d) No blasting shall occur on Sunday, on a statutory holiday prescribed by the Province, or on any day between 1800 and 0800 hours.

e) The Approval Holder shall ensure that all blasts are monitored for concussion and ground vibration to ensure that the limits in Table 2 are not exceeded.

f) The monitoring station for blasting shall be as indicated in Table 2. Additional monitoring stations for blasting may be specified as required by the Department.

g) A monthly summary of results of monitoring shall be submitted to the Department upon request. Results shall be included in an annual report.

Table 2

Blasting Limits

Parameters	Maximum	Monitoring Frequency	Monitoring Station
Concussion (Air Blast)	128 dBL	Every Blast	Within 7 m of the nearest structure not located on the Site
Ground Vibration	0.5 in/sec (12.5 mm/s)	Every Blast	Below grade or less than 1 m above grade in any part of the nearest structure not located on the Site

11. Rehabilitation

a) The Approval Holder shall post an interim security in a form acceptable to the Department in the amount of $2,500.00 an acre of disturbed area and/or proposed disturbed area on or before **April 30, 2009.** The Approval is null and void should the security not be posted.

b) The interim security shall not exceed one (1) year unless otherwise agreed in writing by the Administrator.

c) The Approval Holder shall submit a rehabilitation plan to the Department for review by **July 31, 2009**. The rehabilitation plan shall be revised and updated every three years thereafter and submitted for review. The rehabilitation plan

shall include the estimated total cost for labour, equipment, supplies and services of a third party contractor to undertake the following activities:

i) surface contouring
ii) establishing proper drainage
iii) re-vegetation work
iv) any work necessary to reclaim the quarry

Disturbed areas must be reclaimed with native grasses and trees and with species not known to be invasive.

d) Before the expiry of the interim security, the Approval Holder shall post a final security which shall be calculated using the rehabilitation plan and factors in item c) above. The final security shall be revised every three years in accordance with the revised rehabilitation plan.

e) The Approval Holder shall rehabilitate the Site within twelve (12) months of abandonment and in accordance with the rehabilitation plan submitted by the Approval Holder in 11 (c) or other terms as specified by the Department,

f) Nova Scotia Environment shall release the security to the Approval Holder after final rehabilitation of the Site has been completed to the satisfaction of the Minister or Administrator. The Approval Holder shall notify the Department when rehabilitation has been completed.

g) The Approval Holder shall ensure that any security posted for rehabilitation be kept valid for the term of the Approval.

12. Site Specific Conditions

a) The boundaries of the Site will be cut out and kept reasonably clear of new growth and the corner boundaries shall be clearly marked with permanent markers no less than four feet high.

b) The approval holder shall maintain a record of complaints received at or about the facility and what corrective measures were taken to address the complaints. The records shall be maintained at the site for review by an inspector during regular hours of operation.

13. Reporting

The approval holder shall submit an annual report to the Department, by **January 31st** of each year, documenting the following information:

- results from sampling surface water required in Section 7 of this Approval
- records of blasting events and surveys conducted
- quantities of rock removed from the site for the year
- rehabilitation undertaken during the year
- summary of complaints received and actions taken to address the complaints
- any spills at the site and corrective action taken
- updated contingency plan if required

PROPERTY Online NOVA SCOTIA

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Land Registration View

* Indicates interests inherited on subdivision or re-configuration of parcel

PID	05085279	Parcel Type	STANDARD PARCEL	Status	ACTIVE
Area	135.66 ACRE(S)	Parcel Access	PUBLIC	Manag. Unit	MU9907
Lot		Created	Aug 21, 1991 12:00:00AM		
PDCA Status	APPROVED	Municipal Unit	MUNICIPALITY OF THE COUNTY OF ANNAPOLIS	Manner of Tenure	NOT APPLICABLE
LR Status	LAND REGISTRATION	LR Date	Apr 19, 2011 01:18:46PM		

Location	County	Primary Location	Source
93 WANDA LYNN DRIVE NICTAUX	ANNAPOLIS COUNTY	Yes	Not Assigned by Municipality

Comments

Vendora Dr
0244910065040
1044900065000

Assessment Account	Value	Tax District	Tax Ward	Tax Sub
07024487	$192,500 (2013 RESIDENTIAL TAXABLE) $11,200 (2013 COMMERCIAL TAXABLE) $19,500 (2013 RESOURCE FOREST)	090	000	

Back to Results | Details View | Parcel Archive View | Map View

Registered Interests

Interest Holder (Qualifier)	Interest Holder Type	Mailing Address	Type	Year	Doc #	Book/Page/Plan	Registration Date	NS Non-Res?
CHRISTOPHER M HANKINSON	FEE SIMPLE	POST OFFICE BOX 215 MIDDLETON NS CA B0S 1P0	DEED	1994	2488 View Doc)	Book 515 Page 815	Aug 11, 1994	No

Farm Loan Board - Occupants & Mailing Addresses

Name	Interest Holder Type	Mailing Address

No Records Found

Benefits to the Registered Interests

Benefit Details	Interest Holder Type	Type	Year	Doc #	Book/Page/Plan	Registration Date

No Records Found

Burdens on the Registered Interests

Interest Holder (Qualifier)	Interest Holder Type	Mailing Address	Type	Year	Doc #	Book/Page/Plan	Registration Date
DEXTER CONSTRUCTION COMPANY LIMITED	PARTY TO AGREEMENT (BURDEN)	1800 HOLLIS ST HALIFAX NS CA B3J 3N4	EASEMENT/RIGHT OF WAY	2000	255 View Doc	Book 598 Page 458	Feb 14, 2000
NOVA SCOTIA DEPARTMENT OF TRANSPORTATION AND INFRASTRUCTURE RENEWAL	EASEMENT / RIGHT OF WAY HOLDER (BURDEN)	GRANVILLE ST POST OFFICE BOX 1672 HALIFAX NS CA B3J 3Z8	DEED	1994	2488 View Doc	Book 515 Page 815	Aug 11, 1994
NOVA SCOTIA POWER INCORPORATED	EASEMENT / RIGHT OF WAY HOLDER (BURDEN)	1894 BARRINGTON ST HALIFAX NS CA B3J 2W5	EASEMENT/RIGHT OF WAY	2006	85093145 View Doc		May 16, 2006

Textual Qualifications on Title

Qualifications Text

Tenants in Common not registered pursuant to the *Land Registration Act*

Interest Holder (Qualifier)	Interest Holder Type	Mailing Address	Type	Year	Doc #	Book/Page/Plan	Registration Date

No Records Found

Recorded Interests

Interest Holder (Qualifier)	Interest Holder Type	Mailing Address	Type	Year	Doc #	Book/Page/Plan	Registration Date
ANNAPOLIS VENTURES LIMITED	MORTGAGEE	POST OFFICE BOX 478 BRIDGETOWN NS CA B0S 1C0	CORRECTION OF AUTHORIZED LAWYER'S ERROR ON CLE	2011	99588528 View Doc		Nov 23, 2011

Parcel Description

ALL and singular that certain lot, piece or parcel of land, lying and being situated in Nictaux, Annapolis County, Nova Scotia and being more particularly described as

follows:

BEGINNING at a survey marker found on the East boundary of lands now or formerly of Robert Allen (formerly of James Vidito), and being the Southwest corner of Lot "8-B" Nictaux Flats Subdivision, Registry of Deeds Plan File No. P-2123;

THENCE Southerly along lands now or formerly of Robert Allen to a stake;

THENCE in an Easterly direction along the North boundary of lands now or formerly of William Hinds (formerly of Daniel Willett) and along the North boundary of lands now or formerly of Whylie Ruggles (formerly of Harry Willett) a total distance of 61 rods, from said Robert Allen's East boundary, or until it comes to the West boundary of lands now or formerly of Harold Wilkins (formerly of Albert Gates);

THENCE in a Northerly direction along the West boundary of said Harold Wilkins to a corner bound;

THENCE in a Westerly direction one (1) rod;

THENCE in a Northwesterly direction through a bog, crossing a brook, and continuing Westerly along the South boundary of lands now or formerly of Harold Wilkins aforesaid, until it comes to his West boundary;

THENCE in a Northerly direction along the West boundary of said Harold Wilkins to a survey marker found being the Southeast corner of Vendora Drive, Nictaux Flats Subdivision;

THENCE S 66 degrees 29' 15" W along the South boundary of said Vendora Drive a distance of 66.01' to a survey marker found, being the Northeast corner of Lot "22" Nictaux Flats Subdivision, Registry of Deeds Plan File No. P-2459;

THENCE S 22 degrees 35' 35" E along the East boundary of said Lot "22" a distance of 298.00' to a survey marker found, being the Southeast corner of Lot "22";

THENCE S 66 degrees 29' 15" W along the South boundary of said Lot "22" a distance of 167.27' to a survey marker found, being the Southwest corner of Lot "22";

THENCE N 23 degrees 03' 05" W along the West boundary of said Lot "22" a distance of 120.00' to a survey marker found, being the Southeast corner of Lot "9" Nictaux Flats Subdivision, Registry of Deeds Plan No. P-2459;

THENCE S 66 degrees 29' 15" W along the South boundary of said Lot "9" a distance of 168.24' to a reference point, being the Southwest corner of Lot "9";

THENCE N 23 degrees 30' 45" W along the West boundary of said Lot "9" a distance of 178.00' to a survey marker found on the East boundary of Wanda Lynn Drive and the South boundary of Vendora Drive;

THENCE following a curve to the right having an Arc of 69.46' and a Radius of 63.00' to a survey marker found on the East boundary of Lot "8-B" being S 66 degrees 29' 15" W and a distance of 66.00' from the last mentioned survey marker found;

THENCE S 23 degrees 30' 45" E along the East boundary of said Lot "8-B' a distance of 106.32' to a survey marker found, being the Southeast corner of Lot "8-B";

THENCE S 77 degrees 09' 40" W along the South boundary of said Lot "8-B" a distance of 203.50 to the PLACE OF BEGINNING;

BEING AND INTENDED TO BE a portion of land conveyed to House Hold Reality Corp. (Book 505, Page 258).

SUBJECT TO a right-of-way over the lands more particularly described hereafter for the purpose of water drainage including the right of the Grantee or its servants to enter upon said lands from time to time for the purpose of ensuring proper drainage;

BEGINNING at a survey marker found at a point where the South boundary of Vendora Drive intersects the East boundary of Wanda Lynn Drive, said point being the Northwest corner of Lot"9" of the Nictaux Flats Subdivision;

THENCE in a Westerly direction along the South boundary of Wanda Lynn Drive a curve to the right having an Arc of 31.73' and a Radius of 63.00' to a reference point, being S 49 degrees 19' 43" W a distance of 31.40' from the last mentioned survey marker found;

THENCE S 23 degrees 30' 45" E a distance of 168.74' to a reference point;

THENCE N 66 degrees 29' 15" E a distance of 30.00' to a reference point being the Southwest corner of said Lot "9";

THENCE N 23 degrees 30' 45" W along the West boundary of said Lot "9" a distance of 178.00' to the PLACE OF BEGINNING.

BEING AND INTENDED TO BE as shown on a Plan of Survey prepared by Edward J. Cleveland, NSLS, of Tru-Line Surveys Limited, dated July 11, 1986, last amended on August 22, 1990, Plan file No. 86-97, a copy of which is filed in the Annapolis County Registry of Deeds on March 30, 2011 under document no. 98041594.

SUBJECT TO a Grant of Use of Land between Dexter Construction Company Limited, contractor, and Christopher Mark Hankinson, owner, dated February 24, 1999 and recorded in the Annapolis County Registry of Deeds on February 14, 2000 in Book 598 at Page 458 under document no. 255.

AND FURTHER SUBJECT TO a Grant of Easement between Christopher Mark Hankinson, owner, and Nova Scotia Power Inc., dated May 16, 2006, and recorded in the Annapolis County Registry of Deeds on May 16, 2006 under document no. 85093145.

ALSO BEING AND INTENDED TO BE a portion of lands conveyed to House Hold Reality Corp. (Book 505, Page 258).

*** Municipal Government Act, Part IX Compliance ***

Compliance:

The parcel is created by a subdivision (details below) that has been filed under the Registry Act or registered under the Land Registration Act

Registration District: ANNAPOLIS COUNTY
Registration Year: 1986
Plan or Document Number: 2459

Non-Enabling Documents

Inst Type	Inst No	Year	Type	Book/Page	Registration System	Registration Date

No Non Enabling Documents Found

Non-Enabling Plans

Inst Type	Inst No	Year	Type	Plan Name	Drawer Number	Registration Date
Plan	98041594 View Plan	2011	RETRACEMENT PLAN	PLAN OF SURVEY OF NICTAUX FLATS S/D A PORTION OF LANDS OF REGINALD PENNY & LOIS PENNY		Mar 30, 2011

AFR Bundles

Inst Type	Inst No	Year	Type	Filing Reference	Instrument Date

No AFR Bundles Found

Parcel Relationships

Related PID	Type of Relationship
05113030	INFANT PARCEL

Back to Results | Details View | Parcel Archive View | Map View

This parcel IS REGISTERED PURSUANT TO THE *Land Registration Act*. The registered owner of the registered interest owns the interest defined in this register in respect of the parcel described in the register, subject to any discrepancy in the location, boundaries or extent of the parcel and subject to the overriding interests [*Land Registration Act* subsection 20(1)].

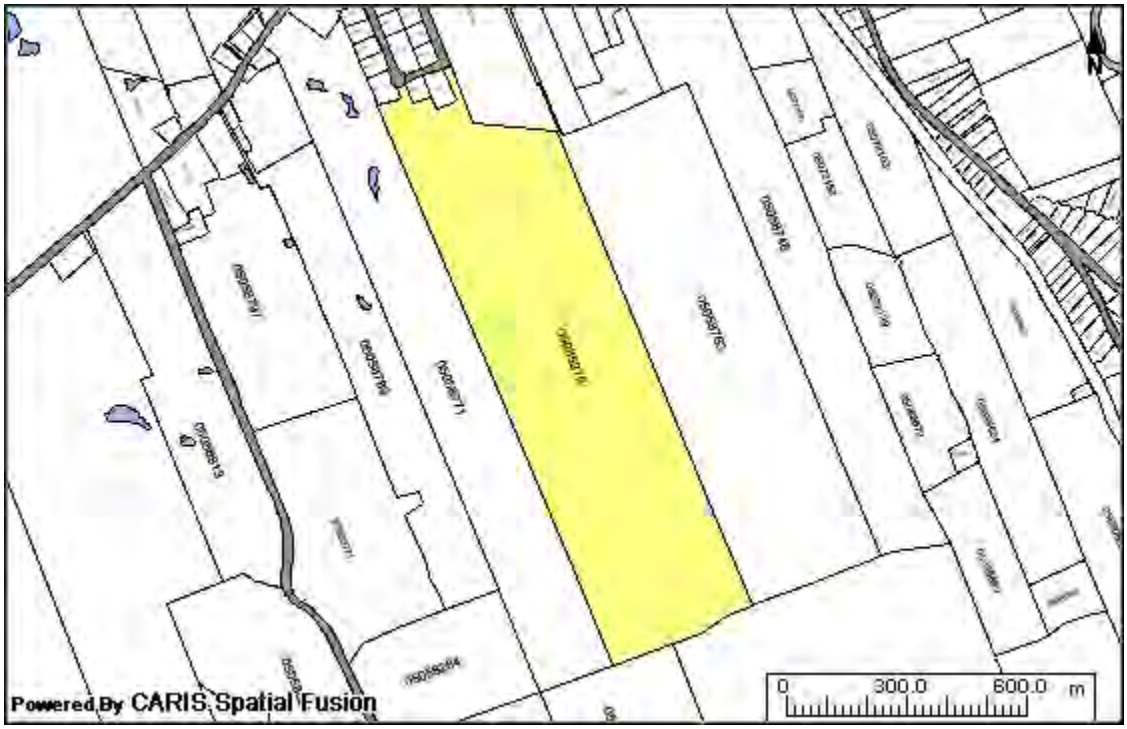
No representations whatsoever are made as to the validity or effect of recorded documents listed in this parcel register. The description of the parcel is not conclusive as to the location, boundaries or extent of the parcel [*Land Registration Act* subsection 21(1)].

Boundary/Area Problem | General Problem | Municipal Tax Query

PROPERTY Online NOVA SCOTIA

Property Online Map

Date: **Sep 11, 2013 1:03:29 PM**



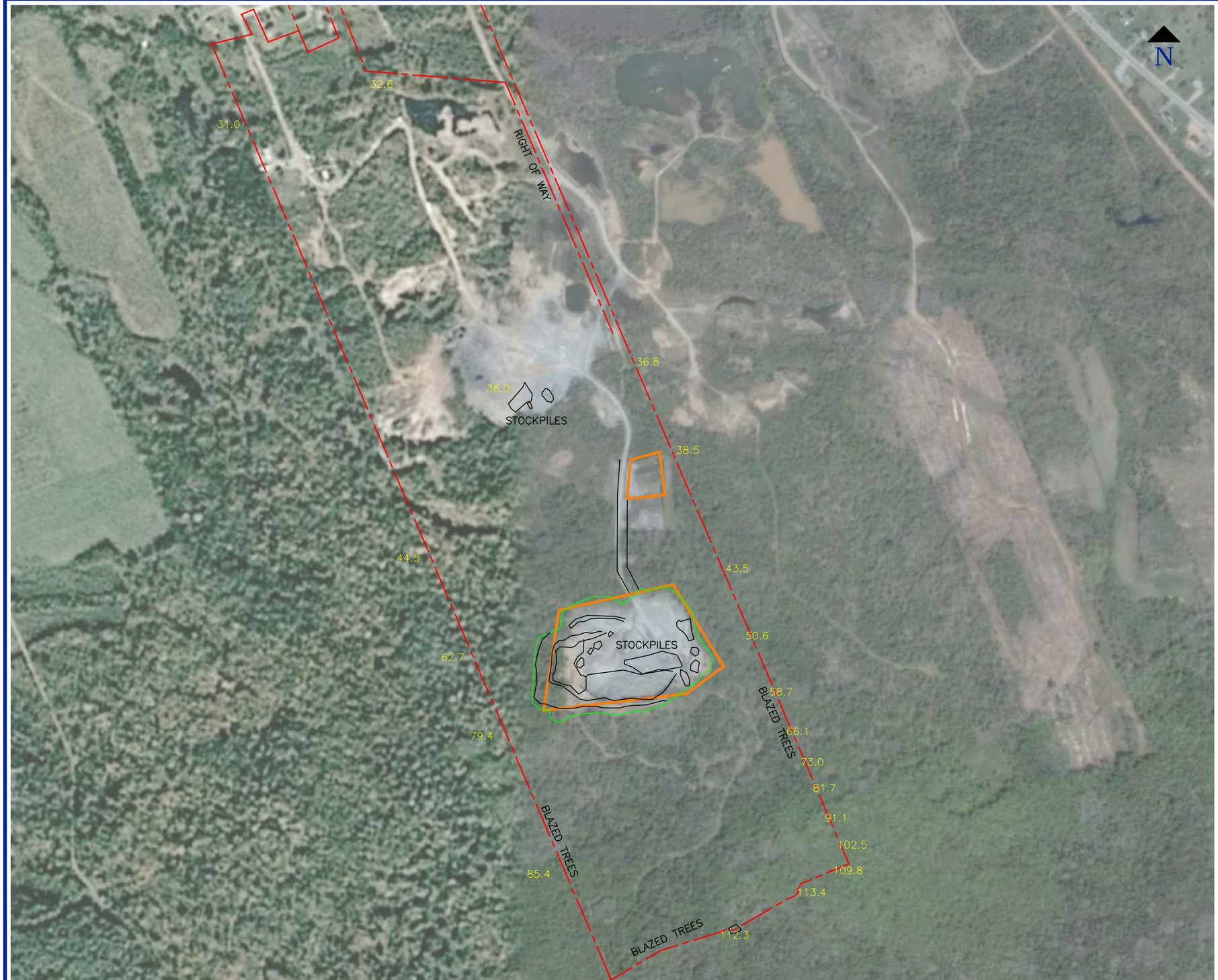
PID:	05085279	Owner:	CHRISTOPHER M HANKINSON	AAN:	07024487
County:	ANNAPOLIS COUNTY	Address:	93 WANDA LYNN DRIVE NICTAUX	Value:	$192,500 (2013 RESIDENTIAL TAXABLE) $11,200 (2013 COMMERCIAL TAXABLE) $19,500 (2013 RESOURCE FOREST)
LR Status:	LAND REGISTRATION				

The Provincial mapping is a graphical representation of property boundaries which approximate the size, configuration and location of parcels. Care has been taken to ensure the best possible quality, however, this map is not a land survey and is not intended to be used for legal descriptions or to calculate exact dimensions or area. The Provincial mapping is not conclusive as to the location, boundaries or extent of a parcel [*Land Registration Act* subsection 21(2)]. THIS IS NOT AN OFFICIAL RECORD.

Property Online version 2.0

APPENDIX B
Figures and Drawings

Environmental Assessment Registration
Document for Nictaux Quarry Expansion



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

SCALE 1:600

WHEN PLOTTED AT 11 x 17 PAGE SIZE

0 15 30 45m

NOTES

DRAWING COMPILED FROM EXISTING LOCATION CHRISTOPHER HANKINSON QUARRY DRAWING BY DEXTER CONSTRUCTION COMPANY LIMITED. PID 5085279 NICTAUX, ANNAPOLIS COUNTY, NS.

LEGEND

- SITE LOCATION
- EXISTING PERMIT
- TREELINE

DEXTER CONSTRUCTION COMPANY LIMITED
CHRISTOPHER HANKINSON QUARRY
PID 5085279
NICTAUX, NS

Report
ENVIRONMENTAL ASSESSMENT

Drawing
DETAILED SITE PLAN

Date April 2, 2013	Scale AS SHOWN	Drawing No. 1
File Name S_210-05839-00000-C1-3	Project No. 210.05839.00000	

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

SCALE 1:600

WHEN PLOTTED AT 11 x 17 PAGE SIZE

0 15 30 45m

NOTES

DRAWING COMPILED FROM EXISTING LOCATION CHRISTOPHER HANKINSON QUARRY DRAWING BY DEXTER CONSTRUCTION COMPANY LIMITED. PID 5085279 NICTAUX, ANNAPOLIS COUNTY, NS.

LEGEND

- SITE LOCATION
- EXISTING PERMIT
- TREELINE
- PROPOSED FUTURE EXPANSION AREA

DEXTER CONSTRUCTION COMPANY LIMITED
CHRISTOPHER HANKINSON QUARRY
PID 5085279
NICTAUX, NS

Report: ENVIRONMENTAL ASSESSMENT

Drawing: PROPOSED FUTURE BUILD OUT

Date: April 2, 2013	Scale: AS SHOWN	Drawing No.: 2
File Name: S_210-05839-00000-C2	Project No.: 210.05839.00000	

APPENDIX C
Rock Sulphur Content Analysis Results

Environmental Assessment Registration
Document for Nictaux Quarry Expansion

23-Sep-13

Dexter Construction Co. Ltd.
927 Rocky Lake Drive
P.O. Box 48100
Bedford, NS
B4A 3Z2
Attention: Gavin Isenor

Re: Results of analysis on submitted samples.

Sample	Wt. % S(Total)	kg/t Acid Prod. Potential
Nictaux	0.017	0.53
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Certified Ref. Sa.	Wt. % S(Total)
NBM-1 (0.28% S)	0.281

Daniel Chevalier, MASc
Manager, Minerals Engineering Centre

APPENDIX D
Biophysical Assessment Report (Envirosphere, 2013)

Environmental Assessment Registration
Document for Nictaux Quarry Expansion

Biophysical Assessment of the Nictaux Quarry Expansion— 93 Wanda Lynn Drive, PID 05085279 Nictaux, Annapolis County, N.S.

Submitted to:

WMR Environmental Services Inc. & Associates
Fall River, Nova Scotia

November 22, 2013

Envirosphere CONSULTANTS LIMITED

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1 INTRODUCTION

Municipal Group of Companies, Waverley, Nova Scotia, is proposing to expand its quarry in the Nictaux area of Annapolis County, near Middleton, 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 various 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. Site visits and walkovers by project personnel were carried out on June 6 (site visit and spring botany survey), June 13-14 (owls, breeding birds and fish), August 22 (herptiles and incidental observations), and September 6, 7 & October 12 (fall botany and wetlands). Key project personnel included Patrick Stewart, M.Sc. and Heather Levy, BSc. Hons; botany and wetland surveys were conducted by Mr. Jim Jotcham, M.Sc. (Marbicon Inc.); bird and herpetile surveys by Mr. Fulton Lavender, Halifax and Mr. John Gilhen, Prospect, Nova Scotia, respectively.

3 SITE LOCATION AND STUDY AREA

The site is located ~4 km southwest of Middleton, Nova Scotia, ~1.5 km south of Hwy 201 and at the end of Wanda Lynn Drive in the community of Nictaux, 1:50000 NTS 21A-14, Northing: 4974735, Easting: 338165, Zone UTM Zone 20, Air Photo 2012 309_026, August 24, 2012, PID 05085279 (Figures 1, 2 & 3). The Nictaux Quarry, which is the subject of this biophysical assessment, occupies the southern half of the property, with the northern portion occupied by an existing sand and gravel operation run by Mark Hankinson, Nictaux. This assessment focuses on the quarry operation and does not consider the sand and gravel portion of the Hankinson property. Both the Hankinson property and focus area for the assessment are shown on Figure 2 and Map A-5, Appendix A).

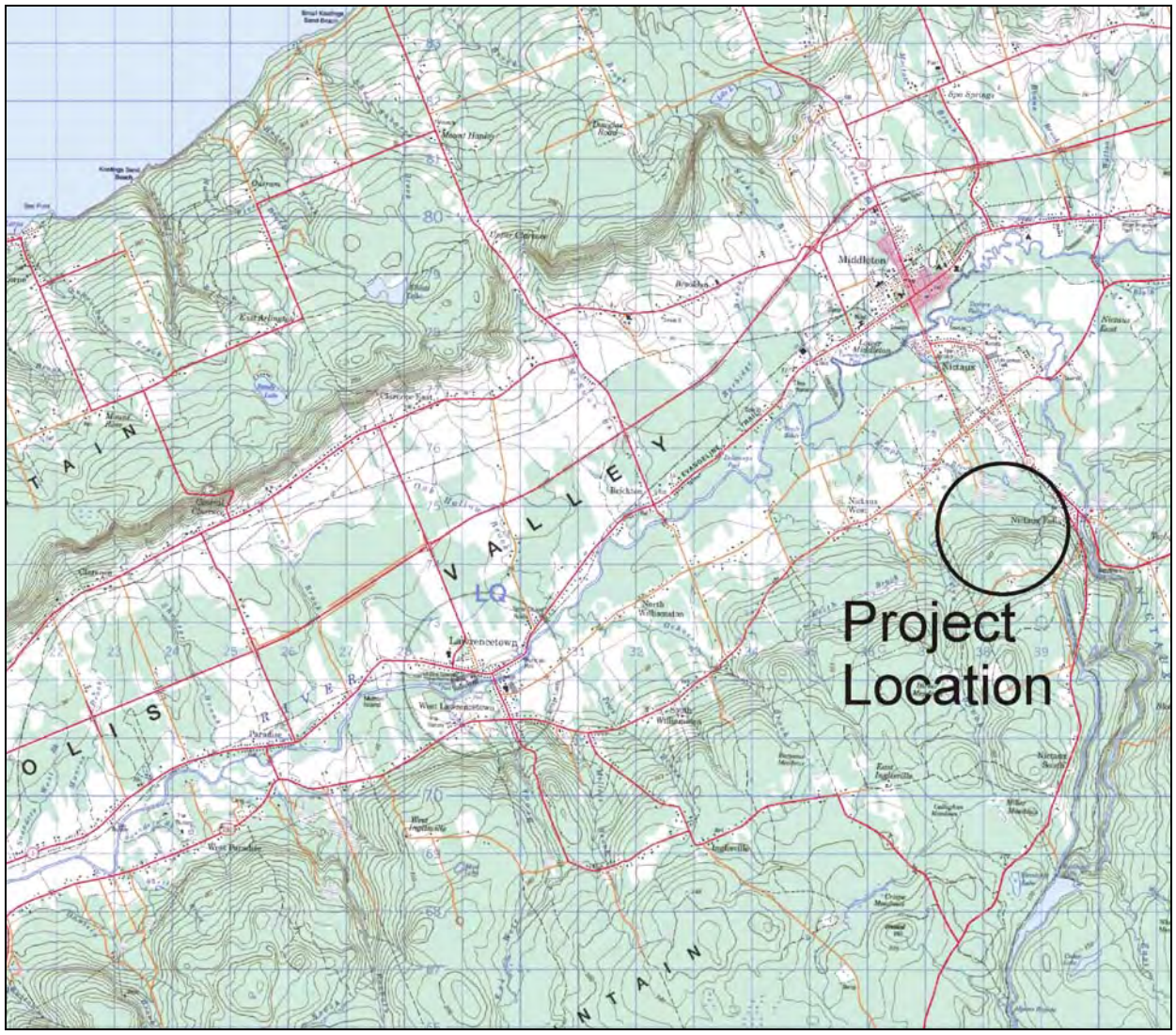

Figure 1. Project location.

4 EXISTING ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 CLIMATE

Prevailing wind direction for the Bay of Fundy Shore is from the northwest quadrant (west to north) from November to March, shifting in April to south and southwest, and returning to predominantly Northwest in October-November (TDC 1991). Strong northeasterly and southwesterly winds can develop in the Annapolis Valley due to channelling along the valley. Annual average temperature at Greenwood, approximately 13 km east of the site, is 6.8º C., averaging 19.3º in July and –5.6ºC. in January, the coldest month (Canadian Climate Normals, *www.climate. weatheroffice.gc.ca/climate_normals*), but temperatures are probably moderated somewhat due to the proximity to the Bay of Fundy coast. The area receives moderate total precipitation (annual average of 1127 mm) mostly as rain (910 mm). Peak

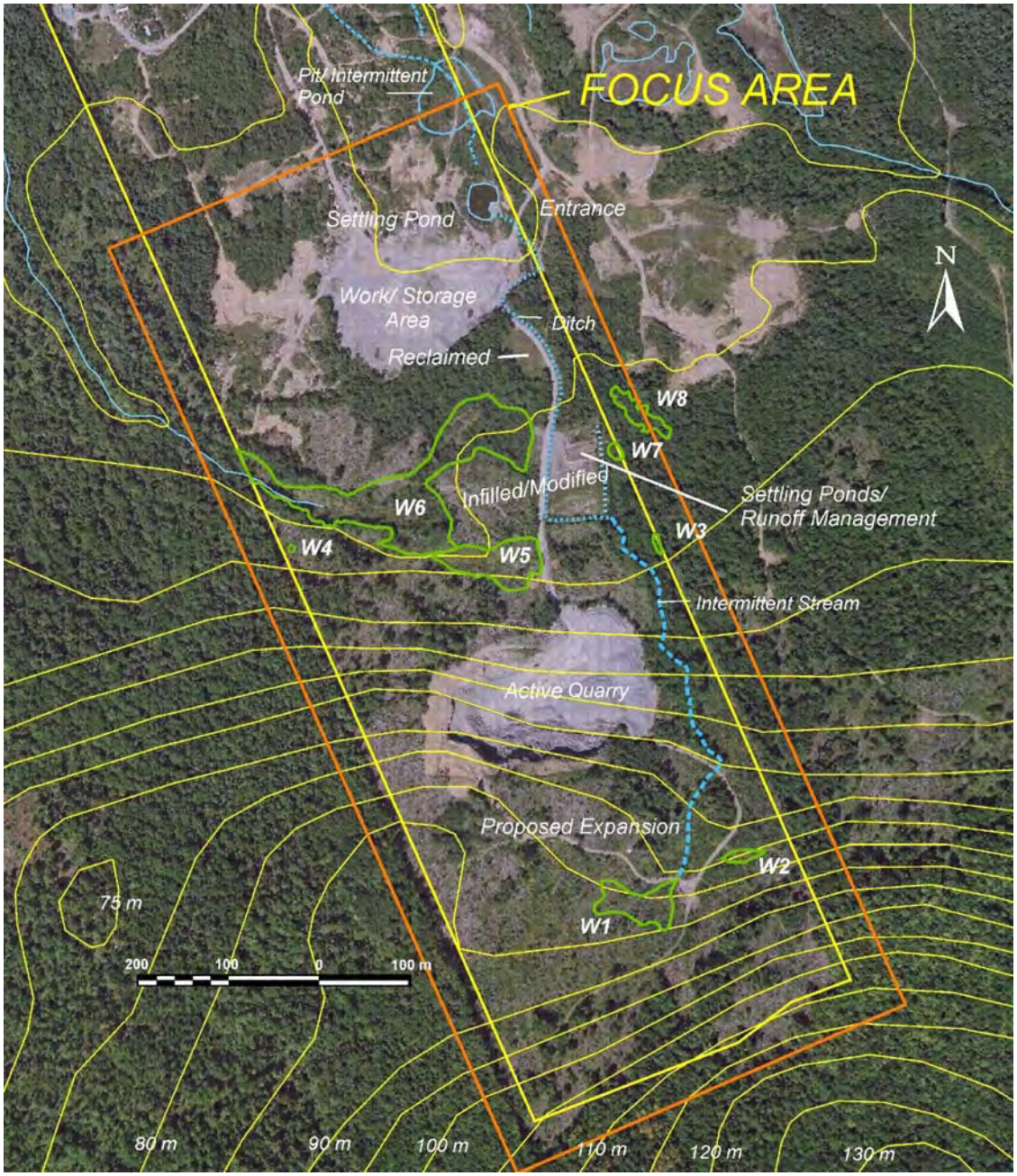

Figure 2. Project location and features. Based on air photo 2012 309_026, August 24, 2012.

Figure 3. View of quarry face looking south, in June 2013.

Figure 4. View of quarry, from access road near laydown area, October 2013.

precipitation occurs in late Fall to winter (October-January), and is lowest in spring-summer (April-August) period although some months in summer can have significant rainfall (Figure 5). The property owner noted that snowfall appears elevated at the site, compared with nearby Annaopolis Valley areas (M. Hankinson, Nictaux, pers. comm. 2013).

4.1.2 TOPOGRAPHY AND GEOLOGY

The study area is in eastern Annapolis County on the slope of South Mountain. The main bedrock geological formations at the site include: Wolfville Formation consisting of interbedded red and grey conglomerate, sandstone, siltstone and claystone; Elderkin Formation, a sub-unit of the Halifax and Goldenville Formations which occupies most of the site, containing light grey to red-brown laminated slate and mudstone and the greywackes and quartzite forming the target deposit; and the South

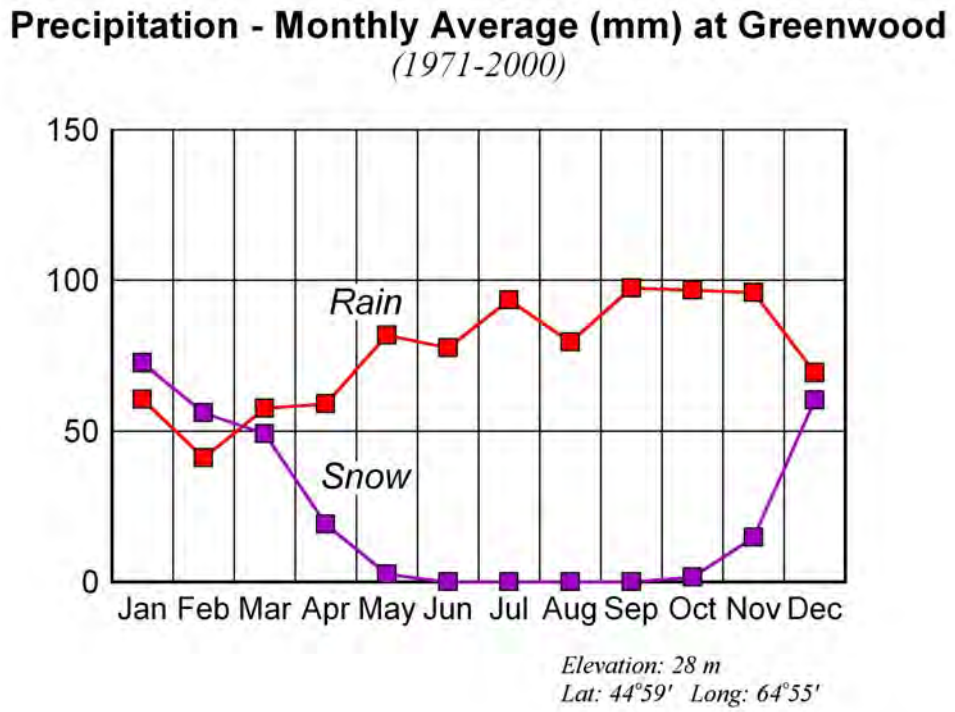

Figure 5. Precipitation for Nictaux Quarry, observed at Greenwood (1971-2000).

Mountain Batholith, an igneous formation located to the south and southwest and which locally intrudes into other formations with granodiorite (Appendix A, Map A-3) (Keppie 2000; Trescott 1968; White 2009). Quarry rock has a low sulfur content (sulphur 0.017%) and low acid-generating potential (12.51 kg/tonne), which is well below acceptable regulatory limits.

The site slopes abruptly towards the north from South Mountain to the floor of the Annapolis Valley, which at the site is level to undulating, comprised of sand and gravel deposited as kame moraines and eskers from a melting glacier, as well as outwash deposits of sand and gravel (Stea et al 1992; Trescott 1968)(Appendix A, Map A-4). At the site most of the sand and gravel in the glacial deposits has been removed, levelled, or excavated approximately 5 m below the original land surface. A shallow veneer of glacial till occurs on slopes.

4.1.3 AIR QUALITY AND NOISE

The Nictaux Quarry is surrounded by intact or logged forest, agricultural land, and open landscape of sand and gravel operations, and is expected to have a relatively high natural baseline air quality typical of areas with low levels of human activities. Traffic on adjacent roads, activities associated with residences including home heating and local burning, all contribute to a low level of particulates and exhaust emissions. The only other operations which could contribute to air quality issues are sand and gravel operations, including the Hankinson Property and others located to the east. Operations can cause dust and vehicle exhaust. The level of activities at the other operations in most cases is probably extremely

small. All trucks leaving the site are required to follow best management practices to minimize noise and to cover loads to minimize dust release. 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. Noise includes blasting, and sound from crusher and other heavy equipment operations (e.g. motors, back-up signals etc). The quarry is far from the nearest residences and there are forest patches and berms between the quarry and other areas, further reducing sound transmission. Trucks transporting product from the quarry along the Highway 201 will contribute to vehicle-generated noise and exhaust emissions, but the number and frequency of trips will be relatively small and is not expected to exceed levels which have been experienced recently at the site. Speed limits on the portion of the access road to the quarry from Highway 201 (Gravel Pit Road, Appendix A, Map-A2) are restricted to 15 km/h to reduce noise and dust.

4.1.4 HYDROLOGY

The main surface waters in the area are the Annapolis River, located about 2.8 km north of the site and Nictaux River about 2.5 km east. A tributary of the Annapolis River—Kempt Brook—arises on South Mountain to the east, flowing north through neighboring sand and gravel operations, and turning west to flow along the north border of the Hankinson Property. Upstream portions of Kempt Brook have been blocked and diverted by sand and gravel extraction activities (JWEL 2005). A tributary of Kempt Brook arises on the quarry property in a swamp on the west side (Figure 2). Kempt Brook flows northwest, crossing Highway 201 about 500 m west of Wanda Lynn Drive, and thence to the Annapolis River (Appendix Map A-1).

Drainage on the quarry site is complicated by site modifications associated with the quarry and long-time use of the area for sand and gravel extraction operations. Watercourses on site include: 1) a small intermittent stream that runs down the slope from the southeast end of the property, and discharges into a ditch system at the foot of the slope; and 2) a small tributary stream to Kempt Brook which originates in a swamp on the west side of the mid-portion of the property at the foot of the slope and which drains to the northwest (Figure 2). In addition to these natural features, a system of road ditches and settling ponds serves to channel runoff down the slope along the road from the existing quarry and to the north into the sand and gravel pit area where there is a large settling pond. Overflow from the settling pond, flows north through a highly disturbed area of the Hankinson sand/gravel pit through a combination of old sand and gravel pits and excavated channels, to a large pond at the north end; and from there into the north branch of Kempt Brook. During high runoff periods, flow is continuous through the whole system and fish can move upstream from the sand and gravel pit into the settling pond and further upstream into the ditch below the quarry. Little or no flow passes from the site through the sand extraction area during drier periods of the year (July-early September).

The *intermittent stream* which flows down the south slope east of the quarry (Figure 2) flows into a ditch on the south side of a modified area used for washing and disposal of fines, and then enters the ditch along the quarry road, which channels runoff from the stream to the north. Just past the wash ponds to the

north (Figure 2), the ditch flow is channelled into the woods on the east for about 50 m and it emerges back in a ditch beside the road. The ditch continues around the margin of the laydown/storage area near the weigh scale at the quarry entrance, and is directed by berms to flow into the large wash pond, after passing through a culvert under the access road at the eastern entrance to the quarry. Although the intermittent stream is presently diverted into the ditch system, it probably originally flowed into the wetland on the west side of the quarry site to become the Kempt Brook tributary at the site. When the quarry was developed originally, the flow was diverted into ditch system to supply the settling ponds and the road blocked further flow into the wetland. An early air photo shows the end of the stream discharging into a ditch which leads to the two existing settling ponds; the ditch is still in place and it is assumed that under high flow, some of the water from the stream can still flow through that route to the settling ponds.

The north part of the Hankinson property and the part of the site where the quarry was developed were originally probably separated hydrologically and the activities at the site have shifted some of the flow from the southern to the northern parts of the property. The north branch of Kempt Brook at the north end of the Hankinson Property is largely disconnected from the large sand pit pond located there, and except during periods of high runoff, the main water supply for the pond appears to be from local runoff and groundwater[1].

A branch of Kempt Brook originates in a shrub/graminoid swamp downslope of the quarry, in places forming a channel but it is by no means continuous, and flows northwest off the property. Surface runoff and groundwater enters the swamp from the slope above it, and the wetland also receives surface runoff from the road leading upslope to the quarry. The road reaches a low point where it forms the east end of the wetland, and runoff naturally flows into the swamp from both the north and south. Probably the swamp originally accumulated runoff from all along the foot of the slope, and now has reduced flow due to the presence of the road and resulting diversion of some of the flow to the north.

4.1.5 HYDROGEOLOGY

There are both surficial and bedrock aquifers in the area. The Wolfville Formation which underlies most of the Annapolis Valley Floor in the vicinity of the quarry, including sandstones and conglomerates, provides some of the best aquifers in Nova Scotia, but surface sand and gravel deposits in the Nictaux area are also important in providing a high quality groundwater supply in the area.

Surficial unconsolidated deposits at the site include estuarine silt and clay, glacial till, outwash sand and gravel, ice contact sand and gravel, and sand and silty alluvium. The total thickness of the surficial

1 A berm constructed from material from the sand pit runs across the north end of the Hankinson property, forming the north bank of the north pond, and separating it from Kempt Brook and associated wetlands. Although a ditch has been dug in the berm at the east end near Gravel Pit Road to join the two areas, no flow was observed on site visits and it is presumed that at most times of year, the flow from the south end of the quarry as well as groundwater is the major source for the pond. Flow of Kempt Brook from the east was partially blocked at Gravel Pit Road throughout the summer. Flow of the north branch of Kempt Brook where it crosses Wanda Lynn Drive was a combination of flows from the sand pit area, and flow from the watershed of Kempt Brook to the east.

deposits varies from 0 to 20 m with 7.6 m as an average thickness. The bedrocks of the valley floor are mainly soft claystones, siltstones, and sandstones of the Wolfville Formation. The groundwater from outwash and gravel as well as sandstones are soft and low in sulfate, iron, total dissolved solids and and have a low sodium adsorption ratio, and are suitable for both domestic and irrigation use without treatment (Lin 1971).

4.1.6 SOILS

The southern half of the study area, largely on the slopes of South Mountain, is occupied by rocky till derived from Wolfville group soils, moderately well-drained dark reddish-brown loam to sandy clay loam over reddish-brown loam to sandy clay loam; and Nictaux group soils, well-drained and dry soils which have developed over coarsely stratified outwash and deltaic sands and gravel deposits which occur in the area (MacDougall *et al* 1969). Most of the surface soil has been removed from the northern part of the property in commercial sand and gravel operations, leaving exposed deposits and poorly-developed soils over much of the area.

4.2 BIOLOGICAL RESOURCES AND HABITAT

4.2.1 TERRESTRIAL ENVIRONMENT

The site is on the lower slope of South Mountain and extends across a level sand and gravel deposit which is typical of much of the valley floor in the communities of Nictaux, Nictaux Falls and Nictaux West. The slope occupies about the southern half of the property and is steep (1:6 to 1:10) with a terrace above the present quarry, reaching a maximum elevation of about 120 m. Thin till soil on the slope and exposed cobble to boulder-sized rock occurs at the surface in places (Figure 6). The native forest at the site, which is still intact at the extreme south of the property, is mature mixed sugar maple, birch (white and yellow) and beech forest with red oak, red spruce and balsam fir, having typical understorey vegetation (Figure7). The lower part of the slope is modified extensively through quarry activities and previous logging. Medium-aged mixed forest regeneration occurs in the logged areas and peripheral parts of disturbed areas have a cover of young trees and shrub species. Most of the site has been logged, with the most recent cutting on the upper slope having occurred within the past 10 years, and is revegetating with saplings of red maple and white birch. Logging continues on the adjacent property to the east although the forest to the west is intact for some distance.

A shallow, low-lying swale occurs at the foot of the slope in the sand and gravel deposit. This feature is occupied by a patchwork of modified and reclaimed land, forest and wetland (Figure 2; Appendix A, Map A2). Most of the forest to the west has been cut in the swale except in the wettest portions of the shrub/graminoid swamp which occurs there. North of the swale, elevation increases to reach the level and totally modified working laydown area of the quarry.

North of area used for various operations of the quarry (i.e. the focus area for the assessment), the Hankinson sand and gravel pit offers an unusual mottled landscape consisting of mixed sand and gravel

deposits of various grades, interrupted by sand pits and ridges, and criss-crossed by temporary roads and trails, and temporary streams and ditches connecting shallow, intermittent, sand pit ponds. The area is dominated by a forest cover of short (3-4 m) wire birch and speckled alder, occasional white pine and white spruce, with an understorey dominated by Sweet Fern. Sand pits are bordered by growth of speckled alder mixed with understories of grasses, sedges and terrestrial weed species.

A large, apparently permanent, sand pit pond dominates at the north end of the Hankinson Property. It is bordered on the north by a long established berm approximately 5 m in height which extends to Gravel Pit Road. The berm has developed a mature forest dominated by spruce and tall White Pine (Figure 27).

Figure 6. Boulders landscape on upper slope at south end of property, June 7, 2013.

Figure 7. Mature forest at south end of property, June 7, 2013.

Figure 8. View of proposed expansion area from south boundary looking north. Existing quarry is just beyond forest patch in the left background, June 7, 2013.

Figure 9. Laydown area for quarry looking east from top of west quarry face, June 14, 2013.

Figure 10. View of landscape including north side of existing quarry, access road and settling ponds (centre right) and valley floor with North Mountain in background, June 14, 2013.

Figure 11. Typical terrestrial vegetation in sand and gravel deposit on north side of Hankinson property, October 18, 2013.

4.2.2 AQUATIC ENVIRONMENT

The intermittent stream east of the aggregate quarry has a well-defined, narrow (typically less than 1 m wide) and rocky streambed, with highly intermittent flow apparently related to rapid runoff after rainfall or snowmelt events. It is also a relatively steep gradient with no pools, and is judged not to be suitable as

fish habitat. Flow was negligible when the site was visited in early June and the stream was dry in August; flow at times can be persistent enough, however, to allow the development of mosses and stream vegetation on rock surfaces but during the June survey was no more than a trickle and vegetation on rock surfaces was exposed (Figures 12 & 13). No fish were caught in minnow traps in the lower section where the stream meets the ditch system adjacent to the road. Flow in the stream appears to arise from swampy clearcut areas high on the slope, and passes through culverts on the logging roads above the existing quarry, and is relatively undisturbed down the east side of the property to the approximate base of the slope where it enters a drainage ditch associated with the settling ponds and dewatering areas.

Figure 12. Bed of intermittent stream on upper slope adjacent to quarry, June 7, 2013.

The tributary of Kempt Brook originating in the wetland at the foot of the slope on the west side of the property (W6 in Figure 2, Appendix A, Map A2) occupies a narrow (<1 m) channel for a short distance where it arises in the swamp near the west property boundary, and localized open water occurs in several places[2] (Figure 14). Fish were not seen in the tributary, but it is likely that the area could be reached by individuals from Kempt Brook and the short stretch into the wetland should be presumed to be potential fish habitat. Water supply to the wetland is from precipitation, groundwater seepage and surface flow from the slope to the south (predominant source), as well as runoff from the quarry access road, which borders the wetland on the eastern side, and runoff from the adjacent areas at higher elevation to the north.

2 The site was only observed in June and not during normally dry periods.

Figure 13. Moss development on bed of intermittent stream, downslope of Figure 12, June 7, 2013.

Figure 14. Open water in tributary of Kempt Brook near west boundary of property, June 7, 2013.

Various ponds both permanent and intermittent although all artificial, occur on the quarry site, including settling ponds and ponds which have been created by sand and gravel excavation. Two settling ponds are associated with the south part of the quarry development, and a large settling pond used by the quarry is near the entrance to the quarry. The smaller settling ponds appear to be about 2 m deep, and the large pond possibly 3 m. The smaller ponds are occupied around the margins by aquatic vegetation such as

cattails, and sedges; while the large pond is bordered by, in addition to emergent vegetation, by extensive development of alders. A beaver dam crosses the outlet of the pond, which flows into a shallow drainage channel and enters the intermittent pond system of the sand and gravel pit area to the north.

Figure 15. Ditch draining upper quarry area, near quarry entrance, on June 14, 2013. Quarry is upslope to the right of the photo. This ditch dries out in summer.

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 pH of 6.4 to 8.1 (Table 1).

Table 1. Water quality measurements at Dexter Nictaux Quarry. For locations see Appendix A, Map A-2.

Site Location & Date	June 14, 2013					August 22, 2013
	WQ1 Kempt Brook	WQ2 Sand Pit Pond	WQ3 Quarry Ditch	WQ4 Settling Pond	WQ5 Ditch Near Stream Outlet	WQ6 Main Settling Pond
Time	~0845	0900	0920	0936	0947	1231
Temperature ºC	12.7	13.7	11.3	15.5	11.2	25.8
Oxygen Saturation (%)	70.8	65.3	92.5	63.5	84.6	--
Dissolved Oxygen (mg/L)	7.5	7.4	10.1	6.3	9.5	--
Conductivity (µs)	28.8	40.5	42.4	60.0	50.1	
Specific Conductivity (25˚) (µs)	40.3	57.8	59.6	84.2	71.2	62.1
TSS (mg/L)	<0.5	<0.5	<0.5	1.5	0.5	--
pH	6.4	6.5	7.0	7.0	6.9	8.1
Turbidity & Colour	Pale tea colour	Clear & Colourless	Clear & Colourless	Very pale tea colour	Very pale tea colour	Pale yellow, slightly cloudy.

4.2.4 WETLANDS

The operational area of the quarry has two topographically distinct parts—the South Mountain slope which covers the southern half; and a level to undulating sand and gravel deposit or plain at the foot of the slope on the northern half. The slope has been modified by the installation of logging and quarry roads; by the quarry and associated level laydown, work and storage areas and boulder piles; and by logged areas, with the slope almost entirely cutover except for several inaccessible forest patches, and in places is heavily rutted by logging equipment. The sand and gravel deposit at the foot of the slope contains a mixture of natural landscape features including a linear wetland (shrub/graminoid swamp) and patches of forest and modified landscape, including infilled work areas; excavations for sand/gravel pits; the quarry access road and associated ditches; a remediated and reclaimed field; settling and wash ponds and de-watering areas; and level areas used for aggregate storage and management (Figure 2).

Two areas disturbed by logging activity (W1 & W2 on Figure 2) were identified as wetlands in the proposed expansion area above the existing quarry, consisting of swampy areas arising from disrupted drainage in areas heavily rutted by logging equipment (Figures 16 & 17, Table 2). These formerly supported mature mixed forest and were probably areas of high water table and seepage which has been now captured by the ruts, leading to the formation of this type of unnatural wetland.

Figure 16. Slope swamp/seepage swamp modified by logging activity (Wetland W2 on Figure 2).

Figure 17. Slope swamp/seepage swamp modified by logging activity (Wetland W1 on Figure 2).

A wetland complex occurs on the lower portion of the slope and in the swale on the sand and gravel deposit adjacent to the slope (W5 & W6, Figures 18 to 21). The location of the wetland on the slope (W5) is another area where logging has disturbed groundwater flow, and which may not have been a wetland prior to recent logging activity (Figure 19). Here is a gradual transition from wetland to upland, with a relatively high water table, allowing the wetland character to predominate where the landscape is heavily rutted by logging equipment. This area is bordered upslope by boulders and overburden from the current quarry (Figure 19) and downslope by the shrub/graminoid swamp (W6) (Figure 18). During the site visit in June, groundwater seepage, characterized by orange ferric deposits, was observed extending down the slope from under the boulder and overburden piles.

Figure 18. Transition of slope swamp/seeage swamp below quarry (W5), to shrub/ graminoid swamp (W6)

Figure 19. Disturbed slope swamp below grubbings and boulder pile along south edge of existing quarry, June 2013.

Figure 20. Southern margin of shrub/ graminoid swamp (W6) where it meets mature mixed forest upland margin, near west boundary of property.

Figure 21. Open water stream channel in shrub/graminoid swamp (W6), June 2013.

The W6 shrub/graminoid swamp is the most significant wetland, and may be a remnant part of a more extensive wetland which may have existed in central quarry area, but which has been modified by quarry activities. The wetland is the headwater of one of the tributaries of Kempt Brook. Dominant splant pecies in the wetland include: Speckled alder *Alnus incana, Calamagrostis canadensis, Scirpus cyperinus,* and *Carex crinita* and subdominants included *Glyceria striata, Glyceria canadensis,* and *Carex lurida*. The eastern part of the wetland was extremely difficult to define due to infilling and recent logging disturbance. The infilled/modified area between W6 and the road on Figure 2 is level and poorly drained, and has developed an alder-dominated overstorey with an understorey of weeds, and gradually transitions into a mixed community of alders, sedges and grasses. Water supply to the wetland consists of a combination of downslope runoff and groundwater flow, and runoff from the quarry and road surfaces on the east side.

Of the remaining wetlands, W4 is a small sedge meadow in a level clearing which is poorly drained (Figure 2) and W3, W6 & W7 are vernal ponds occurring in local unconnected topographic lows. They typically are occupied only by alders but with occasional other species such as unidentified sedges, Red Maple, and Royal Fern (Figures 22 & 23). W3 receives sudden surface runoff from the adjacent property to the east as evidenced by an eroded channel, which was dry in the June survey (Figure 22). Wash/settling ponds in the central part of the quarry have marsh/wetland plants including bulrushes, cattails (*Typha* sp.) and grasses (Figure 24).

Figure 22. Location of high surface water runoff from adjacent property, June 7, 2013.

Figure 23. Vernal pool wetland on the eastern boundary of the property, June 7, 2013.

Figure 24. One of the settling ponds in the central area of the quarry operations, June 2013.

Sand and gravel pits in the north section of the quarry area only intermittently contain water, particularly in wetter periods of the year, but the margins and intervening areas are dominated by alders with occasional wetland species including sedges and cotton wool grass. Higher elevations are dominated by wire birch and speckled alder, with Sweet Fern the dominant understorey species. The main wash pond on the northeast corner by the entrance is bordered by alders and willow; water levels fluctuate significantly through the year and in late August were well below the outlet, which is restricted by a beaver dam.

Figure 25. Main settling pond for Nictaux Quarry looking north, August 21, 2013. Outlet and beaver dam is on the far side of the pond.

Figure 26. Edge of north sand pit pond, October 2013.

Figure 27. Large pond in sand pit at north end of Hankinson property, August 22, 2013.

Table 2. Wetlands, Nictaux Quarry Expansion. See Figure 2 for locations.

Identification	Area (ha)	Type and Comments
W1	0.28	Seepage / Slope Swamp, disturbed by logging.
W2	0.04	"
W3	0.01	Vernal pond.
W4	<0.01	Seepage swamp.
W5	0.40	Seepage / Slope Swamp, disturbed by logging.
W6	1.66	Shrub/graminoid swamp
W7	0.02	Vernal pond.
W8	0.2[1]	Vernal pond.

1. Not on quarry property.

4.2.5 BIRDS

Ninety-six (96) 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, 2013) (Table 3). A night survey for owls by a professional bird observer (Fulton Lavender, Halifax) at three listening sites on June 13, 2013 between 2230 hrs and 0030 hrs[2] detected only a single Barred Owl in the vicinity of the quarry. A site on the north edge of the study area detected four pairs and a single individual Barred Owl but no other owl species. The dawn bird survey found 46 species (Table 4); and an additional two species (Ruffed Grouse and Merlin) outside the observation period. Both areas (main quarry and sand/gravel pit at the north end of the property) had approximately the same diversity (34 species at the sand and gravel pit and 36 over the rest of the site). American Robin, Chestnut-Sided Warbler and Red-eyed Vireo were most common and abundant at the sand pit, with Alder Flycatcher, Common Raven and Yellow Warbler also relatively common and abundant. American Robin, Chestnut-Sided Warbler and White-Throated Sparrow were the most common and abundant birds in locations around the quarry and working areas, with Alder Flycatcher and Black and White Warbler also common

and abundant. All of the species are known to breed or are suspected of occurring in the area based on the Maritime Breeding Birds Atlas (Table 3). The sand and gravel pit has a number of intermittent ponds and the Hooded Merganser was at the large north pond. On a site visit for herptiles (August 22, 2013), a flock of approximately 100 Canada Geese were occupying the main quarry pond and adjacent shoreline.

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]. Blue = associated with water; Green = associated with terrestrial areas.

Breeding Evidence[2]:		
Confirmed and Probable in Area		**Possible in Area**
American Black Duck	Purple Finch	Alder Flycatcher
American Crow	Red-tailed Hawk	American Bittern
American Goldfinch	Red-winged Blackbird	American Kestrel
American Redstart	Rose-breasted Grosbeak	Bald Eagle
American Robin	Ruby-throated Hummingbird	Baltimore Oriole
American Woodcock	Song Sparrow	Bank Swallow
Barn Swallow	Spotted Sandpiper	Belted Kingfisher
Barred Owl	Tree Swallow	Black-billed Cuckoo
Black-and-white Warbler	Veery	Blackburnian Warbler
Black-capped Chickadee	Warbling Vireo	Blue-headed Vireo
Black-throated Green Warbler	White-breasted Nuthatch	Broad-winged Hawk
Blue Jay	White-throated Sparrow	Brown-headed Cowbird
Bobolink	Wilson's Snipe	Canada Warbler
Canada Goose	Yellow Warbler	Common Loon
Cedar Waxwing	Yellow-bellied Sapsucker	Eastern Wood-Pewee
Chestnut-sided Warbler	Yellow-rumped Warbler	Great Blue Heron
Chimney Swift		Hermit Thrush
Chipping Sparrow		House Sparrow
Cliff Swallow		Least Flycatcher
Common Grackle		Magnolia Warbler
Common Nighthawk		Merlin
Common Raven		Nashville Warbler
Common Yellowthroat		Northern Waterthrush
Dark-eyed Junco		Olive-sided Flycatcher
Downy Woodpecker		Osprey
Eastern Kingbird		Palm Warbler
Eastern Phoebe		Pileated Woodpecker
European Starling		Pine Siskin
Evening Grosbeak		Red-breasted Nuthatch
Gray Catbird		Red-eyed Vireo
Great Crested Flycatcher		Ring-necked Pheasant
Great Horned Owl		Rock Pigeon
Hairy Woodpecker		Ruffed Grouse
Killdeer		Savannah Sparrow
Mallard		Sharp-shinned Hawk
Mourning Dove		Sora
Northern Cardinal		Swainson's Thrush

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]. Blue = associated with water; Green = associated with terrestrial areas.

Breeding Evidence[2]:	
Confirmed and Probable in Area	**Possible in Area**
Northern Flicker	Swamp Sparrow
Northern Parula	Winter Wren
Ovenbird	Yellow-bellied Flycatcher

[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.

Table 4. Bird species present (heard or seen) during a site visit conducted 0500-0800 hrs, June 14, 2013. For locations of observation points, see Map A2.

	Active Quarry (Sites 5,7,8,10 & 12)		Sand Pit (Sites 1,2 & 4)			Active Quarry (Sites 5,7,8,10 & 12)		Sand Pit (Sites 1,2 & 4)	
	no./5 min.	no. of sites	no./5 min.	no. of sites	no. of sites	no./5 min.	no. of sites	no./5 min.	no. of sites
Passeriformes					**Passeriformes (cont.)**				
Alder Flycatcher	3.0	4	4.7	2	Magnolia Warbler	0.0	0	0.7	1
American Crow	1.4	3	0.7	1	Nashville Warbler	0.0	0	0.3	1
American Goldfinch	0.8	2	1.3	2	Northern Parula Warbler	2.4	2	0.0	0
American Redstart	2.0	4	2.7	3	Ovenbird	1.6	4	1.3	2
American Robin	4.2	5	3.7	3	Red-eyed Vireo	2.6	5	3.3	3
Belted Kingfisher	0.0	0	0.3	1	Red-Winged Blackbird	0.2	1	0.3	1
Black and White Warbler	2.0	5	1.7	2	Rose-Breasted Grosbeak	0.2	1	0.0	0
Black-capped Chickadee	1.8	3	1.7	2	Song Sparrow	2.6	5	3.0	3
Black-throated Green	0.2	1	0.0	0	Swamp Sparrow	0.6	3	0.0	0
Blue-headed Vireo	0.6	3	0.3	1	Veery	3.8	3	1.3	2
Blue Jay	0.6	2	0.7	1	White Throated Sparrow	5.0	5	1.0	2
Cedar Waxwing	0.4	1	0.0	0	Yellow-bellied Flycatcher	0.2	1	0.0	0
Chestnut-sided Warbler	6.6	5	4.0	3	Yellow-bellied Sapsucker	0.4	2	0.7	2
Chipping Sparrow	1.0	1	0.0	0	Yellow Warbler	0.6	1	2.0	3
Common Grackle	0.0	0	0.3	1	**Columbiformes**				
Common Raven	1.0	3	2.3	3	Mourning Dove	0.6	2	1.0	2
Common Yellowthroat	0.8	3	0.7	1	**Piciformes**				
Dark Eyed Junco	1.0	3	0.0	0	Northern Flicker	0.4	2	0.3	1
Downy Woodpecker	0.2	1	0.0	0	Pileated Woodpecker	0.2	1	0.3	1
Eastern Kingbird	0.0	0	0.3	1	**Gaviiformes**				
Eastern Phoebe	0.0	0	0.3	1	Ring-Necked Pheasant	0.2	1	0.0	0
European Starling	0.0	0	1.3	1	**Apodiformes**				
Grey Catbird	0.2	1	0.7	2	Ruby Throated Hummingbird	0.0	0	0.3	1
Hermit Thrush	0.4	2	1.0	1	**Anseriformes**				
Least Flycatcher	0.4	2	0.0	0	Hooded Merganser	0.0	0	0.7	1

4.2.6 MAMMALS

The quarry site is expected to have similar mammalian species as those observed in the nearby areas of Annapolis and Kings Counties. No significant or unique concentrations of mammals are known from the site, and a range of species typical of mixed forests is expected. White-tailed Deer tracks were often seen during site surveys. Muskrat were observed in the northern quarry pond at the site, and signs of beaver activity were seen throughout the site, including a dam at the outlet of the north sand pit pond which maintains the water level in the pond.

Southern flying squirrel, and the federally-listed Little Brown, Northern Long-eared & Tricoloured bats have been found within the general area of the proposed development site (S. Weseloh-McKeane, Coordinator of Special Places, personal communication, 2013). Southern Flying Squirrel occupies mature mixed forests in southcentral Nova Scotia, and potentially could occur in the uncut forest areas around the margin of the property.

4.2.7 FISH

Surface waters capable of supporting fish are largely absent in the vicinity of the quarry. A branch of Kempt Brook which originates in a swamp on the west-central section of the property below the quarry may attract upstream movements of some species during high flow periods of the year, and may sustain some fish during some years, but mostly the stream is intermittent and is expected to dry out in summer. A small intermittent stream which flows down the slope on the east side of the property dries out in summer, and cannot support fish. The ditch system below the quarry flows into the north sand and gravel pit area, eventually reaching Kempt Brook through the settling ponds, sand pits, and at times of high runoff, there is potential for fish passage through the main settling pond into the ditch system in the south section of the property below the quarry, although these intermittent environments are not considered natural fish habitat. The permanent pond in the sand and gravel pit area (north end of the Hankinson property) is also fish habitat, which can be accessed from Kempt Brook through a drainage channel on the northwest end of the pond, blocked by a beaver dam in 2013[3]. Site surveys also found that during high runoff conditions, fish evidently moved through the sand and gravel pit and main wash pond, reaching the lower section of the ditch leaving the south part of the quarry area (site FISH/WQ3, Appendix A, Map A-2).

Fish species potentially occurring include many of the common species likely to occur in small streams and ponds in the Annapolis River watershed. Species which could potentially occur in Kempt Brook, although not all might occur in the headwaters near the site, include brook trout, brown trout, creek chub, smallmouth bass, white sucker, American Eel, Banded Killifish, Sticklebacks, American Shad (known to spawn in Nictaux River[4]) and Atlantic Salmon (L. Cliche, Clean Annapolis River Project, pers. comm.

3 A beaver dam on the outlet channel helped to maintain water levels in the pond, and in past quarry operators may have blocked the channel to control water levels in the pond, but no other water control structure was observed.
4 A small dam on Nictaux River just up from the bridge has been breached and anglers are now seeing American Shad near the (inactive) power generating station near Nictaux Falls.

2013). A recent electrofishing survey in Nictaux River (September 2013) found smallmouth bass, three- and nine-spine stickleback, yellow perch, brook trout, finescale dace[5], banded killifish, white sucker, American eel, brown bullhead and sea lamprey (L. Freeman, Clean Annapolis River Project, pers. comm., 2013). Of these species, American Eel are listed by COSEWIC as a threatened species.

Species caught at the quarry site in minnow trap sets included Creek Chub, Three- and Nine-Spine Stickleback (*Gasterosteus aculeatus* and *Pungitius pungitius* respectively*),* and White Sucker *(Catastomus commersoni)* in the northern branch of Kempt Brook at Wanda Lynn Drive; Creek Chub (*Semotilus atromaculatus)*, Northern Redbelly Dace *(Chrosomus eos)*[6] and White Sucker in the large

Table 5. Fish caught on the Hankinson Property and Nictaux Quarry site, June-August, 2013[1].

Site	Location	Date	Species and Number Caught (total length (cm) and number)	Comments
FISHWQ1	Kempt Brook Branch Upstream of Access Road	June 13-14, 2325 -~0930	Creek Chubb, 8 cm (1)	2 traps
	Kempt Brook Branch Downstream of Access Road	August 21-22, 1930 - 1230	Three-Spine Stickleback, 3 cm (1); White Sucker, 3-13 cm (4); Creek Chubb, numerous.	2 traps
FISHWQ2	Gravel Pit Pond	June 13-14, 2335-0830	Nine-spine Stickleback, 6 cm (1); Northern Redbelly Dace, 4-4.5 cm (13), 7.0 cm (3); Creek Chubb, 11 cm (2), 8.5 cm (2), 7.0 cm (3); White Sucker, 7 cm (1);	4 traps
		August 21-22, 1930 - 1230	Northern Redbelly Dace (numerous); Creek Chubb (numerous)	Voucher specimens for NS Museum (J. Gilhen); 4 traps
FISHWQ3	Ditch	June 13-14, 2350-0659	Creek Chubb , 8-8.5 cm, (2); Nine-Spine Stickleback, 5.5 cm, (3)	Two traps
FISHWQ4	Settling Pond	June 13-14, 0005-0715	0	Two Traps
		Aug 21-22, 1830-1231	0	Two Traps
FISHWQ5	Ditch at End of Upper Intermittent Stream	June 13-14, 0015-~0730	0	Two Traps
FISHWQ6	Main Settling Pond	Aug 21-22, 1830-1231	0	Two Traps
Fish sampling was done under DFO Species at Risk Permit 326193 and General Permit 322937 to Envirosphere Consultants; and General Permit 322956 to Nova Scotia Museum (for J. Gilhen).				

sand pit pond at the north end of the site; and Creek Chub, Three- and Nine-Spine Stickleback in the drainage ditch (Table 5). The main settling pond into which the ditch discharges potentially could be

5 Finescale dace have not previously been found in Nova Scotia so this finding may be a new record or a misidentification.

occupied by some of the species, although none were caught in a minnow trap set in late August[7]. At times of high flow, the ditch and settling ponds are connected to the north branch of Kempt Brook by ditches and intermittent ponds formed in former sand and gravel pits, and some of the same species can probably reach the wetland on the site through the southwest branch of Kempt Brook.

The confirmed presence of Northern Redbelly Dace in the Hankinson pond is a significant finding, as this represents the only record of the species in Annapolis County and the Annapolis River watershed, with its most westerly previous occurrence being in the Windsor area. The Clean Annapolis River Project (Annapolis Royal) found a dace which they tentatively identified as Finescale Dace, a species closely similar to Redbelly Dace but which has never been found in Nova Scotia, in Nictaux River in September 2013. Although the finding suggests that the species found in Nictaux River may have been Northern Redbelly Dace, no occurrences elsewhere in the area are known. Quarry activities are not expected to interact directly with the dace although runoff from the quarry is one of the water sources for the pond. As a precaution in further development of the quarry to avoid interference with the dace, the present general flow pattern, in which runoff from the quarry is directed north through the main settling pond, should be maintained. A fish passage barrier should be installed below the upper settling pond to prevent dace and other species from moving upstream into the quarry ditch system where they can become stranded.

4.2.8 REPTILES AND AMPHIBIANS

Most of the common Nova Scotian amphibians and reptiles are expected to occur at the site. The quarry and the sand and gravel pit complex to the north are diverse in habitats that would favour the presence of both reptiles and amphibians. The South Mountain slope on which much of the quarry operations are located is expected to support only more common species and probably not significant populations due to the absence of permanent watercourses and surface waters. The site visit to this part of the property by a regional herpetologist[8] determined that there were no habitats that were particularly important for reptiles and amphibians, although many of the more common species could occur there from time to time. In particular the slope/ seepage swamps modified by logging equipment, which contain small standing water pools in spring, as well as intermittent streams and settling ponds on the property, can be good habitat for some species such as Wood Frog and Spring Peeper. Margins of these habitats can be important for various snakes but only the more common species are expected.

The lowland at the foot of the slope and extending to the north settling pond for the quarry operation contains a wetland complex including the headwaters of a stream feeding into Kempt Brook; as well as settling ponds, all of which would be suitable habitat for amphibians and reptiles. Most of the common species would be expected to occur in and around wetlands and settling ponds at the site.

6 The identity of the Northern Redbelly Dace was confirmed by John Gilhen, NS Museum. This occurrence is the most westerly recorded occurrence of the species in Nova Scotia. The species was abundant in the pond.
7 Locations sampled for fish using minnow traps are shown on Appendix Map A4.

The large pond at the north end of the Hankinson property is a good habitat for amphibians, although it isn't in the focus area for the environmental assessment. Runoff from the quarry is one of the sources of surface water that maintains the pond. Bullfrog (*Lithobates catesbeianus*) is an uncommon species generally, but it was abundant at the site, found in the main quarry settling pond, and as part of a larger population in standing water ponds in the sand and gravel complex in the northern part of the Hankinson property. The species was heard calling on June 14 and all stages (young, juveniles and adults) were observed to be common in the northern quarry pond on the Hankinson Property during the August 22 site visit. Gravel pit ponds at the site also support Northern Green and Northern Leopard Frog. Wood Frog and Spring Peeper were also seen or heard during site surveys.

The diverse habitat offered by the sand and gravel pit complex, as well as the availability of food, make the area an ideal habitat for snakes, and both Maritime Garter Snakes and Northern Red-bellied snake were observed on site visits. The permanent ponds at the site also support turtles, and the quarry owners report occasional sightings of Eastern Painted Turtle and Common Snapping Turtle in the large quarry pond (Mark Hankinson, quarry owner, personal communication, 2013), although turtles were not seen on any of the recent site visits. Because Wood Turtle, a federally listed (endangered) and provincially yellow- listed species (sensitive to human activities), have been known to occur in the nearby Nictaux River and other parts of the Annapolis watershed[9], the herpetologist conducted a search for evidence of nesting of Wood Turtles or other species around the main quarry pond at the north end of the property and the main settling pond for the quarry. The survey indicated no evidence of nesting, or sand of suitable texture for nesting, by any of the species. Normal habitat for wood turtle is on the banks of slow-flowing rivers.

4.2.9 SPECIES AT RISK

Species at Risk are plants or animals whose existence is threatened or which are in danger of being threatened, by human activities or natural events. The Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC) presently recommends species to be listed 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.* A national system of rankings of species based on their conservation status—*The General Status of Species in Canada*—includes rankings for Nova Scotia species, with Categories 1 & 2 (red and orange), "At Risk or May be at Risk" respectively; and Category 3 (yellow) "Sensitive". Species which may be at risk of extirpation or extinction are candidates for a detailed risk assessment by COSEWIC, or provincial or territorial equivalents.

8 John Gilhen, Associate Curator, Nova Scotia Museum, visited the property on August 22, 2013.
9 Wood Turtle has been observed within the general area of the proposed development (S. Weseloh-Mckeane, Coordinator, Special Places, personal communication, 2013; D. Sam, NSDNR, personal communication 2013). The species was originally recorded in the Nictaux River which is relatively close (~2 km) from the site, in the early 1900s and confirmed sightings have been made occasionally in the Annapolis Valley, in the Middleton-Bridgetown area (J. Gilhen, personal communication, 2013).

One provincially yellow-listed and federally-listed endangered species, the Wood Turtle (*Glyptemys insculpta)* occurs in the general vicinity of the project in the Nictaux and Annapolis Rivers, and could potentially stray to the site. We conducted a survey of the main pond habitats where it was most likely to be found and found no evidence of the species or of suitable habitat[10].

Other species at risk, both plant an animal, can occur in the general area of the Nictaux Quarry, but none were found at the project site. Within a 100 km radius of the study site there are 2390 documented occurrences (database records) of vascular plants (317 species), 138 records of non-vascular flora (53 species), 4830 records of vertebrate animal species (136 species) and 361 records of invertebrate taxa (61 species) (ACCDC, 2013) (Appendix C). Within 10 km of the study site, there are records of eleven plant species which may be at risk provincially: Red-Listed (Category 1 At Risk) (Eastern White Cedar); Category 2 (May be at Risk) (Wild Leek, Blue Cohosh, Sleepy Catchfly, Long-branched Frostweed, Porcupine Sedge, American Cancer-Root, Downy Rattlesnake-Plantain, Shining Ladies'-Tresses, Round-lobed Hepatica and Blunt-leaved Bedstraw), as well as one red-listed (Category 1) animal species (American Marten), and fourteen federally-listed species at risk—Harlequin Duck, Chimmey Swift, Common Nighthawk, Barn Swallow, Bobolink, Rusty Blackbird, Canada Warbler, Red-headed Woodpecker, Olve-sided Flycatcher, Eastern Wood Pewee, Snapping Turtle, Wood Turtle, American Eel, and Little Brown Myotis (ACCDC, 2013) (Tables 6 & 7). Eastern White cedar is an uncommon tree in Nova Scotia, found mainly in calcareous soils and perennially wet environments and would be unlikely to occur at the site. Otherwise there is potential habitat for only four of the Provincial Category 2 species at the site—*Sleepy Catchfly* in degraded and disturbed sand and gravel sites; Pocupine sedge in swamps and wet areas; *Downy Rattlesnake Plantain* in dry or damp mixed forests; and *Blunt-leaved Bedstraw* in boggy swales, floodplain areas, thickets and swamps. None of these species were encountered during the botanical survey for the project.

Bird species of conservation significance known to be nesting within 10 km of the site include Northern Goshawk, Common Loon, Rusty Blackbird, Common Nighthawk, Chimney Swift, Barn Swallow, Gray Jay, Boreal Chickadee and Bobolink (S. Weseloh-Mckeane, Coordinator, Special Places, pers. comm., 2013). Chimney Swifts occupy roosts in the Middleton Regional High School chimney in summer, but the species need intact forests with large trees and cavities, cabes, or abandoned buildings for roosting, none of which are available at the site. Our field study found Northern Red-Bellied Dace[11] whose occurrence is significant as it represents a local population, although the species is not at risk. The NS Museum database also lists Wood Turtle occurring in the area, and Southern Flying Squirrel and several species of bats (Little Brown Bat, Northern Long-eared Bats, and Tricoloured Bats) could potentially occur (Table 6) (S. Weseloh-Mckeane, Coordinator, Special Places, pers. comm., 2013). Southern Flying

10 Mr. John Gilhen, Nova Scotia Museum of Natural History visited the site on August 22, 2013.
11 The record of Red-Bellied Dace noted in the NS Museum database was from the site survey for this project, in which numerous individuals of the species were found breeding in the large gravel pit pond on June 14, 2013. The species has not previously been reported in the Annapolis River watershed, the previous most westerly record being ponds southwest of Windsor, N.S. The occurrence was reported to the Nova Scotia Museum of Natural History, and photographs supplied. Voucher specimens were taken by John Gilhen during the herpetile survey on August 22, 2013.

Squirrel requires mature mixed forest and potentially could occur in forests in back of the site. Characteristics of federally listed species at risk observed within 10 km of the quarry are summarized in Table 8.

Table 6. Provincially listed species of concern or other significance with potential to occur in the vicinity of the project site. Nova Scotia Museum records (S. Weseloh-McKeane, NS Museum, pers. comm., 2013).

Scientific Name	Common Name	General Status of Wild Species Rankings National (Nova Scotia) (numerical)[1] & Nova Scotia (colour)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]
PLANTS			
Allium tricoccum	Wild Leek	2, yellow	G5, S1, -
Anenome quinquefolia	Wood Anemone	3, yellow	G5, S2, -
Carex hystricina	Porcupine Sedge	2, red	G5, S2, -
Dichanthelium linearifolium	Narrow Leaved Panic Grass	3, yellow	G5, S2?, -
Fraxinus nigra	Black Ash	3, yellow	G5, S2S3, -
*Isotes protypus**	Prototype Quillwort	-, red	-
Juncus marginatus	Grass Leaved Rush	3, yellow	G5, S3, -
Polygala sanguinea	Blood Milkwort	3, yellow	G5, S2S3, -
Polygonum scandens	Climbing False Buckwheat	3, yellow	G5, S3, -
Spiranthes lucida	Shining Ladies' Tresses	3, yellow	G5, S2, -
Thuja occidentalis	Eastern White Cedar	1, red	G5, S1S2, -
BIRDS			
Accipiter gentilis	Northern Goshawk	4, yellow	G5, S3S4, NAR
Chaetura pelagica	Chimney Swift	1,yellow	G5, S2S3B, Threatened
Chordeiles minor	Common Nighthawk	1, yellow	G5, S3B, Threatened
Dolichonyx oryzivorus	Bobolink	3, yellow	G5, S3S4B, Threatened
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
Parus hudsonicus	Boreal Chickadee	3, yellow	G5, S3, -
Perisoreus Canadensis	Gray Jay	3, yellow	G5, S3S4, -
FISH			
Northern Red-bellied Dace	Phoxinus eos	4, -	-
OTHER			
Myotis lucifugus	Little Brown Bat	3, yellow	G5, S1, Endangered
Myotis septentrionalis	Northern Long-eared	3, yellow	G4, S1, Endangered

Table 6. Provincially listed species of concern or other significance with potential to occur in the vicinity of the project site. Nova Scotia Museum records (S. Weseloh-McKeane, NS Museum, pers. comm., 2013).

Scientific Name	Common Name	General Status of Wild Species Rankings National (Nova Scotia) (numerical)[1] & Nova Scotia (colour)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]
	Bat**		
Perimyotis subflavus	Tricolored/Pipistrelles	-	-
Glaucomys volans	Southern Flying Squirrels	3, yellow	G5, S2S3, N-A
REPTILES & AMPHIBIANS			
Glyptemys insculpta	Wood Turtle	3, yellow	G4, S3, Threatened

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.

* A plant found in a lake within the footprint area (S. Weseloh-Mckeane, Coordinator, Special Places, personal communication, 2013).

Table 7. Records of species of concern within a 10 km radius of Nictaux Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Family/Scientific Name		Common Name	Rank		
			General Status of Wild Species Rankings		ACCDC[3] Rankings (GRANK, SRANK, NPROT)[4]
			Provincial (colour)[1]	National (numerical)[2]	
Plants					
Amaryllidaceae	*Allium tricoccum*	Wild Leek	Yellow	4 (2NS)	G5, S1, -
Asclepiadaceae	*Asclepias incarnata ssp. pulchra*	Swamp Milkweed	Green	4	G5T5, S2S3, -
Asteraceae	*Rudbeckia laciniata var. gaspereauensis*	Cut-leaved Coneflower	Yellow	4 (3NS)	G5TNR, S2, -
Berberidaceae	*Caulophyllum thalictroides*	Blue Cohosh	Red	4 (2NS)	G4G5, S2
Brassicaceae	*Arabis glabra*	Tower Mustard	Undetermined	4 (5NS)	G5, S1, -
Caryophyllaceae	*Silene antirrhina*	Sleepy Catchfly	Red	4 (2NS)	G5, S1, -
Cistaceae	*Helianthemum canadense*	Long-branched Frostweed	Red	3 (2NS)	G5, S1, -
	Hudsonia ericoides	Pinebarren Golden Heather	Yellow	3	G4, S2, -
Cupressaceae	*Thuja occidentalis*	Eastern White Cedar	Red	4 (1NS)	G5, S1S2, -
Cyperaceae	*Carex atlantica ssp. capillacea*	Atlantic Sedge	Green	4	G5T5?, S2, -

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			Provincial (colour)[1]	National (numerical)[2]	
	Carex hystericina	Porcupine Sedge	Red	4 (2NS)	G5, S2, -
	Carex rosea	Rosy Sedge	Green	4	G5, S3, -
	Carex swanii	Swan's Sedge	Yellow	4 (3NS)	G5, S2S3, -
	Carex tenera	Tender Sedge	Yellow	4 (3NS)	G5, S1S2, -
	Eleocharis nitida	Quill Spikerush	Green	4	G4, S3, -
	Eriophorum gracile	Slender Cottongrass	Yellow	4 (3NS)	G5, S2, -
Juncaceae	*Juncus acuminatus*	Sharp-fruited Rush	Undetermined	4 (3NS)	G5, S3S4, -
	Juncus dudleyi	Dudley's Rush	Yellow	4 (3NS)	G5, S2?, -
	Juncus subcaudatus	Woodland Rush	Undetermined	3	G5, S3, -
Orobanchaceae	*Conopholis americana*	American Cancer-root	Red	4 (2NS)	G5, S1S2, -
Oleaceae	*Fraxinus nigra*	Black Ash	Yellow	4 (3NS)	G5, S2S3, -
Orchidaceae	*Corallorhiza trifida*	Early Coralroot	Green	4	G5, S3, -
	Goodyera pubescens	Downy Rattlesnake-Plantain	Red	4 (2NS)	G5, S2, -
	Goodyera repens	Lesser Rattlesnake-Plantain	Yellow	4 (3NS)	G5, S3, -
	Platanthera flava var. herbiola	Tubercled Orchid	?	-	G4T4Q, S1S2, -
	Spiranthes casei var. novaescotiae	Case's Ladies'-Tresses	Yellow	4 (3NS)	G4TNR, S2, -
	Spiranthes lucida	Shining Ladies'-Tresses	Red	4 (2NS)	G5, S2, -
	Spiranthes ochroleuca	Yellow Ladies'-tresses	Yellow	3	G4, S2S3, -
Placynthiaceae	*Polychidium muscicola*	Eyed Mossthorns Woolybear Lichen	Yellow	4 (2NS)	G3G5, S1S2, -
Poaceae	*Alopecurus aequalis*	Short-awned Foxtail	Yellow	4 (3NS)	G5, S2S3, -
	Dichanthelium clandestinum	Deer-tongue Panic Grass	Green	4	G5?, S3, -
	Dichanthelium linearifolium	Narrow-leaved Panic Grass	Yellow	4 (3NS)	G5, S2?, -
	Panicum tuckermanii	Tuckerman's Panic Grass	--	4 (3NS)	G5, S2S3, -
	Torreyochloa pallida var. pallida	Pale False Manna Grass	Green	4	G5T5?, S1, -
Polygalaceae	*Polygala sanguinea*	Blood Milkwort	Yellow	4 (3NS)	G5, S2S3, -
Polygonaceae	*Polygonum achoreum*	Leathery Knotweed	Undetermined	4 (5NS)	G5, S1, -

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			Provincial (colour)[1]	National (numerical)[2]	
	Polygonum buxiforme	Small's Knotweed	Undetermined	?	G5, S2S3, -
	Polygonum pensylvanicum	Pennsylvania Smartweed	Green	4	G5, S3, -
	Polygonum robustius	Stout Smartweed	Green	4	G4G5, S3S4, -
	Polygonum scandens	Climbing False Buckwheat	Yellow	4 (3NS)	G5, S3, -
Ranunculaceae	*Anemone quinquefolia*	Wood Anemone	Yellow	4 (3NS)	G5, S2, -
	Hepatica nobilis var. obtuse	Round-lobed Hepatica	Red	?	G5T5, S1S2, -
Rosaceae	*Agrimonia gryposepala*	Hooked Agrimony	Green	4	G5, S3, -
	Amelanchier stolonifera	Running Serviceberry	Green	4	G5, S3?, -
	Rubus flagellaris	Northern Dewberry	Undetermined	4 (5NS)	G5, S1?, -
Rubiaceae	*Galium obtusum*	Blunt-leaved Bedstraw	Red	4 (2NS)	G5, S1S2, -
Urticaceae	*Boehmeria cylindrica*	Small-spike False-nettle	--	4 (2NS)	G5, S1, -
	Laportea canadensis	Canada Wood Nettle	Yellow	4 (3NS)	G5, S3, -
Violaceae	*Viola sagittata var. ovata*	Arrow-leaved Violet	Green	4	G5T5, S3S4, -
		Animals-Birds			
Accipitridae	*Accipiter gentilis*	Northern Goshawk	Yellow	4	G5, S3S4, NAR
Anatidae	*Anas discors*	Blue-winged Teal	Green	4 (2NS)	G5, S3B, -
	Histrionicus histrionicus	Harlequin Duck	Yellow	3 (1NS)	G4T4, S2N, SC
	Mergus serrator	Red-breasted Merganser	Green	4	G5, S3B, S5N
Apodidae	*Chaetura pelagica*	Chimney Swift	Yellow	1	G5, S2S3B, T
Caprimulgidae	*Chordeiles minor*	Common Nighthawk	Yellow	1	G5, S3B, T
Cardinalidae	*Cardinalis cardinalis*	Northern Cardinal	Green	4	G5, S3S4, -
	Pheucticus ludovicianus	Rose-breasted Grosbeak	Green	4 (3NS)	G5, S3S4B, -
	Piranga olivacea	Scarlet Tanager	Green	4 (5NS)	G5, S2B, -
Cathartidae	*Cathartes aura*	Turkey Vulture	Accidental	4 (3NS)	G5, S2S3B, -
Charadriidae	*Charadrius vociferus*	Killdeer	Green	4 (3NS)	G5, S3S4B, -
Corvidae	*Perisoreus canadensis*	Gray Jay	Yellow	4 (3NS)	G5, S3S4, -
Cuculidae	*Coccyzus erythropthalmus*	Black-billed Cuckoo	Green	4 (2NS)	G5, S3?B, -

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			Provincial (colour)[1]	National (numerical)[2]	
Fringillidae	*Carduelis pinus*	Pine Siskin	Green	4 (3NS)	G5, S3S4B/ S5N, -
	Pinicola enucleator	Pine Grosbeak	Green	4 (2NS)	G5, S3?B/ S5N, -
Gaviidae	*Gavia immer*	Common Loon	Yellow	4 (2NS)	G5, S3B/ S4N, NAR
Hirundinidae	*Hirundo rustica*	Barn Swallow	Yellow	4 (3NS)	G5, S3B, T
	Petrochelidon pyrrhonota	Cliff Swallow	Green	4 (2NS)	G5, S3B, -
	Riparia riparia	Bank Swallow	"	4 (2NS)	G5, S3B, -
Icteridae	*Dolichonyx oryzivorus*	Bobolink	Yellow	4 (3NS)	G5, S3S4B, T
	Euphagus carolinus	Rusty Blackbird	Yellow	3 (2NS)	G4, S2S3B, SC
	Icterus galbula	Baltimore Oriole	Green	4 (2NS)	G5, S2S3B, -
	Molothrus ater	Brown-headed Cowbird	Green	4	G5, S2S3B, -
Mimidae	*Dumetella carolinensis*	Gray Catbird	Green	4 (2NS)	G5, S3B, -
Paridae	*Poecile hudsonica*	Boreal Chickadee	Yellow	4 (3NS)	G5, S3, -
Parulidae	*Dendroica castanea*	Bay-breasted Warbler	Green	4 (3NS)	G5, S3S4B, -
	Dendroica tigrina	Cape May Warbler	Green	4 (3NS)	G5, S3?B, -
	Vermivora peregrina	Tennessee Warbler	Green	4 (3NS)	G5, S3S4B, -
	Wilsonia canadensis	Canada Warbler	Yellow	1	G5, S3B, T
	Wilsonia pusilla	Wilson's Warbler	Green	4 (3NS)	G5, S3S4B, -
Picidae	*Melanerpes erythrocephalus*	Red-headed Woodpecker	Accidental	1 (8NS)	G5, SNA, SC
	Picoides arcticus	Black-backed Woodpecker	Green	4 (3NS)	G5, S3S4, -
Scolopacidae	*Actitis macularius*	Spotted Sandpiper	Green	4 (3NS)	G5, S3S4B, -
	Gallinago delicata	Wilson's Snipe	Green	4 (3NS)	G5, S3S4B, -
Tyrannidae	*Contopus cooperi*	Olive-sided Flycatcher	Yellow	1	G4, S3B, T
	Contopus virens	Eastern Wood-Pewee	Green	4 (3NS)	G5, S3S4B, SC
	Empidonax flaviventris	Yellow-bellied Flycatcher	Green	4 (3NS)	G5, S3S4B, -
	Sayornis phoebe	Eastern Phoebe	Green	4 (3NS)	G5, S3S4B, -
	Tyrannus tyrannus	Eastern Kingbird	Green	4 (3NS)	G5, S3S4B, -
Animals-Dragonflies & Damselflies					
Gomphidae	*Stylurus scudderi*	Zebra Clubtail	Undetermined	4 (2NS)	G4, S1S2, -
Animals-Butterflies					
Hesperiidae	*Hesperia comma laurentina*	Laurentian Skipper	Green	6 (4NS)	G5T5, S3, -
Other					

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			Provincial (colour)[1]	National (numerical)[2]	
Chelydridae	*Chelydra serpentina*	Snapping Turtle	Green	4	G5, S5, SC
Emydidae	*Glyptemys insculpta*	Wood Turtle	Yellow	1 (3NS)	G4, S3, T
Mustelidae	*Martes pennant*	Fisher	Yellow	4 (3NS)	G5, S2, -
	Martes americana	American Marten	Red	4 (1NS)	G5, S1, -
Salmonidae	*Salmo salar*	Atlantic Salmon-Inner Bay of Fundy population	Red	4 (2NS)	G5TNR, S2, E
Vespertilionidae	*Myotis lucifugus*	Little Brown Myotis	Yellow	4 (3NS)	G3, S1, E

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; ( )provincial rank
3. Atlantic Canada Conservation Data Centre (ACCDC).

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

G1	**Critically Imperilled**—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	**Imperilled**—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, recentand 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

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		Provincial (colour)[1]	National (numerical)[2]	

(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 imperilled 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 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 or 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 occurrednces 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.

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		Provincial (colour)[1]	National (numerical)[2]	

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 8. Characteristics of federally-listed plant and animal species occurring within 10 km of Nictaux Quarry.

Species	Description
Barn Swallow (*Hirundo rustica*)	Barn Swallows are listed by COSEWIC as a *threatened* species. The species breeds across Canada and migrates south to Central and South America to 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).
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 breeds 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.
Chimney Swift *(Chaetura pelagica*)	The Chimney Swift is a small, fast-flying, swallow-like bird that nests in caves and large hollow trees in woodlands and feeds on insects far above the ground. The species often attracts public attention through its use of man-made structures such as abandoned chimneys in populated areas for roosting and the high numbers in which it occupies them. For unknown reasons this species is in serious decline both in abundance and range, but pesticide use affecting insect populations on which it feeds, and habitat loss, are thought to be major factors.
Bobolink (*Dolichonyx oryzivorus*)	Bobolink is a medium-sized grassland bird which breeds in Canada and is listed by COSEWIC as a *threatened* species. The species typically arrives in the area in May, nesting in 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* that nests and breeds in forested wetlands, some woodlands, and cultivated fields across Canada. Threats to the species include: loss of habitat in overwintering areas due to conversion of wetlands to agriculture and/or human use land; human disturbance (wetland degradation); and possibly bird control programs used to protect crops.
Red-Headed Woodpecker (*Melanerpes erythrocephalus*)	The Red-Headed Woodpecker is a north American species occurring from southern Canada to Mexico and east to Atlantic Canada. It inhabits a range of habitats, typically in and around hardwood forests, with a high density of dead or unhealthy trees for roosting, and where holes can easily be made for nesting. Red-Headed Woodpecker occurs as an accidental in Nova Scotia.
Canada Warbler (*Cardellina canadensis)*	Canada Warbler is a small songbird that nests on or close to the ground in ferns or fallen logs within wet, mixed forests with shrubby 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 spraying, and changes in insect populations, such as the decline in spruce budworm populations since 1970. It is federally listed as a *threatened* species under the Species at Risk Act.

Table 8. Characteristics of federally-listed plant and animal species occurring within 10 km of Nictaux Quarry.

Species	Description
Olive-sided Flycatcher (*Contopus cooperi*)	The species is a large forest flycatcher widespread in Canada and the United States. It is often observed in open forests and forested margins of bogs, rivers or wetlands, or areas altered by man (due to logging or development) where it forages for flying insects. The forest areas tend to be coniferous or mixed woods that have a combination of mature trees and deadwood. The species breeds between April and June, mainly in mid-to-late May. After fledging in late July, they begin their fall migration, 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.
Eastern Wood-Pewee (*Cantopus virens*)	Eastern Wood-Peewee is a flycatcher common and widespread in forested environments in eastern North America, reaching the northern limit of its range in southern Canada including the Maritimes. It is typically found in clearings and forest edges in broadleaf forests where it feeds principally on flying insects. Populations of the species have been declining rapidly in recent years (25% per decade) and the decline has not been explained.
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 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. 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. In Nova Scotia, the species is secure.
Wood Turtle (*Glyptemys insculpta*)	Wood Turtle is federally listed as a *threatened* species. The species is generally active April to October, nesting 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, preferring 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).
Little Brown Bat (*Myotis lucifugus*), Northern Long-eared Bat (*Myotis septentrionalis)* and Eastern Pipistrelle (*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 fatal to bats. These three species may hibernate in underground mines or caves in the study area, if present.

4.3 HUMAN USES OF THE ENVIRONMENT

4.3.1 MI'KMAQ

The Annapolis River Valley and its tributaries and the surrounding lands are included in territory traditionally occupied by the Mi'kmaq. Mi'kmaq would have used all areas in the valley to some degree, although the upland areas, such as those occupied by Nictaux Quarry, have a lower potential for archaeological resources. Modern Mi'kmaq are likely to participate in the same activities in the study area as the general population of Annapolis County, including recreational use, hunting and fishing, gathering of ceremonial foods, etc. The project site is not near any of the Mi'kmaq communities in Annapolis County. The closest Mi'kmaq community, located over 35 km from the site, is the Cambridge 32 Community (near Cambridge Station in Kings County), which is part of the Annapolis Valley First Nation. Other Mi'kmaq communities within about 65 km include: Bear River 6A & B (near Annapolis Royal) and Bear River 6 (near Digby) of the Bear River First Nation; New Ross 20 and Pennal 19 (north of the town of New Ross in Lunenburg County) of the Indian Brook First Nation (also known as

Shubenacadie First Nation); and Wildcat 12 (near Caledonia in Queens County) of the Acadia First Nation.

Two tribal councils exist in Nova Scotia: the Confederacy of Mainland Mi'kmaq (CMM) and Union of Nova Scotia Indians (UNSI). CMM is a not-for-profit organization incorporated in 1986, whose mission is to promote and assist Mi'kmaw communities. The UNSI, created in 1969, was formed to provide a "cohesive political voice for Mi'kmaq people". Both Annapolis Valley First Nation and Bear River First Nation are members of CMM, and Acadia First Nation and Indian Brook First Nation are members of the UNSI. 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 KMK negotiates between Nova Scotia Mi'kmaq, 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 of AFNEN, for which the Mi'kmaq Confederacy of PEI in Charlottetown is currently 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.

No Mi'kmaq ceremonial or cultural uses have been identified for the Nictaux Quarry site or vicinity. Additionally, the area is not known to be used for other Mi'kmaw purposes, based on the background archaeological review for the project (CRM 2013) and the Nova Scotia Museum database search (Peter Christmas, NS Museum, pers. comm 2013).

4.3.2 POPULATION AND ECONOMY

Population density in the area is higher than average for Nova Scotia; the town of Middleton and Census subdivision C of Annapolis County (which includes the quarry and lands on the west side of Highway 10) have population densities of 24.2 and 321.6 people per km^2, respectively, while the population density for Nova Scotia is 17.4 people per km^2 (Statistics Canada, 2011). Population density and number of residences decreases away from Middleton and Nictaux. Employment rate and average salaries are typical of Nova Scotia—similar to the average for the Province (57% and $35,478, respectively; Statistics Canada, 2011). The top three industries for employment (in terms of number of people in that industry) for Middleton are the retail trade, educational services and public administration, while the top three for

Annapolis County (which are also the top three for the Province) are the retail trade, social/health care and public administration (Statistics Canada, 2011).

4.3.3 WATER SUPPLY AND RESIDENTIAL WELLS

The site is not located in or near any water supply areas for Annapolis County and the Town of Middleton obtains its water from groundwater wells located within Town limits north of the Annapolis River. Residences and farms in the Nictaux area rely on groundwater wells, both drilled and dug.

4.3.4 LAND USE

Land in the vicinity of the quarry is used primarily for forest resource, sand and gravel extraction, agriculture, and residential/ commercial activity. Highways 10 & 201 in the area form a corridor for residential development zoned for a mixture of R1, R2 and R3 (low, medium and high density) and Highway 10 is zoned for R1 & R3 with commercial zoning. To the west along Highway 201, Nictaux West is predominantly agricultural, including orchards, mixed farms and livestock (Appendix A, Map A-6).

4.3.5 HUNTING

The quarry site is expected to support wildlife species characteristic of Annapolis and Kings Counties, with a possibility for some of the more uncommon species to occur due to the proximity to the protected wilderness areas to the south. Predominant fur-bearing species reported in trapping catch for Annapolis and Kings Counties likely occur near the project and include muskrat, mink, raccoon, squirrel, weasel, coyote, beaver and fisher (Table 9). Annapolis County reported the second highest catch provincially for weasel and third highest catch for squirrel for the period between 2007-2012. Kings County reported the fourth highest catch provincially for muskrat, mink and raccoon, and the fifth highest catch for squirrel between 2007-2012. Of upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant), only the former two are significantly harvested in Annapolis and Kings Counties (Table 9). Between 2007-2012, Kings County ranked first and Annapolis County ranked second provincially for the harvest of Ring-necked Pheasant. Ruffed Grouse is an important game species in Annapolis County, with county harvest ranking second provincially in 2007-2012; the species is not as important here as in Kings County (ranked 12th in 2007-2012). Both counties report Snowshoe Hare harvest, but the species represents a small proportion of the numbers harvested in the province. The area supports White-tailed Deer, and Annapolis County and Kings County reported slightly above the median (4.6%), and at the median (3.9%), respectively, of the provincial harvest values from 2007-2012 (http://novascotia.ca/natr/hunt/deer-stats.asp). Black Bear harvest in Annapolis and Kings Counties is expected to follow the increasing trend occurring lately in the Province.

Table 9. Summary of wildlife harvested in Annapolis County, Kings County and Nova Scotia, from 2007 to 2012.					
	Annapolis County		Kings County		Nova Scotia
Animal	Calculated Harvest	Percent (%) of total for province	Calculated Harvest	Percent (%) of total for province	Calculated Harvest
Large Mammals					
Deer	2,848	4.6	2,379	3.9	61,457
Upland Game					
Snowshoe Hare	30,697	6.7	17,369	3.8	454,994
Ruffed Grouse	14,914	9.3	8,417	5.3	159,593
Ring-necked Pheasant	3,949	14.5	9,237	34.0	27,172
Fur Harvest					
Beaver	1,034	4.9	702	3.3	21,287
Muskrat	5,231	8.6	5,822	9.5	61,019
Otter	67	3.3	52	2.6	2,037
Mink	286	4.0	423	5.9	7,227
Bobcat	267	4.8	122	2.2	5,606
Fox	111	3.8	98	3.3	2,930
Raccoon	670	4.5	1,298	8.8	14,809
Skunk	5	2.5	0	0.0	201
Squirrel	511	5.6	477	5.2	9,158
Weasel	634	12.0	123	2.3	5,293
Coyote	691	5.7	660	5.4	12,196
Lynx	0	0.0	0	0.0	23
Marten	1	3.4	0	0.0	29
Fisher	50	6.0	31	3.7	830
Total , all furbearers	9,558	6.7	9,808	6.9	142,645
Source: Nova Scotia Department of Natural Resources, Wildlife Division, Harvest Statistics, http://www.gov.ns.ca/natr/wildlife/sumindex.asp; Accessed October 22, 2013.					

4.3.6 RECREATIONAL, COMMERCIAL AND MI'KMAQ FISHING

Annapolis County is in Provincial Recreational Fishing Area 5, and supports recreational fishing in inland and tidal waters, from April 1 to September 30 (Nova Scotia Anglers' Handbook and 2013 Summary of Regulations). Brook trout and striped bass are commonly fished in local tributaries and an ice fishery for smelts occurs from January-March in tidal waters just above the Annapolis River causeway (L. Cromwell, Conservation and Protection DFO, personal communication 2013). Brook Trout likely are fished in the lower reaches of Kempt Brook.

Commercial licenses are issued for American Eel in the Annapolis River. Mature eels are caught in eel pots near Bridgetown (between Lawrencetown & Hebb's Landing) and elvers may be caught in one tributary of Annapolis River; however catch is minor compared to larger fisheries in Southwest Nova Scotia (L. Cromwell, Conservation and Protection DFO, personal communication 2013).

Mi'Kmaq communal fishing licenses are used by the Bear River Band (Digby Area) and Glooscap Band (Annapolis royal) for food, social and ceremonial uses.

4.3.7 ARCHAEOLOGICAL AND PALAEONTOLOGICAL RESOURCES

No records of archaeological resources of significance occur in the study area, and the potential for pre-contact sites and historic archaeological resources is low and low to moderate, respectively (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013; CRM 2013).

Some of the rock formations at the site in the Elderkin Brook Formation (Halifax Group & Meguma Supergroup) can contain trace fossils and the Triassic to Jurassic undivided sedimentary and volcanic rocks (Wolfville Formation) can contain rare and important fossils (amphibians, capitosaurs; reptiles, rauisuchids; & plant fossils) (S. Weseloh-Mckeane, Coordinator, Special Places, personal communication, 2013).

4.3.8 PARKS AND PROTECTED AREAS

There are no parks or protected areas in the immediate vicinity of the site but the abandoned rail corridor which runs to the northeast of the site is part of the Bridgetown/Springfield Rail Corridor, which forms part of the Trans Canada Trail.

4.3.9 RECREATIONAL/CULTURAL ACTIVITIES

Residents in the vicinity of the quaryy can be expected to be, and were observed using Highways 201 and 10 for walking, jogging, and bicycling. The abandoned rail line running parallel to Highway 10 is being developed as a section of the Trans Canada Trail. In future this area will be used as a walking, hiking and recreational travel route.

4.3.10 RESIDENTIAL/COMMERCIAL DEVELOPMENT

The communities of Nictaux, Nictaux Falls and Nictaux West near which the Nictaux Quarry is situated contain a low to moderate density of residential properties and farms, and supporting commercial infrastructure, largely centred on the Town of Middleton and spread out along Highways 10 and 201. Approximately 109 residences and farms occur within a 1 km radius of the quarry property (only three

residences are within an 800 m radius of proposed active blasting[12]), the majority along Highway 201, including one subdivision occupied by 17 homes on Wanda Lynn and Vendora Drive immediately north, and the home of the quarry owner which is at the north end of the Hankinson property. Homes along Highway 10 extending to Nictaux Falls are approximately 1 km from the quarry property and one farm on South Mountain is 550 m south of the south boundary of the propety. Access to the quarry site along Gravel Pit Road is through a small subdivision of five homes included in the above totals.

A variety of commercial services for the communities of Nictaux, Nictaux Falls and West Nictaux are situated along Highway 201 and Highway 10 in Nictaux, including: an apartment building, a gas bar, a Needs convenience store and Ben's Bakery Outlet; Nictaux United Baptist Church and Christian Family Centre; a ceramics centre and craft club (B & J Ceramics Shop and Club); the Nictaux Volunteer Fire Department, a Car Quest auto parts dealership, Albert F. Veinot Auto Sales (used cars); the Twelve Baskets food bank, and a restaurant. The commercial district is about 1.2 km from the quarry site.

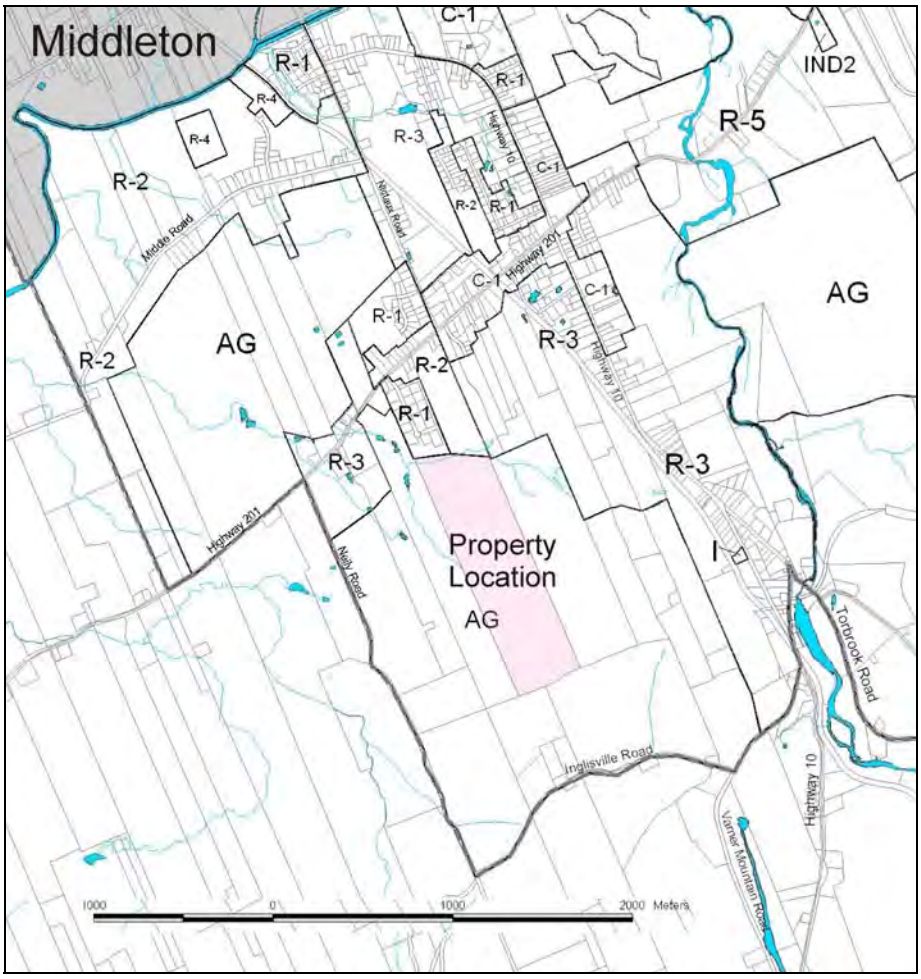

Figure 28. Land use zoning for the Middleton area, Annapolis County (Source: Annapolis County East End Area, Zoning Map.*www. annapoliscounty.ca*).

12 The proponent has signed agreements from the owners of the three residences located within 800 m of the proposed location of blasting.

The Nictaux Quarry site is adjacent to the Balcom Brothers sand and gravel pit operation (PID5058763) and further to the east to the former Ward Aggregates Property (PID 5058748) which is not presently being used. The quarry provides a valuable source of aggregate and paving materials for the local economy, as well as employment and spinoffs locally.

4.3.11 TOURISM AND VIEWSCAPE

The Nictaux-Middleton area of the Annapolis Valley is an important one for visitors, in particular due to the presence of Highway 10, one of the Trunk Highways crossing the province from New Germany and Bridgewater. Nictaux River and the decommissioned power plant at Nictaux Falls are interesting features of the area, and the Town of Middleton has many tourist attractions and services. The quarry will probably not be noticed by visitors to the area, either on foot or in vehicles. The quarry is about 1 km from Highway 10 and cannot be seen by travelers; the quarry and development is located about 1 km from Highway 201, and angle of elevation will be comparatively low, with maximum top face of the quarry probably not more than 110 m (about 40 m above the present top of the face) compared with maximum elevations greater than 150 m beyond on South Mountain. Due to the separation distance from Highway 201, the quarry will not have a high visibility from the highway and the subdivision on Wanda Lynn Drive (Figure 23). While on site we tried to find a location where the existing quarry could be seen from Wanda Lynn Drive and Gravel Pit Road but it is not easily visible from either area. In addition, the more gradual slope behind the quarry will mean that it can extend further back for some distance without substantially increasing its visibility from Highway 201 and adjacent areas. Although it may be possible to see the quarry from North Mountain, the maximum size is comparatively small laterally in the viewplane (375 m east-west) and would not be particularly visible from a great distance.

Figure 29. View of quarry looking south along Wanda Lynn Drive.

4.3.12 TRANSPORTATION

Highway 10 is a major travel route across province between Bridgewater-New Germany and Middleton including tourist and regional commercial traffic. Highway 201 is used more for local use by residents, and for transportation of agricultural products and aggregate. When in operation, the quarry will generate additional truck traffic in the vicinity of the site. Safety concerns arise when traffic along Highway 201 meets the crossroads with Highway 10 at Nictaux, leading to periodic congestion. Depending on location of delivered product, any of the roads leading from the site could experience added traffic. After passing through Nictaux, Highway 10 passes directly into central Middleton, from where it must pass through town to access Highway 101 in the area.

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 of this kind. For this assessment a list of valued environmental components (VECs)[13], and project activities and outcomes for the expansion of the existing quarry were developed, and the potential for interactions of these activities with VECs was identified. Where interactions were identified and significant impacts were likely to occur, mitigating actions or activities have been suggested which will avoid the impact or reduce it to acceptable levels, before the project proceeds. The process ensures that all potentially significant impacts on VECs are identified and all potential impacts on them have been considered, and sufficient mitigation planned.

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 10. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following and are summarized in Tables 11 & 12.

13 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 environmental assessments.

Table 10. Valued Environmental Components (VECs) for Nictaux Quarry Expansion.	
Biophysical	Socioeconomic
Air Quality and Noise	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	Parks and Protected Areas
Northern Redbelly Dace	Water Supplies & Wells
	Industrial/Commercial

6.1 SOCIOECONOMIC IMPACTS

6.1.1 MI'KMAQ

The Mi'Kmaq occupied much of Nova Scotia prior to European contact and would have used river valleys in particular in the area for habitation, hunting and fishing. 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 2013). The site has been largely disturbed by the sand and gravel operations, the current quarry, as well as various cycles of logging.

Quarry operations would interact with any use of natural resources through hunting or fishing, either recreationally or for subsistence, through modifications of the headwaters of Kempt Brook, which is a tributary to the Annapolis River; 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 walking, cycling and home-based recreation in residential areas. Some nature appreciation may also take place. The quarry is a significant distance from roads and residences and would be cyclic, likely occupying mainly the summer construction season. Although the operations could likely be heard and residents would experience truck traffic and other effects of quarry operations, the impacts on these activities are expected to be negligible.

6.1.3 TOURISM AND VIEWSCAPE

The property is located some distance from any of the major roads and the rails-to-trails corridor, and would be both poorly visible and relatively little heard by passersby. Only the entrance to the quarry is visible from the highway and the expanded quarry will also not be visible from the road. The quarry viewed from great distance, such as on North Mountain, is not expected to be particularly noticeable. Use of the area by truck traffic and workers at the quarry would help to support commercial services such as the convenience store. Overall the impacts on viewscape and tourism would be expected to be negligible.

6.1.4 RECREATIONAL FISHING

The lower reaches of Kempt Brook, which originates in the vicinity of the quarry, are probably used from time to time by locals for fishing. The quarry expansion will not affect recreational fishing as it is not expected to change the hydrology significantly. Water quality of the runoff from the quarry is good for salmonids, including low turbidity and neutral pH, which would lead to good quality of waters downstream for fish. Overall a negligible impact of the quarry on recreational fishing is expected.

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 on the site is not suitable for agriculture or forestry due to the terrain and the prior removal of sand and gravel deposits found at the site. Most of the forest at the site has been logged and disturbed. Areas containing remnant forest will be preserved if possible to assist in maintaining wetlands at the site and to provide a buffer of adjacent areas from quarry activities. Quarry activities are not expected to impact existing uses of nearby areas for agriculture or for commercial and residential use. Values for residential properties will likely be only minimally affected by the presence of the quarry. Residential development in the area may proceed at a lower pace than it would in the absence of the sand and gravel and quarry operations. The quarry and other sand and gravel opits have been operating in the area for many years with little impact on the local residential and farm community.

6.1.7 TRANSPORTATION

The quarry generates a low level of truck traffic on the highways in the area, but activity levels are not expected to increase significantly, and consequently the quarry is not expected to change the existing traffic volumes significantly. Traffic in the area could increase because of increasing residential development in Nictaux as well as a general improvement in the economy and industrial activity, but the

rate of change as well as the overall traffic volume is not expected to be influenced significantly by the quarry expansion. Use of other traffic corridors such as Highway 201 to access Highway 101 through Brickton and Wilmot would reduce congestion in Nictaux and Middleton. Overall the impact of the project on transportation is expected to be minimal.

6.1.8 RESIDENTIAL USE

Quarry activities can interfere with normal use and enjoyment of nearby residential properties by creating background noise and through truck and equipment traffic which some residents may find objectionable. Presence of the quarry may limit rate of expansion of urban areas around Middleton compared with other areas, because areas in the vicinity of the quarry are less desirable. Nictaux is among the most desirable areas for urban expansion in the Middleton area, and presence of the lands for the quarry, as well as a group of properties occupying the sand and gravel deposits to the east of the Hankinson property, may reduce the rate of residential development in the immediate future. Aspects of the quarry operation which interact with residential property owners in the Nictaux area include occasional noise from blasting (1-2 times per year), equipment noise both on site and from trucks traveling to and from the site; noise and light pollution from operation of portable plants such as crushers and asphalt plants on the site; and dust. The existing separation of the quarry from most of the properties is around 800 to 1000 m. The closest areas which could be developed for housing on the northeast side in future are approximately 500 m from the northeast parts of the quarry property (and beyond 800 m from the active blasting area). The west and south areas bordering the quarry property are not likely to be developed for some time.

In general there will be sufficient separation from residences and commercial operations to minimize the impacts of noise on adjacent residential properties. Activities at the quarry would be limited in time seasonally (approximately March to November) and during the day, although nighttime operations but not blasting will be required under some circumstances. Speed limits on trucks would be set in residential areas to limit noise and dust production. Traffic volumes from the site would be moderate, and frequency would depend on the supply requirements for particular projects. Dust management will be practiced. 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 circumstances when they are undertaken at night, will involve minimal additional lighting and noise, which is unlikely to be a serious disturbance to local residents. It is expected that at some point in the future, the deposits used by the quarry will run out and the properties in the area may be available for other uses.

6.1.9 WATER SUPPLIES AND RESIDENTIAL WELLS

The water supply for the Town of Middleton is from groundwater wells located within the Town Limits. Residences, commercial properties, and farms in Nictaux, Nictaux Falls and Nictaux West rely on groundwater wells. The project is remote from Town wells and occasional blasting at the quarry is not expected to impact existing wells in the area, in particular since it is located in a separate bedrock unit from the main groundwater resources used in the area. Runoff from the quarry, which flows over sandy surface deposits which overly the aquifers in the area, and can potentially percolate through them, is of

high quality (low conductivity and dissolved solids and neutral in pH). Best management practices for operations will be undertaken to eliminate the potential for release of contaminants such as hydrocarbons from vehicles, and from chemicals contained in explosives, to enter aquifers at the site. Overall, activities at the quarry are not expected to impact wells in the area.

6.1.10 PARKS AND PROTECTED AREAS

The Trans Canada Trail which occupies the abandoned rail corridor between Middleton and Bridgewater is located approximately 1 km east of the site. Activities at the quarry may be heard from the trail, but the quarry is comparatively distant, is not visible from the trail and noise levels will be low. The trail is not far from Highway 10, which is one of the major travel routes across the province, and traffic on the road which would typically be louder than the quarry. Users of the trail would also become acclimatized to the distant background noise, and not be disturbed by it. Overall the impacts on use of the trail would be negligible.

6.1.11 RESOURCE USE—FORESTRY & TRAPPING

The site of the quarry has been logged to permit quarry operations, and so will not be available for logging in future; however the area occupied by the quarry is relatively small in relation to the available forest resources in the area, and the overall impact is expected to be small. Wetlands not in the footprint of the quarry are expected to be avoided, providing habitat for occasional use by wildlife, which could contribute to utilization in the undeveloped lands surrounding the quarry.

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 heavy equipment (e.g earth movers, crushers), 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 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. 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.

Exhaust 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 several pieces of heavy equipment, earth movers, trucks etc as well as operation of crushers and asphalt plant), which will be localized and similar in type and amount 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 already produced at the site, since the operations are expected to be similar in size at a given time, 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).

6.2.2 HYDROGEOLOGY

Activities associated with the project including forest clearing, grubbing and removal of overburden, and blasting, influence groundwater flow locally in the vicinity of the quarry, but are not expected to influence groundwater aquifers elsewhere on the property or in adjacent areas. The amount of recharge area involved in project activities is extremely small in relation to the overall size of the aquifers in the Nictaux area. The effect on overall groundwater patterns will be small, however, due to the small area of the quarry in relation to the area of the adjacent landscape. The overall impact on hydrogeology at the site is therefore expected to be negligible.

6.2.3 HYDROLOGY

Expansion of the quarry will result in an increasingly artificial and managed regime of surface water movement and runoff at the site, mainly near the quarry but potentially affecting the entire active area of quarry operations. With the quarry present, peak runoff flows at the site have likely increased over historic levels, and in future will be more sudden and greater in volume as the area of quarry expands and the amount of natural watershed decreases. This will affect downstream flows in Kempt Brook, into which the site drains, and will affect the hydrological balance in a wetland and two branches of Kempt Brook which arise below the quarry, having at some time in past diverted runoff away from the wetland and from the southwestern tributary of the Brook into the northern tributary. The wetland is important ecologically and the productive ecosystem of a sand pit pond on the north end of the Hankinson property—the pond which contains the Northern Redbelly Dace which is a species of interest at the site, as well as having a productive ecosystem—relies in part on the divreted runoff from the quarry. The present runoff management system also leads to movements of fish from the north end of the Hankinson Property through settling ponds and ditches, to upstream areas near the quarry, where they can be stranded when the flows subside. Thus the present runoff management approach has both positive and negative aspects which could impact the local environment.

A plan for runoff management from the quarry can be instituted which allows for sufficient retention and slowed release of runoff to avoide major impacts to downstream areas, as well as having barriers for fish passage to prevent movements upstream into the artificial drainage system. Ideally the present artificial diversion of runoff between branches of Kempt Brook should be maintained, because of the unknown consequences for species in the pond of major changes in flow.

6.2.4 WATER QUALITY

Water quality downstream of the site is important for fish habitat in the lower watershed of Kempt Brook, and the porous sand and gravel deposits on the property are important for recharge of local groundwater aquifers. Quality of water leaving the site and entering the stream is high, due both to the onsite flow management, settling ponds, etc. and the bedrock quality. Quarry rock is within acceptable limits for sulphur and acid-generating potential. Presence of the quarry probably has 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. Blasting is not expected to result in groundwater quality changes, particularly with efforts to reduce releases of other chemicals such as nitrates used in blasting. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. On-site water and sedimentation management both existing and to be established, including settling ponds are expected to be capable of handling any suspended sediment issues. Release of other contaminants such as oils and lubricants from operating equipment, as well as contaminants which may be found in material, such as recycled asphalt, stored at the site, potentially can impact downstream areas, but is expected to be mitigated by normal precautions on equipment operations and fuelling locations, and measures to reduce runoff from storage piles, and in any case, the concentrations of any contaminants are expected to be exceedingly low.

6.2.5 FRESHWATER AQUATIC ENVIRONMENTS

The intermittent stream on the site, as well as the complex of temporary ponds, settling ponds and streams on the north end of the Hankinson Property, form a productive ecosystem in the area. Activities at the quarry will impact these features chiefly through changes in patterns, timing, and amount of runoff from the site. In particular, the diversion in past of runoff from a wetland on the property and the southwest branch of Kempt Brook, into the north branch, has been a significant change. However the present state of Kempt Brook north of the Hankinson Property appears to be healthy, in part due to the increased flow it is receiving from the quarry. The ponds in the sand and gravel pits at this site, and in the gravel/sand body in this area in general, have interfered with natural flows, but the result has been a fairly productive ecosystem. The expansion of the quarry as proposed could only affect the state of this ecosystem if runoff management seriously altered the present patterns.

The runoff management design for the quarry will take into account the need to preserve the balance of flows presently existing at the site. In addition a barrier system could be put in place to prevent fish movements upstream from the north part of the property into the artificially maintained parts of the system near the quarry.

6.2.6 WETLANDS

Several wetlands occur on the quarry property but only two seepage swamps disturbed during logging the site (0.28 & 0.04 ha) in the area to the south proposed for quarry expansion will be affected. Compensation for loss of the wetlands will likely be required; however the disturbance of these wetlands will not trigger a requirement for a separate environmental assessment, due to their small size. A seepage

swamp and shrub/graminoid swamp at the foot of the slope is not planned to be disturbed. There are opportunities for improvement in the lower wetland, which have been partly disturbed through previous activities. Overall the impact of the quarry expansion will be relatively minor and potentially lead to an improvement in conditions in wetlands at the site.

6.2.7 FISH AND FISH HABITAT

None of the proposed project activities will physically impact Kempt Brook, the main surface water stream in the area, although the flow regime may be changed slightly to reflect more sudden runoff. A small intermittent stream running down the slope at the site will likely be removed as the quarry expands and all the runoff from the upper slope will be managed.

The unique (for Annapolis County) occurrence of Northern Redbelly Dace in a pond on the northern section of the Hankinson property requires that particular care be taken in runoff management from the quarry property, at least until it can be determined that the species occurrence is more widespread in the area. At present the quarry is only one of several sources for the pond, but it appears to be an important one. In developing the quarry, runoff management should be planned carefully to ensure that the present flow regime is duplicated as closely as possible, to ensure that flow patterns at the pond are maintained. The runoff management system should also include construction of a fish passage barrier between the main settling pond and the Hankinson pond, to reduce the possibility that fish (both dace and other species found in the pond) do not move upstream into drainage ditches and become stranded. With appropriate mitigation, the impacts on the Redbelly Dace are expected to be negligible.

6.2.8 FLORA AND FAUNA AND HABITAT

The existing terrestrial ecosystem (plants and animals) will be removed in areas covered by the footprint of the quarry. Most of the land on the south Mountain slope within the property boundary has been cut by the landowner but had potential for regrowth. Several wooded or partially wooded habitats, including wetland areas, are still in place on the property and, in particular, the wooded areas could serve as buffers, wildlife habitat, and assist in runoff management and control. Maintaining these areas would have an important positive impact on the overall ecosystem at the site, and help to compensate for the removal of forest habitat in the vicinity of the quarry. As the quarry expands, areas not needed will be reclaimed and revegetated, in consultation with Nova Scotia Environment and in response to likely approval requirements. Reclamation will reduce the overall impact of the project on loss of terrestrial ecosystems at the site.

6.2.9 SPECIES AT RISK

Areas which have been undisturbed for long periods and have been allowed to return to a semi-natural state, have the potential to support less common species with unique environmental requirements, including rare and uncommon species. The environments at the quarry site, in particular the sand and gravel features found here and woods which develop on them are relatively unique, but, for the most part

have been completely removed by the actions of previous sand and gravel operations. The wetlands and some of the landscape on the site may contain some of the features, characteristics and unique conditions. A goal of development of the quarry is to avoic damage to the adjacent terrestrial ecosystems and to allow them to revegetate.

No species at risk were found at the site; however the occurrence of Northern Redbelly dace in the ponds at the north end of the Hankinson property is significant as it represents the only occurrence of the species yet known in the Annapolis River watershed and the furthest west in Nova Scotia. Quarry activities can only affect the species if the present runoff management system changes; therefore efforts should be made to ensure that the runoff management includes a component which looks at the flow requirements of the Dace, as well as other species in the sand pit ponds on the Hankinson property; and also includes measures to prevent movement of fish from these ponds upstream past the settling ponds.

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. Development of other quarries in the vicinity are unlikely. Dexter owns a property east of the site towards Nictaux Falls but there would be no need to develop it while the Nictaux quarry is operating. The adjacent sand and gravel deposits, while contributing to occasional excavating activity at the site, are largely spent and so levels of activiy would continue to be small and not conflict with the Nictaux Quarry operations. Residential/commercial development potentially could disrupt the natural environment surrounding parts of the quarry site, and logging of the adjacent forests, which is an ongoing activity in Annapolis County, if it takes place, could for a time disrupt the forest ecosystems in the area.

9 MONITORING

Monitoring of hydrological conditions at the site, as well as water quality and fish habitat in Kempt Brook, including the population of Redbelly Dace in the sand pit pond, may be conducted to ensure conditions have been maintained by quarry operations. Routine monitoring of noise levels will be done if required by NS Environment. On-site groundwater monitoring may be conducted, at the request of NSE.

10 PUBLIC CONSULTATION

The Proponent did not conduct, nor is required to conduct, public consultation about the quarry expansion.

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-October 2013 and the generally accepted assessment practices of our industry. No other warranty is made.

Table 11. Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Nictaux 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	Residential Use	Recreational & Mi'Kmaq Fishing	Water Supply	Land Use and Value	Transportation	Industrial, Agricultural	Parks & Protected Areas	Resource Use Forestry /Trapping
Construction																			
Site Clearing/Grubbing	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓			✓	✓
Drilling	✓										✓	✓						✓	
Blasting	✓	✓	✓	✓		✓	✓				✓	✓	✓	✓				✓	
Operation																			
Moving/Transporting Rock and Product	✓										✓	✓	✓	✓	✓	✓	✓	✓	
Crushing	✓											✓		✓	✓			✓	
Washing	✓	✓	✓	✓	✓	✓	✓		✓			✓						✓	
Site Runoff Management		✓	✓	✓	✓	✓			✓						✓		✓	✓	
Portable Asphalt Plant	✓		✓									✓			✓	✓		✓	
Onsite Materials Storage (e.g. recycled asphalt)			✓																
Accidents (Oil/ Fuel Spills)		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓		✓		

Table 12. Summary of impacts and mitigation on Valued Ecosystem Components, Nictaux Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
BIOPHYSICAL COMPONENTS						
Air Quality/Noise	Construction	Noise and dust from heavy equipment during logging and grubbing.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of use by residents in the Nictaux community.	Not significant.
	Operation	Drilling and blasting; equipment for moving rock; crusher & heavy equipment operation.	Significant	Negative	Monitor noise levels and undertake to avoid exceedences of regulatory levels. Institute measures for dust control.	Not significant.
Hydrogeology/ Hydrology	Construction	Forest and soil removal changes surface water flow.	Negligible	Negative	Likely small changes in groundwater and runoff patterns.	Not significant.
	Operation	Blasting fractures bedrock and changes groundwater flow patterns.	Significant	Negative	Bedrock not in same aquifer used by Nictaux. Monitor groundwater hydrology to determine changes.	Not significant.
	Operation	Quarry and work areas change surface water flows. Increased peak stormwater flows.	Significant	Negative	Onsite water management to moderate extreme surface water runoff and suspended sediment levels; measures to maintain normal flow regime.	Not significant.
	Operation	Accidental hydrocarbon spills and blasting residues contaminate groundwater	Significant	Negative	Measures to minimize danger of spills; on-site emergency numbers, spill kits etc. Avoid refueling near watercourses and in sand and gravel deposits.	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.

Table 12. Summary of impacts and mitigation on Valued Ecosystem Components, Nictaux Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	Dust & suspended sediment from operations potentially enter headwaters of Kempt Brook. Chemicals (e.g. nitrates) from explosives entering runoff.	Significant	Negative	Onsite dust control and water management to moderate surface water runoff and suspended sediment levels. Closely monitor explosive residues after blasting.	Not significant.
	Operation	Chemicals in runoff from materials (e.g. recycled asphalt) stored on site.	Negligible	Negative	Best management practice allows leaving piles exposed to the environment.	Not significant.
Freshwater Aquatic Environments	Construction	Higher peak flows and suspended sediment during activities.	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.
	Operation	Retention of runoff for aggregate washing. Lower normal flows in watercourses adjacent to site.	Significant	Negative	Onsite water management to store additional wash water during off peak season, Preserve woodland in buffer areas of quarry.	Not significant.
	Operation	Flows from quarry affect different branches of Kempt Brook	Significant	Negative	Ensure present balance of onsite runoff flows are maintained to preserve sand pit ponds, as well as wetland on site.	Not significant.
	Operation	Releases of chemicals from blasting and runoff from materials stored on site.	Negligible	Negative	Measures to isolate chemical releases and runoff from stored materials piles.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.

Table 12. Summary of impacts and mitigation on Valued Ecosystem Components, Nictaux Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Wetlands	Construction	Removal of several small wetlands.	Significant	Negative	Compensate for wetland loss through NSE wetland alteration approval process. Develop onsite settling ponds as artificial wetlands. Maintain vegetated buffer for wetlands as long as possible before removal.	Not significant.
	Construction	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent watersheds.	Negligible	Negative	Quarry affects small area relative to Kempt Brook watershed as a whole; however preent balance between branches and ponds should be maintained.	Not significant.
	Operation	Change in flow regime in branches of Kempt Brook	Negligible	Negative	Settling and retention ponds & onsite water management moderate flows; fish movement barriers to prevent exchange from Kempt Brook to quarry ditches.	Not significant.
	Construction & Operation	Change in flow regime could affect pond containing Northern Redbelly Dace	Significant	Negative	Ensure that major changes to runoff regime and management at the quarry do not take place.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
	Operation	Accidental spills into Kempt Brook and other waters from truck accidents on Hwy 210 & 10.	Negligible	Negative	Recommend truck traffic use safe driving practices and reduce speed in vicinity of quarry and Nictaux community. Provide pollution prevention and emergency measures.	Not significant.

Table 12. Summary of impacts and mitigation on Valued Ecosystem Components, Nictaux Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
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 & Operation	Accidental releases, contamination of habitat.	Significant	Negative	Provide pollution prevention and emergency measures & response capability. Remediate any permanent areas affected by spills.	Not significant.
	Construction & Operation	Removal of potential forest and wildlife resource (i.e. wildlife habitat)	Negligible	Negative	Small area affected relative to total available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant.
Species at Risk	Construction	No species at risk in the proposed footprint of the quarry.	Negligible	Negative	Leave mature standing trees where possible as nest cavities.	Not significant.
SOCIOECONOMIC COMPONENTS						
Mi'Kmaq	Construction and Operation	Any land use conflicts with Mi'Kmaq Right to Use Land	Significant	Neutral	Consult with Mi'Kmaq First Nations.	Not significant.
		Contamination of local watershed affects Mi'Kmaq Food Fishery in Annapolis River Watershed	Negligible	Negative	Surface water monitoring program will be developed in consultation with NSE. Follow company Best Practices to avoid accidental release of contaminants to headwaters of Annapolis River.	Not significant.
Recreation	Construction & Operation	Noise and sightlines to walking and cycling use of Hwy 10 & 201	Not significant	Negative	Users will be aware of activity at quarry but will not be otherwise impacted by it.	Not significant.
Tourism and Viewscape	Construction & Operation	View of site and industrial character	Significant	Negative	Rehabilitate areas no longer needed for activity and future development.	Not significant.

Table 12. Summary of impacts and mitigation on Valued Ecosystem Components, Nictaux Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Residential Use	Construction & Operation	Noise; light pollution; operation of trucks and transporation of heavy equipment. Restrict expansion of urban area.	Significant	Negative	Use best management practices to reduce disturbance to nearby residents. Rehabilitate areas no longer needed for activity and future development.	Not significant.
Recreational and Mi'Kmaq Hunting and Fishing	Construction & Operation	Accidental hydrocarbon spills and blasting residues contaminate surface waters	Significant	Negative	Provide pollution prevention, emergency measures & response capability. Identify and control contaminant releases.	Not significant.
	Construction	Loss of forested area under quarry footprint.	Not significant	Negative	Rehabilitate areas no longer needed for activity and future development.	Not significant.
Water Supply	Construction and Operation	Blasting potentially impacts aquifers.	Not significant	Negative	Develop groundwater monitoring plan in consultation with NSE.	Not significant.
Land Use and Value	Construction & Operation	Removal of potential forest and wildlife resource (e.g. forestry & trapping).	Negligible	Negative	Small area affected relative to total land available. Minimize footprint of quarry. Restore and rehabilitate areas not used.	Not significant.
Transportation	Operation	Wear on highway	Negligible	Negative	Current levels low and will not increase.	Not significant.
	Operation	Truck traffic	Not significant	No Change	Use good directional signs, viewing pull-offs, posted speed limits and speed policy in vicinity of quarry.	Not significant
Residential, Industrial, Agricultural Use	Construction & Operation	Noise for local residents	Not 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.
	Operation	Competition with other Quarries	Negligible	Neutral	Could affect sales of other quarries but could also result in efficiencies for both.	Not significant.
Parks and Protected areas	Construction & Operation	No local interactions	Not applicable	Not applicable	Not applicable.	Not applicable.

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13 PERSONAL COMMUNICATIONS

Mr. Peter Christmas, NS Museum of Natural History, Heritage Division

Mr. Levi Cliché, Clean Annapolis River Project, Annapolis Royal.

Larry Cromwell, Acting Manager, Fisheries and Oceans, Conservation & Protection, Digby.

Ms Lindsay Freeman, Clean Annapolis River Project, Annapolis Royal .

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

Mr. Mark Hankinson, Quarry Owner, Nictaux.

Mr. Donald Sam, Regional Biologist, NSDNR, Wildlife Division, Kentville.

APPENDIX A
MAPS

THE MUNICIPAL GROUP
OF COMPANIES

DEXTER NICTAUX QUARRY
EXPANSION

Nictaux,
Annapolis County, N.S.

Site Location

Property Boundary

Focus Area for Assessment

800 m Buffer

ACTIVE QUARRY

800 m BUFFER

1km 0km 1km 2km

WMR Environmental Services Inc. & Associates

Map by:
M. MacLean,
Envirosphere Consultants Ltd.
May 2013

Map A-1

THE MUNICIPAL GROUP OF COMPANIES

DEXTER NICTAUX QUARRY EXPANSION
Nictaux, N.S.

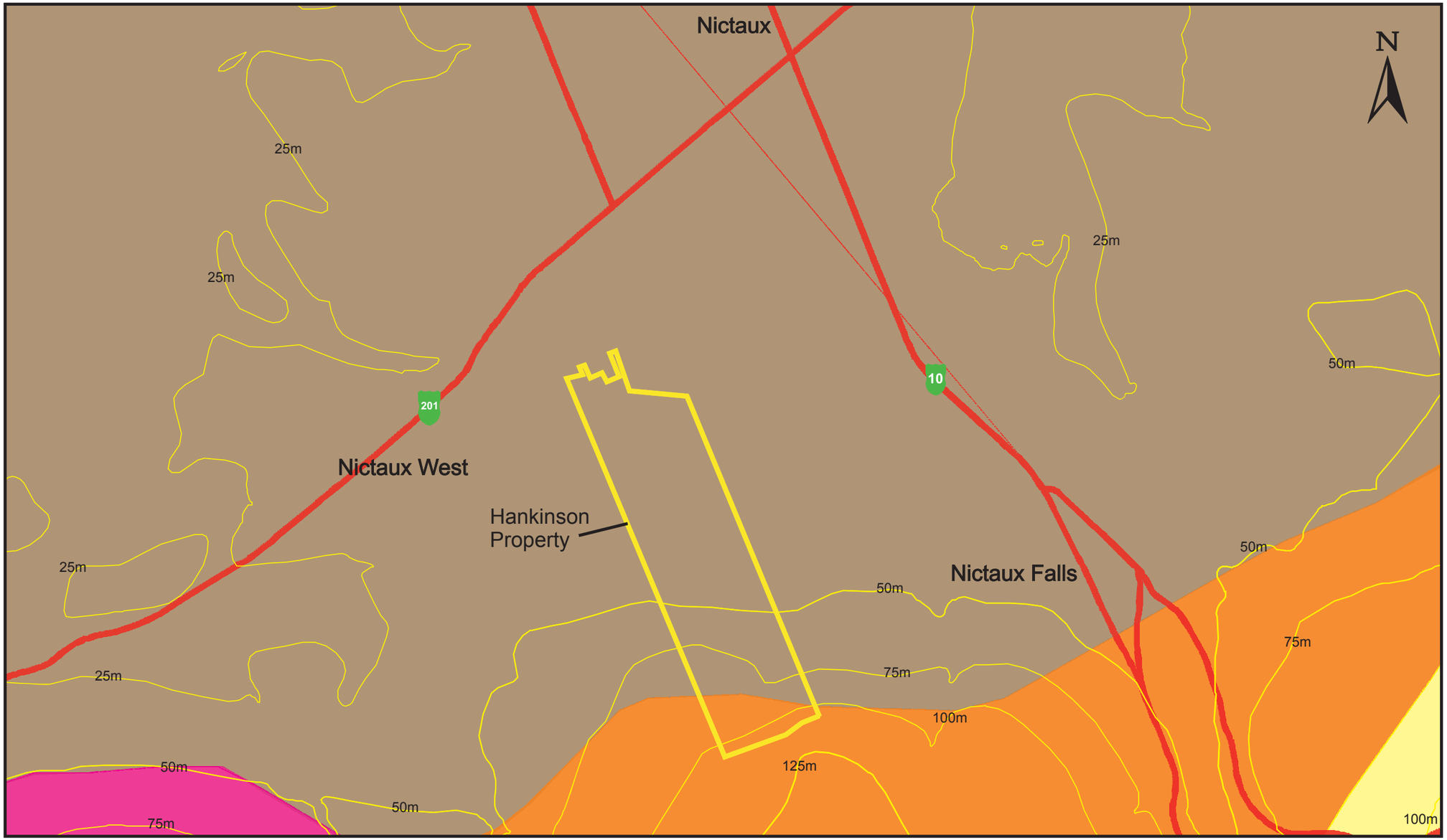
Site Features and Biophysical Sampling Locations

- Contours (5 m)
- Permanent Watercourse
- Intermittent Watercourse
- Ditch
- Wetland Boundary
- Owl Survey Point
- Bird Survey Point
- Water & Fish Sampling

WMR Environmental Services Inc. & Associates

Mapping: Envirosphere Consultants Ltd., October 2013
Air Photo, 2012 309 026, August 24, 2012

Map A-2



THE MUNICIPAL GROUP OF COMPANIES

NICTAUX QUARRY EXPANSION
Nictaux, N.S.

Bedrock Geology

(Stea et al, 1992; White 2009)

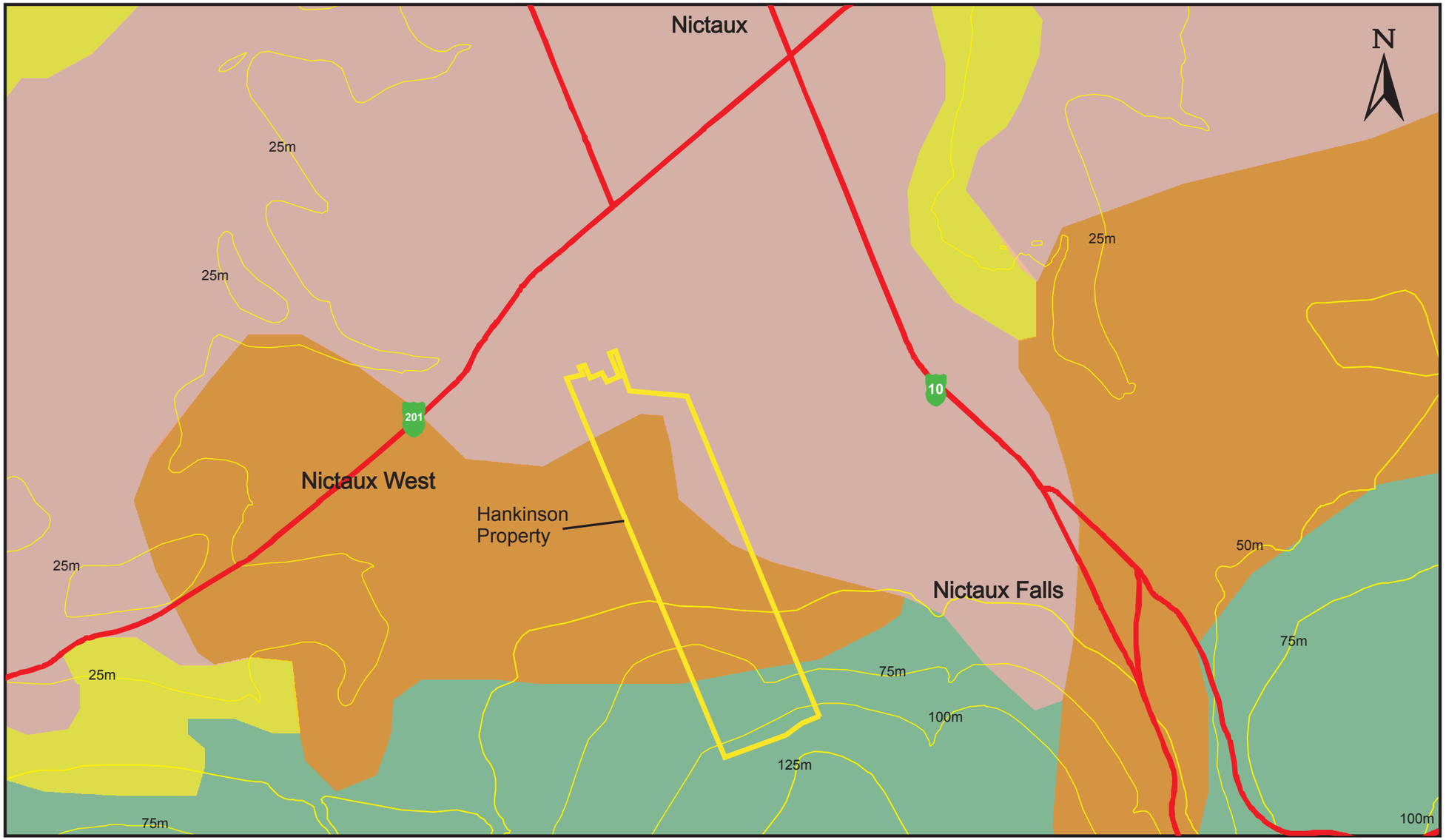
- Wolfville Formation
- White Rock Formation
- Halifax/Goldenville Formation
- South Mountain Batholith
- Major Road

500m 0 500m 1km

WMR Environmental Services Inc. & Associates

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
May 2013

Map A-3



THE MUNICIPAL GROUP
OF COMPANIES

NICTAUX QUARRY
EXPANSION
Nictaux, N.S.

Surficial Geology

(Stea et al, 1992)

- Hummocky Ground Moraine
- Outwash Fans, Deltas & Valley Train Deposits
- Kame Fields & Esker Systems
- Alluvial Deposits
- Major Road

500m 0 500m 1km

WMR Environmental Services Inc. & Associates

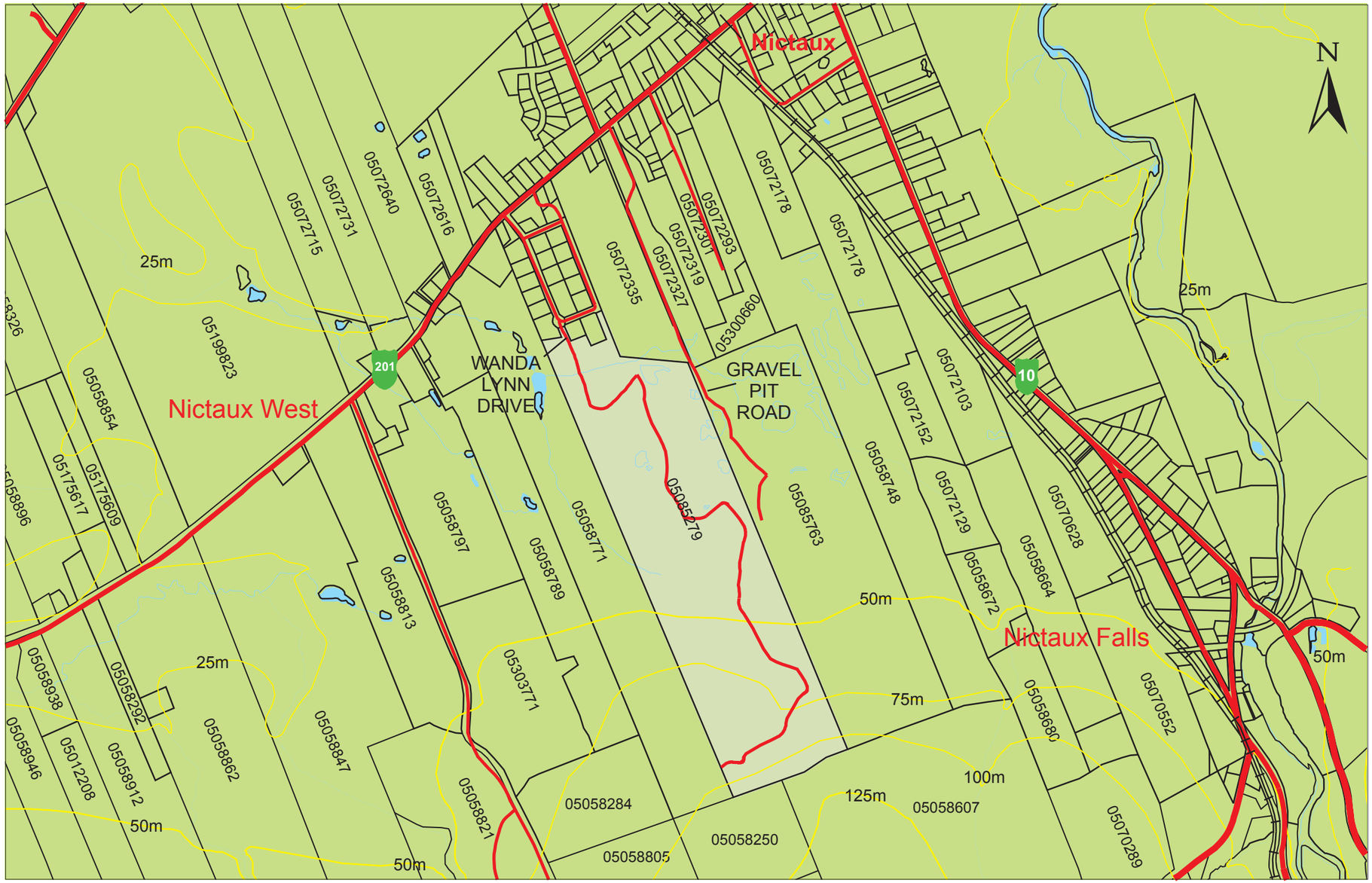
Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
May 2013

Map A-4

THE MUNICIPAL GROUP
OF COMPANIES

NICTAUX QUARRY
EXPANSION
Nictaux, N.S.

Property Ownership



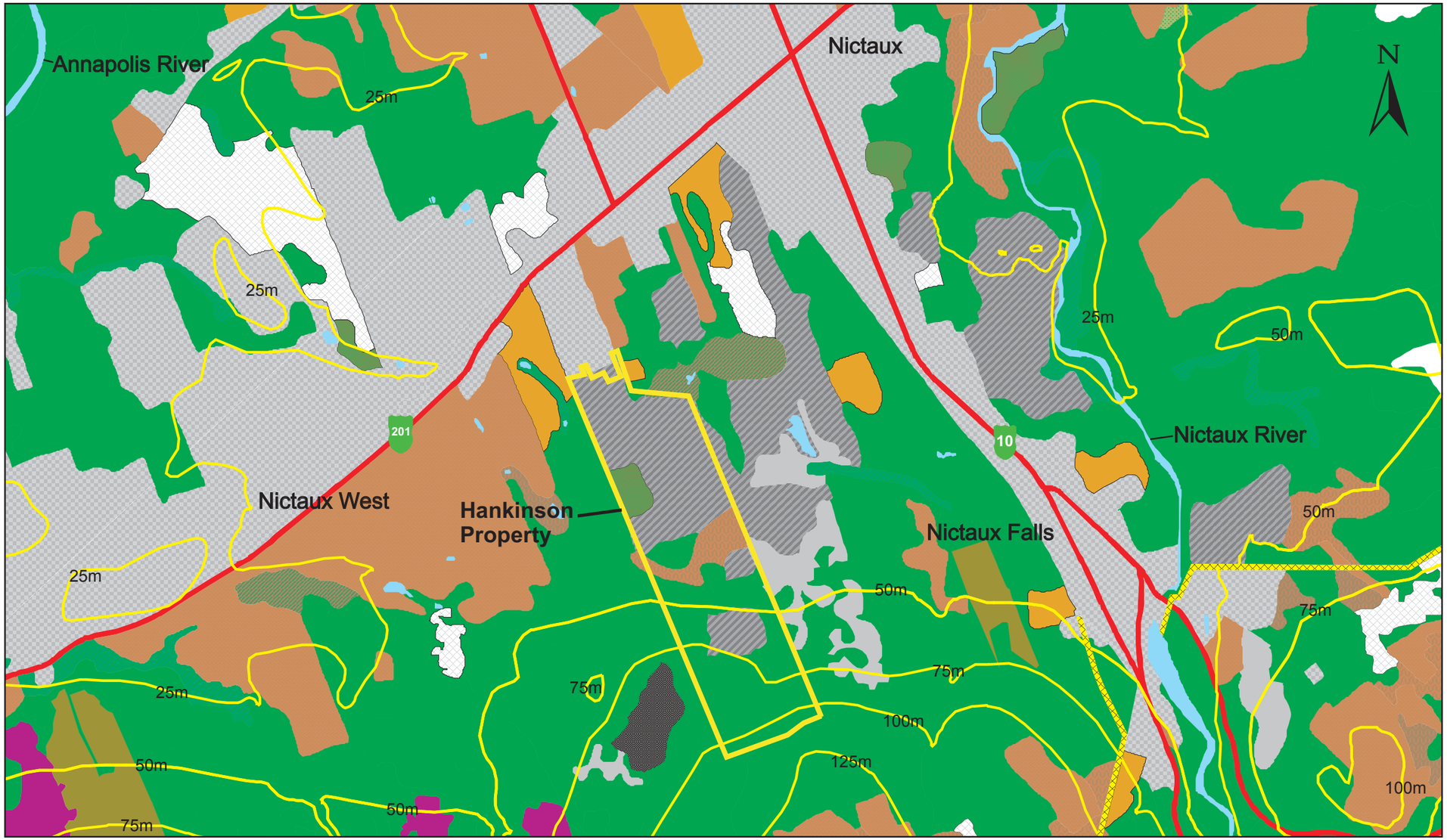
- Quarry Property
- Property Boundaries
- Major Roads
- Contours
- Surface Waters
- Rail Corridor

500m 0 500m 1km

WMR Environmental Services Inc. & Associates

Map drawn by:
M. MacLean,
Envirosphere Consultants Ltd.
May 2013

Map A-5



500m 0 500m 1km

THE MUNICIPAL GROUP
OF COMPANIES

DEXTER NICTAUX QUARRY
EXPANSION
Nictaux, N.S.

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

- Agriculture
- Christmas Trees
- Urban
- Wetlands
- Plantation
- Dead
- Treated
- Brush
- Inland Water
- Natural Stand
- Alders <75%
- Alders >75%
- Old Field
- Partial Depletion
- Treed Bog
- Gravel Pit
- Clear Cut
- Property Boundary
- Power Line
- Roads

WMR Environmental Services Inc. & Associates

Map by:
M. MacLean,
Envirosphere Consultants Ltd.
May 2013

Map A-6

APPENDIX B
WETLAND/BOTANTICAL SURVEY
Marbicon Inc.

Botanical Survey

FOR

Nictaux Quarry
Dexter Construction Co. Ltd.

Nictaux, Annapolis, Nova Scotia

October 13, 2013

Prepared By:
Jim Jotcham, Marbicon Inc.

Marbicon Inc. was contracted in 2013 to perform a botanical survey of a property located on Wanda Lynn Drive in Nictaux, Annapolis County. The site includes an active crushed stone quarry which is about one km west of Highway 10 and 1.5 km south of Highway 201 at approximately 44^{o} 54' 27" North and 65^{o} 03' 01" West. Figure 1 is an aerial view of the study area. The property is bounded by residential property to the north, and on all other sides by forest.

The site (outside the active quarry) was inventoried by botanist Jim Jotcham on June 7, September 6 and 7, 2013, and October 12, 2013. The list of plant species identified and their provincial status is presented in Appendix 1.

Much of the property was cutover (Figure 2) and was regenerating with abundant Red Maple (*Acer rubrum*), Balsam Fir (*Abies balsamea*) and Speckled Alder (*Alnus incana*). The intact portions of the mixed forest were quite rich, and included Eastern Hemlock (*Tsuga canadensis*), Yellow Birch (*Betula allegheniensis*), Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*), and Hop Hornbeam (*Ostrya virginiana*). The understory included typical woodland plants such as Wild Lily-of-the-valley (*Maianthemum canadense*), Wild Sarsaparilla (*Aralia nudicaulis*), and Bracken Fern (*Pteridium aquilinum*).

An intermittent watercourse was identified along the east side of the property, that ran from the top (south) end and joined into a more permanent water course flowing northeast from a sedge meadow (Figure 3) in the property centre (south of the quarry). This wetland was in a depression, collecting runoff from surrounding uplands, and was dominated by a collection of sedges: Fringed Sedge (*Carex crinita*), Wooly Bulrush (*Carex cyperinus*), and Shallow Sedge (*Carex lurida*). There were also a few Broad-Leaved Cattails present (*Typha latifolia*) and Soft Rush (*Juncus effusus*). The wetland was the headwater for a watercourse that flowed east under the existing road through two culverts. and then northerly toward the settling ponds.

Several wetlands were associated with logging activity, such as that shown in Figure 4. Sometimes the wet areas were confined to ruts, and in other cases the wetlands were more pronounced. Between the gravel pit and the quarry, another wetland was identified. This

complex wetland was mostly a Speckled Alder (*Alnus incana*) swamp, but in open sections it appeared to be a marsh (Figure 5) draining northwest (and thence to the Annapolis River). The dominant sedges were Fringed Sedge (*Carex crinita*) and Wooly Bulrush (*Carex cyperinus*). Grasses such as Blue-joint Reed-grass (*Calamagrostis canadensis*), Fowl Manna Grass (*Glyceria striata*), and Canada Manna Grass (*Glyceria canadensis*) were abundant. Sensitive Fern (*Onoclea sensibilis*) was also very common. The wetland edges were mostly alders. A cleared area surrounded by the wetland was marginal upland, with wet ruts holding open water in October.

Other wetlands on site included a couple constructed settling ponds east of the above mentioned alder swamp, also draining northerly.

No 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. Scientific and common names are from the Atlantic Conservation Data Centre (ACCDC).

Appendix 2 is a table from the Atlantic Conservation Data Centre (ACCDC) adapted from their report dated April 26, 2013 (# 5004) summarizing the species of concern that have been observed nearby (within 10 km). The site was sufficiently large and diverse that any of the listed species could conceivably exist on site, but none were found during this survey.

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 the wetlands.

Jim Jotcham

October 9, 2013

Figure 1. Site and Vicinity. Image cropped from aerial photograph 2012309-026 (2012).

Figure 2. Cutover area south of the rock quarry.

Figure 3. Wetland south of the rock quarry. Mostly a sedge meadow, with some shrubs.

Figure 4. Sedge meadow on a logging road.

Figure 5. Wetland west of the driveway. An alder swamp transitioning into an open meadow.

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APPENDIX 1

Site vegetation inventory (wetland and directly adjacent upland) surveyed June 7, September 6, and 7, 2013.

			Status Ranks		
Family	**AC CDC Binomial Only**	**AC CDC English Name**	**G-rank**	**S-rank**	**GS Rank**
Pinaceae	*Abies balsamea*	Balsam Fir	G5	S5	Secure
Aceraceae	*Acer pensylvanicum*	Striped Maple	G5	S5	Secure
Aceraceae	*Acer rubrum*	Red Maple	G5	S5	Secure
Aceraceae	*Acer saccharum*	Sugar Maple	G5	S5	Secure
Asteraceae	*Achillea millefolium*	Common Yarrow	G5	S5	Secure
Poaceae	*Agrostis capillaris*	Colonial Bentgrass	GNR	SNA	Exotic
Betulaceae	*Alnus incana*	Speckled Alder	G5	S5	Secure
Asteraceae	*Ambrosia artemisiifolia*	Annual Ragweed	G5	S5	Secure
Rosaceae	*Amelanchier sp.*	Serviceberry	n/a	n/a	n/a
Asteraceae	*Anaphalis margaritacea*	Pearly Everlasting	G5	S5	Secure
Poaceae	*Anthoxanthum odoratum*	Sweet Vernal Grass	GNR	SNA	Exotic
Apocynaceae	*Apocynum androsaemifolium*	Spreading Dogbane	G5	S5	Secure
Araliaceae	*Aralia nudicaulis*	Wild Sarsaparilla	G5	S5	Secure
Dryopteridaceae	*Athyrium filix-femina*	Lady-Fern	G5	S5	Secure
Betulaceae	*Betula alleghaniensis*	Yellow Birch	G5	S5	Secure
Betulaceae	*Betula papyrifera*	Paper Birch	G5	S5	Secure
Betulaceae	*Betula populifolia*	Gray Birch	G5	S5	Secure
Asteraceae	*Bidens frondosa*	Devil's Beggar-Ticks	G5	S5	Secure
Poaceae	*Brachyelytrum septentrionale*	Bearded Short-Husk	G4G5	S5	Secure
Poaceae	*Bromus ciliatus*	Fringed Brome	G5T5	S5	Secure
Poaceae	*Calamagrostis canadensis*	Blue-Joint Reedgrass	G5	S5	Secure
Brassicaceae	*Cardamine pratensis*	Cuckooflower	G5TU	SNA	Exotic
Cyperaceae	*Carex crinita*	Fringed Sedge	G5	S5	Secure
Cyperaceae	*Carex debilis*	White-Edge Sedge	G5	S5	Secure
Cyperaceae	*Carex gracillima*	Graceful Sedge	G5	S4S5	Secure
Cyperaceae	*Carex intumescens*	Bladder Sedge	G5	S5	Secure
Cyperaceae	*Carex lurida*	Shallow Sedge	G5	S5	Secure
Cyperaceae	*Carex pallescens*	Pale Sedge	G5	S5	Secure
Cyperaceae	*Carex scoparia*	Pointed Broom Sedge	G5	S5	Secure
Cyperaceae	*Carex trisperma*	Three-Seed Sedge	G5	S5	Secure
Asteraceae	*Centaurea nigra*	Black Starthistle	GNR	SNA	Exotic
Onagraceae	*Chamerion angustifolium*	Fireweed	G5	S5	Secure
Saxifragaceae	*Chrysosplenium americanum*	American Golden-Saxifrage	G5	S5	Secure

Asteraceae	*Cichorium intybus*	Chicory	GNR	SNA	Exotic
Asteraceae	*Cirsium vulgare*	Bull Thistle	GNR	SNA	Exotic
Liliaceae	*Clintonia borealis*	Clinton Lily	G5	S5	Secure
Myricaceae	*Comptonia peregrina*	Sweet Fern	G5	S5	Secure
Betulaceae	*Corylus cornuta*	Beaked Hazelnut	G5	S5	Secure
Orchidaceae	*Cypripedium acaule*	Pink Lady's-Slipper	G5	S5	Secure
Poaceae	*Danthonia compressa*	Flattened Oatgrass	G5	S5	Secure
Poaceae	*Danthonia spicata*	Poverty Oat-Grass	G5	S5	Secure
Apiaceae	*Daucus carota*	Wild Carrot	GNR	SNA	Exotic
Dennstaedtiaceae	*Dennstaedtia punctilobula*	Eastern Hay-Scented Fern	G5	S5	Secure
Poaceae	*Dichanthelium boreale*	Northern Witchgrass	G5	S5	Secure
Asteraceae	*Doellingeria umbellata*	Parasol White-Top	G5	S5	Secure
Dryopteridaceae	*Dryopteris intermedia*	Evergreen Woodfern	G5	S5	Secure
Dryopteridaceae	*Dryopteris cristata*	Crested Shield Fern	G5	S5	Secure
Dryopteridaceae	*Dryopteris marginalis*	Marginal Wood-Fern	G5	S5	Secure
Cyperaceae	*Dulichium arundinaceum*	Three-Way Sedge	G5	S5	Secure
Cyperaceae	*Eleocharis obtusa*	Blunt Spike-Rush	G5	S5	Secure
Onagraceae	*Epilobium ciliatum*	Hairy Willow-Herb	G5T5	S5	Secure
Onagraceae	*Epilobium leptophyllum*	Linear-Leaved Willow-Herb	G5	S5	Secure
Orchidaceae	*Epipactis helleborine*	Eastern Helleborine	GNR	SNA	Exotic
Equisetaceae	*Equisetum arvense*	Field Horsetail	G5	S5	Secure
Equisetaceae	*Equisetum sylvaticum*	Woodland Horsetail	G5	S5	Secure
Asteraceae	*Erechtites hieraciifolia*	Fireweed	G5	S5	Secure
Asteraceae	*Erigeron strigosus*	Daisy Fleabane	G5	S5	Secure
Asteraceae	*Eupatorium perfoliatum*	Common Boneset	G5	S5	Secure
Asteraceae	*Euthamia graminifolia*	Flat-Top Fragrant-Golden-Rod	G5	S5	Secure
Fagaceae	*Fagus grandifolia*	American Beech	G5	S5	Secure
Oleaceae	*Fraxinus americana*	White Ash	G5	S5	Secure
Rubiaceae	*Galium mollugo*	Great Hedge Bedstraw	GNR	SNA	Exotic
Ericaceae	*Gaultheria procumbens*	Teaberry	G5	S5	Secure
Ericaceae	*Gaylussacia baccata*	Black Huckleberry	G5	S5	Secure
Geraniaceae	*Geranium robertianum*	Herb-Robert	G5	S4	Secure
Poaceae	*Glyceria canadensis*	Canada Manna-Grass	G5	S5	Secure
Poaceae	*Glyceria striata*	Fowl Manna-Grass	G5	S5	Secure
Asteraceae	*Gnaphalium uliginosum*	Low Cudweed	G5	SNA	Exotic
Dryopteridaceae	*Gymnocarpium dryopteris*	Northern Oak Fern	G5	S5	Secure
Asteraceae	*Hieracium aurantiacum*	Orange Hawkweed	GNR	SNA	Exotic
Asteraceae	*Hieracium murorum*	Wall Hawkweed	GNR	SNA	Exotic
Asteraceae	*Hieracium pilosella*	Mouseear	GNR	SNA	Exotic
Asteraceae	*Hieracium piloselloides*	Tall Hawkweed	GNR	SNA	Exotic
Asteraceae	*Hieracium umbellatum*	Umbellate Hawkweed	G5	SNR	Secure
Clusiaceae	*Hypericum canadense*	Canadian St. John's-Wort	G5	S5	Secure
Clusiaceae	*Hypericum perforatum*	A St. John's-Wort	GNR	SNA	Exotic

Balsaminaceae	*Impatiens capensis*	Spotted Jewel-Weed	G5	S5	Secure
Iridaceae	*Iris versicolor*	Blueflag	G5	S5	Secure
Juncaceae	*Juncus bufonius*	Toad Rush	G5	S5	Secure
Juncaceae	*Juncus effusus*	Soft Rush	G5	S5	Secure
Juncaceae	*Juncus tenuis*	Slender Rush	G5	S5	Secure
Cupressaceae	*Juniperus communis*	Ground Juniper	G5	S5	Secure
Asteraceae	*Leontodon autumnalis*	Autumn Hawkbit	GNR	SNA	Exotic
Asteraceae	*Leucanthemum vulgare*	Oxeye Daisy	GNR	SNA	Exotic
Caprifoliaceae	*Lonicera villosa*	Mountain Fly-Honeysuckle	G5	S4S5	Secure
Fabaceae	*Lotus corniculatus*	Birds-Foot Trefoil	GNR	SNA	Exotic
Juncaceae	*Luzula acuminata*	Hairy Woodrush	G5	S5	Secure
Juncaceae	*Luzula multiflora*	Common Woodrush	G5T5	S5	Secure
Lycopodiaceae	*Lycopodium annotinum*	Stiff Clubmoss	G5	S5	Secure
Lycopodiaceae	*Lycopodium digitatum*	Fan Club-Moss	G5	S5	Secure
Lycopodiaceae	*Lycopodium obscurum*	Tree Clubmoss	G5	S4S5	Secure
Lamiaceae	*Lycopus uniflorus*	Northern Bugleweed	G5	S5	Secure
Liliaceae	*Maianthemum canadense*	Wild Lily-of-The-Valley	G5	S5	Secure
Liliaceae	*Medeola virginiana*	Indian Cucumber-Root	G5	S5	Secure
Lamiaceae	*Mentha arvensis*	Corn Mint	G5	S5	Secure
Rubiaceae	*Mitchella repens*	Partridge-Berry	G5	S5	Secure
Caryophyllaceae	*Moehringia lateriflora*	Grove Sandwort	G5	S5	Secure
Asteraceae	*Oclemena acuminata*	Whorled Aster	G5	S5	Secure
Onagraceae	*Oenothera biennis*	Common Evening-Primrose	G5	S5	Secure
Dryopteridaceae	*Onoclea sensibilis*	Sensitive Fern	G5	S5	Secure
Poaceae	*Oryzopsis asperifolia*	White-Grained Mountain-Ricegrass	G5	S5	Secure
Osmundaceae	*Osmunda cinnamomea*	Cinnamon Fern	G5	S5	Secure
Osmundaceae	*Osmunda claytoniana*	Interrupted Fern	G5	S5	Secure
Osmundaceae	*Osmunda regalis*	Royal Fern	G5	S5	Secure
Betulaceae	*Ostrya virginiana*	Eastern Hop-Hornbeam	G5	S5	Secure
Oxalidaceae	*Oxalis montana*	White Wood-Sorrel	G5	S5	Secure
Oxalidaceae	*Oxalis stricta*	Upright Yellow Wood-Sorrel	G5	S5	Secure
Poaceae	*Phalaris arundinacea*	Reed Canary Grass	G5	S5	Secure
Thelypteridaceae	*Phegopteris connectilis*	Northern Beech Fern	G5	S5	Secure
Poaceae	*Phleum pratense*	Meadow Timothy	GNR	SNA	Exotic
Pinaceae	*Picea glauca*	White Spruce	G5	S5	Secure
Pinaceae	*Picea mariana*	Black Spruce	G5	S5	Secure
Pinaceae	*Picea rubens*	Red Spruce	G5	S5	Secure
Pinaceae	*Pinus strobus*	Eastern White Pine	G5	S5	Secure
Plantaginaceae	*Plantago major*	Nipple-Seed Plantain	G5	SNA	Exotic
Poaceae	*Poa pratensis*	Kentucky Bluegrass	G5	S5	Secure
Polygonaceae	*Polygonum persicaria*	Lady's Thumb	G3G5	SNA	Exotic
Polygonaceae	*Polygonum sagittatum*	Arrow-Leaved Tearthumb	G5	S5	Secure
Polypodiaceae	*Polypodium virginianum*	Rock Polypody	G5	S5	Secure

Polypodiaceae	*Polypodium virginianum*	Rock Polypody	G5	S5	Secure
Dryopteridaceae	*Polystichum acrostichoides*	Christmas Fern	G5	S5	Secure
Salicaceae	*Populus grandidentata*	Large-Tooth Aspen	G5	S5	Secure
Salicaceae	*Populus tremuloides*	Quaking Aspen	G5	S5	Secure
Rosaceae	*Potentilla norvegica*	Norwegian Cinquefoil	G5	S5	Secure
Rosaceae	*Potentilla simplex*	Old-Field Cinquefoil	G5	S5	Secure
Asteraceae	*Prenanthes trifoliolata*	Three-Leaved Rattlesnake-root	G5	S5	Secure
Lamiaceae	*Prunella vulgaris*	Self-Heal	G5	S5	Secure
Rosaceae	*Prunus virginiana*	Choke Cherry	G5	S5	Secure
Dennstaedtiaceae	*Pteridium aquilinum*	Bracken Fern	G5	S5	Secure
Pyrolaceae	*Pyrola elliptica*	Shinleaf	G5	S5	Secure
Fagaceae	*Quercus robur*	English Oak	GNR	SNA	Exotic
Fagaceae	*Quercus rubra*	Northern Red Oak	G5	S5	Secure
Ranunculaceae	*Ranunculus acris*	Tall Butter-Cup	G5	SNA	Exotic
Ranunculaceae	*Ranunculus repens*	Creeping Butter-Cup	GNR	SNA	Exotic
Rosaceae	*Rosa virginiana*	Virginia Rose	G5	S5	Secure
Rosaceae	*Rubus allegheniensis*	Allegheny Blackberry	G5	S5	Secure
Rosaceae	*Rubus hispidus*	Bristly Dewberry	G5	S5	Secure
Rosaceae	*Rubus idaeus*	Red Raspberry	G5	S5	Secure
Polygonaceae	*Rumex acetosella*	Sheep Sorrel	GNR	SNA	Exotic
Polygonaceae	*Rumex crispus*	Curly Dock	GNR	SNA	Exotic
Salicaceae	*Salix bebbiana*	Bebb's Willow	G5	S5	Secure
Cyperaceae	*Scirpus cyperinus*	Cottongrass Bulrush	G5	S5	Secure
Cyperaceae	*Scirpus hattorianus*	Bulrush	G5	S5	Secure
Cyperaceae	*Scirpus microcarpus*	Small-Fruit Bulrush	G5	S5	Secure
Lamiaceae	*Scutellaria lateriflora*	Mad Dog Skullcap	G5	S5	Secure
Solanaceae	*Solanum dulcamara*	Climbing Nightshade	GNR	SNA	Exotic
Asteraceae	*Solidago canadensis*	Canada Goldenrod	G5	S5	Secure
Asteraceae	*Solidago rugosa*	Rough-Leaf Goldenrod	G5	S5	Secure
Asteraceae	*Sonchus arvensis*	Field Sowthistle	GNR	SNA	Exotic
Rosaceae	*Sorbus decora*	Northern Mountain-Ash	G4G5	S4	Secure
Rosaceae	*Spiraea alba*	Narrow-Leaved Meadow-Sweet	G5	S5	Secure
Liliaceae	*Streptopus lanceolatus*	Rosy Twistedstalk	G5	S5	Secure
Asteraceae	*Symphyotrichum lateriflorum*	Farewell-Summer	G5	S5	Secure
Asteraceae	*Symphyotrichum novi-belgii*	New Belgium American-Aster	G5	S5	Secure
Asteraceae	*Tanacetum vulgare*	Common Tansy	GNR	SNA	Exotic
Asteraceae	*Taraxacum officinale*	Common Dandelion	G5	SNA	Exotic
Ranunculaceae	*Thalictrum pubescens*	Tall Meadow-Rue	G5	S5	Secure
Thelypteridaceae	*Thelypteris noveboracensis*	New York Fern	G5	S5	Secure
Primulaceae	*Trientalis borealis*	Northern Starflower	G5	S5	Secure

Fabaceae	*Trifolium arvense*	Rabbit-Foot Clover	GNR	SNA	Exotic
Fabaceae	*Trifolium campestre*	Low Hop Clover	GNR	SNA	Exotic
Fabaceae	*Trifolium pratense*	Red Clover	GNR	SNA	Exotic
Fabaceae	*Trifolium repens*	White Clover	GNR	SNA	Exotic
Liliaceae	*Trillium erectum*	Ill-Scent Trillium	G5	S4	Secure
Pinaceae	*Tsuga canadensis*	Eastern Hemlock	G4G5	S4S5	Secure
Asteraceae	*Tussilago farfara*	Colt's Foot	GNR	SNA	Exotic
Typhaceae	*Typha latifolia*	Broad-Leaf Cattail	G5	S5	Secure
Ericaceae	*Vaccinium angustifolium*	Late Lowbush Blueberry	G5	S5	Secure
Scrophulariaceae	*Verbascum thapsus*	Great Mullein	GNR	SNA	Exotic
Scrophulariaceae	*Veronica officinalis*	Gypsy-Weed	G5	S5	Exotic
Scrophulariaceae	*Veronica serpyllifolia*	Thyme-Leaved Speedwell	G5	S5	Secure
Caprifoliaceae	*Viburnum nudum*	Possum-Haw Viburnum	G5	S5	Secure
Fabaceae	*Vicia cracca*	Tufted Vetch	GNR	SNA	Exotic

Rankings:

S1 = Extremely rare: May be especially vulnerable to extirpation (typically 5 or fewer occurrences or very few remaining individuals).

S2 = Rare: May be vulnerable to extirpation due to rarity or other factors (6 to 20 occurrences or few remaining individuals).

S3 = Uncommon, or found only in a restricted range, even if abundant at some locations (21 to 100 occurrences).

S4 = Usually widespread, **fairly common**, and apparently secure with many occurrences, but of longer-term concern (e.g., watch list) (100+ occurrences).

S5 = Widespread, **abundant**, and secure, under present conditions.

SNA = Not Applicable: A conservation status is not applicable because the species is either: a) exotic, b) not definitively known to occur in the province or c) a hybrid not considered to be conservation significance.

APPENDIX 2

Plant Species at Risk near the Nictaux quarry (ACCDC, April 26 2013).

Scientific Name	Common Name	S-rank	Dist-km
Dichanthelium linearifolium	Narrow-leaved Panic Grass	S2?	01 ±0
Agrimonia gryposepala	Hooked Agrimony	S3	02 ±0
Viola sagittata var. ovata	Arrow-Leaved Violet	S3S4	02 ±0
Anemone quinquefolia	Wood Anemone	S2	02 ±0.1
Carex swanii	Swan's Sedge	S2S3	03 ±0
Carex tenera	Tender Sedge	S1S2	03 ±0
Platanthera flava var. herbiola	Tubercled Orchid	S1S2	03 ±1
Allium tricoccum	Wild Leek	S1	03 ±10
Caulophyllum thalictroides	Blue Cohosh	S2	03 ±10
Fraxinus nigra	Black Ash	S2S3	03 ±10
Hepatica nobilis var. obtusa	Round-lobed Hepatica	S1S2	03 ±10
Thuja occidentalis	Eastern White Cedar	S1S2	03 ±10
Amelanchier stolonifera	Running Serviceberry	S3?	04 ±0
Galium obtusum	Blunt-leaved Bedstraw	S1S2	04 ±0
Goodyera repens	Lesser Rattlesnake-plantain	S3	04 ±0
Hudsonia ericoides	Pinebarren Golden Heather	S2	04 ±0
Polychidium muscicola	Eyed Mossthorns Woollybear Lichen	S1S2	05 ±0
Polygala sanguinea	Blood Milkwort	S2S3	05 ±0.1
Spiranthes casei var. novaescotiae	Case's Ladies'-Tresses	S2	05 ±0.5
Spiranthes ochroleuca	Yellow Ladies'-tresses	S2S3	05 ±0.5
Dichanthelium clandestinum	Deer-tongue Panic Grass	S3	06 ±0
Spiranthes lucida	Shining Ladies'-Tresses	S2	06 ±0.1
Asclepias incarnata ssp. pulchra	Swamp Milkweed	S2S3	06 ±1
Juncus acuminatus	Sharp-fruited Rush	S3S4	06 ±1
Eleocharis nitida	Quill Spikerush	S3	06 ±10
Corallorhiza trifida	Early Coralroot	S3	07 ±0
Polygonum robustius	Stout Smartweed	S3S4	07 ±1
Carex atlantica ssp. capillacea	Atlantic Sedge	S2	08 ±0
Conopholis americana	American Cancer-root	S1S2	08 ±0
Polygonum pensylvanicum	Pennsylvania Smartweed	S3	09 ±0.1
Juncus dudleyi	Dudley's Rush	S2?	09 ±5
Goodyera pubescens	Downy Rattlesnake-Plantain	S2	10 ±10
Polygonum scandens	Climbing False Buckwheat	S3	10 ±10

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

Atlantic Canada Conservation Data Centre, April 2013

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Accipiter cooperii	Cooper's Hawk	Green	4 (5)	G5	NAR	S1S2B
Accipiter gentilis	Northern Goshawk	Yellow	4	G5	NAR	S3S4
Acipenser oxyrinchus	Atlantic Sturgeon	Red	3 (2)	G3	T	S1?
Actitis macularius	Spotted Sandpiper	Green	4 (3)	G5		S3S4B
Adiantum pedatum	Northern Maidenhair Fern	Red	4 (2)	G5		S1
Aegolius funereus	Boreal Owl	Green	4 (5)	G5	NAR	S1S2B
Aeshna clepsydra	Mottled Darner	Green	4	G4		S2, S3
Aeshna constricta	Lance-Tipped Darner	Undetermined	4	G5		S3
Agalinis neoscotica	Nova Scotia Agalinis	--	4	G4		S3
Ageratina altissima	White Snakeroot	Yellow	4 (2)	G5		S1
Aglais milberti	Milbert's Tortoiseshell	Green	4	G5		S2
Agrimonia gryposepala	Hooked Agrimony	Green	4	G5		S3
Alasmidonta undulata	Triangle Floater	Yellow	4	G4		S2, S2S3
Alasmidonta varicosa	Brook Floater	Yellow	3	G3	SC	S1S2
Alca torda	Razorbill	Yellow	4 (3)	G5		S1B,S4N
Alces americanus	Moose	Red	4 (2)	G5		S1
Allium schoenoprasum	Wild Chives	Undetermined	4 (2)	G5		S2
Allium schoenoprasum var. sibiricum	Wild Chives	--	--	G5T5		S2
Allium tricoccum	Wild Leek	Red	4 (2)	G5		S1, S2
Alnus serrulata	Smooth Alder	Yellow	3	G5		S3
Aloina rigida	Aloe-Like Rigid Screw Moss	--	5 (2)	G3G5		S1
Alopecurus aequalis	Short-awned Foxtail	Yellow	4 (3)	G5		S2S3
Amblyscirtes hegon	Pepper and Salt Skipper	Green	4	G5		S2
Amblyscirtes vialis	Common Roadside Skipper	Green	4	G5		S2
Amelanchier	Fernald's Serviceberry	Undetermined	5	G2G4Q		S2?

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
fernaldii						
Amelanchier nantucketensis	Nantucket Serviceberry	Red	2	G3Q		S1
Amelanchier stolonifera	Running Serviceberry	Green	4	G5		S3?
Anagallis minima	Chaffweed	Red	3 (2)	G5		S1
Anas acuta	Northern Pintail	Green	4 (2)	G5		S2B, S3B
Anas clypeata	Northern Shoveler	Green	4 (2)	G5		S2B
Anas discors	Blue-winged Teal	Green	4 (2)	G5		S3B
Anas strepera	Gadwall	Green	4 (2)	G5		S2B
Anemone canadensis	Canada Anemone	Yellow	4 (2)	G5		S2
Anemone quinquefolia	Wood Anemone	Yellow	4 (3)	G5		S2
Anemone virginiana	Virginia Anemone	Yellow	4 (3)	G5		S2
Anemone virginiana var. virginiana	Virginia Anemone	Yellow	--	G5T5		S2
Anguilla rostrata	American Eel	Green	4 (2)	G4	T	S5
Anomobryum filiforme	a moss	--	4	G4G5, G5		S1?, S1
Antennaria parlinii	Parlin's Pussytoes	Red	4 (2)	G5?		S1
Antennaria rosea ssp. arida	Rosy Pussytoes	--	--	G5T3T5		S1
Anzia colpodes	Black-foam Lichen	--	5 (3)	G3G5		S3, S3?
Arabis drummondii	Drummond's Rockcress	Yellow	4 (3)	G5		S2
Arabis glabra	Tower Mustard	Undetermined	4 (5)	G5		S1, S3
Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	--	--	G5T5		S1S2, S3
Artemisia campestris	Field Wormwood	Red	4 (2)	G5		S3
Asclepias incarnata	Swamp Milkweed	Green	4	G5		S3
Asclepias incarnata	Swamp Milkweed	--	--	G5T5		S2S3

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
ssp. pulchra						
Asio flammeus	Short-eared Owl	Yellow	3 (2)	G5	SC	S1S2, S3B
Asio otus	Long-eared Owl	Green	4 (2)	G5		S2, S2S3
Asplenium trichomanes	Maidenhair Spleenwort	Yellow	4 (3)	G5		S2
Asplenium trichomanes-ramosum	Green Spleenwort	Yellow	4 (3)	G4		S2, S3
Astragalus robbinsii var. minor	Robbins' Milkvetch	Red	--	G5T5		S1
Atriplex franktonii	Frankton's Saltbush	Green	--	G2G4		S2
Balaenoptera physalus	Fin Whale - Atlantic pop.	--	3	G3G4	SC	S2S3
Bartonia virginica	Yellow Bartonia	Green	4	G5		S3
Bartramia ithyphylla	Straight-leaved Apple Moss	--	4 (3)	G4G5		S1
Betula michauxii	Newfoundland Dwarf Birch	Yellow	4 (3)	G3G4		S2
Betula pumila var. pumila	Bog Birch	--	--	G5T5?		S2S3
Bidens discoidea	Swamp Beggarticks	Extirpated	4 (0.1)	G5		SH
Boehmeria cylindrica	Small-spike False-nettle	--	4 (2)	G5		S1
Boloria chariclea	Arctic Fritillary	Yellow	4 (3)	G5		S2
Botaurus lentiginosus	American Bittern	Green	4 (3)	G4		S3S4B
Boyeria grafiana	Ocellated Darner	Undetermined	4 (3)	G5		S3
Branta bernicla	Brant	Yellow	4 (3)	G5		S3M
Bucephala clangula	Common Goldeneye	Green	4	G5		S2B,S5N
Bucephala islandica (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Yellow	4 (1)	G5	SC	S1N
Calidris canutus rufa	Red Knot	--	--	G4T1	E	S2S3M, S3M

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Calidris maritima	Purple Sandpiper	Yellow	4 (3)	G5		S3M, S3N
Calidris minutilla	Least Sandpiper	Green	4	G5		S1B, S5M
Calidris pusilla	Semipalmated Sandpiper	Green	3	G5		S3M
Callitriche hermaphroditica	Northern Water-starwort	Red	4 (2)	G5		S2
Callophrys henrici	Henry's Elfin	Green	4	G5		S2
Callophrys lanoraieensis	Bog Elfin	Red	4 (2)	G3G4		S1S2
Callophrys niphon	Eastern Pine Elfin	Green	4	G5		S2
Callophrys polios	Hoary Elfin	Green	4	G5		S3, S3S4
Campanula aparinoides	Marsh Bellflower	Yellow	4 (3)	G5		S3
Canis lupus	Wolf	Blue	4 (0.1)	G4	NAR	SX
Caprimulgus vociferus	Whip-Poor-Will	Green	1	G5	T	S1?B, S2B
Cardamine maxima	Large Toothwort	Red	4 (2)	G5		S1, S3
Cardamine parviflora var. arenicola	Small-flowered Bittercress	--	--	G5T5		S2
Cardamine pratensis	Cuckoo Flower	Red	4 (2)	G5		S1
Cardinalis cardinalis	Northern Cardinal	Green	4	G5		S3S4
Carduelis pinus	Pine Siskin	Green	4 (3)	G5		S3S4B,S5N
Caretta caretta	Loggerhead Sea Turtle	--	3	G3	E	SNA
Carex adusta	Lesser Brown Sedge	Yellow	4 (3)	G5		S2S3
Carex argyrantha	Silvery-flowered Sedge	Green	4	G5		S3S4
Carex atlantica ssp. capillacea	Atlantic Sedge	--	--	G5T5?		S2
Carex atratiformis	Scabrous Black Sedge	Yellow	4 (3)	G5		S2, S3
Carex bebbii	Bebb's Sedge	Red	4 (2)	G5		S1S2
Carex capillaris	Hairlike Sedge	Yellow	4 (3)	G5		S2, S3
Carex castanea	Chestnut Sedge	Red	4 (2)	G5		S2
Carex chordorrhiza	Creeping Sedge	Red	4 (2)	G5		S3

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Carex comosa	Bearded Sedge	Yellow	4 (3)	G5		S2
Carex cryptolepis	Hidden-scaled Sedge	Green	4	G4		S3?
Carex digitalis	Slender Wood Sedge	Red	4 (2)	G5		S1
Carex eburnea	Bristle-leaved Sedge	Yellow	4 (3)	G5		S3
Carex garberi	Garber's Sedge	Red	4 (2)	G5		S3
Carex granularis	Limestone Meadow Sedge	Undetermined	4 (5)	G5		S1, S2
Carex grisea	Inflated Narrow-leaved Sedge	--	4 (--)	G5?		S1
Carex gynocrates	Northern Bog Sedge	Red	4 (2)	G5		S2
Carex haydenii	Hayden's Sedge	Red	4 (2)	G5		S1
Carex hirtifolia	Pubescent Sedge	Yellow	4 (3)	G5		S2S3
Carex houghtoniana	Houghton's Sedge	Yellow	4 (3)	G5		S2?
Carex hystericina	Porcupine Sedge	Red	4 (2)	G5		S2
Carex laxiflora	Loose-Flowered Sedge	Red	4 (2)	G5		S1
Carex laxiflora var. laxiflora	Loose-Flowered Sedge	--	--	G5T5		S1
Carex livida var. radicaulis	Livid Sedge	Red	--	G5T5		S1, S2
Carex longii	Long's Sedge	Extirpated	2	G5		S1?
Carex lupulina	Hop Sedge	Green	4	G5		S3
Carex ormostachya	Necklace Spike Sedge	Red	4 (2)	G4		S1, S3
Carex pensylvanica	Pennsylvania Sedge	Undetermined	4 (5)	G5		S1S2
Carex prairea	Prairie Sedge	Red	4 (2)	G5?		S1
Carex rosea	Rosy Sedge	Green	4	G5		S3
Carex rostrata	Narrow-leaved Beaked Sedge	Red	4 (2)	G5		S1S2
Carex saxatilis	Russet Sedge	Red	4 (2)	G5		S1
Carex swanii	Swan's Sedge	Yellow	4 (3)	G5		S2S3
Carex tenera	Tender Sedge	Yellow	4 (3)	G5		S1S2, S3
Carex tribuloides	Blunt Broom Sedge	Green	4	G5		S3?
Carex tuckermanii	Tuckerman's Sedge	Red	4 (2)	G4		S1
Carex wiegandii	Wiegand's Sedge	Red	4 (2)	G4		S1, S3
Cathartes aura	Turkey Vulture	Accidental	4 (3)	G5		S2S3B, S3B
Catharus bicknelli	Bicknell's Thrush	Yellow	1	G4	T	S1S2B, S2S3B

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Caulophyllum thalictroides	Blue Cohosh	Red	4 (2)	G4G5		S2
Cephalanthus occidentalis	Common Buttonbush	Yellow	4 (3)	G5		S3
Cepphus grylle	Black Guillemot	Green	4	G5		S3, S3S4
Ceratophyllum echinatum	Prickly Hornwort	--	3 (2)	G4?		S2?, S2S3
Chaetura pelagica	Chimney Swift	Yellow	1	G5	T	S2S3B
Charadrius melodus melodus	Piping Plover melodus ssp	--	--	G3TNR	E	S1B, S2B
Charadrius semipalmatus	Semipalmated Plover	Green	4	G5		S1S2B,S5M
Charadrius vociferus	Killdeer	Green	4 (3)	G5		S3B, S3S4B
Chelydra serpentina	Snapping Turtle	Green	4	G5	SC	S4, S5
Chenopodium rubrum	Red Pigweed	Red	4 (2)	G5		S2
Chlidonias niger	Black Tern	Green	4 (2)	G4	NAR	S2B
Chlosyne nycteis	Silvery Checkerspot	Undetermined	4 (5)	G5		S2, S3
Chordeiles minor	Common Nighthawk	Yellow	1	G5	T	S3B
Cirriphyllum piliferum	Hair-pointed Moss	--	4 (3)	G5		S2
Cistothorus palustris	Marsh Wren	Green	4 (5)	G5		S2B
Clematis occidentalis	Purple Clematis	Red	4 (2)	G5		S3
Coccyzus erythropthalmus	Black-billed Cuckoo	Green	4 (2)	G5		S3?B
Coeloglossum viride var. virescens	Long-bracted Frog Orchid	--	--	G5T5		S2, S2S3
Colinus virginianus	Northern Bobwhite	Exotic	1 (--)	G5	E	
Collema nigrescens	Blistered Tarpaper Lichen	Yellow	4 (3)	G5?		S2S3
Conioselinum	Chinese Hemlock-parsley	Yellow	4 (3)	G5		S2

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
chinense						
Conopholis americana	American Cancer-root	Red	4 (2)	G5		S1S2
Contopus cooperi	Olive-sided Flycatcher	Yellow	1	G4	T	S3B, S3S4B
Contopus virens	Eastern Wood-Pewee	Green	4 (3)	G5	SC	S3S4B, S4B
Corallorhiza trifida	Early Coralroot	Green	4	G5		S3
Coregonus huntsmani	Atlantic Whitefish	Red	1	G1	E	S1
Crataegus submollis	Quebec Hawthorn	Undetermined	4 (5)	G5		S1?, S3?
Cryptogramma stelleri	Steller's Rockbrake	Red	4 (2)	G5		S1, S3
Cuscuta cephalanthi	Buttonbush Dodder	Red	2	G5		S1, S1?
Cuscuta pentagona	Five-angled Dodder	Undetermined	4 (5)	G5		S1
Cynoglossum virginianum var. boreale	Wild Comfrey	Red	--	G5T4T5		S1
Cyperus dentatus	Toothed Flatsedge	Green	4	G4		S3, S3S4
Cypripedium arietinum	Ram's-Head Lady's-Slipper	Red	3 (2)	G3		S1
Cypripedium parviflorum	Yellow Lady's-slipper	Yellow	4 (3)	G5		S2S3
Cypripedium parviflorum var. makasin	Yellow Lady's-slipper	--	--	G5T4Q		S2
Cypripedium parviflorum var. pubescens	Yellow Lady's-slipper	--	--	G5T5		S2
Cypripedium reginae	Showy Lady's-Slipper	Red	4 (2)	G4		S2, S3
Cystopteris bulbifera	Bulblet Bladder Fern	Green	4	G5		S3S4
Cystopteris laurentiana	Laurentian Bladder Fern	Undetermined	3 (2)	G3		S1

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Danaus plexippus	Monarch	Yellow	3	G5	SC	S2B, S3B
Decodon verticillatus	Swamp Loosestrife	Yellow	4 (3)	G5		S3
Degelia plumbea	Blue Felt Lichen	Yellow	4	GNR	SC	S2
Dendroica castanea	Bay-breasted Warbler	Green	4 (3)	G5		S3S4B
Dendroica striata	Blackpoll Warbler	Green	4 (3)	G5		S3S4B
Dendroica tigrina	Cape May Warbler	Green	4 (3)	G5		S3?B
Dermochelys coriacea (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	--	1	G2	E	S1S2N
Desmodium canadense	Canada Tick-trefoil	Red	4 (2)	G5		S1
Desmodium glutinosum	Large Tick-Trefoil	Red	4 (2)	G5		S1
Dichanthelium acuminatum var. lindheimeri	Woolly Panic Grass	--	--	G5T5		S1?
Dichanthelium clandestinum	Deer-tongue Panic Grass	Green	4	G5?		S3
Dichanthelium linearifolium	Narrow-leaved Panic Grass	Yellow	4 (3)	G5		S2?
Dichanthelium meridionale	Matting Witchgrass	Extirpated	--	G5		SH
Dichanthelium spretum	Eaton's Witchgrass	Green	--	G5		S3S4
Dichanthelium xanthophysum	Slender Panic Grass	Red	4 (2)	G5		S1
Dicranoweisia crispula	Mountain Thatch Moss	--	4 (3)	G4G5		S1
Didymodon ferrugineus	a moss	--	4 (3)	G5T5?		S1S2
Dirca palustris	Eastern Leatherwood	Red	4 (2)	G4		S1
Dolichonyx oryzivorus	Bobolink	Yellow	4 (3)	G5	T	S3S4B

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Draba arabisans	Rock Whitlow-Grass	Yellow	4 (3)	G4		S1, S2
Draba glabella	Rock Whitlow-Grass	Red	4 (2)	G4G5		S1
Dryopteris fragrans var. remotiuscula	Fragrant Wood Fern	--	--	G5T3T5		S2, S3
Dumetella carolinensis	Gray Catbird	Green	4 (2)	G5		S3B
Elatine americana	American Waterwort	--	3 (--)	G4		S2S3
Eleocharis erythropoda	Red-stemmed Spikerush	Extirpated	4 (0.1)	G5		SH
Eleocharis nitida	Quill Spikerush	Green	4	G4		S3
Eleocharis olivacea	Yellow Spikerush	Yellow	4 (3)	G5		S2S3
Eleocharis ovata	Ovate Spikerush	Yellow	4 (3)	G5		S2?
Eleocharis quinqueflora	Few-flowered Spikerush	Red	4 (2)	G5		S2, S3
Eleocharis tuberculosa	Tubercled Spike-rush	Red	1	G5	SC	S2
Elodea canadensis	Canada Waterweed	Green	4	G5		S3?
Elymus hystrix	Spreading Wild Rye	Red	4 (2)	G5		S1
Elymus hystrix var. bigeloviana	Spreading Wild Rye	Red	--	G5T5?		S1
Empetrum eamesii	Pink Crowberry	Yellow	4 (3)	G5		S3
Empidonax flaviventris	Yellow-bellied Flycatcher	Green	4 (3)	G5		S3S4B
Empidonax traillii	Willow Flycatcher	Accidental	4 (3)	G5		S1S2B, S2B
Emydoidea blandingii	Blanding's Turtle - Nova Scotia pop.	Red	1	G4	E	S1
Enallagma signatum	Orange Bluet	Undetermined	4 (2)	G5		S1
Enallagma vesperum	Vesper Bluet	Undetermined	4 (3)	G5		S2S3
Ephemerum serratum	a Moss	--	5 (3)	G4		S2S3
Epilobium coloratum	Purple-veined Willowherb	Yellow	4 (3)	G5		S2?

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		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Epilobium hornemannii	Hornemann's Willowherb	Yellow	4 (3)	G5		S3
Epilobium hornemannii ssp. hornemannii	Hornemann's Willowherb	--	--	G5T5		S3
Epilobium strictum	Downy Willowherb	Yellow	4 (3)	G5?		S3
Epitheca princeps	Prince Baskettail	Yellow	4 (3)	G5		S2
Equisetum hyemale	Common Scouring-rush	Green	4	G5		S3S4
Equisetum hyemale var. affine	Common Scouring-rush	--	--	G5T5		S3S4
Equisetum palustre	Marsh Horsetail	Undetermined	4 (2)	G5		S1
Equisetum pratense	Meadow Horsetail	Yellow	4 (3)	G5		S2
Equisetum scirpoides	Dwarf Scouring-Rush	Green	4	G5		S3S4
Eremophila alpestris	Horned Lark	Green	4	G5		S1S2B,S4N, S2B
Erigeron hyssopifolius	Hyssop-leaved Fleabane	Yellow	4 (3)	G5		S3
Erigeron philadelphicus	Philadelphia Fleabane	Yellow	4 (3)	G5		S2
Erioderma mollissimum	Graceful Felt Lichen	Red	1 (2)	G4G5	E	S1, S1S2
Eriophorum chamissonis	Russet Cotton-Grass	Green	4 (--)	G5		S3, S3S4
Eriophorum gracile	Slender Cotton-Grass	Yellow	4 (3)	G5		S2
Erora laeta	Early Hairstreak	Red	3 (2)	GU		S1
Erynnis juvenalis	Juvenal's Duskywing	Green	4	G5		S2S3
Erythrodiplax berenice	Seaside Dragonlet	Yellow	3	G5		S3
Eupatorium dubium	Coastal Plain Joe-pye-weed	--	2	G5		S2
Euphagus carolinus	Rusty Blackbird	Yellow	3 (2)	G4	SC	S2S3B, S3B
Euphydryas phaeton	Baltimore Checkerspot	Green	4	G4		S3
Eurhynchium hians	Light Beaked Moss	--	4 (3)	G5		S1

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Everniastrum catawbiense	Powder-tipped Antler Lichen	--	2	G2G4		S1S2
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius	Red	3	G4T4	SC	S1B
Feniseca tarquinius	Harvester	Green	4	G4		S3S4
Festuca subverticillata	Nodding Fescue	Red	4 (2)	G5		S1
Floerkea proserpinacoides	False Mermaidweed	Yellow	4 (3)	G5	NAR	S2
Fratercula arctica	Atlantic Puffin	Yellow	4 (3)	G5		S1B,S4S5N
Fraxinus nigra	Black Ash	Yellow	4 (3)	G5		S2S3
Fraxinus pennsylvanica	Red Ash	Red	4 (2)	G5		S1
Fulica americana	American Coot	Green	4 (5)	G5	NAR	S1B, S2B
Fuscopannaria leucosticta	Rimmed Shingles Lichen	Yellow	5 (2)	G3G5		S1S2
Galium aparine	Common Bedstraw	Exotic	4 (7)	G5		S1
Galium boreale	Northern Bedstraw	Red	4 (2)	G5		S2
Galium obtusum	Blunt-leaved Bedstraw	Red	4 (2)	G5		S1S2
Gallinago delicata	Wilson's Snipe	Green	4 (3)	G5		S3S4B
Gallinula chloropus	Common Moorhen	Green	4 (5)	G5		S1B, S1S2B
Gavia immer	Common Loon	Yellow	4 (2)	G5	NAR	S3B,S4N
Gentianella amarella ssp. acuta	Northern Gentian	Red	--	G5T5		S3
Geocaulon lividum	Northern Comandra	Yellow	4 (3)	G5		S3
Geranium bicknellii	Bicknell's Crane's-bill	Green	4	G5		S3
Glaucomys volans	Southern Flying Squirrel	Yellow	4 (3)	G5	n-a	S2S3
Globicephala melas	Long-finned Pilot Whale	--	4	G5	NAR	S2S3
Glyptemys insculpta	Wood Turtle	Yellow	1 (3)	G4	T	S3
Gomphaeschna furcillata	Harlequin Darner	Yellow	3	G5		S3
Gomphus	Skillet Clubtail	Red	2	G3	E	S1

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		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
ventricosus						
Goodyera pubescens	Downy Rattlesnake-Plantain	Red	4 (2)	G5		S1, S2
Goodyera repens	Lesser Rattlesnake-plantain	Yellow	4 (3)	G5		S3
Grimmia anodon	Toothless Grimmia Moss	--	4 (3)	G4G5		SH
Hedeoma pulegioides	American False Pennyroyal	Yellow	4 (3)	G5		S2, S2S3
Helianthemum canadense	Long-branched Frostweed	Red	3 (2)	G5		S1
Hemidactylium scutatum	Four-toed Salamander	Green	4	G5	NAR	S1?, S3
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
Hesperia leonardus	Leonard's Skipper	--	4 (--)	G4		S1
Heterodermia squamulosa	Scaly Fringe Lichen	--	3	G3G5		S2S3
Hieracium kalmii	Kalm's Hawkweed	Undetermined	4 (5)	G5		S2?
Hieracium kalmii var. kalmii	Kalm's Hawkweed	--	--	G5T5?		S2?
Hieracium paniculatum	Panicled Hawkweed	Green	4	G5		S3
Hieracium robinsonii	Robinson's Hawkweed	Yellow	3	G2G3		S1
Hirundo rustica	Barn Swallow	Yellow	4 (3)	G5	T	S3B
Histrionicus histrionicus pop. 1	Harlequin Duck - Eastern pop.	Yellow	3 (1)	G4T4	SC	S2N
Hudsonia ericoides	Pinebarren Golden Heather	Yellow	3	G4		S2
Hydrocotyle umbellata	Water-pennywort	Red	1	G5	T	S1
Hydrothyria venosa	Mountain Waterfan Lichen	Red	5 (2)	G4		S1, S1S2
Hygrohypnum	Best's Brook Moss	--	4 (3)	G4		S1S2

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
bestii						
Hygrohypnum montanum	a Moss	--	5 (3)	G3G5		S1S2
Hylocichla mustelina	Wood Thrush	Green	4 (5)	G5	T	S1B
Hypericum dissimulatum	Disguised St John's-wort	Yellow	3	G5		S2S3
Hypericum majus	Large St John's-wort	Red	4 (2)	G5		S1
Hypnum pratense	Meadow Plait Moss	--	4 (3)	G5		S2
Icterus galbula	Baltimore Oriole	Green	4 (2)	G5		S2S3B
Impatiens pallida	Pale Jewelweed	Yellow	4 (3)	G5		S2
Iris prismatica	Slender Blue Flag	Red	2	G4G5		S1
Iva frutescens	Big-leaved Marsh-elder	Undetermined	3	G5		S2
Iva frutescens ssp. oraria	Big-leaved Marsh-elder	--	--	G5T5		S2
Ixobrychus exilis	Least Bittern	Green	1 (5)	G5	T	S1S2B
Juglans cinerea	Butternut	Exotic	1 (7)	G4	E	S1, SNA
Juncus acuminatus	Sharp-fruited Rush	Undetermined	4 (3)	G5		S3S4
Juncus dudleyi	Dudley's Rush	Yellow	4 (3)	G5		S2?
Juncus greenei	Greene's Rush	Red	3 (2)	G5		S1S2
Juncus marginatus	Grass-leaved Rush	Yellow	3	G5		S3
Juncus secundus	One-sided Rush	Undetermined	3 (2)	G5?		S1
Juncus subcaudatus	Woodland Rush	Undetermined	3	G5		S3
Juncus subcaudatus var. planisepalus	Woodland Rush	--	--	G5TNR		S3
Juncus vaseyi	Vasey's Rush	Undetermined	4 (2)	G5?		S2
Lachnanthes caroliniana	Redroot	Red	3 (1)	G4	SC	S2
Lactuca hirsuta var. sanguinea	Hairy Lettuce	--	--	G5?T5?		S2
Lagenorhynchus acutus	Atlantic White-sided Dolphin	--	4	G4	NAR	S3S4
Lampsilis radiata	Eastern Lampmussel	Green	4 (3)	G5		S2
Laportea	Canada Wood Nettle	Yellow	4 (3)	G5		S3

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
canadensis						
Larus delawarensis	Ring-billed Gull	Green	4	G5		S1?B,S5N, S3B
Lasionycteris noctivagans	Silver-haired Bat	Undetermined	4 (5)	G5		S1?
Lasiurus borealis	Eastern Red Bat	Undetermined	4 (5)	G5		S2?
Lasiurus cinereus	Hoary Bat	Undetermined	4 (5)	G5		S2?
Leptodea ochracea	Tidewater Mucket	Red	4 (3)	G3G4		S1
Leptogium corticola	Blistered Jellyskin Lichen	Yellow	3	G3G5		S2S3
Leptogium lichenoides	Tattered Jellyskin Lichen	--	4 (2)	G5		S1S2, S3
Leptogium milligranum	Stretched Jellyskin Lichen	Red	5 (3)	G5		S2S3
Leptogium subtile	Appressed Jellyskin Lichen	Red	5 (3)	GNR		S1S3
Leptogium teretiusculum	Beaded Jellyskin Lichen	--	4 (3)	G4G5		S2S3
Lethe anthedon	Northern Pearly-Eye	--	4	G5		S3
Leucophaeus atricilla	Laughing Gull	Green	3 (4)	G5		SHB
Lilaeopsis chinensis	Eastern Lilaeopsis	Yellow	3	G5	SC	S2
Lilium canadense	Canada Lily	Yellow	4 (3)	G5		S2S3
Limosa haemastica	Hudsonian Godwit	Undetermined	4 (3)	G4		S3M
Limosella australis	Southern Mudwort	Yellow	4 (3)	G4G5		S3
Lindernia dubia	Yellow-seeded False Pimperel	Green	4	G5		S3S4
Liparis loeselii	Loesel's Twayblade	Green	4	G5		S3, S3S4
Listera australis	Southern Twayblade	Red	2	G4		S2
Lobelia kalmii	Brook Lobelia	Yellow	4 (2)	G5		S3S4
Lobelia spicata	Pale-Spiked Lobelia	Red	4 (2)	G5		S1
Lophiola aurea	Goldencrest	Red	1	G4	SC	S2
Luzula parviflora	Small-flowered Woodrush	Green	4	G5		S3S4
Lycaena dospassosi	Maritime Copper	--	4 (--)	G3G4		S3
Lycaena hyllus	Bronze Copper	Green	4	G5		S3

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Lynx canadensis	Canadian Lynx	Red	4 (1)	G5	NAR	S1
Lysimachia quadrifolia	Whorled Yellow Loosestrife	--	4 (--)	G5		S1
Malaxis brachypoda	White Adder's-Mouth	Red	4 (2)	G4Q		S1
Martes americana	American Marten	Red	4 (1)	G5		S1
Martes pennanti	Fisher	Yellow	4 (3)	G5		S2
Megalodonta beckii	Water Beggarticks	Yellow	4 (3)	G4G5		S3
Melanerpes erythrocephalus	Red-headed Woodpecker	Accidental	1 (8)	G5	SC	SNA
Mergus serrator	Red-breasted Merganser	Green	4	G5		S3B,S4S5N, S3B,S5N
Mimus polyglottos	Northern Mockingbird	Green	4	G5		S3B
Minuartia groenlandica	Greenland Stitchwort	Yellow	4 (3)	G5		S2
Molothrus ater	Brown-headed Cowbird	Green	4	G5		S2S3B, S3B
Montia fontana	Water Blinks	Red	4 (2)	G5		S1
Morone saxatilis	Striped Bass	Red	1	G5	E,E,SC	S1, S2
Myiarchus crinitus	Great Crested Flycatcher	Green	4 (2)	G5		S2B, S3B
Myotis lucifugus	Little Brown Myotis	Yellow	4 (3)	G3	E	S1
Myotis septentrionalis	Northern Long-eared Myotis	Yellow	4 (3)	G1G3	E	S1
Myriophyllum farwellii	Farwell's Water Milfoil	Yellow	4 (3)	G5		S2, S3
Myriophyllum sibiricum	Siberian Water Milfoil	Green	4	G5		S3
Myriophyllum verticillatum	Whorled Water Milfoil	Yellow	4 (3)	G5		S3
Najas gracillima	Thread-Like Naiad	Undetermined	3 (2)	G5?		S1S2
Nannothemis bella	Elfin Skimmer	Green	4	G4		S3
Nephroma arcticum	Arctic Kidney Lichen	Yellow	4 (2)	G5?		S2
Nephroma bellum	Naked Kidney Lichen	Green	4 (3)	G3G5		S2S3, S3?
Nycticorax nycticorax	Black-crowned Night-heron	Yellow	4 (2)	G5		S1S2B

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Nymphalis l-album	Compton Tortoiseshell	Green	4	G5		S3
Nymphalis vaualbum j-album	Compton Tortoiseshell	--	--	G5T5		S1S2, S3
Odobenus rosmarus	Atlantic Walrus - Northwest Atlantic pop.	Blue	3	G4	n-a	SNA
Oeneis jutta	Jutta Arctic	Red	4 (2)	G5		S1
Oeneis jutta ascerta	Jutta Arctic	--	--	G5T4		S3
Oenothera fruticosa	Narrow-leaved Evening Primrose	Undetermined	5	G5		S2
Oenothera fruticosa ssp. glauca	Narrow-leaved Evening Primrose	--	--	G5T5		S2
Ophiogomphus aspersus	Brook Snaketail	Red	4 (2)	G4		S1
Ophiogomphus carolus	Riffle Snaketail	Green	4	G5		S3
Ophiogomphus mainensis	Maine Snaketail	Red	4 (2)	G4		S1
Ophiogomphus rupinsulensis	Rusty Snaketail	Red	4 (2)	G5		S1S2
Osmorhiza depauperata	Blunt Sweet Cicely	Red	4 (2)	G5		S1
Osmorhiza longistylis	Smooth Sweet Cicely	Yellow	4 (2)	G5		S2
Oxytropis campestris var. johannensis	Field Locoweed	--	--	G5T4		S1
Packera paupercula	Balsam Groundsel	Green	4	G5		S3
Paludella squarrosa	Tufted Fen Moss	--	4 (3)	G3G5		S2?
Panicum dichotomiflorum var. puritanorum	Fall Panic Grass	--	--	G5T4		S1?
Panicum rigidulum	Redtop Panic Grass	--	--	G5T5?		S3

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
var. pubescens						
Panicum tuckermanii	Tuckerman's Panic Grass	--	4 (3)	G5		S2S3
Pannaria lurida	Veined Shingle Lichen	Red	2	G3G5		S1?
Pantala hymenaea	Spot-Winged Glider	Green	4 (3)	G5		S3B
Parmeliella parvula	Poor-man's Shingles Lichen	--	3 (2)	GNR		S1?
Passerella iliaca	Fox Sparrow	Green	4	G5		S3S4B
Passerina cyanea	Indigo Bunting	Green	4 (5)	G5		S1S2B, S3B
Peltigera lepidophora	Scaly Pelt Lichen	--	4 (2)	G4		S1S2
Perimyotis subflavus	Eastern Pipistrelle	Yellow	3	G3		S1
Perisoreus canadensis	Gray Jay	Yellow	4 (3)	G5		S3S4
Petrochelidon pyrrhonota	Cliff Swallow	Green	4 (2)	G5		S3B, S3S4B
Phalacrocorax carbo	Great Cormorant	Green	4 (3)	G5		S3
Phalaropus fulicarius	Red Phalarope	Green	3	G5		S2S3M
Phalaropus lobatus	Red-necked Phalarope	Green	4 (3)	G4G5		S2S3M, S3M
Pheucticus ludovicianus	Rose-breasted Grosbeak	Green	4 (3)	G5		S3S4B
Phocoena phocoena (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	--	3	G4G5	SC	S4
Physcomitrium immersum	a Moss	--	5 (3)	G4		S2
Picoides arcticus	Black-backed Woodpecker	Green	4 (3)	G5		S3S4
Picoides dorsalis	American Three-toed Woodpecker	--	4 (5)	G5		S3?
Pieris oleracea	Mustard White	Undetermined	4 (3)	G4G5		S2
Pilea pumila	Dwarf Clearweed	Red	4 (2)	G5		S1, S3
Pinicola enucleator	Pine Grosbeak	Green	4 (2)	G5		S2S3B,S4S5N,

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
						S3?B,S5N
Piptatherum canadense	Canada Rice Grass	Yellow	4 (3)	G5		S2
Piptatherum pungens	Slender Rice Grass	Yellow	4 (3)	G5		S2
Piranga olivacea	Scarlet Tanager	Green	4 (5)	G5		S2B, S3S4B
Plagiothecium latebricola	Alder Silk Moss	--	4 (3)	G3G4		S1
Plantago rugelii	Rugel's Plantain	Undetermined	4 (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		S1
Platanthera orbiculata	Small Round-leaved Orchid	Green	4	G5		S3
Pleuridium subulatum	a Moss	--	3	G5		S3
Pluvialis dominica	American Golden-Plover	Green	3	G5		S3M
Poa glauca	Glaucous Blue Grass	Yellow	4 (3)	G5		S2S3, S3
Podilymbus podiceps	Pied-billed Grebe	Green	4 (3)	G5		S3B
Podostemum ceratophyllum	Horn-leaved Riverweed	Red	3 (2)	G5		S1
Poecile hudsonica	Boreal Chickadee	Yellow	4 (3)	G5		S3
Polychidium muscicola	Eyed Mossthorns Woollybear Lichen	Yellow	4 (2)	G3G5		S1S2
Polygala polygama	Racemed Milkwort	Undetermined	4 (5)	G5		S1

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Polygala sanguinea	Blood Milkwort	Yellow	4 (3)	G5		S2S3
Polygonia comma	Eastern Comma	--	4 (--)	G5		S2
Polygonia faunus	Green Comma	Green	4	G5		S3
Polygonia interrogationis	Question Mark	Green	4	G5		S3B
Polygonia progne	Grey Comma	Green	4	G4G5		S3S4
Polygonia satyrus	Satyr Comma	Yellow	4 (3)	G5		S1
Polygonum achoreum	Leathery Knotweed	Undetermined	4 (5)	G5		S1
Polygonum arifolium	Halberd-leaved Tearthumb	Yellow	4 (3)	G5		S2, S3
Polygonum buxiforme	Small's Knotweed	Undetermined	--	G5		S2S3
Polygonum pensylvanicum	Pennsylvania Smartweed	Green	4	G5		S3
Polygonum raii	Sharp-fruited Knotweed	Undetermined	--	G3G5Q		S2S3
Polygonum robustius	Stout Smartweed	Green	4	G4G5		S3S4
Polygonum scandens	Climbing False Buckwheat	Yellow	4 (3)	G5		S3
Pooecetes gramineus	Vesper Sparrow	Yellow	4 (2)	G5		S2B, S2S3B
Potamogeton friesii	Fries' Pondweed	Undetermined	4 (2)	G4		S2
Potamogeton obtusifolius	Blunt-leaved Pondweed	Yellow	4 (3)	G5		S3
Potamogeton praelongus	White-stemmed Pondweed	Undetermined	4 (3)	G5		S2S3, S3?
Potamogeton pulcher	Spotted Pondweed	Undetermined	2	G5		S1S2
Potamogeton richardsonii	Richardson's Pondweed	Undetermined	4 (2)	G5		S2, S2S3
Potamogeton zosteriformis	Flat-stemmed Pondweed	Yellow	4 (3)	G5		S2S3
Prenanthes racemosa	Glaucous Rattlesnakeroot	Extirpated	4 (2)	G5		S1, S3

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Primula laurentiana	Laurentian Primrose	Green	4	G5		S1, S3
Primula mistassinica	Mistassini Primrose	Yellow	4 (3)	G5		S3
Progne subis	Purple Martin	Red	3 (2)	G5		S1B, S1S2B
Proserpinaca intermedia	Intermediate Mermaidweed	Red	2	G4?Q		S1
Proserpinaca palustris var. crebra	Marsh Mermaidweed	--	--	G5T5		S3
Proserpinaca palustris var. palustris	Marsh Mermaidweed	--	--	G5T5		S1?
Proserpinaca pectinata	Comb-leaved Mermaidweed	Green	4 (3)	G5		S3
Pseudevernia cladonia	Ghost Antler Lichen	--	3	G2G4	NAR	S2S3, S3
Pseudognaphalium obtusifolium	Eastern Cudweed	--	4	G5		S1, S3S4
Puccinellia fasciculata	Saltmarsh Alkali Grass	Extirpated	7 (5)	G3G5		S1
Puma concolor pop. 1	Cougar - Eastern pop.	Undetermined	4 (5)	G5THQ	DD	SH, SU,SH
Pyrola asarifolia	Pink Pyrola	Green	4	G5		S3
Pyrola minor	Lesser Pyrola	Yellow	4 (3)	G5		S2, S3
Rallus limicola	Virginia Rail	Green	4 (5)	G5		S2B, S3B
Ramalina thrausta	Angelhair Ramalina Lichen	--	4 (3)	G3G4		S3S4
Rangifer tarandus pop. 2	Woodland Caribou (Atlantic-Gasp,sie pop.)	Blue	4 (0.1)	G5T1Q	E	SX
Ranunculus flammula var. flammula	Lesser Spearwort	Green	--	G5T4T5		S2
Ranunculus gmelinii	Gmelin's Water Buttercup	Green	4	G5		S3
Ranunculus	Cursed Buttercup	Red	4 (2)	G5		S1

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
sceleratus						
Rhamnus alnifolia	Alder-leaved Buckthorn	Yellow	4 (3)	G5		S3
Rhexia virginica	Virginia Meadow Beauty	Green	4	G5		S3
Rhynchospora macrostachya	Tall Beakrush	--	2	G4		S1
Rhytidium rugosum	Wrinkle-leaved Moss	--	4 (3)	G5		S1
Ribes americanum	Wild Black Currant	Undetermined	4 (5)	G5		S1
Riparia riparia	Bank Swallow	Green	4 (2)	G5		S3B
Rissa tridactyla	Black-legged Kittiwake	Green	4 (3)	G5		S2B,S4S5N
Rosa palustris	Swamp Rose	Green	4	G5		S3
Rubus flagellaris	Northern Dewberry	Undetermined	4 (5)	G5		S1?
Rudbeckia laciniata var. gaspereauensis	Cut-Leaved Coneflower	--	--	G5TNR		S2
Rumex salicifolius var. mexicanus	Triangular-valve Dock	--	--	G5T5		S2
Sabatia kennedyana	Plymouth Gentian	Red	1	G3	E	S1
Sagina nodosa ssp. borealis	Knotted Pearlwort	--	--	G5T5		S2, S2S3
Salix pedicellaris	Bog Willow	Yellow	4 (3)	G5		S2
Salix petiolaris	Meadow Willow	Green	4	G5		S3
Salix sericea	Silky Willow	Yellow	4 (2)	G5		S2
Salmo salar	Atlantic Salmon	Red	4 (2)	G5		S2
Salmo salar pop. 1	Atlantic Salmon - Inner Bay of Fundy pop.	Red	4 (2)	G5TNR	E	S2
Samolus valerandi ssp. parviflorus	Seaside Brookweed	Yellow	--	G5T5		S2
Sanguinaria canadensis	Bloodroot	Green	4	G5		S3S4
Sanicula odorata	Clustered Sanicle	Red	4 (2)	G5		S1
Satyrium acadica	Acadian Hairstreak	Undetermined	4 (5)	G5		S3
Satyrium calanus	Banded Hairstreak	Undetermined	4 (5)	G5		S2
Satyrium liparops	Striped Hairstreak	Undetermined	4 (5)	G5		S3
Saxifraga	White Mountain Saxifrage	--	--	G5T5?		S1, S2

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		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
paniculata ssp. neogaea						
Sayornis phoebe	Eastern Phoebe	Green	4 (3)	G5		S3S4B
Schoenoplectus robustus	Sturdy Bulrush	Undetermined	5	G5		S1?
Schoenoplectus torreyi	Torrey's Bulrush	--	4 (2)	G5?		S1, S3
Scirpus longii	Long's Bulrush	Red	3	G2G3	SC	S2S3
Scirpus pedicellatus	Stalked Bulrush	Undetermined	4 (5)	G4		S1
Scorpidium scorpioides	Hooked Scorpion Moss	--	4 (3)	G4G5		S2
Scrophularia lanceolata	Lance-leaved Figwort	Undetermined	4 (5)	G5		S1, S2
Seligeria diversifolia	a Moss	--	3 (--)	G2G3		S1S2
Shepherdia canadensis	Soapberry	Yellow	4 (3)	G5		S2
Sialia sialis	Eastern Bluebird	Yellow	4 (3)	G5	NAR	S3B
Silene antirrhina	Sleepy Catchfly	Red	4 (2)	G5		S1
Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass	Green	4	G5		S1, 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 hispida	Hairy Goldenrod	Red	4 (2)	G5		S1?
Solidago latissimifolia	Elliott's Goldenrod	Green	4	G5		S3
Solorina saccata	Woodland Owl Lichen	Red	4 (2)	G3G5		S1, S3
Somatochlora forcipata	Forcipate Emerald	Undetermined	4 (2)	G5		S2, S3
Somatochlora franklini	Delicate Emerald	Undetermined	4 (3)	G5		S1

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Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Somatochlora kennedyi	Kennedy's Emerald	Undetermined	4 (2)	G5		S1S2
Somatochlora tenebrosa	Clamp-Tipped Emerald	Yellow	4	G5		S3
Sorex maritimensisÿ	Maritime Shrew	Green	4	GNR		S3
Sparganium natans	Small Burreed	Green	4	G5		S3
Speyeria aphrodite	Aphrodite Fritillary	Green	4	G5		S3, S3S4
Sphagnum wulfianum	Wulf's Peat Moss	--	4 (3)	G5		S2S3
Spiranthes casei	Case's Ladies'-Tresses	Yellow	4 (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	4 (2)	G5		S2
Spiranthes ochroleuca	Yellow Ladies'-tresses	Yellow	3	G4		S2S3
Stellaria humifusa	Saltmarsh Starwort	Yellow	4 (3)	G5?		S2, S3
Stellaria longifolia	Long-leaved Starwort	Yellow	4 (3)	G5		S2
Sterna dougallii	Roseate Tern	Red	1	G4	E	S1B
Sterna hirundo	Common Tern	Yellow	4 (3)	G5	NAR	S3B
Sterna paradisaea	Arctic Tern	Yellow	4 (2)	G5		S3B
Sticta fuliginosa	Peppered Moon Lichen	Yellow	4 (3)	G3G5		S3?
Sticta limbata	Powdered Moon Lichen	Red	3 (2)	G3G4		S1S2
Strymon melinus	Grey Hairstreak	Green	4	G5		S2
Stuckenia filiformis ssp. alpina	Thread-leaved Pondweed	--	--	G5T5		S2, S2S3
Sturnella magna	Eastern Meadowlark	Green	4 (3)	G5	T	S1B
Stylurus scudderi	Zebra Clubtail	Undetermined	4 (2)	G4		S1S2, S3
Suaeda calceoliformis	Horned Sea-blite	Green	4	G5		S2S3, S3S4
Suaeda rolandii	Roland's Sea-Blite	Red	3 (2)	G1G2		S1?
Symphyotrichum	Boreal Aster	Yellow	4 (3)	G5		S2?, S3

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		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
boreale						
Symphyotrichum ciliolatum	Fringed Blue Aster	Yellow	4 (3)	G5		S2S3
Symphyotrichum undulatum	Wavy-leaved Aster	Yellow	3	G5		S2
Symplocarpus foetidus	Eastern Skunk Cabbage	Green	4	G5		S2, S3S4
Synaptomys cooperi	Southern Bog Lemming	Green	4	G5		S3
Syntrichia ruralis	a Moss	--	4 (3)	G5		S1
Tetraplodon angustatus	Toothed-leaved Nitrogen Moss	--	4 (3)	G4		S2S3
Tetrodontium brownianum	Little Georgia	--	4 (3)	G3G4		S1S2
Teucrium canadense	Canada Germander	Yellow	4 (3)	G5		S3
Thalictrum venulosum	Northern Meadow-rue	--	4 (--)	G5		S3
Thamnobryum alleghaniense	a Moss	--	3	G5?		S2
Thamnophis sauritus pop. 3	Eastern Ribbonsnake - Atlantic pop.	--	3 (1)	G5	T	S2S3
Thuja occidentalis	Eastern White Cedar	Red	4 (1)	G5		S1S2
Tiarella cordifolia	Heart-leaved Foamflower	Yellow	4 (3)	G5		S2
Timmia megapolitana	Metropolitan Timmia Moss	--	4 (3)	G5		S2?
Timmia norvegica	a Moss	--	4 (3)	G4?		S1
Torreyochloa pallida var. pallida	Pale False Manna Grass	--	--	G5T5?		S1
Tortula mucronifolia	Mucronate Screw Moss	--	4 (3)	G5		S1S2
Tortula truncata	a Moss	--	4 (3)	G3G5		S3S4
Toxicodendron vernix	Poison Sumac	Red	4 (2)	G5		S1
Toxostoma rufum	Brown Thrasher	Green	4 (5)	G5		S1?B, S2B

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Tramea carolina	Carolina Saddlebags	Undetermined	5	G5		S1B
Triantha glutinosa	Sticky False Asphodel	Red	4 (2)	G4G5		S3
Trichostema dichotomum	Forked Bluecurls	--	2 (--)	G5		S1
Triglochin gaspensis	Gasp, Arrowgrass	Undetermined	4 (5)	G3G4		S3
Trillium grandiflorum	White Trillium	Undetermined	4 (5)	G5		S1
Tringa melanoleuca	Greater Yellowlegs	Green	4 (3)	G5		S3B,S5M
Tringa semipalmata	Willet	Green	4 (2)	G5		S2S3B
Tringa solitaria	Solitary Sandpiper	Green	4	G5		S1?B,S4S5M, S2B,S5M
Triosteum aurantiacum	Orange-fruited Tinker's Weed	Yellow	4 (3)	G5		S2
Trisetum spicatum	Narrow False Oats	Green	4	G5		S3S4
Tyrannus tyrannus	Eastern Kingbird	Green	4 (3)	G5		S3S4B
Utricularia gibba	Humped Bladderwort	Yellow	4	G5		S3S4
Utricularia radiata	Little Floating Bladderwort	Green	4	G4		S3
Utricularia resupinata	Inverted Bladderwort	Red	4 (2)	G4		S1S2, S3?
Utricularia subulata	Zigzag Bladderwort	Green	4	G5		S3
Vaccinium boreale	Northern Blueberry	Red	4 (2)	G4		S2
Vaccinium caespitosum	Dwarf Bilberry	Yellow	4 (3)	G5		S2
Vaccinium corymbosum	Highbush Blueberry	Green	4	G5		S3
Verbena hastata	Blue Vervain	Green	4	G5		S3
Vermivora peregrina	Tennessee Warbler	Green	4 (3)	G5		S3S4B
Veronica serpyllifolia ssp. humifusa	Thyme-Leaved Speedwell	--	--	G5T5?		S3

Table C1. Records of species of concern within a 100 km radius of Nictaux Quarry, from Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (colour)	National (numerical)	GRANK	NPROT	SRANK
Viola canadensis	Canada Violet	Extirpated	4 (0.1)	G5		S1
Viola nephrophylla	Northern Bog Violet	Yellow	4 (3)	G5		S2, S3
Viola sagittata	Arrow-Leaved Violet	Green	4	G5		S3S4
Viola sagittata var. ovata	Arrow-Leaved Violet	--	--	G5T5		S3S4
Vireo gilvus	Warbling Vireo	Green	4 (5)	G5		S1?B
Vireo philadelphicus	Philadelphia Vireo	Green	4 (5)	G5		S2?B
Williamsonia fletcheri	Ebony Boghaunter	Red	4 (2)	G4		S1
Wilsonia canadensis	Canada Warbler	Yellow	1	G5	T	S3B, S3S4B
Wilsonia pusilla	Wilson's Warbler	Green	4 (3)	G5		S3S4B
Woodsia alpina	Alpine Cliff Fern	Red	3 (2)	G4		S2
Woodsia glabella	Smooth Cliff Fern	Yellow	4 (3)	G5		S2, S3
Woodwardia areolata	Netted Chain Fern	Yellow	3	G5		S2S3

APPENDIX D
NOVA SCOTIA MUSEUM REPORT
HERITAGE AND BIOLOGICAL RESOURCES

NOVA SCOTIA **Communities, Culture & Heritage**

1741 Brunswick St.
P.O. Box 456
Halifax, NS
B3J 2R5

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

September 6, 2013

Heather A. Levy
Envirosphere Consultants Limited
P.O. Box 2906 Unit 5
120 Morison Dr.
Windsor, NS
B0N 2T0

Dear Ms. Levy:

RE: Environmental Screening 13-08-28b
Nictaux Dexter Municipal Quarry

Further to your request of August 20, 2013, the staff at the Communities, Culture and Heritage Division 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, and may include varying degrees of accuracy with respect to the precise location and condition of heritage resources.

It should be noted that the amount and degree of disturbance from previous developments could have a significant role in establishing the presence, absence or condition of heritage resources in this area.

Archaeological, Historical Sites and Remains
Staff have reviewed the files and found that there are No recorded archaeological sites are present within the study area. The study area has low potential for pre-contact sites. The study area has low to moderate potential for historic period archaeological sites.

Natural Heritage
The staff of the Nova Scotia Museum Collections Unit (Natural History) have reviewed their records and made the following observations:

Zoology
Staff have reviewed file and found no records for species with conservation concern for the zone outlined.
We do, however have records for the following species that are found within the general are of the proposed development.

Wood Turtle (Glyptemys insculpta) provincially yellow-listed
Southern flying squirrel (Glaucomys volans) provincially yellow-listed
Northern red-bellied dace (Phoxinus eos)
Little Brown Bat (Myotis lucifugus) ENDANGERED
Northern long-eared bat ENDANGERED
Tricoloured Bat / pipistrelle (Perimyotis subflavus) ENDANGERED

In addition, there are nesting records for the following bird species of concern in the area.

Northern goshawk (Accipiter gentilis)
Common loon (Gavia immer) provincially yellow-listed
Rusty blackbird (Euphagus carolinus) provincially yellow-listed
Common nighthawk (Chordeiles minor) provincially yellow-listed
Chimney swift (Chaetura pelagica) provincially yellow-listed
Barn swallow (Hirundo rustica) provincially yellow-listed
Gray Jay (Perisoreus Canadensis) provincially yellow-listed
Boreal chickadee (Parus hudsonicus) provincially yellow-listed
Bobolonk (Dolichonyx oryzivorus) provincially yellow-listed

Other Heritage VEC'S
There are no designated Ecological Sites within the study area, nor are there any important ecological sites as described by the International Biological Programme.

Botany
Staff have reviewed the Museum records for Plant Species-at-Risk which may be expected within or adjacent to the proposed footprint, based on past occurrence records. These are listed below with the Provincial Status, as assigned by Department of Natural Resources. Prior to development, the presence/absence of the following plant species should be determined through field study and the results included in any final reports. Plant inventory work should be conducted during the growing season, when their identity can be determined with certainty. The species marked with an asterisk is known from a lake within the footprint area.

Allium tricoccum Yellow
Anenome quinquefolia Yellow
Carex hystricina Red
Dichanthelium linearifolium Yellow
Fraxinus nigra Yellow
Isoetes protypus Red*
Juncus marginatus Yellow
Polygala sanguinea Yellow
Polygonum scandens Yellow
Spiranthes lucida Yellow
Thuja occidentalis Red

Paleontology
Staff have reviewed their files and found that the proposed area will disrupt rocks of the Elderkin Brook Formation (part of the Halifax Group & Meguma Supergroup) and what is referred to as "Triassic to Jurassic undivided sedimentary and volcanic rocks", according to Dr. Chris White **[Pre-Carboniferous Bedrock Geology of the Annapolis Valley Area (NTS 21A/14, 15 and 16; 21H/01 and 02), Southern Nova Scotia, 2009, Nova Scotia Department of Natural Resources Report of Activities, 137-155].**

The Elderkin Brook Formation in this area contains numerous trace fossils.

The undivided sedimentary and volcanic rocks may belong to the Wolfville Formation, which contains some rare, but very significant fossils including those of amphibians (capitosaurs) and reptiles (rauisuchids). There may also be very rare plant fossils.

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,

Sean Weseloh-Mckeane
Coordinator, Special Places

Enclosure

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: 17-Jun-13 Report Number: A0393

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	pH	Type of Sample	Detection Limit	Sample Comments
L2013-33	CRM	Nictaux Quarry	CRM	6/14/2013	6/14/2013	7.0	STD	0.1	CRM = 7.01
L2013-33	Site 1	Nictaux Quarry	Stream Water	6/14/2013	6/14/2013	6.4	REG	0.1	Pale tea colour
L2013-33	Site 2	Nictaux Quarry	Pond Water	6/14/2013	6/14/2013	6.5	REG	0.1	No colour
L2013-33	Site 3	Nictaux Quarry	Stream Water	6/14/2013	6/14/2013	7.0	REG	0.1	No colour
L2013-33	Site 3 (dup)	Nictaux Quarry	Stream Water	6/14/2013	6/14/2013	7.0	DUP	0.1	No colour
L2013-33	Site 4	Nictaux Quarry	Stream Water	6/14/2013	6/14/2013	7.0	REG	0.1	Very pale tea colour
L2013-33	Site 5	Nictaux Quarry	Stream Water	6/14/2013	6/14/2013	6.9	REG	0.1	Very pale tea colour

Name of Analyst: Renee Raudonis 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.

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: 21-Jun-13 Report Number: A0394

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comments
L2013-33	Site 1	Nictaux Quarry	Stream water	6/14/2013	6/20/2013	<0.5	REG	0.5 mg/L	Pale tea colour
L2013-33	Site 2	Nictaux Quarry	Pond Water	6/14/2013	6/20/2013	<0.5	REG	0.5 mg/L	No colour
L2013-33	Site 3	Nictaux Quarry	Stream Water	6/14/2013	6/20/2013	<0.5	REG	0.5 mg/L	No colour
L2013-33	Site 4	Nictaux Quarry	Stream Water	6/14/2013	6/20/2013	1.5	REG	0.5 mg/L	Very pale tea colour
L2013-33	Site 5	Nictaux Quarry	Stream Water	6/14/2013	6/20/2013	0.5	REG	0.5 mg/L	Very pale tea colour
L2013-33	Site 3 (dup)	Nictaux Quarry	Stream Water	6/14/2013	6/20/2013	<0.5	DUP	0.5 mg/L	No colour
L2013-33	Blank	Nictaux Quarry	Deionized Water	6/14/2013	6/20/2013	<0.5	BLANK	0.5 mg/L	
L2013-33	CRM	Nictaux Quarry	CRM	6/14/2013	6/20/2013	208.0	STD	0.5 mg/L	CRM = 213 mg/L

Name of Analyst: Renee Raudonis 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: 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.

APPENDIX E
Cultural Resource Management Report (CRM, 2013)

Environmental Assessment Registration
Document for Nictaux Quarry Expansion

DEXTER CONSTRUCTION COMPANY LIMITED

HANKINSON QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2013
NICTAUX, ANNAPOLIS COUNTY, NOVA SCOTIA

FINAL REPORT

Submitted to:
Dexter Construction Company Limited
and the
Special Places Program of the Nova Scotia
Department of Communities, Culture & Heritage

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

Consulting Archaeologist: Robert H. J. Shears
Report Preparation: Robert H. J. Shears

Heritage Research Permit Number: A2013NS075

CRM Group Project Number: 2013-0009-01

OCTOBER 2013

The following report may contain sensitive archaeological site data. Consequently, the report must not be published or made public without the written consent of Nova Scotia's Coordinator of Special Places Program, Department of Communities, Culture and Heritage.

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HANKINSON QUARRY EXPANSION
ARCHAEOLOGICAL SCREENING & RECONNAISSANCE
NICTAUX, ANNAPOLIS COUNTY, NOVA SCOTIA

1.0 INTRODUCTION

Dexter Construction Company Limited (Dexter) is proposing to expand the Hankinson Quarry located at 93 Wanda Lynn Drive in Nictaux, Annapolis 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 through H2O Geo Environmental Services Incorporated to undertake archaeological screening and reconnaissance of the proposed quarry expansion.

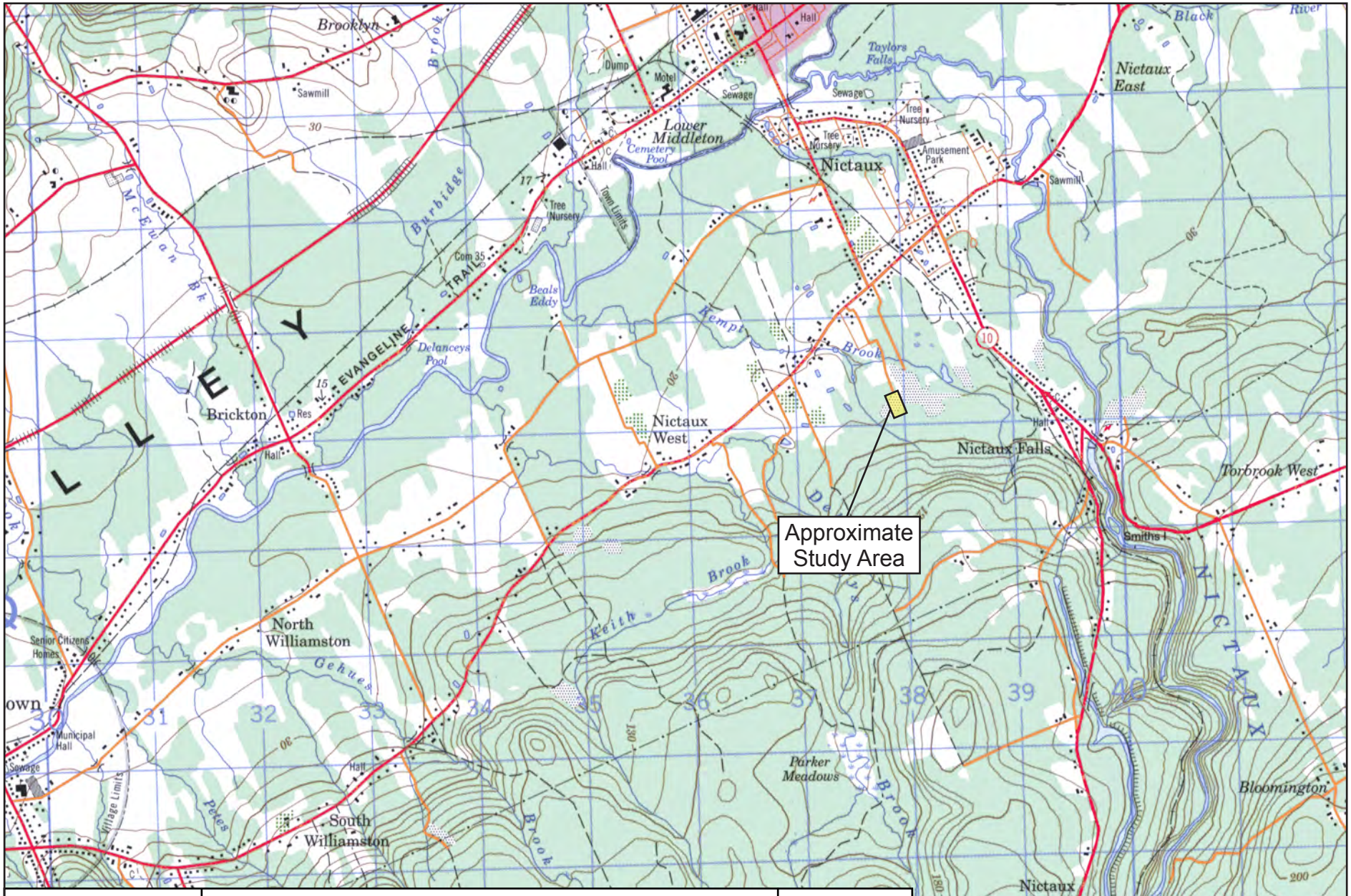
The archaeological screening and reconnaissance was directed by CRM Group Archaeologist Robert Shears with technical assistance provided by Archaeological Field Technician Kyle Cigolotti. Reconnaissance was conducted on August 28, 2013.

The archaeological investigation was conducted according to the terms of Heritage Research Permit A2013NS075 (Category 'C'), issued to Shears through the Special Places Program of the Nova Scotia Department of Communities, Culture and Heritage. This report describes an archaeological screening and reconnaissance of the Dexter Hankinson Quarry Expansion study area, presents the results of these efforts and offers cultural resource management recommendations.

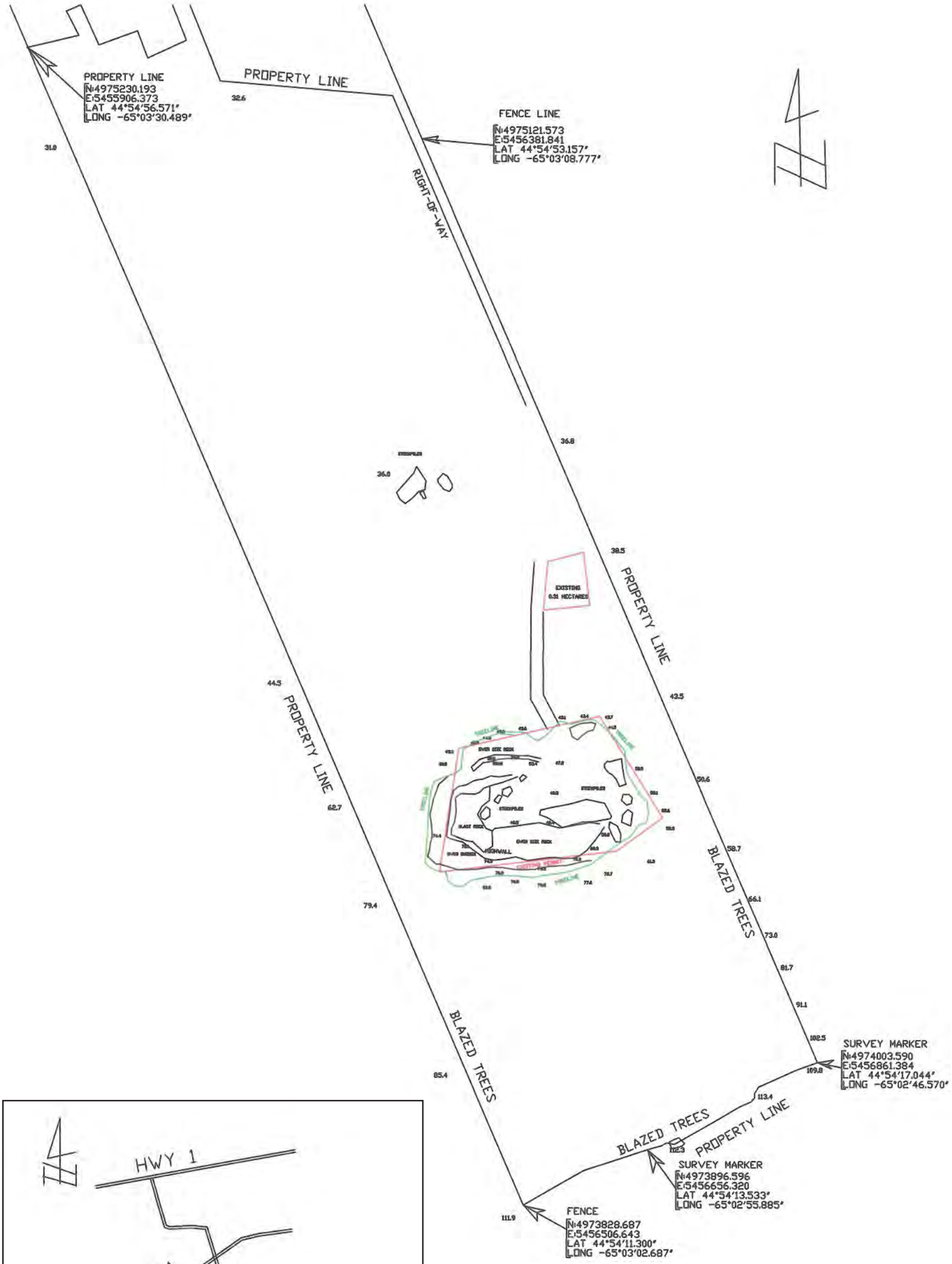
2.0 STUDY AREA

The Hankinson Quarry is located approximately one kilometre south of Highway 201 at 93 Wanda Lynn Drive in Nictaux, Annapolis County. The northern section of Wanda Lynn Drive serves a residential subdivision. The quarry lies approximately 3 kilometres south of the intersection of Highway 1 and Nictaux Road, and approximately 1.3 kilometres west of Highway Trunk 10 (***Figure 1***). The proposed impact area measures approximately 64 hectares (***Figure 2***). Access to the study area was gained off Wanda Lynn Drive and several service roads located within the study area. The south end of the study area extends part way up the slope of South Mountain, rising to a maximum elevation of approximately 110 metres above sea level. The study area is situated between two tributaries of Kempt Brook which flows into the Annapolis River. The west tributary lies approximately 410 metres from the study area and the east tributary lies at a distance of approximately 580 metres. The study area is also approximately 1.7 kilometres west of the Nictaux River.

PLATE 1: Hankinson Quarry, Annapolis County; facing south; August 28, 2013.



CRM Group Cultural Resource Management Group Ltd.	*Approximate Study Area*	*Figure 1*
	CHRISTOPHER HANKINSON QUARRY ARCHAEOLOGICAL SCREENING & RECONNAISANCE 2013 NICTAUX, ANNAPOLIS COUNTY	October 2013 Scale 1:50000



CRM Group Cultural Resource Management Group Ltd.	*Detailed Site Plan*	*Figure 2*
	CHRISTOPHER HANKINSON QUARRY ARCHAEOLOGICAL SCREENING & RECONNAISSANCE 2013 NICTAUX, ANNAPOLIS COUNTY	October 2013 Scale 1:5000

3.0 METHODOLOGY

In the summer of 2013, H2O Geo Environmental Services Inc. retained CRM Group, on behalf of Dexter, to undertake archaeological screening and reconnaissance of the proposed Hankinson Quarry Expansion. The objective of the archaeological assessment was to evaluate archaeological potential within the area that may be disturbed by expanded quarrying activities. To address this objective, CRM Group developed a work plan consisting of the following components: a review of relevant site documentation to identify areas of high archaeological potential; archaeological reconnaissance of the area 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 Nova Scotia Museum.

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 either the background study or the 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 researchers were 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.

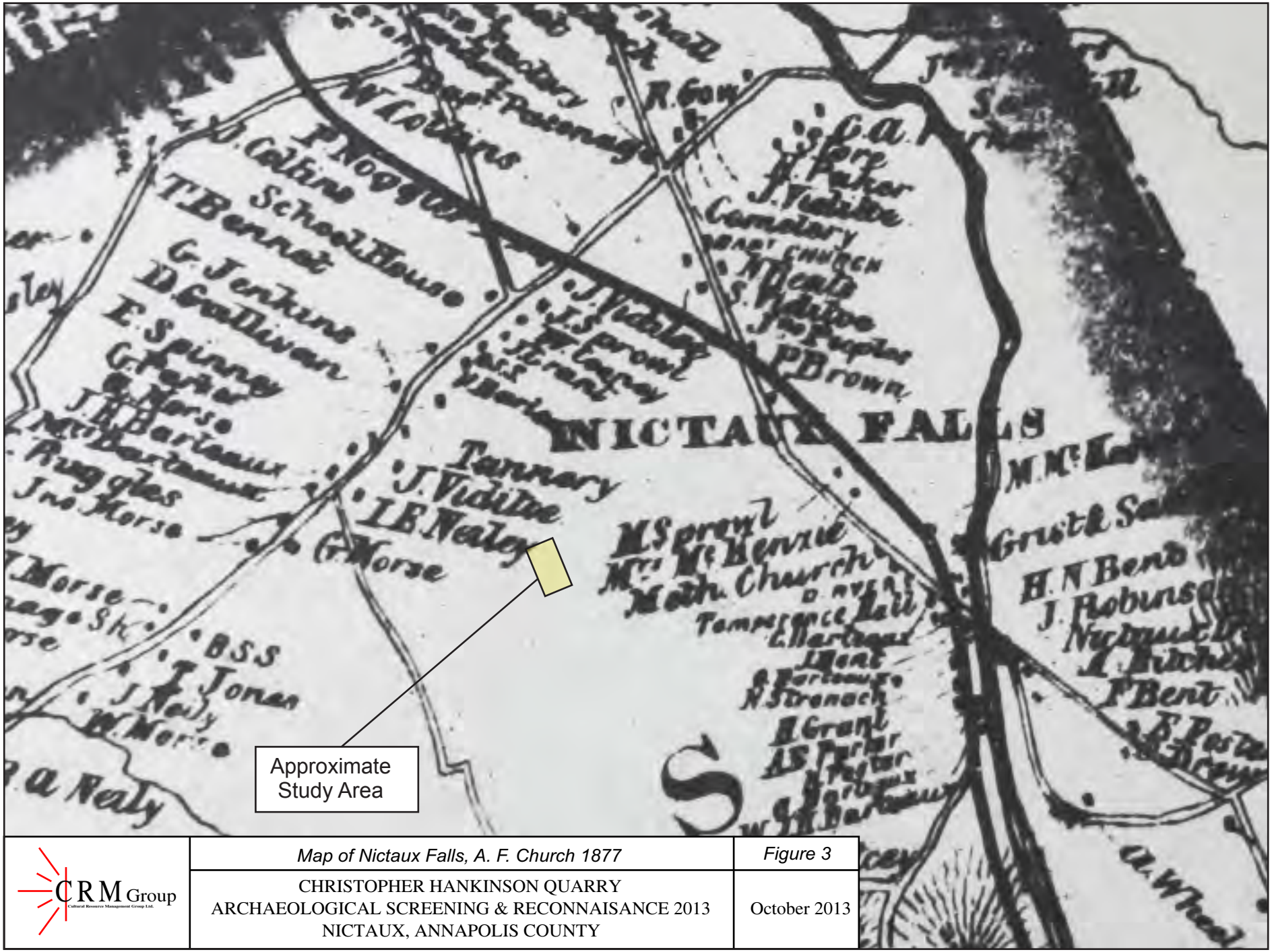
4.0 RESULTS

4.1 Background Study

The traditional Mi'kmaq place name for the region covering the study area, and a large portion of the Annapolis Valley is *Sipekne'katik* meaning "Wild Potato Area." The name of the Nictaux River and the community of Nictaux are derived from the Mi'kmaw word *Niktak*, meaning "the forks of a river" (Parker 2006: 75). A review of the Maritime Archaeological Resource Inventory (MARI), the provincial archaeological site database maintained by the Nova Scotia Museum, identified no registered Precontact sites in the immediate area of the Hankinson Quarry. The closest registered Precontact site is located in the neighbouring town of Middleton. The site (BfDg-04) was recorded in 1969 by pioneering Nova Scotian archaeologist John Erskine and does not include a map. The lack of archaeological data in the vicinity of the study area, however, reflects a lack of archaeological investigation, rather than an absence of archaeological sites.

Early historic settlement in Nictaux was spurred by the iron ore industry. On a tour of the area in 1789, Bishop Charles Inglis noted iron smelting on the river by New England Planters, who had arrived in 1757 following the Acadian Deportation. The community at that time was comprised of about 156 families (Parker 2006: 75). Several efforts at mining iron ore were made in the nineteenth and early twentieth century, with the most ambitious being between 1857 and 1913 by the Acadian Iron Mining Company. The operation included mine shafts, a 75 kilometre railway spur and the construction of a concentrator for separating iron from rock and an electricity generating plant on the river. In addition, several companies have operated granite quarries in Nictaux since 1889 (Calnek 1897: 242; Parker 2006: 75).

The Ambrose Church map of Annapolis County (1876) shows settlement in Nictaux and along Highway 201, including residences of the Barlow, Coopey and Sprowl families (***Figure 3***). A schoolhouse is located at the corner of Nictaux Road and Highway 201. There is no indication of Wanda Lynn Drive at this time. It does not appear that the area of Nictaux which includes the study area was ever settled prior to the construction of the current subdivision. The road immediately to the east, that runs parallel with Wanda Lynn Drive is named Pit Road, indicative of past land use in the area.



CRM Group Cultural Resource Management Group Ltd.	*Map of Nictaux Falls, A. F. Church 1877*	*Figure 3*
	CHRISTOPHER HANKINSON QUARRY ARCHAEOLOGICAL SCREENING & RECONNAISANCE 2013 NICTAUX, ANNAPOLIS COUNTY	October 2013

4.2 Field Reconnaissance

The archaeological reconnaissance was undertaken on August 28, 2013 under clear conditions. The goals of the visit were 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. Using existing access roads to gain entry to the interior of the site, the study area was systematically field walked in sections from south to north.

Overall, the study area exhibited low potential for archaeological and/or historical resources. Much of the area not already impacted by resource extraction had a gentle slope and was hummocky to undulating. The soil upslope, toward the south of the study area, was thin and rocky. Soils down slope were well drained and sandy. Aside from a small creek at the northern border of the study area and a number of man-made holding ponds, there was no access to freshwater. Vegetation where it existed consisted of a mix of hardwood and softwood species. Ground cover consisted of a mix of grasses, wild berry plants, ferns and other small shrubs

In addition to the existing quarry site, large portions of the study area have been disturbed as a result of gravel and/or sand extraction (***Plates 2 & 3***). In some areas, past excavation activities had resulted in the removal of several metres of material. The study area has isolated areas where modern garbage and building materials have been dumped (***Plates 4 & 5***). The refuse includes modern household garbage, derelict vehicles, appliances and building materials from at least the 1950s.

PLATE 2: Eastern portion of the study area used as a sand pit (UTM 20 T 337994 4975307); facing north; August 28, 2013.

PLATE 3: **Northeastern section of the study area used as a sand pit (UTM 20 T 337868 4975475); facing north; August 28, 2013.**

PLATE 4: **Modern household garbage and building materials dumped within the study area (UTM 20T 337839 4975111); facing south; August 28, 2013.**

PLATE 5: **Modern garbage at the entrance to the Hankinson Quarry (UTM 20T 337677 4975471); facing east; August 28, 2013.**

PLATE 6: **Extreme slope in southern portion of the study area; facing south; August 28, 2013.**

PLATE 7: Rocky sloped terrain in south end of study area; facing south; August 28, 2013.

The southern portion of the study area extends onto the slope of South Mountain from a low elevation of approximately 35 metres above sea level to approximately 110 metres above sea level. The extreme slope of this portion of the study area made it unsuitable to human habitation (***Plate 6 & 7***).

The northern end of the study area abutted a residential property that formed part of the subdivision on Wanda Lynn Drive. This area was crisscrossed by access roads and littered with abandoned machinery, vehicles and modern garbage.

No areas of high archaeological potential areas were identified during the 2013 archaeological reconnaissance of the Hankinson Quarry expansion. Apart from objects attributed to the nearby residential properties and previous quarrying activities, no historical features or artifacts were noted during the survey. 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 either Native (both Precontact and historic) or Euro-Canadian archaeological resources.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 2013 archaeological screening and reconnaissance of the Hankinson Quarry Expansion study area consisted of historical background research and visual inspection. 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 either Native (both Precontact and historic) or Euro-Canadian 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 Hankinson Quarry Expansion, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh McKeane: 902-424-6475).

6.0 REFERENCES CITED

Calnek, W. A.
1897 *History of the County of Annapolis*. Toronto: William Briggs.

Church, Ambrose F.
1876 *Topographical Township Map of Annapolis County, Nova Scotia*. Halifax: A.F. Church & Co.

Frame, Elizabeth
1892 *A List of Micmac Names of Places, Rivers, etc. in Nova Scotia*. John Wilson & Son: Cambridge, UK.

Parker, Mike
2006 *Historic Annapolis Valley: Rural Life Remembered*. Images of Our Past Series. Halifax: Nimbus Publishing.

Public Archives of Nova Scotia
1967 *Place-names and Places of Nova Scotia*. Halifax: PANS.

APPENDIX F
Public Consultation Document

Environmental Assessment Registration
Document for Nictaux Quarry Expansion

NOTICE

Registration of Undertaking for Environmental Assessment ENVIRONMENT ACT

This is to advise on April 30, 2015, Dexter Construction Company Limited registered the Nictaux Quarry Expansion Project for environmental assessment, in accordance with Part IV of the Environment Act.

The purpose of the proposed undertaking is to expand the existing Nictaux Quarry located at 93 Wanda Lynn Drive, Nictaux, Annapolis County, Nova Scotia. It is noted that the existing quarry has been in operation at this location since 1999. The expanded quarry will occupy a maximum of 21.9 hectares (including the existing quarry) of land, with an expected project life of 20 years. The quarry will provide aggregate, primarily used in the road construction industry in Annapolis County. 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 its inception.

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

- Middleton Canada Post, 275 Main Street, Middleton, NS
- Needs Convenience Store, 9337 Highway 10, Nictaux, NS
- Ecology Action Centre, 2705 Fern Lane, Halifax, NS
- Nova Scotia Environment, 136 Exhibition Street, Kentville, NS
- Nova Scotia Environment Library, Barrington Place, 1903 Barrington St., Suite 2085, Halifax, NS
- EA website (when available) http://www.novascotia.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 30, 2015** or contact the department at (902) 424-3600, (902) 424-6925 (Fax), or e-mail at EA@novascotia.ca.

All submissions received, including personal information, will be made available for public review in the Nova Scotia Environment Library, Barrington Place, Suite 2085, 1903 Barrington Street, Halifax, NS.

Published by: Dexter Construction Company Limited Limited
927 Rocky Lake Drive, P.O. Box 48100, Bedford, NS B4A 3Z2

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

November 1, 2013

H2OGEO INC. FILE # 2012-004

Annapolis Valley First Nations
PO Box 89, Cambridge Station,
Kings County, Nova Scotia
B0P 1G0

Attention: Janette Peterson

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

Dear Chief. Peterson,

On behalf of Dexter Construction Company Ltd. (Dexter), this correspondence is to let you know about a project Dexter is undertaking on the leased Hankinson property (PID #'s 5085279) located at 93 Wanda Lynn Drive, in Nictaux, Annapolis County, NS (See Map Attached). The project is an expansion of an existing rock quarry, which has operated on the property for many years. The proposed expansion is to the south and east 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 is in the process of completing the above noted Registration Document and plans to submit it to Nova Scotia Environment (NSE) as a Draft in late November, 2013. 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 Annapolis Valley 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 A2013NS075. The CRM report concluded that:

"The 2013 archaeological screening and reconnaissance of the Hankinson Quarry Expansion study area consisted of historical background research and a visual inspection. It did not involve sub-surface testing. The background research and field reconnaissance conducted by the CRM Group determined the study area to exhibit low potential for encountering either Native (both Precontact and historic) or Euro-Canadian archaeological resources".

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 Hankinson Quarry Expansion, all work in the associated area(s) should be halted and immediate contact made with the Special Places Program (Sean Weseloh McKeane: 902-424-6475).

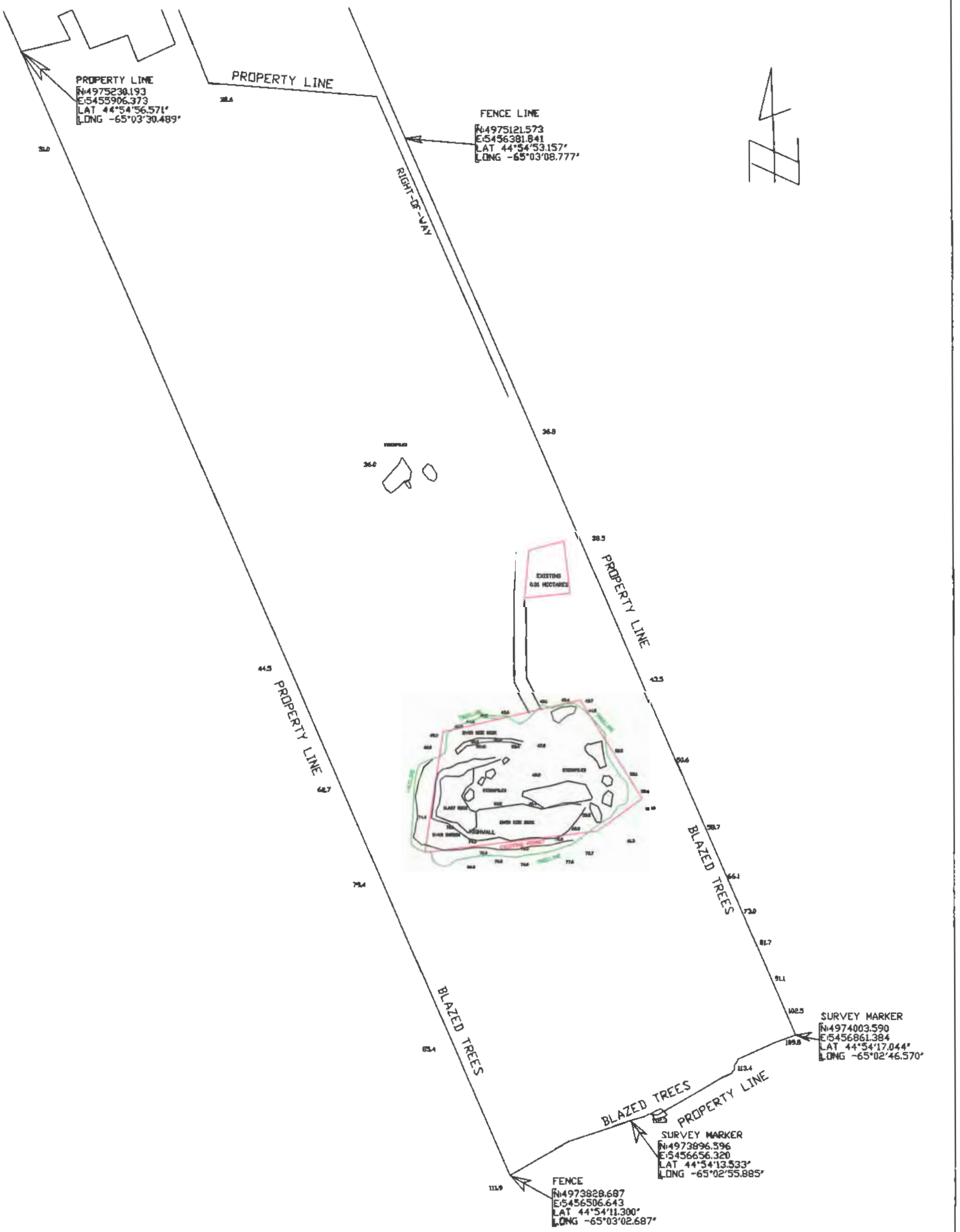
As noted it is our intent to submit the document as a Draft to NSE in late November, 2013 which will be subject to an intergovernmental review. Following this process the document will be revised as necessary and then formally submitted to NSE. In tandem with this formal submission, will be public notification 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 during the interim, please contact the undersigned, at your convenience.

Sincerely,
H2OGEO Environmental Services Inc.

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

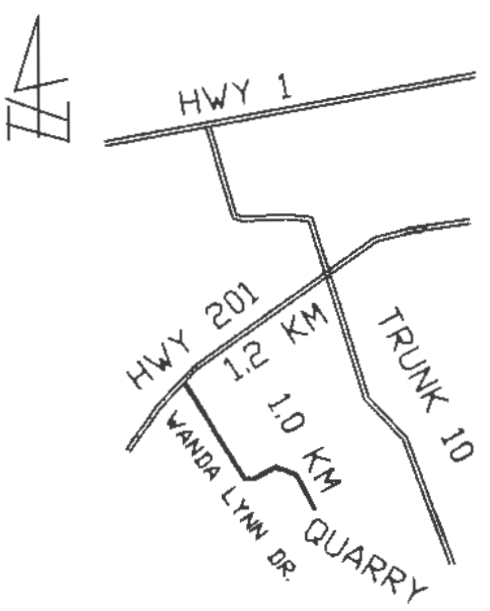
cc: Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO); Att.: Heather MacLeod-Leslie
Native Council of Nova Scotia
Office of Aboriginal Affairs



PLAN SHOWING
EXISTING LOCATION
CHISTOPHER HANKINSON QUARRY
93 WANDA LYNN DRIVE, NICTAUX
ANNAPOLIS COUNTY, NS
PID 5085279
NSE APPROVAL NO. 2009-066020-R01
CO-ORDINATES ARE ATS 77, ZONE 5

SCALE 1 = 5000

H. DANIEL BAILLIE NSLS 392



KEY PLAN

NOT TO SCALE

DEXTER

P.O. Box 48100
BEDFORD, NOVA SCOTIA
B4A 3Z2

TELEPHONE: (902) 835-3381
FAX: (902) 835-7300

Dexter Construction Company Limited **General Contractors**

April 1, 2015

Annapolis Valley First Nation
PO Box 89, Cambridge Station,
Kings County, Nova Scotia
B0P 1G0

Attention: Janette Peterson

Re: Dexter Construction Company Limited, Nictaux Quarry Expansion, Nictaux, Annapolis County, NS - Registration Document for a Class 1 Undertaking Under Section 9 (1) of the NS Environment Assessment Regulations.

Dear Chief. Peterson,

Further to correspondence dated November 1, 2013, this letter is to inform you that Dexter Construction Company Limited (Dexter) will be formally submitting the above noted EA Registration document to Nova Scotia Environment (NSE) on April 30th, 2015. Notices for the Registration are scheduled to appear in the provincial edition of the Chronicle Herald and in the Annapolis County Spectator on April 30th, 2015 (see attached). Copies of the EA Document will also be placed for Public viewing at the Nictaux Needs Convenience Store (corner of Trunk 10 and Route 201) as well as the Middleton Canada Post, the NSE Western Regional Office in Kentville and the NSE Main Office in Halifax. The document will also be available on-line at http://www.gov.ns.ca/nse/ea/.

Questions or comments relating to the EA Document can be forwarded to the NSE Environmental Assessment Officer, Helen Yeh, or to Dexter, until May 30th, 2015. As noted previously, Dexter is available to answer any questions or meet with the Annapolis Valley First Nation representatives, at your convenience.

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

Sincerely,

Dexter Construction Company Limited

Gary Rudolph

Gary Rudolph, P. Eng.
Director of Aggregates

cc: Helen Yeh, NSE
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)
Native Council of Nova Scotia
Office of Aboriginal Affairs

DEXTER

P.O. Box 48100
BEDFORD, NOVA SCOTIA
B4A 3Z2

TELEPHONE: (902) 835-3381
FAX: (902) 835-7300

Dexter Construction Company Limited — **General Contractors**

Date: JUNE 25/13

I / We David & Libby Burns
(Home owner)

PID: 05058607 - 3097 Inglisville Road, Nictaux South, Annapolis County, NS
(Address)

do hereby agree that we have no objections to Dexter Construction Company Limited and / or Christopher Hankinson drilling and blasting on the following property:

Location of Property:
Christopher M. Hankinson, Nictaux, Annapolis County, N.S.
Specifically P.I.D: 05085279

Dexter Construction Company Limited accepts full responsibility for damage to any property caused by our blasting and agrees not to blast closer than 600 meters from house on PID 05058607. A pre blast survey will be conducted by a third party at the expense of Dexter Const. Co. Ltd. when the active quarry is within 800 m of your home.

Signature:

David E Burns
(Home owner)

Gary Rudolph
(Witness)

Elizabeth Burns
(Home owner)

Gary Rudolph
(Witness)

DEXTER

P O. Box 48100
BEDFORD, NOVA SCOTIA
B4A 3Z2

TELEPHONE. (902) 835-3381
FAX: (902) 835-7300

Dexter Construction Company Limited **General Contractors**

I / We GILBERT HINDS (Homeowner)

RR#3 MIDDLETON, NS. B0S 1P0 (Address)

3076 INGLISVILLE ROAD, NICTAUX SOUTH

Do hereby agree that I / We have no objections to Dexter Construction Company Limited and / or Mark Hankinson drilling & blasting on the following property; which is a distance less than 800 meters from the blast.

Location of property: CHRISTOPHER M. HANKINSON

PID #05085279, NICTAUX

The company will accept all responsibility for damage to any property caused by blasting.

Signatures:

Date: APRIL 3/13

Gilbert Hinds
Homeowner

Date: APRIL 3/13

Gary Rudolph
Dexter Construction Co. Ltd

DEXTER

P.O. Box 48100
BEDFORD, NOVA SCOTIA
B4A 3Z2

TELEPHONE: (902) 835-3381
FAX: (902) 835-7300

Dexter Construction Company Limited **General Contractors**

I / We LAWRENCE HENDRY (MYRTLE) (Homeowner)

RR#3 MIDDLETON, N.S. B0S 1P0 (Address)

3100 INGLISVILLE ROAD, NICTAUX SOUTH

Do hereby agree that I / We have no objections to Dexter Construction Company Limited and / or Mark Hankinson drilling & blasting on the following property; which is a distance less than 800 meters from the blast.

Location of property: CHRISTOPHER M. HANKINSON

PID # 05085279, NICTAUX

The company will accept all responsibility for damage to any property caused by blasting.

Signatures:

Date: APR. 3/13 Lawrence Hendry
Homeowner

Date: APR. 3/13 Gary Rudolph
Dexter Construction Co. Ltd

Stantec Consulting Ltd.
102 - 40 Highfield Park Drive
Dartmouth NS B3A 0A3
Tel: (902) 468-7777
Fax: (902) 468-9009

November 14, 2013
File: 121615899.300.150

Attention: Mr. Gavin Isenor
Dexter Construction Co. Ltd.
P.O. Box 48100
927 Rocky Lake Drive
Bedford NS B4A 3Z2

Dear Mr. Isenor,

Reference: Preblast Surveys, Inglisville Road, Nictaux South, Nova Scotia

At the request of Gavin Isenor of Dexter Construction Ltd, Stantec was commissioned to complete preblast surveys on October 20, 2013, of residences on Inglisville Road in Nictaux South, Nova Scotia (PID 05058615 - Gilbert Hinds, PID 05058599 - Myrtle and Lawrence Hinds, PID 05058607 - David/Libby Burns).

The home owners were informed by phone on October 10, 2013, of Dexter Construction's requirement to have preblast surveys performed on these properties in connection with a quarry on an adjacent property. Permission was granted by the home owners and arrangements were made to meet at each of the properties to perform the preblast surveys. The preblast surveys are in video format on the attached DVD along with water testing results for each location.

We trust that this is the information you require at this time. If you have any questions please do not hesitate to call the undersigned or Dan McQuinn at (902) 468-0425.

Regards,

STANTEC CONSULTING LTD.

Leo D. Booth, C.Tech.
Geotechnical Technician
Phone: (902) 456-4885
Leo.Booth@stantec.com

Attachment: DVD of Preblast Surveys and Water Testing Results

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