

APPENDIX D
Biophysical Assessment Report (Envirosphere, 2013)

Environmental Assessment Registration
Document for James River Quarry Expansion

Biophysical Assessment of the
Expansion of the
Municipal Enterprises Aggregate Quarry—
380 Leslie Road
James River, Antigonish County, N.S.

PID 01240837 & 10118032

Revised: March, 2014

Submitted to:

WMR Environmental Services Inc.
Fall River, Nova Scotia

March 20, 2014

TABLE OF CONTENTS

	Page
1 Introduction.....	1
2 Information Sources.....	1
3 Site Location and Study area	2
4 Existing Environment	4
4.1 Physical Environment	4
4.1.1 Climate.....	4
4.1.2 Topography and Geology	6
4.1.3 Air Quality, Noise, and Light.....	6
4.1.4 Hydrology	8
4.1.5 Hydrogeology	8
4.1.6 Soils.....	9
4.2 Biological Resources and Habitat	10
4.2.1 Terrestrial Environment	10
4.2.2 Aquatic Environment	12
4.2.3 Water Quality.....	13
4.2.4 Wetlands	14
4.2.5 Birds.....	15
4.2.6 Mammals.....	17
4.2.7 Fish.....	18
4.2.8 Reptiles and Amphibians	19
4.2.9 Species at Risk	19
4.3 Human Uses of the Environment	28
4.3.1 Mi'Kmaq.....	28
4.3.2 Water Supply Areas	29
4.3.3 Land Use	29
4.3.4 Forestry	29
4.3.5 Hunting and Trapping.....	29
4.3.6 Recreational & Mi'Kmaq Fishing.....	30
4.3.7 Archaeological Resources.....	30
4.3.8 Parks and Protected Areas.....	30
4.3.9 Recreational/Cultural Features.....	31
4.3.10 Residential/Commercial/Industrial Development	33
4.3.11 Tourism and Viewscape.....	33
5 Assessment Approach and Methods	33
6 Predicting Environmental Effects / Significance And Mitigation Of Impacts on Valued Ecosystem Components	34
6.1 Socioeconomic Impacts	34
6.1.1 Mi'Kmaq.....	34
6.1.2 Archaeological/Cultural/Historical	35

6.1.3	Recreational Activities	35
6.1.4	Tourism and Viewscape.....	35
6.1.5	Wilderness.....	36
6.1.6	Recreational Fishing & Hunting	36
6.1.7	Land Use and Value	36
6.1.8	Transportation	37
6.1.9	Residential Use	37
6.1.10	Water Supply	37
6.1.11	Industrial/Agricultural Activities	37
6.2	Biophysical Impacts—Impacts of the Project on the Environment	38
6.2.1	Air Quality and Noise	38
6.2.2	Hydrogeology	38
6.2.3	Hydrology	39
6.2.4	Water Quality	39
6.2.5	Freshwater Aquatic Environments.....	39
6.2.6	Wetlands	40
6.2.7	Fish and Fish Habitat	40
6.2.8	Wildlife and Habitat.....	40
6.2.9	Species at Risk	40
7	Impacts of The Environment on the Project	41
8	Cumulative Impacts	41
9	Monitoring	41
10	Public Consultation.....	41
11	Limiting Conditions.....	41
12	References.....	49
13	Personal Communications.....	50

List of Figures:

Figure 1. Project location.....	1
Figure 2. Features of existing James River quarry operation, October 2013.....	2
Figure 3. View of quarry towards entry gate in June 2013.....	3
Figure 4. View of northern face of James River Quarry, June 2013.	3
Figure 5. View of west side, James River Quarry, June 2013. Stand of mature hardwood shown on right.	4
Figure 6. Dominant wind speeds and directions in the south-western Gulf of St. Lawrence, January to July (From TDC Atlas 1991).....	5
Figure 7. Dominant wind speeds and directions in the south-western Gulf of St. Lawrence, August to December (From TDC Atlas 1991).....	5
Figure 8. Precipitation for James River Quarry, observed at Collegeville (1971-2000).	6
Figure 9. Recent logging on eastern section of study area, June 19, 2013.	10
Figure 10. Recent 2+ yr regeneration on northeastern section, June 19, 2013.	11

Figure 11. Patch of older regenerated forest including some old hardwood in swamp east of woods trail	11
Figure 12. Cleared area east of existing pit, taken from pit berm June 19, 2013.....	11
Figure 13. Forest cover and wetlands, James River Quarry, 2013 [information from NS Forest Inventory, Aerial Photography, and site visits, June & September 2013].....	12
Figure 14. Hardwood regeneration south of old (reclaimed) quarry, June 20, 2013.	12
Figure 15. Seepage swamp (0.6 ha) on eastern section of property, September 5, 2013 (for location, see Figure 13).....	14
Figure 16. Small seepage swamp in clearcut on slope to east of existing pit, June 19, 2013.	15
Figure 17. Protected and significant wildlife areas in the vicinity of the James River Quarry include: the Eigg Mountain-James River Wilderness Area; James River Protected Water Area; and the DNR Deer Wintering Area. Map from NSDNR Protected Areas (www. http://gov.ns.ca/nse/protectedareas/docs/GullyLakeEigg/EMJR_Base_map.pdf).....	32

List of Tables:

Table 1. Water quality measurements at James River Quarry, June 19-20, 2013.....	13
Table 2. Wetlands, James River Quarry Expansion. See Figure 13 for locations.	14
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.....	16
Table 4. Bird species present (heard or seen) during 5-minute surveys conducted on June 20, 2013. For locations of observation points, see Map A-6.....	17
Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013).	20
Table 6. Records of species of concern within a 10 km radius of James River Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.....	22
Table 7. Characteristics of federally-listed plant and animal species occurring within 10 km of James River quarry.	26
Table 8. Valued Environmental Components (VECs) for James River Quarry Expansion.....	34
Table 9. Potential interactions between project activities and operations and Valued Environmental Components (VECs) for James River Quarry expansion.....	43
Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, James River Quarry expansion.	44

1 INTRODUCTION

Municipal Group of Companies, Waverley, Nova Scotia, is proposing an expansion of a quarry on Leslie Road in the James River area of Antigonish County, near Antigonish, Nova Scotia (Figure 1). An approval to expand the quarry is required under the Nova Scotia Environment Assessment Act. WMR Environmental Services Inc, 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.

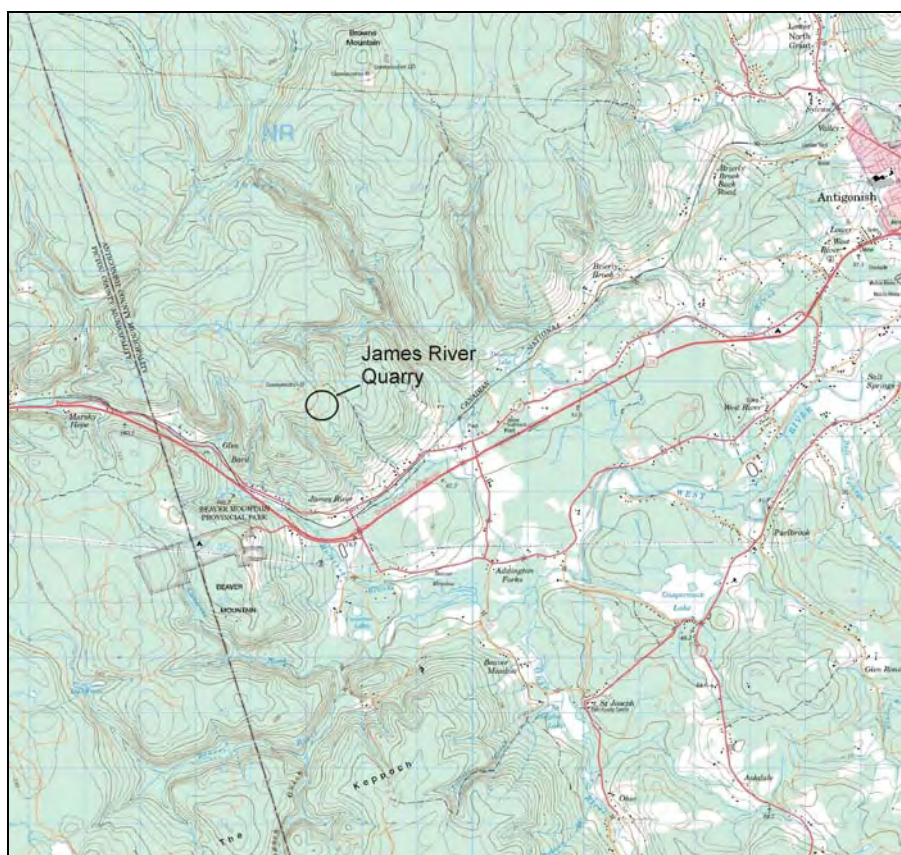


Figure 1. Project location.

2 INFORMATION SOURCES

Information for the biophysical overview and assessment was collected from a variety of sources, including interviews with representatives of the Department of Natural Resources, Fisheries and Oceans Canada, local municipal organizations and individuals; review of existing published information including soil surveys, geology, natural history (e.g. *Natural History of Nova Scotia*), relevant websites (DNR Significant Habitat and Wetland Databases, Atlantic Canada Conservation Data Centre, and Nova

Scotia Museum of Natural History) as well as technical documentation such as aerial photos and 1:50,000 topographic maps and digital land use data. Site visits and walkovers by project personnel were carried out on June 19-20 (spring botany survey and owl and breeding bird survey); September 5 for incidental site features; and September 11 (fall botany and wetlands). Botany surveys were conducted by Mr. Jim Jotcham, M.Sc. (Marbicon Inc.) and bird surveys by Mr. Fulton Lavender, Halifax, Nova Scotia.

3 SITE LOCATION AND STUDY AREA

The site is located ~11 km west of Antigonish, Nova Scotia, ~3-4 km north of Hwy 104 (Exit 30) and along Leslie Road in the community of James River, 1:50,000 NTS 11E-09, Easting: 567,210, Northing: 5,048,660, Zone UTM Zone 20, Air Photo 2007404-174 (July 2007) (Figure 1). The current quarry operation consists of an active pit, work areas and access roads, as well as reclaimed parts of a pre-existing quarry which have been reclaimed and revegetated and serve as runoff control for the quarry and roads at the site (Figures 2-5).

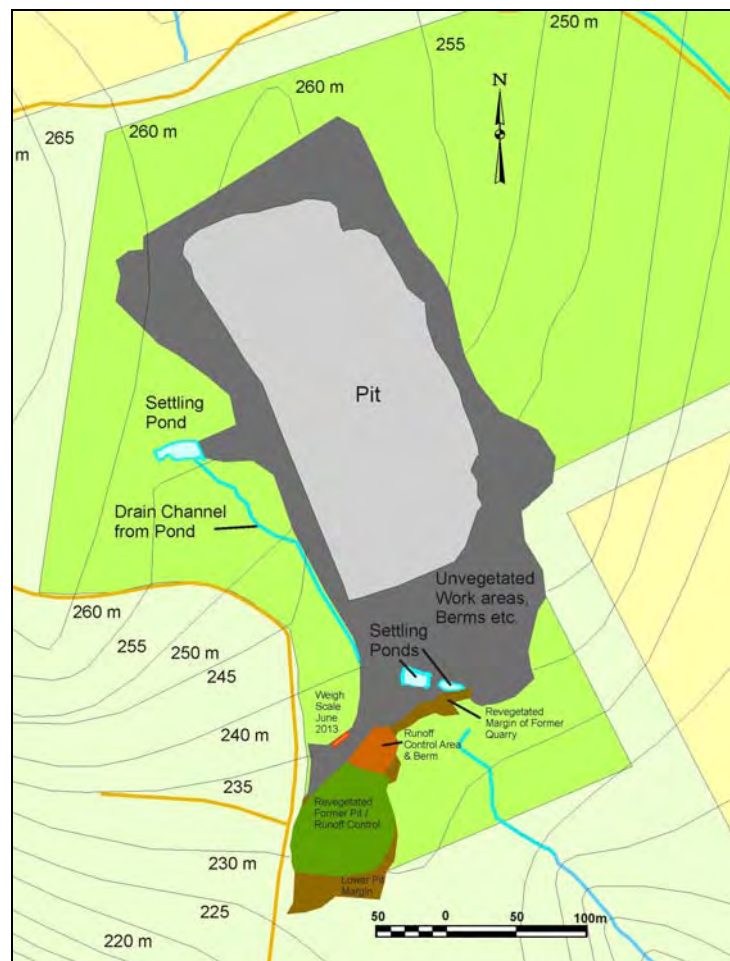


Figure 2. Features of existing James River quarry operation, October 2013.



Figure 3. View of quarry towards entry gate in June 2013.



Figure 4. View of northern face of James River Quarry, June 2013.



Figure 5. View of west side, James River Quarry, June 2013. Stand of mature hardwood shown on right.

4 EXISTING ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 CLIMATE

The James River Quarry is located where the Pictou Antigonish Highlands meet the Northumberland Lowland, the former which includes a series of plateaus divided by steep-sided ravines and lowlands, climate is characterized by warm rainy summers and mild to cold snowy winters. The area receives a mean annual precipitation of 1000-1600 mm with typical mean summer and winter temperatures of 14.5 and -2.5°C , respectively. Winds are predominantly from the north to northwest in winter, shifting to the south and southwest during the May to November period (Figures 6 & 7). The site has a more extreme climate regime due its interior location and elevation. Annual average temperature near the site (measured at Collegeville, southwest of Antigonish and ~15 km southeast of the site) is 5.8°C , averaging 18.2°C in July and -6.6°C in January and February, the coldest months (Canadian Climate Normals, www.climate.weatheroffice.gc.ca/climate_normals). The area receives high total precipitation (annual average of 1384 mm) mostly as rain (1176 mm). Peak precipitation occurs in late fall-winter (October-December), and is lowest though moderate in spring-summer (April to August period) (Figures 8).

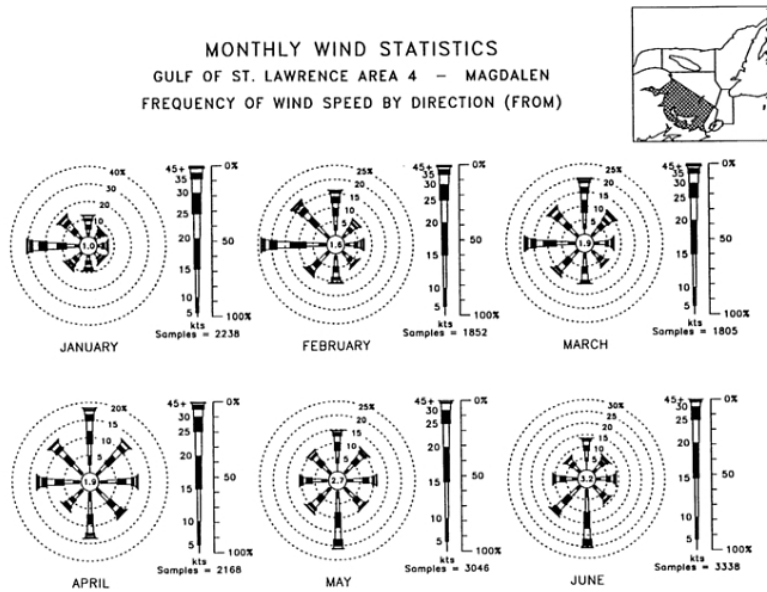


Figure 6. Dominant wind speeds and directions in the south-western Gulf of St. Lawrence, January to July (From TDC Atlas 1991).

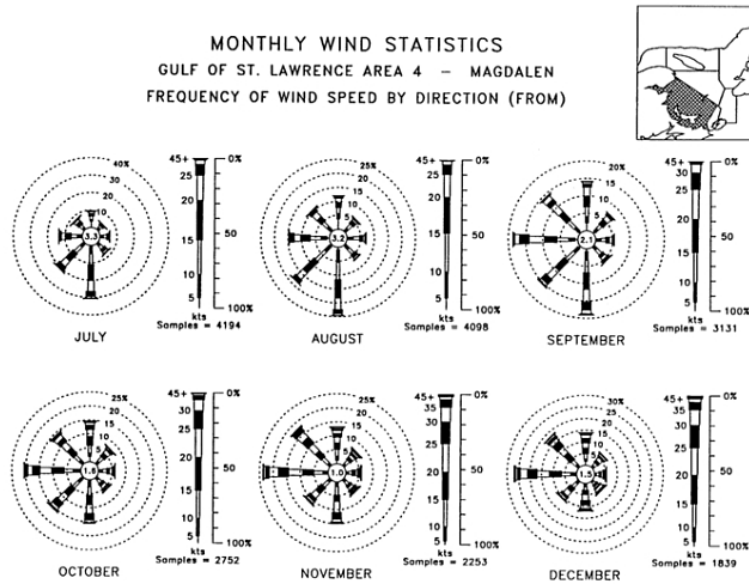


Figure 7. Dominant wind speeds and directions in the south-western Gulf of St. Lawrence, August to December (From TDC Atlas 1991).

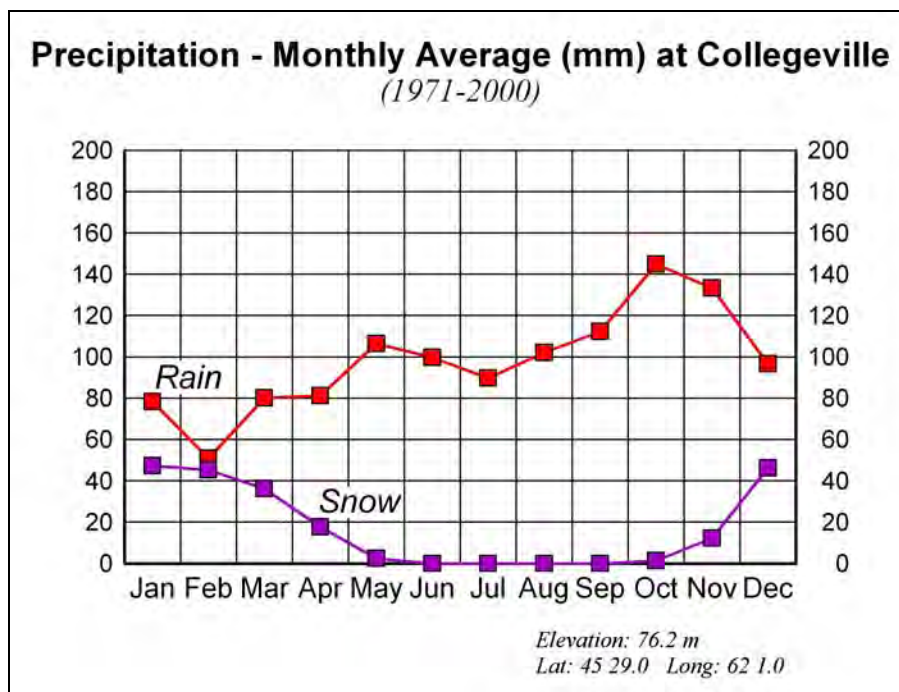


Figure 8. Precipitation for James River Quarry, observed at Collegeville (1971-2000).

4.1.2 TOPOGRAPHY AND GEOLOGY

The James River Quarry is located in the Pictou Antigonish Highlands at the community of James River, 11 km west of the Town of Antigonish (Figure 1). The Pictou-Antigonish Highlands is underlain by a massive deposit of igneous rock, which forms the structural basis, outcropping in places but mostly overlain by sedimentary rocks (conglomerates, sandstones and shales) of the Horton, James River, and Windsor groups (Davis and Browne 1996; Stea et al 1992, Appendix Map A-3). Granite outcrops at the surface of the quarry site, while the lowlands at James River and along Highway 104 are underlain by sedimentary deposits (reddish brown and gray sandstones and shales, with some gypsum and limestone)(Appendix Map A-3). Sandstone, slate and conglomerate of the Horton formation occur in the surroundings and form Browns Mountain to the north (Cann and Hilchey 1954). Rock at the site is non-acid-bearing. Surface materials and soils reflect the dominant local bedrock modified and redistributed by the last glaciation (Appendix Map A-2). The plateau is gently undulating with moderate slopes, and with incised ravines occupied by streams on the slopes. The site is near the height of land in the area at an elevation of approximately 250 m above sea level and slopes generally to the southeast.

4.1.3 AIR QUALITY, NOISE, AND LIGHT

The James River Quarry is expected to have high air quality, low to moderate sound levels, and low ambient light due to its occurrence in a remote location near a major transportation corridor in the area but surrounded by a large area of natural landscape, including undeveloped, protected areas of the Eigg Mountain Wilderness Area and James River Protected Watershed Area to the north, and undeveloped forest areas elsewhere. There is normally little use of the access roads and logging trails at the site, and

site visits by vehicles to the adjacent telecommunications towers are made only periodically. The roads are also used at various times of the year for ATVs and snowmobiles. Apart from noise arising from the quarry, sound levels generated from traffic on Highway 104 and Highway 4, which run east-west south of the site; as well as from the Riverside International Speedway, a stock car racing venue, located about 3 km south of the site, and the Cape Breton and Central Nova Scotia Railway (CBNS) line passing the site¹. While the Speedway operates infrequently (typically about a half dozen weekends per year) and the rail line has a maximum of four trains per day (C. MacDonald, local resident James River, personal communication 2013), Highway 104 represents the most continuous source of sound, which can occur day and night year-round. No other industrial activities occur in the immediate vicinity of the project. Noise levels generated by the quarry are relatively limited and typical for quarry operations, including: occasional blasting and site activities such as operation of heavy equipment, and crusher operations, back-up alarms etc. Trucks transporting product from the quarry along the Leslie Road will contribute to a certain amount of local noise; however all truckers involved in transporting materials from the quarry are advised not to use engine braking. Two residents were interviewed about noise levels—the farmer living on Leslie Road closest to the quarry noted that sound levels derived from the quarry were not objectionable; blasting was not even noticed; and that the regulation of engine braking had solved an earlier issue with noise levels (R. Vacheresse, pers. comm. 2013). This individual further indicated that the Cape Breton and Central Nova Scotia Railway line is more audible than trucking arising from the quarry or quarry activities; the Speedway is also audible when in operation, which is typically for short periods, approximately half a dozen weekends a year when events take place; and noise from Highway 104 is continually present, although not objectionable. A second resident living 2.3 km southeast of the site, noted an audible, though low, noise level arising when the quarry was operating (C. MacDonald, James River, pers. comm. 2013). He also noted issues of noise from the Speedway, the railway, Highway 104 and truck traffic arising from several quarries in the area (two quarries are operated on the Brierly Brook Back Road by Nova Construction and the Gravel Pit Road by Chapman Brothers Construction, and trucks pass along Highway 4 towards James River).

Activities at the quarry including crushing, equipment use, and truck movement, will generate dust at the quarry as well as along Leslie Road; and operation at night will require lights. Light from the quarry when operations take place at night cannot be seen at the base of the slope at the site (R. Vacheresse, local resident, pers. comm. 2013); however a resident about 2.3 km southwest of the quarry noted that a glow from the site could be seen under certain conditions (C. MacDonald, James River, pers. comm. 2013), and quarry lights could possibly been seen from greater distances, such as from Beaver and Keppoch Mountains to the south.

1 . A diesel locomotive presumed to be in Antigonish was heard distinctly during the night of June 19-20, 2013 during a site visit. Antigonish is visible day and night from the James River quarry.

4.1.4 HYDROLOGY

The project is located in the James River watershed—one of the sources of West River, an important fourth order river which enters Antigonish Harbour at Antigonish. The quarry is situated on the height of land on the upland plateau and surface and groundwater flows arising from the site are moderate. The upland plateau drains to the north through two intermittent streams originating north of the site and flowing into a tributary of James River about 1.5 km northeast, while several streams flow down the southeast slope to the valley floor below, and then join and flow east between Highway 4 and 104 to meet James River southeast of the site (Appendix Map A-1). The streams in the vicinity of the quarry are ephemeral, typically going dry in the summer. More continuous flow is observed in the lower watershed such as south of Highway 4 (R. Vacheresse, local resident, pers. comm. 2013). None of the watershed occupied by the quarry enters the portion of the upper James River watershed used as the water supply for the Town of Antigonish and conserved as a protected watershed. The Town reservoir is located on James River about 1.5 km northeast of the project site, consisting of a 3.7 ha, 600 m impoundment and dam, which feeds through a 20" (50 cm) pipeline which runs along the river valley to a point near the Highway 4 crossing, where it runs parallel to Highway 4 to the water treatment facility near the community of Brierly Brook (K. Proctor, Town of Antigonish, pers. comm. 2013). The protected watershed area extends north and west of the reservoir, beginning approximately 1.5 to 2 km north of the project site (Figure 17).

The site itself has as largely unmodified natural drainage pattern in places, as well as pit and settling pond drainage. The upper west settling pond (Figure 2) overflows overland through the forest and meets a ditch system which drains the west side of the quarry, with both flows leaving the site through two settling ponds. Seepage from the floor of the quarry also leaves the quarry after reaching the ponds through ditches. Below the easterly settling pond, seepage forms into braided channels in a treed riparian swamp (see Section 4.2.4), eventually forming a single channel which shortly turns into a permanent intermittent stream at the southern boundary of the property (Figure 2). Only small intermittent flowages derived from surface water and seepages were found in the east sector of the project area. The main one flowed largely parallel to the woods trail crossing the property (Figure 13) and joined the ditch for the trail; this flowage is expected to be dry in the summer, but had a flow during the site visits, which coincided with prior periods of heavy rainfall. Two other small flowages were observed on the eastern slope leading away from the current pit (Figure 13). During the first (June) survey the woods trail was flooded in a low area along the property line.

4.1.5 HYDROGEOLOGY

The site is immediately underlain by complex glacial deposits, weathered and frost-shattered rock and soils derived from bedrock of various types and ages, glacially-scoured basins and knobs, overlain by a thin, discontinuous veneer of till, shaped by glacial erosion (J. Fraser, H2GEO Environmental Services, Halifax). The till veneer, based on visual observations, appears to be less than 1 m thick, with significant areas of boulder terrain and/or bedrock outcropping (NS Department of Natural Resources, Map 92-3; Scale 1:500,000 – Stea *et al.* 1992). Bedrock geology in the general area consists of turbidic conglomerate, wacke, mudstone and minor basalt of the Georgeville Group, James River Formation.

However the quarry site itself is located within an area of a granite pluton of middle to late Devonian age. (Geological Map of Nova Scotia. NS Department of Natural Resources, Minerals and Energy Branch, Map 2000-1; Scale 1:500,000 – Keppie 2000).

The site topography is generally flat to strongly rolling with the slope predominantly to the southeast toward an un-named stream trending southeast to the James River. It is anticipated that the surficial and shallow groundwater flow mirror the topographic flow, and that therefore, the local / site-specific shallow groundwater will flow towards James River (southeast). It also anticipated that the bedrock aquifer will exhibit fracture flow. The quarry area has been previously disturbed and altered for surface and shallow groundwater control, thereby altering the water flow regime in the immediate area, which has been directed off-site to the south, which eventually flows southeast towards an un-named brook and then to the James River.

Shallow groundwater is expected to discharge to the on-site surface water control structures; where ultimately it would become part of the surface water regime. The deeper bedrock groundwater regime in the general area is used for potable water source; however there are no well log records for the subject site or within 1.6 km. of the quarry property (NSE Well Log Database). The database identifies 34 wells located within 10 km. of the site, the nearest at 955 James River Road, approximately 1.6 km. south of the subject property. In addition, a drive-by survey was completed along Trunk 4 through James River, immediately to the south of the quarry property which confirmed that homes with on-site wells were located at a distance of approximately 1.6 km. south of the quarry property (J. Fraser, H2GEO Environmental Services, Halifax). The depth of the bedrock water table at the quarry site is not known; however the water table has not been encountered during historic quarry operations.

4.1.6 SOILS

Soils in the vicinity of the quarry have developed from underlying till and bedrock in uplands and slopes, and outwash and alluvial deposits in the lowlands, and reflect largely glacial processes and subsequent weathering of surficial material (See Figure A3). The main soil type at the site and adjacent uplands is the Thom group—brown gravelly sandy loam over light yellowish brown sandy loam, developed from till derived from upland conglomerate and metamorphic bedrock. The base of the slopes in the area are predominantly Hebert soils, light brown sandy loam over yellowish brown gravelly sandy loam developed on outwash deposits. Stewiacke soil—stone-free dark reddish brown silt loam over reddish brown silt loam—has developed in floodplains associated with lowland watercourses (Cann and Hilchey 1954).

4.2 BIOLOGICAL RESOURCES AND HABITAT

4.2.1 TERRESTRIAL ENVIRONMENT

The study area is occupied by cut-over upland hardwood forest dominated by sugar maple, white and yellow birch, but including balsam fir, and red maple, in various stages of regeneration² (Figure 11). The original forest type reflected local topography (moderate slopes) and drainage (well-drained) of the site. Presently, the site supports regenerated stands of the dominant tree species for the area, and terrace areas of reduced slope are wetter and include species such as red maple. In places such as the ‘regen’ forest north of the active face, and along the eastern side of the property, dense stands of young to medium age balsam fir predominate (Figure 4). In several locations, including a swamp on the southeast corner of the property, older white birch have been left standing (Figure 11). A fairly old regenerated patch of hardwood occurs on the western side of the present active quarry footprint and a small patch of mature white birch occurs on the southeast corner of the pit (Figure 13). The results of a botanical survey of the site, conducted by Marbicon Inc., carried out in June and September 2013, is presented in Appendix B.



Figure 9. Recent logging on eastern section of study area, June 19, 2013.

² All of the site has been cut at some time, and the forest displays various ages of regeneration. A 1.2 ha patch of old growth hardwood occurs on the southwest edge of the quarry (Figure 5; Appendix Map A-4). A botanical survey of the site was conducted on June 19-20 and September 11, 2013 (Appendix B).



Figure 10. Recent 2+ yr regeneration on northeastern section, June 19, 2013.



Figure 11. Patch of older regenerated forest including some old hardwood in swamp east of woods trail in eastern section, June 19, 2013.



Figure 12. Cleared area east of existing pit, taken from pit berm June 19, 2013.

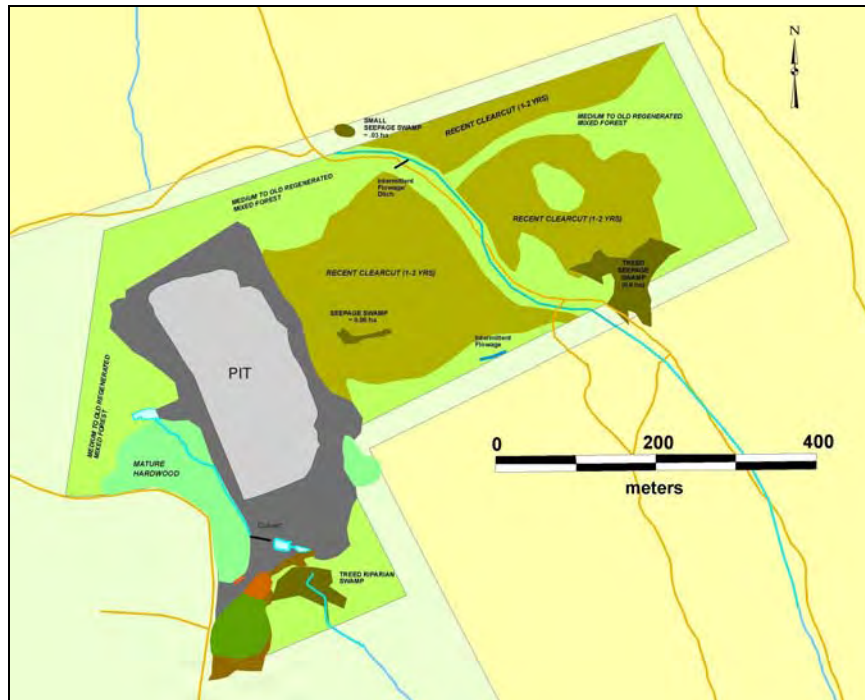


Figure 13. Forest cover and wetlands, James River Quarry, 2013 [information from NS Forest Inventory, Aerial Photography, and site visits, June & September 2013].



Figure 14. Hardwood regeneration south of old (reclaimed) quarry, June 20, 2013.

4.2.2 AQUATIC ENVIRONMENT

There are no natural surface water features (permanent streams or ponds) on the quarry property; however occasional ephemeral flowages (areas of surface water flow which do not have defined channels and are dry for part of the year) occur (Figure 13). Overflow areas from settling ponds, and ditches along the access road have led to channelling of some runoff and groundwater seepage. Several intermittent streams

develop adjacent to the property from runoff and groundwater seepage originating at the site (Figure 13). Settling ponds provide limited aquatic habitat for aquatic insects and no fish occupy even the lower settling ponds, although tadpoles (presumably Green Frog) and Giant Water Bug (Belostomatidae) were found at one site.

4.2.3 WATER QUALITY

Water quality at the James River Quarry is acceptable for freshwater aquatic life. Surface waters at the quarry are extremely low in conductivity, acidic to neutral in acidity, and low in suspended sediments. Measurements during site visits showed pH of 5.4 to 7.5 (Table 1). The north settling pond and a stream originating near the north boundary of the site were more acidic than the other locations, and low in conductivity, suggesting the pond has a natural surface or groundwater source, although no surface water source could be found. The low pH in some of the waters at the site are a function of the low levels of dissolved solids which are not available for buffering, but as the water flows it picks up dissolved material and leads to a more neutral pH (Table 1). Total suspended solids were low, ranging from not detectable to 7.5 mg/L.

Table 1. Water quality measurements at James River Quarry, June 19-20, 2013.					
Site Location	June 19, 2013			June 20, 2013	
	North Stream (Site WS1)	Upper Sedimentation Pond (Site WS2)	First Lower Sedimentation Pond (Site WS3)	Stream Below Lower Sedimentation Ponds Site WS4	Site WS5
Temperature °C	10.8	19.0	16.8	13.0	12.5
Oxygen Saturation (%)	47.2	70.9	83.7	81.2	91.9
Dissolved Oxygen (mg/L)	4.95	6.6	8.2	8.5	9.7
Conductivity (µs)	16.8	21.7	121.0	116.9	132.7
Specific Conductivity (25°) (µs)	23.0	24.5	135.0	151.5	171.6
TSS (mg/L)	0.5	<0.5	2.0	4.5	7.5
pH	5.4	5.8	7.5	7.5	7.6
Turbidity & Colour	Clear & Colourless	Clear & Colourless	Clear & Colourless	Clear & Colourless c/w occasional particles	Clear & colourless, c/w occasional particles

4.2.4 WETLANDS

Several small wetlands were identified on the property. Due to the position of the quarry on the height of land and the general sloping trend of the landscape, runoff and ground water doesn't tend to accumulate and lead to conditions suitable for the development of wetlands. Two areas of reduced slope on the eastern side of the property contained seepage swamps (Figures 13, 15 and 16). The largest (~0.6 ha) was dominated by an overstorey of red maple, white birch and white ash, while the second occurred in a clearcut, had no overstorey vegetation, and was enhanced by disturbed surface layer by logging equipment. These are presumed to be relatively dry for part of the year and some non-wetland and facultative species were present. A small seepage swamp containing sedges, mosses and ericaceous shrubs, occupied the eastern slope near the eastern pit margin (Figure 13). A seepage swamp has developed arising from the overflow from the furthest settling pond on the southern margin of the property (Figure 13).



Figure 15. Seepage swamp (0.6 ha) on eastern section of property, September 5, 2013 (for location, see Figure 13).

Table 2. Wetlands, James River Quarry Expansion. See Figure 13 for locations.		
Identification	Area (ha)	Type and Comments
1	0.6	Treed Slope Swamp
2	0.3	Treed Riparian Swamp
3	0.07	Seepage Swamp, north side in clearcut
4	0.06	Seepage swamp, slope east of pit



Figure 16. Small seepage swamp in clearcut on slope to east of existing pit, June 19, 2013.

4.2.5 BIRDS

One hundred & twenty-three (123) 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). Thirty-six species were observed during bird surveys for the project including owl surveys and early morning observations, as well as general reconnaissance of the site. Virtually no owls were heard during the owl survey at 0200-0300 hrs on June 20, 2013 (only a single call of a Long-eared Owl was heard)³, although conditions were ideal (clear, calm and a full moon in the southwest sky). Other species heard or seen at the site outside the survey period included an American Woodcock (during the owl survey); and a Ruffed Grouse, seen near the quarry entrance. All species observed with the exception of Ruffed Grouse were listed as confirmed or possibly breeding at the site in the Maritime Breeding Birds Atlas (MBBA)(Table 3). Dawn survey locations in the regenerating forest or adjacent to clearcuts in the vicinity of the pit had 28 species all of which were typically associated with woodlands, with Swainson's Thrush, American Robin, American Redstart and Magnolia Warbler the most common and abundant, and Hermit Thrush and Common Yellowthroat also relatively abundant but not at all sites (Table 4). On the eastern section of the quarry property, 24 species were represented with White-throated Sparrow, American Robin and Mourning Warbler most common and abundant; while various warblers (Black and White, Magnolia, Swainson's and Chestnut-Sided); thrushes (Ovenbird and Hermit Thrush); and Alder Flycatcher were common but did not occur at all sites (Table 4).

³ Long-eared Owl is a species of concern because of low numbers reported; however, the species is difficult to detect and lack of sightings may be due to their biology. The Maritime Breeding Birds Atlas (Erskine 1992) reports a sighting north of Antigonish.

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 Atlas¹. Blue = associated with water; Green = associated with terrestrial areas.

Breeding Evidence²:		
Confirmed and Probable in Area		Possible in Area
Alder Flycatcher	Hooded Merganser	Bay-breasted Warbler
American Bittern	House Sparrow	Black-billed Cuckoo
American Black Duck	Killdeer	Blue-winged Teal
American Crow	Least Flycatcher	Common Goldeneye
American Goldfinch	Lincoln's Sparrow	Double-crested Cormorant
American Kestrel	Magnolia Warbler	Eastern Phoebe
American Redstart	Mallard	Great Blue Heron
American Robin	Merlin	Mallard / Black Duck Hybrid
American Woodcock	Mourning Dove	Northern Harrier
Bald Eagle	Mourning Warbler	Northern Waterthrush
Bank Swallow	Nashville Warbler	Osprey
Barn Swallow	Northern Flicker	Palm Warbler
Barred Owl	Northern Goshawk	Pine Grosbeak
Belted Kingfisher	Northern Mockingbird	Red-breasted Merganser
Black-and-White Warbler	Northern Parula	Tennessee Warbler
Black-backed Woodpecker	Northern Saw-whet Owl	White-winged Crossbill
Blackburnian Warbler	Olive-sided Flycatcher	Willow Flycatcher
Black-capped Chickadee	Ovenbird	Wilson's Warbler
Black-throated Blue Warbler	Pied-billed Grebe	Yellow-bellied Flycatcher
Black-throated Green Warbler	Pileated Woodpecker	
Blue Jay	Pine Siskin	
Blue-headed Vireo	Purple Finch	
Bobolink	Red-breasted Nuthatch	
Boreal Chickadee	Red-eyed Vireo	
Brown Creeper	Red-tailed Hawk	
Canada Goose	Red-winged Blackbird	
Canada Warbler	Ring-necked Duck	
Cape May Warbler	Rock Pigeon	
Cedar Waxwing	Rose-breasted Grosbeak	
Chestnut-sided Warbler	Ruby-crowned Kinglet	
Chimney Swift	Ruby-throated Hummingbird	
Chipping Sparrow	Ruddy Duck	
Cliff Swallow	Ruffed Grouse	
Common Grackle	Rusty Blackbird	
Common Loon	Savannah Sparrow	
Common Merganser	Sharp-shinned Hawk	
Common Nighthawk	Song Sparrow	
Common Raven	Sora	
Common Yellowthroat	Spotted Sandpiper	
Dark-eyed Junco	Swainson's Thrush	
Downy Woodpecker	Swamp Sparrow	
Eastern Kingbird	Tree Swallow	
Eastern Wood-Pewee	Veery	
European Starling	Virginia Rail	
Evening Grosbeak	White-breasted Nuthatch	
Golden-crowned Kinglet	White-throated Sparrow	
Gray Catbird	Wilson's Snipe	
Gray Jay	Winter Wren	

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 Atlas¹. Blue = associated with water; Green = associated with terrestrial areas.

Breeding Evidence²:	
Confirmed and Probable in Area	Possible in Area
Great Horned Owl	Wood Duck
Green-winged Teal	Yellow Warbler
Hairv Woodpecker	Yellow-bellied Sapsucker
Hermit Thrush	Yellow-rumped Warbler

¹Breeding 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).

²Observed 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 5-minute surveys conducted on June 20, 2013. For locations of observation points, see Map A-6.

	Quarry Area (Sites 1,2,4,6)		Eastern Area (Sites 7,8, 11 & 12)			Quarry Area (Sites 1,2,4,6)		Eastern Area (Sites 7,8, 11 & 12)	
	no./5 min.	no. of sites	no./5 min.	no. of sites		no./5 min.	no. of sites	no./5 min.	no. of sites
Passeriformes					Passeriformes (cont.)				
Alder Flycatcher	1.8	2	3.3	2	Magnolia Warbler	3.0	4	1.3	4
American Goldfinch	0.0	0	0.3	1	Mourning Warbler	1.8	2	10.3	4
American Redstart	3.5	3	0.3	1	Nashville Warbler	0.3	1	0.0	0
American Robin	6.8	4	6.5	4	Northern Parula Warbler	1.3	2	0.0	0
Black and White Warbler	0.8	3	2.0	4	Ovenbird	2.0	4	2.5	4
Blackburnian Warbler	0.0	0	1.3	3	Palm Warbler	0.3	1	0.0	0
Black-capped Chickadee	0.5	2	0.0	0	Purple Finch	0.5	2	0.0	0
Black-throated Green Warbler	0.5	2	0.5	2	Red-eyed Vireo	2.8	3	2.3	3
Blue-headed Vireo	0.3	1	0.5	2	Ruby Crowned Kinglet	0.5	2	0.0	0
Chestnut-sided Warbler	1.3	2	3.0	2	Song Sparrow	0.8	2	0.0	0
Common Raven	0.3	1	0.0	0	Swainson's Thrush	10.3	4	5.5	3
Common Yellowthroat	3.0	2	2.5	2	White Throated Sparrow	2.5	2	8.0	4
Dark Eyed Junco	1.0	2	1.0	2	Yellow-bellied Flycatcher	0.5	1	1.3	2
Evening Grosbeak	0.8	1	0.0	0	Yellow-rumped Warbler	0.0	0	0.3	1
Golden Crowned Kinglet	0.0	0	0.5	2	Piciformes				
Hermit Thrush	3.0	2	3.3	2	Pileated Woodpecker	0.5	2	0.0	0
Least Flycatcher	0.0	0	0.3	1	Galliformes				
Lincoln's Sparrow	1.3	1	0.3	1	Spruce Grouse	0.0	0	0.3	1

4.2.6 MAMMALS

No significant or unique concentrations of mammals are known from the site. A range of species typical of mixed to coniferous forests are expected. Seven bat species occur in Nova Scotia – Hoary Bats

(*Lasiurus cinereus*), Silver-haired Bats (*Lasionycteris noctivagans*), Eastern Red Bats (*Lasiurus borealis*), and Big Brown Bats (*Eptesicus fuscus*), with smaller numbers of Eastern Pipistrelles (*Perimyotis subflavus*), Northern Long-eared (*Myotis septentrionalis*) and Little Brown Bats (*Myotis lucifugus*). Northern Long-eared, Little Brown Bat (both most common) and Eastern Pipistrelle are the only ones with significant populations in Nova Scotia and all three are currently endangered, currently provincially listed as Species at Risk. The Northern Long-eared Bat is forest interior species; while the Little Brown Bat is more of a generalist (Broders *et al* 2003). One medium-sized bat thought to be a Silver-haired Bat, was called in during the owl survey on the north side of the quarry early in the morning on June 20. Little Brown Bat and Northern Long-eared Bat have been observed within the general area of the project (S. Weseloh-Mckeane, Coordinator, Special Places, pers. comm. 2013). Nova Scotia Department of Natural Resources has identified a deer wintering area immediately east of the study site, which borders James River. Moose, an endangered species provincially on the Nova Scotia Mainland has been observed within a 10 km radius of the project site (ACCDC, 2013) and is a COSEWIC-listed species.

4.2.7 FISH

The upper portions of watercourses originating on the upper slopes below the site do not contain fish⁴, but Brook Trout can be found in sections of the streams on lower slopes near Highway 4 (R. Vacheresse, James River, pers. comm. 2013); and in lower sections of the streams where flow is more consistent through the year, presumably both Brook Trout and juvenile Atlantic Salmon could occur. The James River/West River watershed is an important spawning and juvenile nursery area for salmonids, including Atlantic Salmon. The upper reaches of James River and West River contain some of the highest densities of juvenile Atlantic Salmon in Atlantic Canada (C. MacInnis, ret'd DFO Biologist, Antigonish, pers. comm. 2013). Adults can occur in James River up to the reservoir, and juveniles (but not adults) have been observed in the western branch of the river, which runs north of the project site. Other species likely to occur in downstream areas include Brown and Speckled Trout, White Sucker, American Eel, Gaspereau (a run into tributaries of James River near the railway crossing can occur periodically when flows are particularly high), and Yellow Perch⁵ (C. MacInnis, ret'd DFO Biologist, pers. comm. 2013; N. MacInnis, DFO Fisheries Officer, Antigonish, pers. comm. 2013). Federally-listed Striped Bass is known to occur in the Southern Gulf of St. Lawrence, and possibly could stray into West River, but does not spawn there (COSEWIC 2004).

4. None were observed during the survey and minnow traps were set overnight in the lower settling ponds. Generally slopes are steep and the streams have a highly intermittent flow, typically going dry in summer, precluding the occurrence of fish at the site. Fisheries and Oceans Canada also concluded that streams on the upper slopes in the vicinity of the quarry were not suitable as fish habitat (C. MacInnis, ret'd DFO Biologist, pers. comm. 2013).

4.2.8 REPTILES AND AMPHIBIANS

Most of the common Nova Scotian amphibian and reptile species are expected to occur at the site. Species heard or seen during site visits were generally common ones including: Spring Peeper, Wood Frog, Green Frog, Leopard Frog, American Toad, and Maritime Garter Snake. The habitat at the site lacks open and running water and therefore is not suitable for many of the species but seasonal flows in ditches and standing water in pools and swamp areas would provide good breeding habitat for some. Federally-listed Wood Turtle and COSEWIC-listed Snapping Turtle have been observed within a 10 km radius of the project site (ACCDC, 2013) but the preferred habitat is more likely to be in the lowland streams and ponds associated with James and West Rivers. The site location is not in the expected range of the Four-toed Salamander, and the habitat observed was also not suitable for the species.

4.2.9 SPECIES AT RISK

Species at Risk are those plants or animals whose existence is threatened or which are in danger of being threatened, by human activities or natural events. The Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC) presently recommends species to be listed under the federal *Species at Risk Act*, and species are also listed at the provincial level. Nova Scotia maintains a list of endangered species under the *Endangered Species Act*.

Various species at risk, both plant and animal, can occur in the general area of the James River Quarry, but were not found at the project site during field surveys, including the spring and fall botanical survey (Appendix B). Within a 100 km radius of the study site there are 1277 documented occurrences (database records) of vascular plants (248 species), 40 records of non-vascular flora (18 species), 4150 records of vertebrate animal species (104 species) and 216 records of invertebrate taxa (49 species) (ACCDC, 2013) (Appendix C). Within 10 km of the study site, there is one record of a provincial red status plant species (Hayden's Sedge), as well as records of fifteen federally-listed species at risk—Chimney Swift, Common Nighthawk, Whip-poor-will, Piping Plover, Barn Swallow, Bobolink, Rusty Blackbird, Canada Warbler, Wood Thrush, Olive-sided Flycatcher, Eastern Wood-Pewee, Snapping Turtle, Wood Turtle, Striped Bass and Brook Floater (ACCDC, 2013)(Tables 5 & 6). In addition, four provincial red status plants species (Wild Leek, Tinged Sedge, Woolly Beach-heath & Longleaf Pondweed); twelve bird species of concern (Long-eared Owl, Northern Goshawk, Common Loon, Rusty Blackbird, Common Nighthawk, Chimney Swift, Olive-sided Flycatcher, Barn Swallow, Gray Jay, Boreal Chickadee, Canada Warbler and Bobolink); and several species of bats (Little Brown Bat & Northern Long-eared Bat) have also been reported within the general project area (S. Weseloh-McKeane, Coordinator, Special Places, pers. comm. 2013) (Table 5).

5 Yellow Perch occur in Josephs and Cameron Lakes in the upper watershed of West River.

Of the federally-listed species at risk, none are likely to commonly occur or breed in the proposed quarry development area, based on the absence of suitable habitat. Chimney Swift require tree cavities for nesting, neither of which were available due to the extensive logging at the site; the dense relative immaturity of the forest regrowth; and logging debris left in the clearcut areas would not be suitable for Common Nighthawk, but the species could nest on spoil piles around the fringe of the site [however this is unlikely due to the overall low abundance of the species]. No habitat is available at the site for Bobolink (requiring open fields), Rusty Blackbird (wetlands around lake edges, bogs, swamps and edges of fens); Piping Plover (requiring beaches); Barn Swallow (requiring buildings and structures); Wood Thrush (requiring expanses of mature mixed forest); and Canada Warbler (which requires undisturbed areas of deep sphagnum moss development along swamp margins). Olive-sided Flycatcher prefers sparse natural forest stands which are not present at the site; while the Eastern Wood-Pee-wee and Whip-poor-will requires natural mature forest stands. Snapping Turtle, Wood Turtle, Striped Bass and Eastern Floater are associated with rivers and/or lakes and ponds and wouldn't be found at the site. Characteristics of federally listed species at risk observed within 10 km of the quarry are summarized in Table 6. The Provincially red status Hayden's Sedge (*Carex haydenii*) is unlikely to occur because habitats at the project site are not typical for the species—it requires moist locations along streams, wet meadows and river bottoms. Of the Provincially red status species which have been reported in the general area, the plants all require wetlands or beach edges, which are not found at the site, and the cutover forest at the site is not ideal habitat for the bird species. The Little Brown Bat, Long-eared Bat and Eastern Pipistrelle need caves, tree cavities or buildings to roosting and hibernation, none of which are available at the quarry site.

Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013).

Scientific Name	Common Name	General Status of Wild	ACDC ³ Rankings (GRANK, SRANK, NPROT) ⁴
		Species Rankings National (numerical) ¹ & Nova Scotia (color) ²	
PLANTS			
<i>Allium tricoccum</i>	Ramp (Wild Leek)	2, red	G5, S1, -
<i>Bidens hyperborea</i>	Estuary Beggarticks	2, yellow	G4, S1, -
<i>Campanula aparinoides</i>	Marsh Bellflower	4 (3), yellow	G5, S3, -
<i>Carex tinctoria</i>	Tinged Sedge	2, red	G4G5, S1, -
<i>Eleocharis flavescens</i>	Yellow Spikerush	3, yellow	G5, S2S3, -
<i>Erigeron hyssopifolius</i>	Hyssopleaf fleabane	3, yellow	G5, S3, -
<i>Fraxinus nigra</i>	Black Ash	3, yellow	G5, S2S3, -
<i>Hudsonia tomentosa</i>	Woolly Beach-heath	2, red	G5, S3, -
<i>Lilium canadense</i>	Canada Lily	4 (3), yellow	G5, S2S3, -
<i>Potamogeton nodosus</i>	Longleaf Pondweed	2, red	G5, S1, -
<i>Potamogeton obtusifolia</i>	Blunt-leaved Pondweed	4 (3), yellow	G5, S2S3, -
<i>Teucrium canadense</i>	Canada Germander	3, yellow	G5, S3, -

Table 5. Provincially listed species of concern with potential to occur in the vicinity of the project site. Nova Scotia Museum records (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013).

Scientific Name	Common Name	General Status of Wild Species Rankings National (numerical) ¹ & Nova Scotia (color) ²	ACCDC ³ Rankings (GRANK, SRANK, NPROT) ⁴
<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed	3, yellow	G5, S2, -
BIRDS			
<i>Asio otus</i>	Long-eared Owl	2, yellow	G5, S2, -
<i>Accipiter gentilis</i>	Northern Goshawk	4, yellow	G5, S3S4, NAR
<i>Chaetura pelagica</i>	Chimney Swift	1, yellow	G5, S2S3B, Threatened
<i>Charadrius melodus</i>	Piping Plover	1, red	G3TNR, S1B, Endangered
<i>Chordeiles minor</i>	Common Nighthawk	1, yellow	G5, S3B, Threatened
<i>Contopus borealis</i>	Olive-sided Flycatcher	1, yellow	G4, S3B, Threatened
<i>Dolichonyx oryzivorus</i>	Bobolink	4 (3), yellow	G5, S3S4B, Threatened
<i>Gavia immer</i>	Common Loon	2, yellow	G5, S3B/ S4N, NAR
<i>Euphagus carolinus</i>	Rusty Blackbird	2, yellow	G4, S2S3B, Special Concern
<i>Hirundo rustica</i>	Barn Swallow	3, yellow	G5, S3B, Threatened
<i>Parus hudsonicus</i>	Boreal Chickadee	4 (3), yellow	G5, S3, -
<i>Perisoreus canadensis</i>	Gray Jay	3, yellow	G5, S3S4, -
OTHER			
<i>Myotis lucifugus</i>	Little Brown Bat*	3, yellow	G5, S1, Endangered
<i>Myotis septentrionalis</i>	Northern Long-eared Bat*	3, yellow	G4, S1, Endangered
<p>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.</p> <p>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 be 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 unpredictably, outside their usual range.</p> <p>3. Atlantic Canada Conservation Data Centre (ACCDC).</p> <p>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.</p> <p>* Records of species in the general area.</p>			

Table 6. Records of species of concern within a 10 km radius of James River 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 (color) ¹	National (numerical) ²	
Plants					
Asteraceae	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	Yellow	4 (3)	G5, S3, -
	<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	Yellow	4 (3)	G5, S2, -
Campanulaceae	<i>Campanula aparinoides</i>	Marsh Bellflower	Yellow	4 (3)	G5, S3, -
Caprifoliaceae	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed	Yellow	4 (3)	G5, S2, -
Cyperaceae	<i>Carex haydenii</i>	Hayden's Sedge	Red	4 (2)	G5, S1, -
	<i>Carex pensylvanica</i>	Pennsylvania Sedge	Undetermined	4 (5)	G5, S1S2, -
	<i>Cyperus lupulinus ssp. macilentus</i>	Hop Flatsedge	Extirpated	-	G5T5?, S1, -
	<i>Eleocharis olivacea</i>	Yellow Spikerush	Yellow	-	G5, S2S3, -
Haloragaceae	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil	Yellow	4 (3)	G5, S2, -
Liliaceae	<i>Lilium canadense</i>	Canada Lily	Yellow	4 (3)	G5, S2S3, -
Oleaceae	<i>Fraxinus nigra</i>	Black Ash	Yellow	4 (3)	G5, S2S3, -
Orchidaceae	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Yellow	4 (3)	G5, S2S3
	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid	Green	4	G5, S3, -
Papaveraceae	<i>Sanguinaria canadensis</i>	Bloodroot	Green	4	G5, S3S4, -
Poaceae	<i>Alopecurus aequalis</i>	Short-awned Foxtail	Yellow	4 (3)	G5, S2S3, -
Potamogetonaceae	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	Yellow	4 (3)	G5, S2S3, -
	<i>Potamogeton praelongus</i>	White-stemmed Pondweed	Undetermined	4 (3)	G5, S3?, -
Rosaceae	<i>Crataegus submollis</i>	Quebec Hawthorn	Undetermined	4 (5)	G5, S1?, -
Animals-Birds					
Accipitridae	<i>Accipiter gentilis</i>	Northern Goshawk	Yellow	4	G5, S3S4, NAR
Anatidae	<i>Anas discors</i>	Blue-winged Teal	Green	4 (2)	G5, S3B, -
	<i>Bucephala clangula</i>	Common Goldeneye	Green	4	G5, S2B/ S5N, -
	<i>Mergus serrator</i>	Red-breasted Merganser	Green	4	G5, S3B, S5N, -
Apodidae	<i>Chaetura pelagica</i>	Chimney Swift	Yellow	1	G5, S2S3B, T
Ardeidae	<i>Botaurus lentiginosus</i>	American Bittern	Green	4 (3)	G4, S3S4B, -
Caprimulgidae	<i>Chordeiles minor</i>	Common Nighthawk	Yellow	1	G5, S3B, T

Table 6. Records of species of concern within a 10 km radius of James River 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 (color) ¹	National (numerical) ²		
	<i>Caprimulgus vociferus</i>	Whip-poor-will	Green	1	G5, S1?B, T
Cardinalidae	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	Green	4 (3)	G5, S3S4B, -
	<i>Piranga olivacea</i>	Scarlet Tanager	Green	4 (5)	G5, S2B, -
Charadriidae	<i>Charadrius vociferus</i>	Killdeer	Green	4 (3)	G5, S3S4B, -
	<i>Charadrius melodus</i>	Piping Plover	Red	1	G3TNR, S1B, E
Corvidae	<i>Perisoreus canadensis</i>	Gray Jay	Yellow	4 (3)	G5, S3S4, -
Cuculidae	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	Green	4 (2)	G5, S3?B, -
Emberizidae	<i>Passerella iliaca</i>	Fox Sparrow	Green	4	G5, S3S4B, -
	<i>Pooecetes gramineus</i>	Vesper Sparrow	Yellow	4 (2)	G5, S2S3B, -
Fringillidae	<i>Carduelis pinus</i>	Pine Siskin	Green	4	G5, S3S4B/ S5N, -
	<i>Pinicola enucleator</i>	Pine Grosbeak	Green	4 (2)	G5, S3?B/ S5N, -
Gaviidae	<i>Gavia immer</i>	Common Loon	Yellow	4 (2)	G5, S3B/ S4N, NAR
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	Yellow	4 (3)	G5, S3B, T
	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	Green	4 (2)	G5, S3B, -
	<i>Riparia riparia</i>	Bank Swallow	Green	4 (2)	G5, S3B, -
Icteridae	<i>Dolichonyx oryzivorus</i>	Bobolink	Yellow	4 (3)	G5, S3S4B, T
	<i>Euphagus carolinus</i>	Rusty Blackbird	Yellow	3 (2)	G4, S2S3B, SC
	<i>Icterus galbula</i>	Baltimore Oriole	Green	4 (2)	G5, S2S3B, -
	<i>Molothrus ater</i>	Brown-headed Cowbird	Green	4	G5, S2S3B, -
Laridae	<i>Sterna paradisaea</i>	Arctic Tern		4 (2)	G5, S3B, -
Mimidae	<i>Dumetella carolinensis</i>	Gray Catbird	Green	4 (2)	G5, S3B, -
	<i>Mimus polyglottos</i>	Northern Mockingbird	Green	4	G5, S3B, -
Paridae	<i>Poecile hudsonica</i>	Boreal Chickadee	Yellow	4 (3)	G5, S3, -
Parulidae	<i>Dendroica castanea</i>	Bay-breasted Warbler	Green	4 (3)	G5, S3S4B, -
	<i>Dendroica tigrina</i>	Cape May Warbler	Green	4 (3)	G5, S3?B, -
	<i>Vermivora peregrina</i>	Tennessee Warbler	Green	4 (3)	G5, S3S4B, -
	<i>Wilsonia canadensis</i>	Canada Warbler	Yellow	1	G5, S3B, T
	<i>Wilsonia pusilla</i>	Wilson's Warbler	Green	4 (3)	G5, S3S4B, -
Picidae	<i>Picoides arcticus</i>	Black-backed Woodpecker	Green	4 (3)	G5, S3S4, -
Podicipedidae	<i>Podilymbus podiceps</i>	Pied-billed Grebe	Green	4 (3)	G5, S3B, -
Rallidae	<i>Rallus limicola</i>	Virginia Rail	Green	4 (5)	G5, S2B, -
Scolopacidae	<i>Actitis macularius</i>	Spotted Sandpiper	Green	4 (3)	G5, S3S4B, -

Table 6. Records of species of concern within a 10 km radius of James River 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 (color) ¹	National (numerical) ²	
	<i>Gallinago delicata</i>	Wilson's Snipe	Green	4 (3)	G5, S3S4B, -
	<i>Tringa semipalmata</i>	Willet	Green	4 (2)	G5, S2S3B, -
Sternidae	<i>Sterna hirundo</i>	Common Tern	Yellow	4 (3)	G5, S3B, NAR
Turdidae	<i>Hylocichla mustelina</i>	Wood Thrush	Green	4 (5)	G5, S1B, T
Tyrannidae	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Yellow	1	G4, S3B, T
	<i>Contopus virens</i>	Eastern Wood-Pewee	Green	4 (3)	G5, S3S4B, SC
	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	Green	4 (3)	G5, S3S4B, -
	<i>Sayornis phoebe</i>	Eastern Phoebe	Green	4 (3)	G5, S3S4B, -
	<i>Tyrannus tyrannus</i>	Eastern Kingbird	Green	4 (3)	G5, S3S4B, -
Vireonidae	<i>Vireo gilvus</i>	Warbling Vireo	Green	4 (5)	G5, S1?B, -
	<i>Vireo philadelphicus</i>	Philadelphia Vireo	Green	4 (5)	G5, S2?B, -
Animals-Dragonflies & Damselflies					
Gomphidae	<i>Lanthus parvulus</i>	Northern Pygmy Clubtail	Yellow	4	G4, S3, -
	<i>Ophiogomphus mainensis</i>	Maine Snaketail	Red	4 (2)	G4, S1, -
Animals-Butterflies					
Hesperiidae	<i>Hesperia comma</i>	Common Branded Skipper	Green	4	G5, S3, -
	<i>Hesperia comma laurentina</i>	Laurentian Skipper	Green	-	G5T5, S3, -
Other					
Chelydridae	<i>Chelydra serpentina</i>	Snapping Turtle	Green	4	G5, S5, SC
Cervidae	<i>Alces alces</i>	Moose	Red	4 (1)	G5, S1, -
Emydidae	<i>Glyptemys insculpta</i>	Wood Turtle	Yellow	1 (3)	G4, S3, T
Felidae	<i>Puma concolor pop. 1</i>	Cougar - Eastern pop.	Undetermined	4 (5)	G5THQ, SH, DD
Moronidae	<i>Morone saxatilis</i>	Striped Bass	Red	1	G5, S1, E,E, SC
Salmonidae	<i>Salmo salar</i>	Atlantic Salmon	Red	4 (2)	G5, S2, -
Unionidae	<i>Alasmidonta varicosa</i>	Brook Floater	Yellow	3	G3, S1S2, SC
	<i>Lampsilis radiata</i>	Eastern Lampmussel	Green	3	G5, S2, -

1. NS General Status of Wild Species Ranks: Blue (Extinct/Extirpated)=No longer in Nova Scotia or extinct in the wild; Red=Known to be or thought to be at risk; Yellow=Sensitive to human activities or natural events; Green=Not to be 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 unpredictably, outside their usual range.

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

3. Atlantic Canada Conservation Data Centre (ACCDC).

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

G1 **Critically Imperiled**—At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.

G2 **Imperiled**—At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or

Table 6. Records of species of concern within a 10 km radius of James River 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 (color) ¹	National (numerical) ²	
	other factors.			
G3	Vulnerable —At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.			
G4	Apparently Secure —At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.			
G5	Secure —At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.			
GU	Unrankable —Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.			
GNR	Unranked —Global rank not yet assessed.			
G#G#	Range Rank —A numeric range rank (e.g., G2G3, G1G3) is used to indicate the range of uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).			
Q	Questionable taxonomy that may reduce conservation priority —Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The “Q” modifier is only used at a global level and not at a national or subnational level.			
C	Captive or Cultivated Only —Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The “C” modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to “Extinct” in the Wild (EW) in IUCN’s Red List terminology (IUCN 2001).			
T	Infraspecific Taxon (trinomial) —The status of infraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species’ global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species. For example, a G1T2 subrank should not occur. A vertebrate animal population, (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T-rank; in such cases a Q is used after the T-rank to denote the taxon’s informal taxonomic status.			
SRANK. Sub-National (Provincial) Rarity Ranks				
S1	Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.			
S2	Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.			
S3	Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations (21 to 100 occurrences).			
S4	Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).			
S5	Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.			
S#S#	Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).			
SH	Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having 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)			

Table 6. Records of species of concern within a 10 km radius of James River Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, April 2013.				
Family/Scientific Name	Common Name	Rank		ACCDC ³ Rankings (GRANK, SRANK, NPROT) ⁴
		General Status of Wild Species Rankings		
		Provincial (color) ¹	National (numerical) ²	
	recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.			
SE	Exotic: An exotic established in the province (e.g., Purple Loosestrife or Coltsfoot); may be native in nearby regions.			
SE#	Exotic numeric: An exotic established in the province that has been assigned a numeric rank.			
SP	Potential: Potential that Element occurs in the province, but no occurrences reported.			
SR	Reported: Element reported in the province but without persuasive documentation, which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.			
SRF	Reported falsely: Element erroneously reported in the province and the error has persisted in the literature.			
SZ	Zero occurrences: Not of practical conservation concern in the province, because there are no definable occurrences, although the species is native and appears regularly. An NZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.			
<u>NPROT, National conservation status of species, as designated by COSEWIC.</u>				
Extinct (X) – A wildlife species that no longer exists.				
Extirpated (XT)- A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.				
Endangered (E)- A wildlife species facing imminent extirpation or extinction.				
Threatened (T)- A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.				
Special Concern (SC)- A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.				
Data Deficient (DD)- A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.				
Not At Risk (NAR)- A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.				

Table 7. Characteristics of federally-listed plant and animal species occurring within 10 km of James River quarry.	
Species	Description
Striped Bass (<i>Morone saxatilis</i>)	Striped Bass (<i>Morone saxatilis</i>) is an anadromous fish that formerly spawned in rivers flowing into Northumberland Strait, as well as occurring widely in the Gulf of St. Lawrence and the Atlantic Coast of Nova Scotia, New Brunswick, the Bay of Fundy and eastern and northern coast of the United States. At present only the population in the Shubenacadie River and Miramichi River are sustaining themselves.
Brook Floater (<i>Alasmidonta varicosa</i>)	Brook Floater is a medium-sized freshwater mussel that lives in the bottom of freshwater streams and rivers and in Canada is confined to 15 widely scattered watersheds in Nova Scotia and New Brunswick. The species represents typically only 1-5% of the total freshwater mussel fauna at a given site. It is endangered chiefly because few populations remain elsewhere in its range, which includes the eastern US, largely through human impacts on the population.
Chimney Swift (<i>Chaetura pelagica</i>)	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.
Whip-poor-will (<i>Antrostomus vociferous</i>)	Whip-poor-will is a swallow-like woodland bird, known for its soft and distinct call which mimics its name. The species feeds on insects at night, which it locates while flying high in the atmosphere. Whip-poor-will is at the northern limit of its range in Eastern Canada, and occurs in Nova Scotia, but has shown significant declines in recent years both here and throughout its range. Like other aerial foraging insectivores, habitat loss and degradation as well as changes to the insect prey base are likely factors in its population decline.
Common Nighthawk (<i>Chordeiles minor</i>)	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 <i>threatened</i> species due to declining numbers from reforestation, agricultural use and forest fire suppression.
Piping Plover	Piping Plover is a small shorebird that nests on marine and freshwater shorelines, occurring in the general vicinity of

Species	Description
(<i>Charadrius melodus melodus</i>)	Antigonish on gravelly-sandy beaches of the exposed Northumberland Strait and Georges Bay shores. The species usually nests above the normal high-water mark, breeding first in the April-May period and leaving by the end of July, but some plovers from a second nesting may occur until late August. In only rare cases are the young flightless plovers likely to be present in beach areas in August, from nesting in early July. They are federally listed as an <i>endangered</i> species at risk largely due to declines in population from habitat loss. Human disturbance, predators such as gulls, crows, foxes etc. and sea level rise are their main threats.
Wood Thrush (<i>Hylocichla mustelina</i>)	Wood Thrush is a forest-nesting songbird species which has shown significant long and short-term declines in population abundance. Various factors in the declines have been implicated, including habitat loss on its wintering grounds; habitat fragmentation and degradation in its preferred broadleaf forest habitat; and predation and parasitism by cowbirds. The species is on the northern limit of its range in Nova Scotia. Wood Thrush feeds on insects in the forest litter.
Barn Swallow (<i>Hirundo rustica</i>)	Barn Swallows are listed by COSEWIC as a <i>threatened</i> 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).
Bobolink (<i>Dolichonyx oryzivorus</i>)	Bobolink is a medium-sized grassland bird which breeds in Canada and is listed by COSEWIC as a <i>threatened</i> 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 (<i>Euphagus carolinus</i>)	Rusty Blackbird is federally listed as a <i>species of concern</i> 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.
Eastern Wood-Pee-wee (<i>Cantopus virens</i>)	Eastern Wood-Pee-wee 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.
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	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 <i>threatened</i> 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.
Canada Warbler (<i>Cardellina canadensis</i>)	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 <i>threatened</i> species under the Species at Risk Act.
Snapping Turtle (<i>Chelydra serpentina</i>)	Snapping Turtle is federally listed as a <i>species of special concern</i> 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.
Wood Turtle (<i>Glyptemys insculpta</i>)	Wood Turtle is federally listed as a <i>threatened</i> 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 (<i>Myotis lucifugus</i>), Northern Long-eared Bat (<i>Myotis septentrionalis</i>) and Eastern Pipistrelle (<i>Perimyotis subflavus</i>)	These species have recently been placed on an emergency COSEWIC listing as <i>endangered</i> 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 Pictou Antigonish Highlands are included in territory traditionally occupied by the Mi'Kmaq. Mi'Kmaq would have used all areas in the highlands to some degree, although upland areas such as occupied by James River Quarry would have had less use, and now have a lower potential for archaeological resources than lowland areas, which would have a medium to high potential⁶. Mi'Kmaq are likely to participate in the same activities in the study area as the general population of Antigonish County, including recreational use, hunting and fishing, collecting edible plants, but in addition gathering of ceremonial foods, etc. Mi'Kmaq fish for Atlantic Salmon in James River, particularly near the railway crossing and downstream of Highway 104, in October-November (C. MacInnis ret'd DFO Biologist, pers. comm. 2013). No Mi'Kmaq communities are near the site, the nearest being communities east of Antigonish and to the west in eastern Pictou County. Antigonish County communities are in Paq'tnek First Nation (Pomquet and Afton, and Summerside, located near Pomquet east of Antigonish); and communities of Pictou Landing First Nation (Boat Harbour, Fisher's Grant and Mergomish Harbour) in the Pictou/New Glasgow area of Pictou County.

Two tribal councils exist in Nova Scotia: the Confederacy of Mainland Mi'kmaq (CMM) and Union of Nova Scotia Indians (UNSI). CMM is a not-for-profit organization that was incorporated in 1986, and their mission is to promote and assist Mi'kmaq communities. The UNSI, created in 1969, was formed to provide a cohesive political voice for Mi'kmaq people. Both Pictou Landing First Nation and Paq'tnek First Nation are members of CMM. The Native Council of Nova Scotia (NCNS) represents Mi'kmaq people living off-reserve. The NCNS is a self-governing agency located in Truro. Statistics Canada estimated that in 2006 approximately 48% of the Mi'kmaq populations lived off-reserve. The goal of NCNS is "to operate and administer a strong and effective Aboriginal Peoples Representative Organization that serves, advocates and represents our community."

The Mi'kmaq Rights Initiative (Kwilmu'kw Maw-klusuaqn; KMK) also represents Mi'kmaq. The mission of KMK—whose name means, "we are seeking consensus."— is "to address the historic and current imbalances in the relationship between Mi'kmaq and non-Mi'kmaq people in Nova Scotia and secure the basis for an improved quality of Mi'kmaq life." The initiative is to negotiate between the Mi'kmaq of Nova Scotia, the province and the Government of Canada. KMK's main office is located in Millbrook. The Atlantic First Nations Environmental Network (AFNEN) is an environmental organization of Mi'kmaq communities and organizations to which both CMM and UNSI belong. The AFNEN includes a representative from each Mi'kmaq organization and community interested in environmental issues. The Network meets regularly during the year through meetings, conferences, and the Internet to discuss environmental matters or concerns.

⁶ Davis Archaeological Consultants Ltd, Archaeological Resource Impact Assessment for the Glen Dhu Wind Farm, 2008.

A Mi'Kmaq food fishery for Atlantic Salmon and trout is observed on the James and West Rivers near the quarry site. Otherwise no Mi'Kmaq ceremonial or cultural uses have been identified for the James River Quarry site or vicinity, nor is the area known to be used for other purposes, based on the background review and previous cultural reviews for other environmental assessments in the area, the archaeological resources survey of the site (CRM 2013), and the Nova Scotia Museum database search (S. Weseloh-Mckeane, Coordinator, Special Places, pers. comm. 2013).

4.3.2 WATER SUPPLY AREAS

The site is south of a Protected Water supply area for the Town of Antigonish Water Supply Reservoir, which is northeast of the site (K. Proctor, Town of Antigonish, pers. comm. 2013). None of the surface water runoff from the quarry site enters the Town of Antigonish water supply area.

4.3.3 LAND USE

In addition to the quarry, land on the uplands in the vicinity is primarily forest resource, with two telecommunications towers and associated grounds on the northwest edge; and livestock and dairy farms occupying the lower slopes adjacent to Highway 4 (Map A-4). The main road accessing the property (Leslie Road) continues northwest to meet Browns Mountain Road which is a forest road/hiking trail originating as the Strathglass Road at Marshy Hope and leading inland to Browns Mountain. Hunting, recreational vehicle use (ATVs and snowmobiles) and motorcycles are main recreational uses of the site. Much of the Crown Land in the area is leased to forestry companies which are harvesting on a moderate rotation. A large section of the lands on Browns Mountain-Eigg Mountain have been set aside as a wilderness area, the Eigg Mountain-James River Wilderness Area, under the provincial Wilderness Protection Act. A large portion of the James River watershed north of the site is set aside as a Protected Watershed Area for the Town of Antigonish water supply (K. Proctor, Town of Antigonish, pers. comm. 2013).

4.3.4 FORESTRY

Most of the land in the Pictou-Antigonish Highlands to the north of the project location is Crown Land under license to or forestry companies, and is in various stages of regeneration from previous harvesting. No old growth stands occur within 13 km of the site. Parts of the land to the north of the site are included in the Eigg Mountain-James River Wilderness area, which contains approximately 4,150 ha, about half of the forest land in the area, which will not be harvested in future.

4.3.5 HUNTING AND TRAPPING

The quarry site is expected to support wildlife species characteristic of Antigonish County, with a tendency for some of the more uncommon species to occur due to the remoteness and proximity to the protected forest areas to the north. Predominant upland species reported in trapping catch for Antigonish County likely occur near the project including mink, bobcat, fox, racoon, skunk, squirrel, weasel, coyote

and fisher (www.novascotia.ca/natr/hunt/uplandgame-stats.asp#abundance). Antigonish County reported the third highest catch provincially in terms of mink and red fox in the 2011-2012 period. The area supports white-tail deer although the County reported a below median white-tail deer harvest in the 2003-2012 period and only about 3% of total provincial harvest in 2012. An important deer wintering area has been identified to the northeast of the quarry site, bordered on the west by James River (Figure 17, NS Significant Habitats Database, [www. http://gov.ns.ca/nse/protectedareas/docs/GullyLakeEigg/EMJR_Base_map.pdf](http://gov.ns.ca/nse/protectedareas/docs/GullyLakeEigg/EMJR_Base_map.pdf)). Of upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant) only the former two are harvested but Antigonish County has a comparatively low rank with only 3% of total harvest in the 2010-2012 periods. Antigonish County Black Bear harvest is expected to follow the increasing trend occurring recently in the Province.

4.3.6 RECREATIONAL & MI'KMAQ FISHING

No recreational fishing takes place on the site but the lower reaches of some of the watercourses that originate outside the quarry property support brook trout which can be fished by locals. The streams are dry for parts of the year during which fishing does not take place. West River and James River are important for recreational fishing, with species including Brook Trout, Brown Trout, and Atlantic Salmon. Mi'Kmaq fish for Atlantic Salmon in James River, particularly near the railway bridge and downstream of Highway 104, in October-November (C. MacInnis ret'd DFO Biologist, pers. comm. 2013). James River extending from the dam to the junction with West River is fished for brown trout at night from April 15 to August 31 (NS Anglers Handbook 2013). West River is a special trout management area with a regulated fishery.

4.3.7 ARCHAEOLOGICAL 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, pers. comm. 2013). The James River area was the site of a major thrust of settlement in Nova Scotia, and some of the farms in the area date back to earlier times and may have more recent historical significance. The Glen Bard Cemetery, located about 2 km southwest of the quarry on Highway 4, is significant for its use by early and prominent settlers. The old Glen Bard United Church at the site was demolished about a decade ago, but the Bethel Presbyterian Church built in 1929 is still maintained under the management of the First Presbyterian Church New Glasgow. It is open for services from July 1 – Labour Day, and is under the pastoral charge of Barney's River Presbyterian Church in Kenzieville (Rev. G. Matheson, First Presbyterian Church, pers. comm. 2013).

4.3.8 PARKS AND PROTECTED AREAS

No significant habitats listed in the NSDNR Significant Habitats Database occur in the immediate vicinity of the site; and there are four designated parks & protected areas in the surrounding area: Eigg Mountain Wilderness Area & James River Protected Water Area, both north of the project site and protected under provincial acts (NS Wilderness Protection Act & NS Environment Act, respectively); and Beaver

Mountain Provincial park, southwest of the project area, day-use parks for picnicking and hiking (ACCDC, 2013). A day-use park formerly existed along Highway 4 west of the site, but was cut off by the construction of Highway 4 and closed, later replaced by the Beaver Mountain Provincial Park. Also, NS Department of Natural Resources has identified a deer wintering area immediately east of the study site, which borders James River (Figure 17).

Eigg Mountain Wilderness Area—Designated from Crown Lands under the NS Wilderness Protection Act in March 2005 The wilderness area extends 4,150 ha. It includes the headwaters of James River which is the water supply of the Town of Antigonish (K. Proctor, Town of Antigonish, pers. comm. 2013). The area includes forest which has previously been logged as well as forest under management.

James River Protected Water Area—The James River Watershed is regulated under the NS Environment Act and serves as the Town of Antigonish primary drinking water supply. The reservoir and dam for the supply are located in the southeast corner of the water supply area, and includes crown lands as well as portions of the Eigg Mountain Wilderness Area (Figure 17).

James River Deer Wintering Area—Wintering areas are locations, typically with good forest cover and browse, located on south-facing slopes, where White-tailed Deer have been known to congregate naturally. Forest practices in the area follow guidelines to ensure adequate conditions for the species are maintained.

Beaver Mountain Provincial Park—Beaver Mountain is a 133 ha, day-use park in the Nova Scotia Provincial Park system. The Park is wheelchair accessible offering a 1-1.6 km paved loop of trails, picnic areas and an interpretive area and signage. The upland on which the quarry is located is visible from the park; however, the quarry, which is on the top, and access roads are not.

4.3.9 RECREATIONAL/CULTURAL FEATURES

The site is relatively inaccessible and there are no recreational facilities or recreational/cultural activities carried out in the immediate vicinity of the site. Logging trails are used locally for ATVs and the access road connects with hiking trails (e.g. the Browns Mountain trail north of Marshy Hope), and with trail and snowmobile networks in the protected lands (Eigg Mountain Wilderness Area and Antigonish Protected Watershed area to the north). A notable waterfall (James River Falls) is located on the river where it crosses the Browns Mountain trail about 4.5 km north of the quarry, and is a destination for hikers. Hunting by locals likely takes place on lands adjacent to the quarry.

Glen Bard Cemetery, James River—Along the Highway 4 (“Old Highway”) west of the quarry, the Glen Bard Cemetery is a Designated Provincial Heritage Property: burial place of Bard MacLean, a famous Gaelic poet. Glen Bard United Church and cemetery, located about 1.5 km southwest of the quarry, were established in 1848; the Church was dismantled about a decade ago but the cemetery is maintained and is

used by the Bethel Presbyterian Church located not far to the west (Rev. G. Matheson, First Presbyterian Church, pers. comm. 2013).

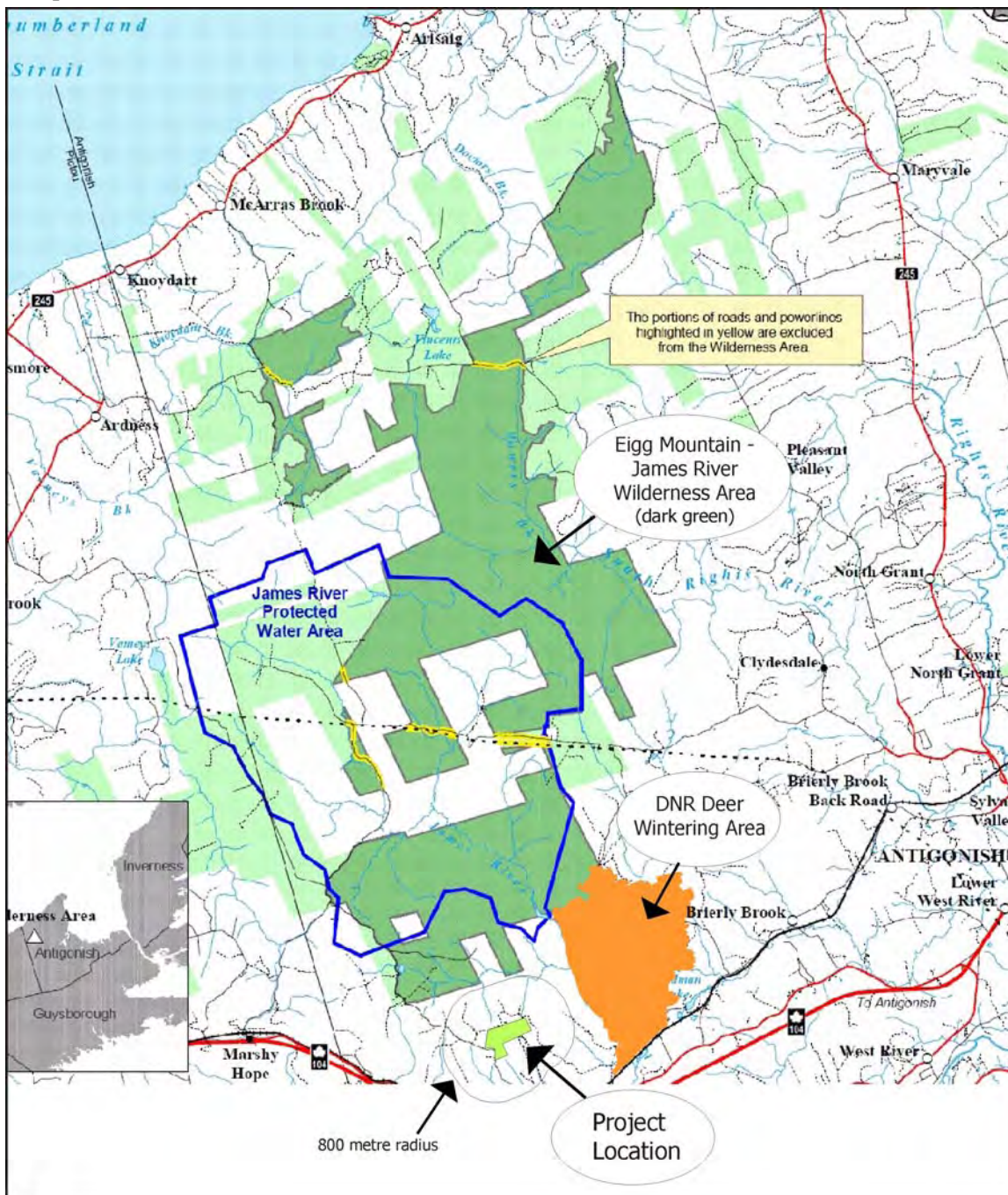


Figure 17. Protected and significant wildlife areas in the vicinity of the James River Quarry include: the Eigg Mountain-James River Wilderness Area; James River Protected Water Area; and the DNR Deer Wintering Area. Map from NSDNR Protected Areas ([www. http://gov.ns.ca/nse/protectedareas/docs/GullyLakeEgg/EMJR_Base_map.pdf](http://gov.ns.ca/nse/protectedareas/docs/GullyLakeEgg/EMJR_Base_map.pdf))

Riverside International Speedway—Riverside International Speedway is located on the south side of Highway 104 about 2.5 km due south of the quarry site. In 2013 it put on five stock car race events in the June-September period, and has been operated nearly continuously since 1969. The site can support 600

recreational vehicles and during the main race weekends over 1,000 people can be on site. Access to the site from Highway 104 is direct via the Beaver Meadow interchange, which is the same one used by trucks from the quarry site.

Keppock Mountain Ski/Mountain Biking Area—Until the late 1990s, the Keppock Mountain or “The Keppock” was a local downhill ski operation when it proved uneconomic and closed. In recent years mountain bikers began using the area and Recently a non-profit recreational group—Positive Action for Keppock (PAK) have begun developing a trail area and system at the site focused on downhill runs but with a view to including trails for both cross country biking and Nordic skiing⁷, and PAK hosted an opening event in June 2013. Keppock Mountain is located on the uplands south of Highway 104, about 5 km due south of the quarry site, and runs are visible.

4.3.10 RESIDENTIAL/COMMERCIAL/INDUSTRIAL DEVELOPMENT

The land near the James River Quarry has a low population density, with the major landuse in farms and low-density single- and multiple family⁸ dwellings concentrated along Highway 4. The nearest homes/farms—a farm on the lower slope on the west side of Leslie Road; and a single family residence on the east side, which is occupied only seasonally—are about 1 km from the quarry and there are no homes or farm buildings within 800 m of the quarry.

Several quarries operate in the general vicinity of the James River Quarry, including an aggregate quarry on Gravel Pit road and aggregate and gypsum quarries operated by Nova Construction on Brierley Brook Back Road. An inactive sand and gravel pit operation, which formerly operated a cement plant, is located on Highway 4 on the east side of James River (D. MacDonald, James River, pers. comm 2013).

4.3.11 TOURISM AND VIEWSCAPE

The James River Quarry is located on the top of an upland plateau near the maximum elevation for the area as a whole, and as such is only marginally visible from the surroundings. From the top of the overburden piles there is a line of sight to the lands around the Town of Antigonish and the uplands south of Highway 104 including Keppock Mountain, and potentially the quarry could be seen from the higher elevations in the Keppock Mountain area. The access road for the site (Leslie (formerly Tower) Road) is inconspicuous from Highway 4, similar in appearance to typical connector roads.

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*

⁷ <http://www.somegoodadventure.com/general/new-bike-trails-the-keppock/>.

⁸ A 2-unit apartment building is located on Highway 4 opposite the junction with Beaver Meadow/Addington Forks road.

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)⁹, 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 8. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following and are summarized in Table 9.

Table 8. Valued Environmental Components (VECs) for James River Quarry Expansion.	
Biophysical	Socioeconomic
Air Quality & Noise	Mi'Kmaq
Hydrogeology	Archaeological, Cultural and Historical
Hydrology	Recreation, Tourism & Viewscape
Water Quality	Wilderness
Wetlands	Land Use & Value
Aquatic Environments	Residential, Industrial & Agricultural Use
Fish & Fish Habitat	Recreational & Mi'Kmaq Fishing
Flora & Fauna Species & Habitat	Transportation
Species at Risk	Water Supply
	Parks & Protected Areas

6.1 SOCIOECONOMIC IMPACTS

6.1.1 MI'KMAQ

The Mi'Kmaq occupied much of Nova Scotia prior to European contact and the lowlands and rivers such as the West River would have been used by them for habitation hunting and fishing, and as travel routes. In more recent times, treaties made with the British and continued through Canadian law have maintained

⁹ 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.

their rights to fish, and harvest wildlife and forest resources. The site does not have a cultural historical significance for the Mi'Kmaq; no artefacts indicating prehistoric or historical use were identified at the site; and the study area is believed to have low potential for encountering either Native or Euro-Canadian archaeological resources (CRM 2013).

Quarry Operations would interact with Mi'Kmaq use only indirectly if runoff from the site entered the James River, where there is a Mi'Kmaq food fishery; or if presence of the quarry influenced wildlife or game populations or hunting access or routes. The footprint of the proposed quarry expansion is relatively small (a maximum of approximately 17 ha over the lifetime of the quarry) which 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 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. The historic Glen Bard Cemetery located on Highway 4 is not in an area which will experience significant truck traffic originating at the quarry and is sufficiently far from the quarry to be expected to experience only low noise levels for visitors. Consequently the project will not have an impact on cultural/historical/archaeological features.

6.1.3 RECREATIONAL ACTIVITIES

Recreational use of the environment in the vicinity of the site consists principally of hunting, snowmobiling, and use of motorized recreational vehicles. Logging trails are used by local hunters, hikers, and off-road vehicles, and back roads may be used to access trails in the Eigg Mountain James River Wilderness area. A local snowmobile club, the 'Snow Dogs', grooms trails extending into the wilderness north of the site, extending from the telecommunications towers at the site. The volume of users is probably low, restricted to some locals as well as a cross section of hunters, recreational vehicle users which habitually use the area. Recreational users could be impacted if individuals trespassed on the site but this is an extremely unlikely eventuality. However berms and suitable warning signs are in place around the quarry property to prevent accidents.

6.1.4 TOURISM AND VIEWSCAPE

Tourists pass through the area mainly on Highway 104, from which the James River Quarry cannot be seen. At higher elevations, such as the portion of the highlands south of the highway, at Beaver Mountain Provincial Park or Keppock Mountain, the quarry would barely be seen. Truck traffic from the quarry during periods of high utilization would be concentrated principally on Highway 4 and Highway 104 where it would contribute to added traffic and coincide with tourist traffic (which is also highest in the summer which is a peak period for aggregate use from the quarry) and could contribute to congestion (Highway 104 is not twinned at this point).

6.1.5 WILDERNESS

Few places in Nova Scotia are remote and have been untouched by human hands, but those that remain are valued by Nova Scotians, particularly with the Province's rural culture based on historic settlement, land ownership and land use. In addition to its availability for experiences of Nature and isolation from civilization, wilderness offers benefits for protection and preservation of wildlife, contributing to tourism, forming iconic landscape, for example in distinctive features such as the Pictou-Antigonish Highlands, protection and regulation of surface waters, ecosystem services and economic benefits, in particular in relation to watershed protection and management. The Province of Nova Scotia has a policy focused on setting aside a portion of its landmass in the form of wilderness areas. The James River Quarry is on the margin of the Pictou-Antigonish Highlands south of a major set-aside of Crown Lands—the Eigg Mountain-James River Wilderness Area. With the exception of noise generated by the quarry, which will likely only be heard near the southern edge of this protected area, presence of the quarry is unlikely to disrupt any of the wilderness values or activities in the Eigg Mountain-James River Wilderness area. The quarry does not routinely block access to the interior of the wilderness area, and does not contribute areas of undisturbed landscape, being an area which has already been logged and is crossed by logging roads, as well as being adjacent to communications towers and grounds. It is itself in an area which has moderate human use and land development in the form of farms, and the transportation corridor (railway and highways) in the adjacent lowlands, which generate noise. The quarry is not highly visible, as it is on the upland plateau at the site, would not be seen by visitors to the area, and would not interfere with the overall experience of wilderness in the area.

6.1.6 RECREATIONAL FISHING & HUNTING

Freshwater streams and ponds at the foot of the slope near Highway 4 in the vicinity of the quarry are used locally for recreational fishing for trout, and in James River and some lowland tributaries for Atlantic Salmon, including a Mi'Kmaq food fishery. Only the extreme headwaters of the streams originate in the vicinity of the quarry where they do not support nursery areas for these species where the significant slope prevents access. Control measures on sedimentation and prevention of accidental contamination of the upper waters of these streams by the quarry will avoid impacts on the lower areas of the watershed where juveniles occur and the portions of streams even further downstream where these species may be fished. The quarry expansion will not affect recreational or Mi'Kmaq fishing, as changes in hydrology resulting from the quarry are likely to be insignificant. Water quality of the runoff from the Quarry is good for salmonids, including low turbidity and neutral pH, which would tend to maintain the quality of waters downstream for fish.

6.1.7 LAND USE AND VALUE

The land at the site is not of a high quality suitable for cultivation although it can be used for livestock and grazing. Hardwood forests which predominated at the site have historically been logged and much of the upland in the vicinity of the quarry, with the exception of the Eigg Mountain-James River Wilderness

area, will be logged in future. Although local trapping activity was not identified for the site, the area forms potential wildlife habitat for furbearers, as well as for species ungulates such as Whitetail Deer, which are hunted in the area. The footprint of the expanded quarry, which will add approximately 17 ha to the existing footprint, is exceedingly small in relation to the available lands in the area, and therefore would have a small overall impact on forest and wildlife resource use in the area.

6.1.8 TRANSPORTATION

The quarry generates a moderate and variable level of truck traffic on Highways 4 and 104 but is not expected to change the existing traffic volumes significantly. Existing quarries on the Brierly Brook Back Road and Gravel Pit road frequently use Highway 4 as a route (C. MacDonald, Brierly Brook, pers. comm. 2013) so it is possible that higher levels of traffic from multiple quarries could, at times, occur, particularly if there is high demand for aggregate for local projects. There is little local private traffic which will be impacted, and the truck loading will impact the existing roads to some degree. Impacts on road condition are normal, and will have to be considered in the rotation of road repairs in the area.

6.1.9 RESIDENTIAL USE

No occupied permanent residences occur within 800 m of the quarry. The nearest homes are associated with a farm on the lower slope on the west side of Leslie Road; and a single family residence on the east side, which is occupied only seasonally. Blasting at the site will occur infrequently during daylight hours and will be unlikely to disturb owners of residences and farms. 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 occasions when they are undertaken at night, will involve minimal additional lighting and noise, which is unlikely to be a serious disturbance to local residents.

6.1.10 WATER SUPPLY

The Town of Antigonish Protected Watershed Area on the James River watershed is located north of the quarry site. However, the quarry is located on a portion of the watershed which feeds into James River below the dam and reservoir (located northeast of the site) and no runoff from the site would enter the reservoir. Dust from quarry operations, if uncontrolled, could be transported some distance by the wind and could enter the reservoir, particularly in summer when predominant winds are from the southwest and the quarry is most active. The proportion of the time that dust would be an issue, and during which there were significant enough winds to transport dust, is thought to be extremely small, and likely wouldn't impact the reservoir.

6.1.11 INDUSTRIAL/AGRICULTURAL ACTIVITIES

Quarry operations would indirectly impact the activities of competing quarries (aggregate and gypsum) located on the Brierley Road Back Road and on Gravel Pit Road. This is normal in a competitive environment, and it is expected that all the quarries will continue to operate.

6.2 BIOPHYSICAL IMPACTS—IMPACTS OF THE PROJECT ON THE ENVIRONMENT

6.2.1 AIR QUALITY AND NOISE

Various project activities have the potential to generate dust, combustion emissions, and noise. In particular, operation of tree-clearing and grubbing equipment, rock drilling and blasting, as well as onsite routine operations contribute to increased dust and particulate levels. Activities at the quarry including crushing, equipment use, and truck movements, will generate dust and noise (engine noise, back-up alarms etc.) at the quarry as well as along Leslie Road. Dust emissions during the construction phase will be localized and short term, and from the routine operations are expected to be minimal, and dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Any stockpiled topsoil and overburden will be allowed to revegetate naturally. Monitoring of airborne particulate emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines and the Nova Scotia Air Quality Guidelines.

Combustion emissions will be generated from the operation of vehicles and equipment. Given the scope of the planned operations, emissions will be minimal, 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*. Blasting is expected to occur infrequently (1-2 times per year) and will occur only during daylight hours.

6.2.2 HYDROGEOLOGY

Shallow groundwater is expected to discharge to the on-site surface water control structures; where ultimately it would become part of the surface water regime. The deeper bedrock groundwater regime in the general area is used for potable water source. However, a search of the NSE well log database notes that there are no well log records for the subject site or within 1.6 km. of the quarry property. The NSE Well Log data base identifies 34 wells located within 10 km. of the site. The nearest well noted by the database is located at 955 James River Road, approximately 1.6 km. south of the subject property. A drive by “windscreen” survey was completed along Trunk 4 through James River, immediately to the south of the quarry property. This process confirmed that homes with on-site wells were located at a distance of approximately 1.6 km. south of the quarry property. It is also noted that the actual depth of the bedrock water table at the quarry site is not known, however it is known that this water table has not been encountered during historic quarry operations. Given the fact that the quarry expansion is not intended to extend below the deep bedrock water table, it is concluded that this groundwater will not be encountered during future operations.

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

6.2.3 HYDROLOGY

Runoff from the pit surfaces in the quarry will probably increase peak flows slightly in the streams originating around the existing pit, and the quarry expansion will lead to further increases in annual runoff; peak flows resulting from storms and runoff events; as well as reducing the duration of flows during dry periods. Quality of water leaving the site and entering flowage is high, due both to the onsite flow management and the granite base material. Both factors have probably not impacted the quality of the surface waters in downstream areas significantly. Expansion of the quarry will result in further increases in peak flows to the stream; however the overall change will be extremely small due to the small size of the quarry relative to the overall watershed area of the adjoining surface waters and the runoff control measures used at the site.

6.2.4 WATER QUALITY

Water quality downstream of the site is important for fish habitat in the lower watershed. Blasting is not expected to result in changes in groundwater quality, 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. There are no watercourses on site in the vicinity of the proposed expansion for direct transmission of suspended sediments to nearby surface waters, and which potentially could reach downstream areas. 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.

The quarry has onsite sedimentation and flow management, which effectively mitigates release of fines from normal quarrying operations. Release of other contaminants such as oils and lubricants from equipment, as well as contaminants in materials 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 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

There are no permanent streams on the quarry property; and only intermittent flowages drain the south and north sides of the property. Drainage from the present pit flows south through several settling ponds. None of the proposed quarry expansion will be in the vicinity of the flowages and consequently there are

not expected to be impacts. Use of woods trails for heavy equipment should be done with a view to minimizing impact on drainage; and maintenance of a vegetated buffer in areas not proposed for quarry development, are recommended to avoid impacts on water quality.

6.2.6 WETLANDS

The quarry property has few wetlands. Part of one wetland (a 0.6 ha treed swamp) and another small seepage swamp (0.05 ha) may be removed by pit development and avoidance is generally not practical. A treed riparian swamp south of the settling ponds (0.3 ha) will likely not be affected by future development. None of the wetlands are a significant type. Potential removal of wetlands will trigger Provincial requirements for a wetland alteration approval application, wetland delineation and functional assessment, and compensation.

6.2.7 FISH AND FISH HABITAT

None of the proposed project activities will physically impact the flowages which originate just outside the property boundary, on the north (on the upper James River watershed) and on the south (flowing down the southern slope to meet tributaries of James River in the vicinity of Highway 4 and the railway line). Management of runoff from the pit, and erosion and sedimentation control during all operations will minimize release of suspended sediment. Soils at the site are relatively rocky and have an overall lower potential for the release of fines. The area affected by the quarry is relatively small in relation to the watershed as a whole, also reducing the extent of impacts.

6.2.8 WILDLIFE AND HABITAT

Expansion of the quarry over time will involve removal of up to approximately 17 ha of existing terrestrial ecosystem (plants and animals). If at all possible, activities such as logging on the lands outside the pit should be avoided, or if required for pit expansion, be conducted using access through existing roads in the quarry proper. Invasive species can be a problem around pit margins and a monitoring and control program may be undertaken in these areas if required. If there is a significant concern about any of the species, a plan will be developed to control the species.

6.2.9 SPECIES AT RISK

No plant or animal species at risk occur in the footprint of the proposed expansion of the quarry. Mobile wildlife of concern include moose, which in this area are uncommon but part of the small remnant 'mainland' population. Moose are unlikely to be impacted by the quarry. Lights during night operations during migration periods (August-September) would attract various bird species, which could include species at risk. If possible, 24-hour operations in August-early September, should be avoided.

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. The site has, in addition to sedimentation ponds, a system of runoff control basins utilizing the footprint of the original quarry and remediated areas at the site, and has runoff control structures along the access road. Aggregate and other rock products stored at the site are stable under varying conditions of rainfall and wind.

8 CUMULATIVE IMPACTS

No cumulative impacts (impacts arising from the project in combination with ongoing or foreseen activities) are likely to be caused by the project. The quarry is unlikely to have other quarries or industrial developments locate in the vicinity in future. Presently the noise levels experienced at the quarry and in the immediate environs are a combination of three major sources, including Highway 104 (the main continuous source); the Cape Breton and Central Nova Scotia Railway; and Riverside International Speedway which are periodic sources of noise; and the quarry operations themselves. Quarries on the Brierly Brook Back Road and Gravel Pit Road also generate noise, but activities at those sites are not expected to increase in future. The project itself occupies a small footprint in the landscape, and removes a relatively small amount of forest landscape, and other quarries would similarly have a relatively small footprint on the natural landscape.

9 MONITORING

None of the Valued Environmental Components in the vicinity of the James River Quarry will be significantly impacted by it. Water quality at the site has been routinely monitored as a condition of the present approval, and monitoring would be continued. 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.

10 PUBLIC CONSULTATION

The Proponent has not held public or Mi'Kmaq consultations concerning the proposed expansion of the James River Quarry—public meetings are not required for the EA registration. The proponent may be required to conduct a Mi'Kmaq Ecological Knowledge (MEK) study, to address the Province's duty to consult with the Mi'Kmaq on projects affecting use of the land.

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 they may decide if modifications to our conclusions are necessary.

The findings of this investigation are based on research and investigations carried out in May-September 2013 and the generally accepted assessment practices of our industry. No other warranty is made.

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

General Category of VEC	Biophysical								Socioeconomic										
	Air Quality and Noise	Hydrogeology & Hydrology	Water Quality	Aquatic Environments	Wetlands	Fish and Fish Habitat	Flora & Fauna Species & Habitat	Species at Risk	Mi'Kmaq	Cultural/ Historical	Recreation, Tourism & Viewscape	Wilderness	Recreational & Mi'Kmaq Fishing	Water Supply	Land Use and Value	Transportation	Residential, Industrial, Agricultural	Parks & Protected Areas	Resource Use Forestry /Trapping
Project Component (potential interactions shown by ✓)																			
Construction																			
Site Clearing/Grubbing	✓	✓	✓		✓		✓	✓			✓			✓	✓		✓	✓	✓
Drilling	✓										✓						✓	✓	
Blasting	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓			✓	✓	
Operation																			
Moving/Transporting Rock and Product	✓										✓		✓	✓		✓	✓	✓	✓
Site Lighting							✓										✓		
Crushing	✓												✓				✓	✓	
Washing	✓	✓	✓	✓		✓	✓		✓								✓	✓	
Site Runoff Management		✓	✓	✓	✓	✓			✓									✓	
Portable Asphalt Plant	✓		✓															✓	
Onsite Materials Storage (e.g. recycled asphalt)			✓																
Accidents (Oil/ Fuel Spills)		✓	✓	✓	✓	✓	✓		✓		✓		✓						

Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, James River 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 outdoor use by locals and wildlife.	Not significant.
	Operation	Drilling and blasting; equipment for moving rock; crusher & heavy equipment operation.	Significant	Negative	Monitor noise levels and schedule activity to avoid peak periods of outdoor use by locals and wildlife. 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	Monitor groundwater hydrology to determine changes.	Not significant.
	Operation	Pit 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.	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 10. Summary of impacts and mitigation on Valued Ecosystem Components, James River 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 stream. 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	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 (e.g. small quantities of hydrocarbons in exhaust and lubricants) and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Ecosystem Components, James River 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 watersheds as a whole and no streams occur on site.	Not significant.
	Operation	Change in flow regime in watercourse north and south of site	Negligible	Negative	Settling and retention ponds & onsite water management moderate flows.	Not significant.
	Construction & Operation	Routine releases and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
	Operation	Accidental spills into James River and other waters from truck accidents on Hwy 4.	Negligible	Negative	Recommend truck traffic use of Hwy 104. 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. grubblings 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.

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

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.
		Disturbance and attraction of migratory birds by lights.	Significant	Negative	Use appropriate site lighting & use only when necessary.	Not significant.
		Site development activities may disturb nesting birds.	Significant	Negative	Advise personnel of concern over birds adjacent to quarry. Conduct nesting bird survey prior to major works near pit.	Not significant.
Species at Risk	Construction	No species at risk in the proposed footprint of the quarry.	Negligible	Negative	Monitor for occurrence of invasives in disturbed border of work area. Leave mature standing trees where possible as nest cavities. Check vehicles and materials to prevent invasives establishing on the site.	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 James and West Rivers	Negligible	Negative	Ensure negligible accidental and routine releases of contaminants to headwaters of James and West Rivers	Not significant.
Cultural and Historical Features	Construction and Operation	Noise and traffic impacts Bethel Presbyterian Church and Glen Bard Cemetery	Not significant	Negative	Schedule activities at quarry to avoid Sunday services.	Not significant.
Recreation	Construction & Operation	Controls on access to site via Leslie Road	Not significant	Negative	Avoid restricting recreational vehicle traffic along Leslie Road and to telecomm towers.	Not significant.

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

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Tourism and Viewscape	Construction & Operation	View of site and industrial character	Significant	Negative	Maintain forested buffer around site to restrict views from Hwy 104, and Beaver & Keppoch Mountains.	Not significant.
Wilderness	Construction & Operation	Presence of the quarry near existing wilderness area; noise; light pollution.	Significant	Negative	Maintain forested buffer around site to restrict views; avoid nighttime operations requiring lights. Acknowledge and promote existing wilderness areas. Maintain a moderate size of operation at any time.	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	Minimize area of land utilized; maintain forested buffer around active work area.	Not significant.
Water Supply	Construction and Operation	Blasting potentially impacts rock structures under James River dam.	Significant	Negative	Monitor the dam for vibration during one of the blasts to determine if there is an effect.	Not significant.
		Dust from operations could enter the James River Reservoir	Not significant	Negative	Dust control measures during construction and operation.	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

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

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
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.
	Construction & Operation	Changes in water table.	Not significant	No effect on local wells.	No mitigation needed.	Not applicable
	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.

12 REFERENCES

Atlantic Canada Conservation Data Centre (ACDC) 2013. Report on database search of species of conservation status for James River. Report to EnviroSphere Consultants Ltd, April 2013.

Broders, H., G. Quinn, and G. Forbes. 2003. Species status and the spatial and temporal patterns of activity of bats in southwest Nova Scotia, Canada. *Northeastern Naturalist* 10: 383-398.

Cann, D.B and J.D. Hilchey. 1954. Soil Survey of Antigonish County, Nova Scotia. Report No. 6, Nova Scotia Soil Survey, Canada Dept of Agriculture and N.S. Dept. of Agriculture and Marketing.

COSEWIC 2004. COSEWIC Assessment and Status Report on the Striped Bass, *Morone saxatilis*, in Canada. Southern Gulf of St. Lawrence Population, St. Lawrence Estuary Population and Bay of Fundy Population. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 43 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

Cultural Resource Management Group Limited (CRM). 2013. James River Quarry Expansion Archaeological Screening & Reconnaissance, 2013, James River, Antigonish County, Nova Scotia. Report to Dexter Construction Co. Ltd. and the Nova Scotia Department of Communities, Culture and Heritage, Heritage Division. October 2013. 11 p.

Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing Ltd and Nova Scotia Museum, Halifax, 270 pages + maps.

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

Transportation Development Centre (TDC). 1991. Wind and Wave Climate Atlas. Vol I. The East Coast of Canada. Transportation Development Centre, Policy and Coordination Group, Transport Canada, Ottawa.

13 PERSONAL COMMUNICATIONS

Mr. Sean Weseloh-Mckeane, Coordinator, Special Places, Nova Scotia Museum of Natural History

Mr. Charlie MacInnis, retired DFO Biologist

Ms. Nadia MacInnis, Fisheries and Oceans Canada, Antigonish

Rev. Dr. Glen Matheson, First Presbyterian Church, New Glasgow

Mr. Donald MacDonald, dairy farmer, James River

Mr. Carl MacDonald, resident, James River

Mr. Robert Vacheresse, farmer, James River

Mr. Ken Proctor, engineer, Town of Antigonish

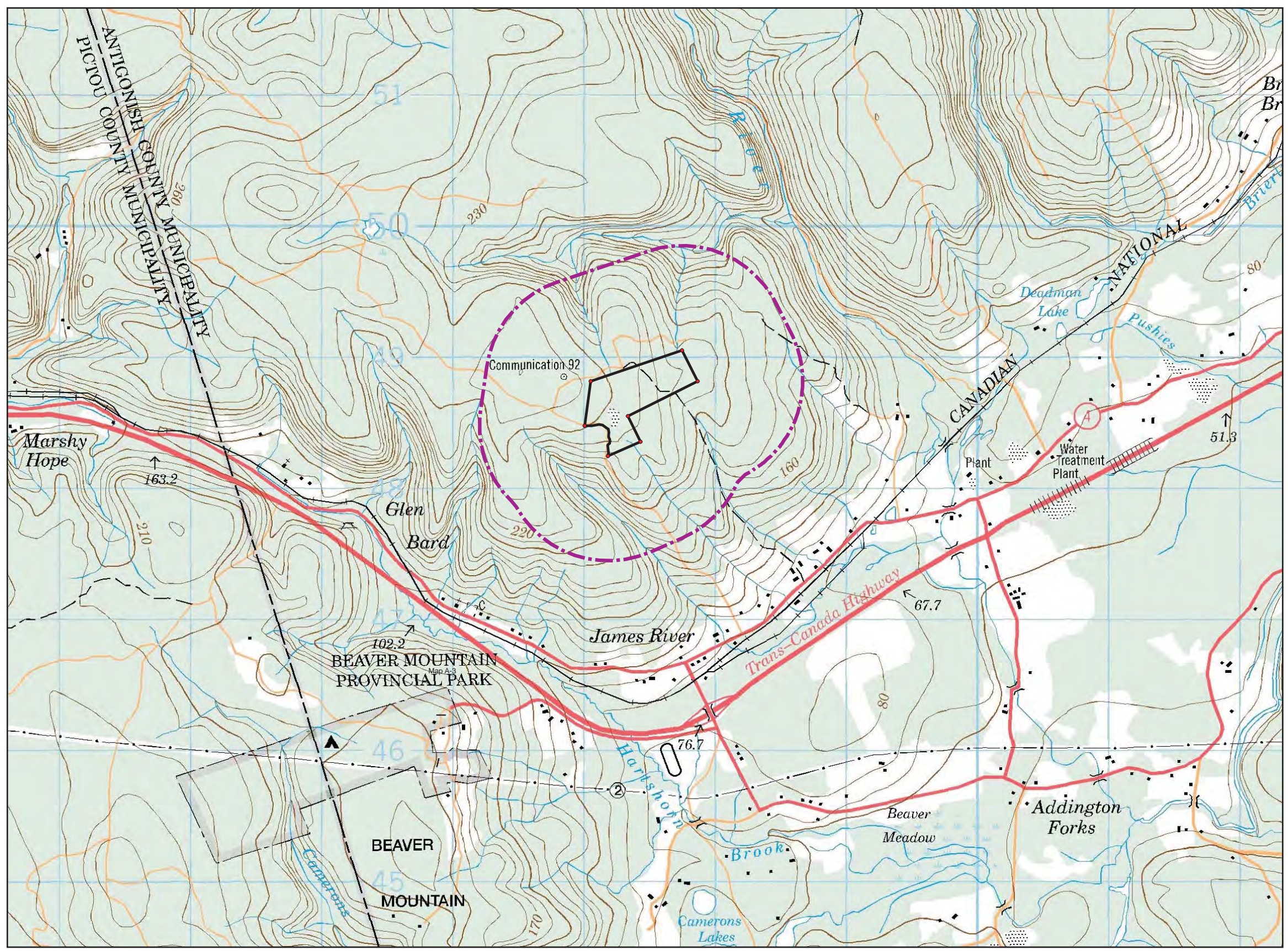
APPENDIX A

MAPS

**THE MUNICIPAL GROUP
OF COMPANIES**

**JAMES RIVER QUARRY
EXPANSION
James River, N.S.**

-  Project Boundary
-  800m Buffer
-  Major Roadway
-  Minor Roads
-  Watercourse

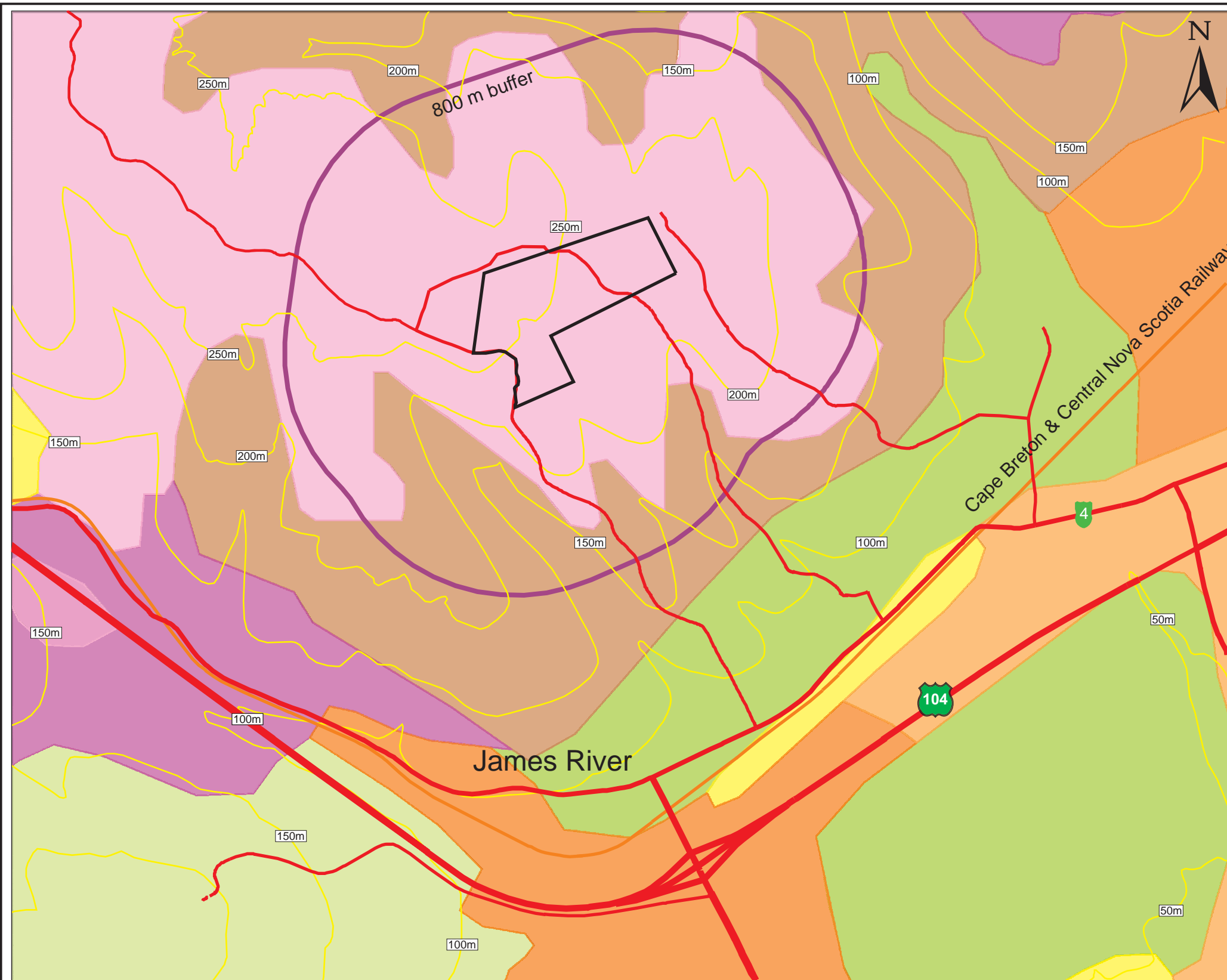


Base Map from National Topographic Series, 11E 9

Map Prepared by:
Envirosphere Consultants Ltd.
Windsor, Nova Scotia

September, 2013

Map A-1



**THE MUNICIPAL GROUP
OF COMPANIES**

**JAMES RIVER QUARRY
EXPANSION
James River, N.S.**

**Surficial
Geology
(Stea et al, 1992)**

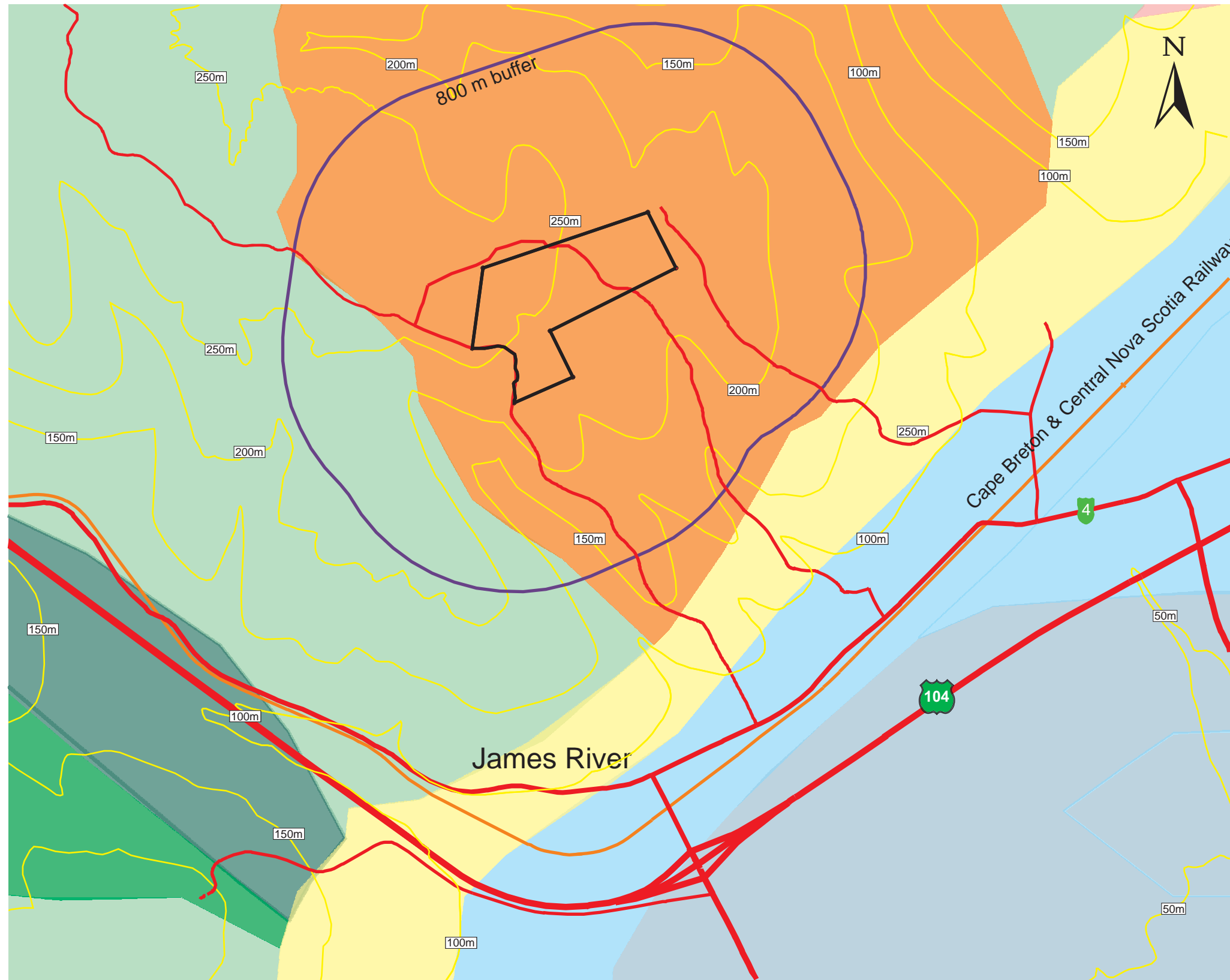
- Kame Fields & Esker Systems
- Alluvial Deposits
- Colluvial Deposits
- Bedrock
- Stoney Till Plain
- Silty Till Plain
- Glaciofluvial Deposits
- Residuum
- 800m Buffer
- Roads
- Quarry & Expansion
- Contours
- Railway



WMR Environmental Services Inc. & Associates

Map A-2

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



**THE MUNICIPAL GROUP
OF COMPANIES**

**JAMES RIVER QUARRY
EXPANSION**
James River, N.S.

**Bedrock
Geology**
(Stea et al, 1992)

- Hadrynian- Cambrian Granite
- James River Formation
- Horton Group
- Lower & Middle Windsor Group
- Clydesdale Formation
- Bears Brook Formation
- South Rights Formation
- Middle & Upper Windsor Group
- Roads
- Contours
- Quarry & Expansion
- 800m Quarry Buffer
- Railway



WMR Environmental Services Inc. & Associates

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

Map A-3

THE MUNICIPAL GROUP
OF COMPANIES
JAMES RIVER QUARRY
EXPANSION
James River, N.S.

**Property
Ownership**

-  Proponent Lands
-  Open Water
-  Roads
-  Contours
-  Study Area
-  800m Buffer
-  Railway



WMR Environmental Services Inc. & Associates

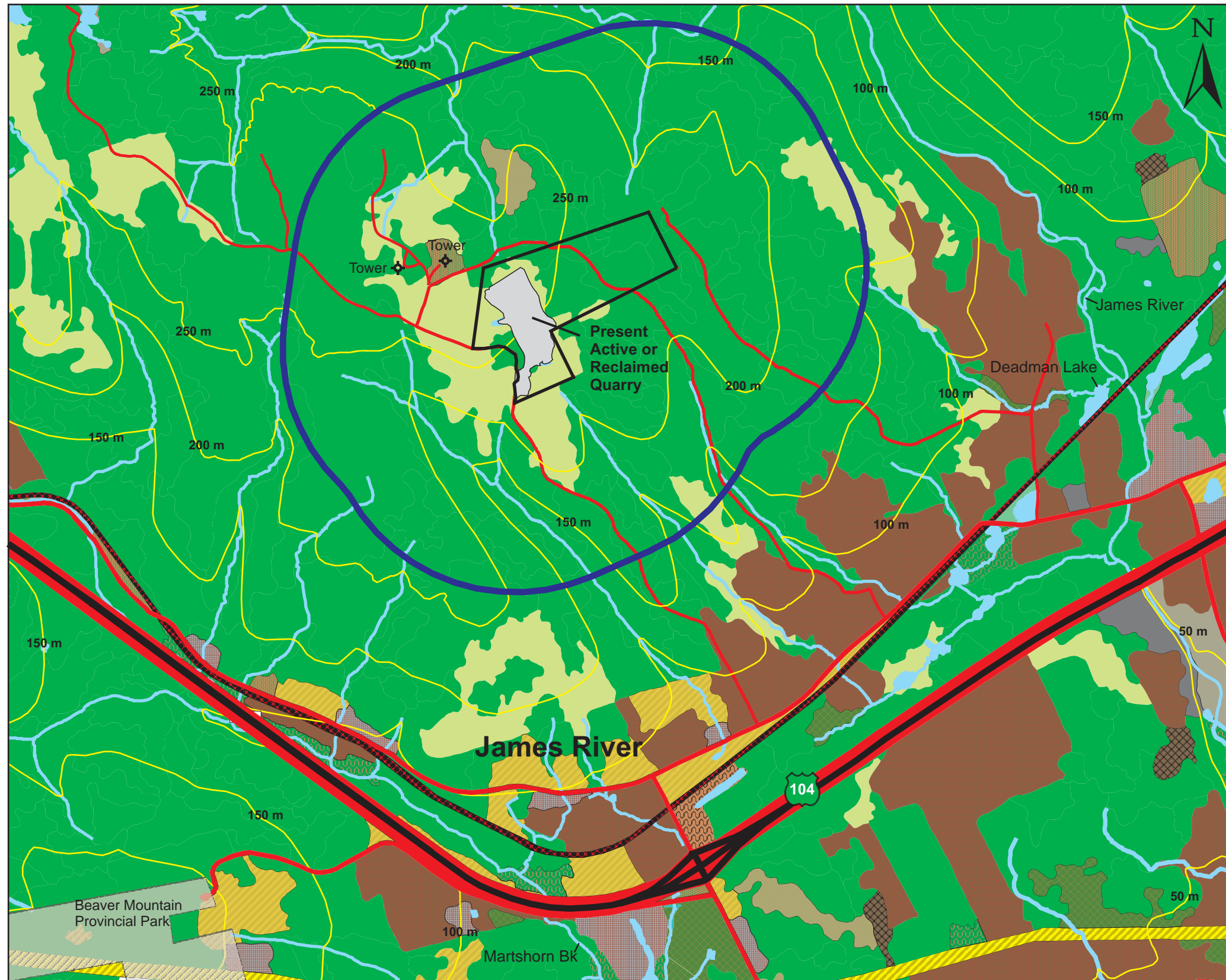
Map A-4

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

THE MUNICIPAL GROUP
OF COMPANIES

QUARRY
EXPANSION
James River, N.S.

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



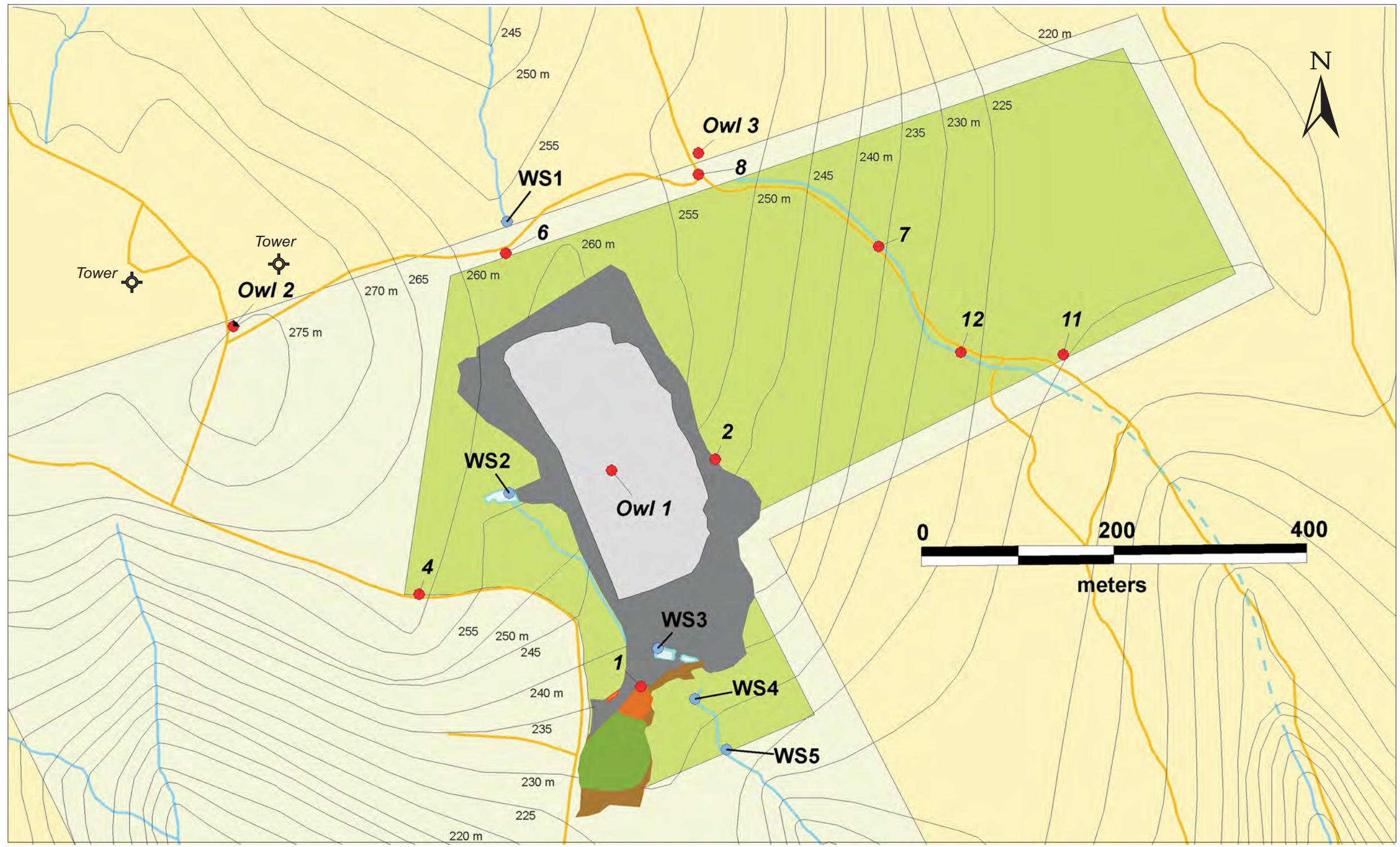
- | | |
|--|--|
|  Natural Stand |  Brush |
|  Inland Water |  General Wetland |
|  Open Bog |  Old Field |
|  Treed Bog |  Agriculture |
|  Clear Cut |  Alders >77% |
|  Barren |  Alders <77% |
|  Treated |  Urban Area |
|  Miscellaneous |  Power Line |
|  Dead Stand |  Rail Line |
|  Gravel Pit |  Road |
|  Project Boundary |  100-Series Highway |
|  Active Pit Area |  800m Quarry Buffer |



Map A-5

WMR Environmental Services Inc. & Associates

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



**THE MUNICIPAL GROUP
OF COMPANIES**

**JAMES RIVER QUARRY
EXPANSION
James River, N.S.**

**Bird Observations,
Water Sampling
Locations, and
Surface Waters**

- Property
- Proposed Development Area
- Active Pit
- Unvegetated Work Area
- Forest Regrowth on Reclaimed Former Pit Area
- Revegetated Pit
- Runoff Management Area
- Access Roads & Trails
- Contours (5 m)
- Flowages/Watercourses
- Bird Survey Points
- Water Sampling Locations

WMR Environmental Services Inc. & Associates

Map by:
Envirosphere Consultants Limited.
September 2013

APPENDIX B
WETLAND/BOTANTICAL SURVEY
Marbicon Inc.

Botanical Survey
FOR
**James River Quarry
Dexter Construction Co. Ltd.**
James River, Antigonish County, Nova Scotia

October 15, 2013

Prepared By:
Jim Jotcham, Marbicon Inc.

Marbicon Inc. was contracted in 2013 to perform a botanical survey of a property located on Highway 4 in James River, Antigonish County. The site contains an active crushed stone quarry which is about 0.5 km east of Beaver Meadow Road (north of Exit 30 on Highway 104) and 2.0 km north of Highway 4 on Leslie Road at approximately 45° 35' 15" North and 62° 08' 15" West. Figure 1 is an aerial view of the study area. The quarry is bounded on all sides by forest.

The site was inventoried by botanist Jim Jotcham on June 19 and 20, and September 11, 2013. The list of plant species identified and their provincial status is presented in Appendix 1.

Much of the property has been recently cutover (Figure 2) and is regenerating with abundant Red Maple (*Acer rubrum*) and Balsam Fir (*Abies balsamea*). The intact portions of the mixed forest included Yellow Birch (*Betula allegheniensis*), Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*), and Red Maple (*Acer rubrum*). The understory of the intact portions included typical woodland plants such as Wild Lily-of-the-valley (*Maianthemum canadense*), Wild Sarsaparilla (*Aralia nudicaulis*), and Bracken Fern (*Pteridium aquilinum*). Where the forest had been cut some time ago, the woods were often close-stemmed thickets (Figure 3).

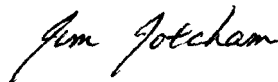
Several man-made ponds were situated around the quarry, one on the northwest side and two on the south side. An example is shown in Figure 4. In addition several wetlands were observed (Figure 1). The extent of the woodlands were determined by walking the approximate boundaries using a handheld GPS. A small wooded swamp was found in the eastern portion of the subject property, straddling a logging road (Figure 5). Additional small seepage areas were found in the cutover area (Figure 6), which often contained easily seen species such as Broad-Leaved Cattail (*Typha latifolia*) or Woolly Bulrush (*Scirpus cyperinus*). These linear wet areas tended to follow ruts remaining from the logging operations.

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 Canada Conservation Data Centre (ACCDC).

Appendix 2 is a table from the Atlantic Canada Conservation Data Centre (ACCDC) adapted from their report dated April 26, 2013 (# 5003) summarizing the species of concern that have been observed nearby (within 10 km). None of these species were found on site, although suitable habitat existed for most of them. Species on this list not likely to be seen on site were the two Pondweeds (*Potamogeton* spp.), since the ponds were small fairly shallow man-made ponds. Yellow Lady Slipper (*Cypripedium parviflorum*) tends to prefer gypsum outcrops, a habitat not seen on site. The remainder of the listed species had somewhat suitable habitat, although the wetlands were limited in size and most of the upland had been cutover, either recently or sometime in the past.

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.

A handwritten signature in cursive script that reads "Jim Folcham".

October 15, 2013

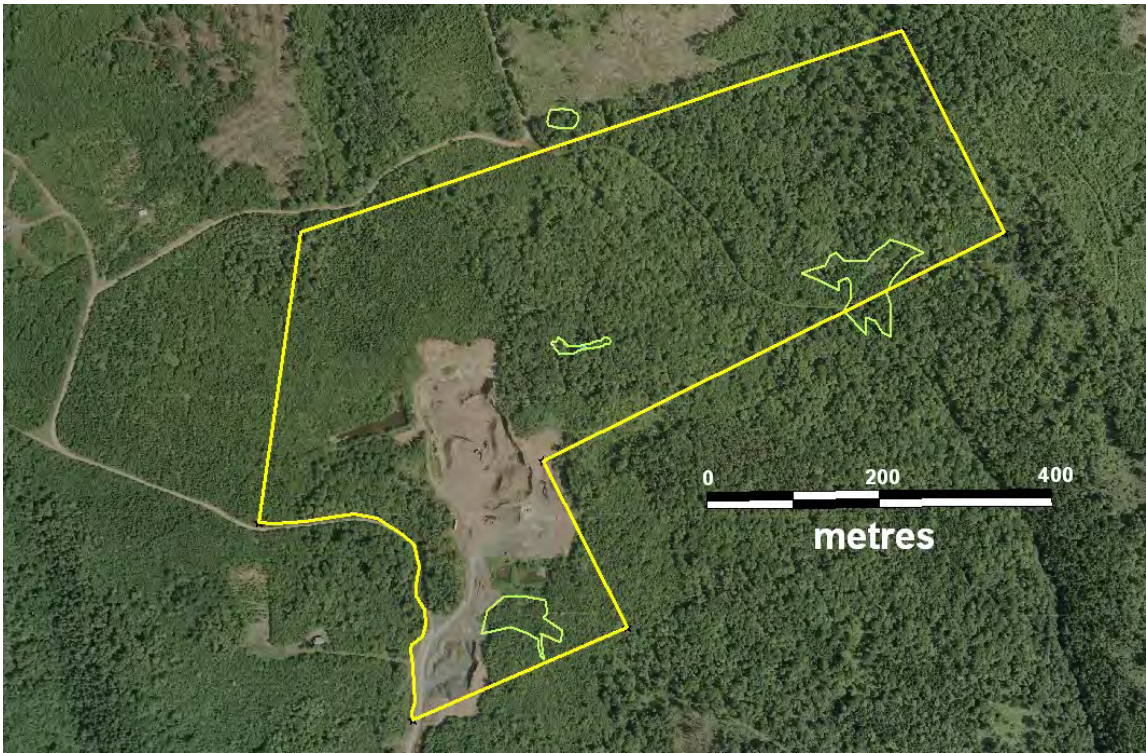


Figure 1. Site and Vicinity. Included are the outlines of four wetlands. Base image cropped from aerial photograph 2007404-174 (2007).



Figure 2. Cutover area east of the rock quarry.



Figure 3. Older cutover with closely spaced young trees.



Figure 4. Constructed pond south of the rock quarry.



Figure 5. Swamp straddling a logging road (southeast edge of property).



Figure 6. Wetland in clearcut site. Wet areas are easily identified by presence of Cattails.

REFERENCES

Atlantic Canada Conservation Data Centre. 2013:
<http://www.accdc.com/Products/ranking.html>

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

APPENDIX 1

Site vegetation inventory (wetland and directly adjacent upland) surveyed June 19 and 20, and September 11, 2013.

Family	AC CDC Binomial Only	AC CDC English Name	Status Ranks		
			G-rank	S-rank	GS Rank
Pinaceae	<i>Abies balsamea</i>	Balsam Fir	G5	S5	Secure
Aceraceae	<i>Acer pensylvanicum</i>	Striped Maple	G5	S5	Secure
Aceraceae	<i>Acer rubrum</i>	Red Maple	G5	S5	Secure
Aceraceae	<i>Acer saccharum</i>	Sugar Maple	G5	S5	Secure
Aceraceae	<i>Acer spicatum</i>	Mountain Maple	G5	S5	Secure
Ranunculaceae	<i>Actaea pachypoda</i>	White Baneberry	G5	S4	Secure
Ranunculaceae	<i>Actaea rubra</i>	Red Baneberry	G5	S5	Secure
Rosaceae	<i>Agrimonia striata</i>	Woodland Agrimony	G5	S5	Secure
Asteraceae	<i>Anaphalis margaritacea</i>	Pearly Everlasting	G5	S5	Secure
Poaceae	<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	GNR	SNA	Exotic
Araliaceae	<i>Aralia nudicaulis</i>	Wild Sarsaparilla	G5	S5	Secure
Dryopteridaceae	<i>Athyrium filix-femina</i>	Lady-Fern	G5	S5	Secure
Brassicaceae	<i>Barbarea vulgaris</i>	Yellow Rocket	GNR	SNA	Exotic
Betulaceae	<i>Betula alleghaniensis</i>	Yellow Birch	G5	S5	Secure
Betulaceae	<i>Betula populifolia</i>	Gray Birch	G5	S5	Secure
Poaceae	<i>Bromus inermis</i>	Awnless Brome	G5	SNA	Exotic
Brassicaceae	<i>Cardamine pensylvanica</i>	Pennsylvania Bitter-Cress	G5	S5	Secure
Cyperaceae	<i>Carex crinita</i>	Fringed Sedge	G5	S5	Secure
Cyperaceae	<i>Carex debilis</i>	White-Edge Sedge	G5	S5	Secure
Cyperaceae	<i>Carex gracillima</i>	Graceful Sedge	G5	S4S5	Secure
Cyperaceae	<i>Carex pallescens</i>	Pale Sedge	G5	S5	Secure
Cyperaceae	<i>Carex stipata</i>	Stalk-Grain Sedge	G5	S5	Secure
Cyperaceae	<i>Carex trisperma</i>	Three-Seed Sedge	G5	S5	Secure
Cyperaceae	<i>Carex vesicaria</i>	Inflated Sedge	G5	S4S5	Secure
Asteraceae	<i>Cirsium arvense</i>	Creeping Thistle	GNR	SNA	Exotic
Asteraceae	<i>Cirsium vulgare</i>	Bull Thistle	GNR	SNA	Exotic
Ranunculaceae	<i>Clematis virginiana</i>	Virginia Virgin-Bower	G5	S5	Secure
Liliaceae	<i>Clintonia borealis</i>	Clinton Lily	G5	S5	Secure
Myricaceae	<i>Comptonia peregrina</i>	Sweet Fern	G5	S5	Secure
Ranunculaceae	<i>Coptis trifolia</i>	Goldthread	G5	S5	Secure
Ranunculaceae	<i>Coptis trifolia</i>	Goldthread	G5	S5	Secure
Cornaceae	<i>Cornus alternifolia</i>	Alternate-Leaf Dogwood	G5	S5	Secure
Cornaceae	<i>Cornus canadensis</i>	Dwarf Dogwood	G5	S5	Secure
Fumariaceae	<i>Corydalis sempervirens</i>	Pale Corydalis	G4G5	S4	Secure
Betulaceae	<i>Corylus cornuta</i>	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
Droseraceae	Drosera rotundifolia	Roundleaf Sundew	G5	S5	Secure
Dryopteridaceae	Dryopteris campyloptera	Mountain Wood-Fern	G5	S5	Secure
Dryopteridaceae	Dryopteris intermedia	Evergreen Woodfern	G5	S5	Secure
Poaceae	Elymus repens	Quackgrass	GNR	SNA	Exotic
Onagraceae	Epilobium ciliatum	Hairy Willow-Herb	G5T5	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	Eupatorium maculatum	Spotted Joe-Pye Weed	G5	S5	Secure
Asteraceae	Eupatorium perfoliatum	Common Boneset	G5	S5	Secure
Scrophulariaceae	Euphrasia stricta	Drug Eyebright	GNRQ	SNA	Exotic
Asteraceae	Euthamia graminifolia	Flat-Top Fragrant-Golden-Rod	G5	S5	Secure
Fagaceae	Fagus grandifolia	American Beech	G5	S5	Secure
Rosaceae	Fragaria virginiana	Virginia Strawberry	G5	S5	Secure
Oleaceae	Fraxinus americana	White Ash	G5	S5	Secure
Lamiaceae	Galeopsis tetrahit	Brittle-Stem Hempnettle	GNR	SNA	Exotic
Rubiaceae	Galium asprellum	Rough Bedstraw	G5	S5	Secure
Rubiaceae	Galium palustre	Marsh Bedstraw	G5	S5	Secure
Poaceae	Glyceria canadensis	Canada Manna-Grass	G5	S5	Secure
Poaceae	Glyceria striata	Fowl Manna-Grass	G5	S5	Secure
Asteraceae	Hieracium canadense	Canada Hawkweed	G5	S4S5	Secure
Asteraceae	Hieracium piloselloides	Tall Hawkweed	GNR	SNA	Exotic
Apiaceae	Hydrocotyle americana	American Water-Pennywort	G5	S5	Secure
Clusiaceae	Hypericum perforatum	A St. John's-Wort	GNR	SNA	Exotic
Iridaceae	Iris versicolor	Blueflag	G5	S5	Secure
Asteraceae	Leucanthemum vulgare	Oxeye Daisy	GNR	SNA	Exotic
Scrophulariaceae	Linaria vulgaris	Butter-And-Eggs	GNR	SNA	Exotic
Caprifoliaceae	Linnaea borealis	Twinflower	G5	S5	Secure
Campanulaceae	Lobelia inflata	Indian-Tobacco	G5	S5	Secure
Caprifoliaceae	Lonicera villosa	Mountain Fly-Honeysuckle	G5	S4S5	Secure
Juncaceae	Luzula multiflora	Common Woodrush	G5T5	S5	Secure
Lycopodiaceae	Lycopodium annotinum	Stiff Clubmoss	G5	S5	Secure
Lamiaceae	Lycopus americanus	American Bugleweed	G5	S5	Secure
Lamiaceae	Lycopus uniflorus	Northern Bugleweed	G5	S5	Secure
Liliaceae	Maianthemum canadense	Wild Lily-of-The-Valley	G5	S5	Secure

Liliaceae	<i>Maianthemum racemosum</i>	Solomon's-Plume	G5	S4S5	Secure
Lamiaceae	<i>Mentha arvensis</i>	Corn Mint	G5	S5	Secure
Rubiaceae	<i>Mitchella repens</i>	Partridge-Berry	G5	S5	Secure
Monotropaceae	<i>Monotropa hypopithys</i>	American Pinesap	G5	S4	Secure
Monotropaceae	<i>Monotropa uniflora</i>	Indian-Pipe	G5	S5	Secure
Asteraceae	<i>Oclemena acuminata</i>	Whorled Aster	G5	S5	Secure
Onagraceae	<i>Oenothera biennis</i>	Common Evening-Primrose	G5	S5	Secure
Dryopteridaceae	<i>Onoclea sensibilis</i>	Sensitive Fern	G5	S5	Secure
Osmundaceae	<i>Osmunda cinnamomea</i>	Cinnamon Fern	G5	S5	Secure
Osmundaceae	<i>Osmunda claytoniana</i>	Interrupted Fern	G5	S5	Secure
Oxalidaceae	<i>Oxalis montana</i>	White Wood-Sorrel	G5	S5	Secure
Oxalidaceae	<i>Oxalis stricta</i>	Upright Yellow Wood-Sorrel	G5	S5	Secure
Poaceae	<i>Phalaris arundinacea</i>	Reed Canary Grass	G5	S5	Secure
Thelypteridaceae	<i>Phegopteris connectilis</i>	Northern Beech Fern	G5	S5	Secure
Pinaceae	<i>Picea glauca</i>	White Spruce	G5	S5	Secure
Pinaceae	<i>Pinus strobus</i>	Eastern White Pine	G5	S5	Secure
Plantaginaceae	<i>Plantago major</i>	Nipple-Seed Plantain	G5	SNA	Exotic
Poaceae	<i>Poa pratensis</i>	Kentucky Bluegrass	G5	S5	Secure
Polygonaceae	<i>Polygonum convolvulus</i>	Black Bindweed	GNR	SNA	Exotic
Polygonaceae	<i>Polygonum sagittatum</i>	Arrow-Leaved Tearthumb	G5	S5	Secure
Dryopteridaceae	<i>Polystichum acrostichoides</i>	Christmas Fern	G5	S5	Secure
Salicaceae	<i>Populus tremuloides</i>	Quaking Aspen	G5	S5	Secure
Rosaceae	<i>Potentilla norvegica</i>	Norwegian Cinquefoil	G5	S5	Secure
Rosaceae	<i>Potentilla simplex</i>	Old-Field Cinquefoil	G5	S5	Secure
Asteraceae	<i>Prenanthes trifoliolata</i>	Three-Leaved Rattlesnake-root	G5	S5	Secure
Lamiaceae	<i>Prunella vulgaris</i>	Self-Heal	G5	S5	Secure
Rosaceae	<i>Prunus pensylvanica</i>	Fire Cherry	G5	S5	Secure
Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Bracken Fern	G5	S5	Secure
Ranunculaceae	<i>Ranunculus acris</i>	Tall Butter-Cup	G5	SNA	Exotic
Ranunculaceae	<i>Ranunculus repens</i>	Creeping Butter-Cup	GNR	SNA	Exotic
Grossulariaceae	<i>Ribes glandulosum</i>	Skunk Currant	G5	S5	Secure
Rosaceae	<i>Rubus pubescens</i>	Dwarf Red Raspberry	G5	S5	Secure
Polygonaceae	<i>Rumex crispus</i>	Curly Dock	GNR	SNA	Exotic
Salicaceae	<i>Salix discolor</i>	Pussy Willow	G5	S5	Secure
Caprifoliaceae	<i>Sambucus nigra</i>	Common Elderberry	G5	S5	Secure
Caprifoliaceae	<i>Sambucus racemosa</i>	Red Elderberry	G5	S5	Secure
Cyperaceae	<i>Scirpus cyperinus</i>	Cottongrass Bulrush	G5	S5	Secure
Cyperaceae	<i>Scirpus microcarpus</i>	Small-Fruit Bulrush	G5	S5	Secure
Solanaceae	<i>Solanum dulcamara</i>	Climbing Nightshade	GNR	SNA	Exotic
Asteraceae	<i>Solidago bicolor</i>	White Goldenrod	G5	S5	Secure
Asteraceae	<i>Solidago canadensis</i>	Canada Goldenrod	G5	S5	Secure
Asteraceae	<i>Solidago flexicaulis</i>	Broad-Leaved Goldenrod	G5	S5	Secure
Asteraceae	<i>Solidago puberula</i>	Downy Goldenrod	G5	S5	Secure

Asteraceae	<i>Solidago rugosa</i>	Rough-Leaf Goldenrod	G5	S5	Secure
Rosaceae	<i>Sorbus decora</i>	Northern Mountain-Ash	G4G5	S4	Secure
Caryophyllaceae	<i>Stellaria graminea</i>	Little Starwort	GNR	SNA	Exotic
Liliaceae	<i>Streptopus lanceolatus</i>	Rosy Twisted-stalk	G5	S5	Secure
Asteraceae	<i>Symphyotrichum lateriflorum</i>	Farewell-Summer	G5	S5	Secure
Asteraceae	<i>Taraxacum officinale</i>	Common Dandelion	G5	SNA	Exotic
Thelypteridaceae	<i>Thelypteris noveboracensis</i>	New York Fern	G5	S5	Secure
Primulaceae	<i>Trientalis borealis</i>	Northern Starflower	G5	S5	Secure
Fabaceae	<i>Trifolium pratense</i>	Red Clover	GNR	SNA	Exotic
Fabaceae	<i>Trifolium repens</i>	White Clover	GNR	SNA	Exotic
Liliaceae	<i>Trillium undulatum</i>	Painted Trillium	G5	S5	Secure
Asteraceae	<i>Tussilago farfara</i>	Colt's Foot	GNR	SNA	Exotic
Typhaceae	<i>Typha latifolia</i>	Broad-Leaf Cattail	G5	S5	Secure
Ericaceae	<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	G5	S5	Secure
Scrophulariaceae	<i>Verbascum thapsus</i>	Great Mullein	GNR	SNA	Exotic
Scrophulariaceae	<i>Veronica officinalis</i>	Gypsy-Weed	G5	S5	Exotic
Caprifoliaceae	<i>Viburnum nudum</i>	Possum-Haw Viburnum	G5	S5	Secure
Fabaceae	<i>Vicia cracca</i>	Tufted Vetch	GNR	SNA	Exotic
Violaceae	<i>Viola cucullata</i>	Marsh Blue Violet	G4G5	S5	Secure

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 of concern observed within 10 km of the James River quarry (ACCDC, April 26 2013, #5003). None of these species were found on site during this survey.

Scientific Name	Common Name	G-rank	S-rank	Dist-km
<i>Alopecurus aequalis</i>	Short-awned Foxtail	G5	S2S3	02 ±1
<i>Fraxinus nigra</i>	Black Ash	G5	S2S3	02 ±1
<i>Potamogeton praelongus</i>	White-stemmed Pondweed	G5	S3?	02 ±1
<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	G5	S2S3	04 ±0.5
<i>Lilium canadense</i>	Canada Lily	G5	S2S3	04 ±1
<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	G5	S3	06 ±0.1
<i>Carex haydenii</i>	Hayden's Sedge	G5	S1	07 ±5
<i>Sanguinaria canadensis</i>	Bloodroot	G5	S3S4	08 ±0
<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed	G5	S2	08 ±0
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	G5	S2S3	09 ±10
<i>Carex pensylvanica</i>	Pennsylvania Sedge	G5	S1S2	10 ±0

APPENDIX C
SPECIES AT RISK FOUND WITHIN
100 KM OF JAMES RIVER QUARRY

Atlantic Canada Conservation Data Centre,
APRIL 2013

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRANK	NPROT	SRANK
<i>Accipiter gentilis</i>	Northern Goshawk	Yellow	4	G5	NAR	S3S4
<i>Actitis macularius</i>	Spotted Sandpiper	Green	4 (3)	G5		S3S4B
<i>Adiantum pedatum</i>	Northern Maidenhair Fern	Red	4 (2)	G5		S1
<i>Aegolius funereus</i>	Boreal Owl	Green	4 (5)	G5	NAR	S1B
<i>Aeshna clepsydra</i>	Mottled Darner	Green	4	G4		S3
<i>Aeshna constricta</i>	Lance-Tipped Darner	Undetermined	4	G5		S3
<i>Ageratina altissima</i>	White Snakeroot	Yellow	4 (2)	G5		S1
<i>Aglais milberti milberti</i>	Milbert's Tortoise Shell	Green	4	G5T5		S3
<i>Agrimonia gryposepala</i>	Hooked Agrimony	Green	4	G5		S3
<i>Alasmidonta undulata</i>	Triangle Floater	Yellow	4	G4		S2S3
<i>Alasmidonta varicosa</i>	Brook Floater	Yellow	3	G3	SC	S1S2
<i>Alces americanus</i>	Moose	Red	4 (1)	G5		S1
<i>Allium schoenoprasum var. sibiricum</i>	Wild Chives	Undetermined	-	G5T5		S2
<i>Allium tricoccum</i>	Wild Leek	Red	4 (2)	G5		S1
<i>Alopecurus aequalis</i>	Short-awned Foxtail	Yellow	4 (3)	G5		S2S3
<i>Amblyscirtes hegon</i>	Pepper and Salt Skipper	Green	4	G5		S2
<i>Amblyscirtes vialis</i>	Common Roadside Skipper	Green	4	G5		S2
<i>Amelanchier fernaldii</i>	Fernald's Serviceberry	Undetermined	5	G2G4Q		S1, S2?
<i>Amelanchier stolonifera</i>	Running Serviceberry	Green	4	G5		S1?
<i>Amphiagrion saucium</i>	Eastern Red Damsel	Green	4	G5		S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Anas acuta</i>	Northern Pintail	Green	4 (2)	G5		S2B, S3B
<i>Anas clypeata</i>	Northern Shoveler	Green	4 (2)	G5		S3B
<i>Anas discors</i>	Blue-winged Teal	Green	4 (2)	G5		S3B, S3S4B
<i>Anemone canadensis</i>	Canada Anemone	Yellow	4 (2)	G5		S2
<i>Anemone quinquefolia</i>	Wood Anemone	Yellow	4 (3)	G5		S2
<i>Anemone virginiana</i>	Virginia Anemone	Yellow	4 (3)	G5		S2
<i>Anemone virginiana var. alba</i>	Virginia Anemone	Yellow	-	G5T4T5		S1S2
<i>Anemone virginiana var. virginiana</i>	Virginia Anemone	Yellow	-	G5T5		S2
<i>Angelica atropurpurea</i>	Purple-stemmed Angelica	Green	4	G5		S2, S3S4
<i>Antennaria parlinii</i>	Parlin's Pussytoes	Red	4 (2)	G5?		S1
<i>Anzia colpodes</i>	Black-foam Lichen	-	5 (3)	G3G5		S3?
<i>Arabis drummondii</i>	Drummond's Rockcress	Yellow	4 (3)	G5		S2
<i>Arnica lonchophylla</i>	Northern Arnica	Red	4 (2)	G4		S1
<i>Asclepias incarnata</i>	Swamp Milkweed	Green	4	G5		S1, S3
<i>Asclepias incarnata ssp. pulchra</i>	Swamp Milkweed	-	-	G5T5		S2S3
<i>Asio flammeus</i>	Short-eared Owl	Yellow	3 (2)	G5	SC	S1S2, S1S2B
<i>Asio otus</i>	Long-eared Owl	Green	4 (2)	G5		S2
<i>Asplenium trichomanes</i>	Maidenhair Spleenwort	Yellow	4 (3)	G5		S2
<i>Asplenium</i>	Green Spleenwort	Yellow	4 (3)	G4		S2

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>trichomanes-ramosum</i>						
<i>Atriplex acadensis</i>	Maritime Saltbush	Undetermined	-	G4?		S1?
<i>Atriplex franktonii</i>	Frankton's Saltbush	Green	-	G2G4		S1S2, S3S4
<i>Bartonia paniculata ssp. paniculata</i>	Branched Bartonia	-	-	G5T5	T	SNA
<i>Bartonia virginica</i>	Yellow Bartonia	-	4	G5		S3
<i>Betula borealis</i>	Northern Birch	Yellow	-	G4G5		S2
<i>Betula michauxii</i>	Newfoundland Dwarf Birch	Yellow	4 (3)	G3G4		S2
<i>Betula pumila</i>	Bog Birch	Yellow	4 (3)	G5		S2, S2S3
<i>Bidens hyperborea</i>	Estuary Beggarticks	Yellow	4 (2)	G4		S1
<i>Boloria chariclea</i>	Arctic Fritillary	Yellow	4 (3)	G5		S2
<i>Botaurus lentiginosus</i>	American Bittern	Green	4 (3)	G4		S3S4B
<i>Boyeria grafiana</i>	Ocellated Darner	Undetermined	4 (3)	G5		S1, S3
<i>Branta bernicla</i>	Brant	Yellow	4 (3)	G5		S3M
<i>Bromus latiglumis</i>	Broad-Glumed Brome	Red	4 (2)	G5		S1
<i>Bucephala clangula</i>	Common Goldeneye	Green	4	G5		S2B, S5N
<i>Bucephala islandica (Eastern pop.)</i>	Barrow's Goldeneye - Eastern pop.	Yellow	4 (1)	G5	SC	S1N, S2N
<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass	Yellow	4 (3)	G5		S2S3
<i>Calamagrostis stricta var. stricta</i>	Slim-stemmed Reed Grass	-	-	G5T5		S2S3
<i>Calidris canutus rufa</i>	Red Knot	Yellow	-	G4T1	E	S2N, S2S3M
<i>Calidris maritima</i>	Purple Sandpiper	Yellow	4 (3)	G5		S2N, S3N
<i>Calidris minutilla</i>	Least Sandpiper	Green	4	G5		S1B, S5M
<i>Calidris pusilla</i>	Semipalmated Sandpiper	Green	3	G5		S3M
<i>Calliargon</i>	Giant Spear Moss	-	4 (3)	G5		S2?

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>giganteum</i>						
<i>Callophrys lanoraieensis</i>	Bog Elfin	Red	4 (2)	G3G4		S1S2, S2
<i>Callophrys niphon</i>	Eastern Pine Elfin	Green	4	G5		S2
<i>Callophrys polios</i>	Hoary Elfin	Green	4	G5		S3S4
<i>Caltha palustris</i>	Yellow Marsh Marigold	Yellow	4 (3)	G5		S2
<i>Campanula aparinoides</i>	Marsh Bellflower	Yellow	4 (3)	G5		S3
<i>Campylostelium saxicola</i>	a Moss	-	3	G3G5		S1S2
<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Green	4 (3)	G5	T	S1?B
<i>Cardamine pratensis</i>	Cuckoo Flower	Red	4 (2)	G5		S1
<i>Cardamine pratensis var. angustifolia</i>	Cuckoo Flower	-	-	G5T5		S1
<i>Cardinalis cardinalis</i>	Northern Cardinal	Green	4	G5		S3S4
<i>Carduelis pinus</i>	Pine Siskin	Green	4	G5		S2S3B, S4N, S3S4B,S5N
<i>Carex adusta</i>	Lesser Brown Sedge	Yellow	4 (3)	G5		S2S3
<i>Carex alopecoidea</i>	Foxtail Sedge	Red	4 (2)	G5		S1
<i>Carex argyrantha</i>	Silvery-flowered Sedge	Green	4	G5		S1
<i>Carex atlantica ssp. capillacea</i>	Atlantic Sedge	Green	4	G5T5?		S2
<i>Carex atratiformis</i>	Scabrous Black Sedge	Yellow	4 (3)	G5		S2
<i>Carex bebbii</i>	Bebb's Sedge	Red	4 (2)	G5		S1S2, S3?
<i>Carex comosa</i>	Bearded Sedge	Yellow	4 (3)	G5		S1, S2
<i>Carex cryptolepis</i>	Hidden-scaled Sedge	Green	4	G4		S3?
<i>Carex eburnea</i>	Bristle-leaved Sedge	Yellow	4 (3)	G5		S3
<i>Carex garberi</i>	Garber's Sedge	Red	4 (2)	G5		S1
<i>Carex grisea</i>	Inflated Narrow-leaved Sedge	-	4 (-)	G5?		S1

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Carex gynocrates</i>	Northern Bog Sedge	Red	4 (2)	G5		S1
<i>Carex haydenii</i>	Hayden's Sedge	Red	4 (2)	G5		S1
<i>Carex hirtifolia</i>	Pubescent Sedge	Yellow	4 (3)	G5		S2S3
<i>Carex hystericina</i>	Porcupine Sedge	Red	4 (2)	G5		S1S2, S2
<i>Carex lupulina</i>	Hop Sedge	Green	4	G5		S3
<i>Carex peckii</i>	Peck's Sedge	Red	4 (2)	G4G5		S2?
<i>Carex pellita</i>	Woolly Sedge	-	4 (2)	G5		S1
<i>Carex pennsylvanica</i>	Pennsylvania Sedge	Undetermined	4 (5)	G5		S1S2
<i>Carex plantaginea</i>	Plantain-Leaved Sedge	Red	4 (2)	G5		S1
<i>Carex rosea</i>	Rosy Sedge	Green	4	G5		S3
<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge	Red	4 (2)	G5		S1
<i>Carex tenera</i>	Tender Sedge	Yellow	4 (3)	G5		S1S2
<i>Carex tenuiflora</i>	Sparse-Flowered Sedge	Red	4 (2)	G5		S1
<i>Carex tinctoria</i>	Tinged Sedge	Red	4 (2)	G4G5		S1
<i>Carex tribuloides</i>	Blunt Broom Sedge	Green	4	G5		S1, S3?
<i>Carex tuckermanii</i>	Tuckerman's Sedge	Red	4 (2)	G4		S1
<i>Carex vacillans</i>	Estuarine Sedge	-	3 (5)	GNR		S1S3
<i>Carex viridula var. elatior</i>	Greenish Sedge	-	-	G5TNR		S1
<i>Carex wiegandii</i>	Wiegand's Sedge	Red	4 (2)	G4		S1
<i>Catharus bicknelli</i>	Bicknell's Thrush	Yellow	1	G4	T	S1S2B
<i>Caulophyllum thalictroides</i>	Blue Cohosh	Red	4 (2)	G4G5		S2
<i>Cephus grylle</i>	Black Guillemot	Green	4	G5		S2B, S3S4
<i>Ceratophyllum echinatum</i>	Prickly Hornwort	Green	3 (2)	G4?		S2?
<i>Chaetura pelagica</i>	Chimney Swift	Yellow	1	G5	T	S2S3B
<i>Chamaesyce polygonifolia</i>	Seaside Spurge	Green	4	G5?		S2
<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	-	-	G3TNR	E	S1B

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Charadrius semipalmatus</i>	Semipalmated Plover	Green	4	G5		S1S2B,S5M
<i>Charadrius vociferus</i>	Killdeer	Green	4 (3)	G5		S3B, S3S4B
<i>Chelydra serpentina</i>	Snapping Turtle	Green	4	G5	SC	S5
<i>Chenopodium rubrum</i>	Red Pigweed	Red	4 (2)	G5		S1, S1?
<i>Chordeiles minor</i>	Common Nighthawk	Yellow	1	G5	T	S1B, S3B
<i>Cinna arundinacea</i>	Sweet Wood Reed Grass	Red	4 (2)	G5		S1
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	Green	4 (2)	G5		S3?B, S3S4B
<i>Cochlearia tridactylites</i>	Limestone Scurvy-grass	Red	4 (2)	G3G5		S1
<i>Collema furfuraceum</i>	Blistered Tarpaper Lichen	Green	4 (3)	G5		S3?
<i>Collema nigrescens</i>	Blistered Tarpaper Lichen	Yellow	4 (3)	G5?		S2S3
<i>Comandra umbellata</i>	Bastard's Toadflax	Red	4 (2)	G5		S2, S3
<i>Conioselinum chinense</i>	Chinese Hemlock-parsley	Yellow	4 (3)	G5		S2
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Yellow	1	G4	T	S3B
<i>Contopus virens</i>	Eastern Wood-Pewee	Green	4 (3)	G5	SC	S3S4B, S4B
<i>Corallorhiza trifida</i>	Early Coralroot	Green	4	G5		S2, S3
<i>Cornus suecica</i>	Swedish Bunchberry	Yellow	4 (3)	G5		S1S2
<i>Crataegus robinsonii</i>	Robinson's Hawthorn	Undetermined	5	G2G4Q		S1?
<i>Crataegus submollis</i>	Quebec Hawthorn	Undetermined	4 (5NS)	G5		S1?
<i>Cryptogramma stelleri</i>	Steller's Rockbrake	Red	4 (2)	G5		S1

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Cuscuta cephalanthi</i>	Buttonbush Dodder	Red	2	G5		S1
<i>Cyperus lupulinus ssp. macilentus</i>	Hop Flatsedge	Extirpated	-	G5T5?		S1
<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	Yellow	4 (3)	G5		S2, S2S3
<i>Cypripedium parviflorum var. makasin</i>	Yellow Lady's-slipper	-	-	G5T4Q		S2
<i>Cypripedium parviflorum var. pubescens</i>	Yellow Lady's-slipper	-	-	G5T5		S2
<i>Cypripedium reginae</i>	Showy Lady's-Slipper	Red	4 (2)	G4		S2
<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern	Green	4	G5		S3S4
<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern	Undetermined	3 (2)	G3		S1
<i>Danaus plexippus</i>	Monarch	Yellow	3	G5	SC	S1B, S2B
<i>Decodon verticillatus</i>	Swamp Loosestrife	Yellow	4 (3)	G5		S3
<i>Degelia plumbea</i>	Blue Felt Lichen	Yellow	4	GNR	SC	S2
<i>Dendroica castanea</i>	Bay-breasted Warbler	Green	4 (3)	G5		S3B, S3S4B
<i>Dendroica striata</i>	Blackpoll Warbler	Green	4 (3)	G5		S3S4B
<i>Dendroica tigrina</i>	Cape May Warbler	Green	4 (3)	G5		S3?B
<i>Desmodium canadense</i>	Canada Tick-trefoil	Red	4 (2)	G5		S1
<i>Dichanthelium acuminatum var. lindheimeri</i>	Woolly Panic Grass	Green	-	G5T5		S1?
<i>Dichanthelium clandestinum</i>	Deer-tongue Panic Grass	-	4	G5?		S3
<i>Dichanthelium</i>	Narrow-leaved Panic Grass	-	4 (3)	G5		S2?

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>linearifolium</i>						
<i>Ditrichum rhynchostegium</i>	a Moss	-	3	G3G5		S1
<i>Dolichonyx oryzivorus</i>	Bobolink	Yellow	4 (3)	G5	T	S3B, S3S4B
<i>Draba arabisans</i>	Rock Whitlow-Grass	Yellow	4 (3)	G4		S2
<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern	-	-	G5T3T5		S2
<i>Dumetella carolinensis</i>	Gray Catbird	Green	4 (2)	G5		S3B
<i>Eleocharis erythropoda</i>	Red-stemmed Spikerush	Extirpated	4 (0.1)	G5		SH
<i>Eleocharis olivacea</i>	Yellow Spikerush	Yellow	-	G5		S2S3
<i>Eleocharis ovata</i>	Ovate Spikerush	Yellow	4 (3)	G5		S2?
<i>Eleocharis quinqueflora</i>	Few-flowered Spikerush	Red	4 (2)	G5		S2
<i>Elymus hystrix</i> var. <i>bigeloviana</i>	Spreading Wild Rye	-	-	G5T5?		S1
<i>Elymus wiegandii</i>	Wiegand's Wild Rye	Red	4 (2)	G4G5		S1
<i>Empetrum eamesii</i>	Pink Crowberry	Yellow	4 (3)	G5		S2
<i>Empetrum eamesii</i> ssp. <i>atropurpureum</i>	Pink Crowberry	-	-	G5T5		S2
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	Green	4 (3)	G5		S3S4B
<i>Empidonax traillii</i>	Willow Flycatcher	Accidental	4 (3)	G5		S2B
<i>Epilobium coloratum</i>	Purple-veined Willowherb	Yellow	4 (3)	G5		S2?
<i>Epilobium strictum</i>	Downy Willowherb	Yellow	4 (3)	G5?		S2, S3
<i>Equisetum hyemale</i>	Common Scouring-rush	Green	4	G5		S3S4

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Equisetum hyemale</i> var. <i>affine</i>	Common Scouring-rush	-	-	G5T5		S3S4
<i>Equisetum palustre</i>	Marsh Horsetail	Undetermined	4 (2)	G5		S1, S2
<i>Equisetum scirpoides</i>	Dwarf Scouring-Rush	Green	4	G5		S3S4
<i>Equisetum variegatum</i>	Variiegated Horsetail	Green	4	G5		S3
<i>Eremophila alpestris</i>	Horned Lark	Green	4	G5		S1S2B,S4N
<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane	Yellow	4 (3)	G5		S3
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	Yellow	4 (3)	G5		S2
<i>Erioderma mollissimum</i>	Graceful Felt Lichen	-	1 (2)	G4G5	E	S1S2
<i>Eriophorum gracile</i>	Slender Cottongrass	Yellow	4 (3)	G5		S1, S2
<i>Erynnis juvenalis</i>	Juvenal's Duskywing	Green	4	G5		S2S3
<i>Euphagus carolinus</i>	Rusty Blackbird	Yellow	3 (2)	G4	SC	S2B, S2S3B
<i>Euphydryas phaeton</i>	Baltimore Checkerspot	Green	4	G4		S2, S3
<i>Feniseca tarquinius</i>	Harvester	Green	4	G4		S2S3, S3S4
<i>Floerkea proserpinacoides</i>	False Mermaidweed	Green	4 (3)	G5	NAR	S2
<i>Fraxinus nigra</i>	Black Ash	Yellow	4 (3)	G5		S2, S2S3
<i>Fulica americana</i>	American Coot	Green	4 (5)	G5	NAR	S1B
<i>Fuscopannaria leucosticta</i>	Rimmed Shingles Lichen	Yellow	5 (2)	G3G5		S1S2
<i>Galium aparine</i>	Common Bedstraw	Exotic	4 (7)	G5		S1
<i>Galium kamtschaticum</i>	Northern Wild Licorice	Yellow	4	G5		S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Galium labradoricum</i>	Labrador Bedstraw	Yellow	4 (3)	G5		S1S2, S2
<i>Gallinago delicata</i>	Wilson's Snipe	Green	4 (3)	G5		S3S4B
<i>Gallinula chloropus</i>	Common Moorhen	Green	4 (5)	G5		S1B
<i>Gavia immer</i>	Common Loon	Yellow	4 (2)	G5	NAR	S1B,S4N, S3B,S4N
<i>Geocaulon lividum</i>	Northern Comandra	Yellow	4 (3)	G5		S3
<i>Glyptemys insculpta</i>	Wood Turtle	Yellow	1 (3)	G4	T	S3
<i>Gomphaeschna furcillata</i>	Harlequin Darner	Yellow	3	G5		S1, S3
<i>Gomphus desertus</i>	Harpoon Clubtail	Yellow	4 (3)	G4		S2
<i>Goodyera oblongifolia</i>	Menzies' Rattlesnake-plantain	Yellow	4 (3)	G5?		S1
<i>Goodyera repens</i>	Lesser Rattlesnake-plantain	Yellow	4 (3)	G5		S2, S3
<i>Gratiola neglecta</i>	Clammy Hedge-Hyssop	Yellow	4 (3)	G5		S1S2
<i>Halenia deflexa</i>	Spurred Gentian	Yellow	4 (3)	G5		S2S3
<i>Hedeoma pulegioides</i>	American False Pennyroyal	Yellow	4 (3)	G5		S2S3
<i>Hemidactylum scutatum</i>	Four-toed Salamander	Green	4	G5	NAR	S3
<i>Hepatica nobilis</i> var. <i>obtusata</i>	Round-lobed Hepatica	Red	-	G5T5		S1S2
<i>Hesperia comma</i>	Common Branded Skipper	Green	4	G5		S3
<i>Hesperia comma laurentina</i>	Laurentian Skipper	Green	-	G5T5		S3
<i>Hieracium kalmii</i>	Kalm's Hawkweed	Undetermined	4 (5)	G5		S2?
<i>Hieracium kalmii</i> var. <i>kalmii</i>	Kalm's Hawkweed	-	-	G5T5?		S2?
<i>Hieracium paniculatum</i>	Panicled Hawkweed	Green	4	G5		S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Hieracium robinsonii</i>	Robinson's Hawkweed	Yellow	3	G2G3		S2
<i>Hirundo rustica</i>	Barn Swallow	Yellow	4 (3)	G5	T	S3B
<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Yellow	3	G4T4	SC	S2N
<i>Hudsonia ericoides</i>	Pinebarren Golden Heather	Yellow	3	G4		S1
<i>Hudsonia tomentosa</i>	Woolly Beach-heath	Red	4 (2)	G5		S1, S3
<i>Humulus lupulus var. lupuloides</i>	Common Hop	-	-	G5T5		S1?
<i>Hylocichla mustelina</i>	Wood Thrush	Green	4 (5)	G5	T	S1B
<i>Hypericum dissimulatum</i>	Disguised St John's-wort	Yellow	3	G5		S2S3
<i>Icterus galbula</i>	Baltimore Oriole	Green	4 (2)	G5		S2B, S2S3B
<i>Impatiens pallida</i>	Pale Jewelweed	Yellow	4 (3)	G5		S2
<i>Iris prismatica</i>	Slender Blue Flag	Red	2	G4G5		S1
<i>Juncus acuminatus</i>	Sharp-fruited Rush	Undetermined	4 (3)	G5		S3S4
<i>Juncus alpinoarticulatus ssp. nodulosus</i>	Alpine Rush	-	-	G5T5?		S1S2
<i>Juncus dudleyi</i>	Dudley's Rush	Yellow	4 (3)	G5		S2?
<i>Juncus greenei</i>	Greene's Rush	Red	3 (2)	G5		S1S2
<i>Juncus subcaudatus</i>	Woodland Rush	Undetermined	3	G5		S3
<i>Juncus trifidus</i>	Highland Rush	Yellow	4 (3)	G5		S2
<i>Juncus vaseyi</i>	Vasey's Rush	Undetermined	4 (2)	G5?		S1
<i>Lampsilis radiata</i>	Eastern Lampmussel	Green	4 (3)	G5		S2
<i>Lanthus parvulus</i>	Northern Pygmy Clubtail	Yellow	4	G4		S3
<i>Laportea canadensis</i>	Canada Wood Nettle	Yellow	4 (3)	G5		S3
<i>Larus</i>	Ring-billed Gull	Green	4	G5		S1?B,S5N,

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>delawarensis</i>						S1B,S5N
<i>Leptogium corticola</i>	Blistered Jellyskin Lichen	Yellow	3	G3G5		S2S3
<i>Leptogium teretiusculum</i>	Beaded Jellyskin Lichen	-	4 (3)	G4G5		S2S3
<i>Lethe anhedon</i>	Northern Pearly-Eye	Green	4	G5		S3
<i>Lilium canadense</i>	Canada Lily	Yellow	4 (3)	G5		S2S3
<i>Limosa haemastica</i>	Hudsonian Godwit	Undetermined	4 (3)	G4		S3M, S3S4M
<i>Limosella australis</i>	Southern Mudwort	Yellow	4 (3)	G4G5		S2
<i>Lindernia dubia</i>	Yellow-seeded False Pimperel	Green	4	G5		S3S4
<i>Liparis loeselii</i>	Loesel's Twayblade	Green	4	G5		S2, S3S4
<i>Listera australis</i>	Southern Twayblade	Red	2	G4		S1, S2
<i>Lobelia kalmii</i>	Brook Lobelia	Yellow	4 (2)	G5		S1
<i>Luzula parviflora</i>	Small-flowered Woodrush	Green	4	G5		S3S4
<i>Lycaena dorcas</i>	Dorcas Copper	-	4	G5		S1
<i>Lycaena dospassosi</i>	Maritime Copper	-	4 (-)	G3G4		S2
<i>Lycaena hyllus</i>	Bronze Copper	Green	4	G5		S1
<i>Lynx canadensis</i>	Canadian Lynx	-	4 (1)	G5	NAR	S1
<i>Malaxis brachypoda</i>	White Adder's-Mouth	-	-	G4Q		S1
<i>Martes americana</i>	American Marten	Red	4 (1)	G5		S1
<i>Megalodonta beckii</i>	Water Beggarticks	Yellow	4 (3)	G4G5		S3
<i>Mergus serrator</i>	Red-breasted Merganser	Green	4	G5		S2B,S5N, S3B,S5N
<i>Microtus chrotorrhinus</i>	Rock Vole	Green	4	G4		S2
<i>Mimus polyglottos</i>	Northern Mockingbird	Green	4	G5		S2B, S3B
<i>Molothrus ater</i>	Brown-headed Cowbird	Green	4	G5		S2S3B, S3B
<i>Montia fontana</i>	Water Blinks	Red	4 (2)	G5		S1

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Morone saxatilis</i>	Striped Bass	Red	1	G5	E,E,SC	S1
<i>Morus bassanus</i>	Northern Gannet	Green	4	G5		SHB,S5M
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	Green	4 (2)	G5		S2B
<i>Myotis lucifugus</i>	Little Brown Myotis	Yellow	3	G3	E	S1
<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Yellow	4 (3)	G1G3	E	S1
<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil	Yellow	4 (3)	G5		S2
<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil	Green	4	G5		S3S4
<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil	Yellow	4 (3)	G5		S2
<i>Nannothemis bella</i>	Elfin Skimmer	Green	4	G4		S3
<i>Nephroma bellum</i>	Naked Kidney Lichen	Green	4 (3)	G3G5		S3?
<i>Numenius phaeopus hudsonicus</i>	Hudsonian Whimbrel	-	-	G5TNR		S3M
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Yellow	4 (2)	G5		S1B
<i>Nymphalis vaualbum j-album</i>	Compton Tortoiseshell	Green	-	G5T5		S1S2
<i>Oeneis jutta</i>	Jutta Arctic	Red	4 (2)	G5		S1, S3
<i>Oeneis jutta ascerta</i>	Jutta Arctic	-	-	G5T4		S1
<i>Oenothera fruticosa ssp. glauca</i>	Narrow-leaved Evening Primrose	-	-	G5T5		S2
<i>Ophiogomphus aspersus</i>	Brook Snaketail	Red	4 (2)	G4		S1
<i>Ophiogomphus carolus</i>	Riffle Snaketail	Green	4	G5		S3
<i>Ophiogomphus mainensis</i>	Maine Snaketail	Red	4 (2)	G4		S1

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely	Yellow	4 (2)	G5		S1, S2
<i>Packera paupercula</i>	Balsam Groundsel	Green	4	G5		S3
<i>Pantala hymenaea</i>	Spot-Winged Glider	Green	4 (3)	G5		S2B
<i>Parnassia palustris</i> var. <i>parviflora</i>	Marsh Grass-of-Parnassus	-	-	G5T4		S2
<i>Passerculus sandwichensis princeps</i>	Savannah Sparrow princeps ssp	Yellow	-	G5T2	SC	S1B
<i>Passerella iliaca</i>	Fox Sparrow	Green	4	G5		S3S4B
<i>Passerina cyanea</i>	Indigo Bunting	Green	4 (5)	G5		S1S2B
<i>Peltigera collina</i>	Tree Pelt Lichen	Undetermined	4 (3)	G3G4		S2S3
<i>Perisoreus canadensis</i>	Gray Jay	Yellow	4 (3)	G5		S3, S3S4
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	Green	4 (2)	G5		S3B, SHB,SNAN
<i>Phalacrocorax carbo</i>	Great Cormorant	Green	4 (3)	G5		S2B, S3
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	Green	4 (3)	G5		S3B, S3S4B
<i>Phocoena phocoena</i> (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	-	3 (-)	G4G5	SC	SNR
<i>Physconia detersa</i>	Bottlebrush Frost Lichen	-	4 (3)	G5?		S2S3
<i>Picoides arcticus</i>	Black-backed Woodpecker	Green	4 (3)	G5		S2, S3S4
<i>Picoides dorsalis</i>	American Three-toed Woodpecker	Green	4 (5)	G5		S1S2
<i>Pieris oleracea</i>	Mustard White	Undetermined	4 (3)	G4G5		S2, S3
<i>Pilea pumila</i>	Dwarf Clearweed	Red	4 (2)	G5		S1
<i>Pinicola enucleator</i>	Pine Grosbeak	Green	4 (2)	G5		S1?B,S4N S3?B,S5N
<i>Piranga olivacea</i>	Scarlet Tanager	Green	4 (5)	G5		S2B

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Plantago rugelii</i>	Rugel's Plantain	Undetermined	4 (5)	G5		S2
<i>Platanthera flava</i>	Tuberclad Orchid	Yellow	3	G4		S2
<i>Platanthera flava</i> <i>var. herbiola</i>	Tuberclad Orchid	-	-	G4T4Q		S1S2
<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid	Green	4	G5		S3
<i>Platanthera hookeri</i>	Hooker's Orchid	Green	4	G4		S3
<i>Platanthera macrophylla</i>	Large Round-Leaved Orchid	Yellow	3	G5T4		S2
<i>Platanthera orbiculata</i>	Small Round-leaved Orchid	Green	4	G5		S2, S3
<i>Platydictya jungermannioides</i>	False Willow Moss	-	4 (3)	G5		S2?
<i>Pluvialis dominica</i>	American Golden-Plover	Green	3	G5		S3?M, S3M
<i>Poa glauca</i>	Glaucous Blue Grass	Yellow	4 (3)	G5		S2S3
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Green	4 (3)	G5		S3B
<i>Poecile hudsonica</i>	Boreal Chickadee	Yellow	4 (3)	G5		S3
<i>Polygala sanguinea</i>	Blood Milkwort	Yellow	4 (3)	G5		S2S3
<i>Polygonia faunus</i>	Green Comma	Green	4	G5		S3
<i>Polygonia gracilis</i>	Hoary Comma	Yellow	4 (3)	G5		S1
<i>Polygonia interrogationis</i>	Question Mark	Green	4	G5		S3B
<i>Polygonia progne</i>	Grey Comma	Green	4	G4G5		S3S4
<i>Polygonia satyrus</i>	Satyr Comma	Yellow	4 (3)	G5		S2
<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb	Yellow	-	G5		S2
<i>Polygonum buxiforme</i>	Small's Knotweed	Undetermined	-	G5		S2S3
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	Green	4	G5		S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Polygonum raii</i>	Sharp-fruited Knotweed	Undetermined	-	G3G5Q		S1?, S2S3
<i>Polygonum robustius</i>	Stout Smartweed	Green	-	G4G5		S3S4
<i>Polygonum scandens</i>	Climbing False Buckwheat	Yellow	4 (3)	G5		S3
<i>Polygonum viviparum</i>	Alpine Bistort	Red	-	G5		S1
<i>Polystichum lonchitis</i>	Northern Holly Fern	Yellow	4 (3)	G5		S2
<i>Poocetes gramineus</i>	Vesper Sparrow	Yellow	4 (2)	G5		S1S2B, S2S3B
<i>Potamogeton friesii</i>	Fries' Pondweed	Undetermined	4 (2)	G4		S2
<i>Potamogeton nodosus</i>	Long-leaved Pondweed	Undetermined	4 (2)	G5		S1
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	Yellow	4 (3)	G5		S2S3
<i>Potamogeton praelongus</i>	White-stemmed Pondweed	Undetermined	4 (3)	G5		S3?
<i>Potamogeton pulcher</i>	Spotted Pondweed	Undetermined	2	G5		S1S2
<i>Potamogeton richardsonii</i>	Richardson's Pondweed	-	4 (2)	G5		S2S3
<i>Potamogeton zosteriformis</i>	Flat-stemmed Pondweed	Yellow	4 (3)	G5		S2S3
<i>Primula mistassinica</i>	Mistassini Primrose	Yellow	4 (3)	G5		S2
<i>Progne subis</i>	Purple Martin	Red	3 (2)	G5		S1B
<i>Proserpinaca palustris</i>	Marsh Mermaidweed	Green	4	G5		S3
<i>Proserpinaca palustris var. crebra</i>	Marsh Mermaidweed	-	-	G5T5		S3
<i>Proserpinaca</i>	Comb-leaved Mermaidweed	Green	4 (3)	G5		S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>pectinata</i>						
<i>Pseudognaphalium obtusifolium</i>	Eastern Cudweed	Green	4	G5		S1
<i>Puma concolor pop. 1</i>	Cougar - Eastern pop.	Undetermined	4 (5)	G5THQ	DD	SH
<i>Pyrola asarifolia</i>	Pink Pyrola	Green	4	G5		S2, S3
<i>Pyrola minor</i>	Lesser Pyrola	Yellow	4 (3)	G5		S2
<i>Rallus limicola</i>	Virginia Rail	Green	4 (5)	G5		S2B
<i>Ranunculus flammula var. flammula</i>	Lesser Spearwort	-	-	G5T4T5		S2
<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup	-	4	G5		S2, S3
<i>Rhamnus alnifolia</i>	Alder-leaved Buckthorn	Yellow	4 (3)	G5		S3, S3S4
<i>Rhynchospora capillacea</i>	Slender Beakrush	Red	4 (2)	G4		S1
<i>Ribes americanum</i>	Wild Black Currant	Undetermined	4 (5)	G5		S1
<i>Riparia riparia</i>	Bank Swallow	Green	4 (2)	G5		S3B
<i>Rosa palustris</i>	Swamp Rose	Green	4	G5		S3
<i>Rubus flagellaris</i>	Northern Dewberry	Undetermined	4 (5)	G5		S1?
<i>Rudbeckia laciniata</i>	Cut-Leaved Coneflower	Yellow	4 (3)	G5		S2
<i>Rudbeckia laciniata var. gaspereaensis</i>	Cut-Leaved Coneflower	-	4 (3)	G5TNR		S2
<i>Rumex salicifolius var. mexicanus</i>	Triangular-valve Dock	-	-	G5T5		S2
<i>Sagina nodosa ssp. borealis</i>	Knotted Pearlwort	-	-	G5T5		S1S2
<i>Salix candida</i>	Sage Willow	Red	4 (2)	G5		S1
<i>Salix pedicellaris</i>	Bog Willow	Yellow	4 (3)	G5		S2
<i>Salix pellita</i>	Satiny Willow	Undetermined	4 (5)	G5		S2S3
<i>Salix petiolaris</i>	Meadow Willow	Green	4	G5		S1S2, S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Salmo salar</i>	Atlantic Salmon	Red	4 (2)	G5		S2
<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Red	4 (2)	G5TNR	E	S2
<i>Samolus valerandi ssp. parviflorus</i>	Seaside Brookweed	Yellow	-	G5T5		S1, S2
<i>Sanguinaria canadensis</i>	Bloodroot	Green	4	G5		S3S4
<i>Sanicula odorata</i>	Clustered Sanicle	Red	4 (2)	G5		S1
<i>Satyrium acadica</i>	Acadian Hairstreak	Undetermined	4 (5)	G5		S1, S1S2
<i>Satyrium liparops</i>	Striped Hairstreak	Undetermined	4 (5)	G5		S3
<i>Saxifraga paniculata ssp. neogaea</i>	White Mountain Saxifrage	-	-	G5T5?		S2
<i>Sayornis phoebe</i>	Eastern Phoebe	Green	4 (3)	G5		S3S4B
<i>Scirpus pedicellatus</i>	Stalked Bulrush	Undetermined	4 (5)	G4		S1
<i>Scrophularia lanceolata</i>	Lance-leaved Figwort	Undetermined	4 (5)	G5		S1
<i>Senecio pseudoarnica</i>	Seabeach Ragwort	Yellow	4 (3)	G5		S2
<i>Shepherdia canadensis</i>	Soapberry	Yellow	4 (3)	G5		S2
<i>Sialia sialis</i>	Eastern Bluebird	Yellow	4 (3)	G5	NAR	S3B
<i>Sisyrinchium angustifolium</i>	Narrow-leaved Blue-eyed-grass	Green	4	G5		S3S4
<i>Solidago hispida</i>	Hairy Goldenrod	Red	4 (2)	G5		S1?
<i>Solidago simplex var. randii</i>	Sticky Goldenrod	-	-	G5T4		SH
<i>Somatochlora forcipata</i>	Forcipate Emerald	Undetermined	4 (2)	G5		S1
<i>Somatochlora franklini</i>	Delicate Emerald	Undetermined	4 (3)	G5		S1
<i>Somatochlora</i>	Kennedy's Emerald	Undetermined	4 (2)	G5		S1

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>kennedyi</i>						
<i>Sorex dispar</i>	Long-tailed Shrew	Yellow	3	G4	NAR	S1
<i>Sparganium hyperboreum</i>	Northern Burreed	Yellow	4 (3)	G5		S1S2
<i>Sparganium natans</i>	Small Burreed	Green	4	G5		S1, S3
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	Green	4	G5		S2, S3S4
<i>Spiranthes lucida</i>	Shining Ladies'-tresses	Red	4 (2)	G5		S2
<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses	Yellow	3	G4		S1
<i>Stellaria crassifolia</i>	Fleshy Stitchwort	Red	4 (2)	G5		SH
<i>Stellaria humifusa</i>	Saltmarsh Starwort	Yellow	4 (3)	G5?		S1, S2
<i>Stellaria longifolia</i>	Long-leaved Starwort	Yellow	4 (3)	G5		S3
<i>Sterna dougallii</i>	Roseate Tern	Red	1	G4	E	S1B
<i>Sterna hirundo</i>	Common Tern	Yellow	4 (3)	G5	NAR	S2B, S3B
<i>Sterna paradisaea</i>	Arctic Tern	Yellow	4 (2)	G5		S3B
<i>Sticta fuliginosa</i>	Peppered Moon Lichen	Yellow	4 (3)	G3G5		S3?
<i>Stuckenia filiformis</i>	Thread-leaved Pondweed	Undetermined	4 (5)	G5		S1
<i>Stuckenia filiformis ssp. alpina</i>	Thread-leaved Pondweed	-	-	G5T5		S1, S2S3
<i>Suaeda calceoliformis</i>	Horned Sea-blite	Green	4	G5		S1?, S2S3
<i>Suaeda maritima ssp. richii</i>	White Sea-blite	-	-	G5T3		S1
<i>Sympetrum danae</i>	Black Meadowhawk	Green	4 (3)	G5		S1, S3
<i>Symphyotrichum boreale</i>	Boreal Aster	Yellow	4 (3)	G5		S2, S2?
<i>Symphyotrichum ciliolatum</i>	Fringed Blue Aster	Yellow	4 (3)	G5		S2S3
<i>Synaptomys</i>	Southern Bog Lemming	Green	4	G5		S3S4

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>cooperi</i>						
<i>Tetradontium brownianum</i>	Little Georgia	-	4 (3)	G3G4		S1
<i>Teucrium canadense</i>	Canada Germander	Yellow	4 (3)	G5		S3
<i>Thorybes pylades</i>	Northern Cloudywing	Yellow	4 (3)	G5		S2
<i>Thuja occidentalis</i>	Eastern White Cedar	Red	4 (1)	G5		S1S2, S3S4
<i>Tiarella cordifolia</i>	Heart-leaved Foamflower	Yellow	4 (3)	G5		S2
<i>Toxostoma rufum</i>	Brown Thrasher	Green	4 (5)	G5		S1?B
<i>Triantha glutinosa</i>	Sticky False Asphodel	Red	4 (5)	G4G5		S1
<i>Triglochin gaspensis</i>	Gasp, Arrowgrass	Undetermined	4 (5)	G3G4		S1?, S2S3
<i>Tringa melanoleuca</i>	Greater Yellowlegs	Green	4 (3)	G5		S3B,S5M
<i>Tringa semipalmata</i>	Willet	Green	4 (2)	G5		S2S3B
<i>Tringa solitaria</i>	Solitary Sandpiper	Green	4	G5		S1?B,S4S5 M
<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed	Yellow	4 (3)	G5		S2
<i>Trisetum spicatum</i>	Narrow False Oats	Green	4	G5		S3S4
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Green	4 (3)	G5		S3B, S3S4B
<i>Usnea mutabilis</i>	Bloody Beard Lichen	-	3	G5		S2S3
<i>Utricularia gibba</i>	Humped Bladderwort	Yellow	4	G5		S3S4
<i>Vaccinium boreale</i>	Northern Blueberry	Red	4 (2)	G4		S2
<i>Vaccinium caespitosum</i>	Dwarf Bilberry	Yellow	4 (3)	G5		S2
<i>Verbena hastata</i>	Blue Vervain	Green	4	G5		S3
<i>Vermivora peregrina</i>	Tennessee Warbler	Green	4 (3)	G5		S3B, S3S4B
<i>Veronica serpyllifolia ssp. humifusa</i>	Thyme-leaved Speedwell	-	-	G5T5?		S2S3

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

Scientific Name	Common Name	General Status of Wild Species Rankings		ACCDC		
		NS (color)	National (numerical)	GRAN K	NPRO T	SRANK
<i>Viburnum edule</i>	Squashberry	Yellow	4 (3)	G5		S3
<i>Viola canadensis</i>	Canada Violet	Extirpated	4 (0.1)	G5		S1
<i>Viola nephrophylla</i>	Northern Bog Violet	Yellow	4 (3)	G5		S1S2, S2
<i>Vireo gilvus</i>	Warbling Vireo	Green	4 (5)	G5		S1?B
<i>Vireo philadelphicus</i>	Philadelphia Vireo	Green	4 (5)	G5		S1S2B, S2?B
<i>Wilsonia canadensis</i>	Canada Warbler	Yellow	1	G5	T	S3B
<i>Wilsonia pusilla</i>	Wilson's Warbler	Green	4 (3)	G5		S1?B, S3S4B
<i>Woodsia glabella</i>	Smooth Cliff Fern	Yellow	4 (3)	G5		S2
<i>Zizia aurea</i>	Golden Alexanders	Yellow	4 (2)	G5		S1

APPENDIX D
NOVA SCOTIA MUSEUM REPORT
HERITAGE AND BIOLOGICAL RESOURCES



**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 13-08-28a
James River 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 NSM Zoological records and note that there are no records of species with conservation concern for the footprint outlined.

There are, however, records of the following species that do have such concerns in the general area.

Little Brown Bat (*Myotis lucifugus*) ENDANGERED
Northern Long-eared Bat (*Myotis septentrionalis*) ENDANGERED

There are nesting records for the following bird species of concern.

Long-eared owl (*Asio otus*) provincially yellow-listed
Northern Goshawk (*Accipiter gentilis*) provincially yellow-listed
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
Olive-sided flycatcher (*Contopus borealis*) provincially yellow-listed
Barn swallow (*Hirundo rustica*) provincially yellow-listed
Gray Jay (*Perisoreus Canadensis*) provincially yellow-listed
Boreal chickadee (*Parus hudsonicus*) provincially yellow-listed
Canada warbler (*Wilsonia Canadensis*) provincially yellow-listed
Bobolink (*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 proposed area with respect to plant species at risk. The following plants are known from the vicinity of James River and should be considered prior to any development of the turbine sites or access roads.

Allium tricoccum Red
Bidens hyperborean Yellow
Campanula aparinoides Yellow
Carex tinctoria Red
Eleocharis flavescens Yellow
Erigeron hyssopifolius Yellow
Fraxinus nigra Yellow
Hudsonia tomentosa Red
Lilium canadense Yellow
Potamogeton nodosus Red
Potamogeton obtusifolia Yellow
Teucrium canadense Yellow

Triosteum aurantiacum Yellow

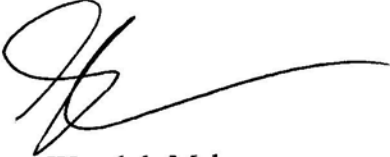
The presence/absence of the above species should be determined when identification is certain and the results should be stated in the final report.

Paleontology

Staff have reviewed the file and found that the expansion will affect Devonian-Carboniferous aged granite and possibly rocks from the Precambrian-aged James River Formation. Neither groups of rocks contain any known 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

Environmental Sample Analysis Report

Report Date: 21-Jun-13 Report Number: A0395

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

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	pH	Type of Sample	Detection Limit	Sample Comments
L2013-35	CRM	James River	CRM	6/20/2013	6/20/2013	7.0	STD	0.1	CRM = 7.01
L2013-35	Site 1	James River	Stream Water	6/20/2013	6/20/2013	5.4	REG	0.1	
L2013-35	Site 2	James River	Upper Pond	6/20/2013	6/20/2013	5.8	REG	0.1	
L2013-35	Site 2 (dup)	James River	Upper Pond	6/20/2013	6/20/2013	5.8	DUP	0.1	
L2013-35	Site 3	James River	Lower Pond	6/20/2013	6/20/2013	7.5	REG	0.1	
L2013-35	Site 4	James River	Headwater of Stream	6/20/2013	6/20/2013	7.5	REG	0.1	Some particles present
L2013-35	Site 5	James River	Stream	6/20/2013	6/20/2013	7.6	REG	0.1	Some particles present

Name of Analyst: Rene Landry

Analyses reviewed by: JL

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: A0396

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comments
L2013-35	Site 1	James River	Stream Water	6/20/2013	6/21/2013	0.5	REG	0.5 mg/L	
L2013-35	Site 2	James River	Upper Pond	6/20/2013	6/21/2013	<0.5	REG	0.5 mg/L	
L2013-35	Site 3	James River	Lower Pond	6/20/2013	6/21/2013	2.0	REG	0.5 mg/L	
L2013-35	Site 4	James River	Headwater of Stream	6/20/2013	6/21/2013	4.5	REG	0.5 mg/L	
L2013-35	Site 5	James River	Stream	6/20/2013	6/21/2013	7.5	REG	0.5 mg/L	
L2013-35	Site 4 (dup)	James River	Headwater of Stream	6/20/2013	6/21/2013	4.5	DUP	0.5 mg/L	
L2013-35	CRM	James River	CRM	6/21/2013	6/21/2013	210.0	STD	0.5 mg/L	CRM = 213 mg/L
L2013-35	Blank	James River	Deionized Water	6/21/2013	6/21/2013	<0.5	BLANK	0.5 mg/L	

Name of Analyst: R. 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.