

## **APPENDIX D**

### **BIOPHYSICAL ASSESSMENT REPORT (ENVIROSPHERE, 2014)**

Environmental Assessment Registration  
Document for Irish Cove Quarry Expansion

Biophysical Assessment of the  
Irish Cove Quarry Expansion—  
195 Irish Cove Road  
Irish Cove, Richmond County, NS

PID 75075309 & 75204032

Submitted to:

Municipal Enterprises Limited  
Bedford, Nova Scotia

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## **1 INTRODUCTION**

Municipal Enterprises Limited, Waverley, Nova Scotia, is proposing to expand its quarry in the Irish Cove area of Richmond County, near St. Peters in eastern Cape Breton, Nova Scotia. An approval to expand the quarry, which opened in the Fall of 2010, is required under the Environmental Assessment Regulations of the Nova Scotia Environment Act. Municipal Enterprises Limited contracted EnviroSphere Consultants Limited of Windsor, Nova Scotia, to prepare a biophysical and socio-economic 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 assessment provides a sufficient level of detail to ensure that all information necessary to allow adequate review of the project is provided; to demonstrate how the assessment was conducted; and to document the information on which the conclusions were based.

## **2 INFORMATION SOURCES**

Information for the biophysical and socio-economic overview and assessment was collected from various sources, including interviews with representatives of the Department of Natural Resources, Nova Scotia Department of Aquaculture and Fisheries (NSDAF), Fisheries and Oceans Canada, contacts with organizations, businesses and individuals in the Irish Cove area; review of existing published information including soil surveys, reports on geology and natural history (e.g. *Natural History of Nova Scotia*); use of relevant websites and databases (DNR Significant Habitat and Wetland Databases, Atlantic Canada Conservation Data Centre, and Nova Scotia Museum of Natural History); use of maps, digital data on land use and property ownership, aerial photos, and 1:50,000 topographic maps. Site visits and walkovers by project personnel were carried out on October 26, 2013 (Fall botany survey), June 19-20 (site reconnaissance, spring botany, owls, breeding birds and fish). Key project personnel included Patrick Stewart, M.Sc. and Heather Levy, BSc. Hons (site reconnaissance, water quality & fish habitat); botany surveys (Ms. Ruth Newell M.Sc. and Mr. Jim Jotcham M.Sc., Fall (2013) and Spring (2014) respectively); and bird surveys (a daylight walkover, a night owl survey and a dawn songbird survey) were conducted by Mr. Fulton Lavender, Halifax, Nova Scotia (June 19-20, 2014).

## **3 SITE LOCATION AND STUDY AREA**

The Irish Cove Quarry, which is the subject of this biophysical assessment, is near the community of Irish Cove, located ~25 km northeast of St. Peters, Nova Scotia, PIDs 75075309 & 75204032 approximately 1 km east of Hwy 4 and the eastern shore of East Bay, Bras d'Or Lakes, 1:50000 NTS 11F-15, Northing: 5075672, Easting: 681557, Zone UTM Zone 20. The site is visible in aerial 1:10000 imagery (Air Photo 2008 306\_207, July 6, 2008, prior to quarry development), and Google Earth satellite imagery from July 2012 (after quarry construction)(Figures 1 & 2). The site occupies the east end of the study area along the northeast side of Irish Cove Rd., with the proposed expansion extending northwest from the present footprint. The focus area for the assessment is shown on Figure 2 and Map A-1, Appendix A. The quarry is shown in Figures 3 & 4.



Figure 1. Project location.



Figure 2. Project location. Based on Google Earth image, July 22, 2012.





Figure 3. Northward view of Irish Cove Quarry, September 2011. Revegetated areas and berm along Irish Cove road are bright green.



Figure 4. Northeast view of Irish Cove Quarry, August 2014.

## 4 EXISTING ENVIRONMENT

### 4.1 PHYSICAL ENVIRONMENT

#### 4.1.1 CLIMATE

The East Bay Hills of the eastern shore of the Bras d'Or Lakes—where the Irish Cove Quarry is located – has a modified continental climate, moderately warm in the summer and cold in the winter, influenced by the predominance of land surfaces and lakes, but not as much by the Atlantic Ocean. Temperatures are moderate, with an annual average of 5.9° C. (measured at Sydney, though probably higher locally), highest in August (18.0° C.) and –5.9° C. in February, the coldest month. Precipitation in the area comes predominantly as rain, highest in April-May and in October-November, with annual precipitation of 1520 mm (Figure 5)(Canadian Climate Normals 2014). In summer, the warm lake waters prevent the formation of sea fog but radiation fog can develop locally, and the lake is ice-covered in winter. Winds are generally strongest in winter, predominantly from the west (November-April) shifting to the southwest in May-October (TDC 1991). Presence of the broad expanse of open water of the Bras d'Or Lakes leads to elevated wind speeds, particularly from the west and northwest, and the steep-sided valleys of rivers such as Irish Cove Brook, along which the quarry is located, lead to funnelling of winds up the valley causing higher than normal winds and gusts at the quarry site.

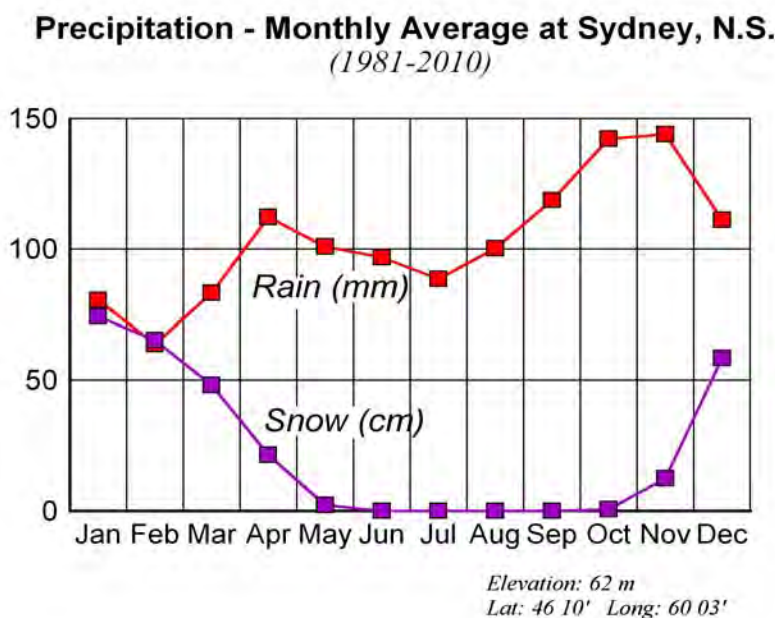


Figure 5. Annual precipitation cycle for Irish Cove Quarry using observations from Sydney (1981-2010).

#### 4.1.2 TOPOGRAPHY AND GEOLOGY

The eastern coastline of the Bras d'Or Lake at Irish Cove is dominated by the East Bay Hills, formed from faulted blocks of Precambrian rock which rise steeply from the coast, reaching 160-180 m elevation on an upland plateau within 2 km. The plateau surface is flat to rolling and slopes gradually downward to

the east to the central lowlands of eastern Cape Breton, where several large lakes, in particular Lake Uist and Loch Lomond, are found. The largely poorly drained surfaces of the uplands are smooth to undulating with a high incidence of bog and swamp wetlands and conifer dominated landscape, with steep slopes and incised stream valleys around the upland margin. The East Bay Hills are divided by deep valleys of major rivers flowing into the Bras d'Or in the area, including, from south to north, Irish Cove Brook, Jim MacDonalds Brook, MacNeils Brook and McIntyre Brook in back of Big Pond.

Dominant bedrock formations at the site include Forchu East Bay Hills Group (tuff, basalt, rhyolite, slate, quartzite and greywacke) and intrusive granites (Figure 6). Windsor Group deposits of limestone, which were quarried at one time, are exposed at the coast in East Bay (Figure 6). Glacial till deposits overlie the basal bedrock, in thin and varying thicknesses, characterized as a stony till plain (Stea et al 1992)(Figure 7). Deposits and associated soils reflect proximity to the bedrock types from which they were developed.

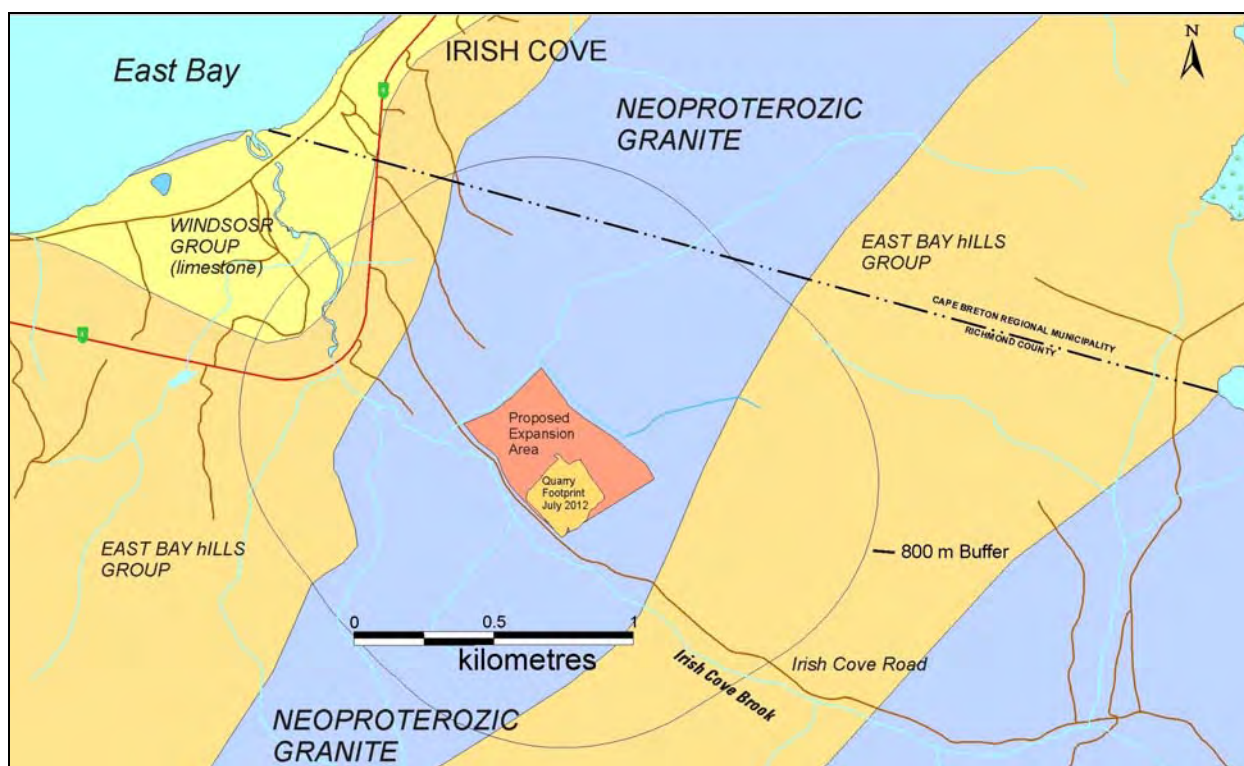


Figure 6. Bedrock geology of the vicinity of the Irish Cove Quarry (From Keppie 2002).



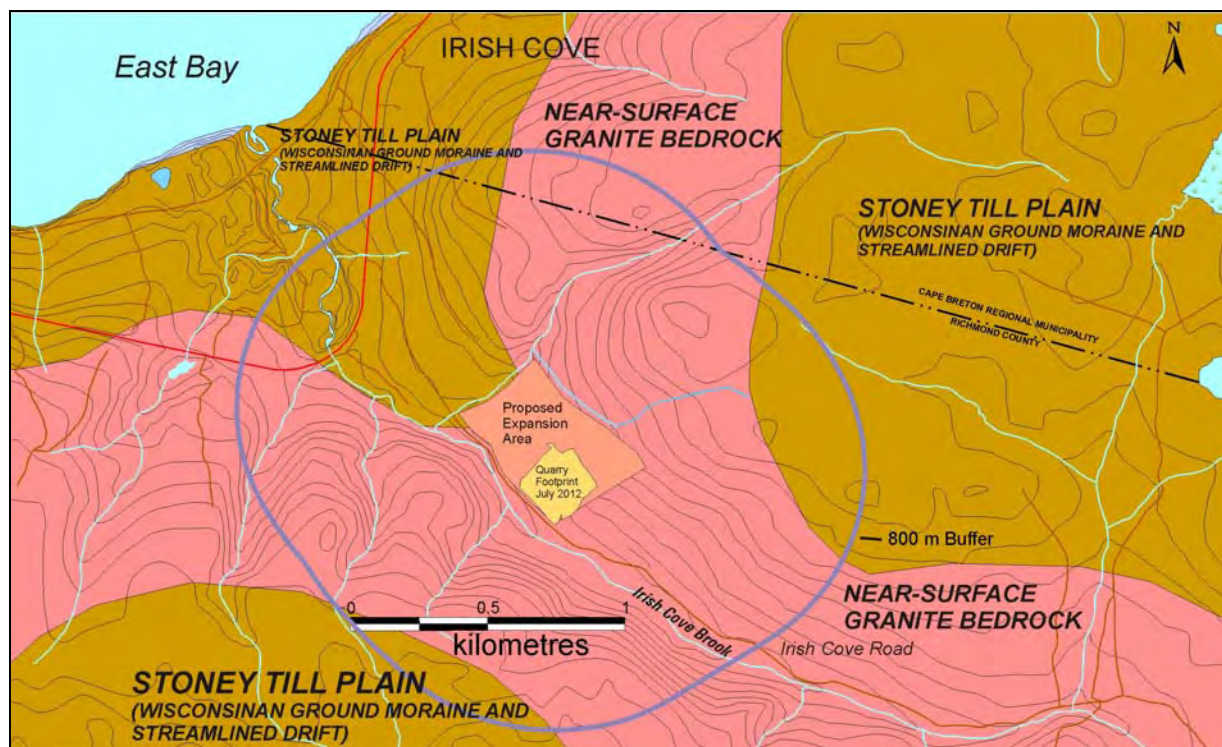


Figure 7. Surficial geology of the East Bay Hills in the vicinity of the Irish Cove Quarry (from Stea et al. 1992 and digital version).

#### 4.1.3 AIR QUALITY, NOISE & LIGHT

Irish Cove Quarry is surrounded by intact or logged forest, wilderness, and the open expanse of the Bras d'Or Lakes, extending in all directions, and is expected to have a relatively high natural baseline air quality typical of areas with low levels of human activity. Traffic on the adjacent Highway 4 and low levels of vehicle use by properties in Irish Cove, are the only significant contributor to particulates and exhaust emissions—contributing a low level; while quarry activities can lead to periodic dust and vehicle exhaust emissions. The quarry and associated movement of trucks and equipment, as well as vehicular traffic on Highway 4, as well as logging, which can take place periodically in the area, provide the main sources of noise in the area, of which the quarry is probably a minor contributor. There is no through traffic on Irish Cove Road, which is an un-maintained woods trail used principally and occasionally as a logging road. A proposed wind project (East Bay Hills Wind Project), with its most western turbines some 1300 m from the proposed quarry expansion, may contribute a low level of noise in the area (Figure 8). Operations at the quarry can probably be heard on Highway 4 due to the proximity (800 m) but noise levels reaching the coast and homes in Irish Cove (the nearest residence is approximately 1.2 km) are probably minor. Operations at the quarry are periodic in response to demand for product. Blasting occurs typically one to two times per year; operation of the crusher or crushers could take place periodically for several months at a time; and transport of product using trucks and heavy loading equipment would occur on an as required basis. Typical noise includes blasting, and sound from crusher and other heavy equipment operations (e.g. motors, back-up signals etc). All trucks leaving the site are required to follow best operational practices to minimize noise and to cover loads to minimize dust release. Noise levels

arising from the quarry are small and the levels generated by the quarry will be relatively limited and similar to those produced by the existing quarry operations at the site.

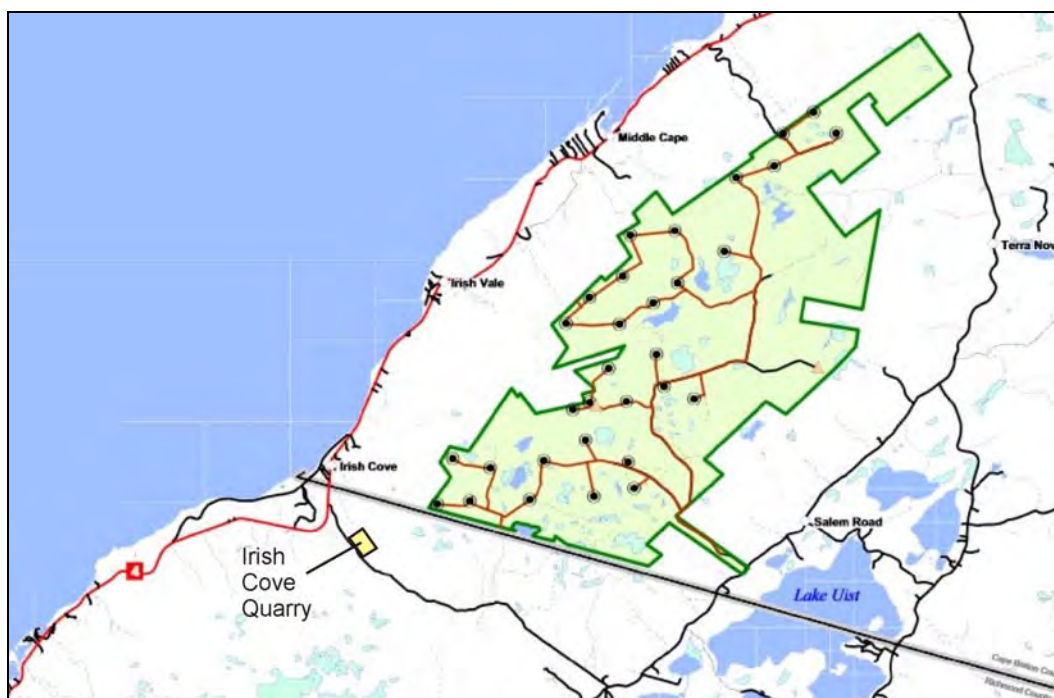


Figure 8. Proposed East Bay Hills Wind Project in relation to Irish Cove Quarry. Wind Project Map from McCallum Environmental (2014).

#### 4.1.4 HYDROLOGY

Irish Cove Quarry is located in the lower watershed of, and overlooking Irish Cove Brook, a second order stream, which drains the upland at the site. The Brook continues for a distance east-west to the Bras d'Or Lakes, and is oriented north-south on the east to its origin near Rear Irish Cove Lakes (Maps A1 & A5). Downstream of the site, Irish Cove Brook flows northwest, crossing under Hwy 4 and through a former limestone quarry prior to emptying into the Bras d'Or Lake. Flows can be strong in the Brook and tributaries due to steep gradients and the predominant substrate is bedrock.

Several first order streams visible on 1:50,000 mapping flow in steep ravines into Irish Cove Brook from the upland above the quarry. An unnamed first order stream flows south in a sharply incised ravine immediately beyond the west border of the proposed expansion area (Figure 9). A second, smaller, stream formerly flowed through the site of the present quarry; this stream was diverted in 2013 in consultation with federal and provincial authorities, and now flows due west for ~400 m along the north side of the expansion area where it drops precipitously to enter the larger stream (Figures 10-15)<sup>1</sup>. The streambed of the original stream is still present in a shallow ravine between the diversion berm and the present quarry,

<sup>1</sup> The diversion consists of a berm of overburden which aligned with the northeast border of the proposed expansion area. Substrate under the stream is mainly exposed bedrock, which was near the surface at the site. The diversion was constructed with Federal and Provincial approvals, and through consultation with appropriate agencies.



and supports a low flow derived from local runoff and groundwater input. This flow is absorbed in the bed of the quarry, where it enters groundwater, with negligible surface flow exiting the quarry on the south side next to Irish Cove Brook below the road.



Figure 9. Northwest unnamed stream immediately above Irish Cove Road, June 19, 2014.



Figure 10. Start of stream diversion, showing origin and location of water sampling location WS2, June 19, 2014.





Figure 11a. View of diversion channel looking upstream towards origin.



Figure 11b. Diverted stream along the northeast side of the project area, June 19, 2014.





Figure 12. Downslope base of diversion berm, looking west. June 19, 2014.



Figure 13. Cleared access area for stream diversion, looking downhill to west. For location, see Figure 18.





Figure 14. Northwest end of diversion where it flows into ravine of unnamed stream.

Surface water runoff from the immediate site, springs, and seepage from under the berm of the stream diversion forms into several small intermittent flowages, one on the east side of the existing quarry, and several which flow west southwest across the slope in the proposed quarry area (Figures 15-18), and combine to flow down a ravine into the stream on the west end of the property. In places these flowages have run for short distances following a former woods trail (probably used for logging equipment) which crosses the property and exits on the north side of Irish Cove Road where it crosses the western stream. Seepage and intermittent flow was also observed on the eastern grubbed marginal area of the existing quarry.





Figure 15. Southeast slope of Irish Cove Quarry showing revegetated margin, and seepage channels in path, June 19, 2014.



Figure 16. Flowage in northwestern section of proposed expansion area, June 19, 2014.





Figure 17. Junction of flowage and ravine with northwest unnamed stream, June 19, 2014.

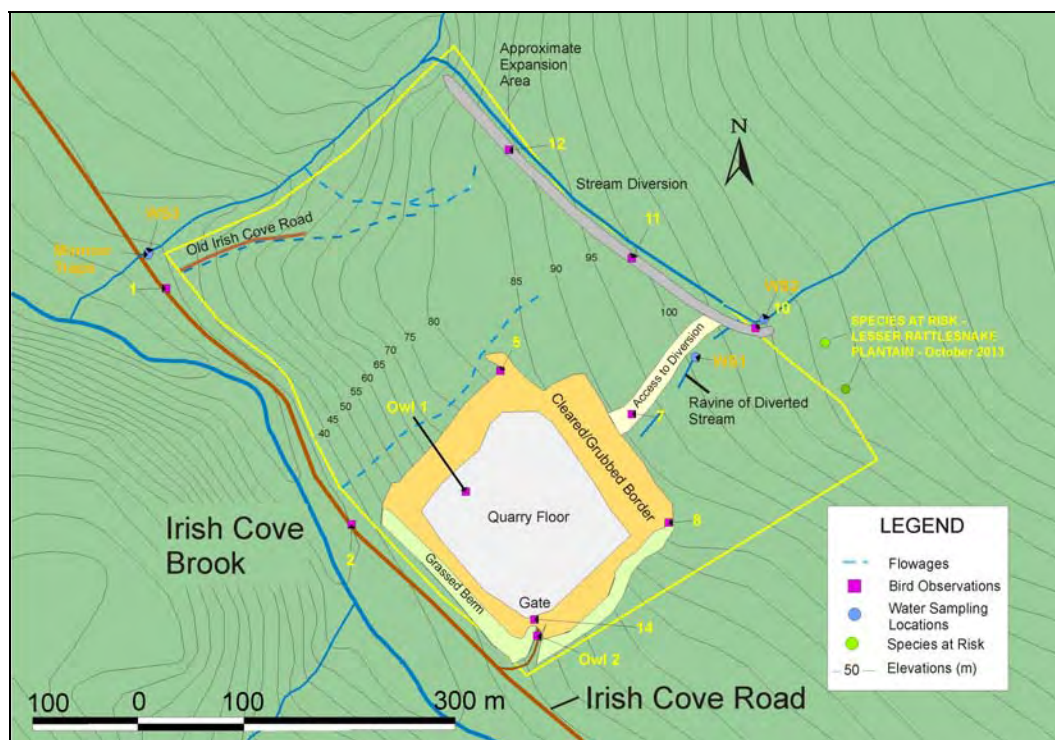


Figure 18. Site features, observation & sampling locations, and species at risk, Irish Cove Quarry, 2014.

#### **4.1.5 HYDROGEOLOGY**

Groundwater develops predominantly subsurface in cracks and fractures, in horizontal surfaces between strata in bedrock at the site; as well as in till which can accumulate in some locations in the general area. A combination of both types is expected at the site. The natural water table is likely depressed due to the presence of an adjacent valley, and groundwater flow is expected mirror topographic slope, which is downslope towards Irish Cove Brook. The site is underlain by unconsolidated surficial materials—specifically glacial till with a stony, sandy matrix derived from local bedrock sources. Till in the area is estimated to be between 2 and 20 metres thick (Stea et al 1992). Bedrock consists of intrusive granites of the Huntington Mountain Formation of Sturtian to Early Cambrian age (Keppie et al 2000). It is anticipated that the bedrock aquifer will exhibit fracture flow. The existing quarry area has disturbed and altered surface and shallow groundwater to a degree, shifting the flow to the southwest to Irish Cove Brook, which eventually flows northwest towards the Bras d’Or Lakes. Shallow groundwater is expected to discharge to the on-site surface water control structures at the quarry, and ultimately to surface waters. The actual depth of the bedrock water table at the quarry site is not known, but it has not been encountered during previous quarry operations, and it is not anticipated that the quarry expansion will reach the bedrock water table.

Potable water wells in the general vicinity of Irish Cove use the deeper bedrock groundwater regime. No wells are recorded in the NSE well log database within 800 m of the quarry property, and only 21 wells within 10 km of the site, with the nearest well on Highway 4 in Irish Cove, approximately 1.5 km from the quarry (confirmed by a reconnaissance survey of the area).

#### **4.1.6 SOILS**

Soils at the site belong to the Thom formation, which typically are podzols derived from moderately coarse-textured glacial till over metamorphic and granitic bedrock. Soils are very stoney and not suitable for agriculture but drainage is good. Typical topography is strongly rolling to hilly north of the site, to undulating to gently rolling to the south. The Millbrook soil formation occurs over the sedimentary deposits around Irish Cove. These are imperfectly drained, gleyed podzols derived from dark reddish brown gravely clay loam till. These are only moderately stoney and largely unsuitable for agriculture (Cann et al 1963).

### **4.2 BIOLOGICAL RESOURCES AND HABITAT**

#### **4.2.1 TERRESTRIAL ENVIRONMENT**

The quarry has been developed on the southwestern slope of a steep hill where it meets the valley of Irish Cove Brook (Figure 4). Land slopes steeply up from Irish Cove Road (approximately 1:3 and 1:5 on the northwest corner), levels off in the centre of the expansion area to 1:10 and then continues fairly steeply (1:6) towards the upland northeast of the property (Figure 18; Appendix A, Map A-5). As part of the development of the quarry, Irish Cove Road has been widened to handle quarry traffic, and is separated from the foot of the slope by a ditch and several culverts which channel runoff under the road (Figures 19

& 20). A widened area of the road near the west end of the proposed expansion area separates the main road bed from Irish Cove Brook; this expanded area was present prior to the establishment of the quarry (Figure 21). An isolating and grassed berm separates the quarry from the road (Figures 3 & 19). The active quarry floor, defined by abrupt cliff faces, is bordered by a grubbed area in preparation for further quarrying activities (Figure 15). Grubbings have been largely distributed on the southeastern side, and levelled to form a hydroseeded border and occupied by natural set of local species. The southeast border of the property rises abruptly 50 m to elevations of 90-100 m near the northeast corner of the quarry footprint.



Figure 19. Berm separating present quarry from Irish Cove Road, June 19, 2014.





Figure 20. Irish Cove Road at base of slope on west end of proposed expansion area, June 19, 2014.



Figure 21. Pre-existing widened portion of Irish Cove Road and Irish Cove Brook, near west end of proposed expansion area, June 19, 2014.

Land in the area has a fairly uniform topography, becoming irregular, with the presence of short, steep-sided ravines, where the land slopes steepest to the south and west. Land is rocky with occasional erratics. Locally the area is predominantly forested or occupied by swamp, and boggy terrain, or steep forested



slopes, with a high proportion of undisturbed lands, and with cleared agricultural land along Highway 4 and the adjacent coast in Irish Cove. Dominant forest type is mixed deciduous (red maple, beech, white and yellow birch, white spruce and Balsam fir) in well-drained areas; and red maple in more poorly drained ones (Davis & Browne 1997). At the quarry site, most of the property has been cut over, and supports an uneven-aged stand with some mature trees (e.g. Yellow Birch and Eastern Hemlock) (Figure 22) (Appendix B). The northeast section is occupied by the characteristic mixed forest type dominated by Sugar and Red Maple, Balsam Fir, Yellow Birch and Eastern Hemlock, including Mountain & Moose Maple, Heart-leaved Birch, Red Spruce, American Beech and White pine (Figure 22).

The western section of the proposed expansion area is occupied mainly by a regenerated softwood stand (Balsam Fir) with occasional old deciduous trees (Sugar Maple and Yellow Birch), with hardwood species occupying the steep slopes of ravines associated with local watercourses. Ground cover is principally mossy, with various dry upland herb species (e.g. Goldthread, Bunchberry, Starflower), commonly occurring (Figures 23 & 24). North of the site (i.e. north of the stream diversion) are predominantly softwoods, which have regenerated after previous harvesting.



Figure 22. Hardwood forest in northeast section of property, June 19, 2014.





Figure 23. Regenerated softwoods (Balsam Fir) in northwest section of property, June 19, 2014.



Figure 24. Ground cover of mosses and herbs in softwood forest, June 19, 2014.

#### 4.2.2 AQUATIC ENVIRONMENT

No major water bodies or first and higher order streams are found in association with the existing quarry and in the proposed quarry expansion area. As noted earlier (Section 4.1.4), a first order stream, which crossed the quarry, was diverted to flow past the proposed expansion area on the north side (Figures 11 & 25). Flowages crossing the site are intermittent, originating on site. Irish Cove Brook is a major second



order river adjacent to the site. Irish Cove Brook is the main significant stream in the area, running along the southwest side of the quarry.



Figure 25. Remaining bed of diverted stream between diversion channel and quarry, June 19, 2014.

#### 4.2.3 WATER QUALITY

Surface waters at the quarry were similar in water quality characteristics, and were low in conductivity, slightly below neutral in acidity (pH ranging from 6.2 to 6.7), and low in suspended sediments (Table 1).

Table 1. Water quality measurements at Irish Cove Quarry. For locations see Figure 18. Samples at WS1, WS2 & WS3 were taken at 1330, 1405 & 1745 hrs respectively.			
Site Location & Date	June 19, 2014		
	WS1 Abandoned Stream	WS2 Stream Upstream of Diversion	WS3 Western Stream Upstream of Road
Temperature °C	10.3	10.4	10.5
Oxygen Saturation (%)	91.4	91.9	96.4
Dissolved Oxygen (mg/L)	10.3	10.3	10.7
Conductivity (µs)	28.3	20.5	20.1
Specific Conductivity (25°) (µs)	39.2	28.4	27.9
TSS (mg/L)	2.0	<0.5	0.5
pH	6.7	6.3	6.5
Turbidity & Colour	Clear & colorless	Clear & very pale yellow	Clear & very pale yellow

Water quality measurements in the ditch exiting the quarry, obtained as part of monthly monitoring at the site in 2014, ranged from 7.2 to 7.5 for pH and 5 – 7 mg/L for total suspended solids, and the ditch was occasionally dry. Upstream and downstream locations Irish Cove Brook had virtually the same pH on all sampling occasions, but both ranged seasonally (May to July) from 6.4 to 7.4. Levels of total suspended solids in Irish Cove Brook immediately downstream of the site were low (non-detect to 7 mg/L), compared to non-detect at sites upstream of the quarry in the May to July period (J. Fraser, personal communication, 2014). All levels are low and within guideline ranges for the protection of freshwater aquatic life.

#### **4.2.4 WETLANDS**

No wetlands were observed on the quarry site or proposed expansion area. Slope and drainage are generally sufficient to prevent conditions, which would lead to wetland development.

#### **4.2.5 FISH & FISH HABITAT**

With the exception of Irish Cove Brook, which runs along the southwest side of the project, no fish habitat occurs in the existing quarry or in the proposed expansion area. Prior to quarry development the diverted stream would have had a precipitous descent down the slope from the quarry and probably would not have been passable by fish. The larger unnamed stream which runs along the west end of the proposed expansion area also is unlikely to have supported fish populations due to the steep slope and also due to a hanging 1 m diameter culvert under Irish Cove Road (Figure 26). No fish were seen in streams and none were caught in an overnight set of minnow traps in the stream at the west end of the expansion area. Irish Cove Brook is an important river supporting fish populations in the area. Brook Trout have been found in the lower reaches and some restoration work took place in 2010-2012 (NS Salmon Association-NSLC Adopt A Stream Program 2012). Fish species potentially occurring include many of the common species likely to occur in small streams and ponds in the Bras d'Or Lakes watershed, including: Speckled (Brook) Trout, Rainbow Smelt, Gaspereau and small minnow/forage species such as, Banded Killifish and several stickleback species (E. MacIntyre, NSDNR, personal communication, 2014) as well as endangered American Eel and Atlantic Salmon. American Eel and Atlantic Salmon are listed by COSEWIC as a threatened and endangered species, respectively. Other common species potentially occurring in the Bras d'Or Lake include Rainbow Trout, Brown Trout, groundfish (cod, flounder), pelagics (mackerel & herring), eels, smelt & and shellfish (oyster, lobster, mussels, quahogs and softshell clams).



Figure 26. Culvert of unnamed stream flowing under Irish Cove Road, June 19, 2014.

#### 4.2.6 BIRDS

Birds are important components of the ecosystem in the vicinity of the Irish Cove quarry, occupying both forests and open waters (lakes and ponds and river valleys). Different types of birds with different habits and habitats occupy most areas, in the vicinity of the quarry reflecting predominantly predaceous species (raptors such as hawks, eagles, osprey, and owls), songbirds and woodland nesting birds (e.g. warblers & thrushes), and some water-associated birds and waterfowl (e.g. kingfishers & mergansers). The Irish Cove area in the vicinity of the quarry includes a wide area with numerous habitats ranging from lake/estuarine to forest to upland bog and barren, and consequently, the number of species potentially occurring is large, although the numbers likely to occur at the site in particular are likely smaller.

In the surrounding area (i.e. in adjacent 10 x 10 km survey squares encompassing the site, Maritime Breeding Bird Atlas, 2013), breeding occurrences of one hundred ten (110) bird species are suspected or have been confirmed (Table 2). Twenty-nine species were recorded during surveys at the site (June 19-20, 2014<sup>2</sup>). The dawn bird survey recorded 27 species (Table 3); and an additional species (Osprey) was observed outside the observation period. Thirty-two species were identified during a daylight walkover on

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<sup>2</sup> Ten-minute point count observations were made at nine points during the early morning of June 20. Locations (shown in Figure 18) were selected to allow the birder good listening points to provide coverage of the entire expansion site. All birds heard, and the approximate number, were noted.



June 19 and all sightings were common or expected<sup>3</sup>. The night survey for owls detected a single Long-eared Owl in the vicinity of the quarry<sup>4</sup>. Both areas (quarry and the woodlands in the proposed expansion area to the west) had approximately the same diversity (22 species in the quarry and 24 in the woods). Red-eyed Vireo, Swainson's Thrush, American Robin, Blue-headed Vireo and Black-capped Chickadee were most common and abundant at the quarry. Yellow-bellied Flycatcher, Swainson's Thrush, American Robin, Blackburnian Warbler and Red-eyed Vireo were the most common and abundant birds in locations in the woods around the quarry. All of the species in Table 3 are known to breed or are suspected of occurring in the area based on the Maritime Breeding Bird Atlas with the exception of Pine Grosbeak and Veery. Pine Grosbeak was listed in the first breeding bird atlas as a probable breeder in the area, and Veery are known to breed in other nearby areas, but have not been noted as breeders in the general area. There is an eagle nesting area (< 0.5 km) to the west of the quarry site with recorded nests in the area over the last 20 years (T. Power, NSDNR, personal communication, 2014)(Appendix A, Map A-4). One eagle sighting was made during the field survey on June 19 (Table 4), though residents have noted seeing eagles in the vicinity of Irish Cove almost daily (D. Cash and C. MacIntyre, personal communications, 2014).

Table 2. Bird species with potential to breed in the vicinity of the Irish Cove Quarry, based on presence of suitable habitat. Source: Maritimes Breeding Bird Atlas<sup>1</sup>. Blue = associated with water; Green = associated with terrestrial areas.

Confirmed and Probable Breeding in Area <sup>2</sup>			Possible Breeding <sup>2</sup> in Area
Alder Flycatcher	Cliff Swallow	Northern Harrier	Bobolink
American Bittern	Common Grackle	Northern Parula	Canada Warbler
American Black Duck	Common Loon	Olive-sided Flycatcher	Eastern Phoebe
American Crow	Common Merganser	Osprey	Eastern Towhee
American Goldfinch	Common Nighthawk	Ovenbird	Green-winged Teal
American Kestrel	Common Raven	Palm Warbler	Northern Goshawk
American Redstart	Common Tern	Pileated Woodpecker	Northern Saw-whet Owl
American Robin	Common Yellowthroat	Pine Siskin	Sora
American Wigeon	Dark-eyed Junco	Purple Finch	White-winged Crossbill
American Woodcock	Double-crested Cormorant	Red-breasted Merganser	Wilson's Warbler
Arctic Tern	Downy Woodpecker	Red-breasted Nuthatch	Winter Wren
Bald Eagle	Eastern Bluebird	Red-eyed Vireo	
Bank Swallow	Eastern Wood-Pewee	Red-tailed Hawk	
Barn Swallow	European Starling	Red-winged Blackbird	
Bay-breasted Warbler	Golden-crowned Kinglet	Ring-necked Duck	
Barred Owl	Gray Jay	Ruby-crowned Kinglet	
Belted Kingfisher	Great Black-backed Gull	Ruby-throated Hummingbird	
Black-and-white Warbler	Great Blue Heron	Ruffed Grouse	
Blackburnian Warbler	Great Horned Owl	Rusty Blackbird	
Black-capped Chickadee	Greater Yellowlegs	Savannah Sparrow	
Black-throated Blue Warbler	Hairy Woodpecker	Song Sparrow	

<sup>3</sup> During the owl survey, a suspected Northern Wheatear (*Oenanthe oenanthe*) was heard flying over the sight.

<sup>4</sup> A suspected Eastern Screech-owl was observed about 1.5 km away from the quarry by a local resident in August 2014 (M. MacNeil, personal communication, 2014).

Table 2. Bird species with potential to breed in the vicinity of the Irish Cove Quarry, based on presence of suitable habitat. Source: Maritimes Breeding Bird Atlas<sup>1</sup>. Blue = associated with water; Green = associated with terrestrial areas.

Confirmed and Probable Breeding in Area <sup>2</sup>			Possible Breeding <sup>2</sup> in Area
Black-throated Green Warbler	Hermit Thrush	Spotted Sandpiper	
Blue Jay	Herring Gull	Swainson's Thrush	
Blue-headed Vireo	House Sparrow	Swamp Sparrow	
Boreal Chickadee	Least Flycatcher	Tennessee Warbler	
Broad-winged Hawk	Lincoln's Sparrow	Tree Swallow	
Brown Creeper	Magnolia Warbler	White-throated Sparrow	
Canada Goose	Mallard	Willet	
Cape May Warbler	Merlin	Wilson's Snipe	
Cedar Waxwing	Mourning Dove	Yellow Warbler	
Chestnut-sided Warbler	Mourning Warbler	Yellow-bellied Flycatcher	
Chimney Swift	Nashville Warbler	Yellow-bellied Sapsucker	
Chipping Sparrow	Northern Flicker	Yellow-rumped Warbler	

<sup>1</sup>Breeding evidence was determined from the "Maritimes Breeding Bird Atlas" website (<http://www.mba-aom.ca>). Data was obtained for the 10 X 10 km survey area that covers the project site. Bird species highlighted in blue have breeding/food 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).

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

Table 3. Bird species present (heard or seen) during a dawn bird survey conducted from 0545-0715 hrs, June 20, 2014 at the Irish Cove Quarry. For locations of observation points, see Figure 24.

	Quarry (Sites 7,8 & 14)		Woodlands (Sites 1,2, 5, 10, 11 & 12)	
	no./10 min.	no. of sites	no./10 min.	no. of sites
<b>Passeriformes</b>				
American Crow	0.3	1	0.0	0
American Goldfinch	1.0	2	0.3	2
American Redstart	1.3	3	0.2	1
American Robin	4.0	3	1.7	4
Black-and-white Warbler	0.7	1	0.2	1
Blackburian Warbler	2.3	2	1.7	6
Black-capped Chickadee	3.0	3	0.7	3
Black-throated Green Warbler	1.7	1	0.7	3
Blue-headed Vireo	3.7	3	1.3	6
Dark Eyed Junco	2.0	3	1.2	5
Golden Crowned Kinglet	1.0	2	0.7	3
Hermit Thrush	1.0	3	0.7	3
Magnolia Warbler	1.3	2	0.3	2
Northern Parula	1.3	1	0.2	1
Ovenbird	0.7	1	0.7	4
Pine Grosbeak	0.0	0	0.2	1
Pine Siskin	0.0	0	0.2	1
Purple Finch	0.3	1	0.2	1
Red-breasted Nuthatch	0.0	0	0.2	1
Red-eyed Vireo	5.3	2	1.7	6

Table 3. Bird species present (heard or seen) during a dawn bird survey conducted from 0545-0715 hrs, June 20, 2014 at the Irish Cove Quarry. For locations of observation points, see Figure 24.				
	Quarry (Sites 7,8 & 14)		Woodlands (Sites 1,2, 5, 10, 11 & 12)	
	no./10 min.	no. of sites	no./10 min.	no. of sites
Swainson's Thrush	5.0	2	2.0	5
Veery	0.3	1	0.0	0
White Throated Sparrow	1.3	3	0.2	1
Yellow-bellied Flycatcher	1.7	2	3.3	5
<b>Anseriformes</b>				
Common Merganser	0.3	1	0.0	0
<b>Piciformes</b>				
Pileated Woodpecker	0.0	0	0.2	1
<b>Accipitriformes</b>				
Red-tailed Hawk	0.0	0	0.3	1
<b>Total</b>	39.7	3	18.7	6
<b>Species per area</b>	22	–	24	–

Table 4. Bird species present (heard or seen) during a 4-hr walkover survey on Irish Cove Road at the quarry, June 19, 2014.			
<b>Passeriformes</b>		<b>Passeriformes continued</b>	
American Crow	1	Northern Parula	1
American Goldfinch	10	Ovenbird	5
American Redstart	5	Pine Siskin	2
American Robin	10	Purple Finch	1
Black-and-white Warbler	5	Red-eyed Vireo	15
Bay-breasted Warbler	1	Ruby-crowned Kinglet	1
Blackburian Warbler	15	Swainson's Thrush	25
Black-capped Chickadee	10	White-throated Sparrow	10
Black-throated Green Warbler	10	Yellow-bellied Flycatcher	10
Blue-headed Vireo	10	Yellow-bellied Sapsucker	1
Brown Creeper	2	Yellow-rumped Warbler	1
Common Raven	1	<b>Charadriiformes</b>	
Dark-eyed Junco	5	Great Black Backed Gull	1
Golden-crowned Kinglet	10	<b>Piciformes</b>	
Hermit Thrush	2	Hairy Woodpecker	4
Least Flycatcher	1	<b>Accipitriformes</b>	
Magnolia Warbler	5	Bald Eagle	1
Northern Flicker	3	<b>Total</b>	<b>184</b>

#### 4.2.7 MAMMALS

Large and small mammals, including game and furbearing species, are important in the ecosystem of eastern Cape Breton. The continuous expanses and high proportion of undeveloped and protected wilderness areas, as well as land used in past principally for forestry, makes the Irish Cove area important for mammal occurrences. Mammal species which may be found either regularly or occasionally at the quarry site are expected to reflect the community observed in the surrounding areas of Richmond County and the Cape Breton Regional Municipality (CBRM). There are no records of significant or unique

occurrences of mammals in the general area of the proposed expansion (S. Weseloh-McKeane, Coordinator of Special Places, personal communication, 2013). Uplands around the quarry and along the eastern shore of the Bras d'Or Lakes (East Bay Hills), support one of the important concentrations of Canada Lynx, an uncommon species that requires large tracts of undisturbed forest, and which breeds in the area. Lynx move widely, and movements from northeast of the quarry to the St. Peter's Bay area (about 23 km to the southwest) have been documented (Parker 2001). The area also supports deer wintering areas, one ~ 2 km east of the quarry site and one west of Lake Uist (T. Power, NSDNR, personal communication, 2014) (Appendix A, Map A-4).

Mammal species typical of softwood, deciduous and mixed forest landscape are expected, including: bats (Northern Long Eared, Little Brown Bat and Eastern Pipistrelle); canids (coyote, red fox), squirrels (red squirrel and chipmunk), ungulates (White-tailed Deer and moose), rodents (muskrat and beaver, forest mice species such as Deer Mouse), mustelids (mink, ermine), felids (Canada Lynx and Bobcat), raccoon, Black Bear and River Otter. Bat populations in Cape Breton have not been affected to the same degree by White-Nose syndrome, a fungus disease that has largely wiped them out elsewhere in the province; Cape Breton thus represents a refugium for reestablishment and thus populations here have elevated conservation significance.

#### **4.2.8 REPTILES AND AMPHIBIANS**

Many of the common Nova Scotian amphibians and reptiles are expected to occur at the site, but not in particular abundance due to the absence of wetlands and relatively low abundance of surface waters. Typical species would likely include: amphibians (American toad, Wood Frog, Spring Peeper, Pickerel Frog); Maritime Garter Snake, Yellow Spotted Salamander, etc. Types of aquatic habitats available at the site, which are fast flowing rocky streams and rivers, would not be suitable for the endangered Wood Turtle and Common Snapping Turtle (both uncommon), which are the only turtle species to occur on Cape Breton Island.

#### **4.2.9 SPECIES AT RISK**

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

One provincially yellow-listed and federally-listed endangered species, the Wood Turtle (*Glyptemys insculpta*) has been found in the general vicinity of the project, and could potentially stray to the site

(ACCDC, 2013) but such an occurrence is extremely unlikely. The botany survey identified one yellow listed plant species—Lesser Rattlesnake Plantain (*Goodyera repens*) in the mature deciduous forest just outside (northeast) of the proposed expansion area (Fall Botany Survey, Appendix B).

Other species at risk, both plant and animal can occur in the general area of the Irish Cove Quarry. Shining lady's tresses (Orange Listed (Category 2 May be at Risk)) is a Provincially Listed species occurring within 10 km of the site (Table 5). Federally listed species occurring within 5 km of the study site include: three species of vascular plants; three species of non-vascular plants; and 26 species of vertebrates (there are no records of invertebrates) (ACCDC, 2013) (Appendix C).

Species which have been recorded closer to the site (within 5 km) include five plants which may be at risk provincially (Orange-Listed (Category 2, May be at Risk) (Arctic Kidney Lichen); Yellow-Listed (Category 3, Sensitive) (Lesser Pyrola, Lesser Rattlesnake-plantain<sup>5</sup>, Naked Kidney Lichen and Blistered Tarpaper Lichen)); and twenty-six animals which may be at risk provincially (Red-listed (Category 1, At Risk) animal species (Chimney Swift, Common Nighthawk, Olive-sided Flycatcher, Atlantic Salmon and Canada Lynx); Orange-Listed (Category 2, May be at Risk) (Common Loon, Cliff Swallow, Bank Swallow and Rusty Blackbird); and Yellow-Listed (Category 3, Sensitive) (American Bittern, Pine Siskin, Barn Swallow, Bobolink, Common Tern, Boreal Chickadee, Bay-breasted Warbler, Blackpoll Warbler, Cape May Warbler, Tennessee Warbler, Wilson's Warbler, Spotted Sandpiper, Wilson's Snipe, Greater Yellowlegs, Eastern Bluebird, Eastern Wood-Pewee and Yellow-bellied Flycatcher)). There are ten federally-listed species at risk—Chimney Swift, Common Nighthawk, Barn Swallow, Bank Swallow, Bobolink, Rusty Blackbird, Olive-sided Flycatcher, Eastern Wood-Pewee, Wood Turtle and Atlantic Salmon (ACCDC, 2013) (Tables 6 & 7) which have been recorded within 5 km of the quarry.

Bird species of conservation significance known to nest within 10 km of the site include: Pine Siskin, Chimney Swift, Common Nighthawk, Olive-sided Flycatcher, Bay-breasted Warbler, Yellow-bellied Flycatcher, Rusty Blackbird, Cape May Warbler, Common Loon, Barn Swallow, Cliff Swallow, Boreal Chickadee, Bank Swallow, Arctic Tern, Tennessee Warbler, Gray Jay, Black-backed Woodpecker, Ruby-crowned and Golden-crowned Kinglet (S. Weseloh-McKeane, Coordinator, Special Places, pers. comm., 2013) (Table 6).

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<sup>5</sup> Species was observed just off the property in the vicinity of the east corner of the survey area (northeast of the existing quarry) in deciduous woodland (R. Newell, fall botany report).



Table 5. Provincially listed species of concern with potential to occur in the vicinity of the Irish Cove Quarry (~10km). Nova Scotia Museum records (S. Weseloh-McKeane, NS Museum, pers. comm., 2013).

Scientific Name	Common Name	General Status of Wild Species Rankings for NS (numerical) <sup>1</sup> , SPROT (Provincial GS Rank) <sup>2</sup>	ACCDC <sup>3</sup> Rankings (GRANK, SRANK, NPROT) <sup>4</sup>
<b>PLANTS</b>			
<i>Spiranthes lucida</i>	Shining lady's tresses	2, - (May Be At Risk)	--
<b>BIRDS</b>			
<i>Carduelis pinus</i>	Pine Siskin	3, - (Sensitive)	G5, S3S4B/ S5N, -
<i>Chaetura pelagica</i>	Chimney Swift	1, Endangered (At Risk)	G5, S2S3B, T
<i>Chordeiles minor</i>	Common Nighthawk	1, Threatened (At Risk)	G5, S3B, T
<i>Contopus cooperi</i>	Olive-sided Flycatcher	1, Threatened (At Risk)	G4, S3B, T
<i>Dendroica castanea</i>	Bay-breasted Warbler	3, - (Sensitive)	G5, S3S4B, -
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	3, - (Sensitive)	G5, S3S4B, -
<i>Euphagus carolinus</i>	Rusty Blackbird	2, Endangered (May Be At Risk)	G4, S2S3B, SC
<i>Dendroica tigrina</i>	Cape May Warbler	3, - (Sensitive)	G5, S3?B, -
<i>Gavia immer</i>	Common Loon	2, - (May Be At Risk)	G5, S3B S4N, NAR
<i>Hirundo rustica</i>	Barn Swallow	3, Endangered (At Risk)	G5, S3B, T
<i>Perisoreus canadensis</i>	Gray Jay	3, - (Sensitive)	--
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	2, - (May Be At Risk)	G5, S3B, -
<i>Picoides arcticus</i>	Black-backed Woodpecker	3, - (Sensitive)	--
<i>Poecile hudsonicus</i>	Boreal Chickadee	3, - (Sensitive)	G5, S3, -
<i>Regulus calendula</i>	Ruby-crowned Kinglet	3, - (Sensitive)	--
<i>Regulus satrapa</i>	Golden-crowned Kinglet	3, - (Sensitive)	--
<i>Riparia riparia</i>	Bank Swallow	2, - (May Be At Risk)	G5, S3B, T
<i>Sterna paradisaea</i>	Arctic Tern	2, - (May Be At Risk)	--
<i>Vermivora peregrina</i>	Tennessee Warbler	3, - (Sensitive)	G5, S3S4B
<p>1. National General Status of Wild Species Rank listed for Nova Scotia: 0.2=Extinct (Blue); 0.1=Extirpated (Purple); 1=At Risk (Red); 2=May be at Risk (Orange); 3=Sensitive (Yellow); 4=Secure (Green); 5=Undetermined (light grey); 6=Not Assessed (dark grey); 7=Exotic (Black); 8=Accidental (Aqua).</p> <p>2.SPROT=Provincial Rank/status of taxon &amp; Provincial GS Rank.</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>			

Table 6. Records of species of concern within a 5 km radius of Irish Cove Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, December 2013.

Family/Scientific Name		Common Name	Rank			
			General Status of Wild Species Rankings (numerical) <sup>1</sup>		ACCDC <sup>2</sup> Rankings	
					SPROT <sup>3</sup>	GRANK, SRANK, NPROT <sup>4</sup>
Plants						
Ericaceae	<i>Lesser Pyrola</i>	Lesser Pyrola	3	4	-	G5, S2, -
Orchidaceae	<i>Lesser Rattlesnake-plantain</i>	Lesser Rattlesnake-plantain	3	4	-	G5, S3, -
	<i>Loesel's Twayblade</i>	Loesel's Twayblade	4	4	-	G5, S3S4, -
Lichens	<i>Nephroma arcticum</i>	Arctic Kidney Lichen	2	4	-	G5?, S1S2, -
	<i>Nephroma bellum</i>	Naked Kidney Lichen	3	4	-	G3G5, S3?, -
	<i>Collema furfuraceum</i>	<i>Blistered Tarpaper Lichen</i>	3	4	-	G5, S3?, -
Animals-Birds						
Accipitridae	<i>Accipiter gentilis</i>	Northern Goshawk	4	4	-	G5, S3S4, NAR
Apodidae	<i>Chaetura pelagica</i>	Chimney Swift	1	1	Endangere d	G5, S2S3B, T
Ardeidae	<i>Botaurus lentiginosus</i>	American Bittern	3	4	-	G4, S3S4B, -
Caprimulgidae	<i>Chordeiles minor</i>	Common Nighthawk	1	1	Threatened	G5, S3B, T
Fringillidae	<i>Carduelis pinus</i>	Pine Siskin	3	4	-	G5, S3S4B/ S5N, -
Gaviidae	<i>Gavia immer</i>	Common Loon	2	4	-	G5, S3B/ S4N, NAR
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	3	4	Endangere d	G5, S3B, T
	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	2	4	-	G5, S3B, -
	<i>Riparia riparia</i>	Bank Swallow	2	4	-	G5, S3B, T
Icteridae	<i>Dolichonyx oryzivorus</i>	Bobolink	3	4	Vulnerable	G5, S3S4B, T
	<i>Euphagus carolinus</i>	Rusty Blackbird	2	3	Endangere d	G4, S2S3B, SC
Laridae	<i>Sterna hirundo</i>	Common Tern	3	4	-	G5, S3B, NAR
Paridae	<i>Poecile hudsonica</i>	Boreal Chickadee	3	4	-	G5, S3, -
Parulidae	<i>Dendroica castanea</i>	Bay-breasted Warbler	3	4	-	G5, S3S4B, -
	<i>Dendroica striata</i>	Blackpoll Warbler	3	4	-	G5, S3S4B, -
	<i>Dendroica tigrina</i>	Cape May Warbler	3	4	-	G5, S3?B, -

Table 6. Records of species of concern within a 5 km radius of Irish Cove Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, December 2013.

Family/Scientific Name	Common Name	Rank				
		General Status of Wild Species Rankings (numerical) <sup>1</sup>		ACCDC <sup>2</sup> Rankings		
		Provincial	National	SPROT <sup>3</sup>	GRANK, SRANK, NPROT <sup>4</sup>	
	<i>Vermivora peregrina</i>	Tennessee Warbler	3	4	-	G5, S3S4B, -
	<i>Wilsonia pusilla</i>	Wilson's Warbler	3	4	-	G5, S3S4B, -
Scolopacidae	<i>Actitis macularius</i>	Spotted Sandpiper	3	4	-	G5, S3S4B, -
	<i>Gallinago delicata</i>	Wilson's Snipe	3	4	-	G5, S3S4B, -
	<i>Tringa melanoleuca</i>	Greater Yellowlegs	3	4	-	G5, S3B/ S5M, -
Turdidae	<i>Sialia sialis</i>	Eastern Bluebird	3	4	-	G5, S3B, NAR
Tyrannidae	<i>Contopus cooperi</i>	Olive-sided Flycatcher	1	1	Threatened	G4, S3B, T
	<i>Contopus virens</i>	Eastern Wood-Pewee	3	4	Vulnerable	G5, S3S4B, SC
	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	3	4	-	G5, S3S3B, -
Animals - Other						
Emydidae	<i>Glyptemys insculpta</i>	Wood Turtle	1	3	-	-, -, T
Felidae	<i>Lynx canadensis</i>	Canadian Lynx	1	4	Endangered	G5, S1, NAR
Salmonidae	<i>Salmo salar</i>	Atlantic Salmon-Eastern Cape Breton pop.	2	4	-	-, S2, E

1. National General Status of Wild Species Rank listed for Nova Scotia: 0.2=Extinct (Blue); 0.1=Extirpated (Purple); 1=At Risk (Red); 2=May be at Risk (Orange); 3=Sensitive (Yellow); 4=Secure (Green); 5=Undetermined (light grey); 6=Not Assessed (dark grey); 7=Exotic (Black); 8=Accidental (Aqua).

2. Atlantic Canada Conservation Data Centre (ACCDC).

3. SPROT=Provincial Rank/Status of Taxon.

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

- G1 **Critically Imperiled**—At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
- G2 **Imperiled**—At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
- G3 **Vulnerable**—At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
- G4 **Apparently Secure**—At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- G5 **Secure**—At very low risk 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

Table 6. Records of species of concern within a 5 km radius of Irish Cove Quarry. Atlantic Canada Conservation Data Centre (ACCDC) Database, December 2013.

Family/Scientific Name	Common Name	Rank			
		General Status of Wild Species Rankings (numerical) <sup>1</sup>		ACCDC <sup>2</sup> Rankings	
		Provincial	National	SPROT <sup>3</sup>	GRANK, SRANK, NPROT <sup>4</sup>
T	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). <b>Infraspecific Taxon</b> (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 GST1. A T subrank cannot imply the subspecies or variety is more abundant than the species. For example, a GIT2 subrank should not occur. A vertebrate animal population, (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T-rank; in such cases a Q is used after the T-rank to denote the taxon’s informal taxonomic status.				
<u>SRANK, Sub-National (Provincial) Rarity Ranks</u>					
S1	Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.				
S2	Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.				
S3	Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations (21 to 100 occurrences).				
S4	Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).				
S5	Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.				
S#S#	Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).				
SH	Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species), and suspected to be still extant.				
SU	Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.				
SX	Extinct/Extirpated: Element is believed to be extirpated within the province.				
S?	Unranked: Element is not yet ranked.				
SA	Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.				
SE	Exotic: An exotic established in the province (e.g., Purple Loosestrife or Coltsfoot); may be native in nearby regions.				
SE#	Exotic numeric: An exotic established in the province that has been assigned a numeric rank.				
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 5 km of Irish Cove Quarry. Species are highlighted for which suitable habitat is present at the quarry, in the proposed expansion area, and in Irish Cove Brook.**

Species	Description
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, as well as declines in their food source (insect populations) and mortalities due to fluctuating temperatures (i.e. cold snaps).
Bank Swallow ( <i>Riparia riparia</i> )	Bank Swallows are listed by COSEWIC as a <i>threatened</i> species. Known to breed in natural and artificial sites with vertical banks (riverbanks, lake & ocean bluffs, aggregate pits, road cuts & stock piles of soil) with a preference for sand-silt substrates for excavating nest burrows. Breeding sites are often near open terrestrial habitats (grasslands, meadows, pastures & agricultural croplands), which they forage. Also, large wetlands are often used as communal nocturnal roost sites during post-breeding, migration and wintering periods. The species has shown a severe long-term decline of its Canadian population over the last 40 years. Possible causes of declining populations are: loss of breeding and foraging habitat, destruction of nests during aggregate excavation, collision with vehicles, widespread pesticide use affecting prey abundance, and impacts of climate change, which may reduce survival or reproductive potential.
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.
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.
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.
Eastern Wood-Pewee ( <i>Cantopus virens</i> )	Eastern Wood-Pewee 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.
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.
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).
Atlantic Salmon ( <i>Salmo salar</i> )	Atlantic Salmon (Eastern Cape Breton pop.) are listed by COSEWIC as an <i>endangered</i> species. The species is generally found in cool, well-oxygenated rivers and streams with gravel, cobble or boulder bottoms. They undergo lengthy migrations to sea in juvenile and adult stages but return to freshwaters to spawn in fall. Declining populations are due to acid rain and pollution, overfishing, habitat loss and degradation, lack of riparian buffers and water passage obstruction (culverts, dams, aboiteaux and lack of pools).

#### 4.2.10 NATURAL AREAS & WILDERNESS

Segments of Nova Scotian and Canadian Society value natural areas and wilderness, among other things for their symbolic value of the original natural environment of the Province, but also for their conservation significance—providing places where animals and plants which are important to the ecosystem of the Province as a whole can be maintained, monitored and studied. Irish Cove Quarry is

located in an area where limited historic development has allowed some of the landscape representative of these natural and wilderness environments to survive. As a measure of the importance of the area, a number of designated protected areas have been placed in the East Bay Hills along Irish Cove Brook (see Section 4.3.9, Figure 27). Protection does not extend to private land on which the existing quarry and proposed quarry expansion are located.



Figure 27. Mature deciduous forest on the southwest side of Irish Cove Brook opposite the Quarry is part of a complex of protected areas for conservation, monitoring and research.

### 4.3 HUMAN USES OF THE ENVIRONMENT

#### 4.3.1 MI'KMAQ

The Bras d'Or Lake, its channels and surrounding land areas are included in territory traditionally occupied by the Mi'kmaq. Presently many of the Mi'kmaq communities are established around the Lake, including Chapel Island, Wagmatcook, Whycogamah, Eskasoni and Potlotek, reflecting the many factors, but including long-standing use by the Mi'kmaq of the area. Mi'kmaq would have used all areas around the inland sea to some degree, including the upland areas such as East Bay Hills. Many of the traditional place names in Richmond County and CBRM are derived from Mi'Kmaq names. The land within the study area was once part of the greater Mi'Kmaq territory Unama'kik (Land of Fog) and Irish Cove is known as Kulpa'mkitk (flowing around) (Pacifique from CRM 2013). The shores of the Bras d'Or Lakes would have been highly suitable areas for habitation, and many of the present-day Mi'Kmaq communities are located there.

Mi'kmaq living within and outside communities in eastern Cape Breton, are likely to share some of the same activities in relation to natural resources in the study as the general non-Mi'kmaq population, such

as hunting and fishing and outdoor recreation, but as well will have culturally significant activities including ceremonial recreational use, hunting and fishing, gathering of ceremonial foods, etc. The project site is relatively close to several Mi'kmaq communities on Cape Breton Island. Chapel Island is the closest Mi'kmaq community, located about 15 km southwest, and is part of the Chapel Island First Nation (also known as Potlotek First Nation). Other Mi'kmaq communities which are relatively close (within about 65 km) include: Eskasoni (across Bras d'Or Lake in Eskasoni), part of the Eskasoni First Nation; Margaree and Wagmatcook communities in the Wagmatcook First Nation; Whycocomagh of the Waycobah First Nation; Caribou Marsh, and two Membertou communities of the Membertou First Nation (near and around Sydney); and Malagawatch (near Marble Mountain and West Alba), which is administered by the five First Nations in the area (Chapel Island, Eskasoni, Wagmatcook, Waycobah and Membertou).

Two tribal councils exist in Nova Scotia: the Confederacy of Mainland Mi'kmaq (CMM) and Union of Nova Scotia Indians (UNSI). CMM is a not-for-profit organization incorporated in 1986, whose mission is to promote and assist Mi'kmaq communities. The UNSI, created in 1969, was formed to provide a cohesive political voice for Mi'kmaq people. Chapel Island (Potlotek), Eskasoni, Membertou, Wagmatcook and Waycobah First Nations are all members of the UNSI. The Native Council of Nova Scotia (NCNS)—a self-governing agency located in Truro—represents the approximately 35% of Mi'kmaq living outside of reserve land. The goal of NCNS is to operate and administer a strong and effective Aboriginal Peoples representative organization that serves, advocates and represents their community.

The Mi'kmaq Rights Initiative (Kwilmu'kw Maw-klusuaqn Negotiation Office; KMKNO) based in Millbrook, is the only mandated organization to coordinate Crown to Mi'kmaq Consultation on behalf of the Mi'kmaq of Nova Scotia. The mission of KMK—which 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.” KMKNO forms a point of contact and liaison between the Mi'kmaq of Nova Scotia, the province and the Government of Canada. The Atlantic First Nations Environmental Network (AFNEN) is an environmental organization of Mi'kmaq communities and organizations. Both CMM and UNSI are members, and the Mi'kmaq Confederacy of PEI in Charlottetown is currently the acting coordinator. The AFNEN includes a representative from each Mi'kmaq organization and community interested in environmental issues. The Network meets regularly during the year through meetings, conferences, and the Internet to discuss environmental matters or concerns.

Several Mi'kmaq ceremonial or cultural uses have been identified for the area including deer hunting, rabbit hunting, fishing (trout, eel, cod and smelt) along the Bras d'Or Lake coast, smelt fishing in the Irish Cove Brook, and sweet grass gathering (Membertou Geomatics Solutions, 2012)<sup>6</sup>. The proximity of the study area to Potlotek First Nation and the long tradition of snowshoeing along intermittent stream beds

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6 A Mi'kmaq Ecological Knowledge Study (MEKS) was conducted by Membertou Geomatics Solutions in 2012 for the East Bay Hills Wind Project (CBCL 2007).

and into uplands for winter hunting, and to lakes and ponds for winter fishing, suggests that the vicinity of the quarry was used for these purposes (T. Gaudet, KMKNO personal communication, 2014).

#### **4.3.2 POPULATION AND ECONOMY**

Irish Cove Quarry is located in Richmond County, near the municipal boundary with Cape Breton Regional Municipality on the north, and land in the area as well as economic effects of the quarry would include both areas. The population density around the project site is likely similar to the averages for Richmond County, which is lower than average for Nova Scotia (7.5 and 17.4 per km<sup>2</sup>, respectively); however, Cape Breton Regional Municipality (CBRM) has a higher than average density (41.1 per km<sup>2</sup>; Statistics Canada 2011a), though this is mainly concentrated in Sydney and adjacent urban areas located to the northeast. In Richmond County, the percentage of people employed<sup>7</sup> (46%) and average salaries (\$31,233) are a bit lower than the averages for Nova Scotia (57% and \$35,478, respectively; Statistics Canada, 2011a). The top three industries for employment (in terms of number of people in that industry) for Richmond County are health/social care, manufacturing, and the retail trade, while the top three for CBRM are the social/health care, retail trade and educational services. For comparison, the top three industries in Nova Scotia are retail trade, health/social care and public administration (Statistics Canada, 2011a).

#### **4.3.3 WATER SUPPLY AND RESIDENTIAL WELLS**

The site is not located in or near any water supply areas for Richmond County or Cape Breton Regional Municipality. Residences and businesses in the area rely on groundwater wells, both drilled and dug. The small area occupied by the quarry, as well as the distance from the nearest residences (~1 km), suggest that the quarry will not influence residential wells.

#### **4.3.4 LAND USE**

Land in the vicinity of the quarry is a mix of rural residential/commercial use, and lands set aside for conservation purposes. Highway 4 in the area forms a corridor for rural residential and commercial development zoned for R2 and RC-1 (low and medium density), with buildings/residences concentrated toward the lakefront. A small number of the homes are used as vacation homes or rentals (K. Cullen and M. MacNeil, personal communications, 2014) and a few properties are used as private woodlots (C. MacIntyre, personal communication, 2014).

Richmond County has 18 farms with most (six) growing various crops, some (four) raising cattle, and a few (two each) raising sheep/goats, raising other animals or operating as a greenhouse/nursery. There are no farms in the general vicinity of the quarry (Statistics Canada, 2011b).



About half the land in the area is privately owned and there is a significant concentration of Crown ownership (Appendix A, Map A-3). Land in the area has also been set aside for conservation purposes, in particular on undisturbed tracts of Crown Land, and in coastal areas (See Section 4.3.9, Appendix A, Map A-4).

#### 4.3.5 HUNTING AND TRAPPING

The quarry site is expected to support wildlife species characteristic of Richmond County and Cape Breton Regional Municipality (CBRM), with a possibility of occurrence of some of the more uncommon species due to the proximity to the protected wilderness areas to the east and north. No trappers or trap lines were identified for the site; however species occurring at the site are among those generally occurring in the area, which have large ranges could be trapped and hunted elsewhere. Predominant fur-bearing species reported in trapping catches for Richmond County and CBRM include muskrat, coyote, beaver, weasel, squirrel, fox, mink, otter, raccoon, and lynx (Table 8). Richmond County reported the second highest catch provincially for lynx and the fourth highest catch for otter for the period between 2007-2012. CBRM reported the third highest catch provincially for lynx and fox between 2007-2012. Upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant) are harvested in Richmond County and CBRM, but do not constitute a significant proportion of the total numbers harvested in Nova Scotia (Table 8, Figure 28). Between 2007-2012, CBRM ranked ninth provincially for the harvest of Snowshoe Hare and Ruffed Grouse, and ranked thirteenth for the harvest of Ring-necked Pheasant. Richmond County ranked eleventh provincially for the harvest of Snowshoe Hare and Ring-necked Pheasant, and thirteenth for the harvest of Ruffed Grouse. White-tailed Deer occur in the area—however the harvest in Richmond County and CBRM is relatively low (Figure 28), each representing only 1.2% of the provincial harvest between 2007-2012. Black Bear harvest values are not available for each county/municipality, hence there are no numbers presented for either Richmond County or CBRM in Table 8. However, Richmond County and CBRM are expected to follow the increasing trend for the species in the Province.

Table 8. Summary of wildlife harvested in Richmond County, Cape Breton Regional Municipality, and Nova Scotia, from 2007 to 2012.					
	Richmond County		Cape Breton Regional Municipality		Nova Scotia
Animal	Calculated Harvest	Percent (%) of total for province	Calculated Harvest	Percent (%) of total for province	Calculated Harvest
<b>Large Mammals</b>					
Deer	709	1.2	738	1.2	61,457
<b>Upland Game</b>					
Snowshoe Hare	23819	5.2	27542	6.1	454,994

7 The percentages of people employed include those people who on the census reported being aged 15 years or older, identified as being part of the labour force and also reported being employed. This is a proportion of the total population aged 15 years and older, which include the employed, the unemployed and those not in the labour force.

Table 8. Summary of wildlife harvested in Richmond County, Cape Breton Regional Municipality, and Nova Scotia, from 2007 to 2012.					
	Richmond County		Cape Breton Regional Municipality		Nova Scotia
Animal	Calculated Harvest	Percent (%) of total for province	Calculated Harvest	Percent (%) of total for province	Calculated Harvest
Ruffed Grouse	6787	4.3	9278	5.8	159,593
Ring-necked Pheasant	224	0.8	101	0.4	27,172
<b>Fur Harvest</b>					
Beaver	396	1.9	914	4.3	21,287
Muskrat	734	1.2	2,291	3.8	61,019
Otter	131	6.4	102	5.0	2,037
Mink	138	1.9	341	4.7	7,227
Bobcat	160	2.9	158	2.8	5,606
Fox	128	4.4	325	11.1	2,930
Raccoon	107	0.7	238	1.6	14,809
Skunk	0	0.0	0	0.0	201
Squirrel	214	2.3	208	2.3	9,158
Weasel	318	6.0	228	4.3	5,293
Coyote	599	4.9	483	4.0	12,196
Lynx	5	21.7	2	8.7	23
Marten	0	0.0	0	0.0	29
Fisher	1	0.1	0	0.0	830
Total for all Furbearers	2,931	2.1	5,290	3.7	142,645
Source: Nova Scotia Department of Natural Resources, Wildlife Division, Harvest Statistics, <a href="http://www.gov.ns.ca/natr/wildlife/sumindex.asp">http://www.gov.ns.ca/natr/wildlife/sumindex.asp</a> ; Accessed April 22, 2014.					

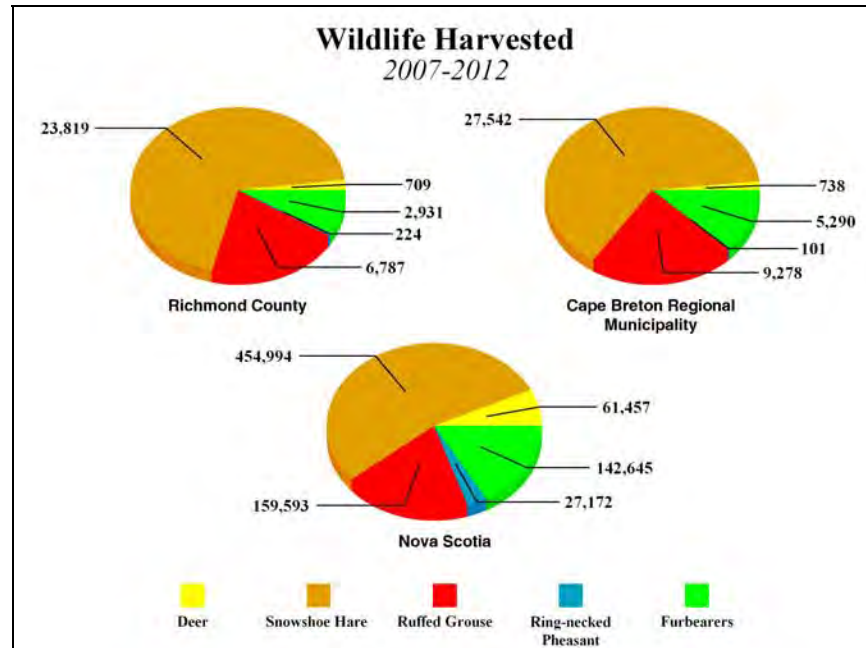


Figure 28. Wildlife harvest data from 2007-2013 for Richmond County, Cape Breton Regional Municipality and Nova Scotia.

#### 4.3.6 FORESTRY

Forestry is one of the main land uses in vicinity of the quarry. Counties of the area bordering the Canso Strait, including Richmond, Inverness, Guysborough and Antigonish have among the highest labour force participation rates in forestry in the Province (APEC 2004). Private land holdings have been cut over for timber in the past, and extensive areas of Crown Land in this part of Cape Breton have been leased to forestry companies, in particular the major pulp mill and paper producer in Cape Breton—NewPage—and its predecessor operating out of Port Hawkesbury, to supply trees for pulp and paper operations, and lately biomass energy production. Forest inventory data and recent aerial images shows numerous clearcuts in the area (Appendix A, Map A-2 & Figure 2).

#### 4.3.7 RECREATIONAL, COMMERCIAL, AND MI'KMAQ FISHING

Fishing provides an important resource and pastime for residents of Richmond County and CBRM. The quarry is in Provincial Recreational Fishing Area 1, and supports recreational fishing (Brook, Brown & Rainbow Trout) in inland surface waters and the Bras d'or Lakes, from April 1 to September 30 and in tidal waters from April 15 to September 30 (Nova Scotia Anglers' Handbook and 2014 Summary of Regulations). Irish Cove Brook in the vicinity of the former limestone quarry (west of Highway 4) is considered to have recreational fishing potential and was the subject of restoration activities in 2010-2012 (Nova Scotia Salmon Association-NSLC Adopt A Stream Program, 2012). Speckled (Brook) Trout and Rainbow Smelt are commonly fished in local tributaries (E. MacIntyre, NSDNR, personal communication, 2014) and cod (Atlantic and Greenland Cod), Atlantic Mackerel, trout (brook, brown &

rainbow) as well as shellfish (mussels, quahogs, & clams) are fished in Bras d'Or Lake (G. Timmons, Conservation and Protection DFO, personal communication 2014). Commercial licenses are issued for Oyster and Lobster in Bras d'Or Lake and there may be an elver fishery in tributaries that drain into the lake, particularly Hay Cove tributaries, which are north of Irish Cove (G. Timmons, Conservation and Protection DFO, personal communication 2014). There are no aquaculture sites around Irish Cove; however, American Oyster aquaculture operations are cultivated in the Bras d'Or Lakes both in St. Peters Inlet and to the northeast in East Bay.

Mi'Kmaq communal fishing licenses are used by the Chapel Island Band for food, social and ceremonial uses. In the vicinity of Irish Cove, Mi'Kmaq fish for trout, eel, cod and smelt along the Bras d'Or Lake coast, and for smelt in Irish Cove Brook (Membertou Geomatics Solutions, 2012). Mi'Kmaq communities in the area (e.g. Eskasoni) also operate shellfish aquaculture leases.

#### **4.3.8 ARCHAEOLOGICAL AND PALAEOONTOLOGICAL RESOURCES**

The area occupied by the quarry is not suitable for agriculture and was not settled by Europeans, although the site was logged, and the valley of Irish Cove Brook was used as a travel route along Irish Cove Road. The early road detoured to run parallel to the unnamed stream along the northwest side of the proposed quarry expansion, running (and still visible) along the ridge above the gorge to the northeast to a suitable ford of the stream (CRM 2013)(Figure 29). Use by Mi'Kmaq is probable but, with the exception of a screening of the site done for the quarry (CRM 2013), no studies have been done in the area. The nearest pre-contact artifact which has been found in the general area was on the shore of Loch



Figure 29. Bed of Old Irish Cove Road near western corner of site, June 2014.

Lomond, 8.6 km east (S. Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2013; CRM 2013). CRM (2013) determined, based on topography and other features of the Irish Cove Quarry site, that the expansion area would have low potential for either Native (both pre-Contact and historic) or Euro-Canadian archaeological resources.

#### 4.3.9 PARKS AND PROTECTED AREAS

Several conservation and recreational areas have been designated in the vicinity of Irish Cove, and are important for public use, recreation and nature appreciation, and conservation.

*Irish Cove Nature Reserve*— The Provincially managed Irish Cove Nature Reserve, occupies 162 hectares of Crown Land immediately west of, and across Irish Cove Brook from, the quarry (Appendix A, Map A-4), and protects a mature old hardwood forest (Red Spruce, Eastern Hemlock & White Pine). The Reserve presently does not have legal status, but is expected to be formally designated under the Nova Scotia Special Places Protection Act. The Reserve originated as a significant old forest area designated under early Nova Scotia Forest Policy, and contains a Biodiversity Monitoring Plot, established in the 1990s under the United Nations Man and the Biosphere Reserve Program (CBCL 2007). The site contains a biodiversity monitoring site for long-term ecological monitoring and research which is used as a long-term ecological research area for Cape Breton University; and contains an International Biological Program (IBP) site<sup>8</sup>. In addition to its significance for mature old hardwood forest, the reserve contains an eagle nesting area (Appendix A, Map A-4), and several rare plants, including Dwarf Rattlesnake Plantain (*Goodyera repens*), lesser wintergreen (*Pyrola minor*) and several uncommon lichens (CBCL 2007). Reports have been produced over the years concerning biodiversity plots for birds, plants, invertebrates, lichens, etc serving as benchmark ecosystem monitoring studies for the area (T. Power, NSDNR, personal communication, 2014). A buffer area encompassing the site was set up as a Significant Ecological Site (SES) under the federal Ecological Monitoring and Assessment Network (EMAN<sup>9</sup>) initiative. However it had no formal legal status and the EMAN program has been discontinued, although the site is still listed as a significant feature in the Nova Scotia Significant Habitats Database.

*Irish Cove Provincial Park*—Located ~ 3km northwest of the quarry along Highway 4 is a small picnic park overlooking Bras d'or Lake (Figure 30). The park is well used by locals and tourists for scenic/wildlife viewing, picknicking or to walk along a short trail (D. Cash, K. Cullen, C. MacIntyre, and M. MacNeil, personal communications, 2014).

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<sup>8</sup> IBP, International Biological Program was set up in 1964 as a long-term study of biological productivity of plant and animal communities as well as manmade ones on a worldwide scale.

<sup>9</sup> The Ecological Monitoring and Assessment Network (EMAN), which operated from 1994 to 2010 was managed by the EMAN coordinating office under Environment Canada. It was created as a network of organizations (government, non-government, academic institutions, aboriginal organizations & community groups) involved in ecological monitoring in Canada to determine, describe, and inform the public concerning ecosystem changes.





Figure 30. Irish Cove Provincial Park.

*Irish Vale Significant Ecological Site (SES)*<sup>14</sup>—Located 4 km north of the quarry site along the Bras d’Or Lake coastline, this site encompasses a sandbar off the shoreline occupied by Common and Arctic Terns, the latter which are relatively uncommon in Nova Scotia (T. Power, NS DNR, pers. comm. 2014; ACCDC, 2013).

*The Bras d’or Lakes Biosphere Reserve (BLBR)*—The quarry site is also in the buffer zone<sup>10</sup> for the Bras d’Or Lakes Biosphere Reserve<sup>11</sup>. The UNESCO designated Reserve encompasses 3,566 km square kilometres and is a means of recognizing and protecting the Bras d’Or Lakes, which is significant both ecologically and to use by the Mi’Kmaq, and its cultural, commercial and historical importance to the non-native population.

*Other Parks and Protected Areas*—Highway 4 is an important tourist and commercial route and supports various tourist and recreational destinations. Parks and recreational areas relatively close to the site include: Battery Provincial Park (~25 km southwest near St Peter’s); Point Michaud Beach (~26 km south); Ben Eoin (~25 km northeast); and Louisburg National Park Game Sanctuary (~40 km east).

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10 Lands in a watersheds draining into the Bras d’Or Lakes are considered to be buffer areas, and deserve special consideration and protection.

11 A “Biosphere Reserve” is an international designation of recognition from UNESCO (the United Nations Educational, Scientific, and Cultural Organization) under the Man and the Biosphere (MAB) Program, for an area in the world which is deemed to demonstrate a “balanced relationship between humans and the biosphere.” <http://blbra.ca> Biosphere reserves typically consist of three main components: a core zone (protected area for conservation of biological diversity); a buffer zone (area surrounding the core zone where environmental research, recreation and tourism can occur); and a transition zone (an area where local communities manage resources such as farming, fishing, etc.).

#### 4.3.10 RECREATIONAL/CULTURAL FEATURES

Residents in the vicinity of the quarry use Highway 4 and some of the small side roads, and in particular the former limestone quarry grounds, for walking, jogging, and bicycling (D. Cash, K. Cullen, E. Kublek, C. MacIntyre and M. MacNeil, Irish Cove, personal communications, 2014). The old coastal road is not presently used for through vehicle traffic as the bridge on Irish Cove Road is out of service. Side roads have no through traffic although they are serviceable, and can be used for walking, biking and RV traffic. Locals also use the Bras d'Or Lakes for boating, swimming and shoreline recreation, although access to the shore is limited in some cases. Irish Cove Provincial Park, a small roadside picnic park located along Highway 4 not far from the quarry, is used by visitors and residents because of its scenic view of Bras d'Or Lake, walking trail, and picnic area.

Lakes both to the east (e.g. Loch Lomond or Lake Uist) or coastal waters of Bras d'Or Lake are used for recreation by visitors and residents. In the Loch Lomond area, east of the quarry site, a canoe route has been established that runs down Grand River. Nova Scotia Coastal Water Trails has a route running along the East Bras d'Or Lake, with access points at Chapel Island, Irish Cove, Big Pond, Ben Eoin, East Bay Causeway and Castle Bay. Sea kayakers can also use coastal areas to access the lake and subsequently the Atlantic coast. An annual international sailing race (*Race the Cape*), which passes through coastal Cape Breton and the Bras d'Or Lakes, includes the Red Islands Cup Yacht Race from Ben Eoin to St. Peter's, passing near Red Islands located southeast of the study site.

#### 4.3.11 RESIDENTIAL USE

Irish Cove is a former farming, fishing and logging community, which is presently largely residential. There are no services in the community, many of the homes are for sale and a few of the residents rent out homes for summer cottages (K. Cullen and M. MacNeil, personal communications, 2014). Former hay fields are marginally and periodically maintained. Some landowners derive some income from logging on the slopes and uplands near the site (C. MacIntyre, personal communication, 2014). The closest main service centre is St. Peter's to the southwest. Approximately 20 single-family residences occur in Irish Cove (none within an 800 m radius of the Quarry). The majority of residents have noticed no impact from the existing quarry activities, though one mentioned that ground tremors could be felt during blasting operations at the quarry; and another resident noted that truck traffic on Irish Cove Road has impeded local access to lands, including a woodlot on the road (E. Kublek and C. MacIntyre, personal communications, 2014).

#### 4.3.12 COMMERCIAL/INDUSTRIAL DEVELOPMENT

There are no commercial operations or activities in Irish Cove, within a few kilometres of the quarry. Residents in Irish Cove are generally employed elsewhere, and local revenues come from rental of coastal cottages and mobile homes to tourists. Although there are no other quarries in the vicinity, six properties within 5 km of the quarry are owned by four construction/aggregate companies, which could potentially develop them in future (Figure 31). A limestone quarry formerly operated at the mouth of Irish Cove

Brook but was decommissioned in the early 1990s, and restoration work was done in the early 2000s, including stream restoration work on Irish Cove Brook (Figure 32) (Hopper and Bonner 2004).

#### 4.3.13 TOURISM AND VIEWSCAPE

The Irish Cove area of the Cape Breton Island is an important one for visitors, in particular as a travel route to access eastern parts of the Island and the Sydney area from the south. Highway 4 (Shore Drive) is one of the trunk highways in the Irish Cove area providing scenic views of the Bras d'Or Lake (Figure 33). Tourist attractions along Highway 4 include the Battery Provincial Park, St. Peter's Canal, Nicolas Denys Museum and the Wallace MacAskill Museum. Big Pond and the Rita MacNeil Tea House are located enroute to Sydney to the north. Irish Cove Provincial Park with its scenic view and picnic areas is an important feature servicing the tourist industry. Travelers are likely to pass through Irish Cove on their way to and from other Cape Breton destinations such as Sydney and Louisbourg.

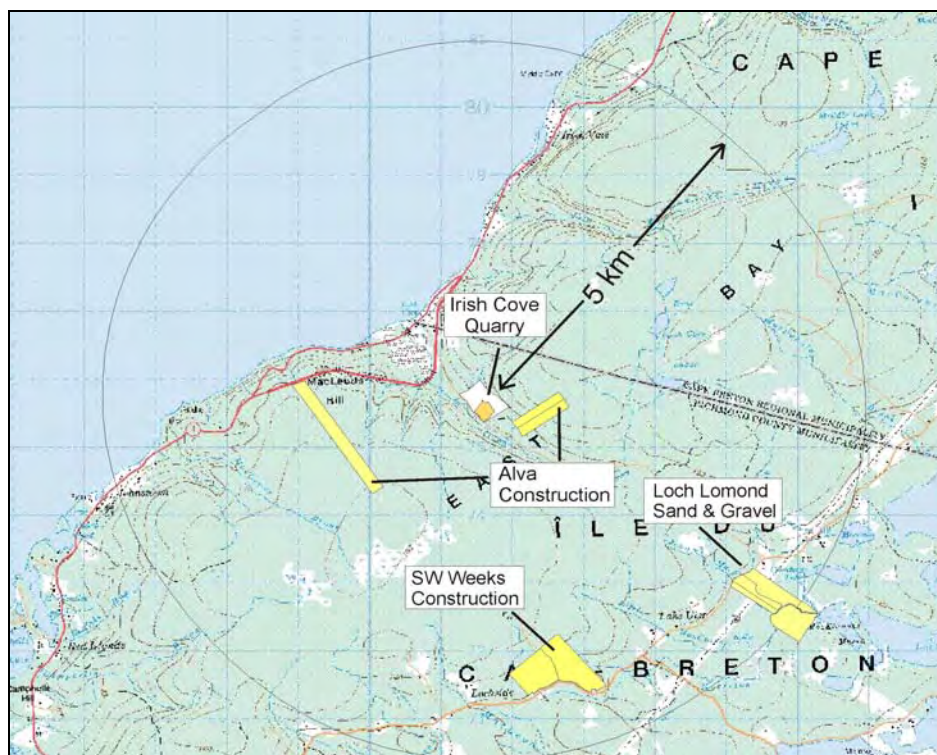


Figure 31. Land ownership by aggregate suppliers within a 5 km radius of Irish Cove Quarry, 2014.





Figure 32. Scotia Limestone Limited quarry at Irish Cove in early 1990s (from Hopper and Bonner 2004). In the background are the valley of Irish Cove Brook and access to Irish Cove Road.

The quarry will probably not be noticed by visitors to the area, either on foot or in vehicles. Although the quarry can be seen from one location on Highway 4 at MacLeod's Hill, it is unlikely to be noticed by road travelers as it is at the point where the Highway drops and turns sharply and there are scenic views. The quarry is about 1 km from the road at this point. For hikers (if any) using Irish Cove Road, the active quarry is not visible from the road, and a berm has been installed on the border of the working quarry along Irish Cove Road which blocks sightlines of the quarry, as well as noise transmission, from the road and extending into the floor of the valley.

#### 4.3.14 TRANSPORTATION

Highway 4 is a major travel route across the province including tourist and regional commercial traffic, and is the main travel route along the eastern side of Bras d'Or Lake, connecting all the major urban centres on the eastern half of Cape Breton Island, including Port Hawkesbury, St. Peters, Sydney and Glace Bay. Traffic levels are likely to be moderate, and seasonal, reflecting the higher traffic volumes associated with tourists in summer, but there is a low level of traffic contributed by locals. There is no traffic on Irish Cove Road, other than associated with the quarry. The existing quarry traffic was noted as an impediment to accessing one resident's private woodlot on Irish Cove Road in the past (C. MacIntyre, personal communication, 2014). When in operation, the quarry will contribute truck traffic in the vicinity



Figure 33. View of Bras d'Or Coast looking north from Irish Cove Provincial Picnic Park.

of the site, typically in the summer and fall, extending from the quarry as far south as the St. Peter's area and Sydney area in the north. The configuration of the Irish Cove Bypass includes a sharp curve and a hill at the intersection of Irish Cove Road. Highway 4 bends sharply at MacLeod's Hill, a bedrock promontory south of Irish Cove and descends steeply to the valley floor of Irish Cove Brook<sup>12</sup> near the Irish Cove Road access to the quarry (Appendix A, Map A-3). Safety concerns arise when quarry traffic is entering and exiting Irish Cove Road onto Highway 4, as there are no turn lanes and the highway is a single lane each direction. Accelerating or decelerating trucks interfere with traffic flow and force traffic to slow down or to pass, possibly inappropriately.

## 5 ENVIRONMENTAL IMPACTS, SIGNIFICANCE, AND MITIGATION

### 5.1 ASSESSMENT APPROACH AND METHODS

Information for the assessment was obtained from consultants' personal knowledge, from reviews of available information, and knowledge of the purpose and proposed design of the project. The environmental assessment follows *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia* (NSE September 2009) and uses assessment methodology typical for environmental assessment screenings of this kind. For this assessment a list of valued environmental components (VECs)<sup>13</sup>, and project activities and outcomes for the expansion of the existing quarry were

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<sup>12</sup> The section of Highway 4 from MacLeods Hill to Irish Cove is known as the Irish Cove Bypass, constructed in the 1970s (Hopper and Bonner 2004).

<sup>13</sup> 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

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.

## 5.2 VALUED ENVIRONMENTAL COMPONENTS

The list of Valued Environmental Components considered for the assessment, and interactions with project components, are presented in Table 9. The environmental effects and potential impacts of the project along with their significance and suggested mitigations are outlined in the following and are summarized in Tables 10 & 11.

Table 9. Valued Environmental Components (VECs) for Irish Cove Quarry Expansion.	
Biophysical	Socioeconomic
Air Quality and Noise	Mi'Kmaq
Hydrogeology & Hydrology	Recreation, Tourism & Viewscape
Water Quality	Archaeological, Cultural and Historical
Freshwater Aquatic Environments & Wetlands	Recreational, Commercial & Mi'Kmaq Fishing
Fish & Fish Habitat	Land Use and Value
Flora & Fauna Species & Habitat	Transportation
Species at Risk	Residential Use
Natural Areas & Wilderness	Parks & Protected Areas
	Water Supplies & Residential Wells
	Forestry, Hunting & Trapping

## 5.3 SOCIOECONOMIC IMPACTS

### 5.3.1 MI'KMAQ

The Mi'kmaq maintain a general interest in all lands in Nova Scotia, and claim they have never surrendered, ceded or sold the Aboriginal title and claim all of Nova Scotia, and as co-owners of the land and its resources, expect that any potential impacts to rights and title are addressed (T. Gaudet, KMKNO, personal communication 2014). Mi'Kmaq occupied much of Nova Scotia prior to European contact and the Bras d'Or Lakes and surrounding lands were used to varying degrees for habitation, hunting and fishing, as noted in Section 4.3.1. In more recent times, treaties made with the British and continued through Canadian law have maintained their rights. Irish Cove Brook and its valley, on which the quarry is located, likely has cultural historical significance for the Mi'Kmaq for its use as a travel route and for hunting and fishing. The quarry site mostly has features such as steep slopes which would have been unsuitable for permanent habitation (CRM 2013) although level areas of the property may have been used

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.

for various purposes from time to time which may have been more suitable. No excavations or detailed searches for artefacts at the site have been undertaken (CRM 2013; T. Gaudet, KMKNO, personal communication 2014).

Operation of the Irish Cove quarry will use land which would otherwise be occupied by terrestrial ecosystems and might be used for human activities such as hunting or fishing, either recreationally or for subsistence; and can influence quality and quantity of surface water runoff into the headwaters of Irish Cove Brook. No effects of the quarry, however, are expected to be large. The Proponent has contacted Potlotek First Nation and no concerns regarding the quarry expansion have been put forward to date. The land area affected is small in relation to the available wildlife habitat in the area, and there are no likely cumulative effects of other activities in the area, and consequently none of these effects are considered significant.

### **5.3.2 RECREATIONAL ACTIVITIES**

Recreational use of the environment in the vicinity of the site consists principally of walking, cycling and home-based recreation in Irish Cove; use of the Provincial Picnic Park on MacLeods Hill, ATV use, hunting, fishing, boating and nature appreciation along Irish Cove Road. Operations at the quarry would be cyclic, likely occupying mainly the summer construction season, and the facilities are well maintained, including Irish Cove Road, which improves access inland to the site and adjoining forest areas. Although the operations could likely be heard and residents would experience truck traffic and other effects of quarry operations, the impacts on these activities are expected to be negligible.

### **5.3.3 TOURISM AND VIEWSCAPE**

The quarry would have little influence on tourism and viewscape at Irish Cove. The property is located some distance (approximately 1 km) from any of the major roads in the area; is not visible from the Irish Cove community; and is poorly visible from Highway 4. Truck and equipment traffic accessing and exiting from Irish Cove Road onto Highway 4 would be occasional and would likely be only a minor impediment to tourist vehicle traffic in the area. The Quarry has good sightlines and is well maintained and not particularly noticeable from the Highway. Noise levels from the quarry reaching summer cottages on the coast would be probably less than noise generated by the intervening Highway 4. Overall the impacts on viewscape and tourism would be expected to be negligible.

### **5.3.4 RECREATIONAL, COMMERCIAL & MI'KMAQ FISHING**

Fishing by local residents including from Mi'Kmaq communities in the area may occur from time to time in Irish Cove Brook, as in many rivers flowing into the Bras d'Or Lakes, as well as in the Bras d'Or Lakes themselves. The Irish Cove Quarry will not change flow regime or water quality in Irish Cove Brook, and its influence on the Brook and the Bras d'Or Lake in the area will be minimal. Water quality of the runoff from the quarry is good for salmonids, including low turbidity and neutral pH, which would

lead to good quality of waters downstream for fish. Overall a negligible impact of the quarry on fishing is expected.

### **5.3.5 ARCHAEOLOGICAL/CULTURAL/HISTORICAL**

The land proposed for the quarry expansion has low potential for pre-contact and/or early historic native or European archaeological resources. The site was not settled by Europeans and, with the exception of fragments of the Old Irish Cove Road, has no on-site structures which could have cultural significance. The section of the old road is on the west boundary of the site, near the major unnamed stream, and will not be reached by the quarry expansion. Consequently the project will not have an impact on cultural/historical/ archaeological features.

### **5.3.6 LAND USE AND VALUE**

Forestry is the major land use at the site, and the proposed quarry expansion area, as well as adjacent lands, have been logged in the past. The land on the site is not suitable for agriculture or subsurface mining, and aggregate production and wind energy extraction are among the only potential commercial uses of the area. Areas containing remnant forest will be preserved if possible to assist in maintaining forest ecosystems containing rare plants at the site, and to provide a buffer of adjacent areas from quarry activities. Quarry activities are not expected to impact existing uses of nearby areas for conservation and scientific use. Values for residential properties in Irish Cove will likely be only minimally affected by the presence of the quarry. Quarries, such as the current aggregate quarry, and the limestone quarry which operated in Irish Cove in past had little impact on the local residential and farm community, while providing economic development.

### **5.3.7 TRANSPORTATION**

The quarry generates a low level of truck traffic on the highways in the area, but activity levels are not expected to increase significantly, and consequently the quarry is not expected to change the existing traffic volumes significantly. Movement of vehicles from the quarry has been carried out safely for over four years and the company will monitor future traffic movements and adjust activities if necessary. Although Highway 4 (Shore Drive) is one of the main access routes from western Nova Scotia to Cape Breton, traffic volumes are not likely to be high enough to normally cause congestion. The highway in the area has a high frequency of curves, which interfere with traffic flow and influence safety. Because of the position of the intersection of Irish Cove Road with Highway 4 (on a sharp curve and a steep hill), trucks and equipment moving to and from the quarry site have the potential to slow traffic and increase the risk of vehicle interactions. Traffic and signage needs will be monitored and discussions will be held with local TIR staff to determine the best location for signs and associated traffic control. Suitable safety awareness training for truckers and equipment operators, as well as the Irish Cove community, would help avoid dangerous situations at the intersection. Overall the impact of the project on transportation and safety is expected to be minimal.

### **5.3.8 RESIDENTIAL USE**

Quarry activities can interfere with normal use and enjoyment of nearby residential properties by creating background noise and through truck and equipment traffic, which some residents may find objectionable. The property is located some distance (approximately 1 km) from any of the major roads in the area, is not visible from the Irish Cove community, and is poorly visible from Highway 4, which largely separates the community from the quarry. Traffic noise on Hwy 4 would likely exceed any coming from the quarry for homes located towards the coast; and sound from the quarry would be blocked by the high hills in back of homes on the east side of the highway. Activities at the quarry would be limited in time seasonally (approximately March to November) and during the day, although nighttime operations, but not blasting, will be required under some circumstances. Traffic volumes from the site would be moderate, and high frequency of truck traffic would be an irregular occurrence, depending on the supply requirements for particular projects. Dust from the operations is unlikely to reach residential areas, and dust generation will be comparatively low due to shielding of winds by the higher elevation forested areas around the site. Quarry activities are not expected to impact residential wells as they are located at a significant distance from the site. Most operations at the site occur during daylight hours, and on rare circumstances when they are undertaken at night, will involve minimal additional lighting and noise, which is unlikely to be a serious disturbance to local residents. The quarry will include signage with phone numbers and contact persons should any members of the community wish to register complaints or concerns. A complaint resolution procedure will be put in place by Municipal Enterprises Ltd to address complaints and concerns. It is expected that at some point in the future, the rock formation used by the quarry will run out and the properties may be available for other uses.

### **5.3.9 COMMERCIAL/INDUSTRIAL USE**

There are no commercial operations in the Irish Cove area apart from cottage and cabin rentals. The East Bay Hills Wind Project if constructed will occupy the hills area northeast of Irish Cove (Figure 8). Blasting at the quarry site will not have sufficient energy to reach through the bedrock to the nearest turbine site (830 m) at the proposed wind project. The quarry is unlikely to impact cabin and tourist rentals on the coast of Bras d'Or Lakes and there are no other local aggregate producers locally with which the quarry would compete, although product from the quarry could be supplied to projects far afield. Overall the quarry will help to support local trucking operations and supply requirements for aggregate and other product in the vicinity of Irish Cove.

### **5.3.10 WATER SUPPLIES AND RESIDENTIAL WELLS**

Residents of Irish Cove use wells for water supply, but there are no public drinking water supplies in the area. Quarry activities are not expected to impact residential wells as they are located at a sufficient distance (i.e all more than 800 m) to avoid impacts from quarry operations, in particular the occasional blasting which takes place. Groundwater recharge is of high quality (low conductivity and dissolved

solids and neutral in pH). Best management practices for operations will be undertaken to eliminate the potential for any contamination of aquifers at the site. Local land users and area residents will be notified initially of the project by newspaper ads, and it is expected that quality of water leaving the site will be monitored under the industrial approval for the project. Overall, activities at the quarry are not expected to impact wells in the area.

### **5.3.11 PARKS AND PROTECTED AREAS**

One Provincial roadside picnic park and several areas protected for ecological preservation, research, and monitoring, occur in the vicinity of the quarry. The Irish Cove Provincial Picnic Park is unlikely to be influenced by the presence of the Irish Cove Quarry, separated from it by about 2.3 km and with no sightlines. Travelers to and from the park are not likely to see the quarry, although it is marginally visible from the highway east of MacLeod's Hill, and individuals climbing this promontory can see the quarry at present and will be able to see the expanded quarry in the future.

The Irish Cove Quarry expansion will have a small footprint (approximately 16.3 ha total, including the existing quarry) and is on private land, and will not reduce the area of protected and designated areas which are located in the vicinity of the quarry (see Section 4.3.9 for details). The project will only reduce by approximately 3% the area of natural forest within a 1 km radius (see Appendix F). The quarry presently occupies part of one side of the natural gorge of Irish Cove Brook adjacent to Irish Cove Road, and the proposed expansion could potentially affect an additional 300 m of the northeast slope of the valley, although there will be a 30 m buffer on the southeast side, and around all active sides of the quarry<sup>14</sup>. Changes in physical conditions which could occur at the site are relatively small, but include alteration of microclimate (temperature, precipitation, incidence of mist & fog, air circulation); increased levels of dust and vehicle emissions; changes in runoff patterns etc. Effects on biological conditions are also expected to be small, involving effects on movements of animals, dispersal of plants, changes in connectivity between habitats, and local travel routes and habitats and territories of wildlife in the area. Ecological integrity of the area as a whole, will also be affected by the expansion, although the area has experienced other human intrusions such as use of Irish Cove Road for the quarry and by locals for recreational vehicles and hunting, incidental quarrying operations, and for forestry. While these effects of the quarry will occur, the overall final expanded footprint of the quarry and degree of impact will be relatively small compared with the overall area of protected areas at the site.

The quarry will be developed in consultation with regulatory agencies to ensure that impacts on the local environment will be minimized. The present project does not extend to the unnamed stream on the west end, whose gorge will not be impacted. Measures to further protect against sedimentation reaching Irish Cove Brook could be taken such as use of clean rock on travel surfaces to prevent release of sediment into and reduce dust production. At a later date the diverted stream could be returned through a restored

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<sup>14</sup> Ideally the 30 m buffer from Irish Cove Road will be forested; however for physical and safety reasons it may not be possible to implement a forested buffer. The proponent has indicated it will likely be possible, however, to have a forested buffer around the remaining sides of the quarry.

quarry floor to its former outflow in the Brook. Efforts should be made, when areas are revegetated (e.g. on berms and slopes) to encourage reseeding of native plant species to help minimize the spread of invasives into adjacent forest areas.

#### **5.3.12 RESOURCE USE—FORESTRY, HUNTING & TRAPPING**

The site of the quarry will not be available for logging in future; however the area occupied by the quarry is relatively small in relation to the available forest resources in the area, and the overall impact on economic return from logging is expected to be small. The quarry occupies a relatively small area of habitat for furbearing and game species, and will not have a significant impact on hunting and trapping in the Irish Cove area.

### **5.4 BIOPHYSICAL IMPACTS—IMPACTS OF THE PROJECT ON THE ENVIRONMENT**

#### **5.4.1 AIR QUALITY, NOISE, AND LIGHT**

Various project activities have the potential to generate dust, combustion emissions, noise, and light. In particular operation of heavy equipment (e.g earth movers, crushers), rock drilling and blasting, as well as onsite routine operations contribute to increased dust and particulate levels. Noise levels can impact human use and enjoyment of the environment. Dust emissions during the construction phase will be localized and short term, and from routine operations are expected to be minimal, and dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Monitoring of airborne particulate emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines and the Nova Scotia Air Quality Guidelines. An environmental protection plan will be put in place and followed during all phases of operations.

Exhaust emissions will be generated from the operation of vehicles and equipment. Given the scope of the planned operations, these emissions will be minimal (i.e. restricted to several pieces of heavy equipment, earth movers, trucks etc as well as operation of crushers and asphalt plant), which will be localized and similar in type and amount to those produced during previous operations. Ambient air quality monitoring will be conducted at the request of NSE.

Noise levels from the Quarry expansion are expected to be similar to those already produced at the site, since the operations are expected to be similar in size at a given time, and the company 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).

Light during nighttime operations will be seen in Irish Cove, particularly during times of low hanging cloud, and can attract migrating birds. Light ‘pollution’ is increasingly a concern globally. Measures can be taken to ensure use of directional lighting, which minimizes emanation of light upward and laterally over the horizon.



#### **5.4.2 HYDROGEOLOGY**

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

#### **5.4.3 HYDROLOGY**

Expansion of the quarry will result in an artificial and managed regime of surface water movement and runoff at the site, mainly near the quarry but potentially affecting the entire active area of quarry operations. Increased proportions of runoff from the quarry floor will be directed into sedimentation ponds, and eventually will reach Irish Cove Brook. Exposed surfaces on Irish Cove Road lead to more sudden, 'flashy' runoff patterns during rainfall events. A stream formerly flowing into the existing quarry has been diverted west. With the quarry present, peak runoff flows at the site have likely increased over historic levels, and in future will be more sudden and greater in volume as the area of quarry expands and the amount of natural watershed decreases. These changes will have an insignificant impact on broader runoff and flow patterns in the area as a whole, due to the relatively small footprint of the quarry in the larger watershed as a whole.

#### **5.4.4 WATER QUALITY**

Water quality downstream of the site is important for fish habitat in the lower watershed of Irish Cove Brook. Quality of water leaving the site and entering the stream is high, due both to the onsite flow management and the bedrock quality. Quarry rock is within acceptable limits for sulphur and acid-generating potential. Presence of the quarry probably has not impacted the quality of the surface waters in downstream areas significantly. Blasting is not expected to result in groundwater quality changes, particularly with efforts to reduce releases of other chemicals such as nitrates used in blasting. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. The stream diversion running along the northeast boundary is providing clear and sediment-free water flows. Release of other contaminants such as oils and lubricants from operating equipment, as well as contaminants which may be found in material, such as recycled asphalt, stored at the site, potentially can impact downstream areas, but is expected to be mitigated by normal precautions on equipment operations and fuelling locations, and measures to reduce runoff from storage piles, and in any case, the concentrations of contaminants are expected to be exceedingly low. All activities will conform with the Nova Scotia Erosion and Sedimentation Control Handbook (NSE 1988) and the Nova Scotia Pit & Quarry Guidelines (NSE 2003). Impact of the quarry on water quality in adjacent streams and Irish Cove Brook is expected to be negligible.

#### **5.4.5 FRESHWATER AQUATIC ENVIRONMENTS**

Several small flowages for surface drainage found on the site will be removed by quarry expansion. These are not fish habitat, although they would support biological organisms (e.g. aquatic insects); but the area affected represents a small proportion of that available in the area. Flow arising from these features will form part of future quarry drainage and is expected to be at a high level of quality and not likely to impact conditions in Irish Cove Brook. Irish Cove Brook has been the subject of fish habitat restoration efforts in the vicinity of the abandoned Irish Cove limestone quarry and protection of the restored habitat is of particular concern. However the quarry is unlikely to generate significant quantities of contaminants or suspended sediments which could impact any downstream habitat in Irish Cove Brook. Therefore loss of freshwater environments at the site is considered to be a negligible impact.

#### **5.4.6 WETLANDS**

No wetlands occur on the proposed site; although intermittent flowages may support mosses and occasionally wetland plants (see Appendix B, Spring Botany Survey). Overall the quarry expansion will not impact wetlands.

#### **5.4.7 FISH AND FISH HABITAT**

None of the proposed project activities will physically impact fish bearing streams—no streams are on or adjacent to the site and runoff leaving the site is expected to be of high quality, which will not impact conditions in Irish Cove Brook. A forested buffer currently present between Irish Cove Road and the Brook helps to maintain temperatures, inputs of nutrients, and provides a source of leaves and woody debris. Presence of Irish Cove Road and turnaround areas may lead to release of silt and sudden runoff events, which can be mitigated by use of suitable paving materials and erosion control measures. Blasting occurs infrequently at the site and is sufficiently separated from Irish Cove Brook to eliminate harm to fish. All guidelines for activities and timing of blasting in the quarry will be followed. Overall the effects of the quarry construction and operations are expected to be negligible.

#### **5.4.8 FLORA AND FAUNA AND HABITAT**

The existing terrestrial ecosystem (plants and animals) will be removed in areas covered by the footprint of the quarry. Several species of migratory birds are in decline in Nova Scotia, in particular interior forest birds, which rely on large expanses and continuity of intact forest. Similarly important wildlife species of concern such as Canada Lynx have large territories and need large areas of undisturbed forest. The East Bay Hills, in which the quarry is located, is one of the few remaining areas of the Province with natural and old forest stands. Expansion of the Irish Cove quarry will result in only a comparatively small change in the coverage of natural and mature forest stands in the area and have comparatively small impact on interior forest birds and wildlife such as Lynx. An analysis of abundance and distribution of natural forest stands in the area is presented in Appendix F. In terms of vegetation and plant species at risk, most of the

woodland on the quarry has been cut at times and does not contain significant species; however some of the areas support mature forest (e.g. the eastern section) which may in some cases retain plant species which may have conservation significance. In particular Lesser Rattlesnake Plantain is found outside the project area but near the boundary on the northeast side. Impacts on adjacent plant communities such as these can be mitigated by placing buffers zones in these areas. As the quarry expands, areas not needed will be reclaimed and revegetated, in consultation with Nova Scotia Environment and in response to likely approval requirements. Reclamation will reduce the overall impact of the project on loss of terrestrial ecosystems at the site. Grubbed and marginal areas of the quarry offer potential nesting sites for certain species of birds and other wildlife; employees should be educated on the need to check areas for activity and nests before undertaking activities which would disturb established surfaces. Night operations and use of lights have various effects, including attracting insects which otherwise would need darkness to mate and reproduce; light pollution is considered to be an important factor globally in decline of songbird populations, through declines in populations of some insects. Lights during night operations during migration periods (August-September) would attract migrating birds. If possible, 24-hour operations in August-early September, should be avoided and lighting used at the site should focus downward and below the normal horizon, to limit visibility by birds and insects from a distance.

#### **5.4.9 SPECIES AT RISK**

No species at risk were found at the site; however Lesser Rattlesnake Plantain occurs outside the northeast corner, in a forest zone which extends into the expansion area (Figure 18). As a precaution to protect the plant, it is suggested the mature forest in the northeastern corner of the proposed expansion area be avoided and used as a buffer zone<sup>15</sup>. No other species of concern were found at the site, and impacts of quarry expansion as proposed, overall, will be negligible. Common nighthawk, a ground-nesting species, potentially could nest in grubbed and marginal but open areas of the quarry; employees should be made aware of the need to check areas for activity and nests before undertaking activities which would disturb established surfaces. Lights during night operations during migration periods (August-September) would attract various bird species and insects, which could include species at risk. If possible, 24-hour operations in August-early September should be avoided and lighting used at the site should focus downward and below the normal horizon, to limit visibility from a distance.

#### **5.4.10 NATURAL AREAS & WILDERNESS**

The project is located in an area where some of the land and forest is in a natural state and has wilderness and conservation value, although it has not been identified as having particular significance for wilderness appreciation. Traffic, noise, dust and light from quarry operations contrast with the human experience of nature and wilderness and the social values they attribute to them. Activities at the quarry will be carried out with a view to minimizing impacts of the quarry and associated infrastructure, such as roads, on the adjacent natural environment at the site and ensuring that as much as possible of the quarry is reclaimed

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<sup>15</sup> Given the existing conditions at the site with intact forest to the northeast, a buffer zone of 50m from the locations shown in Figure 18, would be sufficient to provide some protection for this species.



in future. The restoration should also take into consideration values important in conservation of biological communities and ecosystems (e.g. importance of the land for Canada lynx habitat); as well as changes in physical conditions which could affect those communities. Normal procedures such as dust control and light management will help to minimize impacts on natural and wilderness values at the site.

## **6 IMPACTS OF THE ENVIRONMENT ON THE PROJECT**

The operating quarry will not be impacted by weather, including high rainfall and precipitation, through its nature and design, which includes site water management. Aggregate and other rock products stored at the site are stable under varying conditions of rainfall and wind. Integrity of the stream diversion constructed on the northeast border of the property is partially dependent on the integrity of the berm<sup>16</sup>, which is constructed from local till, and could be damaged by strong flows caused by extreme rainfall events. If a failure were to occur, the flow would end up in the pit, where it could be managed until repairs are effected, and consequently no major impact to the local environment would occur. To avoid failures of the diversion, the integrity of the berm should be checked regularly (e.g. annually) and suitably maintained.

## **7 CUMULATIVE IMPACTS**

No significant cumulative impacts (impacts arising from the project in combination with ongoing or foreseen activities) are likely to be caused by the project. In future, however, construction and operation of quarries and pits, as well as wind farm development, could take place in the vicinity of the quarry. Development of other quarries in the vicinity are likely, although there are no confirmed projects at present. Four construction companies own properties on suitable rock formations within 5 km of the Irish Cove Quarry (Figure 31), and could potentially develop sites, but the present quarry is the only one developed to date. If they were to be developed, properties owned by Alva Construction within 1 km of the Irish Cove Quarry would probably require upgrading of Irish Cove Road, with associated environmental concerns regarding impacts of roads on Irish Cove Brook. The other properties are accessed from other areas. Any developments affect the ecological integrity of the area, making it less suitable for conservation purposes and affecting the value of the protected areas near the site and all should be undertaken with a view to minimizing the impact on the local natural environment. The proposed East Bay Hills Wind Project is located north of Irish Cove Quarry with the closest turbines proposed approximately 1,300 m northeast (Figure 8). The project area includes the watershed of Irish Cove Brook, and although there is usually considerable care taken to avoid interference with watershed characteristics, there is potential for influencing water quality in it. Changes would not likely be large and together with any changes due to the Irish Cove Quarry, would be negligible.

## **8 MONITORING**

Monitoring of hydrological conditions at the site, as well as water quality monitoring, may be conducted to ensure conditions have been maintained by quarry operations. Routine monitoring of noise levels will

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<sup>16</sup> The diversion is excavated into bedrock and consequently only extremely high flows would reach the berm.

be done if required by NS Environment. On-site groundwater monitoring may be conducted, at the request of NSE.

## 9 PUBLIC CONSULTATION

In addition to contacts already made in developing this assessment and in conducting operations in Irish Cove, the Proponent will undertake to consult with locals, municipal, provincial and federal legislators; and the Mi'Kmaq, about the project and its implications; and the plans for using the resources at the site in an environmentally acceptable manner.

## 10 REFERENCES

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*Continued...*

Table 10. Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Irish Cove Quarry expansion.

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



Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.						
VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
<b>BIOPHYSICAL COMPONENTS</b>						
Air Quality/Noise/Light	Construction	Noise and dust from heavy equipment during logging and grubbing.	Significant	Negative	Schedule activity to avoid peak periods of use by residents in the Irish Cove community. Avoid engine braking.	Not significant.
		Light from the quarry can be seen for great distances.	Significant	Negative	Use directional lighting with downward and lateral focus to minimize light leaving the quarry.	Not significant.
	Operation	Drilling and blasting; equipment for moving rock; crusher & heavy equipment operation.	Significant	Negative	Monitor noise levels and undertake to avoid exceedences of regulatory levels. Institute measures for dust control.	Not significant.
		Light from the quarry can be seen for great distances.	Significant	Negative	Use directional lighting with downward and lateral focus to minimize light leaving the quarry.	Not significant.
Hydrogeology/Hydrology	Construction	Forest and soil removal changes surface water flow.	Negligible	Negative	Likely small changes in groundwater and runoff patterns.	Not significant.
	Operation	Blasting fractures bedrock and changes groundwater flow patterns.	Significant	Negative	Bedrock not in same aquifer used in Irish Cove. Monitor groundwater hydrology to determine changes.	Not significant.
	Operation	Quarry and work areas change surface water flows. Increased peak stormwater flows.	Significant	Negative	Onsite water management to moderate extreme surface water runoff and suspended sediment levels; measures to maintain normal flow regime.	Not significant.
	Operation	Stream diversion increases flow, erosion, and flashiness in unnamed stream	Negligible	Negative	Restore diverted stream to original course after quarry closed.	Not significant.

Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	Accidental hydrocarbon spills and blasting residues contaminate groundwater	Significant	Negative	Measures to minimize danger of spills; on-site emergency numbers, spill kits etc. Avoid refueling near watercourses.	Not significant.
Water Quality	Construction	Increased surface water flows and turbidity in watershed flowages	Negligible	Negative	Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.
	Operation	Dust & suspended sediment from operations potentially enters Irish Cove Brook. Chemicals (e.g. nitrates) from explosives entering runoff.	Significant	Negative	Onsite dust control and water management to moderate surface water runoff and suspended sediment levels. Closely monitor explosive residues after blasting.	Not significant.
	Operation	Chemicals in runoff from materials stored on site.	Negligible	Negative	Best management practice allows leaving piles exposed to the environment.	Not significant.
Natural Areas & Wilderness	Construction & Operation	Presence of the quarry affects natural wilderness values and local physical conditions.	Negligible	Negative	Area affected is small in relation to remaining natural areas, and previous development has occurred in the area, diminishing value of natural areas and wilderness. Attempt to minimize footprint and avoid damage to areas which contribute most to supporting the natural ecosystem and enhancing values. Manage releases of dust and light, and control noise.	Not significant.
Freshwater Aquatic Environments	Construction	Brief occurrences of high suspended sediments and nutrient levels from grubblings and locally diverted flows.	Significant	Negative	Preserve woodland in buffer areas of quarry. Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.

Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	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	Higher peak flows and suspended sediment during activities.	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 and accidental spills of hydrocarbons on site.	Significant	Negative	Provide pollution prevention and emergency measures.	Not significant.
Wetlands	Construction & Operation	No wetlands on or near the site.	Not Significant	Not Applicable	NA	Not significant.
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent watersheds.	Negligible	Negative	Quarry affects small area relative to Irish Cove Brook watershed as a whole.	Not significant.
	Operation	Change in flow regime in Irish Cove Brook.	Negligible	Negative	Restore diverted brook upon closure of the quarry.	Not significant.
	Construction & Operation	Nominal releases of oils, hydraulic fluids etc. from operating equipment. Accidental spills of hydrocarbons on site.	Significant	Negative	Maintain equipment to minimize loss of lubricants and fuels. Provide pollution prevention and emergency measures.	Not significant.
	Operation	Accidental spills into Irish Cove Brook and other waters from truck operations and accidents.	Negligible	Negative	Recommend truck traffic use safe driving practices and reduce speed in vicinity of quarry and intersection on Highway 4. Provide pollution prevention and emergency measures.	Not significant.

Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Terrestrial Flora & Fauna & Habitat	Construction	Removal of Existing Communities	Negligible	Negative	Restore damaged and unused parts of the site (e.g. grubbings and waste rock piles) as soon as possible. Long-term site rehabilitation plan developed with NSE.	Not significant.
		Eagle Nesting Area	Negligible	Negative	Activities such as heavy equipment operation, light, dust and blasting are not expected to harm eagles in the area. The species can become accustomed to human activity, and a major highway passes near the nesting site to which they may be already accustomed. The quarry also may not be operated continuously.	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.
		Light influences movements of birds and insects.	Significant	Negative	Use directional lighting with downward focus to minimize light leaving the quarry.	Not significant.
		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.
		Quarry affects wildlife movement patterns and connectivity of habitats.	Significant	Negative.	Restoration should include consideration for wildlife movement through the restored site.	Not significant.
Species at Risk	Construction	No species at risk in the proposed footprint of the quarry.	Negligible	Negative	Leave mature standing trees where possible as nest cavities.	Not significant.



Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	At Risk Plant Species (Lesser Rattlesnake Plantain) in nearby area.	Significant	Negative	Avoid area and provide an undeveloped buffer (i.e. forest left intact for 50-100 m from footprint of quarry).	Not significant.
		Light influences movements of species at risk birds and insects.	Significant	Negative	Use directional lighting with downward and lateral focus to minimize light leaving the quarry.	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.
		Accidental contamination of Irish Cove Brook may affect Mi’Kmaq recreational fishing and food fishery in Irish Cove Brook and Bras d’Or Lakes.	Negligible	Negative	Surface water monitoring program will be developed in consultation with NSE. Follow company Best Practices to avoid accidental release of contaminants to headwaters of Irish Cove Brook.	Not significant.
Archaeological, Cultural and Historical Significance	Construction	Expansion may affect part of remaining Old Irish Cove Road.	Significant	Negative	Preserve as much as possible ridge of west gorge containing road.	Not significant.
Recreation	Construction & Operation	Quarry traffic & activities affects ATV traffic and local use of Irish Cove Road.	Not significant	Negative	Users will be aware of activity at quarry but will not be otherwise impacted by it.	Not significant.
		Truck and recreational traffic interact.	Negligible	Negative	Ensure awareness of truck operators of local traffic and uses.	Not significant.
Tourism and Viewscape	Construction & Operation	View of site and industrial character	Not Significant	Negative	Maintain a clean operation. Rehabilitate areas no longer needed for activity and future development.	Not significant.

Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Residential Use	Construction & Operation	Noise; light pollution; operation of trucks and transportation of heavy equipment. Restrict expansion of urban area.	Significant	Negative	Use best management practices to reduce disturbance to nearby residents. Inform residents about quarry operations. Provide community with safety information for truck traffic on Highway 4.	Not significant.
Recreational and Mi'Kmaq Hunting and Fishing	Construction & Operation	Accidental Hydrocarbon spills and blasting residues contaminate surface waters.	Significant	Negative	Provide pollution prevention, emergency measures & response capability. Identify and control contaminant releases.	Not significant.
	Construction	Loss of forested area under quarry footprint.	Not significant	Negative	Rehabilitate areas no longer needed for activity and future development.	Not significant.
Water Supply	Construction and Operation	Blasting potentially impacts aquifers.	Not significant	Negative	Develop groundwater-monitoring plan in consultation with NSE.	Not significant.
Land Use and Value	Construction & Operation	Removal of potential forest and wildlife resource (e.g. forestry & trapping).	Not significant	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	Collisions with trucks and equipment on Highway 4 at Irish Cove Road.	Not significant	No Change	Use good directional signs, viewing pull-offs, posted speed limits and speed policy in vicinity of quarry.	Not significant
Industrial & Agricultural Use	Construction & Operation	Noise for local residents	Not significant	Negative	Schedule activities to take place during off peak usage and daylight hours.	Not significant.
	Operation	Wind Turbine foundations	Not significant	Negative	Blasts unlikely to have sufficient force.	Not significant.
	Operation	Competition with other Quarries	Negligible	Neutral	No other quarries in close proximity.	Not significant.
Resource Use Forestry, Hunting & Trapping	Construction & Operation	Removes woodland; game habitat.	Not significant	Negative	Relatively small area is used.	Not significant.
Parks and Protected areas	Construction & Operation	Changes local physical environment (e.g. microclimate)	Negligible	Negative	Minimize footprint and avoid most significant or important natural areas.	Not significant.

Table 11. Summary of impacts and mitigation on Valued Ecosystem Components, Irish Cove Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Construction & Operation	Changes factors affecting biological communities (e.g. connectivity, migration routes)	Negligible	Negative	Provide corridors for wildlife across restored site at project completion.	Not significant.
		Light influences movements of birds and insects from adjacent areas.	Negligible	Negative	Use directional lighting with downward focus to minimize light leaving the quarry.	Not significant.

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## **11 PERSONAL COMMUNICATIONS**

Mr. Daniel Cash, Resident, Irish Cove, NS.

Mrs. Kim Cullen, Resident, Irish Cove, NS.

Mrs. Eleanor Kublek, Resident, Irish Cove, NS.

Mr. Jim Fraser, H<sub>2</sub>OGeo Inc., Halifax, N.S.

Ms. Twila Gaudet, Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), Truro, NS.

Mr. E. MacIntyre, NSDNR, St. Peters, NS.

Mr. Charles MacIntyre, Resident, Irish Vale, NS.

Mr. Michael MacNeil, Resident, Irish Cove, NS.

Mr. Wayne Miller, Resident, Irish Cove, NS.

Mr. Terry Power, Regional Biologist, NSDNR, Cape Breton, NS.

Mr. G. Timmons, Fisheries Officer, Conservation and Protection, Dept. of Fisheries and Oceans, St. Peters, NS.

Mr. Sean Weseloh-McKeane, NS Museum of Natural History, Coordinator, Special Places.

## **12 LIMITING CONDITIONS**

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

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

The findings of this investigation are based on research and investigations carried out in October 2013-July 2014 and the generally accepted assessment practices of our industry. No other warranty is made.



# APPENDIX A

## MAPS



## THE MUNICIPAL GROUP OF COMPANIES

### IRISH COVE QUARRY EXPANSION

Irish Cove,  
Richmond county, Nova Scotia

### Site Location

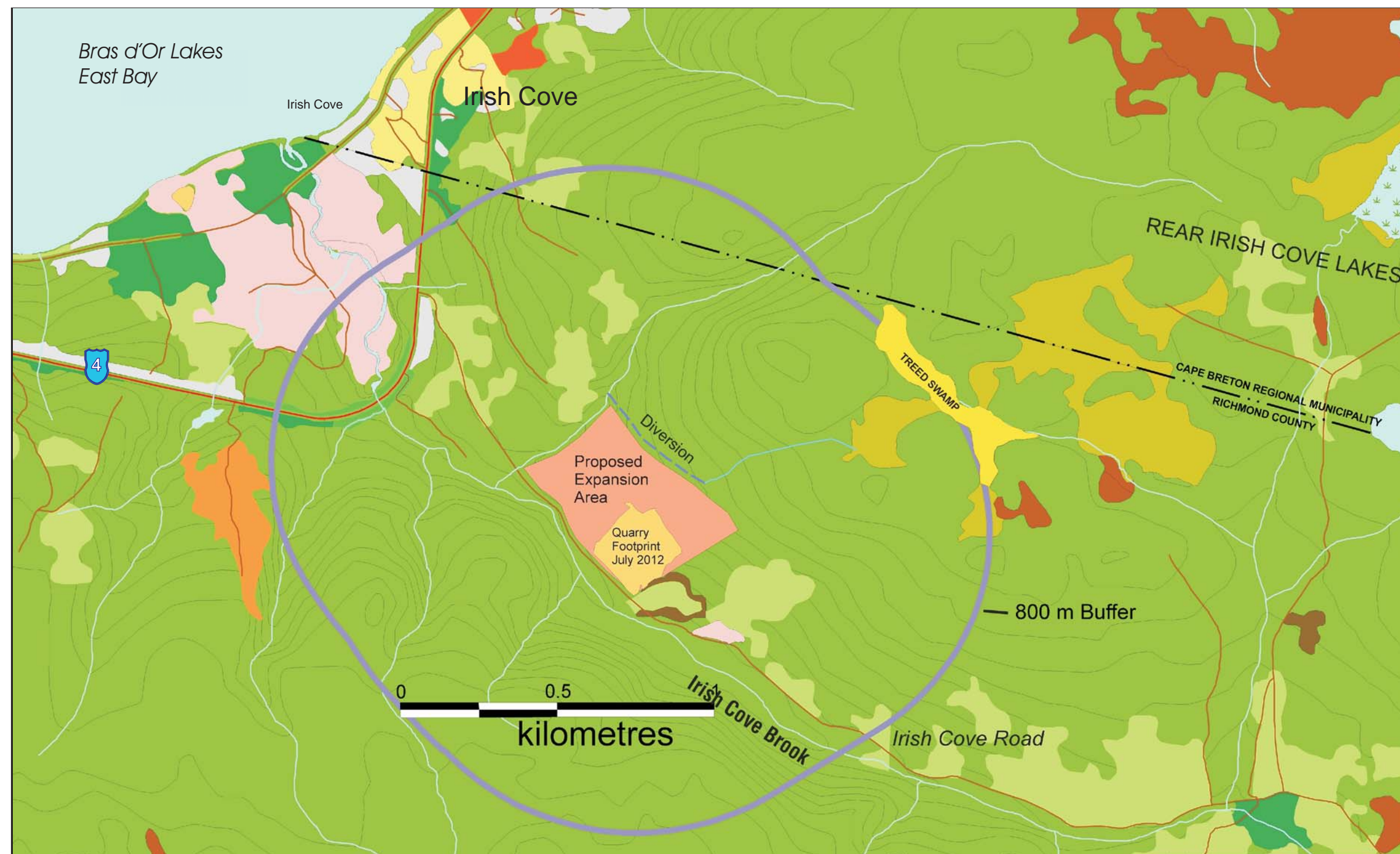
- Quarry Footprint 2014
- Proposed Expansion
- 800 m Buffer

WMR  
Environmental  
Services Inc. & Associates

Map by:  
Envirosphere Consultants Ltd.  
May 2014

Map A-1





# THE MUNICIPAL GROUP OF COMPANIES

## IRISH COVE QUARRY EXPANSION Richmond County, N.S.

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

- Agriculture
- Treated
- Urban
- Wetlands General
- Brush
- Inland Water
- Natural Stand
- Alders
- Old Field
- Partial Depletion
- Treed Bog
- Gravel Pit
- Clear Cut
- Trunk Highway
- Secondary Roads & Trails

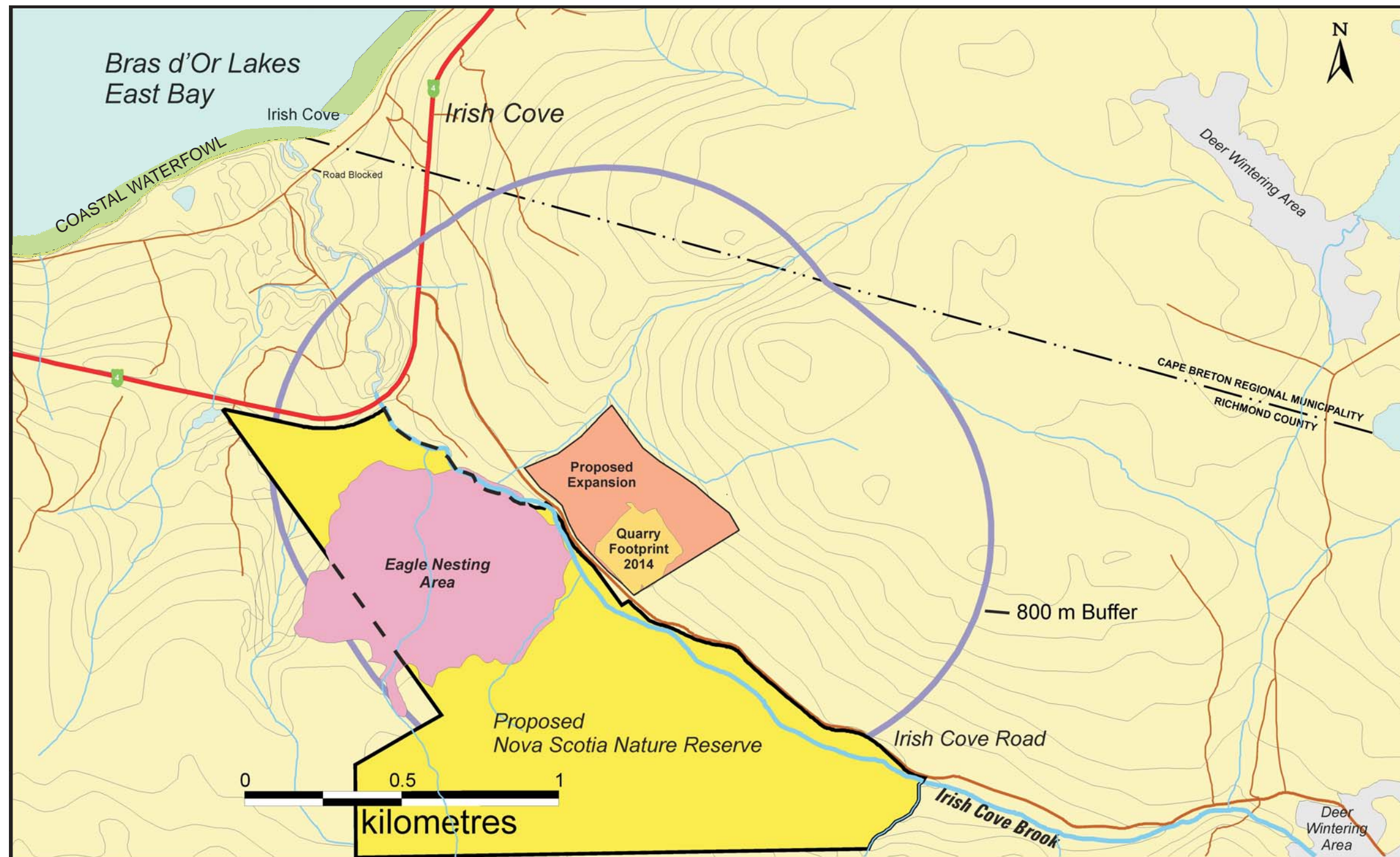
WMR  
Environmental  
Services Inc. & Associates

Map by:  
Envirosphere Consultants Limited.  
Windsor, Nova Scotia, May 2014









THE MUNICIPAL GROUP  
OF COMPANIES

IRISH COVE QUARRY  
EXPANSION  
Irish Cove,  
Richmond County, N.S.

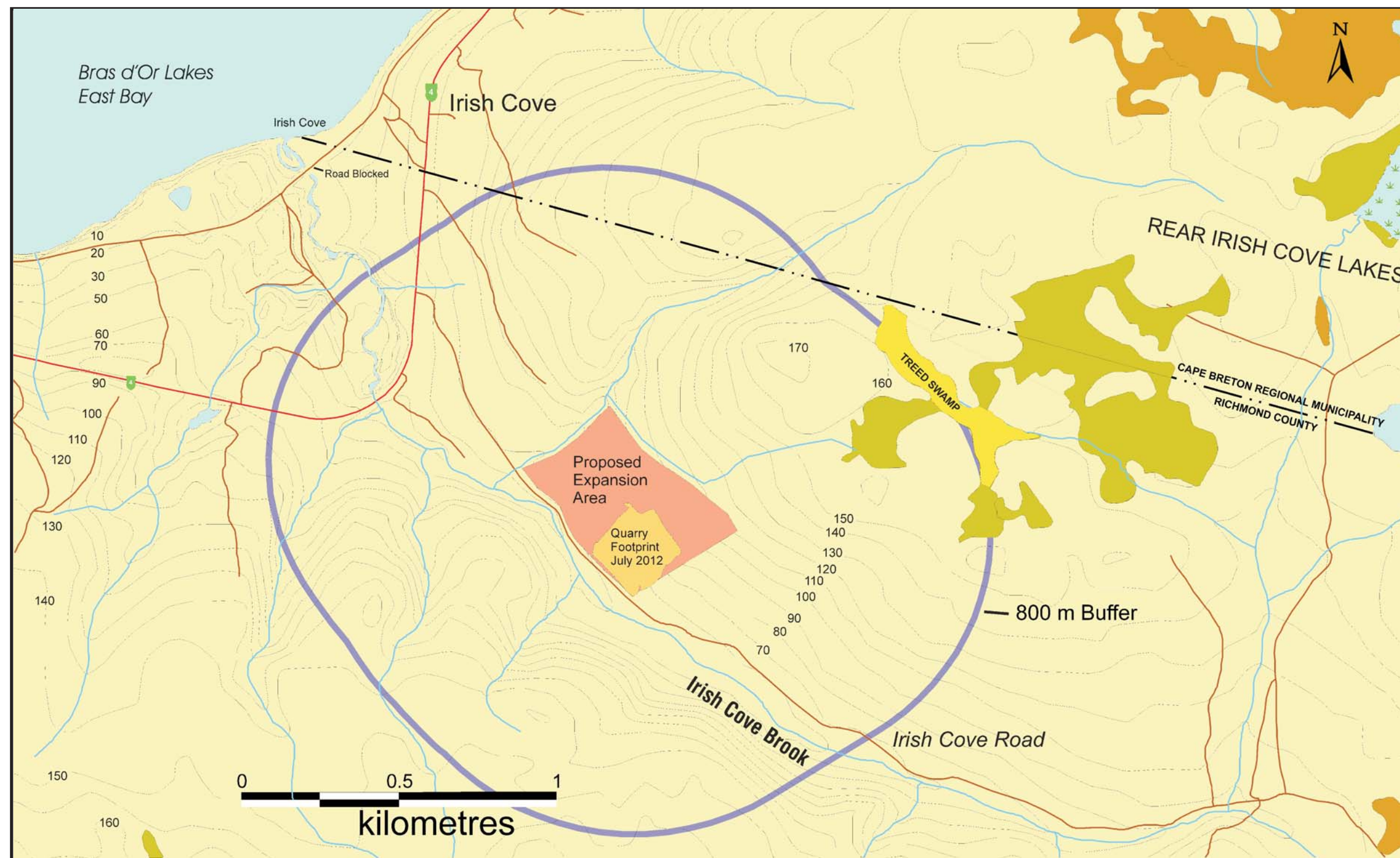
### Ecologically Significant Areas

- Quarry Expansion
- NS Nature Reserve  
(proposed)
- Eagle Nesting
- Deer Wintering
- 800 m buffer
- Surface Waters
- Major Roads
- Minor Roads

WMR  
Environmental  
Services Inc. & Associates

Map by:  
Envirosphere Consultants Limited  
May 2014 (Revised November 2014)





THE MUNICIPAL GROUP  
OF COMPANIES

IRISH COVE QUARRY  
EXPANSION  
Irish Cove, Richmond County

### Surface Waters, Wetlands & Contours

- Wetlands General
- Treed Bog
- Lake Wetland
- Active Quarry
- Trunk Highway
- Access Roads & Trails
- Contours (5 m)
- Flowages/Watercourses

WMR  
Environmental  
Services Inc. & Associates

Map by:  
Envirosphere Consultants Limited  
Windsor, N.S. May 2014

**APPENDIX B**  
**WETLAND/BOTANTICAL SURVEYS**  
**Ruth Newell (Fall 2013)**  
**Jim Jotcham (Spring 2014)**

# Vascular Plant Survey of a Property on Irish Cove Road, Irish Cove, Richmond County, Nova Scotia

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Ruth E. Newell, B.Sc. (Hons.), M.Sc.

11/6/2013

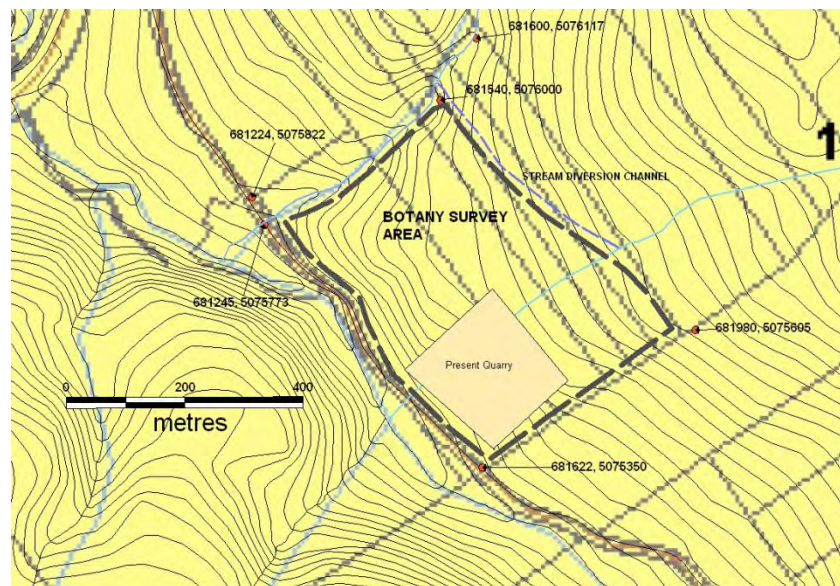


# Vascular Plant Survey of a Property on Irish Cove Road, Irish Cove, Richmond County, Nova Scotia

## Introduction

A vascular plant survey was conducted October 26<sup>th</sup>, 2013 for a proposed quarry expansion on Irish Cove Road, in Irish Cove, Richmond County, Nova Scotia. The existing quarry is situated approximately 2 km southeast of Hwy 104 on the Irish Cove Rd. The 16 ha area surveyed occurs immediately northeast and northwest of the existing quarry (4 ha) and is bordered on its northwest side by an existing stream/gorge, on most of the northeast boundary by a stream diversion ditch and associated berm, and on its southwest boundary by the Irish Cove Road and the existing quarry (Figure 1).

The approximately four hour survey was conducted by botanist, Ruth E. Newell, M.Sc., B.Sc. (Hons.). Four meandering transects were walked across the width of the property from the southwest to the northeast. A section of the stream and gorge occurring along the northwest edge of the property was also included in this survey.



**Figure 1.** Botany survey area of the proposed quarry expansion on the Irish Cove Road.

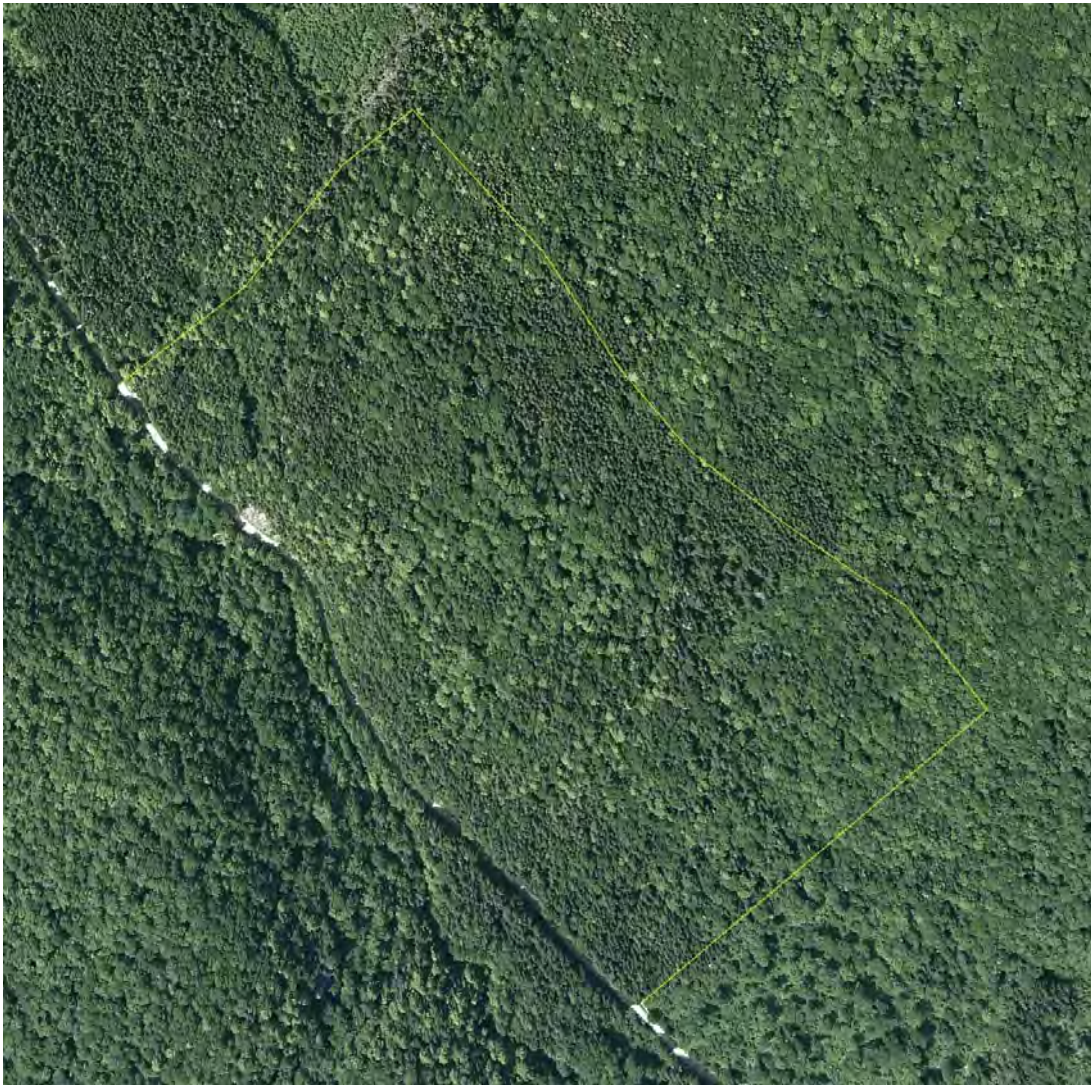
## Site Description

The area surveyed slopes downward from the northeast to the southwest. The terrain tends to be steepest along the lower half of the property (Figure 1).

The entire property with the exception of the existing quarry is forested (Figure 2). The forest is a mixed age stand with scattered mature trees throughout, e.g., Yellow Birch (*Betula alleghaniensis*) and Eastern Hemlock (*Tsuga canadensis*). The remaining trees are of various ages. Stand composition varies from nearly 100% coniferous, to approximately 90% deciduous to a mixture of both coniferous and deciduous

species (Figures 3, 4, 5 & 7). Common tree species include Balsam Fir (*Abies balsamea*), Sugar Maple (*Acer saccharum*), Red Maple (*A. rubrum*), Yellow Birch (*Betula alleghaniensis*) and Eastern Hemlock (*Tsuga canadensis*). Somewhat less common tree species include Mountain Maple (*Acer spicatum*), Moose Maple (*A. pennsylvanicum*), Heart-leaved Birch (*Betula papyrifera* var. *cordifolia*), Red Spruce (*Picea rubens*), American Beech (*Fagus grandifolia*) and White Pine (*Pinus strobus*).

Drainage appears to be generally good throughout (mesic) with occasional damp areas.



**Figure 2.** Air photo of survey area. This photo predates the establishment of the existing quarry.





**Figure 3.** A primarily coniferous stand in lower central portion of the property.



**Figures 4 & 5.** Mixed woodland in centre of property (left photo) and coniferous forest along northwest side of survey area (right photo).

The herbaceous layer was moderately diverse. Common to abundant species include Goldthread (*Coptis trifolia*), Twinflower (*Linnaea borealis*), Evergreen Woodfern (*Dryopteris intermedia*), Wood Aster



(*Oclemena acuminata*) and Smooth White Violet (*Viola blanda*). Ferns and clubmosses were noticeably abundant in the northeast quadrant which was primarily deciduous woodland (Figure 7).

The forest floor was primarily covered with mosses and leaf and coniferous needle litter. Moss and liverwort covered rocks and branches were scattered throughout. Common moss species present included Electrified Cat's-tail Moss (*Rhytidiadelphus triquetrus*), Stairstep Moss (*Hylocomium splendens*) and broom mosses (*Dicranum* spp.). Sphagnum moss (*Sphagnum* spp.) was limited to the occasional damp area or seep.

The northwest boundary line follows a steep-sided gorge and stream. The small stream running through the gorge, eventually joins the Irish Brook located just southwest of the Irish Cove Road. The walls of the gorge are rocky and dominated primarily by Evergreen Woodfern (*Dryopteris intermedia*). The stream is narrow and there is very limited associated floodplain habitat (Figure 6).



**Figure 6.** Stream and gorge occurring along the northwest boundary of the botany survey area.

## Results

Vascular plant species observed during this survey are listed in TABLES 1 and 2.

Given the lateness in the growing season when this survey was conducted, it is highly possible that some herbaceous species were missed or overlooked due to their natural state of deterioration at this time of the year, or lack of flowers and/or fruit. It is therefore recommended that a similar survey be conducted earlier in the growing season to achieve a more complete list of vascular plant species present on the site.

The species that were observed to be present however were not indicative of a habitat with a high level of soil richness or a high degree of plant biodiversity.



## RARE SPECIES

During this present survey, no federally or provincially listed species were observed. Given the nature of the habitat present on site, i.e., mostly mesic woodland, it is not considered likely that any listed vascular plant species under the federal Species at Risk Act (SARA) or the Nova Scotia Endangered Species Act (NSES) do occur here. No wetlands are present on the site with the exception of the small stream along the northwest boundary line and a few small seeps or damp areas.

One **YELLOW** (“sensitive species that are not believed to be at risk of immediate extirpation or extinction but may require special attention or protection to prevent them from becoming at risk”) species (<http://novascotia.ca/natr/wildlife/genstatus/>) was located just off the property (Figure 10) in the vicinity of the east corner of the survey area (northeast of the existing quarry) in deciduous woodland (Figure 7). This was Lesser Rattlesnake-plantain (*Goodyera repens*). Only two small clumps of fruiting stems and basal rosettes (Figures 8 & 9) were observed.

It is considered very likely that Lesser Rattlesnake-plantain occurs within the footprint of the proposed quarry expansion area, especially in the woodland southwest of the two discovered locations for this species.

The basal rosettes (basal leaves) of Lesser Rattlesnake-plantain are generally buried by fallen leaves at this time of the year and plants without fruiting stalks are therefore difficult to locate. A survey earlier in the growing season would give a better understanding of the distribution of this species within the Irish Cove Road Quarry property.

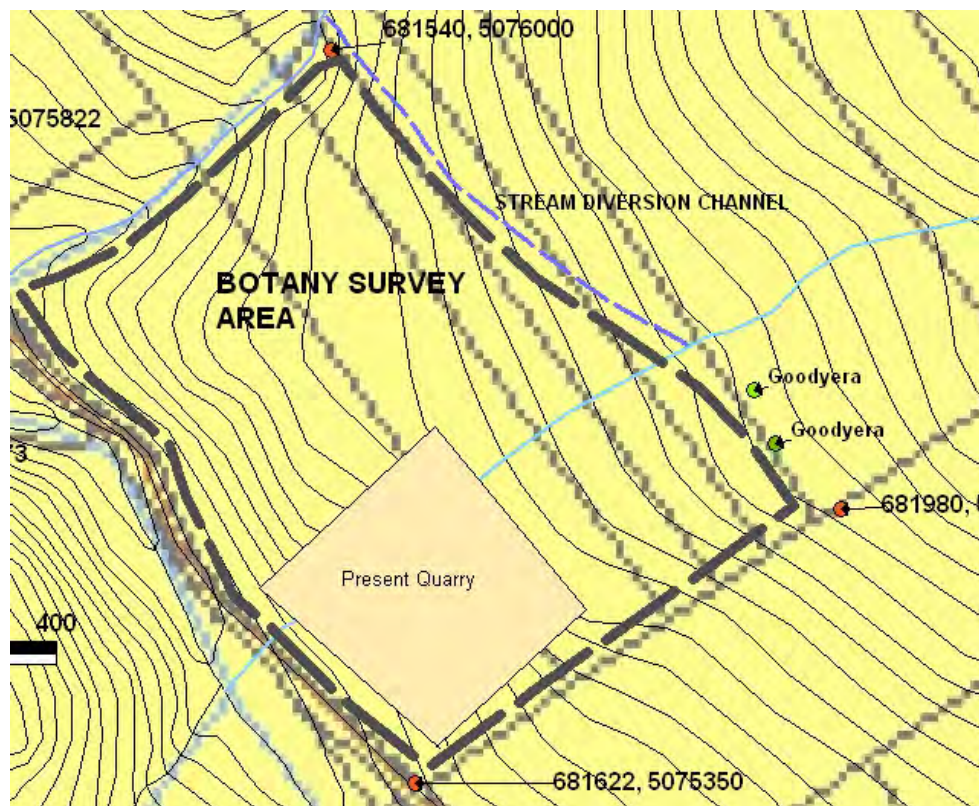
No other vascular plant species of conservation concern were observed during this survey.



**Figure 7.** Primarily deciduous woodland northeast of the existing quarry where the YELLOW species, Lesser Rattlesnake-plantain (*Goodyera repens*) was found.



**Figures 8 & 9.** Fruiting stalk and basal rosettes of Lesser Rattlesnake-plantain (*Goodyera repens*) occurring in deciduous woodland northeast of the existing quarry.



**Figure 10.** Two locations (green dots) where Lesser Rattlesnake-plantain (*Goodyera repens*) was found during this survey. Coordinates for these locations are: 20T 0681924, 5075662 and 20T 0681904, 5075709.

**TABLE 1.** Herbaceous vascular plant species observed during this survey.

Latin Name	Common Name	Abundance on site	Nova Scotia General Status Rank*	ACCDC Status Rank**	SARA-listed species (Federal Species at Risk Act)*** and/or NSESA-listed species (Nova Scotia Endangered Species Act)****
<i>Brachyelytrum erectum</i>	Long-awned Wood Grass	uncommon	GREEN	S5	-
<i>Carex arctata</i>	Drooping Woodland Sedge	occasional	GREEN	S5	-
<i>Carex</i> sp.	a sedge	-	GREEN	-	-
<i>Coptis trifolia</i>	Goldthread	common	GREEN	S5	-
<i>Cornus canadensis</i>	Bunchberry	occasional to scattered	GREEN	S5	-
<i>Dennstaedtia punctilobula</i>	Hay-scented Fern	occasional	GREEN	S5	-
<i>Doellingeria umbellata</i>	Tall White Aster	uncommon	GREEN	S5	-
<i>Dryopteris intermedia</i>	Evergreen Woodfern	common to abundant	GREEN	S5	-
<i>Goodyera repens</i> †	<b>Lesser Rattlesnake-plantain</b>	<b>uncommon</b>	<b>YELLOW</b>	<b>S3</b>	-
<i>Goodyera tessellata</i>	Checkered Rattlesnake-plantain	uncommon	GREEN	S4	-
<i>Hieracium lachenalli</i>	Common Hawkweed	scattered	EXOTIC	SNA	-
<i>Huperzia lucidula</i>	Shining Clubmoss	uncommon	GREEN	S5	-
<i>Linnaea borealis</i>	Twinflower	common	GREEN	S5	-
<i>Lycopodium annotinum</i>	Stiff Clubmoss	uncommon to locally common	GREEN	S5	-
<i>Lycopodium clavatum</i>	Running Clubmoss	uncommon to scattered	GREEN	S5	-
<i>Lycopodium obscurum</i> s.l.	Tree Clubmoss	occasional	GREEN	S5	-
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	occasional	GREEN	S5	-
<i>Mitchella repens</i>	Partridge-berry	scattered	GREEN	S5	-
<i>Monotropa uniflora</i>	Indian Pipe	uncommon	GREEN	S5	-
<i>Oclemena acuminata</i>	Wood Aster	common	GREEN	S5	-
<i>Osmunda cinnamomea</i>	Cinnamon Fern	uncommon to occasional	GREEN	S5	-
<i>Oxalis montana</i>	Wood Sorrel	occasional	GREEN	S5	-
<i>Phegopteris connectilis</i>	Beech Fern	uncommon	GREEN	S5	-
<i>Polystichum acrostichoides</i>	Christmas Fern	uncommon to occasional	GREEN	S5	-



Latin Name	Common Name	Abundance on site	Nova Scotia General Status Rank*	ACCDC Status Rank**	SARA-listed species (Federal Species at Risk Act)*** and/or NSESA-listed species (Nova Scotia Endangered Species Act)****
<i>Prenanthes altissima</i>	Tall Rattlesnakeroot	uncommon	GREEN	S5	-
<i>Prunella vulgaris</i>	Heal-all	uncommon	GREEN	S5	-
<i>Pyrola elliptica</i>	Shinleaf	scattered	GREEN	S5	-
<i>Rubus pubescens</i>	Dewberry	occasional	GREEN	S5	-
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	uncommon	GREEN	S5	-
<i>Solidago rugosa</i>	Rough Goldenrod	occasional	GREEN	S5	-
<i>Thelypteris noveboracensis</i>	New York Fern	scattered	GREEN	S5	-
<i>Trientalis borealis</i>	Star Flower	common	GREEN	S5	-
<i>Tussilago farfara</i>	Colts-foot	uncommon	EXOTIC	SNA	-
<i>Viola blanda</i>	Smooth White Violet	common	GREEN	S5	-

\*[http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)<http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp>

\*\*[http://accdc.com/home\\_m.html](http://accdc.com/home_m.html)

\*\*\*[http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)

\*\*\*\*<http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp>

† *Goodyera repens* was located just outside of the boundary line of the proposed quarry expansion area.

**TABLE 2.** Tree and shrub species observed during this survey.

Latin Name	Common Name	Abundance on site	Nova Scotia General Status Rank*	ACCDC Status Rank**	SARA-listed species (Federal Species at Risk Act)*** and/or NSESA-listed species (Nova Scotia Endangered Species Act)****
<i>Abies balsamea</i>	Balsam Fir	common	GREEN	S5	-
<i>Acer pensylvanicum</i>	Moose Maple	occasional	GREEN	S5	-
<i>Acer rubrum</i>	Red Maple	common	GREEN	S5	-
<i>Acer saccharum</i>	Sugar Maple	common	GREEN	S5	-
<i>Acer spicatum</i>	Mountain Maple	occasional	GREEN	S5	-
<i>Betula alleghaniensis</i>	Yellow Birch	scattered	GREEN	S5	-
<i>Betula papyrifera</i> var. <i>cordifolia</i>	Heart-leaved Birch	occasional to scattered	GREEN	S5	-
<i>Fagus grandifolia</i>	American Beech	scattered	GREEN	S5	-
<i>Lonicera canadensis</i>	Canada Fly Honeysuckle	uncommon	GREEN	S5	-
<i>Picea rubens</i>	Red Spruce	scattered	GREEN	S5	-
<i>Pinus strobus</i>	White Pine	occasional	GREEN	S5	-



<b>Latin Name</b>	<b>Common Name</b>	<b>Abundance on site</b>	<b>Nova Scotia General Status Rank*</b>	<b>ACCDC Status Rank**</b>	<b>SARA-listed species (Federal Species at Risk Act)*** and/or NSESA-listed species (Nova Scotia Endangered Species Act)****</b>
<i>Tsuga canadensis</i>	Eastern Hemlock	common	GREEN	S5	-

\*[http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm))<http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp>

\*\*[http://accdc.com/home\\_m.html](http://accdc.com/home_m.html)

\*\*\*[http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm))

\*\*\*\*<http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp>

Botanical Survey  
FOR  
**Irish Cove Quarry**  
**Dexter Construction Co. Ltd.**  
**Irish Cove, Richmond County, Nova Scotia**

July 17, 2014

Prepared By:  
**Jim Jotcham, Marbicon Inc.**

Marbicon Inc. was contracted in 2014 to perform a botanical survey of a property located on Irish Cove Road at Irish Cove, Richmond County. The site includes an active crushed stone quarry (about 4-5 hectares in size) which is about 1.2 km southeast of Highway 4 on Irish Cove Road at approximately 45° 48' 33" North and 60° 39' 45" West. Figure 1 is an aerial view of the study area. The currently active quarry is about 1.7 km southeast of Bras d'Or Lake. A deep ravine with a stream is on the northwest property line, a stream diversion berm lies along the northeastern property line, and Irish Cove Road lies along the southwestern property front. Otherwise the property is bounded by forest on all sides.

The study site was inventoried by botanist Jim Jotcham on June 19, 2014. The list of plant species identified and their provincial status is presented in Appendix 1.

The property is fairly diverse, ranging from pure conifer stands (Figure 2) to hardwood forest (Figure 3). No wetlands of size were noted, although there were small patches along an intermittent stream (Figure 4) flowing down the hill just by the edge of the current quarry. Much of the site was on a hill sloping down to the road, and generally well drained, albeit with a few intermittent streams gathering water after rain events and during snow melt.

Signs of White-Tailed Deer (*Odocoileus virginianus*) and Eastern Coyote (*Canis latrans*) were observed.

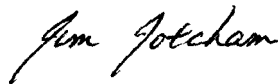
Most of the property had been cut at some time in the past, but it was now an uneven-age stand with some mature trees. The dominant trees included Balsam Fir (*Abies balsamea*), Sugar Maple (*Acer saccharum*), Red Maple (*Acer rubrum*), Yellow Birch (*Betula alleghaniensis*) and Eastern Hemlock (*Tsuga canadensis*). Common understory plants in the woods included Goldthread (*Coptis trifolia*), Twinflower (*Linnaea borealis*), Evergreen Woodfern (*Dryopteris intermedia*), Wood Aster (*Oclemea acuminata*) and Wild Lily-of-the-Valley (*Maianthemum canadense*). Weedy non-native species tended to be along the road or around the edges of the quarry.

No rare plant species or special habitats were identified on the site in this 2014 survey. 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. The Lesser Rattlesnake Plantain (*Goodyera repens*) had been identified in late October 2013, but this could not be confirmed in mid-June 2014, possibly because of the season (pre-bloom).

Appendix 1 shows the list of plant species identified on site. Scientific and common names are from the Atlantic Conservation Data Centre (ACCDC).

The report (#5143) from the Atlantic Conservation Data Centre (ACCDC), dated November 27 2013, noted three vascular plant species of concern for the Irish Cove area: Lesser Pyrola (*Pyrola minor*, S2), Lesser Rattlesnake-Plantain (*Goodyera repens*, S3), and Loesel's Twayblade (*Liparis loeselii*, S3S4). The site was sufficiently diverse that appropriate habitat likely exists for all three species, although less so for Loesel's Twayblade, is usually more of a wetland plant. None of these species were noted in the June 2014 inventory.

In conclusion, no rare or unusual plants or habitats were identified in the 2014 survey.

A handwritten signature in black ink, appearing to read "Jim Folscham". The signature is fluid and cursive, with the first name "Jim" and last name "Folscham" clearly distinguishable.

July 17, 2014





Figure 1. Site and Vicinity. The July 2012 image was taken from Google Earth (2014).





Figure 2. Conifer forest on the slope above Irish Cove Road, northwest of the active quarry.



Figure 3. Hardwood forest northeast of the active quarry. Site of the *Goodyera* finds.





Figure 4. Intermittent stream just northeast of the active quarry, just after a rainy period. This stream had very small patches of wetland in flatter riparian areas, that permitted a small population of wetland sedges.

## REFERENCES

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

Atlantic Canada Conservation Data Centre. 2013: Report # 5143.

Newell, R. E. 2013. Vascular Plant Survey of a Property on Irish Cove Road, Irish Cove, Richmond County, Nova Scotia. Unpublished Report. 10 pp.

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, surveyed June 19, 2014.

Scientific Name	Common Name	Nova Scotia General Status Rank*	ACCDC Status Rank**
<i>Abies balsamea</i>	Balsam Fir	GREEN	S5
<i>Acer pensylvanicum</i>	Moose Maple	GREEN	S5
<i>Acer rubrum</i>	Red Maple	GREEN	S5
<i>Acer saccharum</i>	Sugar Maple	GREEN	S5
<i>Acer spicatum</i>	Mountain Maple	GREEN	S5
<i>Alnus viridis</i>	Green Alder	GREEN	S5
<i>Amelanchier sp.</i>	Serviceberry	n/a	n/a
<i>Anaphalis margaritacea</i>	Pearly Everlasting	GREEN	S5
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	EXOTIC	SNA
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	GREEN	S5
<i>Betula alleghaniensis</i>	Yellow Birch	GREEN	S5
<i>Betula papyrifera</i> var. <i>cordifolia</i>	Heart-leaved Birch	GREEN	S5
<i>Brachyelytrum erectum</i>	Long-awned Wood Grass	GREEN	S5
<i>Carex arctata</i>	Drooping Woodland Sedge	GREEN	S5
<i>Carex communis</i>	Fibrous-Root Sedge	GREEN	S5
<i>Carex crinita</i>	Fringed Seds	GREEN	S5
<i>Carex intumescens</i>	Bladder Sedge	GREEN	S5
<i>Carex leptalea</i>	Bristly-Stalked Sedge	GREEN	S5
<i>Centaurea nigra</i>	Black Starthistle	EXOTIC	SNA
<i>Cerastium arvense</i>	Mouse-ear chickweed	EXOTIC	SNA
<i>Clintonia borealis</i>	Clinton Lily	GREEN	S5
<i>Coptis trifolia</i>	Goldthread	GREEN	S5
<i>Cornus canadensis</i>	Bunchberry	GREEN	S5
<i>Corylus cornuta</i>	Beaked Hazelnut	GREEN	S5
<i>Dactylis glomerata</i>	Orchard Grass	EXOTIC	SNA
<i>Daucus carota</i>	Wild Carrot	EXOTIC	SNA
<i>Dennstaedtia punctilobula</i>	Hay-scented Fern	GREEN	S5
<i>Dryopteris intermedia</i>	Evergreen Woodfern	GREEN	S5
<i>Epigaea repens</i>	Trailing Arbutus	GREEN	S5
<i>Fagus grandifolia</i>	American Beech	GREEN	S5
<i>Fraxinus americana</i>	White Ash	GREEN	S5
<i>Galium triflorum</i>	Sweet Scent Bedstraw	GREEN	S5

<i>Goodyera tessellata</i>	Checkered Rattlesnake-plantain	GREEN	S4
<i>Gymnocarpium dryopteris</i>	Northern Oak Fern	GREEN	S5
<i>Hieracium lachenallii</i>	Common Hawkweed	EXOTIC	SNA
<i>Hieracium murorum</i>	Wall Hawkweed	EXOTIC	SNA
<i>Hieracium pilosella</i>	Mouseear	EXOTIC	SNA
<i>Hieracium x floribundum</i>	Smoothish Hawkweed	EXOTIC	SNA
<i>Hypericum perforatum</i>	A St-John's-Wort	EXOTIC	SNA
<i>Juncus effusus</i>	Soft Rush	GREEN	S5
<i>Leucanthemum vulgare</i>	Oxeye Daisy	Exotic	SNA
<i>Linnaea borealis</i>	Twinflower	GREEN	S5
<i>Lonicera canadensis</i>	Canada Fly Honeysuckle	GREEN	S5
<i>Luzula multiflora</i>	Common Woodrush	GREEN	S5
<i>Lycopodium annotinum</i>	Stiff Clubmoss	GREEN	S5
<i>Lycopodium clavatum</i>	Running Clubmoss	GREEN	S5
<i>Lycopodium obscurum s.l.</i>	Tree Clubmoss	GREEN	S5
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	GREEN	S5
<i>Medeola virginiana</i>	Indian Cucumber-Root	GREEN	S5
<i>Mitchella repens</i>	Partridge-berry	GREEN	S5
<i>Monotropa uniflora</i>	Indian Pipe	GREEN	S5
<i>Oclemena acuminata</i>	Wood Aster	GREEN	S5
<i>Oenothera biennis</i>	Common Evening-Primrose	GREEN	S5
<i>Osmunda cinnamomea</i>	Cinnamon Fern	GREEN	S5
<i>Oxalis montana</i>	Wood Sorrel	GREEN	S5
<i>Phegopteris connectilis</i>	Beech Fern	GREEN	S5
<i>Picea glauca</i>	White Spruce	GREEN	S5
<i>Picea rubens</i>	Red Spruce	GREEN	S5
<i>Pinus strobus</i>	White Pine	GREEN	S5
<i>Plantago major</i>	Nipple Seed Plantain	EXOTIC	SNA
<i>Potentilla simplex</i>	Old-Field Cinquefoil	GREEN	S5
<i>Prenanthes altissima</i>	Tall Rattlesnake-root	GREEN	S5
<i>Prunus virginiana</i>	Choke Cherry	GREEN	S5
<i>Pyrola elliptica</i>	Shinleaf	GREEN	S5
<i>Ranunculus acris</i>	Tall Butter-Cup	EXOTIC	SNA
<i>Ranunculus repens</i>	Creeping Butter-Cup	EXOTIC	SNA
<i>Rubus allegheniensis</i>	Allegheny Blackberry	GREEN	S5
<i>Rubus idaeus</i>	Red Raspberry	GREEN	S5
<i>Rubus pubescens</i>	Dewberry	GREEN	S5
<i>Salix bebbiana</i>	Bebb's Willow	GREEN	S5
<i>Sambucus nigra</i>	Common Elderberry	GREEN	S5

<i>Solidago canadensis</i>	Canada Goldenrod	GREEN	S5
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	GREEN	S5
<i>Solidago rugosa</i>	Rough Goldenrod	GREEN	S5
<i>Sorbus americana</i>	American Mountain-Ash	GREEN	S5
<i>Streptopus lanceolata</i>	Rosy Twistedstalk	GREEN	S5
<i>Taraxacum officinale</i>	Common Dandelion	EXOTIC	SNA
<i>Taxus canadensis</i>	Canadian Yew	GREEN	S5
<i>Thelypteris noveboracensis</i>	New York Fern	GREEN	S5
<i>Trientalis borealis</i>	Star Flower	GREEN	S5
<i>Trifolium pratense</i>	Red Clover	EXOTIC	SNA
<i>Tsuga canadensis</i>	Eastern Hemlock	GREEN	S5
<i>Tussilago farfara</i>	Colts-foot	EXOTIC	SNA
<i>Vaccinium angustifolium</i>	Late Lowbush Blueberry	GREEN	S5
<i>Veronica officinalis</i>	Common Speedwell	EXOTIC	SNA
<i>Vicia cracca</i>	Tufted Vetch	EXOTIC	SNA
<i>Viola cuculata</i>	Marsh Blue Violet	GREEN	S5
<i>Viola macloskeyi</i>	Smooth White Violet	GREEN	S5

\*[http://www.sararegistry.gc.ca/default\\_e.cfm](http://www.sararegistry.gc.ca/default_e.cfm)<http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp>

\*\*[http://accdc.com/home\\_m.html](http://accdc.com/home_m.html)

### 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 C**

## **ATLANTIC CANADA CONSERVATION DATA CENTRE REPORT**





## DATA REPORT 5143: Irish Cove, NS

Prepared 27 November, 2013  
by J. Churchill, Data Manager

### CONTENTS OF REPORT

#### 1.0 Preface

- 1.1 Data List
- 1.2 Restrictions
- 1.3 Additional Information

#### 2.0 Rare and Endangered Species

- 2.1 Flora
- 2.2 Fauna
- Map 1: Flora and Fauna

#### 3.0 Special Areas

- 3.1 Managed Areas
- 3.2 Significant Areas
- Map 2: Special Areas

#### 4.0 Rare Species Lists

- 4.1 Fauna
- 4.2 Flora

#### 5.0 Source Bibliography



## 1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A., 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: [www.ACCDC.com](http://www.ACCDC.com).

Upon request and for a fee, the ACCDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

### 1.1 DATA LIST

Included datasets:

Filename	Contents
IrishCvNS-5143ob.xls	Rare and legally protected <i>Flora and Fauna</i> in your study area
IrishCvNS-5143ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)
IrishCvNS-5143ma.xls	All <i>Managed Areas</i> in your study area
IrishCvNS-5143sa.xls	All <i>Significant Natural Areas</i> in your study area

## 1.2 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

- a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
- b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
- c) The ACCDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
- d) ACCDC data responses are restricted to the data in our Data System at the time of the data request.
- e) Locations given for rare species records may be deliberately imprecise. Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
- f) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
- g) The absence of a taxon cannot be inferred by its absence in an ACCDC data response.

## 1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

Please direct any additional questions about ACCDC data to the following individuals:

### **Plants, Lichens, Ranking Methods**

Sean Blaney, Botanist  
Tel: (506) 364-2658  
[sblaney@mta.ca](mailto:sblaney@mta.ca)

### **Animals (Fauna)**

John Klymko, Zoologist  
Tel: (506) 364-2660  
[jklymko@mta.ca](mailto:jklymko@mta.ca)

### **Plant Communities**

Sarah Robinson, Community Ecologist  
Tel: (506) 364-2664  
[srobinson@mta.ca](mailto:srobinson@mta.ca)

### **Data Management, GIS**

James Churchill, Data Manager  
Tel: (902) 679-6146  
[jlchurchill@mta.ca](mailto:jlchurchill@mta.ca)

### **Billing**

Cindy Spicer  
Tel: (506) 364-2665  
[cspicer@mta.ca](mailto:cspicer@mta.ca)

### **All other Inquiries**

R.A. Lautenschlager  
Tel: (506) 364-2661  
[rlautenschlager@mta.ca](mailto:rlautenschlager@mta.ca)

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (506) 364-2657, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Stewart Lusk, Natural Resources: (506) 453-7110.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Sherman Boates, NSDNR: (902) 679-6146.

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Rosemary Curley, PEI Dept. of Agriculture and Forestry: (902) 368-4807.

## 2.0 RARE AND ENDANGERED SPECIES

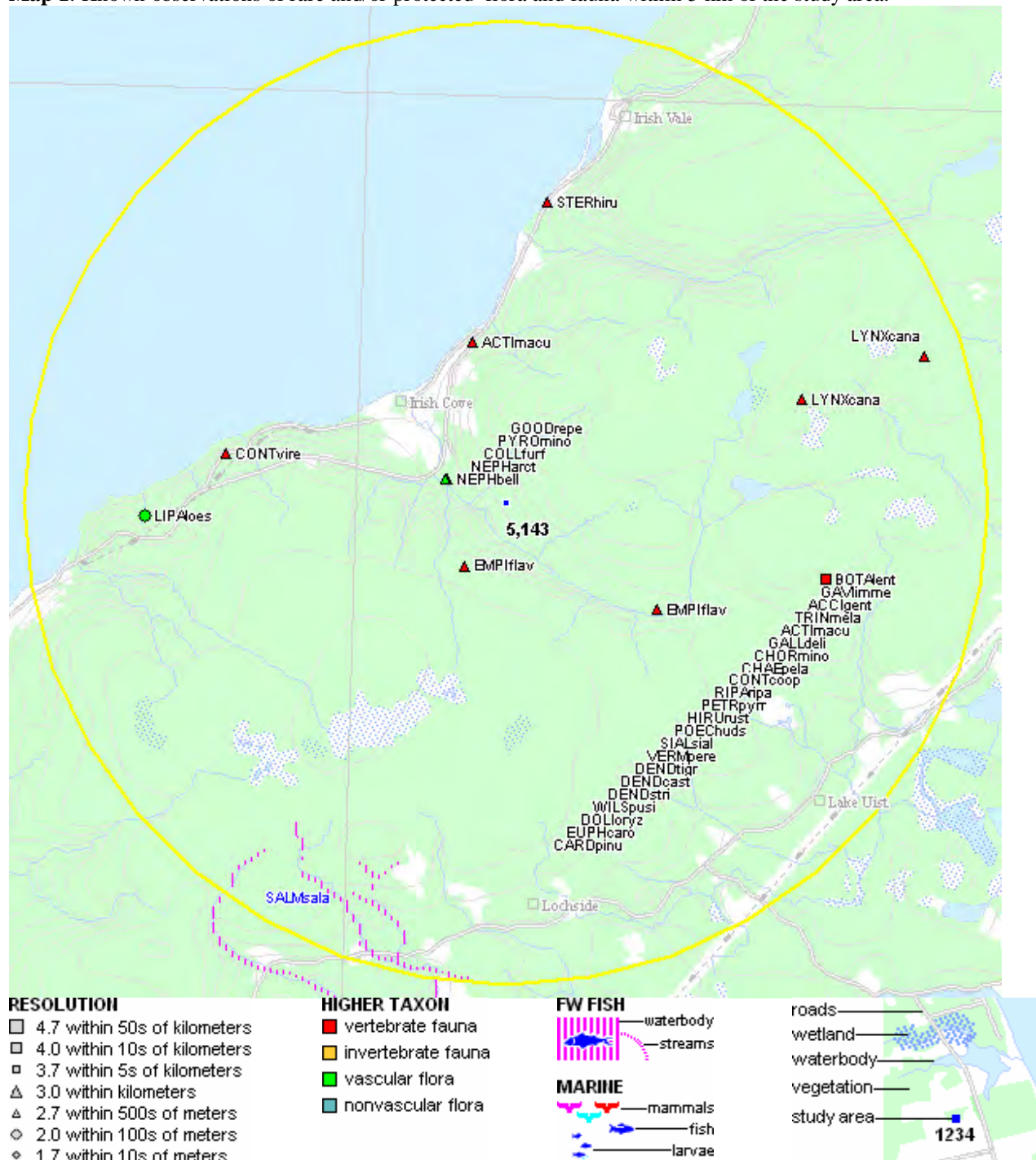
### 2.1 FLORA

A 5 km buffer around the study area contains 6 records of 3 vascular, 3 records of 3 nonvascular flora (attached: \*ob.xls).

### 2.2 FAUNA

A 5 km buffer around the study area contains 48 records of 26 vertebrate, 0 records of invertebrate fauna (Map 1 and attached data files - see 1.1 Data List). Sensitive data: Records indicate Wood Turtle may be present in the study area but concerns about commercial exploitation preclude inclusion of relevant data in this report. See attached file WOTU.pdf for general species information.

**Map 1:** Known observations of rare and/or protected flora and fauna within 5 km of the study area.



### 3.0 SPECIAL AREAS

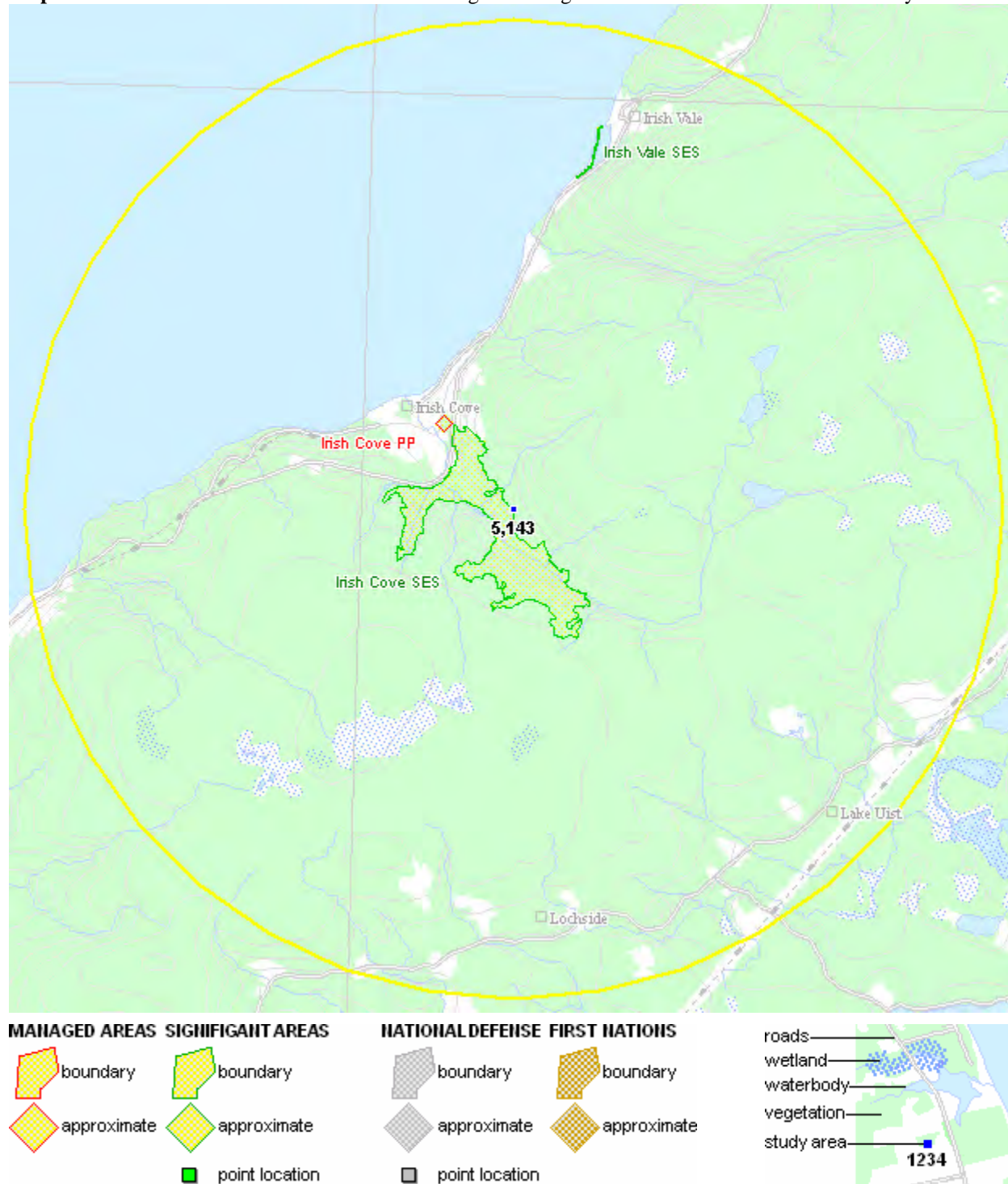
#### 3.1 MANAGED AREAS

The GIS scan identified 1 managed area in the vicinity of the study area (Map 2 and attached file: \*ma\*.xls)

#### 3.2 SIGNIFICANT AREAS

The GIS scan identified 2 biologically significant sites in the vicinity of the study area (Map 2 and attached file: \*sa\*.xls)

**Map 2:** Boundaries and/or locations of known Managed and Significant Areas within 5 km of the study area.





## 4.0 RARE SPECIES LISTS

Rare and/or endangered taxa within the buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation.

[P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community.

### 4.1 FLORA

	Scientific Name	Common Name	COSEWIC	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
N	<i>Nephroma arcticum</i>	Arctic Kidney Lichen			S1S2	May Be At Risk	1	0.7 ± 0.5
N	<i>Nephroma bellum</i>	Naked Kidney Lichen			S3?	Sensitive	1	0.7 ± 0.5
N	<i>Collema furfuraceum</i>	Blistered Tarpaper Lichen			S3?	Sensitive	1	0.7 ± 0.5
P	<i>Pyrola minor</i>	Lesser Pyrola			S2	Sensitive	3	0.7 ± 0.5
P	<i>Goodyera repens</i>	Lesser Rattlesnake-plantain			S3	Sensitive	1	0.7 ± 0.5
P	<i>Liparis loeselii</i>	Loesel's Twayblade			S3S4	Secure	2	3.8 ± 0.25

### 4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Salmo salar pop. 4</i>	Atlantic Salmon - Eastern Cape Breton pop.	Endangered		S2	May Be At Risk	1	4.0 ± 0
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Endangered	S2S3B	At Risk	1	3.5 ± 5.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	S3B	At Risk	1	3.5 ± 5.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	S3B	At Risk	2	3.5 ± 5.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened		S3B	May Be At Risk	1	3.5 ± 5.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Endangered	S3B	At Risk	5	3.5 ± 5.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Vulnerable	S3S4B	Sensitive	1	3.5 ± 5.0
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Endangered	S2S3B	May Be At Risk	2	3.5 ± 5.0
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Vulnerable	S3S4B	Sensitive	1	3.0 ± 0.5
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk	Endangered	S1	At Risk	3	3.3 ± 0.5
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk		S3B	Sensitive	1	3.2 ± 0.5
A	<i>Sialia sialis</i>	Eastern Bluebird	Not At Risk		S3B	Sensitive	1	3.5 ± 5.0
A	<i>Gavia immer</i>	Common Loon	Not At Risk		S3B,S4N	May Be At Risk	2	3.5 ± 5.0
A	<i>Accipiter gentilis</i>	Northern Goshawk	Not At Risk		S3S4	Secure	1	3.5 ± 5.0
A	<i>Poecile hudsonica</i>	Boreal Chickadee			S3	Sensitive	5	3.5 ± 5.0
A	<i>Dendroica tigrina</i>	Cape May Warbler			S3?B	Sensitive	1	3.5 ± 5.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow			S3B	May Be At Risk	3	3.5 ± 5.0
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs			S3B,S5M	Sensitive	1	3.5 ± 5.0
A	<i>Botaurus lentiginosus</i>	American Bittern			S3S4B	Sensitive	1	3.5 ± 5.0
A	<i>Actitis macularius</i>	Spotted Sandpiper			S3S4B	Sensitive	2	1.7 ± 0.5
A	<i>Gallinago delicata</i>	Wilson's Snipe			S3S4B	Sensitive	4	3.5 ± 5.0
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher			S3S4B	Sensitive	2	0.8 ± 0.5
A	<i>Vermivora peregrina</i>	Tennessee Warbler			S3S4B	Sensitive	2	3.5 ± 5.0
A	<i>Dendroica castanea</i>	Bay-breasted Warbler			S3S4B	Sensitive	1	3.5 ± 5.0
A	<i>Dendroica striata</i>	Blackpoll Warbler			S3S4B	Sensitive	1	3.5 ± 5.0
A	<i>Wilsonia pusilla</i>	Wilson's Warbler			S3S4B	Sensitive	1	3.5 ± 5.0
A	<i>Carduelis pinus</i>	Pine Siskin			S3S4B,S5N	Sensitive	2	3.5 ± 5.0

## 5.0 SOURCE BIBLIOGRAPHY

The recipient of this data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
32	Lepage, D. 2009. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 143,498 recs.
13	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
5	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
3	Benjamin, L.K. (compiler). 2001. Significant Habitat & Species Database. Nova Scotia Dept of Natural Resources, 15 spp, 224 recs.
2	None
2	Williams, M. Cape Breton University Digital Herbarium. Cape Breton University Digital Herbarium. 2013.
1	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.

**APPENDIX D**

**NOVA SCOTIA MUSEUM REPORT**

**HERITAGE AND BIOLOGICAL RESOURCES**



**Communities,  
Culture & Heritage**

1741 Brunswick Street  
3<sup>rd</sup> Floor  
P.O. Box 456  
Halifax, NS  
B3J 2R5

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

December 17, 2013

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

Dear Ms. Levy:

**RE: Environmental Screening 13-11-19b  
Dexter Irish Cove Quarry Expansion**

Further to your request of November 19, 2013 staff at Communities, Culture and Heritage has 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.

**Natural Heritage**

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

***Archaeological, Historical Sites and Remains***

There are no recorded archaeological sites for the study area. There are no major watercourses within the study area. Historic maps do indicate settlement. It is recommended that an assessment for archaeological resources take place.

**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 has reviewed the records for plant species-at-risk in our files and report that the following species-at-risk may be found within the Glen Tosh footprint as outlined in the request.

*Spiranthes lucida* Orange

The presence/absence of this species should be determined during field assessment and reported, with any other species listed as at-risk found present, in any submission. Our recommendation is that field assessment be conducted during the growing season or when the identity can be determined to species or variety.

### ***Zoology***

Staff has reviewed NSM Zoological records for the site and note that we have no records for the specific footprint outlined. We do have records of some species with conservation concern in the general area.

We have no records of Amphibians, Reptiles, Molluscs, Insects, fish or Mammals for the area.

There are nesting records for the following bird species in the general area:

Chimney Swift  
Common Nighthawk  
Arctic Tern  
Common Loon  
Gray Jay  
Pine Siskin  
Barn Swallow  
Cliff Swallow  
Bank Swallow  
Rusty Blackbird  
Boreal Chickadee  
Bay-breasted Warbler  
Cape May Warbler  
Tennessee Warbler  
Golden-crowned Kinglet  
Ruby-crowned Kinglet  
Olive-sided Flycatcher  
Yellow-bellied Flycatcher  
Black-backed Woodpecker



**Communities,  
Culture & Heritage**

1741 Brunswick Street  
3<sup>rd</sup> Floor  
P.O. Box 456  
Halifax, NS  
B3J 2R5

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

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](mailto:enviroco@ns.sympatico.ca), website: [www.envirosphere.ca](http://www.envirosphere.ca)



## Environmental Sample Analysis Report

Report Date: 23-Jun-14

Report Number: A0457

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

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comments
L2014-36	WS1	Irish Cove Quarry	Former Quarry Stream	6/20/2014	6/23/2014	2.0	REG	0.5 mg/L	colorless with fine plant debris
L2014-36	WS2	Irish Cove Quarry	Above Diversion	6/20/2014	6/23/2014	<0.5	REG	0.5 mg/L	tea color
L2014-36	WS3	Irish Cove Quarry	At road	6/20/2014	6/23/2014	0.5	REG	0.5 mg/L	tea color
L2014-36	WS3 (Dup)	Irish Cove Quarry	At road	6/20/2014	6/23/2014	0.5	DUP	0.5 mg/L	tea color
L2014-36	Blank	Deionized Water	dH2O	6/23/2014	6/23/2014	<0.5	BLANK	0.5 mg/L	
L2014-36	CRM	CRM	CRM	6/23/2014	6/23/2014	219.0	STD	0.5 mg/L	CRM = 213 mg/L (203-224)

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

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

**Validation Range: 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: Modified from Standard Methods for the Examination of Water and Wastewater 22nd Edition, 2012 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.



# 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](mailto:enviroco@ns.sympatico.ca), website: [www.envirosphere.ca](http://www.envirosphere.ca)

## Environmental Sample Analysis Report

Report Date: 20-Jun-14

Report Number: A0456

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
L2014-36	CRM	CRM	CRM	6/20/2014	6/20/2014	7.0	STD	0.1	CRM = 7.01
L2014-36	WS1	Irish Cove Quarry former stream channel	Former Quarry Stream	6/20/2014	6/20/2014	6.7	REG	0.1	clear & colorless
L2014-36	WS2	Irish Cove Quarry stream above diversion	Above Diversion	6/20/2014	6/20/2014	6.3	REG	0.1	clear & very pale yellow
L2014-36	WS2	Irish Cove Quarry stream above diversion	Above Diversion	6/20/2014	6/20/2014	6.2	DUP	0.1	clear & very pale yellow
L2014-36	WS3	Irish Cove Quarry receiving stream at road	At road	6/20/2014	6/20/2014	6.5	REG	0.1	clear & very pale yellow

Name of Analyst:

*P. Stewart*

Analyses reviewed by:

*HL*

Director / Lab Manager (circle one)

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

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

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

*Comment: Samples for pH should be kept cool until delivery to the lab unless the samples are analyzed immediately. Preferably samples should be analyzed within 24 hours. Hach manual recommends filling bottle completely and capping tightly; cooling to 4°C for storage and analyzing within 6 hours. If this can't be done, Hach manual recommends reporting the holding time with results.*

Method: Standard Methods for the Examination of Water and Wastewater 22nd Edition, 2012 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.

**APPENDIX F –  
ASSESSMENT OF NATURAL FOREST STANDS  
AFFECTED BY THE PROPOSED  
IRISH COVE QUARRY EXPANSION**

## Assessment of Natural Forest Stands Affected by the Proposed Irish Cove Quarry Expansion

November 2014

Several species of migratory woodland birds are in decline in Nova Scotia and one of the factors in the decline is loss of mature forest habitat, including softwood, deciduous and mixed forest types. Included in the losses are temporary loss through clearcutting and other forest practices; and land development including agriculture, urban and industrial activities. The vicinity of the Irish Cove Quarry contains a high percentage of unfragmented mature forest stands (Figures F1 & F2). The proposed expansion area is occupied mainly by mature regenerated softwood forest on the northwest half to three-fourths, and mature deciduous forest on the eastern corner (largely east of the small tributary stream shown in Figure F2).



Figure F1. Google Earth image of the Irish Cove Quarry site showing extent of undisturbed forest in 2012. Circle of 1 km radius is shown.

Within a 1 km radius of the proposed quarry expansion, approximately 90.4% of the land is occupied by natural forest stands [the quarry, deforested areas, and developed areas occupy the remainder (Figures F1 & F2)]. After quarry expansion, the area of natural stands will be 87.2%, a decrease of 3.2%, a comparatively small part. It is acknowledged, however, that further clearcutting and industrial development outside the protected areas could occur in the area, which would, in future, reduce the area of natural stands and change the estimates of percentage of area removed by the quarry in relation to natural stands.



Expansion of the quarry will also have an impact on the continuity of natural forest habitat available to interior forest birds. Forestry activity in the area appears to be concentrated along Irish Cove Road and the western part of the expansion area is a corridor of natural forest joining areas northeast and southwest of the quarry (Figure F2). This corridor would be reduced gradually as the quarry expands. The further development of the quarry is expected to take many years, however, during which time adjacent cutover area would have revegetated and so would offer habitat for forest species and contribute to potential for corridors and continuity of habitats.

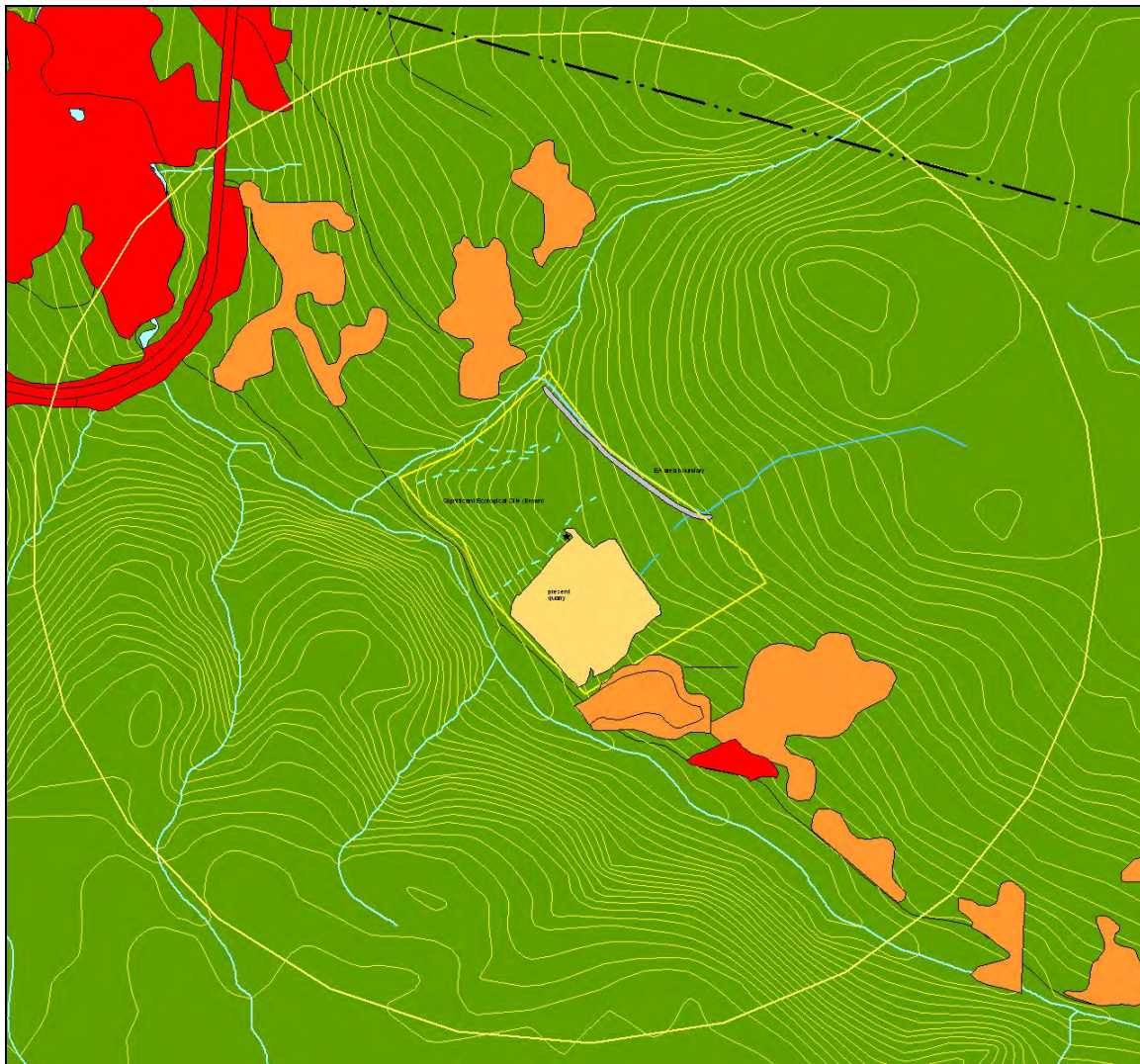


Figure F2. Irish Cove Quarry and proposed expansion area, 2014. Existing mature natural forest stands shown in green, previous clearcuts in orange, and other disturbed areas in red, within a 1 km radius of the proposed expansion area. Based on NS Forest Inventory, 2006.