APPENDIX D
BIOPHYSICAL ASSESSMENT REPORT
(Envirosphere Consultants Ltd., 2015)

Environmental Assessment Registration
Document for Seabrook Quarry Expansion
Seabrook, Digby County, Nova Scotia

Biophysical Assessment of the Seabrook Quarry Expansion— 11621 Hwy 217 Seabrook, Digby County, Nova Scotia

PID 30132740, 30192975 & 30284483

Submitted to:

Municipal Enterprises Limited
Bedford, Nova Scotia

September 2015

Envirosphere CONSULTANTS LIMITED

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1 INTRODUCTION

Municipal Enterprises Limited, Waverley, Nova Scotia, is proposing to expand its quarry in the Seabrook area of Digby County, near Digby, Nova Scotia. The quarry is presently operating under an approval for quarries less than four hectares in size; an approval to expand the quarry beyond the current size 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 of the expansion in support of the approval 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 Seabrook 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 June 18 & July 1, 2015 (early summer botany survey); September 1 (fall botany survey; and June 12, 19-20 and July 23, 2015 (site reconnaissance, owls, breeding birds and fish). Key project personnel included Patrick Stewart, M.Sc., Heather Levy, B.Sc. Hons. Environmental Science and Valerie Kendall (M.Env.Sci) (background review, site reconnaissance, wetlands, water quality & fish habitat assessment); botany surveys (Mr. Jim Jotcham M.Sc.); and bird surveys (Mr. Fulton Lavender and Mr. Richard Hatch, Halifax, Nova Scotia (June 18-19, 2015).

3 SITE LOCATION AND STUDY AREA

The Municipal Enterprises Seabrook Quarry is on Henderson's Mountain in the community of Seabrook, approximately five kilometres west of Digby, Nova Scotia (UTM Zone 20, NAD83 Northing 4944797 and Easting 274889 (NTS 1:50,000 21A12)(Figure 1). The site is shown in air photos Air Photos 2012 301_102 & 302-064, July 11, 2012, and Google Earth satellite imagery from June 2013 (Map A-4). The focus area for the assessment is shown on Figure 1 and Map A-1, Appendix A. The quarry is shown in Figures 2, 3, 10 & 11. The proposed expansion area lies entirely within the EA Study area shown on Figure 1.

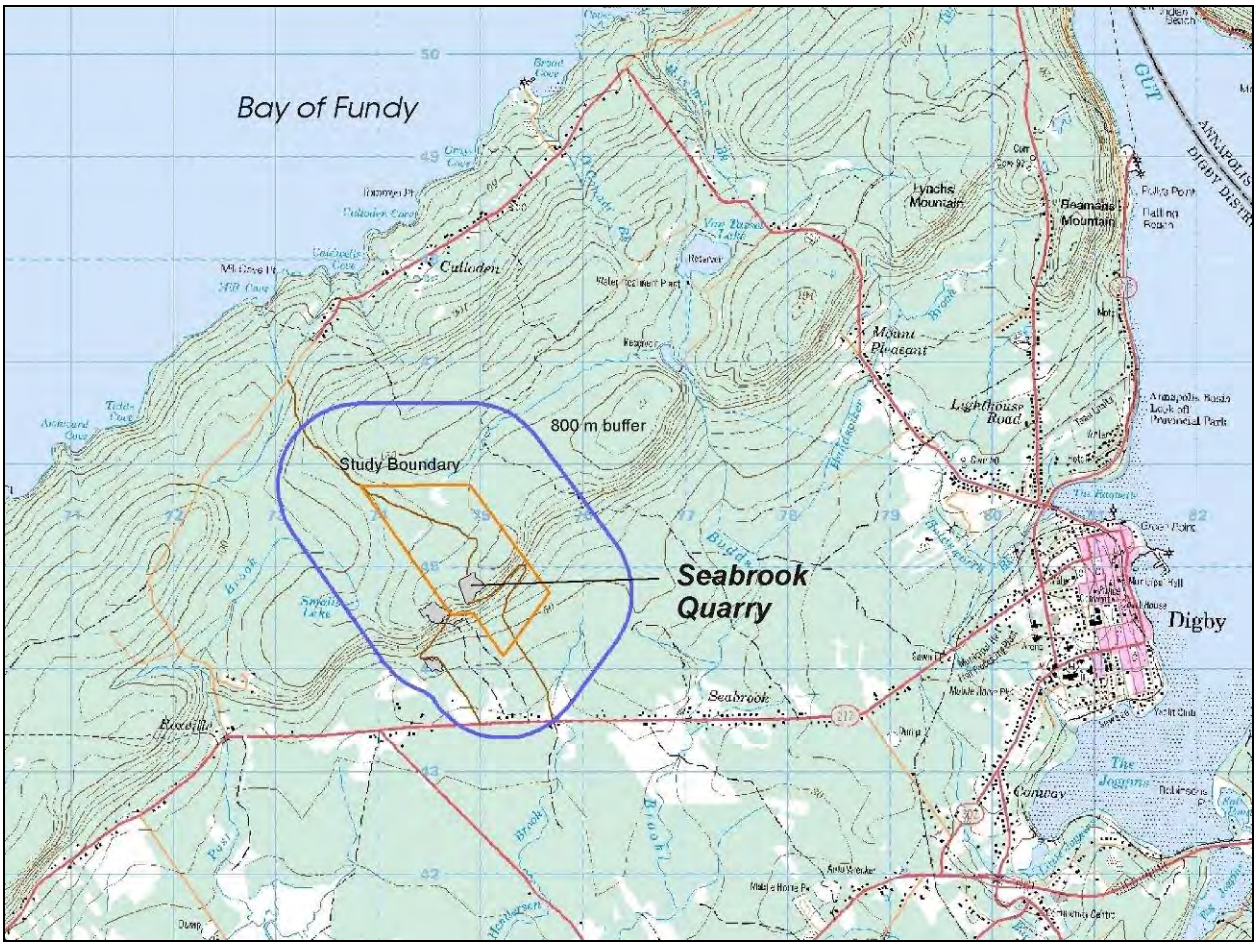

Figure 1. Project location shown on NTS 1:50,000 Map 21A12.

Figure 2. North view of Seabrook Quarry, June 2015.

Figure 3. Northeast view of Seabrook Quarry, June 2015.

4 EXISTING ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 CLIMATE AND WINDS

The Seabrook Quarry is located on Henderson's Mountain between Seabrook and Mill Cove Point on the Bay of Fundy. The waters in the Bay of Fundy heavily influence the region's climate. Temperatures are moderate and similar to the Atlantic Coast, with an annual average of 7.1ºC. (measured at Digby). Summers are moderately warm, with highest temperatures occurring in July and August (18.0ºC.). Winters are moderate with temperatures averaging –4.1 to –4.3ºC. in January and February respectively (http://www.farmzone.com/statistics/temperature, 2015). Precipitation in the area comes predominantly as rain, highest in March-May and in October-November, with annual total precipitation of 1340 mm (Figure 4)(Canadian Climate Normals 2015). The site is heavily influenced by the ocean, influenced both by the waters of St. Mary's Bay and the Bay of Fundy. Currents and mixing caused by extreme tidal activity, characteristic of the Bay of Fundy, prevents freezing of coastal waters throughout winter while also preventing warming of surface waters in the summer months. Water temperatures are not known to exceed 12ºC by late summer. Heavy fog formation can result from moist summer air masses over the Bay, which will quickly dissipate as it reaches the North Mountain crest, impacted by the heat of the land. Winds vary seasonally in direction and intensity; in winter, winds are predominantly from the north to northwest sectors and are of greatest intensity, shifting to the south and southwest and reduced intensity in spring summer and back to northwesterly in the fall (CDC Atlas, 1991).

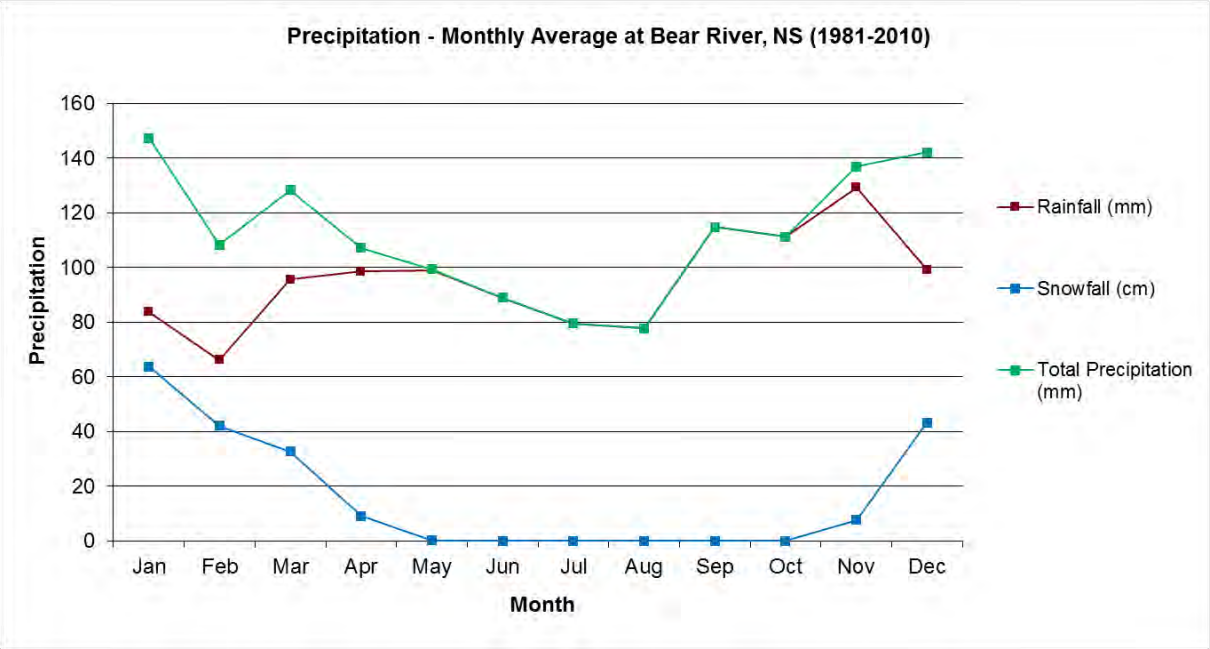

Figure 4. Annual precipitation cycle for Seabrook Quarry using observations from Bear River (1981-2010) (Canadian Climate Normals 2015).

4.1.2 TOPOGRAPHY AND GEOLOGY

The Fundy coastline of southwestern Nova Scotia is dominated by North Mountain, a narrow southwest-northeast trending forested ridge situated along on the mainland portion of southwestern Nova Scotia. Formed of basalt lava flows, the ridge stretches from Brier Island to Cape Split and forms the northern edge of the Annapolis Valley. At the Seabrook Quarry site, North Mountain has a steep southeastern face, forming an upland plateau, which is smooth to undulating and punctuated by remnants of prominences such as Henderson's Mountain on which Seabrook Quarry is located. The plateau slopes gently north towards the Bay of Fundy. Bedrock is close to the surface and at times is exposed, although mostly it is covered by a thin layer of glacial till or organic deposits in wetland areas. Gradual slopes and level surfaces support wetlands developing from surface water accumulations. The southeastern slope of North Mountain at the site meets a flat lowland area which forms the western continuation of the Annapolis Valley and which meets the head of St. Mary's Bay.

The location of the study area is at elevations of 130-170 m on, and northwest of, the top of Henderson's Mountain, at the crest of the steep southern slope of the mountain. Landscape at the foot of the slope is flat to rolling where it forms the lowlands of the western Annapolis Valley. The study area includes three late Triassic bedrock units of the Fundy Group; North Mountain basalt formation (Brier Island, Margaretsville, and East Ferry members); the Middle to late Triassic Blomidon; and Wolfville formations, which underlie the lowland valley floor at the site (Figure 5) (Keppie 2000; White et al 2012). Two sedimentary formations, The Blomidon and Wolfville Formations, underlie the valley floor in Seabrook (Figure 6) (White et al 2012). The Blomidon Formation contains red-brown to locally grey-

green siltstone and minor sandstone and shale. The Wolfville formation, which occurs further from North Mountain, consists of pink to red, coarse-grained sandstone and conglomerate with minor red to red-brown siltstone and shale (White et al 2012).

The upper plateau of North Mountain at the site is overlain by a thin (2 – 20 m) layer of stony, sandy glacial till which conforms to bedrock features and has an undulating surface generally reflecting the topography of the bedrock (Stea et al 1992). The till tends to have abundant surface boulders, and its composition reflects that of local bedrock and till from which it was principally derived. Surface exposures of bedrock were observed at higher elevations at the site. The southeast face of the Mountain and the valley floor are formed from deeper layers of generally less stoney glacial till, which are flat to rolling, have few boulders, and are deeper (3 – 30 m) till (Stea et al 1992).

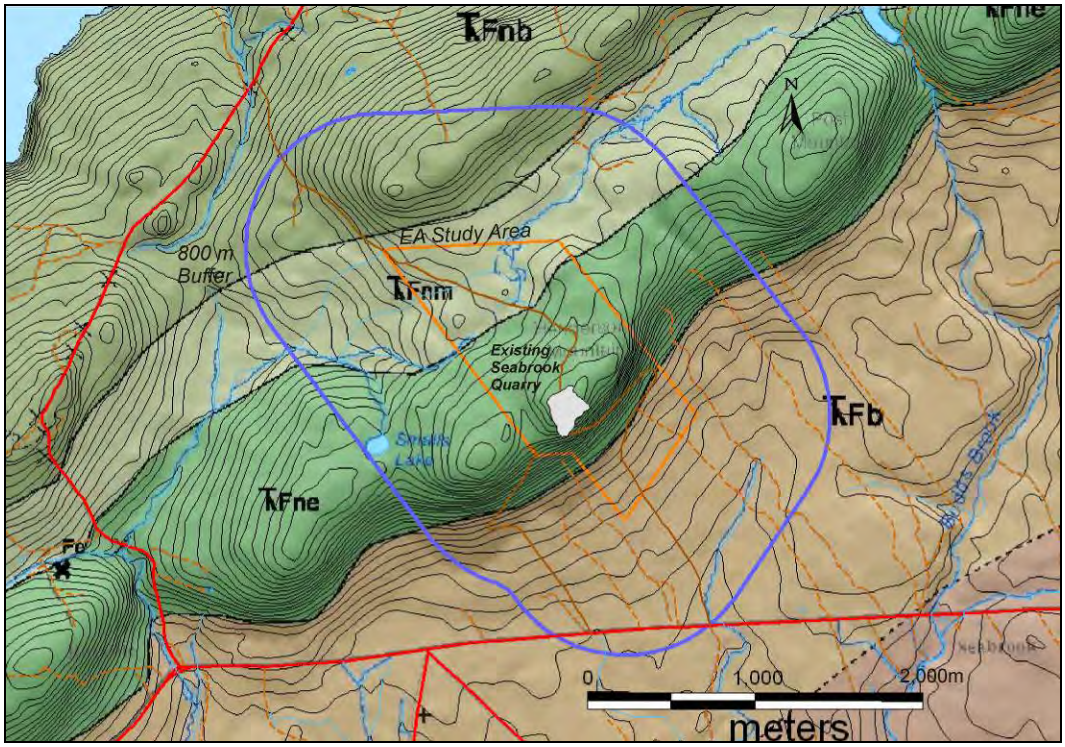

Figure 5. Bedrock geology of the vicinity of the Seabrook Quarry (From White et al. 2012).

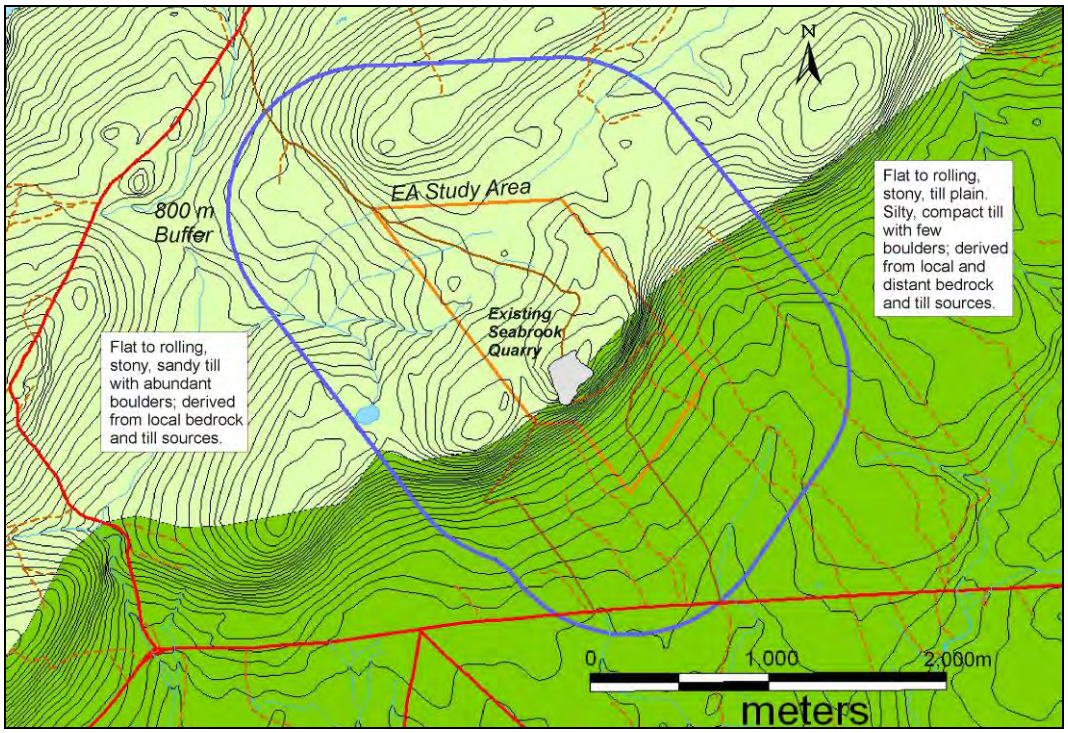

Figure 6. Surficial geology of the eastern Digby Neck in the vicinity of the Seabrook Quarry (from Stea et al. 1992 and digital version).

4.1.3 AIR QUALITY, NOISE & LIGHT

Sources of ambient artificial light in the area adjacent to the quarry are generally not common, with the exception of the Digby urban centre; ambient noise levels reflect local vehicle traffic, operations of an adjacent quarry, and urban noise reaching the site from the Town of Digby. Air quality is expected to be good due to the isolated location and predominantly forested setting.

Parts of the Town of Digby are visible from the site, and lights in the urban area expose the site to nighttime illumination, particularly on nights with low cloud, and forming the main source of nighttime ambient light. Local residences are not visible from the quarry, but the site offers a panorama from the site to both Annapolis Basin and St. Mary's Bay, and house lights, yard lights, and vehicle lights are likely to be seen from the site. When operating at night, lights from the adjacent Parker Mountain Quarry may be seen. Little light will be generated by local residences and traffic on Highway 217.

Air quality is influenced by the proximity to the Bay of Fundy and the undeveloped forests surrounding the site and is expected to be good. The lowland area below the site and extending to St. Mary's Bay is forested with residential developments broadly spaced. It is expected to have a relatively high natural baseline air quality typical of areas with low levels of human activity. Vehicle use on the highway is the main contributor to particulates and exhaust emissions, which are relatively low, contributing to low level emissions; while quarry activities can lead to periodic dust and vehicle exhaust emissions.

Ambient noise levels in general are expected to be low, but due to the position of the quarry at the top of Henderson's Mountain, with sight lines to nearby roads and the Town of Digby, ambient noise levels from outside sources reaching the quarry will be greater than in more sheltered locations. Peak vehicle noise is expected to coincide with vehicle traffic patterns. Highway 217 is the main traffic route for access to Digby Neck, Long Island and Brier Island. Morning and evening traffic and noise level peaks, as well as seasonal (summer) peaks in traffic noise corresponding to tourist activities, are expected. The quarry and associated movement of trucks and equipment, including those of the adjacent quarry, provide a minor source of noise in the area, to which the quarry is a minor contributor. A neighboring quarry west of the Seabrook quarry may contribute a low level of noise and physical disturbance in the area (Figure 22). Lights at the quarry can probably be seen from Highway 217, but noise levels reaching the nearest residences are likely to be minor[1]. 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 a few weeks 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.

4.1.4 HYDROLOGY

The study area for the quarry expansion includes the source and headwaters of several watercourses in the St. Mary's Bay watershed, and includes a small part of the watershed for the Town of Digby drinking water supply[2] (Figure 7). The northern half of a wetland (rich bog/fen) in the northern part of the study area drains through a small permanent stream east to the Town of Digby reservoir and Budd's Brook; while the south part of the wetland drains through a previously unmapped first order stream identified in the present study, southwest towards St. Mary's Bay. This second stream converges with an intermittent stream draining the more southerly large bog/fen wetland at the site, to form Post Brook, which flows to St. Mary's Bay (Figure 15, Map A-4). Both streams have well defined cobble to boulder beds, and likely support moderate flows seasonally but both are intermittent. A second permanent first order stream occurs on the northwest corner of the study area[3] (Figure 15). A third small intermittent stream originates at the south end of the swamp in the valley between the two operating quarries (Figure 7). A small intermittent stream arising from the ditch along the quarry road in the northern part of the study area

1 Local residents interviewed did not indicate problems with noise from the quarry.

2 The watershed of the Town of Digby drinking water supply (Figure 7) extends into the extreme northern part of the study area. However mapping of this watershed from the Province of Nova Scotia incorrectly shows that the watershed boundary provided by the Province is further south than the actual boundary determined in the present study. Onsite observations of the wetlands and streams at the site, and examination of aerial photography, clearly shows that the northern half of the northernmost bog/fen drains northeast and is part of the Digby watershed; while the south half of the wetland drains to the south, where it forms part of the St. Mary's Bay watershed (which is also suggested by Provincial watershed mapping, watershed 1DB, although that mapping also appears to be in error (Figure 7)) since it shows the St. Mary's Bay watershed to extend further east.

becomes a diffuse overland flow into the smaller bog/fen wetland. A small lake (Small's Lake) occurs west of the site and drains into the headwater streams for Post Brook (Figure 15 & Map A-4). Southeast of the quarry, a permanent, second order stream, which is the headwater of Henderson Brook, flows south and under Highway 217, eventually draining to St. Mary's Bay.

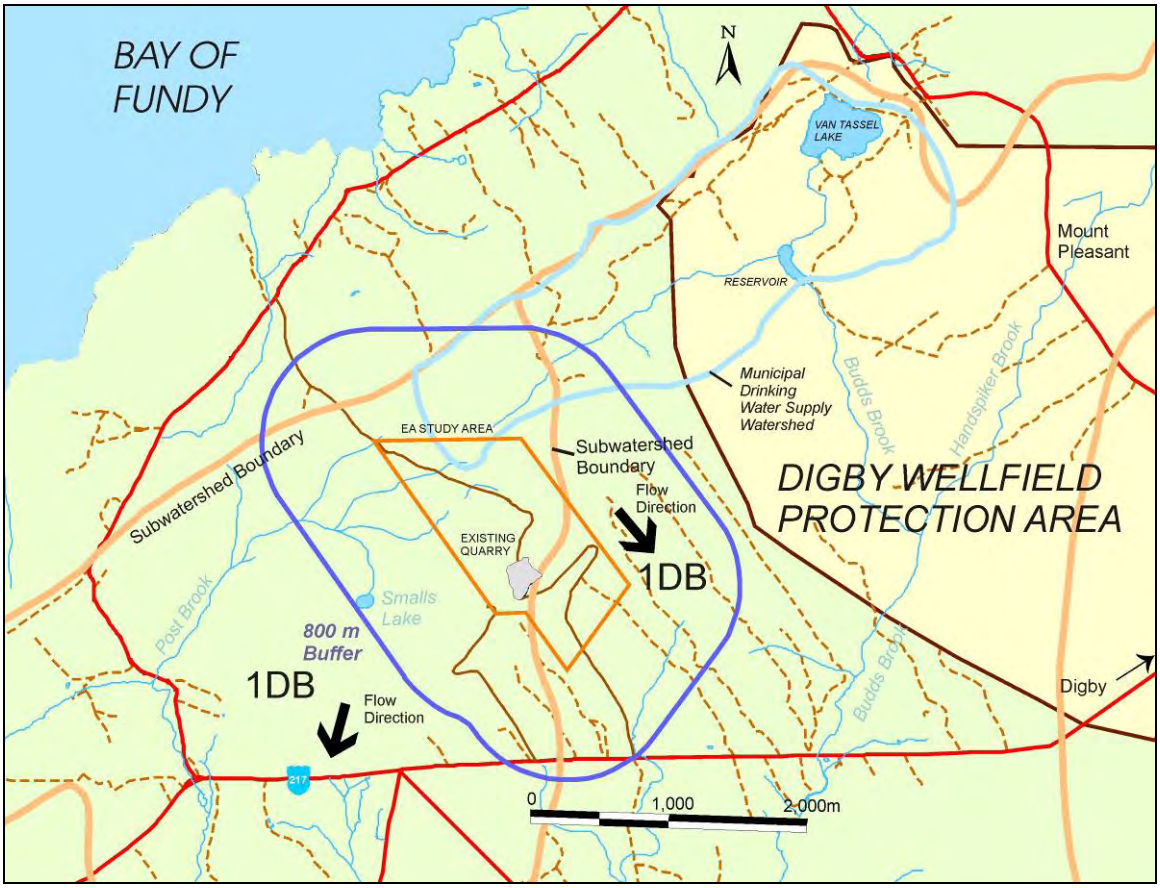

Figure 7. Sub-watersheds and managed groundwater supply areas in the vicinity of Seabrook Quarry. Main watershed unit is 1DB. Municipal drinking water supply watershed from http://www.novascotia.ca/nse/water/docs/municipal.drinking.water.supplies.map.pdf.

4.1.5 HYDROGEOLOGY

Groundwater develops predominantly subsurface in cracks and fractures, in horizontal surfaces between strata in bedrock, as well as in porous aquifers in rock formations on the adjacent valley floor. Till is a minor constituent of the subsurface materials, and is also a minor contributor to groundwater flow. The natural water table in the bedrock formation at the quarry is likely depressed due to the presence near the edge of steep slopes. Groundwater flow is expected to mirror topographic slope, which is away from the quarry in all directions. Potable water wells in the general vicinity of Seabrook and nearby Digby use the sandstone bedrock aquifer. Water supply wells for the Town of Digby are sourced from deeper bedrock groundwater regime. Thirty (30) wells are recorded in the NSE well log database for the Seabrook area.

3 . This stream was not assessed as it is not in the study area for the project.

4.1.6 SOILS

Soils for the study site and surrounding areas are derived from glacial till, the predominant surficial source material, which forms a shallow (2 to 20-30 m) subsurface layer over most of the area. The plateau and highest elevations of North Mountain, as well as the south slope, are dominated by Rossway soils, shallow, generally well-drained grayish to yellowish brown, stony to cobbly sandy loams. The most level parts of the plateau have developed soils of the Roxville series, which are similar to the Rossway soils, though less well-drained (Hilchey *et al* 1962). The Annapolis Valley floor which occupies the lower slopes of North Mountain and the lowland area at the site is dominated by soils of the Annapolis series, poorly drained dark brown to grayish brown sandy loam derived from till. The more-poorly-drained Seely soils are similar and occupy lowest elevations and are wetter. Roxville soils predominate in the northwest third of the EA Study area, with Rossway dominating on the upland portions and the upper slope below the quarry. Mainly Annapolis soils occur on the lower slope, with Seely soils occupying the area between Highway 217 and the lower slope (Hilchey *et al* 1962).

4.2 BIOLOGICAL RESOURCES AND HABITAT

4.2.1 TERRESTRIAL ENVIRONMENT

Seabrook Quarry is located on the crest and forested slope of North Mountain west of Digby, Nova Scotia. The upland of North Mountain at the site, which occupies about half the study area, is moderately level and undulating, and supports mixed forests dominated by sugar maple, beech, birch and red oak in well drained areas, with various other species including red and white pine, balsam fir, black spruce, red maple, hemlock, and tamarack. Forests in the vicinity of the quarry have largely been harvested at one time or another, and consist of regenerated stands of various ages, including areas which have been cut relatively recently (i.e. 2-5 years) (Figure 8), and some logging is ongoing at the site. Several bogs, and other wetlands have developed in small poorly drained depressions and former confined water bodies, but the site is generally well drained and the amount of wetlands occupy a relatively small proportion of terrestrial environments on the upland. For the most part the site slopes northwest at a moderate gradient of 6% and then levels off in a broad level lowland occupied by two large bog/fen wetlands (Section 4.2.4 and Figures 15-21). In recently cut areas, logging equipment has left tracks that were flooded at the time of the survey (June to early-July), and formed wet areas and local drainage channels. The woods support a high diversity of understorey vegetation, and plant and animal communities common to other forested areas of Nova Scotia. The lower slopes of North Mountain below the quarry are wooded, and the lowland near Highway 217 is occupied by forest, alder swamps, abandoned and active agricultural land (chiefly hay fields), as well as yards for residences along Highway 217 (Figures 9-11). The access road for the quarry, after crossing the valley floor, winds up the slope of the mountain at the site where it has exposed the underlying bedrock and soil (Figure 8-11).

Figure 8. Upper part of access road showing regenerated forests dominated by Sugar Maple, American Beech, Yellow Birch and Red Oak, June 18, 2015.

Figure 9. Quarry entrance, lowland forest and alder swamp, June 12, 2015.

Figure 10. South view from Seabrook Quarry to St. Mary's Bay, June 12, 2015.

Figure 11. Eastern view from Seabrook Quarry to Annapolis Basin, June 12, 2015.

Plant communities at the site are comparatively diverse; however no rare or unusual plants or habitats were identified in the summer 2015 survey. The property consists mostly of upland hardwood Maple-Birch forest (Figure 8) with a mix of Sugar Maple (*Acer saccharum*), Red Maple, Paper Birch (*Betula papyrifera var. cordifolia*), and yellow birch (*Betula alleghaniensis*) making up the dominant forest canopy. There are also occasional small conifer stands dominated by Balsam Fir (*Abies balsamea*). Common understorey plants in the woods include Goldthread (*Coptis trifolia*), Twinflower (*Linnaea borealis*), Evergreen Woodfern (*Dryopteris intermedia*), Wood Aster (*Oclemena acuminata*) and Wild Lily-of-the-Valley (*Maianthemum canadense*). Weedy non-native species tended to occur along the road or around the edges of the quarry.

Plant communities in two fairly large bog/fens[4] in the northeast section of the study area (Figures 16-18) are dominated by sedges in terms of cover, especially Smooth Black Sedge (*Carex nigra*). The dominant shrub is Sweet Gale (*Myrica gale*), and Brown *Sphagnum* moss (*Sphagnum fusca*) is dominant throughout, under the sedge. The extreme western portion of the southwest wetland was a treed bog, which has evidently converted to a sedge- and *Sphagnum*- dominated wetland after the logging of the overstorey. Both wetlands drain southwesterly to St. Mary's Bay.

A wooded swamp was found in the valley between the study site and another quarry located directly to the west (operated by Parker Mountain Aggregates Ltd.) (Figure 12 & 15). This site drains to the south and forms a small intermittent stream that flows down the slope from the site. The canopy here was mostly Red Maple (*Acer rubrum*) with an herb layer of Cinnamon Fern (*Osmunda cinnamomea*), over a bed of Sphagnum moss (mostly *Sphagnum girgensohnii*) (Figure 12).

[4] The abundant presence of sedges suggests these two wetlands are exposed to nutrient enrichment. Enrichment may have come from runoff resulting from logging of the adjacent watersheds. The wetlands appear to have transitioned from bogs to more fen-like conditions.

Figure 12. Maple-dominated *Sphagnum* swamp in valley southwest of existing quarry, July 23, 2015.

4.2.2 AQUATIC ENVIRONMENT

The site is in the St. Mary's Bay watershed, draining to the south and southwest. Three intermittent/permanent headwater streams leave the site in a southwesterly direction, and combine to form Post Brook; and one intermittent stream leaves the site to the south (Figure 15). All have well defined banks and coarse gravel to cobble substrate, varying in width from less than one meter to 1.5 meters. The largest (see Figure 15) flows from the north bog/fen wetland. It originates as an open water channel at the edge of the wetland, and then flows through a 1-1.5 meter wide channel over a combination of cobble to bedrock substrate, to the access road, with a section of pools mid-way. It flows through a 60 centimeter diameter culvert under the access road and downstream with a uniform gradient to the southwestern extent of the site (Figure 13). The stream had moderate flow in June and a low flow in late July, and was not flowing on September 1, although pools located upstream of the road were full in July. A second stream—the furthest northwest—is smaller than the first, but bank and substrate characteristics suggest it is also permanent. This stream was not examined in any detail. The third permanent stream forms the outlet from the southwest bog/fen wetland; this stream was not flowing in July, suggesting the stream is intermittent. This bog/fen has a narrow channel (~ 30 cm wide) running through it to a large pond (Figure 20) and then continuing to the southwest extent of the wetland. In addition to watercourses, several flowages were observed (water sampling points W4 & W2, Map A-4); these were points where ditch flow was channeled under the road, and were dry in late-July. Open water

in the form of small ponds and channels along roads and in the bog/fen wetlands, occurred at the site (Figures 13, 14, 16, 20). Much of the area has been logged and tracks of logging equipment have formed linear, intermittent water bodies and channels.

Figure 13. Main stream flowing southwest from bog/fen, June 2015.

Figure 14. Permanent stream at northwest corner of study area, June 12, 2015.

4.2.3 WATER QUALITY

Surface waters in streams and ditches at the quarry were similar in water quality characteristics, and were low in conductivity, slightly below neutral in acidity (pH ranging from 5.9 to 7.1[5]), and low in suspended sediment (Table 1). Most pH and TSS levels are within guideline ranges for the protection of freshwater aquatic life except for pH, which was low and was only acceptable according to the guideline at the WS1 and WS5 sites.

Table 1. Water quality measurements from streams located at the Seabrook Quarry study site. For locations see Map A-4.

Site Location & Date	**June 18, 2015**				
	WS1	**WS2**	**WS3**	**WS4**	**WS5**
Temperature ºC	25.7	18.4	16.4	18.5	15.1
Oxygen Saturation (%)	155.0	82.0	115.3	89.7	108.4
Dissolved Oxygen (mg/L)	11.3	7.6	11.3	8.3	11.0
Conductivity (µs/cm)	62.0	29.6	35.1	39.5	56.6
Specific Conductivity (25˚) (µs/cm)	58.2	33.8	42.6	44.9	70.0
Salinity	0	0	0	0	0
TSS (mg/L)	-	<0.5	0.5	-	0.5
pH	7.1	5.9	5.7	6.4	6.9
Colour	Clear, very pale yellow c/w filamentous algae	Clear, very pale yellow	Clear, pale yellow	Clear, very pale yellow	Clear, colourless
Freshwater Aquatic Life Guideline for pH is 6.5 – 9.					

4.2.4 WETLANDS

Wetlands observed in the Seabrook Quarry study area are summarized in Table 2 and Figure 15. The two largest, which are located in the north and northwest sides of the study area, are rich bog/fens, likely having originated as lakes on the upland, which developed into bogs, and subsequently transformed into fens. They are presently dominated by sedges and Sweet Gale with an understorey of *Sphagnum* moss, and are apparently transitional between bog and fen conditions. Both were previously identified on Provincial wetlands mapping. A smaller wooded *Sphagnum* swamp occurs in the valley between the prominences on which the Seabrook, and adjacent Parker Mountain Aggregates quarries are located (Figure 15), and has been partially logged. A small remnant of a wooded sphagnum swamp (W4, Figure 15) also occurs at the site. Throughout the site, logging activity has rutted the surface, creating localized,

5 The neutral pH is associated with a dense development of filamentous algae in this pond, whose high productivity is associated with raising the pH.

shallow pond-like depressions and linear wet areas, which have developed vegetation communities (e.g. sedges, rushes) typically associated with wetland conditions, although in these cases, they are artificial.

Table 2. Wetlands, Seabrook Quarry Expansion. Locations shown in Figure 7.		
Identification	Area (ha)	Type and Comments
W1	5.30	Bog/Fen, Treed Sphagnum Swamp/Shrub Sedge Swamp
W2	2.66	"
W3	0.46	Maple /Sphagnum Swamp
W4	0.03	Treed Sphagnum Swamp (cut over)

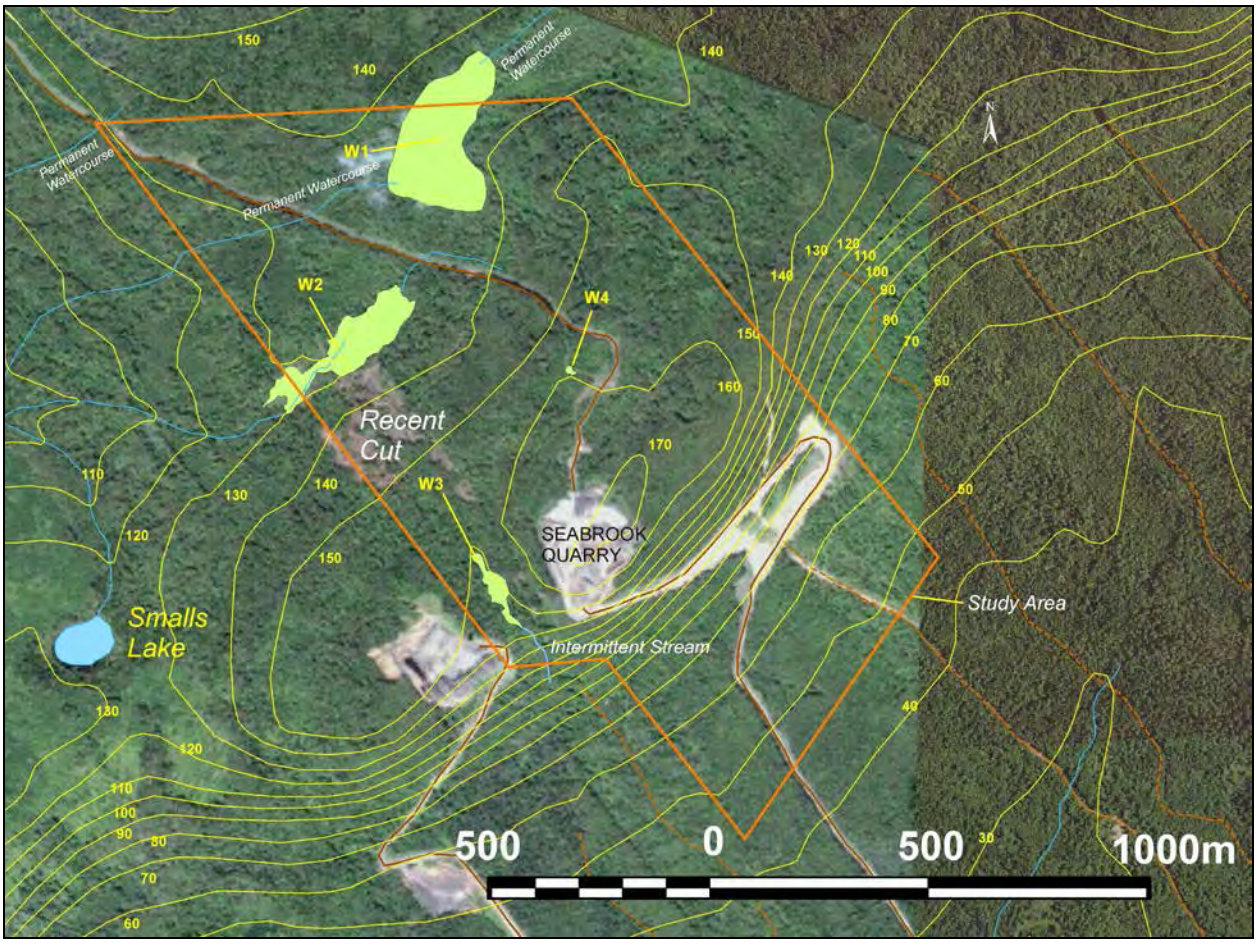

Figure 15. Wetlands in the study area, Seabrook Quarry Expansion, June-July 2015. W1 & W2 are rich bog/fens; and W3 & W4 are maple/sphagnum swamp and cutover sphagnum swamp, respectively. Elevations in metres.

Figure 16. North bog/fen looking west. Flow at the site is to the left of the photo.

Figure 17. North bog/fen looking east.

Figure 18. South bog/fen, looking southwest, June 18, 2015.

Figure 19. Maple-dominated swamp on north side of south swamp, June18, 2015.

Figure 20. Pond separating south bog/fen from southwest cutover treed bog, looking north, July 23, 2015.

Figure 21. Cutover treed bog/fen at western end of southwest bog/fen, July 23, 3015.

4.2.5 FISH & FISH HABITAT

Streams and ponds at the site have the potential to support small areas of spawning and rearing habitat for fish, in particular salmonids. Unidentified juvenile fish and minnows were seen in pools in the upper extremities of the larger stream which drains the north bog/fen, and, based on slope and landform characteristics and the likely absence of obstructions to fish passage, likely there is potential for fish to reach the other stream areas at the site as well. Fish seen were of a similar size to, and behaved like trout and are likely Brook Trout, which is the common salmonid species in the area. Species composition in streams on North Mountain in the general vicinity of the project (e.g. west of Gulliver's Cove) support Brook Trout, American Eel, and several minnow/forage species (Fourspine and Ninespine stickleback)(Stantec 2009); these are common species and have a high likelihood of occurring in the Seabrook streams. Water quality conditions at the site, however, may be marginal for long term survival of fish, due to low pH which is below CCME Freshwater Aquatic Life Guidelines.

4.2.6 BIRDS

Birds are an important component of the ecosystem in the vicinity of the Seabrook Quarry, occupying both forests and wetland areas. Digby Neck is an important migration corridor for birds of all types, and coastal areas of the Bay of Fundy as well as waters, intertidal flats and marshes of inner St. Mary's Bay provide important habitat for many species. The surrounding area (i.e. in adjacent 10 x 10 km survey squares encompassing the site) has suspected or confirmed breeding occurrences of 76 bird species (Table 3) (Maritime Breeding Bird Atlas, 2013). The morning point-count survey, conducted on June 18th and 19th, 2015 recorded a variety of warblers, flycatchers, sparrows and thrushes as well as owls, woodpeckers, ruffed grouse, mourning dove, ruby-throated hummingbird, American woodcock and common nighthawk (See Table 4)—a total of 44 species. All bird sightings were expected based on the Maritimes Breeding Bird Atlas. Birds occurring throughout the entire survey area and most abundantly include: Swainson's Thrush, American Redstart, American Robin, Black-throated Green Warbler, and the Ovenbird. Other commonly occurring species are the Hermit Thrush, Common Yellowthroat, American Goldfinch, Yellow-bellied Flycatcher, Magnolia Warbler, and Red-eyed Vireo (Table 4).

The late evening survey for owls detected a single Long-eared Owl, Barred Owl and Great-horned Owl. Additional sightings of uncommon species for the survey include: Veery, Turkey Vulture, Tree Swallow, Song and Swamp Sparrow, Ruby-crowned Kinglet, Rose-breasted Grosbeak, Red-tailed Hawk, Least Flycatcher, Common Nighthawk, and Cedar Waxwing (Table 4).

Table 3. Bird species with confirmed and potential to breed in the vicinity of the Seabrook Quarry, based on presence of suitable habitat. Source: Maritimes Breeding Bird Atlas[1].		
American Black Duck	Blue Jay	Yellow Warbler
Ring-necked Pheasant	American Crow	Chestnut-sided Warbler
Ruffed Grouse	Common Raven	Blackpoll Warbler
Common Loon	Tree Swallow	Black-throated Blue Warbler
Great Blue Heron	Cliff Swallow	Palm Warbler
Northern Harrier	Barn Swallow	Yellow-rumped Warbler
Broad-winged Hawk	Black-capped Chickadee	Black-throated Green Warbler
Red-tailed Hawk	Boreal Chickadee	Canada Warbler
Wilson's Snipe	Brown Creeper	Chipping Sparrow
American Woodcock	Winter Wren	Field Sparrow
Herring Gull	Golden-crowned Kinglet	Savannah Sparrow
Great Black-backed Gull	Veery	Song Sparrow
Rock Pigeon	Swainson's Thrush	Lincoln's Sparrow
Mourning Dove	Hermit Thrush	Swamp Sparrow
Black-billed Cuckoo	American Robin	White-throated Sparrow
Barred Owl	Gray Catbird	Dark-eyed Junco
Ruby-throated Hummingbird	European Starling	Northern Cardinal
Downy Woodpecker	Cedar Waxwing	Rose-breasted Grosbeak
Hairy Woodpecker	Ovenbird	Bobolink
Northern Flicker	Northern Waterthrush	Red-winged Blackbird
Eastern Wood-Pewee	Black-and-white Warbler	Common Grackle
Alder Flycatcher	Common Yellowthroat	Purple Finch
Least Flycatcher	American Redstart	Pine Siskin
Blue-headed Vireo	Northern Parula	American Goldfinch
Red-eyed Vireo	Magnolia Warbler	Evening Grosbeak
	Blackburnian Warbler	

[1]Breeding evidence was determined from the "Maritimes Breeding Bird Atlas" website (http://www.mba-aom.ca). Data was obtained for the 10 X 10 km survey area that covers the project site (20QK74).

Table 4. Bird species heard or observed during dawn bird surveys conducted June 19 - June 20, 2015 between 04:55 and 10:30 at the Seabrook Quarry study site. For locations of observation points, see Map A-4.

Bird Species	Northwest regenerated mixed forest (Sites 1,2 & 3)		Central mixed forest and bog/fen (Sites 4,5 & 6)		Upland mixed regeneration forest (Sites 7,8 & 9)		Regenerated mixed forest slope (Sites 10 & 11)		Foothills mixed forest (Site 12)	
	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites
Passeriformes										
Alder Flycatcher	0.3	2	0.3	2	0.4	1	0.0	0	0.0	0
American Crow	0.1	1	0.0	0	0.2	2	0.4	2	0.2	1
American Goldfinch	0.1	2	0.2	2	0.2	1	0.1	1	0.4	1
American Redstart	1.3	3	1.0	3-	0.6	3	0.3	2	0.8	1
American Robin	1.6	3	0.2	3	0.5	2	1.1	2	1.5	1
Black-capped Chickadee	0.03	1	0.2	1	0.1	2	0.0	0	0.0	0
Black-throated Green Warbler	0.1	1	0.4	3	0.3	3	0.6	2	0.3	1
Blue Jay	0.2	3	0.1	1	0.0	0	0.0	0	0.0	0
Blue-headed Vireo	0.2	2	0.3	3	0.2	3	0.4	1	0.0	0
Blue-winged Warbler	0.5	3	0.2	3	0.2	2	0.0	0	0.1	1
Cedar Waxwing	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0
Chestnut-sided Warbler	0.1	3	0.6	2	0.8	3	1.2	2	0.0	0
Common Raven	0.1	1	0.03	1	0.1	1	0.0	0	0.0	0
Common Yellowthroat	0.6	3	0.4	2	0.1	2	0.3	2	0.1	1
Dark-eyed Junco	0.03	1	0.0	0	0.1	1	0.2	2	0.1	1
Hermit Thrush	0.1	2	0.1	2	0.3	3	0.5	2	0.1	1
Least Flycathcer	0.0	0	0.0	0	0.0	0	0.2	1	0.0	0
Magnolia Warbler	0.9	3	0.2	3	0.3	3	0.1	2	0.2	1
Northern Parula	0.0	0	0.1	1	0.03	1	0.1	2	0.4	1
Ovenbird	1.0	3	0.4	3	0.6	3	1.0	2	0.4	1
Purple Finch	0.0	0	0.0	0	0.1	2	0.1	1	0.1	1
Red-eyed Vireo	0.9	3	0.8	3	0.8	3	1.2	2	0.4	1
Rose-breasted Grosbeak	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0
Ruby-crowned Kinglet	0.0	0	0.03	1	0.0	0	0.0	0	0.0	0
Song Sparrow	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0
Swainson's Thrush	2.2	3	1.2	3	0.4	3	0.9	2	1.0	1
Swamp Sparrow	0.0	0	0.1	1	0.0	0	0.0	0	0.0	0
Tree Swallow	0.0	0	0.0	0	0.1	1	0.0	0	0.0	0
Veery	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0
White-throated Sparrow	0.7	2	0.2	2	0.3	3	0.1	1	0.0	0
Yellow-bellied Flycatcher	0.2	3	1.0	3	0.3	3	0.1	1	0.1	1
Yellow-rumped Warbler	0.0	0	0.0	0	0.1	1	0.2	1	0.0	0
Charadriiformes										
Herring Gull	0.0	0	0.0	0	0.0	0	0.0	0	0.2	0.3

Table 4. Bird species heard or observed during dawn bird surveys conducted June 19 - June 20, 2015 between 04:55 and 10:30 at the Seabrook Quarry study site. For locations of observation points, see Map A-4.

Bird Species	Northwest regenerated mixed forest (Sites 1,2 & 3)		Central mixed forest and bog/fen (Sites 4,5 & 6)		Upland mixed regeneration forest (Sites 7,8 & 9)		Regenerated mixed forest slope (Sites 10 & 11)		Foothills mixed forest (Site 12)	
	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites	no./10 min.	no. of sites
Piciformes										
Hairy Woodpecker	0.03	1	0.03	1	0.03	1	0.0	0	0.0	0
Pileated Woodpecker	0.03	1	0.1	1	0.0	0	0.0	0	0.0	0
Strigiformes										
Long-eared Owl	0.0	0	0.03	1	0.0	0	0.0	0	0.0	0
Barred Owl	0.0	0	0.0	0	0.0	0	0.0	0	0.4	1
Great Horned Owl	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0
Galliformes										
Ruffed Grouse	0.0	0	0.03	1	0.0	0	0.0	0	0.0	0
Columbiformes										
Mourning Dove	0.0	0	0.0	0	0.0	0	0.1	1	0.1	1
Apodiformes										
Ruby-throated Hummingbird	0.0	0	0.0	0	0.03	1	0.1	1	0.0	0
Caprimulgiformes										
American Woodcock	0.1	1	0.0	0	0.0	0	0.0	0	0.1	1
Common Nighthawk	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0

4.2.7 MAMMALS

Large and small mammals, including game and furbearing species, are important in the ecosystem of Digby County. 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 Digby County. Eastern Coyote tracks and scats were common along the roads at the site, and black bear are known to occur commonly in the vicinity; a beaver was observed walking up the main permanent stream at the site; and bobcat have been seen in the area. There are no records of significant or unique occurrences of mammals in the general vicinity of the proposed expansion (S. Weseloh-McKeane, Coordinator of Special Places, personal communication, 2015) and no deer-wintering areas occur on or near the site.

Mammal species typical of softwood, deciduous and mixed forest landscape are expected. Bats expected to occur in the area include Northern Long Eared, Little Brown Bat, and Hoary Bat; however Digby Neck is not likely a migratory route for bats (Broders et al 2003). Other mammals occurring include: carnivores such as coyote, red fox, and Bobcat; rodents including squirrels (red squirrel and chipmunk) muskrat, beaver, and small mammals such as white-footed mouse, red-backed vole, *Cinereus* and short-tailed shrews; ungulates (White-tailed Deer and moose); mink, ermine, weasel, raccoon; and Black Bear.

Moose (a species of significance because of low numbers on the mainland of Nova Scotia) could occasionally be present at the study site, but the area is not of particular importance to the species. Winter deer yarding (occurrence and aggregations of deer) is generally not common in western Nova Scotia and is not known in the general vicinity of the study site.

4.2.8 REPTILES AND AMPHIBIANS

Many of the common Nova Scotian amphibians and reptiles are expected to occur at the site. Wetlands and open water habitats are present and most of the typical species for Nova Scotia likely occur at the site from one time to another. Species noted at the site include: salamanders (Yellow Spotted (eggs) and Eastern Red-backed (juvenile found under a log)); frogs (Spring Peeper, Green Frog & Wood Frog); and snakes (Maritime Garter Snake). The north bog/fen wetland appears to be suitable habitat for occurrences of Northern Ribbonsnake, an endangered species in Nova Scotia, but the site is well outside its current known range (J. Gilhen, NS Museum of Natural History, personal communication, 2015).

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 that may be at risk of extirpation or extinction are candidates for a detailed risk assessment by COSEWIC, or provincial or territorial equivalents.

No species of conservation concern were identified in the site surveys at the Seabrook Quarry; however, four vascular plant species of concern have been located previously within 5 km of the quarry (ACCDC 2015, Table 5). These species are: Purple-veined Willowherb (*Epilobium coloratum*, S2?), Black Ash (*Fraxinus nigra*, S1S2), Common Scouring-Rush (*Equisetum hyemale var. affine*, S3S4), and Dwarf Scouring-Rush (*Equisetum Scirpoides*, S3S4). The site is sufficiently large and diverse that appropriate habitat may exist for all four of these species of concern. Purple-veined Willowherb (Sensitive) is an herbaceous plant found on low ground and seepy soils. Black Ash (At Risk) is a small tree found on poorly drained soils and in swampy woods. Common Scouring-Rush (Secure) grows in sandy, gravelly soil, on banks or in low areas, often in calcareous regions. Dwarf Scouring-Rush (Secure) is found on wooded banks and mossy slopes, and is typical of alkaline habitats. None of these four species were noted in the 2015 inventory.

The largest wetland at the site is a bog/fen which contains suitable habitat for Northern Ribbonsnake, an endangered species in Nova Scotia, although the species is unlikely to be found there, based on it's present known range (J. Gilhen, Nova Scotia Museum, personal communication 2015).

Five plant species known to occur within and surrounding the study site are included in *The General Status of Species in Canada* rankings. *Allium trioccum, Allium burdickii*, and *Utricularia resupinata* are three plant species listed as 'May be at Risk' (Orange). *Carex swanii* and *Epilobium coloratum* are listed as 'Sensitive' (Yellow) (S. Weseloh Mckeane, NS Museum, pers. comm., 2015). An additional three plant species of concern provincially are documented as occurring within a 5 km radius of the study site – *Epilobium coloratum* (Purple-veined Willowherb); *Equisetum hyemale* var. affine (Common Scouring-Rush); and *Equisetum scirpoides* (Dwarf Scouring-rush) –are noted above. None were found at the site (Appendix C and D).

Federally listed animal species that are documented as occurring within a 5 km radius of the area include Barn Swallow (Threatened), Canada Warbler (Threatened), Olive-sided Flycatcher (Threatened), Bank Swallow (Threatened), Bobolink (Threatened), Rusty Blackbird (Special Concern), and Eastern Wood-Pewee (Special Concern) (ACCDC, 2015). Suitable habitat for Canada Warbler and Eastern Wood Pewee were found at the site. Treed and shrubby grassy swamps occuring around the bog/fen wetlands contain potential habitat for Canada Warbler, but none were heard at the site. Eastern Wood Pewee prefers mature deciduous forests, and the species has the potential to occur at the site, although the regenerating forests are medium-aged and uniform in height. Suitable habitat was not found at the site for the remaining species identified as having been recorded within 5 km radius of the site. Barn Swallow typically occupy buildings in the vicinity of open and wet areas such as fields, marshes and open water, none of which occur at the quarry site. Suitable habitat for Olive-Sided Flycatcher—treed (black spruce) sphagnum bogs and wetlands surrounded by mature softwood forest stands—do not occur at the site. Bobolink typically nest in open field habitats and Bank Swallow need exposed banks, which also were not found at the site. Rusty Blackbird, which uses wetlands around lake edges, bogs, swamps and edges of fens, is also not likely to occur at the site because of lack of suitable habitat. Rose-breasted Grosbeak and Tree Swallow—two species with conservation concern elsewhere in Canada and listed in *The General Status of Species in Canada*—were found at the site, but both are Secure provincially.

Table 5. Records of species of concern within a 5 km radius of Seabrook Quarry, Digby County. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2015.

Family/Scientific Name		Common Name	Rank			
			General Status of Wild Species Rankings (numerical)[1]		ACCDC[2] Rankings	
			Provincial	National	SPROT[3]	GRANK, SRANK, NPROT[4]
Plants						
Equisetaceae	*Equisetum hyemale var. affine*	Common Scouring-rush	4	-	-	G5T5, S3S4, -
	Equisetum scirpoides	Dwarf Scouring-Rush	4	-	-	G5, S3S4, -
Onagraceae	*Epilobium coloratum*	Purple-veined Willowherb	3	-	-	G5, S2?
Animals-Birds						
Cardinalidae	*Cardinalis cardinalis*	Northern Cardinal	4	4	-	G5, S3S4, -
	Pheucticus ludovicianus	Rose-breasted Grosbeak	3	4	-	G5, S3S4B, -
Charadriidae	*Charadrius vociferus*	Killdeer	3	4	-	G5, S3S4B,-
Corvidae	*Perisoreus canadensis*	Gray Jay	3	3	-	G5, S3S4, -
Cuculidae	*Coccyzus erythropthalmus*	Black-billed Cuckoo	2	4	-	G5, S3?B, -
Fringillidae	*Carduelis pinus*	Pine Siskin	3	4	-	G5, S3S4B/S5N, -
Gaviidae	*Gavia immer*	Common Loon	2	4	-	G5, S3B/S4N, NAR
Hirundinidae	*Hirundo rustica*	Barn Swallow	1	4	Endangered	G5, S3B, T
	Petrochelidon pyrrhonota	Cliff Swallow	2	4	-	G5, S3B, -
	Riparia riparia	Bank Swallow	2	4	-	G5, S3B, T
Icteridae	*Dolichonyx oryzivorus*	Bobolink	3	4	Vulnerable	G5, S3S4B, T
	Euphagus carolinus	Rusty Blackbird	2	3	Endangered	G4, S2S3B, SC
	Molothrus ater	Brown-headed Cowbird	4	4	-	G5, S2S3B, -
Mimidae	*Dumetella carolinensis*	Gray Catbird	2	4	-	G5, S3B, -
Paridae	*Poecile hudsonica*	Boreal Chickadee	3	4	-	G5, S3, -
Parulidae	*Dendroica striata*	Blackpoll Warbler	3	4	-	G5, S3S4B, -

Table 5. Records of species of concern within a 5 km radius of Seabrook Quarry, Digby County. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2015.

Family/Scientific Name		Common Name	Rank			
			General Status of Wild Species Rankings (numerical)[1]		ACCDC[2] Rankings	
			Provincial	National	SPROT[3]	GRANK, SRANK, NPROT[4]
	Wilsonia canadensis	Canada Warbler	1	4	Endangered	G5, S3B, T
Scolopacidae	*Actitis macularius*	Spotted Sandpiper	3	4	-	G5, S3S4B, -
	Gallinago delicata	Wilson's Snipe	3	4	-	G5, S3S4B, -
	Tringa semipalmata	Willet	2	4	-	G5, S2S3B, -
Tyrannidae	*Contopus cooperi*	Olive-sided Flycatcher	1	1	Threatened	G4, S3B, T
	Contopus virens	Eastern Wood-Pewee	3	4	Vulnerable	G5, S3S4B, SC
Other						
Lycaenidae	*Callophrys polios*	Hoary Elfin	4	-	-	G5, S3S4, -
Nymphalinae	*Polygonia faunus*	Green Coma	4	-	-	G5, S3, -

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 or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

GU **Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.

GNR **Unranked**—Global rank not yet assessed.

G#G# **Range Rank**—A numeric range rank (e.g., G2G3, G1G3) is used to indicate the range of uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g., GU should be used rather than G1G4).

Q **Questionable taxonomy that may reduce conservation priority**—Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or
type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level and not at a national or subnational level.

C **Captive or Cultivated Only**—Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The "C" modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC or GHC. This is equivalent to "Extinct" in the Wild (EW) in IUCN's Red List terminology (IUCN 2001).

T **Infraspecific Taxon** (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a

Table 5. Records of species of concern within a 5 km radius of Seabrook Quarry, Digby County. Atlantic Canada Conservation Data Centre (ACCDC) Database, May 2015.

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

critically imperiled
subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species. For example, a G1T2 subrank should not occur. A vertebrate animal population, (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

SRANK, Sub-National (Provincial) Rarity Ranks

S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.

S2 Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

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

S4 Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).

S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.

S#S# Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).

SH Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species), and suspected to be still extant.

SU Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.

SX Extinct/Extirpated: Element is believed to be extirpated within the province.

S? Unranked: Element is not yet ranked.

SA Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) 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 occurrances during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.

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

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

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

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

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

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

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

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

Table 6. Provincially listed species of concern with potential to occur in the vicinity of the project site (~10km). Nova Scotia Museum records (S. Weseloh Mckeane, NS Museum, pers. comm., 2015).

Scientific Name	Common Name	General Status of Wild Species Rankings for NS (numerical)[1], SPROT (Provincial GS Rank)[2]	ACCDC [3] Rankings (GRANK, SRANK, NPROT)[4]
PLANTS			
Allium tricoccum	Wild leek	2, - (May Be At Risk)	-, S1, -
Allium burdickii	Narrowleaf wild leek	--	--
Carex swanii	Swan's sedge	3, - (Sensitive)	-, S2S3, -
Epilobium coloratum	Purpleleaf willowherb	3, - (Sensitive)	-, S2?, -
Utricularia resupinata	Lavender Bladderwort	3, - (Sensitive)	-, S2, -
BIRDS			
Actitis macularius	Spotted Sandpiper	3, - (Sensitive)	-, S3S4B, -
Carduelis pinus	Pine Siskin	3, - (Sensitive)	G5, S3S4B/S5N, -
Cardellina canadensis	Canada Warbler	1, Endangered (At Risk)	-, S3B, T
Coccyzus erythropthalmus	Black-billed Cuckoo	2, - (May Be At Risk)	-, S3?B,-
Contopus virens	Eastern Wood-Peewee	3, Vulnerable (Sensitive)	-, S3S4B, SC
Dolichonyx oryzivorus	Bobolink	3, Vulnerable (Sensitive)	-, S3S4B, T
Dumetella carolinensis	Gray Catbird	2, (May Be At Risk)	-, S3B, -
Gallinago delicata	Wilson's Snipe	3, - (Sensitive)	-, S3S4B, -
Gavia immer	Common Loon	2, - (May Be At Risk)	G5, S3B S4N, NAR
Hirundo rustica	Barn Swallow	3, Endangered (At Risk)	G5, S3B, T
Perisoreus canadensis	Gray Jay	3, - (Sensitive)	-, S3S4, -
Petrochelidon pyrrhonota	Cliff Swallow	2, - (May Be At Risk)	G5, S3B, -
Pheucticus ludovicianus	Rose-breasted Grosbeak	3, -(Sensitive)	-, S3S4B, -
Pinicola enucleator	Pine Grosbeak	2, - (May Be At Risk)	-, S3?B, S5N, -
Poecile hudsonicus	Boreal Chickadee	3, - (Sensitive)	G5, S3, -
Regulus satrapa	Golden-crowned Kinglet	3, - (-)	--
Tachycineta bicolor	Tree Swallow	--	--

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.SPROT=Provincial Rank/status of taxon & Provincial GS Rank.
3. Atlantic Canada Conservation Data Centre (ACCDC).
4. GRANK, Global rarity rank of species, using CDC/Nature Serve methods; SRANK, Sub-National (Provincial) Rarity Rank-; NPROT, National conservation status of species, as designated by COSEWIC.

4.2.10 NATURAL AREAS & WILDERNESS

The Digby area, including the Town of Digby, the western Annapolis Valley extending to St. Mary's Bay, and Digby Neck, are rural areas with low population density, which utilize, rely economically, and often thrive on the wide range of local natural resources. People living in these areas are exposed to the natural environment day-to-day and appreciate the presence of, and access to, undeveloped land and nature, while accepting the usual activities needed to use the resources. While there are few areas in the vicinity of Digby and Seabrook which haven't been touched by human activity, in particular forestry and logging, and the clearing of agricultural land, the landscape retains a natural character and is 'wild' in many ways, including the absence of people, the vegetated scenery, and the presence of wild animals such as coyotes, black bear, and deer, and other wildlife nearly everywhere. Forestland used as a resource in past, and regenerated stands and absence of development, give a natural appearance, which is shared and appreciated by residents and the many tourists that visit Digby Neck. Rural life in Nova Scotia includes frequent encounters with wildlife, and nature is part of daily life. One of the core values of the communities in the area is the appreciation of the natural environment (Digby County 2010). Although developments such as quarries and windfarms are accepted as part of the mix of ways to use the land, the response of communities to larger scale quarry developments is mixed, and have resulted in public opposition in past.

4.3 HUMAN USES OF THE ENVIRONMENT

4.3.1 MI'KMAQ

The Bear River First Nation (L'sitkuk), established in 1830, is one of thirteen first nation communities in Nova Scotia located within the Digby and Annapolis counties. Archaeological evidence suggests Mi'kmaq have inhabited this area for nearly 4000 years. It is situated on 698 hectares of land and is comprised of three separate areas; Bear River 6, Bear River 6A, and Bear River 6B. Bear River 6 is the largest of the three areas and is approximately 21 kilometers southeast of Seabrook. A population of approximately 330 community members currently reside on the reserve.

The traditional way of life for the Mi'kmaq living in the Bear River region has included hunting and harvesting resources from the coastline and Bay of Fundy, as well as the inland forests and rivers. The Bear River band crafted canoes of birch and used these boats as a means to travel and hunt porpoise and other marine species from the Bay of Fundy.

Present day uses of the land reflect the traditional lifestyle of the Bear River inhabitants, and the community is active in a variety of educational activities directed primarily at youth and tourism. Organizations in the area include guided hikes and traditional forest harvesting activities (ie. basket making) at the Stone Bear Tracks and Trails Retreat. The First Nations Forestry also facilitates initiatives to bring back natural diversity and ecological integrity including trail systems, silviculture treatments, maintaining wildlife habitat, brook enhancement and education.

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

The Mi'kmaq Rights Initiative (Kwilmu'kw Maw-klusuaqn; KMK) also represents Mi'kmaq. The mission of KMK—whose name means, "we are seeking consensus."— is "to address the historic and current imbalances in the relationship between Mi'kmaq and non-Mi'kmaq people in Nova Scotia and secure the basis for an improved quality of Mi'kmaq life." The initiative is to negotiate between the Mi'kmaq of Nova Scotia, the province and the Government of Canada. KMK's main office is located in Millbrook. The Atlantic First Nations Environmental Network (AFNEN) is an environmental organization of Mi'kmaq communities and organizations. The CMM and UNSI are members and 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.

4.3.2 POPULATION AND ECONOMY

Digby Neck faces many of the same economic challenges of rural Nova Scotia—declines in the fishery, challenges in the fish processing sector, lack of economic growth, aging population and deteriorating service infrastructure (Gardner Pinfold 2006). Rural areas are now hard-pressed to retain youth and rejuvenate stagnating economies in the face of increasing migration to urban areas and a low birth rate (Gardner Pinfold 2006).

Population density around the project site is likely similar to the averages for Digby County, which is lower than average for Nova Scotia (7.2 and 17.4 per km^2, respectively). In Digby County, the percentage of people employed[6] (49%) and average salaries ($27,465) are a bit lower than the averages for Nova Scotia (57% and $35,478, respectively; Statistics Canada, 2011a). Population in Digby County is predominantly rural (88%) and population has continued to decline both in Digby County and Digby Town in the most recent census (2011) (Nova Scotia Federation of Agriculture, 2011). The fishery, including fishing and fish processing activity, is the dominant industry in the area. In the Digby Neck and Islands area, resource industries including agriculture, forestry, fishing and hunting are important,

6 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.

supporting about 36% of labour force, which is comparable to service industries, and more than the tourist industry, which employed about 10% of the labour force in 2011 (Gardner Pinfold 2006). The fishery in the Digby Neck area is dominated by far by lobster, but scallops, quahaugs, sea urchin, and pelagics (herring and mackerel) and groundfish are also important in terms of landed value (Gardner Pinfold 2006).

Agriculture is also an important industry in the area. Some 150 farms operate in Digby County, the majority (two thirds) in the northwest portions of the county and the remainder in Clare. Number of farms in Digby County increased in the most recent census, attributed to the mink farming industry (32 farms). Fur farming is the largest agricultural industry sector in Digby County by number of farms (NS Dept. of Agriculture 2011). Most of the mink farming activity is located in southwest Digby County; however two mink farms are located 2.7 and 5.1 km south of the existing quarry on Middle Cross Road and Marshalltown Road respectively[7]. Livestock raising is carried out at about 15% of farms and mixed vegetable, fruit, and horticulture another 15% (NS Federation of Agriculture 2011).

4.3.3 WATER SUPPLY AND RESIDENTIAL WELLS

A wellfield located northwest of the Town, and Van Tassel Lake, are the Town of Digby's public water supply. The wellfield is the primary supply and it is supplemented by flow from Van Tassel Lake (Municipality of the District of Digby 2002). It is located approximately four kilometers from the existing quarry. A water treatment plant is located on Van Tassel Lake and the water supplies are jointly managed by the Town, Municipality of the District of Digby and the Digby Water Commission. A designated wellfield protection area (Digby Wellfield Protection Area, Figure 7) and associated Municipal Planning Strategy and Land Use By-law are in place (Municipality of the District of Digby, 2002). The purpose of the planning controls is to protect the quality of the water drawn from the Digby Wellfield Area through control of land use and development within the wellfield catchment and recharge area. The source waters in the watershed, which include North Mountain and extend to near the study area (Figure 7), have not been designated for protection as a Protected Water Area under the Environment Act; the Town and municipal authorities chose not to designate the source waters because most of the land is located outside of the Town; the level of development activity in the area is relatively modest; and the Municipality of the District of Digby has adopted land use controls specifically for the Wellfield Protection Area to promote protection of groundwater quality (Town of Digby & Digby Water Commission 2012).

The Town's current (2012) water supply system consists of nine (9) water production wells, which are supplemented by a surface water source called Van Tassel Lake Reservoir. From 2004 to 2009, the wellfield produced between 2.0 and 3.0 million litres per day (450,000 to 500,000 gpd) with minor amounts being produced from Van Tassel Lake (Town of Digby & Digby Water Commission 2012). The water system serves all of the Town, the joint Town/Municipality Industrial Park, Mount Pleasant,

7 . https://www.google.com/maps/d/viewer?mid=zNSdNj3Ll1MU.krmqSMvzMu_M.

BelAire Drive, Pleasant Street and a portion of the Municipality along Highway 217 between the Town boundary and the community of Seabrook.

In the Seabrook area, most drinking water for residences and businesses is supplied by groundwater wells, both drilled and dug. The small area occupied by the quarry, as well as the distance from the nearest residences (only five homes within 800 m), suggest that the quarry will not influence residential wells.

4.3.4 LAND USE

The Municipality of the District of Digby has no overall area or municipality-wide planning or development control mechanisms in place; however it has Municipal Planning Strategies for specific issues, such as Drinking Water Protection and Wind Turbine development.

Land in the vicinity of the quarry is predominantly rural residential but includes forestry, agricultural and commercial use (e.g. quarry) as well as businesses operated from homes. Highway 217 in the area forms a corridor for rural residential and commercial development and is the main travel route to Digby Neck. The main agricultural use along Hwy 217 in the vicinity of Seabrook is livestock and hay production (S. Ashford, property owner, personal communication 2015). A private sawmill and a vehicle maintenance and storage yard in Roxville are present in addition to residential properties. All of the land is privately owned, with no areas of Crown ownership apart from highway right-of-ways, and property owned by the Town and Municipality of Digby immediately adjacent to the Town (Map A-3).

4.3.5 HUNTING AND TRAPPING

The Seabrook Quarry site is expected to support wildlife species characteristic of Digby County. Predominant fur-bearing species reported in trapping catches for Digby are listed in Table 7. Digby County reported the highest catch provincially for marten, squirrel, skunk and mink for the period between 2008-2013.

Upland game species (e.g. Snowshoe Hare, Ruffed Grouse and Ring-necked Pheasant) are harvested in Digby County, with Snowshoe Hare harvest ranking second highest for the province. However, Ruffed Grouse and Ring-necked Pheasant do not constitute a significant proportion of the total numbers harvested in Nova Scotia. Between 2008-2013, Digby County ranked eleventh provincially for the harvest of Ruffed Grouse, and ranked seventh for the harvest of Ring-necked Pheasant (Table 7).

White-tailed Deer occur in the area, but harvest in Digby County is relatively low, representing only 3.9% of the provincial harvest between 2008-2013 (Table 7). Black Bear harvest values are not available by County; however, the region is expected to follow the trend of increasing abundance for the species in the province.

4.3.6 FORESTRY

Forestry is one of the main land uses in vicinity of the quarry. Digby County has the fifth highest labour force participation rates in forestry in the Province with approximately 530 individuals employed (APEC 2004). Private land holdings have been cut over extensively for timber in the past. Forest inventory data and recent aerial images show numerous clearcuts in the area.

Table 7. Summary of wildlife harvested in Digby and Nova Scotia, from 2008 to 2013.

Animal	Calculated Harvest	Percent (%) of Total for Province	Provincial Calculated Harvest
Large Mammals			
Deer	2,456	3.9	62,197
Upland Game			
Snowshoe Hare	29,966	8.9	454,731
Ruffed Grouse	7,215	4.2	205,815
Ring-necked Pheasant	986	4.1	29,886
Fur Harvest			
Beaver	1,475	5.2	28,548
Muskrat	2,521	2.9	88,186
Otter	103	3.6	2,895
Mink	2,954	28.9	10,237
Bobcat	221	3.6	6,120
Fox	82	2.4	3,475
Racoon	1,440	8.4	17,122
Skunk	133	35.9	370
Squirrel	4,356	38.4	11,357
Weasel	610	10.4	5,861
Coyote	435	3.1	13,901
Lynx	0	0.0	49
Marten	15	38.5	39
Fisher	48	4.6	1,036
Total for all Furbearers	*14,393*	*7.6*	*189,196*

Source: Nova Scotia Department of Natural Resources, Wildlife Division, Harvest Statistics. http://novascotia.ca/natr/hunt/stats-index.asp; Accessed May 2015.

4.3.7 RECREATIONAL, COMMERCIAL, AND MI'KMAQ FISHING

Recreational fishing provides an important resource and pastime for residents of Digby County. The quarry is in Provincial Recreational Fishing Area 4, which supports recreational fishing primarily for Brook Trout from April 1 to September 30 (Nova Scotia Anglers' Handbook and 2015 Summary of Regulations). Larger streams in the area such as Henderson Brook, Post Brook and Budd's Brook support Brook Trout, which is the predominant species fished in the area.

Coastal waters in the area support leases for shellfish and finfish aquaculture, as well as a landbased aquaculture facilty. Innovative Fishery Products Inc. holds a quahaug lease in inner St. Mary's Bay as well as several softshell clam leases in western Annapolis Basin around Digby. Kelly Cove Salmon Ltd. operates three finfish leases in the basin for Atlantic Salmon, Rainbow Trout, Atlantic Halibut, Atlantic Cod and Haddock. There is also a land-based haddock aquaculture operation at Victoria Beach on the west side of Digby Gut on the shore of Annapolis basin. A small oyster lease is operated near the ferry terminal. A company in Gulliver's Cove, located west of the quarry, gathers, dries and sells dulse.

Mi'Kmaq hold lobster licenses and may operate along the Bay of Fundy coast in the Digby area. Recreational fishing by Mi'Kmaq in freshwaters at the study site is likely infrequent or does not occur.

4.3.8 HISTORICAL, ARCHAEOLOGICAL AND PALAEONTOLOGICAL RESOURCES

European settlers have occupied the area largely since the end of the 18th century when the area saw influxes of United Empire Loyalists as well as some returning Acadian settlers. Use of the area by Mi'Kmaq is probable but, with the exception of a screening of the site done for the quarry (Cultural Resource Management (CRM) Group Ltd. 2015), no studies have been done in the area, and there is a low likelihood of utilization of the site by Mi'Kmaq. There are no recorded archaeological sites in the vicinity of the proposed quarry expansion (S.Weseloh-Mckeane, Coordinator, Special Places, personnel communication, 2015; CRM 2015); and background research did not indicate any Euro-Canadian settlements in the development area (CRM 2015). CRM (2015) determined, based on site reconnaissance, topography and other features of the Seabrook Quarry site, that the EA Study area would have low potential for either Native (both pre-contact and historic) or Euro-Canadian archaeological resources. The site reconnaissance identified one historical feature within the EA Study area—a cellar believed to belong to the homestead of the earliest settlers (Henderson family) at the site—at the foot of the slope west of the access road (Map A-4). It was recommended that if the cellar could not be avoided during future activities at the site, further archaeological testing should be conducted within a 30 m radius prior to development (CRM 2015). Other historically significant sites located in the general area, but not within the proposed quarry expansion area, include a possible Acadian cellar located on an adjacent property (Murray Ross property) north of Highway 217 and southwest of Municipal Enterprises property; and the Henderson Family Cemetery, located on the southeast corner of the Municipal Enterprises property (CRM 2015).

4.3.9 PARKS AND PROTECTED AREAS

Recreational areas in the vicinity of Seabrook include *Annapolis Basin Lookoff Provincial Park* and the *Digby Pines Resort and Spa, and Golf Course*. The provincial park—located about one kilometer north of Digby and about seven kilometers northeast of the quarry—is a small picnic park overlooking Annapolis Basin. The publically owned Digby Pines Golf Course is located north of Digby, approximately four kilometers east of the existing Seabrook Quarry and the Digby Pines Resort is near the Lookoff Park.

Mudflats, salt marshes and coastal wetlands at the head of St. Mary's Bay are important migratory bird and wildlife habitat, located approximately five kilometers southwest of the Seabrook Quarry.

All the counties of southwest Nova Scotia including Digby County are in the Southwest Nova Biosphere Reserve, a United Nations (UNESCO) designation for a conservation area, which is a means of recognizing and protecting the ecosystem of Southwest Nova Scotia. The reserve was formed with the cooperation of all counties in Southwest Nova—including Digby County—and recognizes the significance of relatively undeveloped areas, the role of the Mi'Kmaq population and the overall cultural, commercial and historical importance of the area.

4.3.10 RECREATIONAL/CULTURAL FEATURES

Residents in the vicinity of the quarry use woods roads and some of the small side roads for ATVs and woodland access, as well as for hunting. The road through the quarry extends beyond the west property boundary to the Culloden Road on the Bay of Fundy. Although the access road through the quarry property is gated at both entry/exit points, the northwest corner of the quarry property can be accessed by automobiles such as trucks and ATVs for recreation (e.g. hunting) via roadway along the Bay of Fundy coast. As the quarry property is privately owned by Municipal Enterprises Limited, use of the property trails, roads and woodland by neighboring residents or the general public as indicated, would be trespassing.

Seabrook Quarry is about 6.5 kilometers east of Gulliver's Cove, a community that supports a coastal walking trail and an ecotourism business (Fundy Adventures, Wanda & Calvin Van Tassell) that offers coastal tours.

4.3.11 RESIDENTIAL USE

Seabrook is a former farming, fishing and logging community, which is presently largely residential or rural residential, with properties aligned on Highway 217. Approximately 25 single-family residences occur in the general area, including the community of Seabrook. No residential structures are found within 800 meters of the existing quarry or proposed quarry expansion area. Residents of the properties

in the immediate vicinity of the quarry, interviewed during the site survey and by telephone, noted no impact from, or concern over, operations of the existing quarry.

4.3.12 COMMERCIAL/INDUSTRIAL DEVELOPMENT

The SkyPower/Scotian Windfields wind turbine development is located approximately eight kilometers west of the study site. This site operates 20 wind turbines. The Parker Mountain Aggregates Quarry operates some 100 meters west of the existing quarry. Commercial development along Highway 217 increases in density between the community of Seabrook and Digby, which is 2.5 kilometers further east.

4.3.13 TOURISM AND VIEWSCAPE

Seabrook Quarry and the access road and associated exposed bedrock and slopes are visible from Highway 217 (Figure 22) and can also be seen from as far away as Highway 101 near Cornwallis. The expanded quarry in late stages of development on is not expected to be more visible from these locations than at present. The adjacent Parker Mountain Aggregates Quarry site is presently, and will continue to be, visible from a distance (Figure 22). Both quarries are approximately 1.2 kilometers from Highway 217, which is and only a minor landscape feature to be noted by visitors traveling to the area by car (Figure 22).

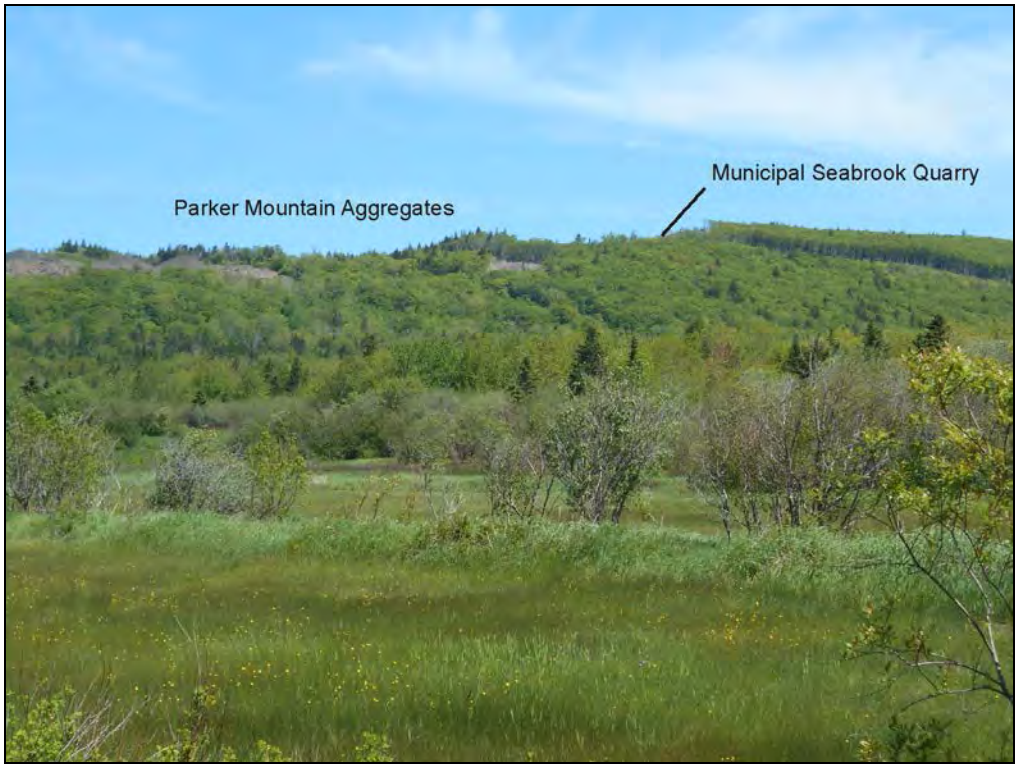

Figure 22. View of site from Highway 217, June 2015.

4.3.14 TRANSPORTATION

Highway 217 is the only connector highway for communities on Digby Neck and is used by all local traffic to and from the rest of the Province. Traffic levels are not particularly high, with a large proportion of traffic expected to be due to local quarries when major construction projects requiring aggregate are taking place nearby. When in operation, the quarry will contribute truck traffic in the vicinity of the site, typically in the summer fall construction season. Access to the quarry is open with good sight lines and is not expected to create safety concerns.

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

5.2 VALUED ENVIRONMENTAL COMPONENTS

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

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

Table 8. Valued Environmental Components (VECs) for Seabrook Quarry Expansion.	
Biophysical	Socioeconomic
Air Quality, Noise and Light	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
	Commercial /Industrial Use
	Water Supplies & Residential Wells
	Forestry, Hunting & Trapping
	Agriculture & Mink Farming

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 that they claim all of Nova Scotia. As co-owners of the land and its resources, they expect that any potential impacts to rights and title be addressed (T. Gaudet, KMKNO, personal communication 2014). Mi'Kmaq occupied much of Nova Scotia prior to European contact, and lands were used to varying degrees for habitation, hunting and fishing, as noted in Section 4.3.1. In more recent times, treaties made with the British and continued through Canadian law have maintained their rights. The location of the quarry, which is on Henderson's Mountain and at the edge of the North Mountain plateau, as well as access through streams flowing off the mountain in many locations, may have attracted Mi'Kmaq to the site. No excavations or detailed searches for artefacts at the site have been undertaken (CRM 2015).

Operation of the Seabrook Quarry will use land that 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 local streams, but such effects will be small. 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, gardening, enjoyment of home-based recreation, ATV use, hunting, fishing and nature appreciation. Operations at the quarry would be cyclic, likely occupying mainly the summer construction season, and the facilities

are well maintained. 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 Seabrook. The property is located some distance (approximately 1 km) from Highway 217, from which it is visible. The combination of the Seabrook Quarry and access road, and the adjacent (to the west) Parker Mountain Aggregates Quarry, are clearly visible from Highway 217 and from beyond Digby on Hwy 101. Visibility will increase as the quarry matures, particularly if the slope of the mountain is used. Truck and equipment traffic accessing and exiting from Seabrook Road onto Highway 217 would be occasional and would likely be only a minor impediment to tourist vehicle traffic in the area. The access road to the Quarry has good sightlines and is well maintained and not particularly noticeable from the Highway. 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 Budds Brook, Post Brook and Henderson Brook, and downstream areas. The Seabrook Quarry will not significantly change flow regime or water quality in these brooks and the overall influence will be minimal. Water quality of the runoff from the quarry is likely to be good for salmonids (versus the low pH found normally in surface waters at the site), 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 area was not settled by Europeans until late in the 18th century and not intensely settled until more recently. Consequently the project is not likely to discover or disturb cultural/historical/archaeological features.

5.3.6 LAND USE AND VALUE

Forestry, mixed agriculture, hunting and trapping, as well as small rural-residential properties, are the major land uses in the vicinity of the site, and the EA Study Area, as well as adjacent lands. The land on the site is not suitable for agriculture or subsurface mining, and aggregate production, forestry, and wind energy extraction are among the only potential commercial uses of the area. Areas not required for the quarry will be preserved if possible to assist in maintaining forest ecosystems for forestry production, and to buffer adjacent areas from quarry activities. Quarry activities are not expected to impact existing residential, agricultural, industrial uses of nearby areas for conservation and scientific use. Values for

residential properties in Seabrook will likely be only minimally affected if at all by the presence of the quarry. The Seabrook Quarry and adjacent Parker Mountain Aggregates Quarry have been operating at the site, having little impact on the local residential and farm community, while providing economic development and a source of aggregate for local construction projects.

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. Suitable safety awareness training for truck and equipment operators, as well as the Seabrook 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 approximately one kilometer from Highway 217 and is poorly visible. Normal traffic noise on Highway 217 would likely exceed any noise coming from the quarry for homes located nearby. Residents of homes along Highway 217 in the vicinity of the quarry indicated that there were no problems associaited with the quarry. 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. Dust generation could be moderate due to the exposed, high location of the site, but measures to control dust will be implemented. 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.

5.3.9 COMMERCIAL/INDUSTRIAL USE

There are no commercial operations in the Seabrook area apart from the two quarries, and the Digby Wind Project located west of Gullivers Cove. Blasting at the quarry site will not have sufficient energy to reach the nearest turbine (eight kilometers distant) at the wind turbine site. The quarry will compete with the existing Parker Mountain Aggregates Quarry in Seabrook; however there will probably be a net

economic benefit to the community in supporting local trucking operations and providing access to aggregate and other quarry product in the vicinity of Seabrook.

5.3.10 WATER SUPPLIES AND RESIDENTIAL WELLS

Residents of Seabrook use wells for water supply and the watershed for the Town of Digby drinking water supply is located adjacent to the site. Quarry activities are not expected to impact residential wells as they are located at a sufficient distance (i.e only five residences are located within 800 meters) to avoid impacts from quarry operations, in particular the occasional blasting that takes place, and they are in a different aquifer. Groundwater recharge generated by the quarry 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. The quarry will not interfere with the water supply watershed for Digby, as it will be set back from wetlands and occupies only a small part of the watershed, and the wellfield protection area for the Town is approximately one kilometer distant. Runoff from the operational area of the quarry will be treated as per specifications under the industrial approval, and quality 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

The quarry site is not near to or visible from any parks or recreational areas (e.g. Digby Pines Golf Course or the Annapolis Basin Lookoff). Although all of Digby County is broadly included in the Southwest Nova Scotia Biosphere Reserve designation, the designation includes the concept of multiple uses of the landscape and management to protect various values the area. Blasting, when it occurs, can be heard at some distance from the site, and will reach the Town of Digby and the park areas; however the blasting activities will be infrequent. Light associated with nighttime operations will not add significantly to that already produced by urban development and street lighting in Digby.

5.3.12 RESOURCE USE—FORESTRY, HUNTING & TRAPPING

Use of the land for a quarry will remove the potential for logging the site for a long time, at least until after the quarry is closed and rehabilitated 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 in the area is expected to be small. The quarry will occupy a relatively small area of habitat for furbearing and game species, and will not have a significant impact on hunting and trapping in the Seabrook area.

5.3.13 AGRICULTURE & MINK RANCHING

Mink ranching is the major sector of the agricultural economy of Digby County. Mink can be sensitive to adverse stimuli such as excessive light, loud noises, and vibrations. When choosing the location of mink farms, mink farmers ideally consider factors proximity to neighbouring activity or high traffic volumes

(National Farm Animal Care Code of Practice 2013). On the other hand, a study cited recently to demonstrate the effects of noise on livestock, including mink, showed that noise levels do not have a significant impact on cattle (milk production), swine, poultry (egg hatching) or mink (kits produced) (Bond (1971) cited in US Dept. of Transportation (2015)). Occasional blasting, and equipment and truck noise likely can be heard, and lights from the quarry can be seen from the nearest mink farm on Middle Cross Road some 2.7 kilometers from the site. Mink, as do many mammal species, will likely acclimate to routine noise and light levels generated by the quarry, and they are housed indoors, which will prevent exposure to light during nighttime operations. Blasting could be heard and potentially a sudden noise could startle animals.

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 are expected to be minimal from routine operations. Dust management will be undertaken, including use of water spray and covering working and laydown areas with blasted rock. Monitoring of airborne particulate emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines and the Nova Scotia Air Quality 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), and 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 expanded quarry are expected to be similar to those already produced at the site, since the operations are expected to be similar in size at a given time, 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 particularly during times of low-hanging cloud and fog, and can attract migrating birds, which orient to Digby Neck during their migrations. 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. The quarry is one of several sources of light, including the Town of Digby, and the adjacent Parker Mountain Aggregates quarry, which has the potential to cumulatively affect bird movements during migration, and at other times of the year. If

possible, the effect can be reduced by operating the quarry primarily in mid-summer outside migratory periods.

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 Seabrook 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 and entering the watershed to the west of the site. Runoff from the quarry will be managed to ensure that it meets acceptable environmental standards. Exposed surfaces on the quarry and on access roads lead to more sudden, 'flashy' runoff patterns during rainfall events. In particular, the surface of the large main access road to the existing quarry as well as the exposed slopes associated with it creates significant sudden runoff flows. Road surfaces oriented downhill are frequently rutted by downslope flow. Surface runoff from the slope crossed by the access road, as well as sheet flow from the road surface, is captured and carried by several ditches, which effectively transport and dissipate the runoff downslope into wooded areas (Figure 23). The flow management system in place appears to be adequate to manage the flow in a natural way and minimize damage to the local landscape, and to surface water quality, but ditches and road surfaces should be maintained regularly to prevent catastrophic failures due to sudden runoff events.

5.4.4 WATER QUALITY

Water quality downstream of the site is important for fish habitat in the lower watersheds, which include Post Brook and Henderson Brook. Quality of water leaving the site and entering surface or groundwaters will be high, due both to the onsite flow management and the low-contaminant characteristics of the basalt bedrock. Quarry rock is within acceptable limits for sulphur and acid-generating potential. Blasting is not expected to result in groundwater quality changes, particularly with efforts to reduce releases of other chemicals such as nitrates used in blasting. Forest clearing and grubbing activities can lead to releases of fines from the soil, resulting locally in elevated suspended sediment levels. 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

Figure 23. Downstream view of one of the ditches draining the part of the steep area of the access road, June 18, 2015. Flow is to the southeast.

contaminants are expected to be exceedingly low. All activities will conform to the Nova Scotia Erosion and Sedimentation Control Handbook (NSE 1988) and the Nova Scotia Pit & Quarry Guidelines (NSE 2003). Impact of the quarry on water quality in adjacent streams and other waters is expected to be negligible.

5.4.5 FRESHWATER AQUATIC ENVIRONMENTS

Most of the permanent streams at the site are associated with the northwestern section of the study area and with the two large bog/fen wetlands found there. Surface runoff as well as some groundwater from the proposed quarry area presently is expected to provide some of the water that supports the wetlands and feeds the streams. Quarry development, even if it doesn't extend into the wetlands, will lead to a reduction in extent and character of the wetlands and streams. Loss of wetlands and the streams could lead to requirements for compensation for losses of wetlands through Nova Scotia Environment and to a requirement for offsets by Fisheries and Oceans Canada under the Fisheries Act. The quarry is unlikely to generate significant quantities of contaminants or suspended sediments that could impact any downstream habitat.

5.4.6 WETLANDS

Two large bog/fens occur at the site, and potentially can be impacted by quarry activities through a reduction in water supply; as well the permanent change in temperature and hydrological conditions in the vicinity of the active quarry. Such changes have the potential to change the plant and ecosystem characteristics, through changes to nutrient input, dust, emissions, temperature regime etc. Longterm

gradual changes to plant communities are difficult to detect and monitor. Measures can be taken to maintain the hydrological regime, reduce nutrient inputs, and adequately buffer the wetlands, to attempt to maintain the existing wetlands.

5.4.7 FISH AND FISH HABITAT

None of the proposed project activities will physically impact potentially fish bearing streams on the northwest side of the project site—an area that is not expected to be developed. Forested buffers will be left in place to help to maintain temperatures, inputs of nutrients, and provide a source of leaves and woody debris. Blasting occurs infrequently at the site and is sufficiently separated from streams leaving the site 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. Other wildlife species need large areas of undisturbed forest to live and reproduce naturally. Occurrence of logging activity in past and the network of woods roads and trails, not associated with the project, already influence movement patterns of wildlife. Expansion of the Seabrook 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. 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 wildlilfe; 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. Night operation lighting during migration periods (August-September) would attract migrating birds. If possible, 24-hour operations in August to 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 and impacts of quarry expansion as proposed, overall, will be negligible. Suitable habitat for the Northern Ribbonsnake was found in the large bog/fen wetland at the northern extent of the study area, although the species is unlikely to occur there based on its record of occurrence in the Province. A survey for northern ribbonsnake at some point in future would establish

potential further importance for the wetland, and assist in further managing the development of the site. Common nighthawk, a ground-nesting endangered bird species, potentially could nest in grubbed and marginal but open areas of the quarry; employees should be made aware of the need to check areas for activity and nests before undertaking activities which would disturb established surfaces. Lights during night operations during migration periods (May-June, August-September) would attract various bird species and insects, which could include species at risk. If possible, 24-hour operations during migrations 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 naturalness and character of the forest landscape of North Mountain at the site is appreciated by locals and tourists alike, and regenerating forests at the site are important in supporting wildlife populations. Efforts should be made to minimize the footprint and effects of the quarry. The quarry will be visible from the populated areas of the lowland and travel routes especially when it is fully developed and uses the lower slopes of the mountain; and traffic, noise, dust and light from quarry operations contrast with the human experience of the natural character of the landscape. 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 in future. The restoration should also take into consideration values important in conservation of biological communities and ecosystems; as well as changes in physical conditions that could affect those communities. Normal procedures such as dust control and light management will help to minimize impacts on natural and wilderness values at the site.

6 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

The operating quarry will not be impacted in general by weather, including high rainfall and precipitation, through its nature and design, which includes site water management. Aggregate and other rock products stored at the site are stable under varying conditions of rainfall and wind. Integrity of any runoff management structures at the site must be maintained and appropriately designed to remove the possibility of catastrophic failure.

7 CUMULATIVE EFFECTS

All the potential impacts of the quarry operation (dust, noise, lights, blasting, traffic volume) will be compounded by the operations of the adjacent Parker Mountain Aggregates Quarry. The two quarries are comparatively small and produce relatively small aggregate volumes, and the expected rate of production is expected to remain at current levels[9]. Light emitted from the two quarries is *(continued on Page 56)*

[9] Effects of operations of the Parker Mountain Aggregate Quarry were not assessed. We assumed that the production volume and longevity of the quarry would remain similar to that at present.

Table 9. Potential interactions between project activities and operations and Valued Environmental Components (VECs) for Seabrook 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, Commercial & Mi'Kmaq Fishing	Water Supplies & Residential Wells	Land Use and Value	Transportation	Commercial /Industrial Use	Parks & Protected Areas	ForestryHunting /Trapping	Agriculture & Mink Ranching
Construction																				
Site Acquisition, Use/Removal of Resources					✓			✓	✓	✓	✓		✓	✓	✓		✓		✓	
Site Clearing/Grubbing	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓				✓	✓	✓
Drilling	✓	✓	✓	✓	✓			✓			✓	✓		✓				✓		✓
Blasting	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓				✓		✓
Lights	✓				✓		✓	✓			✓	✓						✓		✓
Operation																				
Moving/Transporting Rock and Product	✓				✓		✓				✓	✓			✓	✓	✓	✓		✓
Crushing	✓				✓						✓	✓						✓		✓
Washing		✓	✓	✓		✓														
Lights	✓				✓		✓	✓			✓	✓						✓		✓
Site Runoff Management		✓	✓	✓		✓							✓	✓						
Portable Asphalt Plant	✓				✓		✓				✓	✓						✓		✓
Onsite Materials Storage			✓	✓										✓						
Accidents (Fires/Oil & Fuel Spills)	✓	✓	✓	✓	✓	✓	✓				✓	✓		✓				✓	✓	

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
BIOPHYSICAL COMPONENTS						
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 Seabrook community. Take steps to reduce noise sources such as 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 during night operations.	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 and ground water flow levels and patterns.	Negligible	Negative	Use site runoff management to minimize impacts. Likely changes in groundwater and runoff patterns will be small.	Not significant.
	Operation	Blasting fractures bedrock and changes groundwater flow patterns.	Significant	Negative	Bedrock not in same aquifer used in Seabrook community. Monitor groundwater hydrology to determine changes.	Not significant.
	Operation	Quarry and work areas change surface water flows. Increased peak stormwater flows. Washing product creates silt-laden surface flows.	Significant	Negative	Onsite water management to moderate extreme surface water runoff and suspended sediment levels; measures to maintain normal flow regime.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook 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; onsite emergency numbers, spill kits etc. Avoid refueling near watercourses.	Not significant.
Water Quality	Construction	Altered 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 local watershed. 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 chemical residues after blasting.	Not significant.
	Operation	Water chemistry changes in runoff from materials stored on site.	Negligible	Negative	Best management practice allows leaving piles exposed to the environment. Monitored settling ponds and stormwater management.	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	Occurrences of high suspended sediments and nutrient levels from grubbings, road construction, and locally diverted flows.	Significant	Negative	Preserve wooded buffer areas adjacent to wetlands and watercourses. Onsite water management to moderate surface water runoff and suspended sediment levels.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook 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	Maintain forested buffers. Onsite water management to store additional wash water during off peak season.	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	Runoff from access roads.	Significant	Negative	Use of ditching and artificial channels to carry peak flows and additional site runoff.	Not significant.
	Operation	Releases of chemicals from blasting and runoff from materials stored on site.	Negligible	Negative	Isolate and treat runoff from heavy work areas and 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	Grubbing, road construction, pit preparation	Significant	Negative	Avoid work and/or development near main wetlands in the study area. Delineate wetlands and compensate for loss. Maintain natural hydrological regime of wetlands during construction.	Not significant.
	Operation	Dust, nutrient inputs from runoff, changes to hydrology, changes to forest communities.	Significant	Negative.	Maintain a significant forest buffer; maintain hydrological regime.	Not significant.
Fish & Fish Habitat	Construction	Change runoff patterns at site in local and adjacent watersheds.	Significant	Negative	Avoid the major wetlands and associated watercourses. Maintain forested buffer around wetlands and streams.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Operation	Site runoff management and water use affects hydrological and groundwater regime.	Significant	Negative	Ensure the runoff from the site is managed to maintain a supply wetlands and watercourses.	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 Seabrook area streams 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 217. Provide pollution prevention and emergency measures.	Not significant.
Terrestrial Flora & Fauna & Habitat	Construction	Removal of Existing Communities	Negligible	Negative	Restore damaged and unused parts of the site (e.g. grubbings and waste rock piles) as soon as possible. Long-term site rehabilitation plan developed with NSE. Cut forest short term only as needed to expand quarry.	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.
		Artificial light from operations influences movements of birds and insects, particularly birds migrating along Digby Neck.	Significant	Negative	Use directional lighting with downward focus to minimize light leaving the quarry.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
		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	Minimize footprint and maintain as much natural (uncut) natural vegetation as possible. Leave mature standing trees where possible as nest cavities.	Not significant.
		Wetland at site suitable habitat for Northern Ribbonsnake	Significant	Negative.	Do not alter wetland and maintain 30 m buffer from quarry..	Not significant.
	Operation	Sound from blasting can harm bats and birds.	Negligible	Negative	Minimize blasting activity and concentrate in spring and fall (outside breeding and migratory periods) when species are absent.	Not significant.
		Light influences movements of species at risk birds migrating along Digby Neck.	Significant	Negative	Use directional lighting with downward and lateral focus to minimize light leaving the quarry.	Not significant.
		Open areas and grubbings piles occupied by nesting species such as nighthawks.	Significant	Negative	Educate personnel to look for bird life prior to activities; periodically conduct nesting bird survey at site to identify bird issues.	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.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
		Contamination and alteration of flow regime of streams may affect fish populations potentially used by Mi'Kmaq.	Negligible	Negative	Employ surface water monitoring program. Use Best Management Practices for quarries. Avoid accidental releases of contam-inants. Avoid vehicle accidents.	Not significant.
Archaeological, Cultural and Historical Significance	Construction	Expansion may affect artefacts from previous activities (e.g. farming, homesteads, logging) at the site.	Not significant	Negligible	Minimize project footprint.	Not significant.
		Removal of Henderson family homestead cellar.	Significant	Negative	Conduct archae-ological survey (soil test pits) and reconnaissance in a 30 m radius of site prior to development.	Not significant.
Recreation	Construction & Operation	Quarry traffic & activities affects local ATV traffic, recreational hunting.	Not significant	Negative	Users will be aware of activity at quarry but will not be otherwise impacted by it. Access roads gated to prevent unauthorized use.	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	Negligible	Negative	Maintain a clean operation. Rehabilitate areas no longer needed for activity and future development.	Not significant.
Residential Use	Construction & Operation	Noise; light pollution; operation of trucks and transportation of heavy equipment.	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 217.	Not significant.
Recreational and Mi'Kmaq Hunting and Fishing	Construction & Operation	Accidental hydrocarbon spills and blasting residues contaminate surface waters.	Negligible	Negative	Provide pollution prevention, emergency measures & response capability. Identify and control contaminant releases.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
	Construction	Loss of forested area under quarry footprint.	Not significant	Negative	Rehabilitate areas no longer needed for activity and future development. Minimize cutting outside quarry footprint.	Not significant.
Water Supplies & Residential Wells	Construction and Operation	Blasting potentially impacts local aquifers.	Not significant	Negative	Develop groundwater-monitoring plan in consultation with NSE.	Not significant.
	Construction and Operation	Town of Digby water supply watrshed.	Not significant	Negative	A buffer zone around the quarry will avoid the wetlands and parts of the property adjacent to the Digby Watershed.	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 217.	Not significant	No Change	Use good directional signs,signs for slow moving vehicles, and speed policy in vicinity of quarry. Safety training for truck drivers.	Not significant
Industrial & Commercial Use	Operation	Blasting can cause shock waves in bedrock and affect foundations, including Wind Turbines	Not significant	Negative	Blasts unlikely to have sufficient force to affect existing wind farm at Gullivers Cove.	Not significant.
	Operation	Competition with other Quarries	Negligible	Neutral	Quarry operations are in a competitive environment; cooperate if possible.	Not significant.
Resource Use Forestry, Hunting & Trapping	Construction & Operation	Removes woodland; game habitat.	Not significant	Negative	Relatively small area is used.	Not significant.

Table 10. Summary of impacts and mitigation on Valued Environmental Components, Seabrook Quarry Expansion.

VEC	Project Component	Nature of Effect	Significance	Nature of Impact	Mitigation	Significance after Mitigation
Parks and Protected areas	Construction & Operation	Southwest Nova Scotia Biosphere Reserve	Not significant	Neutral	Biosphere reserve concept based on integrated and managed use of natural areas and human development. Manage quarry operations to minimize harm to the environment at the site.	Not significant.
	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.
Agriculture & Mink Ranching	Construction & Operation	Noise, lights, blasting and truck traffic potentially disturbs mink ranch on Middle Cross Road.	Significant	Negative	Consult with local mink rancher about critical times in mink rearing cycle and activities at the quarry.	Not significant.

7.0 CUMULATIVE IMPACTS *(continued from Page 47)*

compounded by the presence of the Town of Digby, which is a major source. The quarries are close to Digby, and their combined range of influence is comparatively small compared to the large areas of undeveloped land in the adjoining landscape, so overall the cumulative effects on bird migrations, and light visibility and lightshine in the area, are expected to be negligible. In future, however, construction and operation ofquarries and pits, as well as wind farm development, could take place in the vicinity of the quarry. Development of other quarries in the vicinity is possible, although there are no confirmed projects at present. The area is also suitable for windfarm development. 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 SkyPower/Scotian Windfields Wind project is located eight kilometres west of Seabrook Quarry. Wind turbines can impact migrating songbirds and bats, and are an

added stress on these wildlife populations. Steps taken in the expansion of Seabrook Quarry to mitigate noise and light use at the site will help to minimize these potential cumulative effects.

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 be done if required by NS Environment. Onsite 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 Seabrook, the Proponent will undertake to consult with locals, municipal, and provincial government officials;,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 PERSONAL COMMUNICATIONS

Mrs. Shirley Ashford, former resident, Brighton, Nova Scotia.

Mr. John Gilhen, NS Museum of Natural History, Associate Curator (Retired) of Zoology.

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

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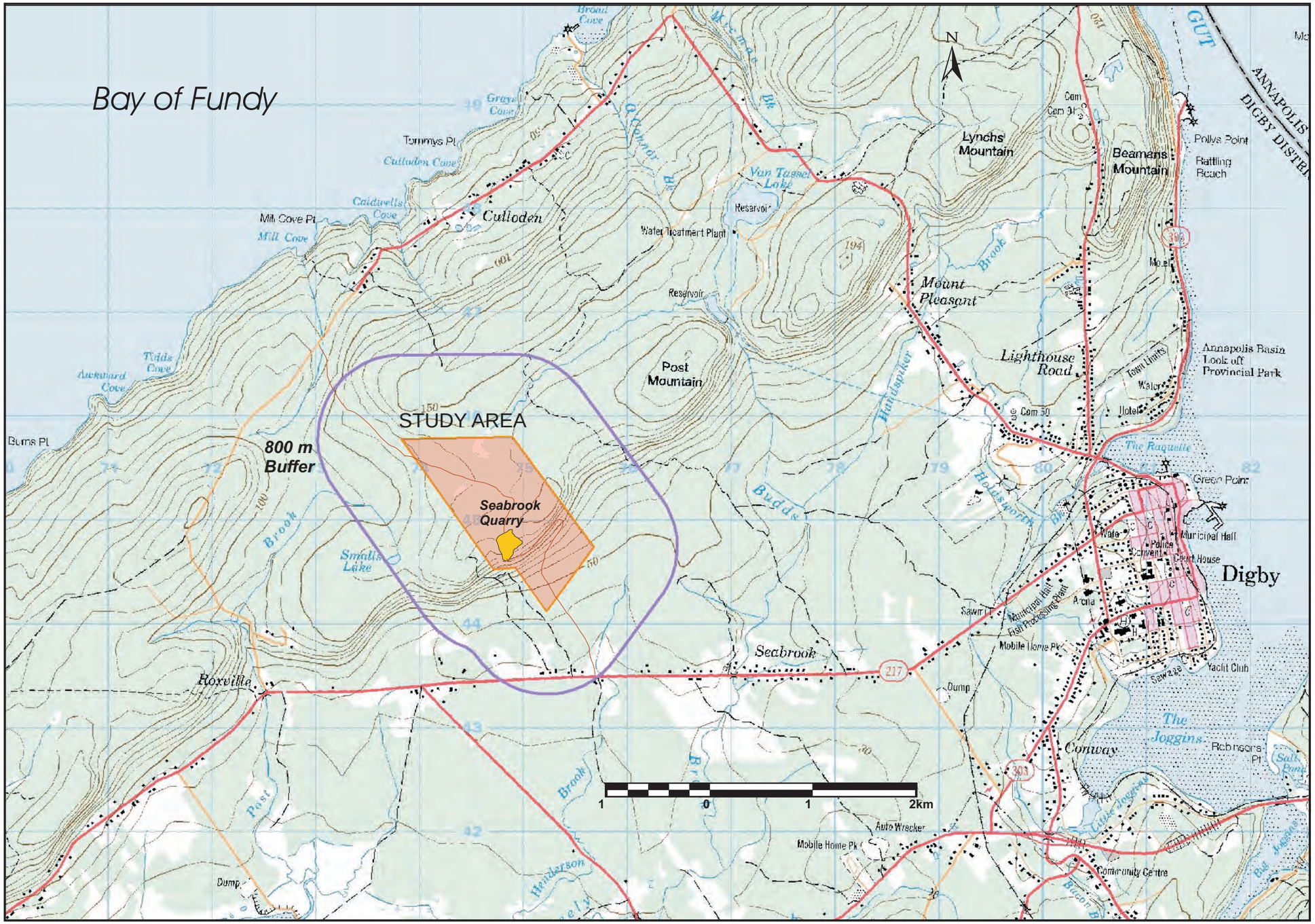
12 LIMITING CONDITIONS

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 May-September 2015 and the generally accepted assessment practices of our industry. No other warranty is made.

APPENDIX A
MAPS



Map A-1

THE MUNICIPAL GROUP OF COMPANIES

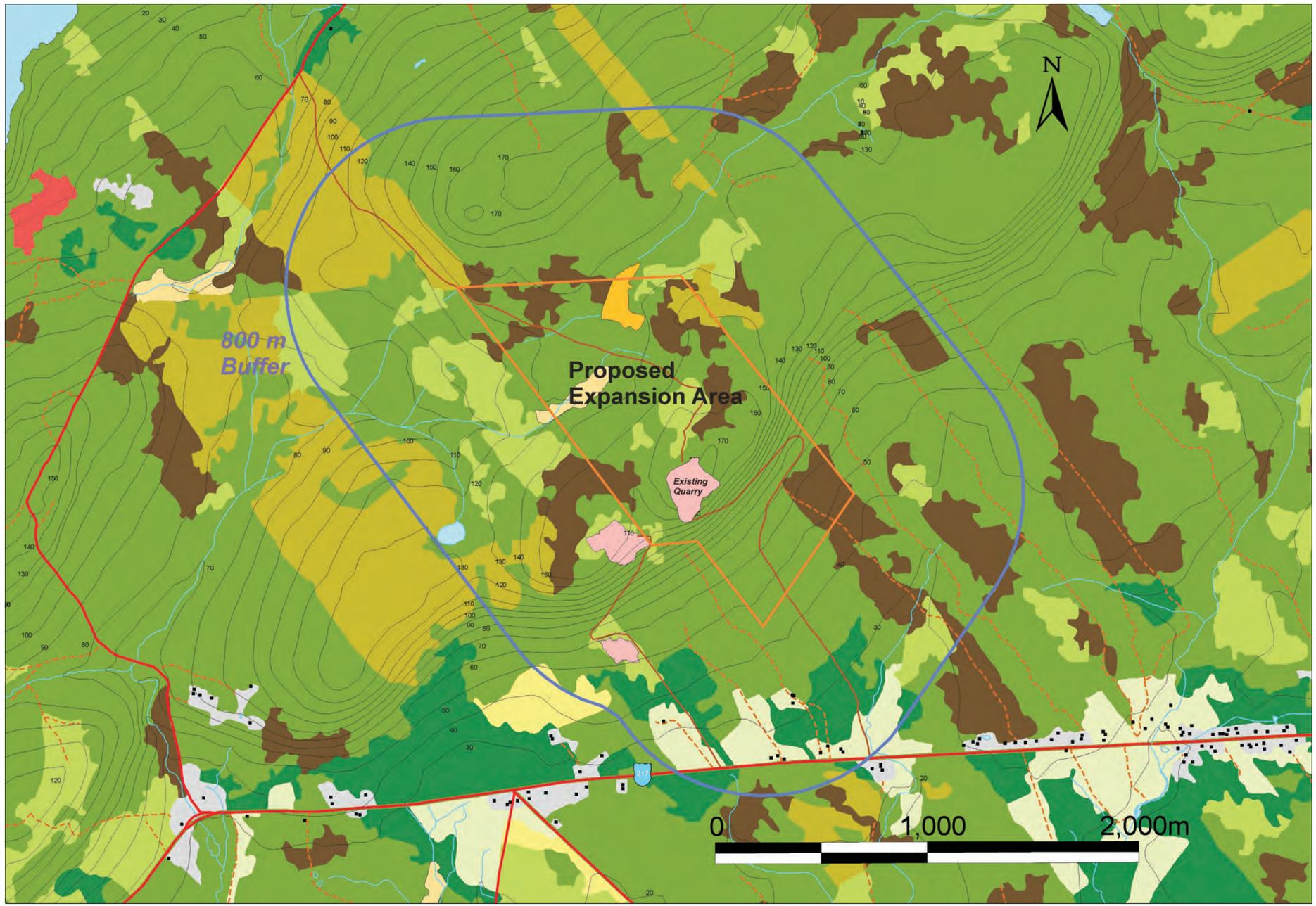
SEABROOK QUARRY EXPANSION

Seabrook,
Digby County, Nova Scotia

Site Location

- Quarry Footprint 2014
- Proposed Expansion
- 800 m Buffer

Map by:
Envirosphere Consultants Limited
Windsor, Nova Scotia, August 2015



THE MUNICIPAL GROUP
OF COMPANIES

SEABROOK QUARRY
EXPANSION
DIGBY COUNTY, N.S.

Land Use Classification

(based on NS Forestry Inventory, 2006)

- Agriculture
- Treated
- Urban
- Wetlands General
- Plantation
- Inland Water
- Natural Stand
- Alders
- Old Field
- Partial Depletion
- Treed Bog
- Open Bog
- Gravel Pit
- Clear Cut
- Forest Stand 50-100% live
- Area for Environmental Assessment
- Main Roads/Trunk Hwy
- Private Roads
- Trails
- Contours (10 m)
- Watercourses

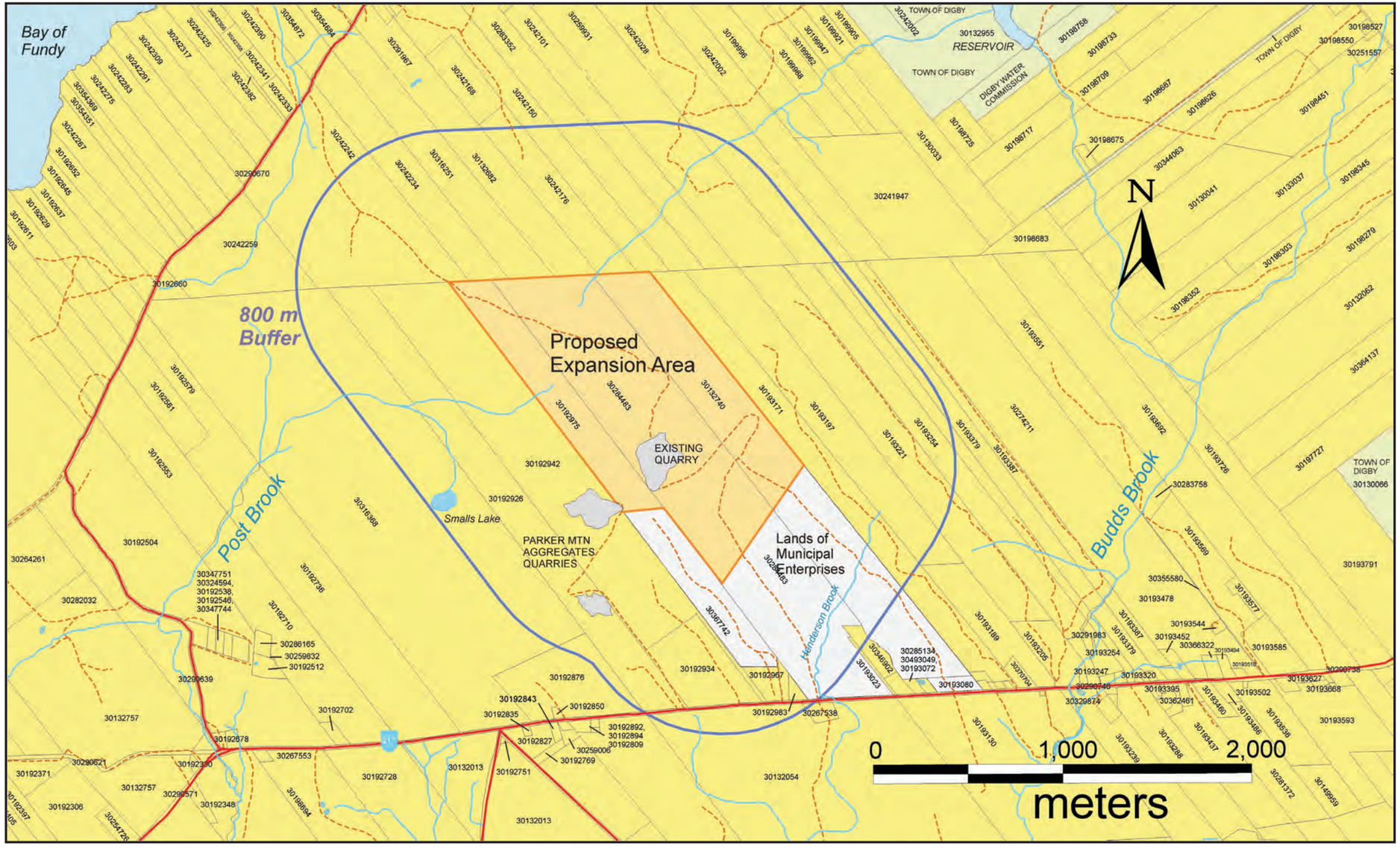
Map by:
Envirosphere Consultants Limited.
Windsor, Nova Scotia, August 2015

Map A-2

THE MUNICIPAL GROUP OF COMPANIES

SEABROOK QUARRY EXPANSION
Seabrook, Digby County, N.S.

Property Ownership



- Public Land
- Proponent Property
- Proposed Expansion / EA Study Area
- Property Boundaries
- Major Roads
- Minor Roads / Trails
- Quarry 800 m Buffer

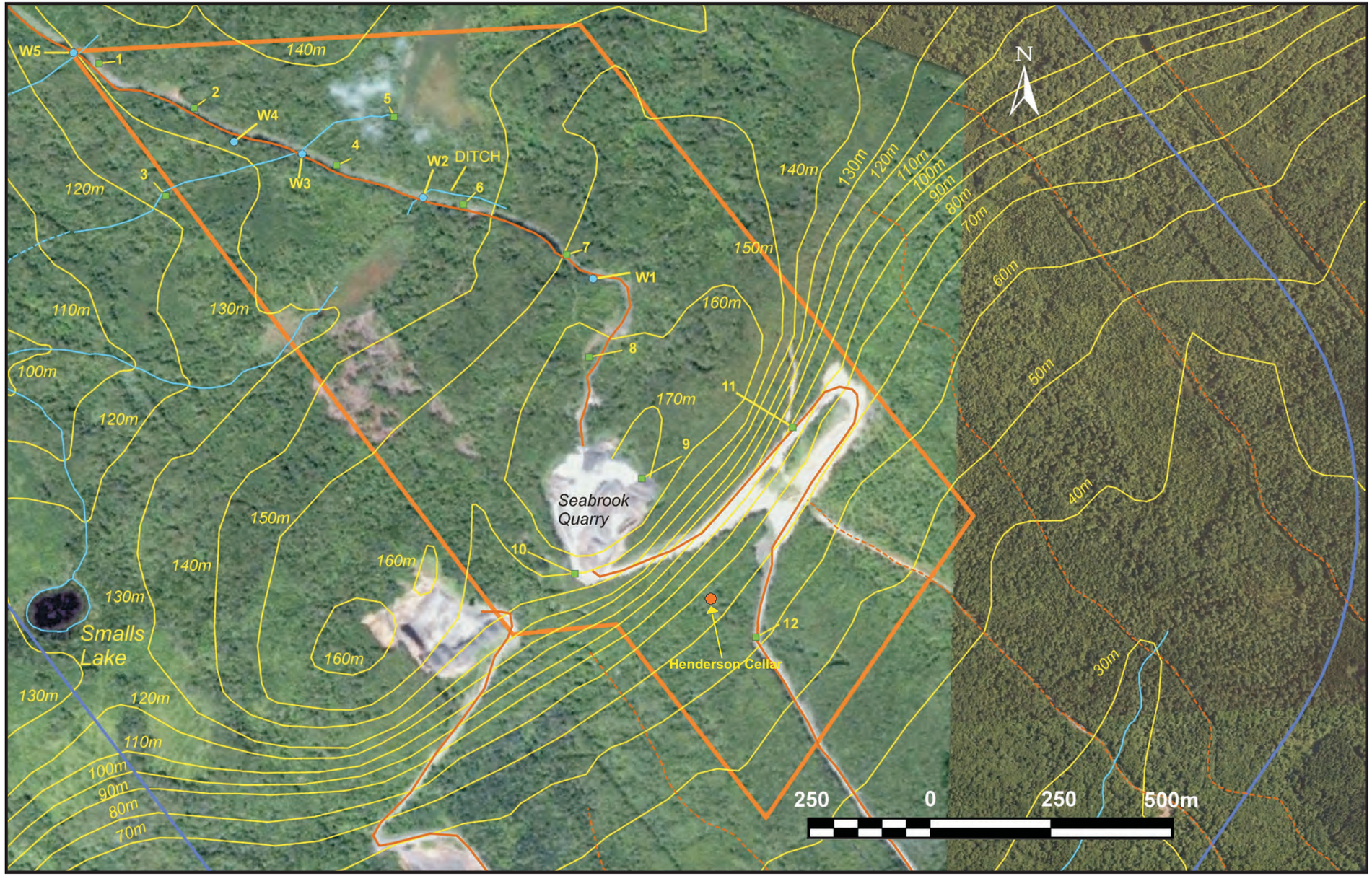
Map by:
Envirosphere Consultants Limited
July 2015

Map A-3

THE MUNICIPAL GROUP
OF COMPANIES

SEABROOK QUARRY
EXPANSION
Seabrook, Digby County

Surface Waters, Sampling Locations & Contours



- Area for Environmental Assessment
- Main Roads
- Trails
- Contours (10 m)
- Flowages/Watercourses
- Breeding Bird Survey Point
- Water Sampling
- Historical Site

Map by:
Envirosphere Consultants Limited
Windsor, Nova Scotia, August 2015

Source of Aerial Imagery:
Google Earth, June 9, 2013
Province of Nova Scotia, July 11, 2012

Map A-4

APPENDIX B
WETLAND/BOTANTICAL SURVEYS

Spring / Early Summer and Fall 2015
Marbicon Inc., Berwick, Nova Scotia

Botanical Survey

FOR

Seabrook Quarry
Dexter Construction Co. Ltd.

Seabrook, Digby County, Nova Scotia

September 24, 2015

Prepared By:
Jim Jotcham, Marbicon Inc.

Marbicon Inc. was contracted in 2015 to perform spring/summer & fall botanical surveys of a property located on Highway 217 in Seabrook, Digby County. The site (PIDs 30284483, 30132740, and 30192975) included an active crushed stone quarry operated by Dexter Construction Limited (about a hectare in size) and associated work areas, which is about 3.5 km due west of Digby at approximately 44º 37' 17" North and 65º 50' 16" West. Figure 1 is an aerial view of the study area. The currently active quarry is about 2 km south of the Bay of Fundy and about 2.5 km northeast of Saint Mary's Bay. Except for a quarry directly to the west (operated by Parker Mountain Aggregates Ltd.), the property is otherwise bounded by forest. Both quarries are on the brow of Henderson's Mountain facing south. A gravel road through the Dexter property continues northerly through a locked gate to Culloden Road.

The study site was inventoried by botanist Jim Jotcham and technician Peter Eaton on June 18, July 1, and September 1, 2015. The list of plant species identified and their provincial status is presented in Appendix 1. Delineating the wetlands and identifying drainage patterns was beyond the mandate of this botanical survey, but they were noted when found.

The property is mostly upland secondary hardwood Maple-Birch forest (Figure 2). Two fairly large bogs exist north of the active quarry, one on each side of the main road (Figures 3 and 4). Culverts under the main road identified known water channels. Most of the drainage from the road and the bog southwest of the road is westerly, draining eventually to St Mary's Bay. According to the Digby 1:50,000 topography map (021A12), the bog northeast of the road appears to drain easterly to a dammed reservoir and thence down toward the Annapolis Basin. The NSDNR Wetland Inventory map (online) shows a contour line that would make the drainage from the northeastern bog also flow westward, which agrees with the current flow of the water crossing in a culvert under the road. It was determined, however, that this bog drains in both directions, with an intermittent stream flowing west, and a permanent stream flowing east.

In addition to the two bogs mentioned above, a wooded wetland (Figure 5) exists in the depression between the two quarries. The canopy here was mostly Red Maple (*Acer rubrum*) with a herb layer of Cinnamon Fern (*Osmunda cinnamomea*), over a bed of Sphagnum moss (mostly *Sphagnum girgensohnii*).

An area of woodland south of the southwest bog had been cleared in the past (Figure 6). Some of the rutted logging roads are very wet in the spring (Figure 7) and in July 2015, the road ruts in places were a distinct water course (Figure 8). By September, the ruts were mostly dry. Another cutover area lies south of the driveway on the Valley floor (see Figure 1).

Signs of White-Tailed Deer (*Odocoileus virginianus*) and Eastern Coyote (*Canis latrans*) were often observed. A Ruffed Grouse (*Bonasa umbellus*) was seen in June along the road up toward the northern gate. Green frogs (*Rana clamitans*) were common in roadside ditches.

The property is quite diverse, with a range of elevation and moisture levels. Some of the area has been recently cutover. All the surveyed area had been cutover at some time. The dominant forest canopy is a mix of maples (Sugar Maple, *Acer saccharum*, and Red Maple) and birches (Paper Birch, *Betula papyrifera var. cordifolia*, and yellow birch, *Betula alleghaniensis*), but there are occasional small conifer stands dominated by Balsam Fir (*Abies balsamea*). The two large wetlands to the north are visually dominated by sedges, especially Smooth Black Sedge (*Carex nigra*). The dominant shrub is Sweet Gale (*Myrica gale*). Brown *Sphagnum* moss (*Sphagnum fuscum*) is common throughout, under the sedge. The abundant presence of the sedges suggest these two wetlands may have fen characteristics, although no flow-through water channel was present in the northwest bog. The southwest bog had flowage to the west. Common understory plants in the woods included Goldthread (*Coptis trifolia*), Twinflower (*Linnaea borealis*), Evergreen Woodfern (*Dryopteris intermedia*), Wood Aster (*Oclemena 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 Spring/Summer & Fall 2015 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..

Appendix 1 lists plant species identified on site. Scientific and common names are from the Atlantic Canada Conservation Data Centre (ACCDC). Habitat preferences noted in this report are taken from Munro, Newell and Hill, 2014.

The report (#5361) from the Atlantic Canada Conservation Data Centre (ACCDC), dated May 8, 2015, noted that four vascular plant species of concern were identified within 5 km of the quarry area. Purple-veined Willowherb (*Epilobium coloratum*, S2?), Black Ash (*Fraxinus nigra*, S1S2), Common Scouring-Rush (*Equisetum hyemale var. affine,* S3S4), and Dwarf Scouring-Rush (*Equisetum Scirpoides*, S3S4). The site was sufficiently large and diverse that appropriate habitat may exist for all four of these species of concern. Purple-veined Willowherb (Sensitive) is a herbaceous plant found in low grounds and seepy soils. Black Ash (At Risk) is a tree found on poorly drained soils and in swampy woods. Common Scouring-Rush (Secure) grows in sandy, gravelly soil, on banks or in low areas, often in calcareous regions. Dwarf Souring-Rush (Secure) is found on wooded banks and mossy slopes, and is typical of alkaline habitats. Each of these four species are visually distinctive, but none were noted in the 2015 inventory. The remainder of the ACCDC list for species of concern found within 100 km of the site is less likely to be on site as the distance from the quarry to the nearest record increases, but exceptions can occur.

In conclusion, no rare or unusual plants or habitats were identified in the spring/summer and Fall 2015 botany surveys.

September 24, 2015

Figure 1. Site and Vicinity. This September 2012 image was taken from Google Earth (2015).

Figure 2. Typical upland deciduous secondary forest (Maple/Birch) found on site.

Figure 3. Northwest Bog. Sphagnum mosses hidden by sedges.

Figure 4. Southwest bog/fen. Sphagnum mosses hidden by sedges.

Figure 5. Red Maple swamp between the Parker and Dexter quarries.

Figure 6. Cutover area immediately south of the southwest bog.

Figure 7. Flooded logging road in June 2015. The road was dry by September.

Figure 8. A watercourse in July down the ruts of a logging road. The road was dry by September.

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APPENDIX 1

Site vegetation inventory, surveyed June 18, July 1, and September 1, 2015.

Scientific Name	Common Name	G-Rank	S-Rank	Sgs-Rank
Abies balsamea	Balsam Fir	G5	S5	4 Secure
Acer pensylvanicum	Striped Maple	G5	S5	4 Secure
Acer rubrum	Red Maple	G5	S5	4 Secure
Acer saccharum	Sugar Maple	G5	S5	4 Secure
Acer spicatum	Mountain Maple	G5	S5	4 Secure
Achillea millefolium	Common Yarrow	G5	S5	4 Secure
Actaea pachypoda	White Baneberry	G5	S4	4 Secure
Agalinis neoscotica	Nova Scotia Agalinis	G4	S3	4 Secure
Alnus incana	Speckled Alder	G5	S5	4 Secure
Alnus viridis	Green Alder	G5	S5	4 Secure
Alopecurus pratensis	Meadow Foxtail	GNR	SNA	7 Exotic
Ambrosia artemisiifolia	Common Ragweed	G5	S5	4 Secure
Amelanchier arborea	Downy Serviceberry	G5	S4S5	4 Secure
Anaphalis margaritacea	Pearly Everlasting	G5	S5	4 Secure
Anthoxanthum odoratum	Large Sweet Vernal Grass	GNR	SNA	7 Exotic
Aralia nudicaulis	Wild Sarsaparilla	G5	S5	4 Secure
Arctium minus	Common Burdock	GNR	SNA	7 Exotic
Arethusa bulbosa	Arethusa	G4	S4	4 Secure
Betula alleghaniensis	Yellow Birch	G5	S5	4 Secure
Betula papyrifera var. cordifolia	Heart-leaved Birch	G5T5	S5	4 Secure
Betula populifolia	Gray Birch	G5	S5	4 Secure
Bidens frondosa	Devil's Beggarticks	G5	S5	4 Secure
Brachyelytrum septentrionale	Northern Shorthusk	G4G5	S5	4 Secure
Bromus inermis	Smooth Brome	G5	SNA	7 Exotic
Calamagrostis canadensis	Bluejoint Reed Grass	G5	S5	4 Secure
Carex communis	Fibrous-Root Sedge	G5	S5	4 Secure
Carex crinita	Fringed Sedge	G5	S5	4 Secure
Carex debilis	White-edged Sedge	G5	S5	4 Secure
Carex echinata	Star Sedge	G5	S5	4 Secure
Carex exilis	Coastal Sedge	G5	S4	4 Secure
Carex flava	Yellow Sedge	G5	S5	4 Secure
Carex folliculata	Northern Long Sedge	G4G5	S5	4 Secure
Carex gracillima	Graceful Sedge	G5	S4S5	4 Secure
Carex leptalea	Bristly-stalked Sedge	G5	S5	4 Secure
Carex lurida	Sallow Sedge	G5	S5	4 Secure
Carex nigra	Smooth Black Sedge	G5	S5	4 Secure
Carex stipata	Awl-fruited Sedge	G5	S5	4 Secure
Carex trisperma	Three-seeded Sedge	G5	S5	4 Secure

Centaurea nigra	Black Knapweed	GNR	SNA	7 Exotic
Chamaedaphne calyculata	Leatherleaf	G5	S5	4 Secure
Chamerion angustifolium	Fireweed	G5	S5	4 Secure
Cirsium vulgare	Bull Thistle	GNR	SNA	7 Exotic
Clematis virginiana	Virginia Clematis	G5	S5	4 Secure
Clintonia borealis	Yellow Bluebead Lily	G5	S5	4 Secure
Coptis trifolia	Goldthread	G5	S5	4 Secure
Cornus canadensis	Bunchberry	G5	S5	4 Secure
Corylus cornuta	Beaked Hazel	G5	S5	4 Secure
Cypripedium acaule	Pink Lady's-Slipper	G5	S5	4 Secure
Danthonia compressa	Flattened Oat Grass	G5	S5	4 Secure
Danthonia spicata	Poverty Oat Grass	G5	S5	4 Secure
Daucus carota	Queen Anne's Lace	GNR	SNA	7 Exotic
Dennstaedtia punctilobula	Eastern Hay-Scented Fern	G5	S5	4 Secure
Dichanthelium acuminatum	Woolly Panic Grass	G5	S5	4 Secure
Diervilla lonicera	Northern Bush Honeysuckle	G5	S5	4 Secure
Doellingeria umbellata	Hairy Flat-top White Aster	G5	S5	4 Secure
Drosera rotundifolia	Round-leaved Sundew	G5	S5	4 Secure
Dryopteris campyloptera	Mountain Wood Fern	G5	S5	4 Secure
Dryopteris cristata	Crested Wood Fern	G5	S5	4 Secure
Dryopteris intermedia	Evergreen Wood Fern	G5	S5	4 Secure
Eleocharis obtusa	Blunt Spikerush	G5	S5	4 Secure
Equisetum arvense	Field Horsetail	G5	S5	4 Secure
Equisetum sylvaticum	Woodland Horsetail	G5	S5	4 Secure
Eupatorium perfoliatum	Common Boneset	G5	S5	4 Secure
Eurybia macrophylla	Large-leaved Aster	G5	S5	4 Secure
Eurybia radula	Low Rough Aster	G5	S5	4 Secure
Euthamia graminifolia	Grass-leaved Goldenrod	G5	S5	4 Secure
Fagus grandifolia	American Beech	G5	S5	4 Secure
Festuca rubra	Red Fescue	G5	S5	4 Secure
Fragaria virginiana	Wild Strawberry	G5	S5	4 Secure
Frangula alnus	Glossy Buckthorn	GNR	SNA	7 Exotic
Fraxinus americana	White Ash	G5	S5	4 Secure
Galium palustre	Common Marsh Bedstraw	G5	S5	4 Secure
Galium triflorum	Three-flowered Bedstraw	G5	S5	4 Secure
Gaultheria procumbens	Eastern Teaberry	G5	S5	4 Secure
Glyceria canadensis	Canada Manna Grass	G5	S5	4 Secure
Glyceria striata	Fowl Manna Grass	G5	S5	4 Secure
Gymnocarpium dryopteris	Common Oak Fern	G5	S5	4 Secure
Hamamelis virginiana	American Witch-Hazel	G5	S5	4 Secure
Hieracium murorum	Wall Hawkweed	GNR	SNA	7 Exotic
Hieracium piloselloides	Tall Hawkweed	GNR	SNA	7 Exotic
Holcus lanatus	Common Velvet Grass	GNR	SNA	7 Exotic
Hypericum canadense	Canada St John's-wort	G5	S5	4 Secure
Hypericum perforatum	Common St. John's-wort	GNR	SNA	7 Exotic

Ilex verticillata	Common Winterberry	G5	S5	4 Secure
Impatiens capensis	Spotted Jewelweed	G5	S5	4 Secure
Iris versicolor	Harlequin Blue Flag	G5	S5	4 Secure
Juncus canadensis	Canada Rush	G5	S5	4 Secure
Juncus effusus	Soft Rush	G5	S5	4 Secure
Juncus tenuis	Slender Rush	G5	S5	4 Secure
Juniperus communis	Common Juniper	G5	S5	4 Secure
Kalmia angustifolia	Sheep Laurel	G5	S5	4 Secure
Larix laricina	Tamarack	G5	S5	4 Secure
Ledum groenlandicum	Common Labrador Tea	G5	S5	4 Secure
Leucanthemum vulgare	Oxeye Daisy	GNR	SNA	7 Exotic
Linnaea borealis	Twinflower	G5	S5	4 Secure
Lonicera canadensis	Canada Fly Honeysuckle	G5	S5	4 Secure
Lotus corniculatus	Garden Bird's-foot Trefoil	GNR	SNA	7 Exotic
Lupinus polyphyllus	Large-Leaved Lupine	G5	SNA	7 Exotic
Luzula multiflora	Common Woodrush	G5	S5	4 Secure
Lycopodium annotinum	Stiff Clubmoss	G5	S5	4 Secure
Lycopodium dendroideum	Round-branched Tree-clubmoss	G5	S5	4 Secure
Lycopus americanus	American Water Horehound	G5	S5	4 Secure
Lysimachia terrestris	Swamp Yellow Loosestrife	G5	S5	4 Secure
Lythrum salicaria	Purple Loosestrife	G5	SNA	7 Exotic
Maianthemum canadense	Wild Lily-of-The-Valley	G5	S5	4 Secure
Medeola virginiana	Indian Cucumber Root	G5	S5	4 Secure
Medicago sativa	Alfalfa	GNR	SNA	7 Exotic
Mitchella repens	Partridgeberry	G5	S5	4 Secure
Monotropa uniflora	Indian Pipe	G5	S5	4 Secure
Morella pensylvanica	Northern Bayberry	G5	S5	4 Secure
Myrica gale	Sweet Gale	G5	S5	4 Secure
Nemopanthus mucronatus	Mountain Holly	G5	S5	4 Secure
Nuphar lutea	Variegated Pond-lily	G5	S5	4 Secure
Oclemena acuminata	Whorled Wood Aster	G5	S5	4 Secure
Oclemena nemoralis	Bog Aster	G5	S5	4 Secure
Oenothera biennis	Common Evening Primrose	G5	S5	4 Secure
Onoclea sensibilis	Sensitive Fern	G5	S5	4 Secure
Osmunda cinnamomea	Cinnamon Fern	G5	S5	4 Secure
Osmunda claytoniana	Interrupted Fern	G5	S5	4 Secure
Osmunda regalis	Royal Fern	G5	S5	4 Secure
Oxalis montana	Common Wood Sorrel	G5	S5	4 Secure
Oxalis stricta	European Wood Sorrel	G5	S5	4 Secure
Phalaris arundinacea	Reed Canary Grass	G5	S5	4 Secure
Phegopteris connectilis	Northern Beech Fern	G5	S5	4 Secure
Phleum pratense	Common Timothy	GNR	SNA	7 Exotic
Photinia melanocarpa	Black Chokeberry	G5	S5	4 Secure
Picea glauca	White Spruce	G5	S5	4 Secure
Picea mariana	Black Spruce	G5	S5	4 Secure

Picea rubens	Red Spruce	G5	S5	4 Secure
Plantago lanceolata	English Plantain	G5	SNA	7 Exotic
Plantago major	Common Plantain	G5	SNA	7 Exotic
Poa palustris	Fowl Blue Grass	G5	S5	4 Secure
Polygonum sagittatum	Arrow-leaved Smartweed	G5	S5	4 Secure
Polystichum acrostichoides	Christmas Fern	G5	S5	4 Secure
Populus grandidentata	Large-toothed Aspen	G5	S5	4 Secure
Populus tremuloides	Trembling Aspen	G5	S5	4 Secure
Potentilla norvegica	Rough Cinquefoil	G5	S5	4 Secure
Potentilla simplex	Old Field Cinquefoil	G5	S5	4 Secure
Prenanthes trifoliolata	Three-leaved Rattlesnakeroot	G5	S5	4 Secure
Prunella vulgaris	Common Self-heal	G5	S5	4 Secure
Prunus pensylvanica	Pin Cherry	G5	S5	4 Secure
Ranunculus acris	Common Buttercup	G5	SNA	7 Exotic
Rhynchospora alba	White Beakrush	G5	S5	4 Secure
Rosa nitida	Shining Rose	G5	S4	4 Secure
Rosa virginiana	Virginia Rose	G5	S5	4 Secure
Rhododendron canadense	Rhodora	G5	S5	4 Secure
Ribes glandulosum	Skunk Currant	G5	S5	4 Secure
Rubus allegheniensis	Alleghaney Blackberry	G5	S5	4 Secure
Rubus hispidus	Bristly Dewberry	G5	S5	4 Secure
Rubus idaeus	Red Raspberry	G5	S5	4 Secure
Rubus pubescens	Dwarf Red Raspberry	G5	S5	4 Secure
Rumex crispus	Curled Dock	GNR	SNA	7 Exotic
Salix bebbiana	Bebb's Willow	G5	S5	4 Secure
Sambucus racemosa	Red Elderberry	G5	S5	4 Secure
Sarracenia purpurea	Northern Pitcher Plant	G5	S5	4 Secure
Scirpus cyperinus	Common Woolly Bulrush	G5	S5	4 Secure
Sisyrinchium montanum	Mountain Blue-eyed-grass	G5	S5	4 Secure
Solidago canadensis	Canada Goldenrod	G5	S5	4 Secure
Solidago flexicaulis	Zigzag Goldenrod	G5	S5	4 Secure
Solidago puberula	Downy Goldenrod	G5	S5	4 Secure
Solidago rugosa	Rough-stemmed Goldenrod	G5	S5	4 Secure
Solidago uliginosa	Northern Bog Goldenrod	G4G5	S5	4 Secure
Sonchus arvensis	Field Sow Thistle	GNR	SNA	7 Exotic
Sorbus decora	Showy Mountain Ash	G4G5	S4	4 Secure
Sparganium americanum	American Burreed	G5	S5	4 Secure
Spiraea alba	White Meadowsweet	G5	S5	4 Secure
Spiraea tomentosa	Steeplebush	G5	S5	4 Secure
Streptopus lanceolatus	Rose Twisted-stalk	G5	S5	4 Secure
Symphyotrichum lanceolatum	Lance-leaved Aster	G5	S4S5	4 Secure
Symphyotrichum lateriflorum	Calico Aster	G5	S5	4 Secure
Symplocarpus foetidus	Eastern Skunk Cabbage	G5	S3S4	4 Secure
Taraxacum officinale	Common Dandelion	G5	SNA	7 Exotic

Thalictrum pubescens	Tall Meadow-Rue	G5	S5	4 Secure
Thelypteris noveboracensis	New York Fern	G5	S5	4 Secure
Toxicodendron radicans	Poison Ivy	G5	S4	4 Secure
Trientalis borealis	Northern Starflower	G5	S5	4 Secure
Trifolium arvense	Rabbit's-foot Clover	GNR	SNA	7 Exotic
Trifolium pratense	Red Clover	GNR	SNA	7 Exotic
Trifolium repens	White Clover	GNR	SNA	7 Exotic
Trillium erectum	Red Trillium	G5	S4	4 Secure
Tussilago farfara	Coltsfoot	GNR	SNA	7 Exotic
Typha latifolia	Broad-leaved Cattail	G5	S5	4 Secure
Vaccinium myrtilloides	Velvet-leaved Blueberry	G5	S5	4 Secure
Vaccinium oxycoccos	Small Cranberry	G5	S5	4 Secure
Verbascum thapsus	Common Mullein	GNR	SNA	7 Exotic
Veronica officinalis	Common Speedwell	G5	S5	7 Exotic
Viburnum nudum	Northern Wild Raisin	G5	S5	4 Secure
Vicia cracca	Tufted Vetch	GNR	SNA	7 Exotic
Viola cucullata	Marsh Blue Violet	G4G5	S5	4 Secure
Viola macloskeyi	Small White Violet	G5	S5	4 Secure

Rankings:

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

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

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

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

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

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

APPENDIX C
ATLANTIC CANADA CONSERVATION DATA CENTRE REPORT

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada Atlantique

DATA REPORT 5361: Seabrook, NS

Prepared 8 May 2015
by J. Churchill, Data Manager

CONTENTS OF REPORT

Map 1. A 100 km buffer around the study area

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.

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
SeabrookNS_5361ob.xls	All Rare and legally protected *Flora and Fauna* within 5 km of your study area
SeabrookNS_5361ob100km.xls	A list of Rare and legally protected *Flora and Fauna* within 100 km of your study area
SeabrookNS_5361ma.xls	All *Managed Areas* in your study area
SeabrookNS_5361sa.xls	All *Significant Natural Areas* 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) 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, All other Inquiries
Sean Blaney, Senior Scientist, Executive Director
Tel: (506) 364-2658
sblaney@mta.ca

Animals (Fauna)
John Klymko, Zoologist
Tel: (506) 364-2660
jklymko@mta.ca

Plant Communities
Sarah Robinson , Community Ecologist
Tel: (506) 364-2664
srobinson@mta.ca

Data Management, GIS
James Churchill, Data Manager
Tel: (902) 679-6146
jlchurchill@mta.ca

Billing
Jean Breau
Tel: (506) 364-2659
jrbreau@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. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

Western: Duncan Bayne
(902) 648-3536
baynedz@gov.ns.ca

Western: Donald Sam
(902) 634-7525
samdx@gov.ns.ca

Central: Shavonne Meyer
(902) 893-6353
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Central: Kimberly George
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georgeka@gov.ns.ca

Eastern: Mark Pulsifer
(902) 863-7523
pulsifmd@gov.ns.ca

Eastern: Donald Anderson
(902) 295-3949
andersdg@gov.ns.ca

Eastern: Terry Power
(902) 563-3370
powertd@gov.ns.ca

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

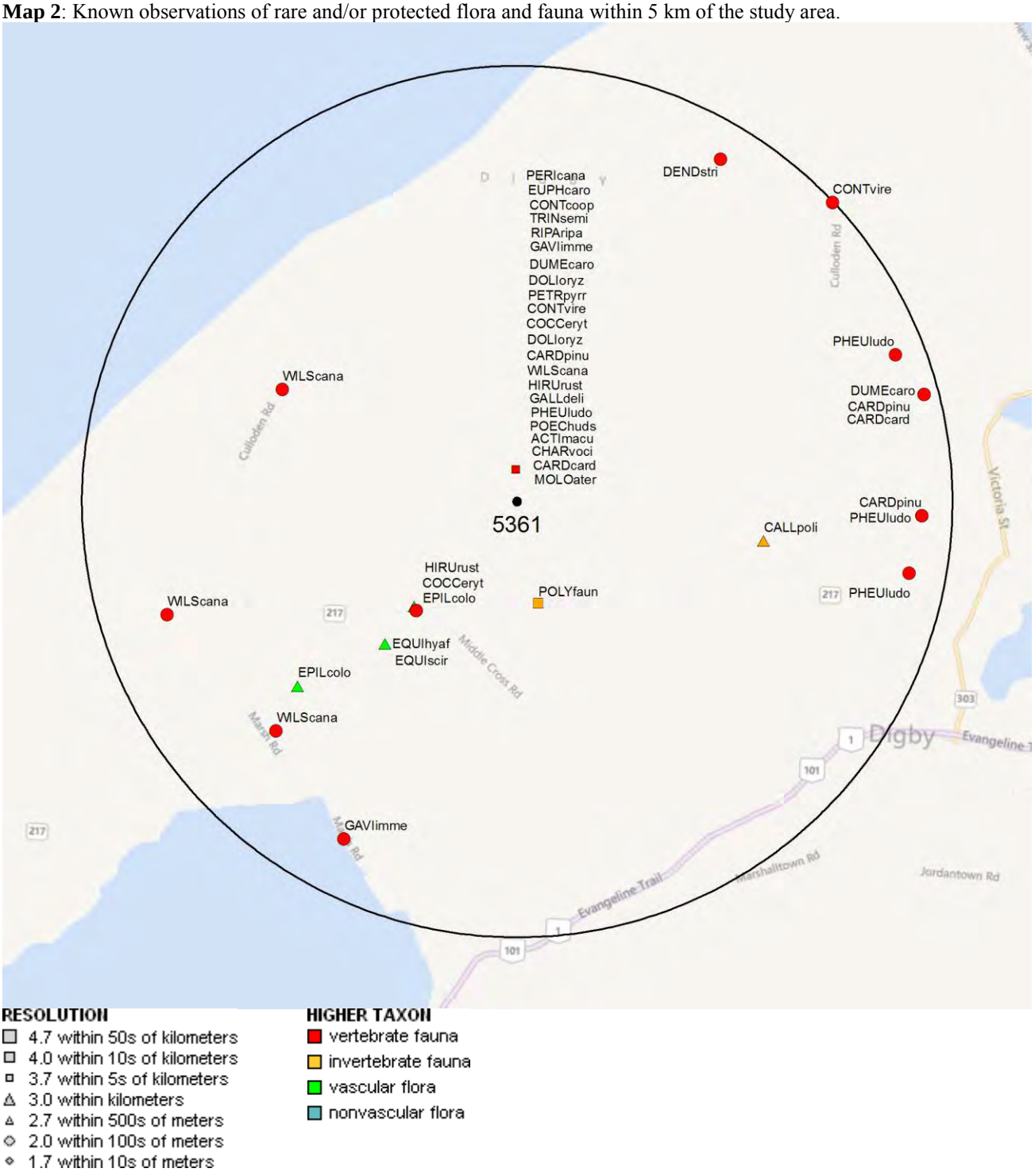
2.1 FLORA

A 5 km buffer around the study area contains 4 records of 3 vascular, no records of nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

A 5 km buffer around the study area contains 63 records of 22 vertebrate, 2 records of 2 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within 5 km of the study area.



RESOLUTION
- 4.7 within 50s of kilometers
- 4.0 within 10s of kilometers
- 3.7 within 5s of kilometers
- 3.0 within kilometers
- 2.7 within 500s of meters
- 2.0 within 100s of meters
- 1.7 within 10s of meters

HIGHER TAXON
- vertebrate fauna
- invertebrate fauna
- vascular flora
- nonvascular flora

3.0 SPECIAL AREAS

3.1 MANAGED AREAS
The GIS scan identified 1 managed area in the vicinity of the study area (Map 3 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 3 and attached file: *sa*.xls)

Map 3: 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 (excluding "location-sensitive" species, section 4.3) within the 5 km-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 (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community.

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	2	1.7 ± 1.0
P	*Equisetum hyemale var. affine*	Common Scouring-rush				S3S4	4 Secure	1	2.2 ± 0.0
P	*Equisetum scirpoides*	Dwarf Scouring-Rush				S3S4	4 Secure	1	2.2 ± 1.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	7	0.4 ± 7.0
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	8	0.4 ± 7.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	1	0.4 ± 7.0
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	1	0.4 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	4	0.4 ± 7.0
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2S3B	2 May Be At Risk	1	0.4 ± 7.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	3	0.4 ± 7.0
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	3	0.4 ± 7.0
A	*Tringa semipalmata*	Willet				S2S3B	2 May Be At Risk	2	0.4 ± 7.0
A	*Molothrus ater*	Brown-headed Cowbird				S2S3B	4 Secure	1	0.4 ± 7.0
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	1	0.4 ± 7.0
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3?B	2 May Be At Risk	2	0.4 ± 7.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3B	2 May Be At Risk	2	0.4 ± 7.0
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	4	0.4 ± 7.0
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	1	0.4 ± 7.0
A	*Cardinalis cardinalis*	Northern Cardinal				S3S4	4 Secure	5	0.4 ± 7.0
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	2	0.4 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	1	0.4 ± 7.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	1	0.4 ± 7.0
A	*Dendroica striata*	Blackpoll Warbler				S3S4B	3 Sensitive	1	4.6 ± 0.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3S4B	3 Sensitive	8	0.4 ± 7.0
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	4	0.4 ± 7.0
I	*Polygonia faunus*	Green Comma				S3	4 Secure	1	1.2 ± 10.0
I	*Callophrys polios*	Hoary Elfin				S3S4	4 Secure	1	2.9 ± 1.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species "location sensitive". Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting a 5 km buffer of your study area are indicated below with "YES".

Nova Scotia

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within 5 km of Study Site?
Fraxinus nigra	**Black Ash**		**Threatened**	**YES**
Emydoidea blandingii	*Blanding's Turtle - Nova Scotia pop.*	Endangered	Vulnerable	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
Bat Hibernaculum		[Endangered][1]	[Endangered][1]	No

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NS Endangered Species Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these 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
44	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
19	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
2	Benjamin, L.K. (compiler) 2012. Significant Habitat & Species Database. NS Dept of Natural Resources.
2	Layberry, R.A. & Hall, P.W., LaFontaine, J.D. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp+plates.
2	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
1	Newell, R.E. 2005. E.C. Smith Digital Herbarium. E.C. Smith Herbarium, Irving Biodiversity Collection, Acadia University, Web site: http://luxor.acadiau.ca/library/Herbarium/project/. 582 recs.
1	Roland, A.E. & Smith, E.C. 1969. The Flora of Nova Scotia, 1st Ed. Nova Scotia Museum, Halifax, 743pp.
1	Staff, DNR 2007. Restricted & Limited Use Land Database (RLUL).

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 32468 records of 174 vertebrate and 492 records of 68 invertebrate fauna; 20214 records of 384 vascular, 468 records of 107 nonvascular flora (attached: *ob100km.xls).

Rare and/or endangered taxa within the 100 km-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 (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Coregonus huntsmani*	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	7 Exotic	4	82.9 ± 1.0
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	43	51.2 ± 0.0
A	*Myotis septentrionalis*	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	11	77.0 ± 0.0
A	*Perimyotis subflavus*	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	26	59.5 ± 0.0
A	*Emydoidea blandingii*	Blanding's Turtle - Nova Scotia pop.	Endangered	Endangered	Endangered	S1	1 At Risk	7849	27.1 ± 0.0
A	*Morone saxatilis pop. 2*	Striped Bass- Bay of Fundy pop.	Endangered			S1	2 May Be At Risk	3	14.5 ± 1.0
A	*Eubalaena glacialis*	North Atlantic Right Whale	Endangered	Endangered		S1		6	11.3 ± 50.0
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	1 At Risk	17	42.9 ± 0.0
A	*Dermochelys coriacea (Atlantic pop.)*	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	67.5 ± 0.0
A	*Morone saxatilis*	Striped Bass	Endangered			S2	2 May Be At Risk	4	73.5 ± 10.0
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S2	2 May Be At Risk	15	8.3 ± 1.0
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S2B	1 At Risk	26	69.3 ± 0.0
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered		Endangered	S2S3M	1 At Risk	260	60.1 ± 0.0
A	*Pagophila eburnea*	Ivory Gull	Endangered	Endangered		SNA	8 Accidental	2	79.2 ± 12.0
A	*Protonotaria citrea*	Prothonotary Warbler	Endangered	Endangered		SNA	8 Accidental	4	72.5 ± 2.0
A	*Caretta caretta*	Loggerhead Sea Turtle	Endangered			SNA		1	32.1 ± 0.0
A	*Rangifer tarandus pop. 2*	Woodland Caribou (Atlantic-Gasp ├⌐sie pop.)	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	3	75.7 ± 1.0
A	*Colinus virginianus*	Northern Bobwhite	Endangered	Endangered				5	44.9 ± 7.0
A	*Charadrius melodus*	Piping Plover	Endangered	Endangered				1	73.2 ± 1.0
A	*Caprimulgus vociferus*	Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	1 At Risk	16	50.6 ± 7.0
A	*Hylocichla mustelina*	Wood Thrush	Threatened			S1B	5 Undetermined	66	20.1 ± 7.0
A	*Sturnella magna*	Eastern Meadowlark	Threatened			S1B	3 Sensitive	8	20.0 ± 7.0
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Special Concern	Endangered	S1S2B	1 At Risk	22	14.4 ± 7.0
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	1 At Risk	10	71.7 ± 5.0
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	3 Sensitive	36	33.1 ± 5.0
A	*Thamnophis sauritus pop. 3*	Eastern Ribbonsnake - Atlantic pop.	Threatened	Threatened	Threatened	S2S3	1 At Risk	1942	42.4 ± 0.0
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	285	16.0 ± 0.0
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	981	0.4 ± 7.0
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	436	0.4 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	324	8.3 ± 0.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	463	0.4 ± 7.0
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	275	0.4 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	278	0.4 ± 7.0
A	*Anguilla rostrata*	American Eel	Threatened			S5	4 Secure	271	20.0 ± 1.0
A	*Melanerpes erythrocephalus*	Red-headed Woodpecker	Threatened	Threatened		SNA	8 Accidental	9	67.5 ± 0.0
A	*Vermivora chrysoptera*	Golden-winged Warbler	Threatened	Threatened		SNA	8 Accidental	1	72.7 ± 1.0
A	*Wilsonia citrina*	Hooded Warbler	Threatened	Threatened		SNA	8 Accidental	4	73.2 ± 1.0
A	*Osmerus mordax pop. 2*	Lake Utopia Smelt large-bodied pop.	Threatened		Threatened			2	97.4 ± 10.0
A	*Falco peregrinus pop. 1*	Peregrine Falcon -	Special Concern	Special Concern	Vulnerable	S1B	3 Sensitive	193	50.2 ± 7.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
		anatum/tundrius							
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	1 At Risk	28	20.7 ± 0.0
A	*Acipenser brevirostrum*	Shortnose Sturgeon	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	4	80.0 ± 10.0
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	1 At Risk	167	23.6 ± 1.0
A	*Balaenoptera physalus*	Fin Whale - Atlantic pop.	Special Concern	Special Concern		S2S3		5	46.6 ± 50.0
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2S3B	2 May Be At Risk	152	0.4 ± 7.0
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	66	29.0 ± 5.0
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	3	73.8 ± 0.0
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	221	43.0 ± 0.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	500	0.4 ± 7.0
A	*Phocoena phocoena (NW Atlantic pop.)*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		214	8.5 ± 1.0
A	*Tryngites subruficollis*	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	66	54.4 ± 0.0
A	*Falco peregrinus*	Peregrine Falcon	Special Concern					394	56.2 ± 6.0
A	*Odobenus rosmarus rosmarus*	Atlantic Walrus	Special Concern					1	29.3 ± 5.0
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S1	1 At Risk	1	81.2 ± 1.0
A	*Fulica americana*	American Coot	Not At Risk			S1B	5 Undetermined	5	29.2 ± 0.0
A	*Falco rusticolus*	Gyrfalcon	Not At Risk			S1N	5 Undetermined	15	66.5 ± 2.0
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	2 May Be At Risk	9	76.1 ± 7.0
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B	2 May Be At Risk	5	71.1 ± 7.0
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk	Special Concern		S2B	2 May Be At Risk	9	78.1 ± 4.0
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B	3 Sensitive	1	74.6 ± 4.0
A	*Glaucomys volans*	Southern Flying Squirrel	Not At Risk	Special Concern		S2S3	3 Sensitive	9	51.1 ± 10.0
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3		3	71.5 ± 1.0
A	*Desmognathus fuscus (QC/NB pop.)*	Northern Dusky Salamander - QC/NB pop.	Not At Risk			S3	3 Sensitive	39	78.8 ± 1.0
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	4 Secure	17	48.1 ± 0.0
A	*Megaptera novaeangliae*	Humpback Whale (NW Atlantic pop.)	Not At Risk	Special Concern		S3		4	46.6 ± 50.0
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S3B	1 At Risk	984	37.3 ± 32.0
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	3 Sensitive	285	24.6 ± 0.0
A	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	3 Sensitive	23	5.6 ± 0.0
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	520	0.4 ± 7.0
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	668	37.3 ± 32.0
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	4 Secure	34	28.0 ± 7.0
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	71.5 ± 1.0
A	*Canis lupus*	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	2	71.8 ± 1.0
A	*Lepomis auritus*	Redbreast Sunfish	Data Deficient	Special Concern		S3?	4 Secure	14	75.4 ± 0.0
A	*Puma concolor pop. 1*	Cougar - Eastern pop.	Data Deficient			SH	5 Undetermined	23	12.0 ± 1.0
A	*Martes americana*	American Marten			Endangered	S1	1 At Risk	20	25.7 ± 0.0
A	*Alces americanus*	Moose			Endangered	S1	1 At Risk	70	33.3 ± 0.0
A	*Lasionycteris noctivagans*	Silver-haired Bat				S1?	5 Undetermined	1	78.4 ± 1.0
A	*Toxostoma rufum*	Brown Thrasher				S1?B	5 Undetermined	47	54.0 ± 7.0
A	*Vireo gilvus*	Warbling Vireo				S1?B	5 Undetermined	6	48.2 ± 7.0
A	*Tringa solitaria*	Solitary Sandpiper				S1?B,S4S5M	4 Secure	233	54.4 ± 0.0
A	*Gallinula chloropus*	Common Moorhen				S1B	5 Undetermined	14	31.7 ± 7.0
A	*Bartramia longicauda*	Upland Sandpiper				S1B	3 Sensitive	31	72.7 ± 1.0
A	*Phalaropus tricolor*	Wilson's Phalarope				S1B	3 Sensitive	40	69.5 ± 7.0
A	*Leucophaeus atricilla*	Laughing Gull				S1B	3 Sensitive	83	51.0 ± 24.0
A	*Progne subis*	Purple Martin				S1B	2 May Be At Risk	14	60.0 ± 7.0
A	*Troglodytes aedon*	House Wren				S1B	5 Undetermined	13	72.5 ± 1.0
A	*Cistothorus palustris*	Marsh Wren				S1B	5 Undetermined	18	31.7 ± 7.0
A	*Aythya marila*	Greater Scaup				S1B,S2N	4 Secure	14	60.0 ± 4.0
A	*Uria aalge*	Common Murre				S1B,S3N	4 Secure	140	37.3 ± 32.0
A	*Alca torda*	Razorbill				S1B,S3N	4 Secure	171	37.3 ± 32.0
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S4N	4 Secure	42	70.0 ± 1.0

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A	*Rissa tridactyla*	Black-legged Kittiwake				S1B,S4N	4 Secure	48	56.2 ± 9.0
A	*Calidris minutilla*	Least Sandpiper				S1B,S5M	4 Secure	279	39.5 ± 0.0
A	*Butorides virescens*	Green Heron				S1S2B	3 Sensitive	11	71.7 ± 5.0
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	3 Sensitive	61	66.7 ± 7.0
A	*Fratercula arctica*	Atlantic Puffin				S1S2B	3 Sensitive	174	37.3 ± 32.0
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	2 May Be At Risk	10	64.9 ± 7.0
A	*Passerina cyanea*	Indigo Bunting				S1S2B	5 Undetermined	44	18.3 ± 0.0
A	*Charadrius semipalmatus*	Semipalmated Plover				S1S2B,S5M	4 Secure	453	6.4 ± 0.0
A	*Asio otus*	Long-eared Owl				S2	2 May Be At Risk	19	61.4 ± 7.0
A	*Salmo salar*	Atlantic Salmon				S2	2 May Be At Risk	29	45.2 ± 1.0
A	*Pekania pennanti*	Fisher				S2	3 Sensitive	6	60.1 ± 5.0
A	*Eptesicus fuscus*	Big Brown Bat				S2?	3 Sensitive	9	73.4 ± 0.0
A	*Lasiurus borealis*	Eastern Red Bat				S2?	5 Undetermined	6	73.9 ± 1.0
A	*Lasiurus cinereus*	Hoary Bat				S2?	5 Undetermined	4	69.9 ± 1.0
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B	5 Undetermined	7	43.5 ± 0.0
A	*Oceanodroma leucorhoa*	Leach's Storm-Petrel				S2B	3 Sensitive	128	37.3 ± 32.0
A	*Anas acuta*	Northern Pintail				S2B	2 May Be At Risk	15	31.7 ± 7.0
A	*Anas clypeata*	Northern Shoveler				S2B	2 May Be At Risk	29	29.3 ± 0.0
A	*Anas strepera*	Gadwall				S2B	2 May Be At Risk	94	28.8 ± 0.0
A	*Rallus limicola*	Virginia Rail				S2B	5 Undetermined	40	14.4 ± 7.0
A	*Empidonax traillii*	Willow Flycatcher				S2B	3 Sensitive	40	19.6 ± 7.0
A	*Myiarchus crinitus*	Great Crested Flycatcher				S2B	2 May Be At Risk	52	29.6 ± 7.0
A	*Eremophila alpestris*	Horned Lark				S2B	2 May Be At Risk	23	71.2 ± 1.0
A	*Piranga olivacea*	Scarlet Tanager				S2B	5 Undetermined	45	20.0 ± 7.0
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	2 May Be At Risk	34	67.9 ± 1.0
A	*Bucephala clangula*	Common Goldeneye				S2B,S5N	4 Secure	36	6.9 ± 5.0
A	*Chroicocephalus ridibundus*	Black-headed Gull				S2M,S1N	3 Sensitive	39	70.0 ± 1.0
A	*Somateria spectabilis*	King Eider				S2N	4 Secure	55	68.0 ± 0.0
A	*Cathartes aura*	Turkey Vulture				S2S3B	3 Sensitive	130	19.9 ± 6.0
A	*Tringa semipalmata*	Willet				S2S3B	2 May Be At Risk	492	0.4 ± 7.0
A	*Molothrus ater*	Brown-headed Cowbird				S2S3B	4 Secure	167	0.4 ± 7.0
A	*Icterus galbula*	Baltimore Oriole				S2S3B	2 May Be At Risk	45	14.4 ± 7.0
A	*Uria lomvia*	Thick-billed Murre				S2S3N	5 Undetermined	67	55.6 ± 15.0
A	*Phalacrocorax carbo*	Great Cormorant				S3	3 Sensitive	20	6.6 ± 10.0
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	129	0.4 ± 7.0
A	*Loxia curvirostra*	Red Crossbill				S3	4 Secure	56	66.5 ± 1.0
A	*Coregonus clupeaformis*	Lake Whitefish				S3	4 Secure	6	75.4 ± 0.0
A	*Salvelinus namaycush*	Lake Trout				S3	3 Sensitive	1	84.3 ± 0.0
A	*Sorex maritimensis*	Maritime Shrew				S3	4 Secure	1	39.7 ± 0.0
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3?B	2 May Be At Risk	33	0.4 ± 7.0
A	*Dendroica tigrina*	Cape May Warbler				S3?B	3 Sensitive	16	20.0 ± 7.0
A	*Pinicola enucleator*	Pine Grosbeak				S3?B,S5N	2 May Be At Risk	41	9.6 ± 7.0
A	*Podilymbus podiceps*	Pied-billed Grebe				S3B	3 Sensitive	28	29.3 ± 0.0
A	*Anas discors*	Blue-winged Teal				S3B	2 May Be At Risk	30	31.7 ± 7.0
A	*Anas americana*	American Wigeon				S3B	4 Secure	340	60.0 ± 4.0
A	*Larus delawarensis*	Ring-billed Gull				S3B	4 Secure	140	56.2 ± 9.0
A	*Sterna paradisaea*	Arctic Tern				S3B	2 May Be At Risk	146	35.7 ± 7.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3B	2 May Be At Risk	292	0.4 ± 7.0
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	215	0.4 ± 7.0
A	*Mimus polyglottos*	Northern Mockingbird				S3B	4 Secure	98	8.5 ± 0.0
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S5M	3 Sensitive	459	29.6 ± 0.0
A	*Mergus serrator*	Red-breasted Merganser				S3B,S5N	4 Secure	359	16.4 ± 0.0
A	*Branta bernicla*	Brant				S3M	3 Sensitive	542	54.8 ± 4.0
A	*Pluvialis dominica*	American Golden-Plover				S3M	3 Sensitive	283	54.4 ± 0.0
A	*Numenius phaeopus hudsonicus*	Hudsonian Whimbrel				S3M	3 Sensitive	49	54.4 ± 0.0
A	*Limosa haemastica*	Hudsonian Godwit				S3M	3 Sensitive	5	95.4 ± 0.0

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A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	3 Sensitive	450	6.4 ± 0.0
A	*Phalaropus fulicarius*	Red Phalarope				S3M	3 Sensitive	127	37.3 ± 32.0
A	*Melanitta nigra*	Black Scoter				S3M,S2S3N	3 Sensitive	756	56.2 ± 3.0
A	*Bucephala albeola*	Bufflehead				S3N	3 Sensitive	1028	55.6 ± 15.0
A	*Calidris maritima*	Purple Sandpiper				S3N	3 Sensitive	248	6.6 ± 10.0
A	*Cepphus grylle*	Black Guillemot				S3S4	4 Secure	782	6.9 ± 5.0
A	*Picoides arcticus*	Black-backed Woodpecker				S3S4	3 Sensitive	32	22.2 ± 7.0
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	162	0.4 ± 7.0
A	*Cardinalis cardinalis*	Northern Cardinal				S3S4	4 Secure	104	0.4 ± 7.0
A	*Botaurus lentiginosus*	American Bittern				S3S4B	3 Sensitive	91	19.6 ± 7.0
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	771	0.4 ± 7.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	281	0.4 ± 7.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	160	0.4 ± 7.0
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	170	9.6 ± 7.0
A	*Sayornis phoebe*	Eastern Phoebe				S3S4B	3 Sensitive	85	20.0 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	3 Sensitive	241	19.9 ± 6.0
A	*Vermivora peregrina*	Tennessee Warbler				S3S4B	3 Sensitive	49	9.6 ± 7.0
A	*Dendroica castanea*	Bay-breasted Warbler				S3S4B	3 Sensitive	136	13.3 ± 6.0
A	*Dendroica striata*	Blackpoll Warbler				S3S4B	3 Sensitive	21	4.6 ± 0.0
A	*Wilsonia pusilla*	Wilson's Warbler				S3S4B	3 Sensitive	25	31.7 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3S4B	3 Sensitive	141	0.4 ± 7.0
A	*Passerella iliaca*	Fox Sparrow				S3S4B	4 Secure	5	89.6 ± 7.0
A	*Coccothraustes vespertinus*	Evening Grosbeak				S3S4B,S4S5N	3 Sensitive	66	60.4 ± 7.0
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	110	0.4 ± 7.0
A	*Podiceps auritus*	Horned Grebe			Special Concern	S4M,S4N	4 Secure	257	55.6 ± 15.0
A	*Morus bassanus*	Northern Gannet				SHB,S5M,S5N	4 Secure	834	37.3 ± 32.0
A	*Lanius ludovicianus*	Loggerhead Shrike				SXB,SNAN	1 At Risk	1	77.9 ± 1.0
C	*Acer saccharum - Fraxinus americana / Polystichum acrostichoides Forest*	Sugar Maple - White Ash / Christmas Fern Forest				S3S4		1	93.0 ± 0.0
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern		S2B	3 Sensitive	82	28.6 ± 0.0
I	*Lyogyrus granum*	Squat Duskysnail	Data Deficient			S2		18	89.9 ± 0.0
I	*Erora laeta*	Early Hairstreak				S1	2 May Be At Risk	1	6.4 ± 1.0
I	*Polygonia satyrus*	Satyr Comma				S1	3 Sensitive	5	5.5 ± 1.0
I	*Ophiogomphus aspersus*	Brook Snaketail				S1	2 May Be At Risk	2	20.4 ± 0.0
I	*Ophiogomphus mainensis*	Maine Snaketail				S1	2 May Be At Risk	9	74.6 ± 0.0
I	*Somatochlora franklini*	Delicate Emerald				S1	3 Sensitive	1	34.9 ± 1.0
I	*Celithemis martha*	Martha's Pennant				S1	5 Undetermined	1	80.3 ± 0.0
I	*Enallagma signatum*	Orange Bluet				S1	2 May Be At Risk	5	35.1 ± 0.0
I	*Leptodea ochracea*	Tidewater Mucket				S1	3 Sensitive	4	37.7 ± 0.0
I	*Tramea carolina*	Carolina Saddlebags				S1B	5 Undetermined	3	59.7 ± 0.0
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle				S1S2	2 May Be At Risk	2	72.8 ± 1.0
I	*Chrysops nigripes*	Taiga Deer Fly				S1S2	2 May Be At Risk	1	46.2 ± 0.0
I	*Nymphalis l-album*	Compton Tortoiseshell				S1S2	4 Secure	18	5.5 ± 1.0
I	*Ophiogomphus colubrinus*	Boreal Snaketail				S1S2	2 May Be At Risk	1	77.2 ± 1.0
I	*Ophiogomphus rupinsulensis*	Rusty Snaketail				S1S2	2 May Be At Risk	9	54.0 ± 1.0
I	*Somatochlora kennedyi*	Kennedy's Emerald				S1S2	2 May Be At Risk	1	95.5 ± 0.0
I	*Stylurus scudderi*	Zebra Clubtail				S1S2	2 May Be At Risk	1	70.1 ± 0.0
I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2	4 Secure	2	54.7 ± 1.0
I	*Amblyscirtes vialis*	Common Roadside-Skipper				S2	4 Secure	3	30.7 ± 1.0
I	*Pieris oleracea*	Mustard White				S2	3 Sensitive	10	28.9 ± 1.0
I	*Satyrium calanus*	Banded Hairstreak				S2	5 Undetermined	2	29.2 ± 1.0
I	*Callophrys henrici*	Henry's Elfin				S2	4 Secure	3	5.5 ± 1.0
I	*Callophrys niphon*	Eastern Pine Elfin				S2	4 Secure	4	30.7 ± 1.0
I	*Strymon melinus*	Grey Hairstreak				S2	4 Secure	5	5.5 ± 1.0
I	*Cupido comyntas*	Eastern Tailed Blue				S2	4 Secure	4	73.2 ± 0.0
I	*Chlosyne nycteis*	Silvery Checkerspot				S2	5 Undetermined	8	35.1 ± 1.0
I	*Polygonia comma*	Eastern Comma				S2	1 At Risk	1	5.5 ± 1.0

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I	*Epitheca princeps*	Prince Baskettail				S2	3 Sensitive	4	55.4 ± 1.0
I	*Somatochlora forcipata*	Forcipate Emerald				S2	2 May Be At Risk	2	34.9 ± 1.0
I	*Ischnura posita*	Fragile Forktail				S2	2 May Be At Risk	3	90.7 ± 1.0
I	*Alasmidonta undulata*	Triangle Floater				S2	3 Sensitive	3	89.0 ± 0.0
I	*Anatis labiculata*	Fifteen-spotted Lady Beetle				S2S3	3 Sensitive	1	83.2 ± 0.0
I	*Carabus maeander*	a Ground Beetle				S2S3	3 Sensitive	1	77.0 ± 7.0
I	*Omophron tessellatum*	a Ground Beetle				S2S3	3 Sensitive	1	77.0 ± 7.0
I	*Naemia seriata*	a Ladybird beetle				S2S3	3 Sensitive	5	28.7 ± 1.0
I	*Erynnis juvenalis*	Juvenal's Duskywing				S2S3	4 Secure	25	29.2 ± 1.0
I	*Gomphus abbreviatus*	Spine-crowned Clubtail				S2S3	4 Secure	1	90.0 ± 0.0
I	*Lestes vigilax*	Swamp Spreadwing				S2S3	3 Sensitive	15	75.4 ± 1.0
I	*Enallagma vesperum*	Vesper Bluet				S2S3	3 Sensitive	11	25.5 ± 1.0
I	*Hesperia comma*	Common Branded Skipper				S3	4 Secure	3	58.5 ± 2.0
I	*Euphyes bimacula*	Two-spotted Skipper				S3	4 Secure	1	91.1 ± 0.0
I	*Lycaena hyllus*	Bronze Copper				S3	3 Sensitive	1	73.6 ± 1.0
I	*Satyrium acadica*	Acadian Hairstreak				S3	4 Secure	1	72.9 ± 1.0
I	*Plebejus idas*	Northern Blue				S3	4 Secure	6	70.6 ± 1.0
I	*Plebejus idas empetri*	Crowberry Blue				S3	4 Secure	8	65.9 ± 0.0
I	*Boloria bellona*	Meadow Fritillary				S3	4 Secure	1	99.6 ± 1.0
I	*Polygonia faunus*	Green Comma				S3	4 Secure	7	1.2 ± 10.0
I	*Lethe anthedon*	Northern Pearly-Eye				S3	4 Secure	11	31.3 ± 1.0
I	*Oeneis jutta*	Jutta Arctic				S3	4 Secure	4	72.4 ± 1.0
I	*Ophiogomphus carolus*	Riffle Snaketail				S3	4 Secure	25	44.8 ± 1.0
I	*Aeshna clepsydra*	Mottled Darner				S3	4 Secure	22	35.1 ± 0.0
I	*Aeshna constricta*	Lance-Tipped Darner				S3	4 Secure	2	28.9 ± 1.0
I	*Boyeria grafiana*	Ocellated Darner				S3	3 Sensitive	13	52.9 ± 1.0
I	*Gomphaeschna furcillata*	Harlequin Darner				S3	3 Sensitive	10	33.1 ± 1.0
I	*Dorocordulia lepida*	Petite Emerald				S3	4 Secure	7	79.9 ± 0.0
I	*Somatochlora cingulata*	Lake Emerald				S3	4 Secure	2	75.8 ± 1.0
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3	4 Secure	9	32.0 ± 0.0
I	*Erythrodiplax berenice*	Seaside Dragonlet				S3	3 Sensitive	17	64.4 ± 0.0
I	*Nannothemis bella*	Elfin Skimmer				S3	4 Secure	7	28.9 ± 1.0
I	*Lestes eurinus*	Amber-Winged Spreadwing				S3	4 Secure	1	72.0 ± 1.0
I	*Enallagma geminatum*	Skimming Bluet				S3	5 Undetermined	4	90.0 ± 0.0
I	*Polygonia interrogationis*	Question Mark				S3B	4 Secure	6	24.7 ± 0.0
I	*Pantala hymenaea*	Spot-Winged Glider				S3B	4 Secure	6	67.3 ± 1.0
I	*Feniseca tarquinius*	Harvester				S3S4	4 Secure	7	5.5 ± 1.0
I	*Callophrys polios*	Hoary Elfin				S3S4	4 Secure	11	2.9 ± 1.0
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3S4	4 Secure	15	6.4 ± 1.0
I	*Polygonia progne*	Grey Comma				S3S4	4 Secure	7	5.5 ± 1.0
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered		Endangered	S1S2	2 May Be At Risk	17	62.4 ± 0.0
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	SH	1 At Risk	1	92.2 ± 1.0
N	*Fissidens exilis*	Pygmy Pocket Moss	Special Concern			S1?	1 At Risk	2	44.6 ± 3.0
N	*Sclerophora peronella (Nova Scotia pop.)*	Frosted Glass-whiskers Lichen - Nova Scotia pop.	Special Concern	Special Concern		S1?		8	77.4 ± 3.0
N	*Degelia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S2	4 Secure	38	62.0 ± 0.0
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S3	5 Undetermined	17	66.6 ± 0.0
N	*Anomodon viticulosus*	a Moss				S1	2 May Be At Risk	4	72.7 ± 1.0
N	*Bryum muehlenbeckii*	Muehlenbeck's Bryum Moss				S1	2 May Be At Risk	1	83.5 ± 1.0
N	*Calliergon trifarium*	Three-ranked Moss				S1	2 May Be At Risk	1	77.0 ± 0.0
N	*Tortula obtusifolia*	a Moss				S1	2 May Be At Risk	1	85.7 ± 0.0
N	*Dichelyma falcatum*	a Moss				S1	2 May Be At Risk	1	99.7 ± 1.0
N	*Orthotrichum pallens*	Pale Bristle Moss				S1		1	56.9 ± 0.0
N	*Plagiothecium latebricola*	Alder Silk Moss				S1	2 May Be At Risk	1	69.0 ± 0.0
N	*Rhytidiadelphus loreus*	Lanky Moss				S1	2 May Be At Risk	1	73.2 ± 10.0
N	*Sphagnum macrophyllum*	Sphagnum				S1	2 May Be At Risk	1	70.6 ± 0.0

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N	*Sphagnum subfulvum*	a Peatmoss				S1	2 May Be At Risk	3	72.4 ± 1.0
N	*Tomentypnum falcifolium*	Sickle-leaved Golden Moss				S1	2 May Be At Risk	1	72.4 ± 1.0
N	*Hamatocaulis vernicosus*	a Moss				S1	2 May Be At Risk	1	79.8 ± 100.0
N	*Coscinodon cribrosus*	Sieve-Toothed Moss				S1	2 May Be At Risk	1	72.8 ± 0.0
N	*Bryohaplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1		1	43.9 ± 3.0
N	*Peltigera collina*	Tree Pelt Lichen				S1	2 May Be At Risk	1	78.7 ± 10.0
N	*Anomobryum filiforme*	a moss				S1?	5 Undetermined	1	91.9 ± 0.0
N	*Pannaria lurida*	Veined Shingle Lichen				S1?	2 May Be At Risk	5	66.1 ± 0.0
N	*Parmelinopsis horrescens*	Hairy-spined Shield Lichen				S1?	2 May Be At Risk	1	95.3 ± 0.0
N	*Andreaea rothii*	a Moss				S1S2	3 Sensitive	1	71.9 ± 0.0
N	*Bryum pallescens*	Pale Bryum Moss				S1S2	5 Undetermined	1	74.5 ± 1.0
N	*Didymodon ferrugineus*	a moss				S1S2	3 Sensitive	1	90.5 ± 1.0
N	*Seligeria campylopoda*	a Moss				S1S2	3 Sensitive	1	79.8 ± 100.0
N	*Seligeria diversifolia*	a Moss				S1S2	3 Sensitive	1	91.9 ± 0.0
N	*Sphagnum angermanicum*	a Peatmoss				S1S2	3 Sensitive	1	70.8 ± 10.0
N	*Fuscopannaria leucosticta*	Rimmed Shingles Lichen				S1S2	2 May Be At Risk	30	38.3 ± 3.0
N	*Polychidium muscicola*	Eyed Mossthorns Woollybear Lichen				S1S2	2 May Be At Risk	1	73.3 ± 0.0
N	*Calypogeia neesiana*	Nees' Pouchwort				S1S3	6 Not Assessed	1	92.4 ± 1.0
N	*Cephaloziella elachista*	Spurred Threadwort				S1S3	6 Not Assessed	1	76.6 ± 5.0
N	*Jungermannia obovata*	Egg Flapwort				S1S3	6 Not Assessed	1	88.2 ± 0.0
N	*Porella pinnata*	Pinnate Scalewort				S1S3	6 Not Assessed	1	99.7 ± 1.0
N	*Leptogium subtile*	Appressed Jellyskin Lichen				S1S3	3 Sensitive	1	91.7 ± 0.0
N	*Bryum uliginosum*	a Moss				S2	3 Sensitive	1	76.3 ± 4.0
N	*Cynodontium tenellum*	Delicate Dogtooth Moss				S2	3 Sensitive	1	77.8 ± 1.0
N	*Hypnum pratense*	Meadow Plait Moss				S2	3 Sensitive	1	76.5 ± 0.0
N	*Physcomitrium immersum*	a Moss				S2	3 Sensitive	1	99.7 ± 1.0
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2	3 Sensitive	4	77.0 ± 0.0
N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S2	3 Sensitive	6	66.5 ± 1.0
N	*Taxiphyllum deplanatum*	Imbricate Yew-leaved Moss				S2	3 Sensitive	1	77.8 ± 1.0
N	*Tayloria serrata*	Serrate Trumpet Moss				S2	3 Sensitive	1	76.8 ± 1.0
N	*Tetraplodon mnioides*	Entire-leaved Nitrogen Moss				S2	3 Sensitive	3	77.8 ± 1.0
N	*Ulota phyllantha*	a Moss				S2	3 Sensitive	1	77.8 ± 1.0
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	2 May Be At Risk	1	78.7 ± 10.0
N	*Anacamptodon splachnoides*	a Moss				S2?	3 Sensitive	1	54.1 ± 0.0
N	*Atrichum angustatum*	Lesser Smoothcap Moss				S2?	3 Sensitive	7	12.8 ± 3.0
N	*Aulacomnium heterostichum*	One-sided Groove Moss				S2?	3 Sensitive	1	85.8 ± 5.0
N	*Bryum algovicum*	a Moss				S2?	3 Sensitive	2	57.1 ± 0.0
N	*Climacium americanum*	American Tree Moss				S2?	3 Sensitive	9	53.3 ± 0.0
N	*Ditrichum rhynchostegium*	a Moss				S2?	3 Sensitive	5	54.0 ± 5.0
N	*Drummondia prorepens*	a Moss				S2?	3 Sensitive	3	32.0 ± 0.0
N	*Eurhynchium hians*	Light Beaked Moss				S2?	3 Sensitive	2	54.0 ± 5.0
N	*Fissidens bushii*	Bush's Pocket Moss				S2?	3 Sensitive	2	12.8 ± 3.0
N	*Fontinalis sullivantii*	a Moss				S2?	3 Sensitive	3	57.7 ± 0.0
N	*Grimmia anodon*	Toothless Grimmia Moss				S2?	3 Sensitive	4	52.1 ± 3.0
N	*Grimmia olneyi*	a Moss				S2?	3 Sensitive	10	53.1 ± 15.0
N	*Anomodon tristis*	a Moss				S2?	3 Sensitive	5	54.1 ± 0.0
N	*Homomallium adnatum*	Adnate Hairy-gray Moss				S2?	3 Sensitive	1	54.0 ± 5.0
N	*Physcomitrium collenchymatum*	a Moss				S2?	3 Sensitive	6	43.3 ± 6.0
N	*Sematophyllum demissum*	a Moss				S2?	3 Sensitive	1	88.3 ± 1.0
N	*Sematophyllum marylandicum*	a Moss				S2?	3 Sensitive	1	53.4 ± 0.0
N	*Sphagnum subnitens*	Lustrous Peat Moss				S2?	3 Sensitive	4	57.6 ± 0.0
N	*Thamnobryum alleghaniense*	a Moss				S2?	3 Sensitive	1	85.1 ± 1.0
N	*Thelia hirtella*	a Moss				S2?	3 Sensitive	32	12.8 ± 3.0
N	*Tortula mucronifolia*	Mucronate Screw Moss				S2?	3 Sensitive	2	52.1 ± 3.0
N	*Zygodon conoideus*	a Moss				S2?	3 Sensitive	7	53.3 ± 0.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
N	*Pseudotaxiphyllum distichaceum*	a Moss				S2?	3 Sensitive	1	49.0 ± 4.0
N	*Cyrto-hypnum minutulum*	Tiny Cedar Moss				S2?	3 Sensitive	1	55.5 ± 0.0
N	*Rauiella scita*	Smaller Fern Moss				S2?	3 Sensitive	16	53.0 ± 0.0
N	*Platylomella lescurii*	a Moss				S2?	3 Sensitive	5	56.9 ± 0.0
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S2S3	3 Sensitive	6	12.8 ± 3.0
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	3 Sensitive	4	72.7 ± 1.0
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	3 Sensitive	2	53.3 ± 0.0
N	*Leucodon andrewsianus*	a Moss				S2S3	3 Sensitive	2	43.9 ± 3.0
N	*Orthotrichum anomalum*	Anomalous Bristle Moss				S2S3	3 Sensitive	1	56.9 ± 0.0
N	*Platydictya subtilis*	Bark Willow Moss				S2S3	3 Sensitive	1	53.4 ± 0.0
N	*Pleuridium subulatum*	a Moss				S2S3	3 Sensitive	2	43.9 ± 3.0
N	*Sphagnum wulfianum*	Wulf's Peat Moss				S2S3	3 Sensitive	1	52.7 ± 0.0
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S2S3	3 Sensitive	2	36.8 ± 0.0
N	*Hylocomiastrum pyrenaicum*	a Feather Moss				S2S3	3 Sensitive	1	54.1 ± 0.0
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S2S3	3 Sensitive	11	73.1 ± 0.0
N	*Heterodermia squamulosa*	Scaly Fringe Lichen				S2S3	3 Sensitive	1	86.2 ± 0.0
N	*Leptogium corticola*	Blistered Jellyskin Lichen				S2S3	3 Sensitive	49	35.6 ± 2.0
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2S3	3 Sensitive	4	66.2 ± 0.0
N	*Usnea rubicunda*	Red Beard Lichen				S2S3	3 Sensitive	2	92.6 ± 0.0
N	*Riccia fluitans*	Floating Crystalwort				S2S4	6 Not Assessed	3	98.0 ± 10.0
N	*Dicranella cerviculata*	a Moss				S3	3 Sensitive	2	77.8 ± 1.0
N	*Dicranum majus*	Greater Broom Moss				S3	4 Secure	3	77.8 ± 1.0
N	*Pogonatum dentatum*	Mountain Hair Moss				S3	4 Secure	1	77.8 ± 1.0
N	*Sphagnum torreyanum*	a Peatmoss				S3	4 Secure	3	70.4 ± 0.0
N	*Sphagnum austinii*	Austin's Peat Moss				S3	4 Secure	1	71.9 ± 1.0
N	*Splachnum rubrum*	Red Collar Moss				S3	4 Secure	1	71.3 ± 1.0
N	*Tetraphis geniculata*	Geniculate Four-tooth Moss				S3	4 Secure	4	77.8 ± 1.0
N	*Schistidium maritimum*	a Moss				S3	4 Secure	1	77.8 ± 1.0
N	*Sphagnum contortum*	Twisted Peat Moss				S3?	4 Secure	1	82.6 ± 0.0
N	*Sphagnum lescurii*	a Peatmoss				S3?	5 Undetermined	1	85.1 ± 0.0
N	*Anzia colpodes*	Black-foam Lichen				S3?	3 Sensitive	15	51.1 ± 1.0
N	*Sticta fuliginosa*	Peppered Moon Lichen				S3?	3 Sensitive	29	73.1 ± 0.0
N	*Nephroma bellum*	Naked Kidney Lichen				S3?	3 Sensitive	3	89.2 ± 0.0
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	4 Secure	1	92.1 ± 5.0
N	*Hypnum fauriei*	a Moss				S3S4	4 Secure	3	77.8 ± 1.0
N	*Tortula truncata*	a Moss				S3S4	4 Secure	1	72.4 ± 0.0
N	*Sphagnum majus*	Olive Peat Moss				S3S4	4 Secure	1	71.2 ± 5.0
P	*Coreopsis rosea*	Pink Coreopsis	Endangered	Endangered	Endangered	S1	1 At Risk	457	69.7 ± 0.0
P	*Sabatia kennedyana*	Plymouth Gentian	Endangered	Threatened	Endangered	S1	1 At Risk	998	32.8 ± 0.0
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	2	97.0 ± 1.0
P	*Geum peckii*	Eastern Mountain Avens	Endangered	Endangered	Endangered	S1	1 At Risk	1670	37.5 ± 0.0
P	*Rhynchospora macrostachya*	Tall Beakrush	Endangered			S1	2 May Be At Risk	57	70.9 ± 0.0
P	*Hydrocotyle umbellata*	Water-pennywort	Threatened	Threatened	Endangered	S1	1 At Risk	182	50.9 ± 0.0
P	*Baccharis halimifolia*	Eastern Baccharis	Threatened		Threatened	S1	At Risk	156	88.8 ± 0.0
P	*Polemonium vanbruntiae*	Van Brunt's Jacob's-ladder	Threatened	Threatened	Threatened	S1	1 At Risk	72	70.7 ± 0.0
P	*Symphyotrichum anticostense*	Anticosti Aster	Threatened	Threatened	Endangered	S1S3	1 At Risk	1	80.5 ± 0.0
P	*Clethra alnifolia*	Coast Pepper-Bush	Special Concern	Special Concern	Vulnerable	S1	1 At Risk	290	34.5 ± 0.0
P	*Lilaeopsis chinensis*	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	31	83.2 ± 0.0
P	*Eleocharis tuberculosa*	Tubercled Spike-rush	Special Concern	Threatened	Vulnerable	S2	1 At Risk	348	71.0 ± 0.0
P	*Lachnanthes caroliniana*	Redroot	Special Concern	Threatened	Vulnerable	S2	1 At Risk	1455	76.1 ± 0.0
P	*Lophiola aurea*	Goldencrest	Special Concern	Threatened	Vulnerable	S2	1 At Risk	801	25.5 ± 3.0
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	6	14.2 ± 0.0
P	*Scirpus longii*	Long's Bulrush	Special Concern	Special Concern	Vulnerable	S3	Sensitive	351	49.5 ± 0.0
P	*Smilax rotundifolia (Atlantic pop.)*	Round-leaved Greenbrier	Not At Risk			S3	4 Secure	754	28.1 ± 0.0
P	*Helianthemum canadense*	Long-branched Frostweed			Endangered	S1	At Risk	55	80.5 ± 0.0
P	*Salix candida*	Sage Willow			Endangered	S1	2 May Be At Risk	1	49.6 ± 1.0
P	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S1	At Risk	100	5.5 ± 0.0

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P	*Toxicodendron vernix*	Poison Sumac				S1	2 May Be At Risk	34	70.4 ± 0.0
P	*Antennaria parlinii*	a Pussytoes				S1	2 May Be At Risk	1	86.6 ± 0.0
P	*Antennaria howellii ssp. petaloidea*	Pussy-Toes				S1	2 May Be At Risk	4	72.4 ± 5.0
P	*Hieracium kalmii*	Kalm's Hawkweed				S1	2 May Be At Risk	3	69.9 ± 1.0
P	*Hieracium kalmii var. kalmii*	Kalm's Hawkweed				S1	2 May Be At Risk	5	69.9 ± 1.0
P	*Hieracium scabrum var. leucocaule*	Rough Hawkweed				S1	2 May Be At Risk	6	76.8 ± 14.0
P	*Prenanthes racemosa*	Glaucous Rattlesnakeroot				S1	2 May Be At Risk	17	24.9 ± 7.0
P	*Senecio pseudoarnica*	Seabeach Ragwort				S1	2 May Be At Risk	22	72.0 ± 1.0
P	*Arabis glabra*	Tower Mustard				S1	5 Undetermined	1	98.9 ± 0.0
P	*Cardamine maxima*	Large Toothwort				S1	2 May Be At Risk	5	73.1 ± 4.0
P	*Draba arabisans*	Rock Whitlow-Grass				S1	2 May Be At Risk	11	87.3 ± 0.0
P	*Draba glabella*	Rock Whitlow-Grass				S1	2 May Be At Risk	6	80.9 ± 1.0
P	*Lobelia spicata*	Pale-Spiked Lobelia				S1	2 May Be At Risk	1	63.9 ± 50.0
P	*Silene antirrhina*	Sleepy Catchfly				S1	2 May Be At Risk	5	81.8 ± 0.0
P	*Chenopodium capitatum*	Strawberry-blite				S1	2 May Be At Risk	1	73.9 ± 1.0
P	*Chenopodium simplex*	Maple-leaved Goosefoot				S1	2 May Be At Risk	3	78.5 ± 1.0
P	*Triadenum virginicum*	Virginia St John's-wort				S1	2 May Be At Risk	2	90.9 ± 0.0
P	*Corema conradii*	Broom Crowberry				S1	2 May Be At Risk	1	72.9 ± 10.0
P	*Lyonia ligustrina*	Maleberry				S1	2 May Be At Risk	6	78.7 ± 0.0
P	*Vaccinium boreale*	Northern Blueberry				S1	2 May Be At Risk	1	90.5 ± 0.0
P	*Desmodium canadense*	Canada Tick-trefoil				S1	2 May Be At Risk	7	52.7 ± 0.0
P	*Desmodium glutinosum*	Large Tick-Trefoil				S1	2 May Be At Risk	4	51.5 ± 1.0
P	*Lomatogonium rotatum*	Marsh Felwort				S1	2 May Be At Risk	2	79.4 ± 0.0
P	*Proserpinaca intermedia*	Intermediate Mermaidweed				S1	2 May Be At Risk	2	69.4 ± 0.0
P	*Trichostema dichotomum*	Forked Bluecurls				S1	2 May Be At Risk	3	84.4 ± 0.0
P	*Fraxinus pennsylvanica*	Red Ash				S1	2 May Be At Risk	4	53.7 ± 7.0
P	*Polygala polygama*	Racemed Milkwort				S1	5 Undetermined	9	14.2 ± 0.0
P	*Polygonum achoreum*	Leathery Knotweed				S1	5 Undetermined	1	44.9 ± 10.0
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S1	2 May Be At Risk	4	81.5 ± 0.0
P	*Montia fontana*	Water Blinks				S1	2 May Be At Risk	4	54.7 ± 0.0
P	*Anagallis minima*	Chaffweed				S1	2 May Be At Risk	6	54.2 ± 0.0
P	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife				S1	2 May Be At Risk	7	75.2 ± 1.0
P	*Ranunculus sceleratus*	Cursed Buttercup				S1	2 May Be At Risk	2	71.0 ± 0.0
P	*Saxifraga paniculata ssp. neogaea*	White Mountain Saxifrage				S1	2 May Be At Risk	7	87.7 ± 10.0
P	*Agalinis paupercula var. borealis*	Small-flowered Agalinis				S1	2 May Be At Risk	2	90.6 ± 1.0
P	*Gratiola aurea*	Golden Hedge-Hyssop				S1	3 Sensitive	2	79.5 ± 5.0
P	*Boehmeria cylindrica*	Small-spike False-nettle				S1	2 May Be At Risk	8	80.6 ± 0.0
P	*Alisma subcordatum*	Southern Water Plantain				S1	5 Undetermined	1	97.9 ± 0.0
P	*Carex digitalis*	Slender Wood Sedge				S1	2 May Be At Risk	4	52.4 ± 0.0
P	*Carex laxiflora*	Loose-Flowered Sedge				S1	2 May Be At Risk	5	32.2 ± 5.0
P	*Carex ormostachya*	Necklace Spike Sedge				S1	2 May Be At Risk	4	33.3 ± 0.0
P	*Carex prairea*	Prairie Sedge				S1	2 May Be At Risk	1	16.5 ± 5.0
P	*Carex saxatilis*	Russet Sedge				S1	2 May Be At Risk	13	76.1 ± 10.0
P	*Carex viridula var. saxilittoralis*	Greenish Sedge				S1	May Be At Risk	2	56.3 ± 5.0
P	*Cyperus diandrus*	Low Flatsedge				S1	May Be At Risk	7	71.0 ± 0.0
P	*Schoenoplectus torreyi*	Torrey's Bulrush				S1	2 May Be At Risk	18	71.6 ± 0.0
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S1	2 May Be At Risk	1	70.2 ± 1.0
P	*Sisyrinchium fuscatum*	Coastal Plain Blue-eyed-grass				S1	2 May Be At Risk	9	7.3 ± 0.0
P	*Juncus greenei*	Greene's Rush				S1	2 May Be At Risk	1	86.1 ± 0.0
P	*Juncus secundus*	Secund Rush				S1	2 May Be At Risk	2	51.8 ± 3.0
P	*Juncus bulbosus*	Bulbous Rush				S1	5 Undetermined	5	76.8 ± 14.0
P	*Allium tricoccum*	Wild Leek				S1	2 May Be At Risk	7	6.4 ± 0.0
P	*Malaxis brachypoda*	White Adder's-Mouth				S1	2 May Be At Risk	3	77.3 ± 10.0
P	*Spiranthes casei var. casei*	Case's Ladies'-Tresses				S1	2 May Be At Risk	2	22.1 ± 0.0
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S1	2 May Be At Risk	26	89.3 ± 0.0
P	*Dichanthelium dichotomum*	Forked Panic Grass				S1	2 May Be At Risk	1	98.9 ± 1.0

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P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	2 May Be At Risk	7	99.8 ± 0.0
P	*Elymus wiegandii*	Wiegand's Wild Rye				S1	2 May Be At Risk	1	72.8 ± 0.0
P	*Torreyochloa pallida var. pallida*	Pale False Manna Grass				S1	0.1 Extirpated	2	48.9 ± 0.0
P	*Potamogeton friesii*	Fries' Pondweed				S1	2 May Be At Risk	4	83.9 ± 5.0
P	*Potamogeton oblongus*	Oblong-leaved Pondweed				S1	2 May Be At Risk	5	76.8 ± 14.0
P	*Potamogeton strictifolius*	Straight-leaved Pondweed				S1	2 May Be At Risk	1	92.6 ± 0.0
P	*Xyris difformis*	Bog Yellow-eyed-grass				S1	5 Undetermined	3	90.7 ± 0.0
P	*Adiantum pedatum*	Northern Maidenhair Fern				S1	2 May Be At Risk	3	77.4 ± 0.0
P	*Asplenium ruta-muraria var. cryptolepis*	Wallrue Spleenwort				S1	2 May Be At Risk	3	87.3 ± 0.0
P	*Selaginella rupestris*	Rock Spikemoss				S1	2 May Be At Risk	12	16.3 ± 1.0
P	*Hieracium kalmii var. fasciculatum*	Kalm's Hawkweed				S1?	5 Undetermined	4	70.5 ± 0.0
P	*Solidago hispida*	Hairy Goldenrod				S1?	2 May Be At Risk	2	25.0 ± 0.0
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S1?	2 May Be At Risk	4	72.4 ± 1.0
P	*Drosera rotundifolia var. comosa*	Round-leaved Sundew				S1?	5 Undetermined	5	71.7 ± 1.0
P	*Proserpinaca palustris var. palustris*	Marsh Mermaidweed				S1?	2 May Be At Risk	2	80.2 ± 2.0
P	*Rubus flagellaris*	Northern Dewberry				S1?	5 Undetermined	3	69.8 ± 0.0
P	*Schoenoplectus robustus*	Sturdy Bulrush				S1?	5 Undetermined	2	33.7 ± 5.0
P	*Dichanthelium acuminatum var. lindheimeri*	Woolly Panic Grass				S1?	5 Undetermined	5	67.5 ± 0.0
P	*Panicum dichotomiflorum var. puritanorum*	Fall Panic Grass				S1?	2 May Be At Risk	17	51.4 ± 0.0
P	*Huperzia selago*	Northern Firmoss				S1?	May Be At Risk	4	56.3 ± 5.0
P	*Fraxinus nigra*	Black Ash			Threatened	S1S2	At Risk	45	1.7 ± 1.0
P	*Rudbeckia laciniata*	Cut-Leaved Coneflower				S1S2	May Be At Risk	4	36.3 ± 7.0
P	*Rudbeckia laciniata var. gaspereauensis*	Cut-Leaved Coneflower				S1S2	May Be At Risk	2	99.0 ± 2.0
P	*Conopholis americana*	American Cancer-root				S1S2	2 May Be At Risk	21	50.6 ± 5.0
P	*Hepatica nobilis var. obtusa*	Round-lobed Hepatica				S1S2	May Be At Risk	6	9.5 ± 0.0
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S1S2	3 Sensitive	1	79.6 ± 0.0
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S1S2	3 Sensitive	1	73.0 ± 0.0
P	*Potamogeton bicupulatus*	Snailseed Pondweed				S1S2	2 May Be At Risk	1	99.8 ± 0.0
P	*Selaginella selaginoides*	Low Spikemoss				S1S2	May Be At Risk	6	58.8 ± 2.0
P	*Conioselinum chinense*	Chinese Hemlock-parsley				S2	3 Sensitive	9	7.0 ± 5.0
P	*Erigeron philadelphicus*	Philadelphia Fleabane				S2	3 Sensitive	2	60.5 ± 1.0
P	*Eupatorium dubium*	Coastal Plain Joe-pye-weed				S2	May Be At Risk	175	59.2 ± 1.0
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S2	3 Sensitive	1	72.8 ± 0.0
P	*Iva frutescens ssp. oraria*	Big-leaved Marsh-elder				S2	Sensitive	50	89.1 ± 0.0
P	*Lactuca hirsuta var. sanguinea*	Hairy Lettuce				S2	3 Sensitive	6	54.1 ± 1.0
P	*Solidago altissima*	Tall Goldenrod				S2	4 Secure	1	90.7 ± 1.0
P	*Symphyotrichum undulatum*	Wavy-leaved Aster				S2	3 Sensitive	82	49.8 ± 7.0
P	*Symphyotrichum ciliolatum*	Fringed Blue Aster				S2	Sensitive	3	10.2 ± 0.0
P	*Impatiens pallida*	Pale Jewelweed				S2	3 Sensitive	2	96.0 ± 0.0
P	*Caulophyllum thalictroides*	Blue Cohosh				S2	2 May Be At Risk	1	71.8 ± 0.0
P	*Betula michauxii*	Michaux's Dwarf Birch				S2	3 Sensitive	45	56.3 ± 5.0
P	*Arabis drummondii*	Drummond's Rockcress				S2	3 Sensitive	7	74.0 ± 5.0
P	*Cardamine parviflora var. arenicola*	Small-flowered Bittercress				S2	3 Sensitive	13	58.2 ± 5.0
P	*Stellaria longifolia*	Long-leaved Starwort				S2	3 Sensitive	2	74.7 ± 10.0
P	*Atriplex franktonii*	Frankton's Saltbush				S2	4 Secure	2	83.6 ± 1.0
P	*Chenopodium rubrum*	Red Pigweed				S2	3 Sensitive	10	73.2 ± 1.0
P	*Hudsonia ericoides*	Pinebarren Golden Heather				S2	3 Sensitive	40	60.3 ± 1.0
P	*Callitriche hermaphroditica*	Northern Water-starwort				S2	4 Secure	2	97.9 ± 2.0
P	*Hypericum majus*	Large St John's-wort				S2	Sensitive	2	65.9 ± 1.0
P	*Lonicera oblongifolia*	Swamp Fly Honeysuckle				S2	3 Sensitive	1	79.0 ± 6.0
P	*Viburnum recognitum*	Northern Arrow-Wood				S2	4 Secure	1	96.7 ± 0.0
P	*Astragalus eucosmus*	Elegant Milk-vetch				S2	2 May Be At Risk	3	91.4 ± 0.0
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S2	3 Sensitive	1	87.1 ± 50.0
P	*Quercus macrocarpa*	Bur Oak				S2	2 May Be At Risk	1	81.9 ± 1.0
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S2	3 Sensitive	11	24.7 ± 0.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Utricularia resupinata*	Inverted Bladderwort				S2	Sensitive	42	19.2 ± 0.0
P	*Nuphar lutea ssp. rubrodisca*	Red-disked Yellow Pond-lily				S2	3 Sensitive	2	89.6 ± 1.0
P	*Oenothera fruticosa ssp. glauca*	Narrow-leaved Evening Primrose				S2	5 Undetermined	21	5.2 ± 0.0
P	*Orobanche uniflora*	One-Flowered Broomrape				S2	3 Sensitive	10	69.9 ± 1.0
P	*Polygonum arifolium*	Halberd-leaved Tearthumb				S2	3 Sensitive	7	62.5 ± 0.0
P	*Polygonum careyi*	Carey's Smartweed				S2	3 Sensitive	1	98.9 ± 5.0
P	*Anemone quinquefolia*	Wood Anemone				S2	3 Sensitive	5	51.1 ± 1.0
P	*Crataegus scabrida*	Rough Hawthorn				S2	3 Sensitive	2	87.3 ± 0.0
P	*Galium boreale*	Northern Bedstraw				S2	2 May Be At Risk	3	33.2 ± 0.0
P	*Salix sericea*	Silky Willow				S2	2 May Be At Risk	108	56.3 ± 5.0
P	*Agalinis maritima*	Saltmarsh Agalinis				S2	Sensitive	47	88.8 ± 0.0
P	*Euphrasia randii*	Rand's Eyebright				S2	2 May Be At Risk	21	66.3 ± 0.0
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S2	3 Sensitive	3	78.6 ± 5.0
P	*Viola novae-angliae*	New England Violet				S2	3 Sensitive	1	95.7 ± 1.0
P	*Carex comosa*	Bearded Sedge				S2	3 Sensitive	3	93.6 ± 1.0
P	*Carex granularis*	Limestone Meadow Sedge				S2	3 Sensitive	1	85.0 ± 0.0
P	*Carex hystericina*	Porcupine Sedge				S2	2 May Be At Risk	2	78.1 ± 1.0
P	*Carex livida var. radicaulis*	Livid Sedge				S2	3 Sensitive	1	72.8 ± 2.0
P	*Carex longii*	Long's Sedge				S2	Sensitive	10	54.9 ± 5.0
P	*Carex salina*	Saltmarsh Sedge				S2	3 Sensitive	2	73.1 ± 1.0
P	*Carex tenera*	Tender Sedge				S2	Sensitive	1	68.8 ± 0.0
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S2	2 May Be At Risk	4	74.1 ± 1.0
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	3 Sensitive	1	67.4 ± 0.0
P	*Carex vacillans*	Estuarine Sedge				S2	3 Sensitive	2	69.3 ± 0.0
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S2	Sensitive	4	24.9 ± 0.0
P	*Eriophorum gracile*	Slender Cottongrass				S2	3 Sensitive	3	17.8 ± 1.0
P	*Blysmus rufus*	Red Bulrush				S2	3 Sensitive	3	72.5 ± 1.0
P	*Vallisneria americana*	Wild Celery				S2	2 May Be At Risk	10	71.2 ± 0.0
P	*Lemna trisulca*	Star Duckweed				S2	4 Secure	8	85.2 ± 1.0
P	*Allium schoenoprasum*	Wild Chives				S2	2 May Be At Risk	1	54.7 ± 1.0
P	*Allium schoenoprasum var. sibiricum*	Wild Chives				S2	2 May Be At Risk	4	24.0 ± 1.0
P	*Najas gracillima*	Thread-Like Naiad				S2	Sensitive	21	58.1 ± 1.0
P	*Calypso bulbosa var. americana*	Calypso				S2	2 May Be At Risk	2	80.8 ± 0.0
P	*Cypripedium parviflorum var. pubescens*	Yellow Lady's-slipper				S2	3 Sensitive	1	17.8 ± 1.0
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	4	72.8 ± 2.0
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S2	Sensitive	38	29.5 ± 0.0
P	*Platanthera flava*	Southern Rein-Orchid				S2	3 Sensitive	25	78.9 ± 0.0
P	*Platanthera flava var. flava*	Southern Rein Orchid				S2	3 Sensitive	346	59.5 ± 1.0
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S2	Undetermined	5	67.2 ± 1.0
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S2	3 Sensitive	3	43.2 ± 0.0
P	*Spiranthes casei*	Case's Ladies'-Tresses				S2	3 Sensitive	2	49.8 ± 7.0
P	*Spiranthes casei var. novaescotiae*	Case's Ladies'-Tresses				S2	3 Sensitive	7	56.3 ± 7.0
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S2	3 Sensitive	6	74.3 ± 0.0
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	May Be At Risk	7	57.0 ± 1.0
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2	Sensitive	10	50.0 ± 5.0
P	*Piptatherum canadense*	Canada Rice Grass				S2	3 Sensitive	13	49.2 ± 0.0
P	*Puccinellia phryganodes*	Creeping Alkali Grass				S2	3 Sensitive	9	70.0 ± 0.0
P	*Piptatherum pungens*	Slender Rice Grass				S2	3 Sensitive	6	80.2 ± 10.0
P	*Potamogeton richardsonii*	Richardson's Pondweed				S2	3 Sensitive	1	72.8 ± 1.0
P	*Potamogeton vaseyi*	Vasey's Pondweed				S2	3 Sensitive	2	83.9 ± 1.0
P	*Woodsia alpina*	Alpine Cliff Fern				S2	3 Sensitive	5	87.7 ± 0.0
P	*Symphyotrichum boreale*	Boreal Aster				S2?	3 Sensitive	16	49.7 ± 7.0
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	5 Undetermined	6	73.5 ± 0.0
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	6	1.7 ± 1.0
P	*Rumex maritimus var. persicarioides*	Peach-leaved Dock				S2?	2 May Be At Risk	1	59.6 ± 0.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S2?	4 Secure	1	71.4 ± 0.0
P	*Rubus recurvicaulis*	Arching Dewberry				S2?	4 Secure	1	84.0 ± 5.0
P	*Salix myricoides*	Bayberry Willow				S2?	3 Sensitive	1	99.9 ± 0.0
P	*Eleocharis ovata*	Ovate Spikerush				S2?	3 Sensitive	5	24.6 ± 0.0
P	*Scirpus pedicellatus*	Stalked Bulrush				S2?	Sensitive	1	25.4 ± 5.0
P	*Potamogeton pulcher*	Spotted Pondweed			Vulnerable	S2S3	Sensitive	41	27.9 ± 0.0
P	*Sagina nodosa*	Knotted Pearlwort				S2S3	4 Secure	23	8.9 ± 0.0
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S2S3	4 Secure	2	7.0 ± 5.0
P	*Ceratophyllum echinatum*	Prickly Hornwort				S2S3	3 Sensitive	6	75.5 ± 1.0
P	*Hypericum dissimulatum*	Disguised St John's-wort				S2S3	3 Sensitive	12	31.2 ± 0.0
P	*Elatine americana*	American Waterwort				S2S3	3 Sensitive	2	87.1 ± 1.0
P	*Chamaesyce polygonifolia*	Seaside Spurge				S2S3	Sensitive	10	60.1 ± 0.0
P	*Bartonia paniculata*	Branched Bartonia				S2S3	3 Sensitive	4	68.4 ± 0.0
P	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S2S3	3 Sensitive	14	71.0 ± 0.0
P	*Geranium robertianum*	Herb Robert				S2S3	4 Secure	12	73.9 ± 1.0
P	*Myriophyllum quitense*	Andean Water Milfoil				S2S3	4 Secure	53	79.4 ± 0.0
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	3 Sensitive	55	7.9 ± 0.0
P	*Polygala sanguinea*	Blood Milkwort				S2S3	3 Sensitive	4	71.1 ± 0.0
P	*Polygonum buxiforme*	Small's Knotweed				S2S3	5 Undetermined	2	50.2 ± 7.0
P	*Polygonum raii*	Sharp-fruited Knotweed				S2S3	5 Undetermined	3	58.2 ± 5.0
P	*Rumex pallidus*	Seabeach Dock				S2S3	3 Sensitive	5	72.2 ± 0.0
P	*Plantago rugelii*	Rugel's Plantain				S2S3	Secure	2	57.0 ± 1.0
P	*Potentilla canadensis*	Canada Cinquefoil				S2S3	Sensitive	6	60.0 ± 5.0
P	*Galium aparine*	Common Bedstraw				S2S3	Sensitive	1	63.7 ± 0.0
P	*Galium labradoricum*	Labrador Bedstraw				S2S3	3 Sensitive	1	79.3 ± 1.0
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	Sensitive	22	57.8 ± 0.0
P	*Salix pellita*	Satiny Willow				S2S3	Sensitive	1	78.1 ± 7.0
P	*Veronica serpyllifolia ssp. humifusa*	Thyme-Leaved Speedwell				S2S3	Sensitive	1	96.2 ± 1.0
P	*Carex adusta*	Lesser Brown Sedge				S2S3	3 Sensitive	2	56.3 ± 7.0
P	*Carex houghtoniana*	Houghton's Sedge				S2S3	Sensitive	6	51.8 ± 3.0
P	*Carex swanii*	Swan's Sedge				S2S3	3 Sensitive	59	5.3 ± 0.0
P	*Eleocharis olivacea*	Yellow Spikerush				S2S3	3 Sensitive	18	34.2 ± 1.0
P	*Elodea canadensis*	Canada Waterweed				S2S3	Secure	1	79.8 ± 0.0
P	*Coeloglossum viride var. virescens*	Long-bracted Frog Orchid				S2S3	2 May Be At Risk	6	76.8 ± 14.0
P	*Listera auriculata*	Auricled Twayblade				S2S3	3 Sensitive	1	74.3 ± 1.0
P	*Poa glauca*	Glaucous Blue Grass				S2S3	3 Sensitive	6	95.5 ± 0.0
P	*Stuckenia filiformis ssp. alpina*	Thread-leaved Pondweed				S2S3	Sensitive	7	30.0 ± 7.0
P	*Potamogeton praelongus*	White-stemmed Pondweed				S2S3	4 Secure	10	72.8 ± 1.0
P	*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern				S2S3	3 Sensitive	5	64.8 ± 1.0
P	*Botrychium simplex*	Least Moonwort				S2S3	3 Sensitive	3	69.8 ± 1.0
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	3 Sensitive	10	36.2 ± 7.0
P	*Panax trifolius*	Dwarf Ginseng				S3	3 Sensitive	1	94.3 ± 0.0
P	*Artemisia campestris ssp. caudata*	Field Wormwood				S3	4 Secure	1	72.6 ± 0.0
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	4 Secure	2	80.9 ± 0.0
P	*Hieracium paniculatum*	Panicled Hawkweed				S3	4 Secure	19	8.1 ± 0.0
P	*Megalodonta beckii*	Water Beggarticks				S3	Secure	28	30.8 ± 0.0
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	4 Secure	2	82.5 ± 1.0
P	*Alnus serrulata*	Smooth Alder				S3	Sensitive	761	49.9 ± 0.0
P	*Betula pumila*	Bog Birch				S3	4 Secure	2	69.0 ± 1.0
P	*Arabis hirsuta var. pycnocarpa*	Western Hairy Rockcress				S3	4 Secure	5	72.9 ± 5.0
P	*Subularia aquatica var. americana*	Water Awlwort				S3	4 Secure	4	97.4 ± 0.0
P	*Campanula aparinoides*	Marsh Bellflower				S3	3 Sensitive	3	89.1 ± 1.0
P	*Lobelia cardinalis*	Cardinal Flower				S3	4 Secure	1	97.6 ± 0.0
P	*Minuartia groenlandica*	Greenland Stitchwort				S3	Sensitive	61	29.1 ± 0.0
P	*Stellaria humifusa*	Saltmarsh Starwort				S3	4 Secure	4	69.6 ± 0.0
P	*Hudsonia tomentosa*	Woolly Beach-heath				S3	4 Secure	3	88.0 ± 0.0

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P	*Crassula aquatica*	Water Pygmyweed				S3	4 Secure	12	70.3 ± 1.0
P	*Rhodiola rosea*	Roseroot				S3	4 Secure	37	64.1 ± 0.0
P	*Penthorum sedoides*	Ditch Stonecrop				S3	4 Secure	1	97.7 ± 0.0
P	*Elatine minima*	Small Waterwort				S3	4 Secure	9	75.4 ± 0.0
P	*Vaccinium caespitosum*	Dwarf Bilberry				S3	Secure	26	90.9 ± 0.0
P	*Vaccinium uliginosum*	Alpine Bilberry				S3	Sensitive	3	57.2 ± 0.0
P	*Hedysarum alpinum*	Alpine Sweet-vetch				S3	4 Secure	2	90.2 ± 0.0
P	*Bartonia virginica*	Yellow Bartonia				S3	4 Secure	42	54.8 ± 0.0
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	4 Secure	3	72.4 ± 0.0
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	4 Secure	10	58.2 ± 0.0
P	*Myriophyllum heterophyllum*	Variable-leaved Water Milfoil				S3	4 Secure	1	90.5 ± 0.0
P	*Myriophyllum verticillatum*	Whorled Water Milfoil				S3	4 Secure	5	72.0 ± 1.0
P	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3	4 Secure	6	73.0 ± 0.0
P	*Proserpinaca palustris*	Marsh Mermaidweed				S3	4 Secure	17	35.1 ± 0.0
P	*Proserpinaca palustris var. crebra*	Marsh Mermaidweed				S3	4 Secure	6	50.3 ± 0.0
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S3	Secure	91	28.9 ± 1.0
P	*Stachys tenuifolia*	Smooth Hedge-Nettle				S3	3 Sensitive	1	97.0 ± 0.0
P	*Teucrium canadense*	Canada Germander				S3	3 Sensitive	28	17.4 ± 1.0
P	*Utricularia radiata*	Little Floating Bladderwort				S3	4 Secure	20	70.4 ± 0.0
P	*Decodon verticillatus*	Swamp Loosestrife				S3	Secure	251	37.2 ± 1.0
P	*Rhexia virginica*	Virginia Meadow Beauty				S3	Secure	1482	29.1 ± 0.0
P	*Nuphar lutea ssp. pumila*	Small Yellow Pond-lily				S3	4 Secure	2	72.8 ± 0.0
P	*Epilobium hornemannii*	Hornemann's Willowherb				S3	4 Secure	3	78.5 ± 0.0
P	*Epilobium strictum*	Downy Willowherb				S3	4 Secure	11	67.0 ± 1.0
P	*Polygonum pensylvanicum*	Pennsylvania Smartweed				S3	4 Secure	9	31.7 ± 7.0
P	*Polygonum punctatum var. confertiflorum*	Dotted Smartweed				S3	4 Secure	7	70.0 ± 1.0
P	*Polygonum scandens*	Climbing False Buckwheat				S3	3 Sensitive	8	28.0 ± 7.0
P	*Littorella uniflora*	American Shoreweed				S3	4 Secure	3	95.4 ± 0.0
P	*Primula mistassinica*	Mistassini Primrose				S3	4 Secure	9	76.8 ± 1.0
P	*Primula laurentiana*	Laurentian Primrose				S3	4 Secure	24	8.7 ± 1.0
P	*Samolus valerandi ssp. parviflorus*	Seaside Brookweed				S3	Sensitive	20	83.2 ± 0.0
P	*Pyrola asarifolia*	Pink Pyrola				S3	4 Secure	2	13.9 ± 7.0
P	*Pyrola minor*	Lesser Pyrola				S3	Sensitive	3	7.2 ± 1.0
P	*Clematis occidentalis*	Purple Clematis				S3	4 Secure	3	79.5 ± 0.0
P	*Thalictrum venulosum*	Northern Meadow-rue				S3	4 Secure	2	83.1 ± 5.0
P	*Rhamnus alnifolia*	Alder-leaved Buckthorn				S3	Secure	1	5.4 ± 0.0
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	4 Secure	24	32.9 ± 5.0
P	*Amelanchier canadensis*	Canada Serviceberry				S3	4 Secure	4	85.8 ± 1.0
P	*Rosa palustris*	Swamp Rose				S3	4 Secure	10	74.4 ± 1.0
P	*Rubus chamaemorus*	Cloudberry				S3	4 Secure	52	64.8 ± 1.0
P	*Cephalanthus occidentalis*	Common Buttonbush				S3	Sensitive	1681	42.2 ± 7.0
P	*Salix nigra*	Black Willow				S3	3 Sensitive	2	83.8 ± 1.0
P	*Salix pedicellaris*	Bog Willow				S3	4 Secure	88	79.2 ± 1.0
P	*Salix petiolaris*	Meadow Willow				S3	4 Secure	6	22.1 ± 0.0
P	*Geocaulon lividum*	Northern Comandra				S3	4 Secure	10	66.4 ± 0.0
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3	4 Secure	209	10.8 ± 1.0
P	*Limosella australis*	Southern Mudwort				S3	4 Secure	19	69.2 ± 0.0
P	*Lindernia dubia*	Yellow-seeded False Pimperel				S3	Secure	4	57.9 ± 2.0
P	*Laportea canadensis*	Canada Wood Nettle				S3	3 Sensitive	1	80.6 ± 0.0
P	*Verbena hastata*	Blue Vervain				S3	Secure	3	50.8 ± 1.0
P	*Viola adunca*	Hooked Violet				S3	4 Secure	1	99.4 ± 1.0
P	*Viola nephrophylla*	Northern Bog Violet				S3	4 Secure	2	76.3 ± 0.0
P	*Carex atratiformis*	Scabrous Black Sedge				S3	4 Secure	1	72.8 ± 0.0
P	*Carex capillaris*	Hairlike Sedge				S3	4 Secure	2	72.8 ± 2.0
P	*Carex conoidea*	Field Sedge				S3	4 Secure	5	67.0 ± 1.0
P	*Carex exilis*	Coastal Sedge				S3	4 Secure	76	64.8 ± 1.0

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P	*Carex garberi*	Garber's Sedge				S3	3 Sensitive	1	90.9 ± 0.0
P	*Carex haydenii*	Hayden's Sedge				S3	4 Secure	5	75.0 ± 0.0
P	*Carex lupulina*	Hop Sedge				S3	4 Secure	19	57.9 ± 0.0
P	*Carex michauxiana*	Michaux's Sedge				S3	4 Secure	46	66.9 ± 0.0
P	*Carex rosea*	Rosy Sedge				S3	4 Secure	6	30.6 ± 4.0
P	*Carex wiegandii*	Wiegand's Sedge				S3	4 Secure	31	67.4 ± 0.0
P	*Carex recta*	Estuary Sedge				S3	4 Secure	4	68.3 ± 0.0
P	*Cyperus dentatus*	Toothed Flatsedge				S3	4 Secure	11	82.8 ± 5.0
P	*Eleocharis nitida*	Quill Spikerush				S3	4 Secure	8	22.0 ± 7.0
P	*Eleocharis rostellata*	Beaked Spikerush				S3	3 Sensitive	61	85.7 ± 0.0
P	*Eriophorum chamissonis*	Russet Cotton-Grass				S3	4 Secure	3	71.3 ± 1.0
P	*Rhynchospora fusca*	Brown Beakrush				S3	4 Secure	21	66.7 ± 0.0
P	*Schoenoplectus americanus*	Olney's Bulrush				S3	3 Sensitive	87	84.7 ± 5.0
P	*Trichophorum clintonii*	Clinton's Clubrush				S3	4 Secure	2	80.8 ± 0.0
P	*Schoenoplectus fluviatilis*	River Bulrush				S3	3 Sensitive	7	88.9 ± 0.0
P	*Juncus marginatus*	Grassleaf Rush				S3	3 Sensitive	32	18.1 ± 0.0
P	*Juncus subcaudatus var. planisepalus*	Woods-Rush				S3	3 Sensitive	22	28.5 ± 0.0
P	*Juncus dudleyi*	Dudley's Rush				S3	Secure	8	9.1 ± 2.0
P	*Triantha glutinosa*	Sticky False-Asphodel				S3	4 Secure	3	91.0 ± 0.0
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	3 Sensitive	4	80.9 ± 10.0
P	*Goodyera repens*	Lesser Rattlesnake-plantain				S3	3 Sensitive	9	49.0 ± 0.0
P	*Listera australis*	Southern Twayblade				S3	Secure	76	31.4 ± 0.0
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	4 Secure	17	8.2 ± 1.0
P	*Platanthera hookeri*	Hooker's Orchid				S3	4 Secure	11	50.2 ± 0.0
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	4 Secure	41	28.0 ± 7.0
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S3	Secure	36	55.1 ± 0.0
P	*Alopecurus aequalis*	Short-awned Foxtail				S3	Secure	2	84.7 ± 0.0
P	*Calamagrostis pickeringii*	Pickering's Reed Grass				S3	4 Secure	101	67.9 ± 0.0
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3	4 Secure	109	8.1 ± 0.0
P	*Panicum rigidulum var. pubescens*	Redtop Panic Grass				S3	Secure	1874	46.7 ± 0.0
P	*Panicum virgatum var. spissum*	Switch Grass				S3	Secure	1	74.5 ± 0.0
P	*Heteranthera dubia*	Water Stargrass				S3	4 Secure	12	74.5 ± 0.0
P	*Potamogeton obtusifolius*	Blunt-leaved Pondweed				S3	4 Secure	2	92.1 ± 0.0
P	*Sparganium natans*	Small Burreed				S3	4 Secure	2	31.4 ± 1.0
P	*Xyris montana*	Northern Yellow-Eyed-Grass				S3	4 Secure	17	70.8 ± 0.0
P	*Zannichellia palustris*	Horned Pondweed				S3	4 Secure	5	72.0 ± 1.0
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3	4 Secure	2	83.7 ± 1.0
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	Secure	7	15.3 ± 0.0
P	*Asplenium trichomanes-ramosum*	Green Spleenwort				S3	4 Secure	15	64.2 ± 0.0
P	*Woodwardia areolata*	Netted Chain Fern				S3	Secure	260	46.4 ± 0.0
P	*Dryopteris fragrans var. remotiuscula*	Fragrant Wood Fern				S3	4 Secure	2	78.8 ± 0.0
P	*Woodsia glabella*	Smooth Cliff Fern				S3	4 Secure	1	77.0 ± 1.0
P	*Equisetum variegatum*	Variegated Horsetail				S3	4 Secure	2	15.3 ± 2.0
P	*Isoetes tuckermanii*	Tuckerman's Quillwort				S3	4 Secure	2	83.0 ± 0.0
P	*Isoetes acadiensis*	Acadian Quillwort				S3	3 Sensitive	21	38.1 ± 0.0
P	*Huperzia appalachiana*	Appalachian Fir-Clubmoss				S3	3 Sensitive	3	66.6 ± 5.0
P	*Botrychium dissectum*	Cut-leaved Moonwort				S3	4 Secure	14	45.7 ± 1.0
P	*Schizaea pusilla*	Little Curlygrass Fern				S3	4 Secure	169	31.4 ± 1.0
P	*Asclepias incarnata ssp. pulchra*	Swamp Milkweed				S3?	Undetermined	8	59.2 ± 1.0
P	*Polygonum amphibium var. emersum*	Water Smartweed				S3?	Undetermined	23	77.1 ± 0.0
P	*Amelanchier stolonifera*	Running Serviceberry				S3?	4 Secure	30	16.2 ± 3.0
P	*Crataegus submollis*	Quebec Hawthorn				S3?	3 Sensitive	3	71.3 ± 1.0
P	*Carex cryptolepis*	Hidden-scaled Sedge				S3?	4 Secure	4	62.3 ± 3.0
P	*Carex tribuloides*	Blunt Broom Sedge				S3?	4 Secure	1	58.2 ± 0.0
P	*Carex foenea*	Fernald's Hay Sedge				S3?	4 Secure	2	56.8 ± 0.0
P	*Triglochin gaspensis*	Gasp ├⌐ Arrowgrass				S3?	Undetermined	20	32.0 ± 0.0
P	*Lycopodium sabinifolium*	Ground-Fir				S3?	4 Secure	3	71.1 ± 0.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Polypodium appalachianum*	Appalachian Polypody				S3?	5 Undetermined	8	67.6 ± 0.0
P	*Solidago latissimifolia*	Elliott's Goldenrod				S3S4	Secure	134	29.3 ± 0.0
P	*Lobelia kalmii*	Brook Lobelia				S3S4	4 Secure	6	73.9 ± 1.0
P	*Suaeda calceoliformis*	Horned Sea-blite				S3S4	Secure	14	31.1 ± 3.0
P	*Vaccinium corymbosum*	Highbush Blueberry				S3S4	Secure	510	36.5 ± 0.0
P	*Utricularia gibba*	Humped Bladderwort				S3S4	4 Secure	15	67.0 ± 1.0
P	*Polygonum fowleri*	Fowler's Knotweed				S3S4	Secure	1	92.2 ± 0.0
P	*Rumex maritimus*	Sea-Side Dock				S3S4		6	76.8 ± 14.0
P	*Potentilla arguta*	Tall Cinquefoil				S3S4	4 Secure	2	90.0 ± 0.0
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S3S4	4 Secure	45	5.3 ± 0.0
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S3S4	4 Secure	365	34.3 ± 0.0
P	*Carex argyrantha*	Silvery-flowered Sedge				S3S4	4 Secure	19	15.1 ± 5.0
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	4 Secure	11	77.7 ± 0.0
P	*Sisyrinchium atlanticum*	Eastern Blue-Eyed-Grass				S3S4	4 Secure	305	29.1 ± 2.0
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	Secure	18	67.3 ± 0.0
P	*Luzula parviflora*	Small-flowered Woodrush				S3S4	4 Secure	1	86.2 ± 7.0
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	3 Sensitive	3	72.4 ± 1.0
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	4 Secure	16	17.8 ± 1.0
P	*Panicum tuckermanii*	Tuckerman's Panic Grass				S3S4	Secure	27	42.3 ± 0.0
P	*Potamogeton oakesianus*	Oakes' Pondweed				S3S4	4 Secure	26	70.5 ± 0.0
P	*Stuckenia pectinata*	Sago Pondweed				S3S4	4 Secure	57	72.0 ± 1.0
P	*Equisetum hyemale var. affine*	Common Scouring-rush				S3S4	4 Secure	6	2.2 ± 0.0
P	*Equisetum scirpoides*	Dwarf Scouring-Rush				S3S4	4 Secure	3	2.2 ± 1.0
P	*Lycopodium complanatum*	Northern Clubmoss				S3S4	4 Secure	6	48.1 ± 1.0
P	*Bidens discoidea*	Swamp Beggarticks				SH	0.1 Extirpated	1	42.3 ± 0.0
P	*Solidago simplex var. randii*	Sticky Goldenrod				SH	0.1 Extirpated	1	61.3 ± 1.0
P	*Carex norvegica ssp. inferalpina*	Scandinavian Sedge				SH	0.1 Extirpated	1	97.8 ± 5.0
P	*Dichanthelium meridionale*	Matting Witchgrass				SH	0.1 Extirpated	3	10.0 ± 10.0
P	*Solidago caesia*	Blue-stemmed Goldenrod				SX	0.1 Extirpated	2	73.9 ± 1.0

5.1 SOURCE BIBLIOGRAPHY (100 km)

The recipient of these 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.

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# recs	CITATION
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1	Klymko, J.J.D. 2012. Insect fieldwork & submissions, 2011. Atlantic Canada Conservation Data Centre. Sackville NB, 760 recs.
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1	Maass, W.S.G. & Yetman, D. 2002. Assessment and status report on the boreal felt lichen (Erioderma pedicellatum) in Canada. Committee on the Status of Endangered Wildlife in Canada, 1 rec.
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1	MacKinnon, D.S. 2013. Email report of Peregrine Falcon nest E of St. Martins NB. NS Department of Environment and Labour, 1 record.
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1	Neily, P.D. Plant Specimens. Nova Scotia Dept Natural Resources, Truro. 2006.
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APPENDIX D
NOVA SCOTIA MUSEUM REPORT
HERITAGE AND BIOLOGICAL RESOURCES

NOVA SCOTIA

Communities, Culture & Heritage

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

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

May 22, 2015

Heather A. Levy
Envirosphere Consultants Limited
PO 2906 Unit 5 - 120 Morison Dr.
Windsor, NS. B0N 2T0

Dear Ms. Levy:

RE: Environmental Screening 15-04-29
Seabrook Quarry Expansion Project

Further to your request of April 29, 2015 staff at Communities, Culture and Heritage has reviewed their files for reference to the presence of natural resources in the study area. Please be aware that the information is not comprehensive, and may include varying degrees of accuracy with respect to the precise location and condition of natural 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 natural resources in this area.

Archaeology

There are no recorded archaeological sites on file for the proposed study area. There are several recorded archaeology sites on file in the surrounding vicinity of the study area. The study area intersects with a watercourse. Historic maps indicate settlement.

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

Botany

Staff has reviewed the records for plant species-at-risk. The following plants should be considered prior to any habitat alteration at this site. All are known from the area within the footprint or in adjacent areas.

Presence/absence of these species-at-risk should be noted in the report. The color ranks are those assigned by the national General Statues of Species in Canada, with Red being the highest priority.

Allium tricoccum Orange
Allium burdickii Orange
Carex swanii Yellow
Epilobium coloratum Yellow
Utricularia resupinata Orange

Zoology

Staff has reviewed the zoological records for species of concern for the site indicated. There are no zoological records for the foot-printed site. However, there are nesting or possible nesting records of bird species with conservation concern within the general area.

Spotted Sandpiper
Wilson's Snipe
Black-billed Cuckoo
Common Loon
Rose-breasted Grosbeak
Gray Jay
Pine Grosbeak
Pine Siskin
Barn Swallow
Cliff Swallow
Tree Swallow
Bobolink
Gray Catbird
Boreal Chickadee
Canada Warbler
Golden-crowned Kinglet
Eastern Wood Peewee

There are other species with conservation concern within 100 km of the site, but these are primarily Marine aquatic species as well as some herptiles that are not recorded from the area under consideration.

There is still a residual population of Myotine Bats (Myotis lucifugus, Myotis septentrionalis and Perimyotis subflavus) within this portion of the province. Due to the loss of most of these species through the appearance of White Nose Syndrome, any occurrence of these, be it in hibernation, or in foraging activity would be significant from a conservation concern, so the proponent should monitor for the existence of hibernation sites as well as habitat use by these species.

NOVA SCOTIA

Communities, Culture & Heritage

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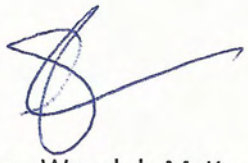
If you have any questions, please contact me at 424-6475.

Sincerely,



Sean Weseloh-McKeane
Coordinator, Special Places

Enclosure

APPENDIX E
LABORATORY RESULTS
TSS & pH

Envirosphere Consultants Limited

Unit 5—120 Morison Drive, Box 2906, Windsor, Nova Scotia, B0N 2T0

ph: (902) 798-4022, fax: (902) 798-2614, e-mail: enviroco@ns.sympatico.ca, website: www.envirosphere.ca

Envirosphere Consultants Ltd.
P.O. Box 2906, Unit 5 - 120 Morison Dr.
Windsor, Nova Scotia B0N 2A0

Environmental Sample Analysis Report

Report Date: 29-Jun-15 Report Number: A0517

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	TSS (mg/L)	Type of Sample	Detection Limit	Sample Comments
L2015-33	W1	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	110.5	REG	0.5 mg/L	algae organic debris
L2015-33	W2	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	<0.5	REG	0.5 mg/L	
L2015-33	W3	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	0.5	REG	0.5 mg/L	
L2015-33	W3	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	<0.5	DUP	0.5 mg/L	
L2015-33	W4	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	58.0	REG	0.5 mg/L	fine organic particles
L2015-33	W5	Seabrook Quarry	Stream water	18/06/2015	28/06/2015	0.5	REG	0.5 mg/L	
L2015-33	CRM	Seabrook Quarry	CRM	18/06/2015	28/06/2015	222.5	STD	0.5 mg/L	CRM = 213 mg/L
L2015-33	Blank	Seabrook Quarry	BLANK	18/06/2015	19/06/2015	<0.5	BLANK	0.5 mg/L	

Name of Analyst: P. Stewart 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

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

Environmental Sample Analysis Report

Report Date: 19-Jun-15 Report Number: A0515

Lab #	Sample ID	Sample Details	Sample Material	Date Received	Date Analyzed	pH	Type of Sample	Detection Limit	Sample Comments
L2015-33	W1	Seabrook Quarry	CRM	18/06/2015	19/06/2015	7.0	STD	0.1	CRM pH= 7.00 +/- 0.01
L2015-33	W1	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	7.1	REG	0.1	clear, pale yellow c/w filam algae
L2015-33	W2	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	5.9	REG	0.1	clear, very pale yellow
L2015-33	W3	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	5.7	REG	0.1	clear, pale yellow
L2015-33	W3	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	5.7	DUP	0.1	clear, pale yellow
L2015-33	W4	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	6.4	REG	0.1	clear, very pale yellow
L2015-33	W5	Seabrook Quarry	Stream water	18/06/2015	19/06/2015	6.9	REG	0.1	clear, colorless

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

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

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

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

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

Method: Standard Methods for the Examination of Water and Wastewater 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.