

Provided the proposed mitigative measures are applied, no residual effects on aquatic habitat and fauna are expected as a result of these incidents.

8.3 Terrestrial Flora

8.3.1 Description of Existing Conditions

Forests in this Ecoregion are mostly coniferous and comprise of black spruce, white spruce (*Picea glauca*) and balsam fir. Red spruce (*Picea rubens*) is notably absent. Some tolerant hardwood stands made up of yellow birch (*Betula alleghaniensis*) and red maple are found in sheltered areas. Forests are rooted in shallow organic soils and are prone to blow down in strong fall storms. Bogs and saltmarshes are prevalent throughout this eco region (Webb and Marshall 1999).

Habitat mapping (NSDNR 2013a) suggests that the vast majority of the Project Area is forested, with softwood forest being the dominant habitat feature (Table 8.4; Drawing 8.5).

Table 8.4: Habitat Types at the Project Area

| Habitat Type | Area (Ha) | Proportion of Project Area |
|--------------|--------------|----------------------------|
| Clear-cut | 5.01 | 30% |
| Softwood | 11.73 | 70% |
| Total | 16.74 | 100% |

Source: NSDNR 2013a

Aerial imagery, combined, with field observations, reveal that the dominant habitat is indeed softwood forest. However, the proportion of intact forest stands is currently less than the habitat mapping suggests due to forestry activity that has taken place in the last 5 to 10 years. Approximately 2 ha of forested land in the northeastern extent of the Project Area has been converted to a Christmas tree farm, and approximately 6 ha of forested land in the southern extent of the Project Area has been cutover.

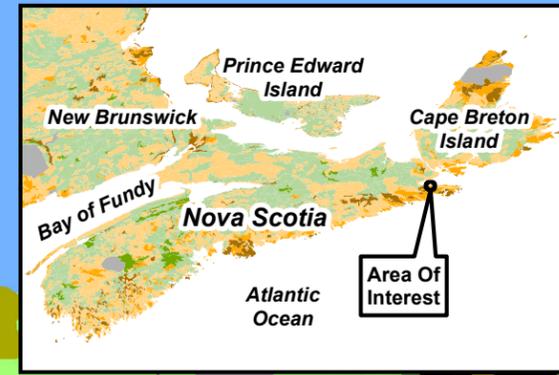
Intact forest stands within the Project are varied in composition depending on topography. North facing slopes are covered with white spruce, black spruce and balsam fir trees. Flat areas are a mosaic of somewhat exposed rock barrens scantily covered by black huckleberry (*Gaylussacia baccata*) and sheep laurel (*Kalmia angustifolia*) shrubs, amongst even-aged balsam fir stands. South facing slopes are covered by balsam fir and black spruce stands amongst wind throw areas characterized by dense balsam sapling fir regeneration.

A review of the Atlantic Canada Conservation Data Center (ACCDC) database for plant species recorded within a 100 km radius of the Project Area was completed for the purposes of the EA.

ACCDC records indicate that 177 flora species have been identified within 100 km of the Project Area. Of the 177 species identified by ACCDC, 158 are considered SOCI. This preliminary list was used to develop a short list of plant SOCI that might be present within the Project Area (Table F1; Appendix F).



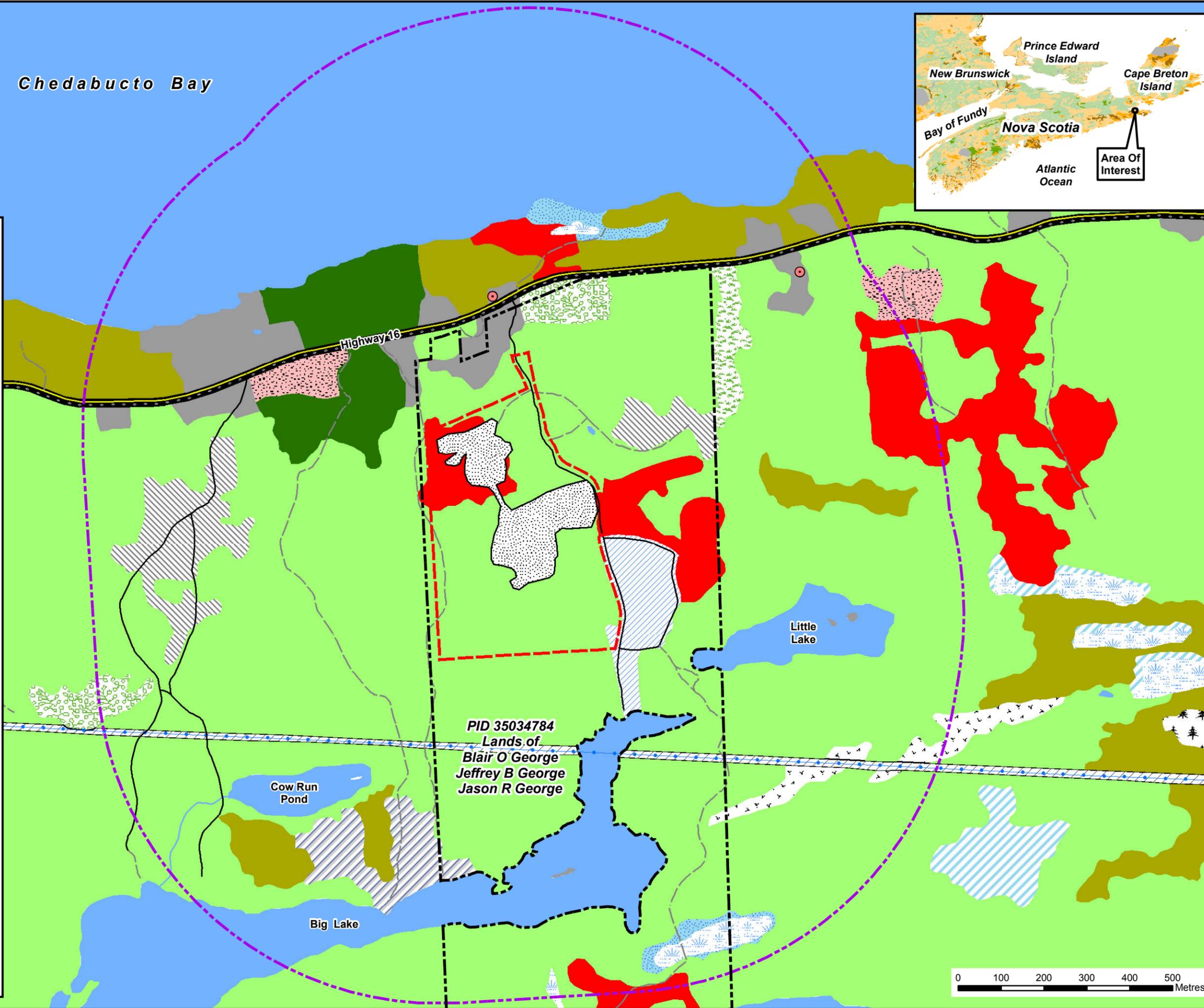
Chedabucto Bay



- Notes:**
- Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre. Forestry Inventory, Land Classification and Mineral Resources Data by Nova Scotia Department of Natural Resources (NS DNR).
 - Projection: NAD83(CSRS), UTM Zone 20 North.

Legend:

- Abandoned Mine Locations (Yellow triangle)
- DRILLED Water Well (Red circle with dot)
- DUG Water Well (Green circle with dot)
- Mineral Occurrences**
 - Coal (Purple dot)
 - Industrial (Blue dot)
 - Metallic (Yellow dot)
 - Metallic and Industrial (Orange dot)
- Project Property (Dashed black line)
- 800m Quarry Buffer (Dashed purple line)
- Project Area (Dashed red line)
- Existing Quarry (Stippled pattern)
- Major Roads and Highways (Thick black line)
- Public Roads (Thin black line)
- Access Roads / Trails (Thin grey line)
- Existing Transmission Lines (Blue line with dots)
- Mapped Stream (Blue line)
- Mapped Indefinite Stream (Dashed blue line)
- Mapped Wet Area (Blue area with wavy lines)
- Water Bodies (Blue area)
- Forested Land (Type)**
 - Softwood (Light green)
 - Mixedwood (Dark green)
 - Hardwood (Olive green)
- Non-Forested Land (Type)**
 - Untreated Natural Stand (Diagonal hatching)
 - Treated Stand (Blue diagonal hatching)
 - Christmas Trees (Green tree symbols)
 - Old Field (Stippled pattern)
 - Dead Stand (Grey hatching)
 - Brush (Green brush symbols)
 - Clear Cut (Red area)
 - General Wetlands (Blue wavy lines)
 - Open Bogs (Blue wavy lines)
 - Treed Bogs (Green tree symbols)
 - Lake/River Wetland (Blue wavy lines)
 - Rock Barren (Grey hatching)
 - Barren (Grey hatching)
 - Urban and Miscellaneous (Grey area)
 - Beach (Stippled pattern)
 - Powerline Corridor (Diagonal hatching)
 - Road Corridor (Black area)



Chedabucto Aggregates Quarry Expansion

Land Classification & Habitat Types



| | |
|------------------------|--------------------------|
| Date: August 2014 | Project #: 13-4880 |
| Scale: 1:9,000 | Drawing #: 8.5 |
| Drawn By: H. Serhan | Checked By: C. Baker |



CCH also identified 3 plant species previously observed in the vicinity of Halfway Cove, NS in an Environmental Screening letter for the Project (Appendix G). These species are:

- Acadian quillwort (*Isoetes acadiensis*) – “Yellow”(NSDNR)
- Northern camandra (geocaulon lividum) – “Yellow” (NSDNR)
- Oval-leaved bilberry (*Vaccinium ovalifolium*) – “Red” (NSDNR)

A plant survey was completed on the Project Area on July 3rd and 4th, 2014. A complete list of plant species identified during the surveys is provided in Appendix F (Table F2). No plant SOCI were observed in the Project Area, including the 3 species identified in the environmental screening prepared by CCH.

8.3.2 Potential Interactions and Effects

The Project has the potential to influence plant communities as a result of direct habitat loss and plant mortality, and indirectly through changes in habitat conditions, such as altered hydrological regimes.

The potential for accidental spills on site exists during construction and operation activities, though should be mitigated through adherence to standard BMPs and the EPP.

8.3.3 Proposed Mitigation and Protective Measures

Standard mitigative measures to minimize the environmental effects of the Project on terrestrial flora include:

- Minimize clearing to the extent possible.
- Implementation of the EPP, including the spill prevention plan and contingency plans (as necessary).
- Introduction of invasive species will be controlled during clearing phases.
- Species found on the site that are considered sensitive by NSDNR should be safeguarded by symbolic fencing off from development or, only where this is not possible, be transplanted to appropriate habitat on site.
- General mitigation measures for the management of wastes, wastewaters and hazardous materials, ESC and surface water and wetland protection (Section 8.2) also contribute to the overall protection of flora species and habitat.

8.3.4 Proposed Monitoring and Follow-Up Programs

A preliminary Rehabilitation Plan will be submitted to NSE for review and approval as part of the Approval amendment application (Section 4.6). The Plan will incorporate vegetation into landscaping plans and ensure that all vegetation used in landscaping plans are native species only. Site rehabilitation will be completed to the satisfaction of NSE.

8.3.5 Expected Residual Effects

Using criteria based on federal and provincial EA guidance (outlined in Section 7.0) an analysis of residual effects on terrestrial flora from the Project is provided in Table 8.5.

Table 8.5: Residual Effects Analysis

| VEC | Phase | Significance Criteria | Residual Effects | Significance of Residual Effects |
|--------------------------|-----------------------------------|--|------------------|----------------------------------|
| Terrestrial Flora | Site Preparation and Construction | Scope: Local Duration: Medium to Long-term Frequency: Continuous Magnitude: Low | Low | Not Significant |
| | Operations and Maintenance | Scope: Local Duration: Medium to Long-term Frequency: Continuous Magnitude: Low | Low | Not Significant |
| | Accidents and Malfunctions | None expected | n/a | n/a |

The field surveys did not reveal the presence of any rare or sensitive plants within the Project area. Furthermore, the habitats present within the expansion area are common throughout the remainder of the Project property and surrounding lands.

Risks to terrestrial flora due to accidents or malfunctions are expected to be addressed through the implementation of the mitigation strategies above, and the EPP. Provided the proposed mitigative measures are applied, no residual effects on terrestrial flora are expected as a result of these incidents.

Project activities are not expected to result in any significant residual effects to terrestrial flora and habitat, following the application of the mitigation measures and implementation of the site rehabilitation plan.

8.4 Terrestrial Fauna and Habitat

8.4.1 Description of Existing Conditions

Information regarding fauna and associated habitat at the Project site, including any SOCI, was obtained through a combination of desktop review and field studies.

The desktop component included a review of the NS Significant Species and Habitat Database (NSDNR 2013a) and ACCDC data (ACCDC 2013) for species recorded within a 100 km radius of the Project site. A comparison of habitat mapping data to known habitat requirements for species expected to occur within the area, and for all SOCI, was also completed. Field surveys were completed between March and July, 2014.

Mammals

The ACCDC database (2014) indicates that five terrestrial mammal SOCI have been recorded within a 100 km radius of the Project Area (Table 8.6).

Table 8.6: Mammal SOCI Recorded within a 100 km radius of the Project Area

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|-----------------------|-------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| American Marten | <i>Martes americana</i> | Not Listed | Endangered | Not Listed | Red |
| Canadian Lynx | <i>Lynx canadensis</i> | Not Listed | Endangered | Not at Risk | Red |
| Cougar - Eastern pop. | <i>Puma concolor cougar</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Long-tailed Shrew | <i>Sorex dispar</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Mainland Moose | <i>Alces alces americanus</i> | Not Listed | Endangered | Not Listed | Red |

Source: ACCDC 2014

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

Field studies (from March to July, 2014) of mammalian fauna at or near the Project Area consisted of direct observation of individuals, as well as the indirect identification of species by sound and/or sign (e.g., scat, tracks, scent, dens, lodges, etc.).

Two surveys were completed for Mainland Moose: a snow tracking survey (March 2014); and a targeted pellet count survey (May 2014). A detailed methodology for the pellet count survey is provided in Appendix H.

Table 8.7 lists the mammal species observed/identified at or near the Project Area during field studies.

Table 8.7: Mammal Species Observed during Field Studies

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|--------------------|-------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| American porcupine | <i>Erethizon dorsatum</i> | Not Listed | Not Listed | Not at Risk | Green |
| Bobcat | <i>Lynx rufus</i> | Not Listed | Not Listed | Not Listed | Green |
| Snowshoe hare | <i>Lepus americanus</i> | Not Listed | Not Listed | Not Listed | Green |
| White-tailed deer | <i>Odocoileus virginianus</i> | Not Listed | Not Listed | Not Listed | Green |
| Red Squirrel | <i>Sciurus vulgaris</i> | Not Listed | Not Listed | Not Listed | Green |
| Eastern Coyote | <i>Canis latrans</i> | Not Listed | Not Listed | Not Listed | Green |

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

Priority mammal species include:

- American Marten – “Endangered” (NS ESA), “Red” (NSDNR);
- Canada Lynx – “Endangered” (NS ESA), “Red” (NSDNR);
- Eastern Cougar – “Yellow” (NSDNR);
- Long-tailed Shrew – “Yellow” (NSDNR); and
- Mainland Moose – “Endangered” (NS ESA), “Red” (NSDNR).

American Marten

American marten prefer mature coniferous forests, and have been more recently observed in mixed forests and cutovers (MTRI 2008). Although these types of habitat are prevalent at the Project Area, the current known distribution of the American marten in Nova Scotia is limited to Cape Breton and the southwestern part of the province, near Yarmouth (NSDNR 2013d).

It is therefore unlikely that the Project will interact with American marten populations and no further consideration of effects and mitigation for this species has been undertaken.

Canada Lynx

The distribution of Canada lynx is limited to the availability of extensive coniferous forests and distribution of Snowshoe hare (*Lepus americanus*) (main prey item), and in Nova Scotia the Canada lynx is limited to the Cape Breton Highlands (MTRI 2008). Although individuals may travel great distances in times of food scarcity (as cited in Parker 2001), potentially passing through the Project Area, the possibility of this occurring during the construction and operation phase of the Project is highly unlikely.

The Project, therefore, is not expected to interact with Canada lynx and no further consideration of effects and mitigation for this species has been undertaken.

Eastern Cougar

Cougars are also known as mountain lions and used to be found from the Yukon to Chile and east to Nova Scotia. The cougar still occurs regularly in British Columbia and the Rocky Mountains of Alberta, though populations have been greatly reduced or even extirpated from central and eastern Canada. A variety of forested habitats are used by this solitary, nocturnal hunter, which feeds mostly on large mammals, including deer, moose, porcupine, beaver, snowshoe hare, mice, and birds.

The cougar is not considered threatened in Canada, however the population of the eastern subspecies (*Felis concolor cougar*) is listed separately as a species-at-risk (NSDNR 2013d). Sightings of eastern cougars are reported on occasion in Nova Scotia, but there has been no tangible evidence to confirm their presence in recent years. All reported sightings are recorded and investigated by wildlife agencies. It is considered unlikely that there is a breeding population of eastern cougar in the province. Due to the very low probability of the Project interacting with eastern cougar, no further consideration of effects and mitigation for this species has been undertaken.

Long-tailed Shrew

Long-tailed shrew are closely associated with steep, talus slopes, usually close to running water, and the presence of rocks is considered a principal habitat component (Kirkland 1981). This species is thought to be found only in the Cobequid Mountains, approximately 215 km from the Project Area (Scott 1987; Woolaver *et al.* 1998).

It is therefore unlikely that the Project will interact with and/or impact Long-tailed shrew populations and no further consideration of effects and mitigation for this species has been undertaken.

Mainland Moose

Habitat requirements for Mainland Moose change throughout the year. Early successional growth, such as that provided by regenerating cutovers, offers quality foraging habitat for moose, and interspersed wetlands provide suitable summer habitat for cows and calves (Parker 2003; Snaith and Beazley 2004). Mature softwood forest is used as escape cover throughout the year, and also provides thermal relief during the summer months (Broders et al. 2012) and relief from deep snows in winter (Telfer 1970).

Five significant concentration areas for Mainland Moose have been identified in Nova Scotia (NSDNR 2012c). The Project Area is situated within the western extent of one such concentration area. This concentration area encompasses 366 km² of land that stretches from Halfway Cove Lake (5k southwest of the Project Area) to the town of Canso NS (37 km east of the Project Area).

Two targeted surveys were conducted for Mainland Moose on and near the Project Area. The first was a snow tracking survey conducted on March 29th, 2014. For this survey, 4.3 km of transects within 1 km of the Project Area (Drawing 8.6) were surveyed for sign of moose and other terrestrial fauna. This constituted a search area of approximately 2.15 ha through habitat types that included middle age to mature softwood forests dominated by black spruce and balsam fir, as well as open shrub barrens and softwood treed swamps. The second targeted survey to search for sign of Mainland Moose was a pellet count survey conducted on May 8th, 2014. Ten kilometers of transects within 2 km of the Project Area were surveyed for sign of Mainland Moose, encompassing a search area of approximately 4.96 ha. Habitat assessed during this survey included middle aged to mature softwood forest, regenerating softwood forest, middle aged mixed wood forest, open shrub barrens, softwood swamps and basin bogs.

Despite the presence of relatively un-fragmented habitat that appears to provide for the varied requirements of Mainland Moose, no signs of this species were observed during these targeted surveys. This is indicative of a low population density of Mainland Moose in the area of the Project Area. However, due to the proximity of the Project Area to Mainland Moose concentration area, interaction with the Project cannot be ruled out. This species is therefore considered further through the residual effects analysis.

Herpetofauna

Data from the ACCDC (2014) indicate that two herpetofauna SOCI have been recorded within a 100 km radius of the Project Area (Table 8.8).

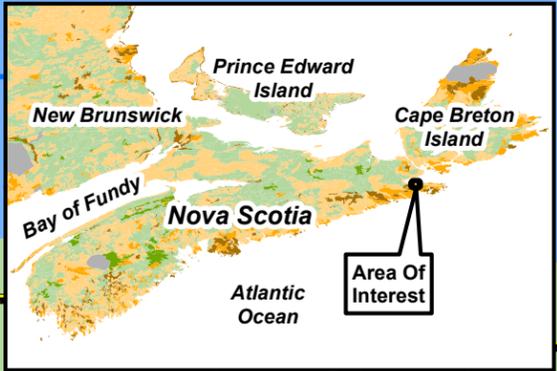
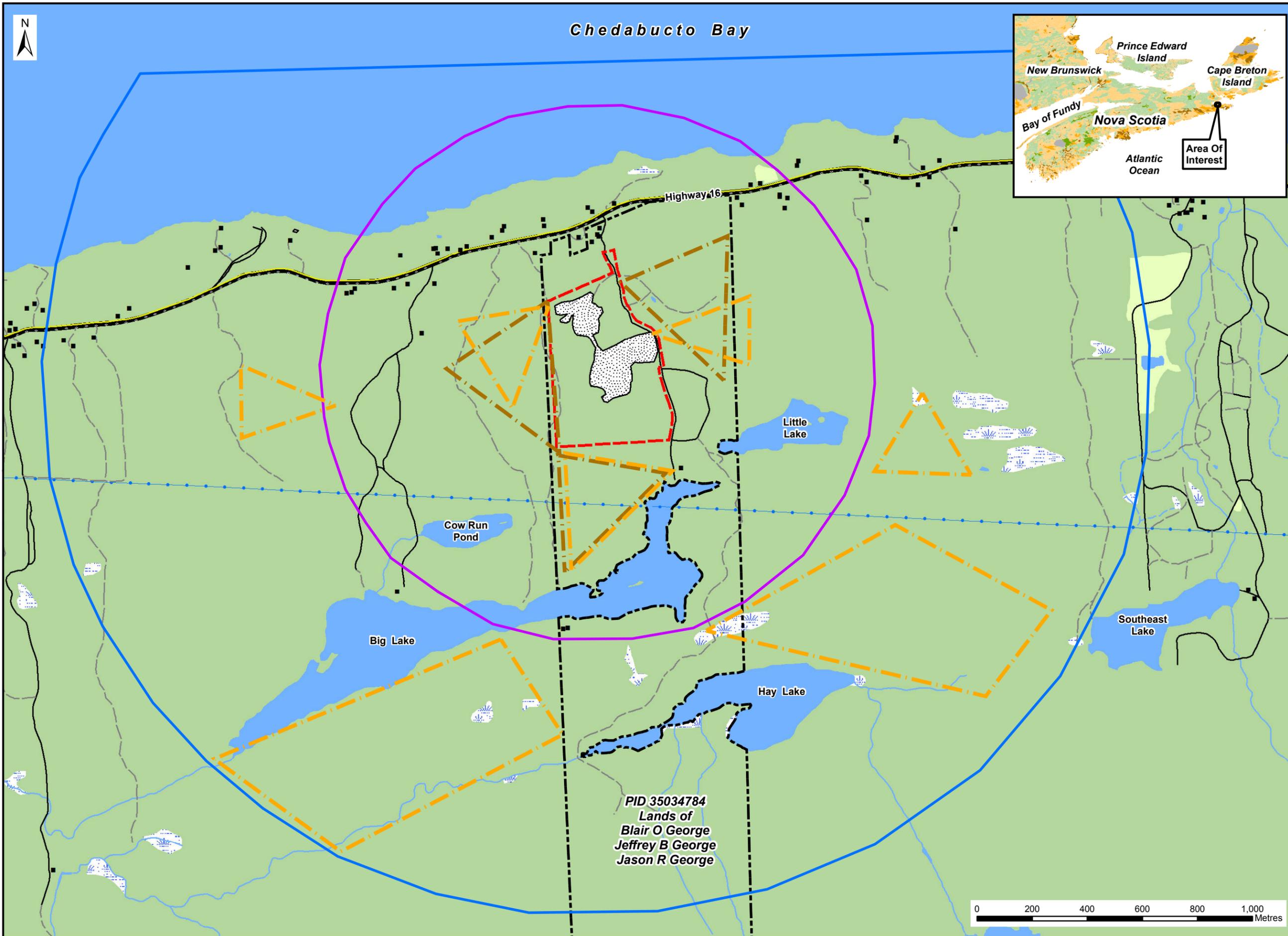
Table 8.8: Herpetofauna SOCI Recorded by ACCDC within a 100 km radius of the Project Area

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|-----------------|----------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| Snapping turtle | <i>Chelydra serpentina</i> | Special Concern | Vulnerable | Special Concern | Green |
| Wood turtle | <i>Glyptemys insculpta</i> | Threatened | Threatened | Threatened | Yellow |

Source: ACCDC 2014

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

The same data limitations and interpretations as noted for the mammalian fauna (above) are also applicable to the reptile and amphibian data.



- Notes:**
- Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre.
 - Projection: NAD83(CSRS), UTM Zone 20 North.
 - GPS Data Collected is Typically to +/-5m Accuracy.

- Legend:**
- Spring Pellet Group Transects
 - Winter Snowtracking Transects
 - Pulsifer Survey Area Bands (Radius)**
 - 1km Radius
 - 2km Radius
 - Project Property
 - Project Area
 - Existing Quarry
 - Building
 - Public Roads
 - Access Roads / Trails
 - Major Roads and Highways
 - Existing Transmission Lines
 - Large Structure
 - Mapped Stream
 - Mapped Indefinite Stream
 - Water Bodies
 - Mapped Wet Area
 - Cleared Area

**Chedabucto
Aggregates
Quarry Expansion**

**Mainland Moose
Survey Transects**



| | |
|-------------------------|------------------------------|
| Date: August 2014 | Project #: 13-4880 |
| Scale: 1:13,000 | Drawing #: 8.6 |
| Drawn By: H. Serhan | |
| Checked By: C. Baker | |



Field studies of amphibian and reptile species were conducted in conjunction with other surveys between April and July, 2014. Species were either identified directly through visual observation, or indirectly using other evidence (e.g., calls, egg masses, tadpoles, etc.). Table 8.9 lists the amphibian and reptile species identified at or near the Project Area during field studies.

Table 8.9: Herpetofauna Species Recorded During Field Studies

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|---------------|-----------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| Green frog | <i>Lithobates clamitans</i> | Not Listed | Not Listed | Not Listed | Green |
| Spring peeper | <i>Pseudacris crucifer</i> | Not Listed | Not Listed | Not Listed | Green |

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

Priority herpetofauna species include:

- Snapping turtle – “Threatened” (SARA), “Threatened” (NS ESA), “Threatened” (COSEWIC), “Yellow” (NSDNR).
- Wood turtle – “Special concern” (SARA), “Vulnerable” (NS ESA), “Special concern” (COSEWIC), “Green” (NSDNR);

None of the priority species listed above were observed during field studies.

Snapping turtle

Common snapping turtle, despite its conservation status, is considered relatively common in mainland Nova Scotia (Davis and Browne 1996). Snapping turtle habitat is usually associated with slow moving water of moderate depth, with a muddy bottom and dense vegetation. Established populations are typically found in ponds, lakes and river edges (COSEWIC 2009a). There are no watercourse nor water bodies within the Project area, so it is unlikely that Snapping turtle would occur on-site. The closest water body that may provide suitable habitat for the Snapping turtle is Big Lake, located approximately 150m south of the Project area.

The quarry operation will not impact Big Lake, or any of its major tributaries, so the Project is not expected to interact with the Snapping turtle or its habitat. No further consideration of effects and mitigation for this species will be examined.

Wood turtle

Wood turtle requires three key habitat components: a watercourse, sandy substrate for nesting, and a forested area for thermal relief during the summer months (MacGregor and Elderkin 2003). Ideal streams have a clear, moderate flow, a hard bottom composed of sand or gravel, and are seven to 100 feet wide (MacGregor and Elderkin 2003). The species is found throughout the province but seems to be most abundant in central Nova Scotia (MacGregor and Elderkin 2003). Suitable habitat for this species is not present within the Project area.

It is possible that Wood turtles may be present in Big Lake or its tributaries, yet none of these features will be impacted by the Project. Therefore no interaction with Wood turtles or their habitat is expected. No further consideration of effects and mitigation for this species has been examined.

Butterflies and Odonates

The ACCDC database contains records of 17 unique taxa of butterfly and Odonates within a 100 km radius of the Project Area (Table 8.10). The database contains no records of butterflies or Odonates within a 30 km radius of the Project site.

Table 8.10: Butterfly and Odonate SOCI Recorded by ACCDC within a 100 km radius of the Project Area

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|--------------------------|--------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| Monarch | <i>Danaus plexippus</i> | Special Concern | Not Listed | Special Concern | Yellow |
| Hoary Comma | <i>Polygonia gracilis</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Brook Snaketail | <i>Ophiogomphus aspersus</i> | Not Listed | Not Listed | Not Listed | Red |
| Maine Snaketail | <i>Ophiogomphus mainensis</i> | Not Listed | Not Listed | Not Listed | Red |
| Short-tailed Swallowtail | <i>Papilio brevicauda</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Northern Cloudywing | <i>Thorybes pylades</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Mustard White | <i>Pieris oleracea</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Banded Hairstreak | <i>Satyrium calanus</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Arctic Fritillary | <i>Boloria chariclea</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Harpoon Clubtail | <i>Gomphus desertus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Forcinate Emerald | <i>Somatochlora forcipata</i> | Not Listed | Not Listed | Not Listed | Red |
| Spot-Winged Glider | <i>Pantala hymenaea</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Jutta Arctic | <i>Oeneis jutta</i> | Not Listed | Not Listed | Not Listed | Red |
| Ocellated Darner | <i>Boyeria grafiana</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Harlequin Darner | <i>Gomphaeschna furcillata</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Black Meadowhawk | <i>Sympetrum danae</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Striped Hairstreak | <i>Satyrium liparops</i> | Not Listed | Not Listed | Not Listed | Undetermined |

Source: ACCDC 2014

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

Monarch

Only the Monarch has been granted a designated conservation status at either the provincial or federal level. This species can be found in open-habitats with abundant wildflower growth. Milkweed (*Asclepias spp.*) is a critical element of breeding habitat, whereas asters (*Asteraciae spp.*) and goldenrods (*Solidago spp.*) provide necessary food resources during migration (MTRI 2008). Nova Scotia falls within the breeding range of this migratory species (COSEWIC 2010a), and individuals can be found throughout the province from May to October (Maritime Butterfly Atlas 2012).

No indication of Monarch was observed during field surveys. Open habitat at the Project Area is prevalent, particularly in cutovers areas, along roadsides and within the existing quarry area. Considering the widespread distribution of the species in Atlantic Canada, it is possible that Monarch occurs at the Project site, particularly during the migratory period (late summer/early fall). However, despite the presence of a number of asters and goldenrods, it is unlikely that the Project Area provides sufficient nectar resources to support a large congregation of migratory Monarchs as these

flowers are not present in abundance. However, because the presence of the Monarch at the Project Area cannot be ruled out, this species is assessed further through residual effects analysis.

Birds

The closest Important Bird Area (IBA) in Canada (IBA Canada 2013) is the Country Island Complex, Country Harbour/Tor Bay NS located approximately 16 km south of the Project Area. This IBA is classified as a globally significant site due to its concentrations of congregatory species and colonial waterbirds/seabirds, and nationally significant for threatened species including the Roseate Tern (*Sterna dougallii*), Common Tern (*Sterna hirundo*), and Arctic Tern (*Sterna paradisaea*).

The Project Area is contained within map squares 20PR32 of the Maritime Breeding Bird Atlas (MBBA) (MBBA 2014). In the most recent edition of the MBBA (2006-2010), 73 species were identified as being possible, probable, or confirmed breeders within this area. The following avian SOCI are considered possible, probable, or confirmed breeders in the survey area:

- Barn Swallow (*Hirundo rustica*) – “Endangered” (NS ESA), “Threatened” (COSEWIC), “Yellow” (NSDNR);
- Bay-breasted Warbler (*Dendroica castanea*) – “Yellow” (NSDNR);
- Black-backed Woodpecker (*Picoides arcticus*) – “Yellow” (NSDNR);
- Boreal Chickadee (*Poecile hudsonicus*) – “Yellow” (NSDNR);
- Common Loon (*Gavia immer*) – “Red” (NSDNR);
- Common Tern (*Sterna hirundo*) - “Yellow” (NSDNR);
- Golden-crowned Kinglet (*Regulus satrapa*) – “Yellow” (NSDNR);
- Gray Catbird (*Dumetella carolinensis*) – “Red” (NSDNR);
- Gray Jay (*Perisoreus canadensis*) – “Yellow” (NSDNR);
- Olive-sided Flycatcher (*Contopus cooperi*) – “Threatened” (SARA), “Threatened” (NS ESA), “Threatened” (COSEWIC), “Red” (NSDNR);
- Ruby-crowned Kinglet (*Regulus calendula*) – “Yellow” (NSDNR);
- Spotted Sandpiper (*Actitis macularius*) – “Yellow” (NSDNR);
- Tennessee Warbler (*Vermivora peregrine*) – “Yellow” (NSDNR);
- Tree Swallow (*Tachycineta bicolor*) – “Yellow” (NSDNR);
- Wilson’s Warbler (*Wilsonia pusilla*) – “Yellow” (NSDNR); and
- Yellow-bellied Flycatcher (*Empidonax flaviventris*) – “Yellow” (NSDNR).

Table 8.11 presents bird SOCI recorded within a 100 km radius of the Project Area, according to ACCDC (2014).

Table 8.11: Bird SOCI Recorded within a 100 km Radius of the Project Area

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|--------------------------------|------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| American Bittern | <i>Botaurus lentiginosus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| American Golden-Plover | <i>Pluvialis dominica</i> | Not Listed | Not Listed | Not Listed | Yellow |
| American Three-toed Woodpecker | <i>Picoides dorsalis</i> | Not Listed | Not Listed | Not Listed | Undetermined |

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|---------------------------|----------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| Arctic Tern | <i>Sterna paradisaea</i> | Not Listed | Not Listed | Not Listed | Red |
| Baltimore Oriole | <i>Icterus galbula</i> | Not Listed | Not Listed | Not Listed | Red |
| Bank Swallow | <i>Riparia riparia</i> | Not Listed | Threatened | Not Listed | Red |
| Barn Swallow | <i>Hirundo rustica</i> | Not Listed | Endangered | Threatened | Yellow |
| Bay-breasted Warbler | <i>Dendroica castanea</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Bicknell's Thrush | <i>Catharus bicknelli</i> | Threatened | Endangered | Threatened | Red |
| Black-backed Woodpecker | <i>Picoides arcticus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Black-billed Cuckoo | <i>Coccyzus erythrophthalmus</i> | Not Listed | Not Listed | Not Listed | Red |
| Black-crowned Night-heron | <i>Nycticorax nycticorax</i> | Not Listed | Not Listed | Not Listed | Red |
| Black-legged Kittiwake | <i>Rissa tridactyla</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Blackpoll Warbler | <i>Dendroica striata</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Blue-winged Teal | <i>Anas discors</i> | Not Listed | Not Listed | Not Listed | Red |
| Bobolink | <i>Dolichonyx oryzivorus</i> | Not Listed | Vulnerable | Threatened | Yellow |
| Boreal Chickadee | <i>Poecile hudsonica</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Boreal Owl | <i>Aegolius funereus</i> | Not Listed | Not Listed | Not at Risk | Undetermined |
| Brant | <i>Branta bernicla</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Buff-breasted Sandpiper | <i>Tryngites subruficollis</i> | Not Listed | Not Listed | Special Concern | Accidental |
| Canada Warbler | <i>Wilsonia canadensis</i> | Threatened | Endangered | Threatened | Red |
| Cape May Warbler | <i>Dendroica tigrina</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Chimney Swift | <i>Chaetura pelagica</i> | Threatened | Endangered | Threatened | Red |
| Cliff Swallow | <i>Petrochelidon pyrrhonota</i> | Not Listed | Not Listed | Not Listed | Red |
| Common Loon | <i>Gavia immer</i> | Not Listed | Not Listed | Not at Risk | Red |
| Common Nighthawk | <i>Chordeiles minor</i> | Threatened | Threatened | Threatened | Red |
| Common Tern | <i>Sterna hirundo</i> | Not Listed | Not Listed | Not at Risk | Yellow |
| Eastern Bluebird | <i>Sialia sialis</i> | Not Listed | Not Listed | Not at Risk | Yellow |
| Eastern Kingbird | <i>Tyrannus tyrannus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Eastern Phoebe | <i>Sayornis phoebe</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Eastern Wood-Pewee | <i>Contopus virens</i> | Not Listed | Vulnerable | Special Concern | Yellow |
| Gray Catbird | <i>Dumetella carolinensis</i> | Not Listed | Not Listed | Not Listed | Red |
| Gray Jay | <i>Perisoreus canadensis</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Great Cormorant | <i>Phalacrocorax carbo</i> | Not Listed | Not Listed | Not Listed | Yellow |

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|---|---|--------------------------|----------------------------|-----------------------------|---------------------------|
| Great Crested Flycatcher | <i>Myiarchus crinitus</i> | Not Listed | Not Listed | Not Listed | Red |
| Greater Yellowlegs | <i>Tringa melanoleuca</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Harlequin Duck - Eastern pop. | <i>Histrionicus histrionicus pop. 1</i> | Special Concern | Endangered | Special Concern | Red |
| Hudsonian Godwit | <i>Limosa haemastica</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Hudsonian Whimbrel | <i>Numenius phaeopus hudsonicus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Indigo Bunting | <i>Passerina cyanea</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Killdeer | <i>Charadrius vociferus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Long-eared Owl | <i>Asio otus</i> | Not Listed | Not Listed | Not Listed | Red |
| Northern Pintail | <i>Anas acuta</i> | Not Listed | Not Listed | Not Listed | Red |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | Threatened | Threatened | Threatened | Red |
| Philadelphia Vireo | <i>Vireo philadelphicus</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Pied-billed Grebe | <i>Podilymbus podiceps</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Pine Grosbeak | <i>Pinicola enucleator</i> | Not Listed | Not Listed | Not Listed | Red |
| Pine Siskin | <i>Carduelis pinus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Piping Plover (<i>melodus</i> ssp.) | <i>Charadrius melodus melodus</i> | Endangered | Endangered | Endangered | Red |
| Purple Martin | <i>Progne subis</i> | Not Listed | Not Listed | Not Listed | Red |
| Purple Sandpiper | <i>Calidris maritima</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Red Knot rufa ssp | <i>Calidris canutus rufa</i> | Endangered | Endangered | Endangered | Red |
| Roseate Tern | <i>Sterna dougallii</i> | Endangered | Endangered | Endangered | Red |
| Rose-breasted Grosbeak | <i>Pheucticus ludovicianus</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Rusty Blackbird | <i>Euphagus carolinus</i> | Special Concern | Endangered | Special Concern | Red |
| Savannah Sparrow (<i>princeps</i> ssp) | <i>Passerculus sandwichensis princeps</i> | Special Concern | Not Listed | Special Concern | Green |
| Scarlet Tanager | <i>Piranga olivacea</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Semipalmated Sandpiper | <i>Calidris pusilla</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Short-eared Owl | <i>Asio flammeus</i> | Special Concern | Not Listed | Special Concern | Red |
| Spotted Sandpiper | <i>Actitis macularius</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Tennessee Warbler | <i>Vermivora peregrina</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Vesper Sparrow | <i>Pooecetes gramineus</i> | Not Listed | Not Listed | Not Listed | Red |
| Virginia Rail | <i>Rallus limicola</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Warbling Vireo | <i>Vireo gilvus</i> | Not Listed | Not Listed | Not Listed | Undetermined |
| Whip-Poor-Will | <i>Caprimulgus vociferus</i> | Threatened | Threatened | Threatened | Red |

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ |
|---------------------------|-------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|
| Willet | <i>Tringa semipalmata</i> | Not Listed | Not Listed | Not Listed | Red |
| Willow Flycatcher | <i>Empidonax traillii</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Wilson's Snipe | <i>Gallinago delicata</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Wilson's Warbler | <i>Wilsonia pusilla</i> | Not Listed | Not Listed | Not Listed | Yellow |
| Wood Thrush | <i>Hylocichla mustelina</i> | Not Listed | Not Listed | Threatened | Undetermined |
| Yellow-bellied Flycatcher | <i>Empidonax flaviventris</i> | Not Listed | Not Listed | Not Listed | Yellow |

Source: ACCDC 2014

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010

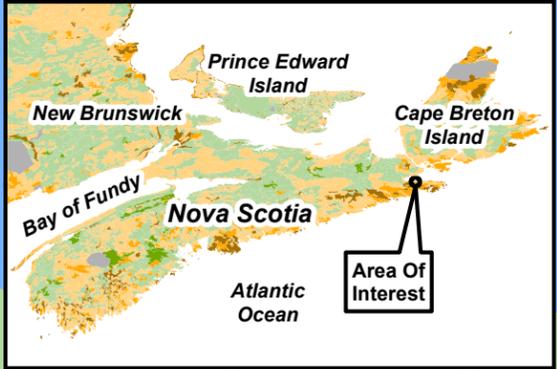
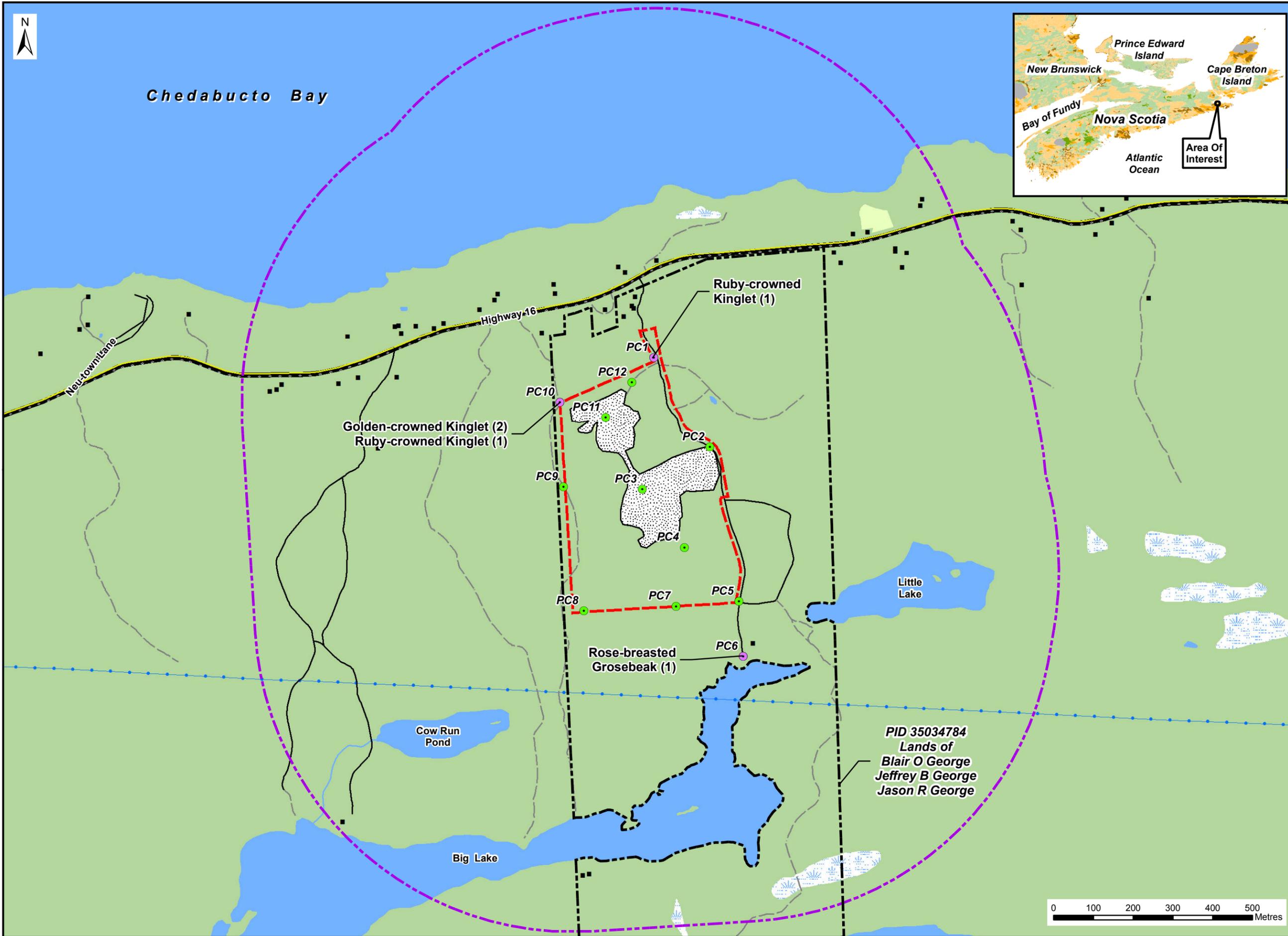
Additionally, CCH identifies 18 species with nesting records in the vicinity of Halfway Cove, NS. These species are:

- Blue-winged teal (*Anas discors*) – “Red” (NSDNR);
- Common tern (*Sterna hirundo*) – “Yellow” (NSDNR);
- Arctic tern (*Sterna paradisaea*) – “Red” (NSDNR);
- Spotted sandpiper (*Actitis macularia*) – “Yellow” (NSDNR);
- Willet (*Tringa semipalmata*) – “Red” (NSDNR);
- Common loon (*Gavia immer*) – “Red” (NSDNR);
- Gray jay (*Perisoreus canadensis*) – “Yellow” (NSDNR);
- Barn swallow (*Hirundo rustica*) – “Endangered” (NS ESA), “Threatened” (COSEWIC), and “Yellow” (NSDNR);
- Tree swallow (*Tachycineta bicolor*) – “Yellow” (NSDNR);
- Gray catbird (*Dumetella carolinensis*) – “Red” (NSDNR);
- Boreal chickadee (*Poencile hudsonicus*) – “Yellow” (NSDNR);
- Bay-breasted warbler (*Dendroica castanea*) – “Yellow” (NSDNR);
- Tennessee warbler (*Oreothlypis peregrina*) – “Yellow” (NSDNR);
- Canada Warbler (*Wilsonia Canadensis*) – “Threatened” (SARA), “Endangered” (NS ESA), “Threatened” (COSEWIC), and “Red” (NSDNR);
- Wilson’s warbler (*Wilsonia pusilla*) – “Yellow” (NSDNR);
- Ruby-crowned kinglet (*Regulus calendula*) – “Yellow” (NSDNR);
- Golden-crowned kinglet (*Regulus satrapa*) – “Yellow” (NSDNR); and
- Black-backed woodpecker (*Picoides arcticus*) – “Yellow” (NSDNR).

A breeding bird survey was completed in early July 2014 to characterize the bird community, and identify species that are present and potentially breeding within the Project Area. The survey was designed in consultation with officials from NSDNR and NSE, and included a detailed breeding bird survey of the Study area, as well as a nest search around the existing the quarry.

Breeding Bird Survey

Twelve point count locations around the Project area were surveyed on the 4th of July, 2014 (Drawing 8.7). A total of 153 individual birds, constituted of 29 species (Table 8.12), were observed during these point counts. One species, Common yellowthroat (*Geothlypis trichas*), was confirmed to



- Notes:**
- Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre.
 - Projection: NAD83(CSRS), UTM Zone 20 North.
 - GPS Data Collected is Typically to +/-5m Accuracy

- Legend:**
- Priority Bird Species Locations (Purple dot)
 - Point Count Locations (Green dot)
 - Project Property (Black dashed line)
 - 800m Quarry Buffer (Purple dashed line)
 - Project Area (Red dashed line)
 - Existing Quarry (Stippled area)
 - Building (Black square)
 - Major Roads and Highways (Thick black line)
 - Public Roads (Thin black line)
 - Access Roads / Trails (Dotted black line)
 - Existing Transmission Lines (Blue line with dots)
 - Mapped Stream (Blue line)
 - Mapped Indefinite Stream (Blue dashed line)
 - Mapped Wet Area (Blue hatched area)
 - Water Bodies (Blue area)
 - Cleared Area (Light green area)

**Chedabucto
Aggregates
Quarry Expansion**

**Breeding Bird Point
Count Locations &
Priority Species
Observations**



| | |
|------------------------|--------------------------|
| Date: August 2014 | Project #: 13-4880 |
| Scale: 1:9,000 | Drawing #: 8.7 |
| Drawn By: H. Serhan | Checked By: C. Baker |



be breeding in the Project area as a nest was observed. An additional two species, Chestnut-sided Warbler (*Dendroica pensylvanica*) and Nashville Warbler (*Vermivora ruficapilla*) were observed to be exhibiting breeding behavior (an adult pair and an adult exhibiting agitated behavior respectively) according to the code prescribed by Maritime Breeding Bird Atlas (MBBA, 2014). Therefore these species should be considered probable breeders. Observations of the remaining 26 species consisted largely of vocalizations from adult males. Detailed survey results are provided in Table I1 (Appendix I).

Given the presence of a variety of habitat types suitable for breeding birds, it is possible that most or all of the species observed may be breeding within or near the Project area.

Table 8.12: Breeding Bird Survey Observations

| Common Name | Scientific Name | SARA Status ¹ | NS ESA Status ² | COSEWIC Status ³ | NSDNR Status ⁴ | Breeding In or Near Project Area |
|------------------------------|--------------------------------|--------------------------|----------------------------|-----------------------------|---------------------------|----------------------------------|
| Alder Flycatcher | <i>Empidonax alnorum</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| American Crow | <i>Corvus brachyrhynchos</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| American Redstart | <i>Setophaga ruticilla</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| American Robin | <i>Turdus migratorius</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Black-and-white Warbler | <i>Mniotilta varia</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Blackburnian Warbler | <i>Dendroica fusca</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Black-capped Chickadee | <i>Poecile atricapillus</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Black-throated Green Warbler | <i>Dendroica virens</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Blue-headed Vireo | <i>Vireo solitarius</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Chestnut-sided Warbler | <i>Dendroica pensylvanica</i> | Not Listed | Not Listed | Not Listed | Green | Probable |
| Common Raven | <i>Corvus corax</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Common Yellowthroat | <i>Geothlypis trichas</i> | Not Listed | Not Listed | Not Listed | Green | Confirmed |
| Dark-eyed Junco | <i>Junco hyemalis</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Golden-crowned Kinglet | <i>Regulus satrapa</i> | Not Listed | Not Listed | Not Listed | Yellow | Possible |
| Hermit Thrush | <i>Catharus guttatus</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Lincoln's Sparrow | <i>Melospiza lincolni</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Magnolia Warbler | <i>Dendroica magnolia</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Nashville Warbler | <i>Vermivora ruficapilla</i> | Not Listed | Not Listed | Not Listed | Green | Probable |
| Northern Flicker | <i>Colaptes auratus</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Palm Warbler | <i>Dendroica palmarum</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Purple Finch | <i>Carpodacus purpureus</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Rose-breasted Grosbeak | <i>Pheucticus ludovicianus</i> | Not Listed | Not Listed | Not Listed | Yellow | Possible |
| Ruby-crowned Kinglet | <i>Regulus calendula</i> | Not Listed | Not Listed | Not Listed | Yellow | Possible |
| Song Sparrow | <i>Melospiza melodia</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Swainson's Thrush | <i>Catharus ustulatus</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Swamp Sparrow | <i>Melospiza georgiana</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| White-throated Sparrow | <i>Zonotrichia albicollis</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Winter Wren | <i>Troglodytes troglodytes</i> | Not Listed | Not Listed | Not Listed | Green | Possible |
| Yellow-rumped Warbler | <i>Dendroica coronata</i> | Not Listed | Not Listed | Not Listed | Green | Possible |

¹Government of Canada 2012; ²NS ESA 2013; ³COSEWIC 2012; ⁴NSDNR 2010.

Three SOCI were observed during the survey (Drawing 8.7). Golden-crowned Kinglet (*Regulus satrapa*), Ruby-crowned Kinglet (*Regulus calendula*), and Rose-breasted Grosbeak (*Pheucticus ludovicianus*) (Drawing 8.7). All three of these species are listed as “Yellow” (Sensitive) by NSDNR, but have no status with COSEWIC, SARA or NS ESA. Two of these species, Golden-crowned kinglet and Ruby-crowned kinglet, were also identified in the environmental screening letter prepared by CCH for the Project. No other species identified in this screening letter were observed during the breeding bird survey.

Three Golden-crowned Kinglets were observed at two point count locations near the northern boundary of the Project area in areas with tall white spruce and balsam fir trees. This species typically resides in mature softwood forests interiors amongst tall spruce, larch and fir trees (CLO 2014). Two male birds were observed together at one point count, which is not indicative of breeding behavior. However, given the habitat suitability for this species in the Project area, and their presence during the breeding season, they should be considered possible breeders within or near the Project area.

Vocalizations from a Ruby-crowned kinglet was observed at a point count location at the northern boundary of the Project area amongst tall white pine and balsam fir trees. Ruby-crowned kinglets also prefer mature softwood forest interiors (CLO 2014). Given the habitat suitability for this species near the Project area, and the presence of a singing male during the breeding season, they should be considered possible breeders within or near the Project area.

A male Rose-breasted Grosbeak was observed singing near the edge of Big Lake, immediately to the south of the Project area. This species has fairly unspecified habitat preferences, but are generally more abundant along forest edges (CLO 2014), such as a lake edge or a clear cut edge, both of which are present within or near the Project area. Given the habitat suitability for this species near the Project area, and the presence of a singing male during the breeding season, they should be considered possible breeders within or near the Project Area.

Nest Search

In addition to a point-count based breeding bird survey, a detailed nest search was conducted throughout the existing quarry area in search of birds that may be utilizing the exposed cliffs, exposed ground or aggregate piles as nesting locations. Quarry operations can create suitable habitat for a number of bird species. Blasting and excavating activities can create cliffs and steep rock faces that is suitable for species such as Cliff swallows (*Petrochelidon pyrrhonota*) and Bank swallows (*Riparia riparia*) to nest. Bank swallows may also nest in the loose material of the aggregate piles. Additionally, scantily vegetated rocky surfaces may provide suitable habitat for Common Nighthawk (*Chordeiles minor*), which nests in exposed rocky areas.

No observations of swallow or Common nighthawk birds or nests were made. Additionally, no other species were observed to be nesting in the quarry area.

Detailed methodologies for all bird surveys are provided in Appendix I.

Given the habitat suitability for several bird species in the Project Area, and their presence during the breeding season, interaction with birds and their habitat is likely. Therefore, birds are assessed further through the residual effects analysis.

Bats

One bat species, Little brown myotis (*Myotis lucifugus*), was identified by ACCDC records, as occurring within 100 km of the Project Area. Also known as the Little brown bat, Little Brown Myotis is the most common bat species in Nova Scotia, and is probably ubiquitous in the province (Broders *et al.* 2003). The species is listed as “Endangered” under the NS ESA, “Endangered” by COSEWIC

and “Red” by NSDNR due to population declines over the past two years that have been attributed to a disease called white-nose syndrome.

During the day, the Little brown myotis will roost in buildings, trees, under rocks, in wood piles, and in caves, congregating in tight spaces to roost at night (Fenton and Barclay 1980). As a non-migratory species, Little brown myotis hibernates from September to early or mid-May in abandoned mines or caves (Fenton and Barclay 1980; Mosely 2007).

ACCDC data indicates that the closest Little brown myotis sighting to the Project Area is 26.3 km away. The closest known hibernacula is an abandoned mine located near the community of Glenelg, NS, approximately 60 km west of the Project Area. It is possible that bats that overwinter in this hibernacula disperse as far east as the Project Area. However, given the population declines (attributable to white-nose syndrome) the frequency that bats originating from this hibernacula visit the Project area to roost or forage is likely to be very low. The Nova Scotia Abandoned Mine Opening Database identifies 11 abandoned mine openings within 20km of the Project area. Six of these openings are abandoned pit mines, 4 are shaft openings, and 1 is a trench opening. The shaft mines are the most likely to support small bat hibernacula or roosts, the closest of which is approximately 11 km northwest of the Project Area. It is possible that bats roosting or hibernating in these abandoned mines, if any, could utilize habitat within the Project Area. However, the effects of white-nose syndrome on any local bat populations would make their occurrence within the Project Area a rarity. However, because a Project interaction with bats and their habitat cannot be ruled out entirely, they are considered further through the residual effects analysis.

8.4.2 Potential Interactions and Effects

Project activities including clearing, grubbing, topsoil stripping, and blasting have the potential to impact terrestrial fauna and habitat. Potential effects include:

- sensory disturbance;
- habitat loss/alteration and/or fragmentation;
- accidental releases; and
- direct mortality.

Sensory disturbance to terrestrial fauna may occur from a variety of anthropogenic sources. Human presence and noise during quarrying activities may discourage wildlife species from using habitats in close proximity to the quarry while quarrying activities are ongoing. Some bird species may be discouraged from using habitats for nesting and feeding in close proximity to the quarry while quarrying activities are ongoing. It is also possible that, due to the Project Areas proximity to the coast (400 m), shorebirds may be attracted to artificial light sources, drawing them away from their normal feeding grounds. Birds drawn to light can become disoriented and collide with lighted structures, which may result in injury and/or death.

Since the quarry has been operational for ten years with no plans for increasing production rates, blasting frequency, or lighting at the site, it is unlikely that the expansion will lead to a significant increase in interaction with bird species particularly sensitive to human activities.

The proposed quarry will result in destruction or loss of habitat within the undisturbed portion of the Project Area. Removal of vegetation for quarry operations will result in habitat fragmentation for wildlife and the loss of potential nesting sites for avifauna.

Altered landscapes can potentially lead to displacement of species with sensitive habitat requirements (Arnett *et al.* 2007). Site clearing and preparation may involve the removal of key habitat features, such as mature trees or shrub cover required as foraging and/or breeding habitat for certain bird species. Habitat loss/fragmentation and avoidance behaviour due to sensory disturbance could result in changes in natural movements, migrations and other life history processes of some fauna species. If adjacent suitable habitat is present, displaced wildlife species would disperse to these areas. However, if adjacent habitats are already occupied, the addition of new individuals could result increased competition for resources and/or increased levels of predation.

As previously discussed, blasting and excavation activities related to quarry operations can create suitable habitat for a number of bird species. The creation of cliffs and steep rock faces may result in suitable nesting habitat for species such as Cliff swallow and Bank swallow. Additionally, scantily vegetated rocky surfaces may provide suitable habitat for Common nighthawk, which nests in exposed rocky areas. Though no observations of birds or nests were made during the quarry nest search, if any species were utilizing stockpiles for nesting, disturbance of the piles during the breeding/nesting season could result in the loss of the nests and any chicks.

Effects from the direct displacement of individuals due to habitat loss are expected to be limited to the undisturbed portion of the Project Area. Displacement due to sensory disturbance may be further-reaching, but is still considered to be localized.

Dangerous/hazardous materials anticipated to be on-site during regular quarry operation include gasoline, diesel fuel and lubricants. The potential for accidental spills on site exists during construction and operation activities, though should be mitigated through adherence to the EPP.

Increased vehicle and heavy equipment traffic during all phases of the Project may result in occasional collisions with terrestrial wildlife, including avifauna. It is expected that these collision events will be minimized by the implementation of safe work practices (e.g., strict adherence to speed limits, obeying all warning signs, etc.). Collisions, should they occur, will be infrequent and will not have a significant effect on population levels.

8.4.3 Proposed Mitigation and Protective Measures

The following general mitigative measures will be implemented to avoid and mitigate any potential effects on terrestrial fauna and habitat:

- Minimization of the Project footprint of physical disturbance by maintaining a buffer around sensitive habitats such as watercourses and wetlands, and minimizing routine vegetation loss by only clearing land required for quarrying activities.
- Following a progressive rehabilitation plan, and promptly restoring areas of disturbance where possible.

- Establishment of a Wetland Exclusion Area in the southern extent of the Project Area (refer to Section 8.2.3).
- Attention will be paid during site rehabilitation to ensure areas will promote wildlife return to the area, to the extent possible.
- Implementation of the EPP, including the spill prevention plan and contingency plans (as necessary).
- Tree clearing activities will be executed in a manner that complies with the MBCA and the SARA, specifically to avoid incidental take.
- Clearing will be conducted outside of the breeding season for most bird species (May 1 to August 31), unless otherwise approved by NSE in consultation with CWS. Should clearing be required during nesting periods, searches for migratory bird nests be undertaken within the area to be disturbed, in consultation with CWS, and all identified nests should be flagged.
- Minimize the risk of impacting active nest or birds by measures such as the establishment of vegetated buffer zones around nests, and minimization of activities in the immediate area until nesting is complete and chicks have naturally migrated from the area.
- Stockpiles will be covered during the breeding season, to prevent certain species of migratory birds (*i.e.*, Bank swallows) to take up occupancy during nesting season.
- Alternatively, if swallows or other species are discovered nesting in stockpiles, piles will not be disturbed until after the breeding/nesting season.
- No additional artificial lighting will be implemented in the Project Area during construction or operations. Lighting requirements are expected to remain consistent with current operations.

Species-Specific Mitigation

Desktop and field analyses for fauna SOCI revealed several species that have the potential to occur at the Project Area. Addressing the potential impacts of the Project on these species will require species-specific mitigation techniques, as described below:

Mainland Moose:

As noted above, a wetland exclusion area will be maintained, and a progressive rehabilitation plan will be followed to ensure that areas of disturbance are restored. Additional specific mitigation for moose includes:

- Project personnel will report any evidence of Mainland Moose to NSDNR.
- The maintenance of the Wetland Exclusion Area is expected to maintain habitat access and utilization, and the movement of Mainland moose between the quarry and the lakes to the south-southwest.

Monarch:

- Should large congregations of Monarchs be found at the Project site, Project activities in the area should cease until the migrating group has left the Project site. This is most likely to occur in late summer, prior to the fall migration.

8.4.4 Proposed Monitoring and Follow-Up Programs

A preliminary Rehabilitation Plan will be provided to NSE as part of the Approval amendment application. The Rehabilitation Plan will be based on a progressive rehabilitation strategy, incorporating sequential stripping and replacement of overburden, subsoil and topsoil which will

allow the establishment of vegetation as restoration moves forward following extraction. Within twelve months of decommissioning of the quarry, the site will be rehabilitated to the satisfaction of NSE in accordance with the approved Rehabilitation Plan.

An EPP will be developed and implemented for the Project, including a spill prevention plan and contingency plans (as necessary).

8.4.5 Expected Residual Effects

Using criteria based on federal and provincial EA guidance (outlined in Section 7.0) an analysis of residual effects from the Project is provided in Table 8.13.

Table 8.13: Residual Effects Analysis

| VEC | Phase | Significance Criteria | Residual Effects | Significance of Residual Effects |
|-------------------------------|-----------------------------------|--|------------------|----------------------------------|
| Terrestrial Fauna and Habitat | Site Preparation and Construction | Scope: Local Duration: Medium to Long-term Frequency: Continuous Magnitude: Low | Low | Not Significant |
| | Operations and Maintenance | Scope: Local Duration: Medium to Long-term Frequency: Continuous Magnitude: Low | Low | Not Significant |
| | Accidents and Malfunctions | None expected | n/a | n/a |

The field surveys did not reveal the presence of any rare or sensitive fauna within the Project area. It is unlikely that the SOCI, with the exception of Mainland moose, would inhabit the Project area due to the lack of suitable habitat conditions.

Despite the presence of relatively un-fragmented habitat that appears to provide for the varied requirements of Mainland moose, no signs of this species were observed during targeted surveys therefore a low population density of Mainland moose in the area of the Project Area is assumed. The maintenance of the Wetland Exclusion Area is expected to maintain habitat access and utilization, and the movement of any Mainland moose between the quarry and the lakes to the south-southwest. Furthermore, the habitats present within the expansion area are common throughout the remainder of the Project property and surrounding lands.

Risks to terrestrial fauna due to accidental spills or infrequent traffic collisions are expected to be addressed through the implementation of the mitigation strategies above, and the EPP. Provided the proposed mitigative measures are applied, no residual effects on fauna and habitat are expected as a result of these incidents.

Effects from the direct displacement of individuals due to habitat loss are expected to be limited to the undisturbed portion of the Project Area. Displacement due to sensory disturbance may be further-reaching, but is still considered to be localized.

Residual effects to terrestrial fauna (including birds and bats) and habitat are therefore considered not significant.

8.5 Atmospheric Conditions/Air Quality

8.5.1 Description of Existing Conditions

Nova Scotia monitors air quality at six stations throughout the province. Measured parameters include ground-level ozone (O₃), particulate matter (PM_{2.5}), and nitrogen dioxide (NO₂), and these values are used to calculate a score on the Air Quality Health Index (AQHI) (EC 2013). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+). The AQHI monitoring station closest to the Project site is located in Port Hawkesbury, approximately 30 km north of the Project site. The AQHI at this site is usually low at all times of the year (EC 2013).

The quarry is located in a rural setting with little industrial development nearby. Residential development is also minimal within 1 km of the Project site.

8.5.2 Potential Interactions and Effects

Quarrying activities such as tree-clearing, grubbing, drilling, blasting, and the operation of heavy machinery generate dust, particulates, and combustion emissions. Quarrying activities can generate dust and airborne particulate matter which has the potential to be transported off-site under certain conditions. The primary activities that may result in particulate matter and dust during quarry operations include:

- Drilling and blasting activities;
- Exposed soils and stockpiled materials on site;
- Excavation and removal of overburden;
- Aggregate crushing and processing;
- Aggregate handling, loading and transportation;
- Exhaust emissions from quarry equipment and vehicles; and
- Dust generated by vehicular traffic during the transport of materials.

Blasting is expected to occur infrequently (1-2 times per year), and will be conducted in accordance with all applicable provincial guidelines and regulations and associated setbacks. Work areas and laydown areas will be covered to minimize the generation of dust from exposed areas. Although there are also emissions from the exhaust of quarry vehicles and equipment, these are not expected to result in significant effects. Construction equipment will be maintained in good working order, and engine idling will be restricted, where feasible.

8.5.3 Proposed Mitigation and Protective Measures

- All quarry operations, including blasting will be conducted in accordance with the applicable municipal, provincial and federal guidelines and regulations for air quality and emissions. Required monitoring programs for dust and emissions will be developed in consultation with NSE as part of the Approval amendment application.

- Dust generated by construction equipment and truck movement will be minimized by limiting traffic speed on access roads, proper truck loading, the application of water or other approved dust suppressant, or other means as required by NSE.
- At the request of NSE, an Air Monitoring Program will be designed and implemented.
- Implementation of the EPP, including the air quality monitoring (if required) and contingency plans (as necessary).

8.5.4 Proposed Monitoring and Follow-Up Programs

Surrounding landowners will be notified prior to any blasting activities, according to applicable guidelines. No blasting will be conducted within 30 m of the boundary of the public or common highway without written consent from NSTIR.

Monitoring of airborne particulate emissions (dust) will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines, the Nova Scotia Air Quality Regulations and the facilities Approval permit and shall not exceed the following limits at the property boundaries:

- Annual Geometric Mean 70 µg/m³; and
- Daily Average (24 hrs) 120 µg/m³.

Combustion emissions will be generated from the operation of vehicles and equipment. These emissions will be minimal (*i.e.* restricted to one/two pieces of heavy equipment), localized and similar to those produced during existing operations.

At the request of NSE, an Air Quality Monitoring Program will be designed and implemented. Based on the results of the monitoring program, necessary modifications to mitigation plans and/or quarry operations will be discussed with NSE.

8.5.5 Expected Residual Effects

Using criteria based on federal and provincial EA guidance (outlined in Section 7.0) an analysis of residual effects from the Project is provided in Table 8.14.

Table 8.14: Residual Effects Analysis

| VEC | Phase | Significance Criteria | Residual Effects | Significance of Residual Effects |
|-------------|-----------------------------------|---|------------------|----------------------------------|
| Air Quality | Site Preparation and Construction | Scope: Local Duration: Short-term Frequency: Continuous Magnitude: Negligible-Low | Minimal/None | Not Significant |
| | Operations and Maintenance | Scope: Local Duration: Long-term Frequency: Intermittent Magnitude: Negligible-low | Minimal/None | Not Significant |
| | Accidents and Malfunctions | None expected | n/a | n/a |

Air quality impacts related to the quarry extension can be controlled with standard mitigation practices and therefore the Project is not likely to result in any significant residual effect on the atmospheric environment.

Risks to air quality due to accidents or malfunctions are expected to be addressed through the implementation of standard mitigation strategies and the EPP. Provided the proposed mitigative measures are applied, no residual effects on air quality are expected as a result of these incidents.

Dust monitoring will be conducted as required at the request of NSE. Additional mitigative measures will be developed as necessary.

8.6 Noise Levels

8.6.1 Description of Existing Conditions

Noise levels from the quarry expansion are expected to be similar to those produced during the existing operation. Blasting is expected to occur infrequently (1-2 times per year) and will occur only during daylight hours. Approximately 42 buildings/structures are located within 800 m of the Project property.

Noise is defined as nuisance or un-wanted sound. Noise levels are usually measured in 'A' weighted decibels (dBA), which is an imperial measurement of sound pressure levels as they are perceived by the human ear. The Project site lies within a semi-rural setting, and thus ambient sound levels are likely relatively low (*i.e.* 40 to 50 dBA). Sounds levels in semi-rural areas are influenced heavily by atmospheric conditions, such as wind or rain, as well as anthropogenic activities, such as traffic, operating machinery, etc.

In the case of the existing quarry operation, noise is generated by operation activities such as heavy trucks, equipment and blasting activities. The Pit and Quarry Guidelines prescribe acceptable levels of operational noise summarize in Table 8.15 below. These noise levels must be observed at the property boundaries of the pit and quarry.

Table 8.15: Sound Level Limits for Pit and Quarry Operations

| Time Period | Acceptable limit (Observable at Property Boundary) |
|-----------------------------------|--|
| Day (7:00 to 19:00 hours) | 65 dBA |
| Evening (19:00 to 23:00 hours) | 60 dBA |
| Night (23:00 hours to 7:00 hours) | 55 dBA |

Source: NSE 2003

The Pit and Quarry Guidelines also prescribe acceptable noise and vibration levels for blasting activities:

- No concussion (air blast) can exceed 128 dBA Within 7 m of the nearest structure not located on the property where the blasting operations occur, or other locations as directed by the Minister or Administrator.

- No ground vibration can exceed 12.5mm/sec particle velocity Measured below grade or less than 1 m above grade in any part of the nearest structure not located on the property where blasting occurs, or other locations as directed by the Minister or Administrator.

The MODG enforces a Noise Control By-law (2011) to maintain the peace and tranquility of the residents of the Municipality. The acceptable noise levels are as follows:

Table 8.16: MODG Noise Control Limits

| Time Period | Acceptable limit |
|---------------------------|------------------|
| 6:00 hours to 23:00 hours | 65 dBA |
| 23:00 hours to 6:00 hours | 55 dBA |

Source: MODG 2011

The Pit and Quarry Guidelines are in adherence with those levels set forth in the MODG Noise Control By-law.

8.6.2 Potential Interactions and Effects

The Project's effects on the area's acoustic environment would include noise from the operation of equipment, and from blasting activities. Table 8.17 summarizes the noise levels are typically generated from a variety of equipment that may operate at a quarry.

Table 8.17: Typical Construction Equipment Noise Levels

| Equipment | Noise levels (dBA) at 15m |
|-----------|---------------------------|
| Loader | 74 to 84 |
| Bulldozer | 74 to 95 |
| Truck | 72 to 82 |

Source: Harris 1979

The volume of noise decreases with increasing distance from the source. The following equation is used to estimate the noise level at different distances.

$$L_2 = L_1 - (20 * \text{Log}_{10} (r_1 / r_2))$$

Were L_1 is the sound pressure level (in dBA) at the first reference distance, r_1 , and L_2 is the sound pressure level at the second reference distance, r_2 . This equation can but used to estimate the noise levels from operating equipment.

The worst case scenario would be the loudest piece of equipment (a bulldozer will be used for this example) operating in an area of the proposed quarry expansion that is closest to a property line. The closest property line to the proposed quarry expansion area is 30 m to the west. Over 30 m the noise level would dissipate approximately 12 dBA, allowing for a maximum observable noise level of approximately 82 dBA at the property boundary. This would be a 17 dBA exceedance of the limit of 65 dBA during daytime hours as prescribed in the Pit and Quarry Guidelines. However the adjacent properties are largely un-utilized and consist of wooded areas with dwellings in the north close to

Highway 316. There are no dwellings on adjacent properties within 140 m of the proposed quarry expansion area. Over this distance, the noise level of equipment would dissipate.

Blasting will occur at a frequency similar to past operations at the site and during daytime hours only. Operations will be conducted in accordance with all applicable provincial guidelines and regulations and associated setbacks. Sound monitoring will be conducted at the request of NSE.

8.6.3 Proposed Mitigation and Protective Measures

Most potential effects due to noise created by Project activities can be mitigated through provincial regulations, and the incorporation of standard mitigation and BMPs. In addition to the mitigation measures listed below, mitigation measures outlined for the protection of air quality and noise (Sections 8.5 and 8.6) also apply to this section.

- Construction equipment will be maintained in good working order and properly muffled.
- Engine idling will be restricted.
- Blasting will occur infrequently (1-2 times per year), and will be conducted in accordance with all applicable provincial guidelines and regulations and associated setbacks.
- Blasting activities shall not exceed the sounds levels outlined in the Pit and Quarry Guidelines and the facilities Approval. Sound monitoring and reporting shall be applied as outlined in the Guidelines, where required.
- No blasting shall occur on Sunday, on a statutory holiday, or on any day between the hours of 1800 hours and 0800 hours.
- No blasting will be conducted within 30 m of the boundary of the public or common highway without written consent from NSTIR.
- Noise control measures (e.g., sound barriers, shrouds, enclosures) will be used where warranted.
- Surrounding landowners will be notified prior to any blasting activities, via the preblast surveys which will be conducted prior to any blasting activities, in accordance with applicable guidelines.
- Implementation of the EPP, including the sound level monitoring (if required) and complaint response (as necessary).

No blasting will be conducted within 800 m of the foundation or base of a structure located off site without written consent from all individuals. The Proponent has been proactive at maintaining communication with surrounding land owners, and many of the owners of properties surrounding the Project Area have provided letters of consent for continuing drilling and blasting operations at the quarry (Appendix B).

8.6.4 Proposed Monitoring and Follow-Up Programs

- An updated Blasting Plan will be submitted to NSE for approval, as part of the Approval amendment application. The plan will include an updated Pre Blast Survey for structures and water supplies within 800 m of the blast area, a detailed Blast Monitoring Plan, and a full blast damage response policy as required by NSE. The Plan will outline proposed blasting methods and schedule.

- A pre-blast survey of all structures within 800 m of the point of blast, shall be conducted prior to any blasting activities, following NSE’s “Procedure for Conducting a Pre-Blast Survey”.
- No blasting will occur on Sundays, on statutory holidays, or on any day between 1800 and 0800 hours, as outlined in the current Approval.
- At the request of NSE, a Sound Monitoring Program will be designed and implemented in accordance with the Guidelines for Environmental Noise Measurement and Assessment (NSDEL 2005). Based on the results of the monitoring programs, necessary modifications to mitigation plans and/or quarry operations to prevent continued unacceptable environmental will be discussed with NSE.

8.6.5 Expected Residual Effects

Using criteria based on federal and provincial EA guidance (outlined in Section 7.0) an analysis of residual effects from the Project is provided in Table 8.18.

Table 8.18: Residual Effects Analysis

| VEC | Phase | Significance Criteria | Residual Effects | Significance of Residual Effects |
|-------|-----------------------------------|---|------------------|----------------------------------|
| Noise | Site Preparation and Construction | Scope: Local Duration: Short-term Frequency: Continuous Magnitude: Negligible-Low | Minimal/None | Not Significant |
| | Operations and Maintenance | Scope: Local Duration: Long-term Frequency: Intermittent Magnitude: Negligible-low | Minimal/None | Not Significant |
| | Accidents and Malfunctions | None expected | n/a | n/a |

Noise impacts related to the quarry extension can be controlled with standard mitigation practices and BMPs, therefore the Project is not likely to result in any significant residual effect on existing noise levels. Noise monitoring will be conducted as required at the request of NSE. Additional mitigative measures will be developed as necessary.

8.7 Population and Demographics

8.7.1 Description of Existing Conditions

The Project is located at 6640 Highway 16, Halfway Cove, approximately 13 km southeast of the Shiretown of Guysborough. The MODG is one of three municipal units in Guysborough County (the County), occupying the eastern half of the County. The MODG surrounds the Town of Mulgrave, and is bordered by the St. Mary’s Municipal District to the west, Antigonish County to the north and the Strait of Canso and Atlantic Ocean to the east/southeast. It covers a land area of 2,116 km², including over 400 km of coastline (MODG 2013a).

The largest communities in Guysborough County include the Shiretown of Guysborough (pop. 1,764) and the towns of Canso (pop. 806), and Mulgrave (pop. 794), (Province of NS 2013; Statistics Canada 2012).

The area surrounding the Project site is sparsely populated by the small communities of Halfway Cove (2.2 km) and Peas Brook (0.4 km), while nearby communities include Queensport (5.2 km), Philips Harbour (8.1 km), and Dorts Cove (9.2 km).

Population statistics for the MODG derived from the 2011 census are summarized in Table 8.19.

Table 8.19: Population in the MODG

| Population Statistics | MODG |
|---|-------------|
| Population in 2011 | 4,189 |
| Population in 2006 | 4,681 |
| Population change from 2006-2011 (%) | -10.5 |
| Total private dwellings in 2011 | 2,827 |
| Land area (square km) | 2,111 |
| Population density per square kilometre | 2.0 |

Source: Statistics Canada 2012

The age distribution in the MODG reveals a median age of 53.9 years, which is slightly higher than the provincial median age (43.7) (Statistics Canada 2012). An overview of age distribution for 2011 for the MODG is outlined in Table 8.20 below.

Table 8.20: Age Distribution in the MODG

| Age Statistics | MODG |
|-------------------------|---------------------|
| 0 - 14 years | 450 (10.7%) |
| 15 - 64 years | 2,600 (62.1%) |
| 65+ years | 1,140 (27.2%) |
| Total Population | 4,190 (100%) |

Source: Statistics Canada 2012

In 2011, the median income for individuals in Guysborough County (the County) was \$21,421 a year, compared with the median income of \$27,570 for Nova Scotia (Statistics Canada 2013). These averages are lower than the Canadian median of \$29,878 in the same year. The median value of dwellings in the County in 2011 was \$80,213. In comparison, the median value of dwellings in the province and in Canada during the same year was \$174,743 and \$280,552, respectively (Table 8.21).

Table 8.21: Median Dwelling Value and Individual Income

| Jurisdictions | Average Dwelling Value | Average Individual Income |
|-------------------------|------------------------|---------------------------|
| Guysborough County | \$80,213 | \$21,421 |
| Province of Nova Scotia | \$174,743 | \$27,570 |
| Canada | \$280,552 | \$29,878 |

Source: Statistics Canada 2013

8.7.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

No effects on local population and demographics are expected as a result of Project activities, therefore this component is not addressed further through mitigation, monitoring or follow-up programs.

8.8 Regional Economy

8.8.1 Description of Existing Conditions

Statistics for Guysborough County indicate that the unemployment rate in 2011 was 15.3%, which is slightly higher than the provincial average of 10% (Statistics Canada 2013). With regard to employment rates, the employment rate in the County was 45.1%, which is slightly lower than the provincial rate of 56.8% (Statistics Canada 2013).

A breakdown of the labour force within the County is provided in Table 8.22. The highest proportion of workers in the County fall into the natural resource (*i.e.*, agriculture, forestry, fishing and hunting) sector (18.0%). Other significant industries include health care and social services, construction, retail trade and public administration (Statistics Canada 2012).

Table 8.22: Top industries for the employed labour force, Guysborough County

| Industry | Total (Percentage) |
|--|--------------------|
| Total employed labour force 15 years + | 3,740 |
| Agriculture, forestry, fishing and hunting | 675 (18.0%) |
| Health care and social services | 420 (11.2%) |
| Construction | 375 (10.0%) |
| Retail Trade | 360 (9.6%) |
| Public Administration | 290 (7.8%) |
| Educational Services | 255 (6.8%) |
| Manufacturing | 250 (6.7%) |

Source: Statistics Canada 2013

The MODG is served by the Guysborough Antigonish Strait Health Authority (GASHA), which offers a range of health services centered in fully-staffed community hospitals, which are located in Guysborough and Canso. The MODG also operates the Milford Haven Home for Special Care, and the Canso Seaside Manor long-term care facilities. Public schools are located in Guysborough, Hazel Hill and Canso.

The MODG hosts Canada's second busiest port (as measured in tonnage), the Strait of Canso. Other notable economic assets include the Melford Superport, which is in the planning and early development stages, and the Martin Marietta aggregate mining operation near Mulgrave. The Municipality's mining potential is promising, with the discovery of proven gold deposits and significant rare earth metal indications (MODG 2013).

Natural gas from Exxon Mobil's Sable project, and soon from EnCana's Deep Panuke development, comes ashore at the Goldboro Liquefied Natural Gas (LNG) facility. Also in the energy sector, the north eastern section of the district in particular has shown immense wind energy potential. In 2012, MODG made a successful bid to develop a 13.8 megawatt (MW) wind energy project near Canso. The development, Sable Wind, represents the largest single investment in the history of the Municipality, and is currently in the construction phase of development. Natural resource industries have traditionally included forestry and fisheries, with Canso being the first permanent European fishing port in North America (MODG 2013).

The towns of Guysborough and Canso are located approximately 13 km and 27 km from the Project site respectively, and offer a range of business services. Only one business, K & N Fisheries Ltd. in Queensport, was identified within 10 km of the Project site. A review of businesses located in proximity to the Project site, was expanded to a 15 km radius to include the town of Guysborough. These businesses are listed in Table 8.23.

Table 8.23: Local Businesses and Proximity to Project Site

| Business | Distance and direction from Project site* |
|--|---|
| K & N Fisheries Ltd. | 5.3 km east, Queensport |
| Seawind Landing Country Inn | 11.3 km south, Wharf Road, Guysborough |
| DesBarres Manor Inn | 13.6 km northwest, Church Street, Guysborough |
| Rare Bird Pub/Rare Bird Craft Beer | 13.4 km northwest, Main Street, Guysborough |
| Guysborough Journal | 13.3 km northwest, Main Street, Guysborough |
| Big G's Pizza and Restaurant | 13.6 km northwest, Main Street, Guysborough |
| Guysborough Pharmacy | 13.7 km northwest, Main Street, Guysborough |
| Days Gone By Bakery, Restaurant and Gifts | 13.8 km northwest, Main Street, Guysborough |
| Osprey Shores Golf Resort | 14.1 km northwest, Ferry Road, Guysborough |
| Full Steam Coffee Co. Harbour Bell Bakery | 13.4 km northwest, Main Street, Guysborough |
| Skipping Stone Café and Store | 13.5 km northwest, Main Street, Guysborough |
| Guysborough Waterfront Development Society/ Marina (Not-for-Profit) | 13.4 km northwest, Main Street, Guysborough |
| Avery's Save Easy | 13.6 km northwest, Guysborough |
| Chedabucto Home Hardware | 13.4 km northwest, Route 16, Guysborough |
| Schrader W. M. Fisheries Ltd. | 14.5 km south, Larry's River |
| NSLC | 14.6 km northwest, Main Street, Guysborough |
| K & N Fisheries Ltd. | 14.7 km south, Pellerine Road, Guysborough |
| Foxberry By the Sea | 14.4 km south, Lower Whitehead, Queensport |
| White Head Consultants Ltd. | 14.9 km south, Deming Point Road, Queensport |
| Cole Harbour Bed and Breakfast | 14.5 km south, Pellerine Road, Guysborough |

*All distances measured from center of the Project site, using the most direct route.

The existing quarry is small, run entirely by the owner. Drilling and blasting activities require additional specialized resources, which are sub-contracted to local professional blasting and drilling companies. Transportation of aggregate materials from the quarry is typically contracted to local hauling companies or provided by the buyer. Demand for transportation varies over time, though up to 8-10 truck-loads of aggregate is hauled from the quarry per day, on average.

8.8.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

The expansion of the existing quarry is expected to have a positive effect on the local economy, as existing local contract opportunities will be maintained through the continuation of quarry operations. The quarry is expected to remain an important source of local, high quality aggregates for use in the local construction industry, supporting various commercial enterprises in the Municipality. Because the cost of aggregate is heavily influenced by the distance it is transported from the source, the availability of locally-produced product should encourage lower, more stable aggregate prices. This would reduce construction costs, to the benefits of local contractors, the public infrastructure sector, and taxpayers.

The project is expected to continue to enhance the community's economic development by providing commercial tax revenue to the MODG on an annual basis.

Effects to the regional economy from the Project are anticipated to be positive in nature. Therefore, no mitigation is recommended.

8.8.3 Expected Residual Effects

Residual effects on local economy as a result of Project activities are expected to be positive in nature, and include economic stimulation, commercial tax revenue to the Municipality, and lower, more stable costs for aggregate materials.

8.9 Surrounding Land Use

8.9.1 Description of Existing Conditions

Of the Municipality's total land mass of 2,116 km², approximately 239 km² is protected lands, equating to 11.3 per cent of the total land mass, a figure well above the provincial average.

The property on which the Project is in a rural setting, sited approximately 400 m south of the coast, on Chedabucto Bay. Project lands are registered as "Residential/Commercial/Resource" lands owned by the Proponent (Service NS 2013). Land use around the Project site is varied, and includes "Residential" and "Resource" lands to the north, "Residential/Commercial/Resource" (owned by the Proponent), as well as "Resource" lands to the west, and a mix of "Resource" and "Residential" lands to the east.

Based on available mapping and aerial photography, residential development in the immediate vicinity of the Project Area is relatively low. Structures identified in the vicinity of the Project Area, unrelated to the Project, are shown in Drawing 3.1 and include:

- 85 structures within 2 km of the Project Area Boundary;

- 58 structures within 1.5 km of the Project Area Boundary;
- 46 structures within 1.0 km of the Project Area Boundary;
- 42 structures within 800 m of the Project Area Boundary; and
- 25 structures within 500 m of the Project Area Boundary.

Managed and Protected Areas

Five Managed Areas and 2 Significant Ecological Areas (SES) were identified within 10 km of the Project site, and are listed in Table 8.24 (ACCDC 2014; NSDNR 2013b).

Table 8.24: Managed and Significant Areas within 10 km of the Project Area

| Name/Designation | Distance and direction from Project Area* |
|--|--|
| Bonnet Lake Barrens Provincial Wilderness Area | 3.1 km south |
| Rook Island SES (Species of Concern) | 5.1 km east |
| Queensport Protected Beach | 5.8 km southeast |
| Ragged Head-Port Shoreham Protected Beach | 8.4 km northwest |
| Ragged Head SES (Migratory Bird) | 8.4 km northwest |
| Port Shoreham Beach Provincial Park | 8.9 km northwest |
| Dorts Cove Provincial Park | 10 km west |

*All distances measured from estimated center of the Project Area, using the most direct route

The Project Property is bordered to the South by the Bonnet Lake Barrens Wilderness Area, as designated under the *Wilderness Area Protection Act*. The Wilderness Area includes 10,380 ha of Crown lands managed by the Municipality of the District of St. Mary's. The area is protected due to its representative Coastal Granite Barrens landscapes; large, ecologically sensitive bogs; rare plants; and an array of lakes and waterways, including ponds, still-waters and streams. Bonnet Lake contains unique, crescent shaped beaches, originally formed from glacial debris (Province of NS 2014).

The nearest Water Supply Area is the Canso Natural Watershed Area/Designated Water Supply Area, located approximately 19.6 km southeast of the Project Area (NSDNR 2013b).

There are no First Nations reserve lands located within 10 km of the Project Area. The closest identified reserve lands are the Pomquet-Afton (23) and Summerside (38) Indian Reserves located in Antigonish County, approximately 40 km from the Project Area. These reserves form part of the Paq'tnkek Mi'kmaw Nation. Aboriginal resources are considered as a separate component in Section 8.14.

Managed and protected areas identified in the vicinity of the Project Area are shown on Drawing 8.8.

Natural Resource Activities (Mining, Forestry)

The NSDNR Mineral Resources Land-Use database indicates 2 aggregate pits, of historical use, are located 2.5 km and 3.5 km west of the Project Area, as well as 2 additional pits located 5.5 and 6.0 km to the east/southeast. Three of these pits are believed to be non-operational, while the remaining pit, owned by a relative of the Proponent, is semi-operational, with blasting occurring infrequently (every 5-6 years). This pit is located approximately 6.0 to the southeast of the Project Area. The

nearest gold mining areas to the site are 2 abandoned mine opening sites located 18 and 29 km southwest of the Project Area, in Sangster Lake and Goldboro, respectively. These mines are associated with the former Sangster Lake and Upper Seal Harbour Gold districts (NSDNR 2006a).

A review of the NSDNR Abandoned Mine Openings Database identifies 11 abandoned mine openings within 20km of the Project area. Six of these openings are abandoned pit mines, 4 are shaft openings, and 1 is a trench opening. There are two abandoned iron mine shafts, owned by Manchester Iron Mine and Railway Company Ltd. approximately 11 km northwest of the Project Area. There is also an abandoned graphite pit in Roachvale, approximately 13.5 km west of the site (NSDNR 2006b). The database confirms the Sangster Lake shafts, pit and trench, and identifies the Goldboro site as a series of gold mine shafts and features associated with former operations by Renada Gold Mines Ltd, New England Mining Company, and Exploration Orex Inc. south of Gold Brook Lake. These abandoned mine sites are of sufficient distance from the Project Area that they are not anticipated to interact with the Project.

Agriculture

As of the 2011 Statistics Canada Census of Agriculture, Guysborough County was home to 2.5 percent of all farms in Nova Scotia, up slightly from 2.4 percent in 2006 with a total of 99 farms. In 2011, the leading agriculture sector in terms of number of farms was nursery and tree production with a total of 66 farms, followed by fruit & tree-nut farming (26 farms). Beef and dairy cattle farming was less common throughout the County, with a total of five farms combined (NSDA 2012).

The Proponent operates a small Christmas tree operation on the lands to the southeast of the Project Area. No additional tracts of agricultural land were identified within 800 m of the Project Area (Drawing 8.5). Therefore, the Project is not located in a region where conflict with current and future agricultural practices is anticipated.

8.9.2 Potential Interactions and Effects

It is expected that Project activities will produce noise from equipment operation and blasting in the same manner as the existing operations. Approximately 42 buildings/structures are located within 800 m of the Project property. The Proponent has been proactive at maintaining communication with surrounding land owners, and many of the owners of properties surrounding the Project Area have provided letters of consent for continuing drilling and blasting operations at the quarry (Appendix B).

The owners of all structures and/or wells within 800 m of blasting activities will be notified and provide consent via pre-blast surveys prior to blasting. Blasting will occur at a frequency similar to past operations at the site (1-2 times per year) and during daytime hours only.

Interactions with the Bonnet Lake Barrens Wilderness Area are not expected to arise from the Project, due to the distance from the Project Area. Topography within the majority of the Project Area slopes to the north, with surface water features draining towards Chedabucto Bay. The southern extent of the site does drain south toward Big Lake, however drainage immediately south of the Project area ultimately drains west, discharging near Halfway Cove. Surface water interactions are not expected as the Bonnet Lake Barrens Wilderness Area is situated in a separate drainage area, discharging to the south.

8.9.3 Proposed Mitigation and Protective Measures

- Construction equipment will be maintained in good working order and properly muffled.
- Engine idling will be restricted.
- Blasting will continue to occur infrequently, and will be conducted in accordance with the Approval and any future amendments, as well as all applicable provincial guidelines and regulations and associated setbacks.
- Blasting limits outlined in Table 4.2 will continue to be adhered to.
- An updated Blasting Plan and Pre Blast Survey will be submitted to NSE for approval, as part of the Industrial Approval Amendment application.
- Surrounding landowners will be notified prior to any blasting activities, in accordance with applicable guidelines.
- Noise control measures (e.g., sound barriers, shrouds, enclosures) will be used where warranted.
- At the request of NSE, an Air Quality Monitoring Program will be designed and implemented. Based on the results of the monitoring program, necessary modifications to mitigation plans and/or quarry operations will be discussed with NSE.
- At the request of NSE, a Sound Monitoring Program will be designed and implemented.
- Implementation of the EPP, including air quality and sound level monitoring (if required) and complaint response (as necessary).

Additional mitigation related to blasting, air quality and noise levels are outlined in Sections 8.5 and 8.6.

8.9.4 Proposed Monitoring and Follow-up Programs

- Additional blast monitoring activities and/or reporting may be required by NSE. Consent will be required and pre-blast surveys will be offered to all property owners with structures and/or wells within an 800 m radius of planned blasting activities. Pre-blast surveys will be conducted in accordance with the NSE Procedure for Conducting a Pre-Blast Survey.
- No blasting will occur on Sundays, on statutory holidays, or on any day between 1800 and 0800 hours, as outlined in the current Approval.
- All blasting limits outlined in the Approval (Table 4.2) or any future amendments, will be adhered to.
- A Sound Monitoring Program will be designed and implemented at the request of NSE. Based on the results of the monitoring programs, necessary modifications to mitigation plans and/or quarry operations will be discussed with NSE.

8.9.5 Expected Residual Effects

Using criteria based on federal and provincial EA guidance (outlined in Section 7.0) an analysis of residual effects from the Project is provided in Table 8.25.

Table 8.25: Residual Effects Analysis

| VEC | Phase | Significance Criteria | Residual Effects | Significance of Residual Effects |
|----------------------|-----------------------------------|---|------------------|----------------------------------|
| Surrounding Land Use | Site Preparation and Construction | Scope: Local Duration: Short-term Frequency: Continuous Magnitude: Negligible-Low | Low | Not Significant |
| | Operations and Maintenance | Scope: Local Duration: Long-term Frequency: Intermittent Magnitude: Negligible-low | Low | Not Significant |
| | Accidents and Malfunctions | None expected | n/a | n/a |

Effects on surrounding land use are largely attributed to noise generated by operation activities such as heavy trucks, equipment and blasting activities. Noise impacts can be controlled with standard mitigation practices and BMPs; therefore the Project is not likely to result in any significant residual effect on existing noise levels and surrounding land use.

Effects to surrounding land use due to accidents and malfunctions are expected to be addressed through the implementation of standard mitigation strategies, BMPs, and the EPP. Provided the proposed mitigative measures are applied, no residual effects to surrounding land use are expected as a result of these incidents.

Noise monitoring and air quality monitoring will be conducted as required at the request of NSE. Additional mitigative measures will be developed as necessary.

8.10 Traffic and Transportation

8.10.1 Description of Existing Conditions

The Project Area is located approximately 300 m south of Hwy 16, with the existing quarry currently accessed via a private road that branches off the highway (Drawing 3.3). This private road will continue to provide access to and from the quarry, and no additional roads are proposed. Aggregate materials will continue to be transported from the site to local consumers via large trucks, with the number of trucks hauling product from the quarry expected to remain consistent with the current number of approximately 8 to 10 per day, on average.

Traffic volumes could increase or decrease over time, depending on demand or other market factors affecting quarry operations. A transportation assessment was not deemed necessary for the Project given that the Project is not anticipated to result in any significant increase in the volume of truck traffic on public roads compared to current levels.

8.10.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

The proposed quarry expansion is not expected to result in significant changes to local traffic on public roads. The expansion will allow continuation of the existing operations at the site, therefore

transportation routes and conditions are expected to remain consistent with the current operations. No mitigation or follow-up programs are expected to be required.

8.10.3 Expected Residual Effects

No residual effects on local traffic are expected as a result of Project activities, therefore this VEC is not assessed further.

8.11 Recreation, Tourism and Viewscape

8.11.1 Description of Existing Conditions

Tourism is an important industry in Guysborough County, which is valued by visitors for its unspoiled coastal landscapes. Wildlife, outdoor recreation and eco-tourism all exist in the region and have great potential to expand. The towns of Guysborough and Canso offer a range of entertainment and recreational services, including historic sites, golf courses, marinas, theatre, and dining. The Canso region is well-known throughout the Maritimes for hosting the annual Stan Rogers Folk Festival.

Existing outdoor recreation in the vicinity of the Project Area includes snowmobiling, ATVing, hunting, sport fishing, beaches, camping and hiking. Bonnet Lake Barrens Provincial Wilderness Area is located 3.1 km south of the Project Area, which is popular among nature enthusiasts for its unique hiking and nature exploration along old footpaths and cart tracks that once joined coastal communities. Popular beaches and parks in the vicinity of the Project Area include Queensport Beach, located approximately 5.8 km to the southeast, Port Shoreham Beach Provincial park, approximately 8.9 km to the northwest, and Dorts Cove Provincial Park, approximately 9.9 km west of the Project Area. The Project Property is located within NSDNR Deer Management Zone 106, which yielded an annual harvest of 436 during the 2012 season (NSDNR 2013e). NSDNR Calculated Harvest of Upland Game reports Guysborough County as producing the highest yield of ruffed grouse (at 6,318) and the second highest yield (at 7,209) of snowshoe hare in the province for the 2012-2013 season (NSDNR 2013f). Sport fishing is a popular recreational activity in lakes and streams near the Project Area with Ocean Lake, Little Lake and Donahue Lake stocked with speckled trout and the Salmon River stocked with brown trout annually via the provincial Hatchery Stocking Program (NSFA 2012a and b).

The 2011 Nova Scotia Visitor Exit Survey Community Report outlines the total trips (stopped or stayed) to communities in Nova Scotia, to particular tourist regions, as well as capture rates of communities within tourist regions (Nova Scotia Department of Economic and Rural Development and Tourism 2011). The nearest communities to the Project Area examined were Guysborough, Canso and Isaacs Harbour within the Eastern Shore tourism region. Table 8.26 shows the total trips (people who stopped for at least 30 minutes or stayed overnight) that were made to these communities as well as their capture rate (the percentage of parties that stopped in a specific community compared to other communities within the region) out of the total number of parties who visited the tourism region. The data shows tourism is not currently a major economic driver in the vicinity of the Project Area.

The Project Area is located along Highway 16, which forms part of the Marine Drive Scenic Travelway. The quarry is located on southern side of the highway, opposite from the coastal side, and is not visible from the highway, which is not expected to change with the expansion.

Table 8.26: Communities Visited in Nova Scotia

| Region/Community | Total Trips (% who stopped or stayed) | Capture Rate (%) |
|----------------------|--|------------------|
| Eastern Shore Region | 7% | |
| Guysborough | 1% | 21% |
| Canso | 2% | 29% |
| Isaacs Harbour | 1% | 9% |

Source: NSERDT 2011

8.11.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

The existing quarry and proposed extension of the operation are not likely to have an impact on tourism and recreational use in the areas surrounding the site due to the distance between the Project Area and identified recreational components. As no watercourses or water bodies are present on the Project Area, effects to recreational fishing activities are not expected.

The existing quarry is located south of Highway 16, and is not currently visible due to the presence of a hill between the quarry and the road. As the expansion progresses towards the northwest, the hill will not be impacted therefore, the quarry will likely continue to not be visible from the highway. Adherence to the Pit and Quarry Guidelines (1999) and Blasting Regulations, including all setback distances, should sufficiently mitigate any potential effects to recreation, tourism and viewscape.

8.11.3 Expected Residual Effects

No residual effects on recreation, tourism and viewscape are expected as a result of Project activities, therefore this VEC is not assessed further.

8.12 Human Health

Potential effect from the Project on human health are related effects on air quality and noise. Air quality and noise levels are addressed in greater detail in Sections 8.5 and 8.6, respectively.

8.13 Cultural and Heritage Resources

8.13.1 Description of Existing Conditions

CCH was provided with details of the Project, so that any areas of cultural, historical, archaeological or paleontological significance potentially present at the site could be identified. Preliminary information and advice from the department regarding the likelihood of encountering such features concluded that while no recorded archaeological sites were on file for the study area, an assessment for archaeological resources is recommended. The presence of fossils in the Meguma Supergroup and/or granitic plutons underlying the site is not expected. A copy of the report is provided in Appendix G.

In order to evaluate the potential for impacting archaeological resources during the proposed expansion, an ARIA was conducted by Boreas Heritage Consulting. The archaeological screening and field reconnaissance was completed in April and May 2014, under Heritage Research Permit A2014NS022. Based on the various components of the ARIA background study, including environmental setting, Native land use and property history, the Project Area is ascribed low potential for encountering Precontact and/or early historic Native archaeological resources, as well as historic Euro-Canadian archaeological resources (BHCI 2014).

Field reconnaissance revealed that the majority of the Project Area constituted a mix of hummocky, undulating and wet terrain that would have been unsuitable for occupation and/or work areas associated with resource exploitation by Precontact peoples. No evidence of archaeological resources or areas of elevated archaeological potential were encountered and no indication of significant historic cultural modification was identified within the Project Area. Based on the nature of the terrain, the distance to a significant water source, and the lack of evidence indicating significant cultural modification, the Project Area is considered to exhibit low potential for encountering significant archaeological resources (BHCI 2014).

A copy of the ARIA was submitted to CCH for review, which has agreed with recommendations provided in the report. The letter from CHH is provided in Appendix G.

8.13.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

As the likelihood of uncovering items of cultural or historical significance during Project activities was considered to be low, further mitigation is not required.

In the event that archaeological resources or human remains are encountered during development activities associated with the quarry, immediate contact should be made with the Coordinator of Special Places, Communities Culture and Heritage. Response procedures related to the discovery of such items will be outlined in the EPP.

8.13.3 Expected Residual Effects

As the likelihood of uncovering items of cultural or historical significance during Project activities is considered to be low, no residual effects are expected.

8.14 Aboriginal Resources

8.14.1 Description of Existing Conditions

There are no First Nations lands identified within 10 km of the Project Area (NSDNR 2013b). The closest identified First Nations lands are Pomquet-Afton (Paq'tnkek) (#23) and Summerside (#38) in Antigonish County, located approximately 40 km and 43.5 km northwest of the Project Area, respectively. These, along with Franklin Manor (#22) (located southwest of Amherst) form the Paq'tnkek Mi'kmaw Nation. Established in, 1820, Paq'tnkek Mi'kmaw Nation has a total registered population of 557, as of January 2014 (AANDC 2014). The name Paq'tnkek, meaning "by the bay", is a distinction emphasizing the importance of the local bay (St. Georges Bay) and its resources to the Mi'kmaw people.

Results of the ARIA reveal that the land within the Project Area was once part of the greater Mi'kmaq territory known as *Eskikewa'kik*, meaning 'skin dressers territory'. The surrounding area is relatively dense with lakes and watercourses that would have been important transportation corridors, providing a resource base for the Mi'kmaq, their ancestors and predecessors for millennia prior to the arrival of European settlers. The Mi'kmaq seasonally moved throughout the region between areas where shelter and resources, including food and medicinal plants, were available and annually migrated between hunting and fishing grounds (Chute 1999 as cited in BHCI 2014).

A review of the Maritime Archaeological Resource Inventory, in support of the ARIA, determined that there are no registered archaeological sites located within the Project Area. The closest registered site is BiCi-1, a Native Copper Kettle burial situated at the mouth of the Salmon River, approximately 10 kilometres west of the study area. The lack of archaeological data for the area undoubtedly reflects a lack of archaeological investigation, rather than an absence of archaeological sites. The potential for Native settlement and/or utilization in the immediate vicinity of Halfway Cove is likely high; however, the Project Area is approximately 3 kilometers east of the cove and would have been considerably less suitable for occupation (BHCI 2014).

No watercourses, water bodies or flora SOCI were identified within the Project Area during 2014 field surveys.

The Proponent has engaged in ongoing consultation with the Council of Paq'tnkek First Nation, as the closest identified First Nations community to the Project Area, as well as the KMKNO and the CMM, as these two bodies have expressed an interest in the Project. To date, no response has been received from Paq'tnkek First Nation.

8.14.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-up

Based on the results of the ARIA, and biological surveys conducted in the Project Area, the potential for Project activities to interact with Aboriginal resources is considered to be low. No watercourses, water bodies or rare/sensitive flora were identified within the Project Area during field surveys, and any effects to offsite biological receptors are expected to be mitigated through measures outlined in this document.

Procedures related to potential discovery of items of Aboriginal cultural or historical significance during construction and/or operations will be described in the EPP. This includes prompt notification of the Confederacy of Mainland Mi'kmaq and/or the Union of Nova Scotia Indians in the event of such a discovery.

8.14.3 Expected Residual Effects

No residual effects on Aboriginal resources are expected as a result of Project activities, therefore this VEC is not assessed further through residual effects analysis.

8.15 Other Undertakings in the Area

8.15.1 Description of Existing Conditions

Aside from one small, semi-operational pit, no other active pit or quarry operations licensed to operate were identified in the vicinity of the Project Area, therefore no cumulative interactions with the Project are expected. Likewise, no similar undertakings were identified in the vicinity of the Project Area that may interact with the Project or contribute cumulative effects, in the form of clearing, blasting, traffic volume etc.

8.15.2 Potential Interactions and Effects, Mitigation, Monitoring and Follow-Up

The existing quarry has been operating for ten years without any issues or impacts to surrounding VECs or land users related to quarry operations. The proposed quarry expansion is not anticipated to result in an increase in production, or any other significant change to existing operations; therefore interactions with other undertakings in the area are not expected to arise. The implementation of the mitigation strategies outlined in this EA document should ensure that interactions with surrounding land-users remain minimal, therefore Project-related effects regarding other undertakings in the area are not likely to occur.

8.15.3 Expected Residual Effects

No residual effects on other undertakings in the area are expected as a result of Project activities, therefore this VEC is not assessed further.

9.0 EFFECTS OF THE ENVIRONMENT ON THE UNDERTAKING

Environmental factors that have the potential effect quarry operations include:

- Precipitation Volumes;
- Extreme weather conditions (wind, snow, rain, ice etc.); and
- Fire.

The primary mitigative measure employed during the construction and operation of the Project will be to educate and train site personnel. Environmental and safety orientations will be conducted prior to the start of construction and all personnel will be informed of the potential effects of the environment on the Project. Staff responsible for the operation and maintenance of the Project will be trained on applicable operating procedures, safety protocols and Emergency Response plans.

Best practices and industry standards will be applied during all phases of the Project to manage risks of damage from significant metrological/environmental events. ESC structures and drainage management plans will be designed to accommodate appropriate levels of precipitation. Weather conditions will be monitored and quarry activities scheduled as appropriate. Table 9.1 demonstrates potential effects resulting from such events and the mitigation associated with each.

Table 9.1: Effects of Environmental Events and Associated Mitigation

| Environmental Event | Effect | Mitigation |
|---|--|---|
| Precipitation Volume | Effects to runoff volumes | <ul style="list-style-type: none"> • Implementation of an updated Storm Water Management Plan. • Design the Storm Water Management Plan in consideration of the increased likelihood of more frequent and intense precipitation events in the coming years with reference to NSE's "Guide to Considering Climate Change in Project Development in Nova Scotia" (NSE 2010). • Design and implementation of an updated ESCP. • Adherence to the applicable industry guidelines, regulations and best practices. |
| Extreme weather conditions (wind, snow, rain, ice etc.) | Poor visibility Delay of on-site activities Delay delivery of aggregate products | <ul style="list-style-type: none"> • Appropriate safety protocols. • Monitor weather conditions. • Cease operations during extreme weather conditions, as necessary. |
| Fire | Fire during construction or operations due to materials and machinery | <ul style="list-style-type: none"> • Fire prevention plan • Evacuation plan • Implementation of contingency and emergency response procedures in the EPP. • Ongoing communication with local emergency response unit (Queensport Fire Dept.). |

Mitigation measures indicated above have allowed for successful operation of the quarry in a variety of climatic/environmental conditions over the past 10 years. Similar measures will be employed with the proposed expansion. Therefore, effects of the environment are not anticipated to significantly affect the operation of the quarry.

10.0 OTHER APPROVALS REQUIRED

In addition to the EA Approval, several other municipal and provincial permits and/or approvals may be required prior to the start of construction (Table 10.1). No federal permitting requirements were identified.

Table 10.1: Future Approvals

| Approval/Notification/Permit Required | Government Agency |
|---------------------------------------|-------------------|
| Municipal | |
| Development Permit | MODG |
| Provincial | |
| ESCP | NSE |
| EPP/Contingency Plan | NSE |
| Storm Water Management Plan | NSE |

| Approval/Notification/Permit Required | Government Agency |
|---|--------------------------|
| Air Monitoring Program (if required) | NSE |
| Sound Monitoring Program (if required) | NSE |
| Updated Site Rehabilitation Plan and Security | NSE |
| Industrial Approval Amendment/Extension | NSE |
| Blasting Plan and Pre-Blast Survey | NSE |
| Notification of Blasting | NSE |

Note: No requirements for a blasting approval are expected as distance to the nearest watercourse is 350 m.

11.0 FUNDING

The Project will be privately funded. No public funding is required for the Project.

12.0 ADDITIONAL INFORMATION

Project Team Credentials are provided in Appendix J. No additional information is provided in support of this document.

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