

## 5.0 ALTERNATIVE PROJECT LOCATIONS AND APPROACHES

As indicated in Section 3.2, Crémallière Harbour is proposed as a preferred location which will compete as a deep water, ice-free port located at the eastern extent of the Canadian North and the Arctic Ocean, connecting to transatlantic shipping and eastern North America. GNP Inc. evaluated the potential of the Crémallière Harbour in comparison to three other potential deep water ports in Newfoundland and Labrador and in the Eastern Arctic. The other potential ports evaluated were Iqaluit on Baffin Island, Rigolet on the mid-Labrador coast, and Cartwright on the mid-Labrador coast, Figure 5-1. Other potential ports on the Island of Newfoundland, such as Bull Arm, Argentia, Cow Head, Marystow and St. John's, do not satisfy the proximity criteria to the Canadian North and the Arctic Ocean identified by GNP Inc. as a rationale for the Project. The existing port at St. Anthony does not fulfil the draft requirements identified by GNP Inc. for potential client needs. Each potential deep water port identified was evaluated using a ranked comparison based on the following five major criteria:

- Proximity to major industries such as oil and gas endeavors and mining operations, as well as proximity to oil spill response capability, community infrastructure and shipping lanes;
- Intermodal connectivity including air services, roads and marine infrastructure;
- Hub potential related to land availability, labour supply and government and industry support;
- Water depth; and
- Navigation accessibility related to months free of ice as well as wind, wave and current factors relating to port usage.

Crémallière Harbour received the highest ranking for potential deep water port development when the rankings provided by GNP Inc. for each of these five major criteria were combined.

Proximity to major industries, including mining operations, was considered as a major factor when evaluating the potential for the Crémallière Harbour Port Development Project in comparison to alternatives. However, the business model of the port is not centered on one particular revenue stream, such as mining. The potential year-round operational capability of the port will serve to provide continuous access for other activities that will foster economic development in the area. This year round access could also serve for emergency support to remote oil and gas operations, vessel support services, and other year round operations. All four of the potential deep water ports considered ranked similarly in terms of this criteria, although Iqaluit and Rigolet ranked slightly higher than Crémallière Harbour and Cartwright because of closer proximity to existing mining and industrial operations.

Crémallière Harbour ranked significantly higher than the other locations evaluated in terms of intermodal connectivity with the most significant factor being potential road connectivity.

Crémallière Harbour also ranked significantly higher than the other locations in terms of hub potential, with both land availability and labour supply availability being the most significant differences.

Water depth was similar in each of the potential sites evaluated and was not a significant factor in the overall ranking among the potential locations evaluated.

Navigation accessibility was a major criteria considered. This criteria is most significantly influenced by the ice free nature of the port itself, but is also influenced by the presence of sea ice. The ice-free season for Crémallière Harbour normally occurs between May and January, providing roughly 7-8 months of ice free conditions. The presence of sea ice outside of Crémallière Harbour is an annual occurrence dependent on weather conditions, but, the harbour entrance itself is shielded from ice bearing currents and wind-blown ice flows by geographic features of the surrounding coast, and the southeast to northwest orientation of the harbour. Should there be sea ice outside of Crémallière Harbour, as is the case in most years, then access to the

port will need to be managed through existing or alternative solutions including Canadian Coast Guard services or potential ice resistant harbour tugs. Due to its unique exposure, Crémallière Harbour is free of ice under pressure year round with only minimal ice breaking support required in the heaviest ice seasons. This is a major economic and logistical advantage and Crémallière Harbour ranked highest in GNP Inc.'s evaluation of potential northern deep water port developments with this factor considered.

GNP Inc.'s economic objective is to create a catalyst for growth based on the cluster of port services driven by current, and projected onshore and offshore logistics requirements as well as military and Coast Guard needs. GNP Inc. is planning a phased approach to development of planned infrastructure based on projected need and contingencies. The overall marine port development is projected to occur over a twelve year period between 2018 and 2030. The first phase of the proposed development will include a period of intensive surveying and engineering design, as well as hydrogeological, bathymetric, environmental and geotechnical assessments to guide site specific excavation and construction planning for specific infrastructure. This phase will also involve the development of roads and utility infrastructure for buildings and other structures. The port related infrastructure will be developed after this initial detailed planning period and will include development of site specific mitigative measures for inclusion in the Project EPP. Infrastructure requirements for the Crémallière Harbour Port development may vary based on projected and identified needs, however, infrastructure development planning will be guided by the results of the engineering, environmental geotechnical studies to be undertaken. The locations of proposed infrastructure are not presently referenced to specific geographical coordinates and may be adjusted in response to site specific engineering and environmental considerations from future engineering studies and environmental protection planning. The infrastructure will also be subject to specific regulatory permit and approval processes, as identified in Appendix D.

**Figure 5-1 Alternative Locations Evaluated for Deep Water Ice-Free Port Project**



## 6.0 ENVIRONMENTAL SETTING, POTENTIAL INTERACTIONS AND MITIGATION

The following provides an overview of the existing environmental setting for the proposed Project, including a description of relevant components of the biophysical and socioeconomic environments. This is followed by an analysis of the Project's potential environmental interactions and the identification and description of mitigation measures which will be put in place to avoid or reduce any such effects.

### 6.1 Natural Environment

#### 6.1.1 Wildlife

Wildlife species are an integral component of local and regional environments and have a range of ecological and socio-cultural roles and values. From an ecological perspective, mammals and birds occupy multiple trophic levels as scavengers, predators and prey (Marquis and Whelan 1994), function as seed dispersers (Levey et al. 2005), and can sometimes influence landscape composition through herbivory (e.g. moose and American beaver). Some groups, including waterfowl, ungulates, and small game are harvested as a food source or are hunted and trapped for recreational enjoyment or a source of income. Wildlife may also provide recreational and aesthetic value through non-consumptive activities including bird watching and photography.

##### **Mammals**

There have been few structured wildlife surveys conducted that include the proposed Project site. Therefore, most inference on the assemblage of mammals and birds that occur within the Project area is based on their known occurrence in similar habitats throughout the Northern Peninsula Ecoregion as well as on local knowledge. Mammalian species that are expected to occur throughout the varied habitats within the Project area include moose (*Alces alces*), snowshoe hare (*Lepus americanus*), river otter (*Lontra Canadensis*), red fox (*Vulpes vulpes*), and meadow vole (*Microtus pennsylvanicus*). The occurrence of two bat species in the Project area (little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*)) is unknown.

Understanding the distribution and abundance of these two species is important given the recent confirmation of white nose syndrome on insular Newfoundland and the susceptibility of these federally listed (Endangered) species to population declines as a result of this fungal disease.

Woodland caribou (*Rangifer tarandus caribou*) are native to insular Newfoundland and have important ecological, cultural, and socio-economic value. As top-level herbivores, caribou influence the composition and structure of plant communities and function as prey species for multiple carnivores and scavengers. From a cultural perspective, caribou have long been utilized by indigenous peoples as a source of food and clothing and for ceremonial and spiritual purposes. Furthermore, caribou are an important big-game species for both residents and non-residents and provide economic benefits through the outfitting industry. Though demographic data on caribou is lacking for the immediate Project area, caribou are known to occur in the greater St. Anthony area (Morgan and Doucet 2007) so may potentially use parts of the Project area during some times of the year.

##### **Avifauna**

Long term data from regional breeding bird survey routes (Environment Canada 2014) and online data sources (eBird Canada 2018) indicates that a number of taxonomic and functional groups occur within the general region including seabirds, waterfowl, shorebirds, wood warblers, birds of prey, sparrows and finches. Collectively, these species inhabit all available terrestrial, wetland and marine habitats including sparsely forested habitats, upland barrens, coastal shorelines and offshore environments. Common species known to breed throughout the St. Anthony region include American Black Duck (*Anas rubripes*), Herring gull (*Larus argentatus*), Common tern (*Sterna hirundo*), Greater Yellowlegs (*Tringa melanoleuca*), American robin (*Turdus migratorius*), Blackpoll Warbler (*Dendroica striata*), Osprey (*Pandion haliaetus*), Savannah sparrow (*Passerculus sandwichensis*), Pine Grosbeak (*Pinicola enucleator*), and Common Eider (*Somateria mollissima*). Less common species that have been

documented to occur in this region, but for which demographic information is lacking, include Gray-cheeked Thrush (*Catharus minimus*), and Short-eared Owl (*Asio flammeus*). Other species that primarily utilize the Northern Peninsula Ecoregion during migration include White-rumped sandpiper (*Calidris fuscicollis*), Snow Bunting (*Plectrophenax nivalis*), and American pipit (*Anthus rubescens*). Though formal bird surveys have not been conducted within the Project area, the assemblage of species at the site is expected to be reflective of bird communities that have been more extensively described for this region of Newfoundland.

### **Listed and rare species**

There are twenty-one species of birds and mammals that are listed on Schedule 1 of the federal *Species at Risk Act* (SARA) and/or the Newfoundland and Labrador *Endangered Species Act* (NLESA) that have the potential to occur within the immediate Project area and surrounding landscape. However, the probability of occurrence varies depending on the species considered, their habitat requirements and their general abundance throughout this region of insular Newfoundland. For example, Piping Plovers (*Charadrius melanotos*) are primarily restricted to sandy coastal beaches in western Newfoundland during the breeding season (Calvert et al. 2006, Intervale Conservation and Heritage Associates, Inc.) and are therefore unlikely to occur in the Project area. Conversely, Ivory Gulls (*Pagophila eburnea*) irregularly overwinter along coastal Newfoundland during years of heavy pack ice (Stenhouse 2004) and are likely to occasionally occur in the Project area. Other species that may occasionally occur in the Project area (given the availability of suitability nesting or foraging habitat) include Short-eared Owl (*Asio flammeus*), Harlequin Duck (*Histrionicus histrionicus*), and Gray-cheeked Thrush (*Catharus minimus*). Species for which there is insufficient data to assess their occurrence in the Project area include little brown myotis, northern myotis, Red Crossbill (*Loxia curvirostra*) and Common Nighthawk (*Chordeiles minor*). Table 6.1 provides a complete list of these listed species along with their probability of occurrence in the Project area. As described above, the lack of comprehensive and long-term survey data limits our ability to fully assess the status of the species in the Project area.

**Table 6.1 Species at risk that potentially occur within the Project Area**

<b>Species</b>	<b>Scientific name</b>	<b>Legal designation</b>	<b>SAR status</b>	<b>Expected status in the Project Area</b>
<b>Avifauna</b>				
Harlequin duck	<i>Histrionicus histrionicus</i>	NL ESA SARA	Vulnerable Special Concern	Likely
Barrow's goldeneye	<i>Bucephala islandica</i>	NL ESA SARA	Vulnerable Special Concern	Possible
Eskimo curlew	<i>Numenius borealis</i>	NL ESA SARA	Endangered	Not expected
Red knot	<i>Calidris canutus rufa</i>	NL ESA SARA	Endangered	Possible
Piping Plover	<i>Charadrius melanotos</i>	NL ESA SARA	Endangered	Not expected
Ivory Gull	<i>Pagophila eburnea</i>	NL ESA SARA	Endangered	Likely
Peregrine falcon	<i>Falco peregrinus anatum</i>	NL ESA SARA	Vulnerable Special Concern	Possible
Short-eared owl	<i>Asio flammeus</i>	NL ESA SARA	Vulnerable Special Concern	Likely

<b>Species</b>	<b>Scientific name</b>	<b>Legal designation</b>	<b>SAR status</b>	<b>Expected status in the Project Area</b>
Olive-sided flycatcher	<i>Contopus cooperii</i>	NL ESA SARA	Threatened	Not expected
Gray-cheeked thrush	<i>Catharus minimus minimus</i>	NL ESA	Threatened	Possible
<b>Species</b>	<b>Scientific name</b>	<b>Legal designation</b>	<b>SAR status</b>	<b>Expected status in the Project Area</b>
<b>Avifauna</b>				
Rusty blackbird	<i>Euphagus carolinus</i>	NL ESA SARA	Vulnerable Special Concern	Possible
Red crossbill	<i>Loxia curvirostra</i>	NL ESA	Endangered	Not expected
Common nighthawk	<i>Chordeiles minor</i>	NL ESA SARA	Threatened	Not expected
Bobolink	<i>Dolichonyx oryzivorus</i>	NL ESA SARA	Vulnerable Threatened	Not expected
Barn swallow	<i>Hirundo rustica</i>	SARA	Threatened	Possible
Bank swallow	<i>Riparia riparia</i>	SARA	Threatened	Not expected
Buff-breasted sandpiper	<i>Tryngites subruficollis</i>	SARA	Special Concern	Possible
Chimney swift	<i>Chaetura pelagica</i>	NL ESA SARA	Threatened	Not expected
<b>Mammals</b>				
Newfoundland marten	<i>Martes americana atrata</i>	SARA	Threatened	Not expected
Little brown myotis	<i>Myotis lucifugus</i>	SARA	Endangered	Unknown
Northern myotis	<i>Myotis septentrionalis</i>	SARA	Endangered	Unknown

### 6.1.2 Vegetation, Streams and Wetlands

Crémaillère Harbour is contained within the Northern Coastal Subregion of the EcoRegions of Newfoundland. The region is flat or gently rolling, with elevations under 150 m. Balsam fir is the dominant tree cover at lower elevations and black spruce at higher elevations. Most of the Northern Coastal Subregion is dominated by bogs and shrub forest.

Six streams are located within the Project area, Figure 6-1. These are relatively small streams with watersheds ranging from 76 ha to 206 ha and stream widths in the 3 to 5 m range. Some streams located in the project area

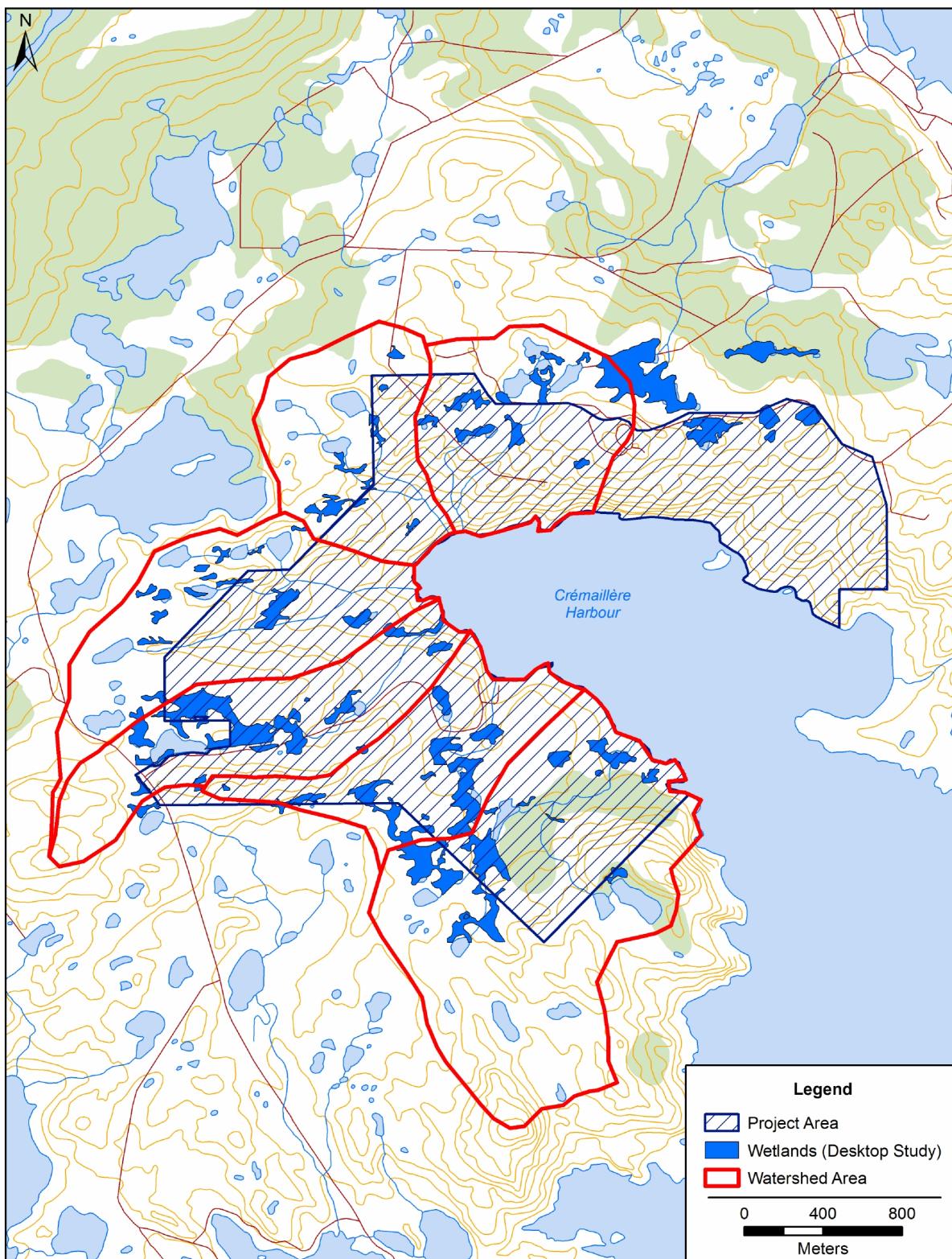
include small ponds, but in most cases headwater ponds for these streams are located outside of the Project area.

Wetland areas have been defined as low-lying areas of vegetated habitat with visible pockets of standing water. Given the resolution and availability of imagery, a differentiation into various wetland types is not possible at this time with any certainty. A total of 67 ha of wetland habitat is located within and near the Project area.

Potential wetland habitat within and near the Project area was delineated using geographic information system and available satellite and aerial imaging, Figure 6-1. This includes wetlands that are wholly within the Project area as well as wetlands that are adjacent to or intersect the Project area. In order to remain conservative, any potential wetland area that is near the current boundary of the project was included because final design may adjust the project footprint and due to proximity, construction/operation activities may affect them. However, of the 67 ha of wetland that was identified, 49 ha occurs fully within or intersects with the Project boundary and this represents 10% of the overall area within the Project boundary.

Streams and wetlands can be used as habitat by various animal and plant species. Some bird and plant species that reside in wetlands can be uncommon or rare.

**Figure 6-1 Streams and Wetlands Within or Near the Project Area**



### 6.1.3 Freshwater and Marine Fish

Freshwater fish species that may be found in streams within the Project area include brook trout, three-spined stickleback and nine-spined stickleback. American eel and rainbow smelt may also be found in these streams on occasion as part of their migratory patterns. The only SARA listed freshwater fish with potential for being present in the area is the Banded Kilifish (*Fundulus diaphanus*) (SARA, 2018). However, the closest known occurrence of this species is on the west side of the Great Northern Peninsula, near Plum Point. No specimens have been found in surveys on the east coast of the Peninsula.

The province of Newfoundland and Labrador's rivers are the spawning ground for 80% of the Atlantic Salmon in North America and the federal government has scheduled rivers that have a significant salmon run to enable application of appropriate fishing regulations and other protections to these rivers. There are no scheduled salmon rivers within Crémallière Harbor. The nearest scheduled salmon rivers to the Project area are Bartlett's Brook and Upper Brook, which both drain to Pistolet Bay on the west side of the Great Northern Peninsula, away from the Project area, Figure 6-2. An unscheduled salmon bearing river on the east side of the Peninsula (Ireland Brook) is located approximately 9 km south of Crémallière Harbour, Figure 6-2.

**Figure 6-2 Scheduled Salmon Rivers**



Crémallière Harbour's shore is made of exposed rocky outcrops with interspersed gravel/pebble beaches. The drop-off is very steep at the rocky out-crops and shallow where beaches occur. This variation of slope provides

habitat for a wide range of fish and invertebrates. Fish habitats include areas that fish directly or indirectly use, including nursery, rearing, spawning, migration and foraging habitat. The fish and invertebrates present in this habitat may be of commercial, cultural and/or ecological importance and support regionally important areas of biodiversity and marine productivity.

Crémaillère Harbour will be home to algae species with specific species presence dependent on variables such as water turbulences, substrate, depth, and nutrients. Likely species encountered for this region can be taken from the Marine Fish and Fish Habitat Report for the Labrador -Island Transmission Link (Sikumiut Environmental Management Ltd. 2010). Based on this report, the algae species will likely include Coralline algae (*Corallina* spp), Crustose algae (*Lithothamnium* spp), Red fern (*Ptilota* spp), Dulse (*Palmaria palmata*), Brown algae species, Sea colander (*Agurum crubosum*), Sour weed (*Desmarestia* spp), Kelp (*Laminaria* spp), Knotted wrack (*Ascophyllum nodosum*), Edible kelp (*Alaria* spp), Rockweed (*Fucus* spp), Brown filamentous algae (Phaeophyceae), and Green filamentous algae.

Marine fish species that may be present in Crémaillère Harbor include some species that are protected under the SARA, as well as those that have been identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species listed under COSEWIC are not attributed any special legal protections, but do warrant a special mention.

The American Eel (*Anguilla rostrata*), a diadromous fish that spawns in the Sargasso sea and returns to the rivers to attain adulthood, is assessed by COSEWIC as threatened (Environment and Climate Change 2018). The same Cosevic status is given to the Lumpfish (*Cyclopterus lumpus*), that has preferred habit between 50 and 150m depth, but it can occur in coastal shallow areas (Environment and Climate Change, 2018). Another species assessed by COSEWIC potentially occurring in the region is the Thorny Skate (*Amblyraja radiata*) (Environment and Climate Change, 2018). The assessment of COSEWIC ranks this species as special concern. As with the lumpfish, the preferred habitat is deeper than the harbour (50 – 100m) but can be encountered in shallower waters. Its preferred habitat is sandy and muddy substrate. Due to the depth of the harbor (ranging from 12.8 to 18.25 m), the only saltwater species falling under SARA (Schedule 1) protection pertinent to this harbor proposal is the Atlantic Wolffish (*Anarhichas lupus*). Other listed species may occur in deeper water than is present in Crémaillère Harbour, whereas the Atlantic Wolffish can occur in depths found within the Harbour. Atlantic Wolffish are listed as vulnerable in Schedule 1 of SARA (SARA, 2018).

Summaries of the species that may be encountered in this area are in Table 6.2.

**Table 6.2 Freshwater and Marine Species Presence Potential in The Project Area (Sources: DFO, Ministry for Fisheries and Land Resources, SARA Registry, Fisheries Act.)**

Common Name	Scientific Name	Biological/Habitat Details
Winter Flounder or Flounder	<i>Pseudopleuronectes americanus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: Variable</li> <li>Preferred depth: 5-143m</li> <li>Preferred substrate: muddy to moderately hard</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>Daytime feeder</li> <li>Feeds on zooplankton invertebrates</li> <li>Batch spawner</li> <li>Migrates into shallow waters for spawning during winter</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery</li> <li>Commercial fishery (bait and for consumption)</li> </ul> <p>Conservation Status</p> <ul style="list-style-type: none"> <li>COSEWIC: No concern</li> <li>SARA: No status</li> </ul>
Mackerel	<i>Scomber scombrus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: 11-14°C</li> <li>Preferred depth: 0-1000m (typical 0-200m)</li> <li>Preferred substrate: Pelagic</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>Annual migration inshore in spring, fall and winter in deep offshore waters</li> <li>Feeds on zooplankton and small fish</li> <li>Spawning occurs mainly in Gulf of St Lawrence in June and July</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery</li> <li>Commercial fishery (bait and for consumption)</li> </ul> <p>Conservation Status</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Nine-spine Stickleback	<i>Pungitius pungitius</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: 10-20°C</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<ul style="list-style-type: none"> <li>Preferred depth: 0 -100m</li> <li>Preferred substrate: within or near vegetation</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Lives in freshwater, brackish water, and marine water</li> <li>Marine populations are anadromous</li> <li>Eats small invertebrates</li> <li>Nest builder during spawning</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Limited; may be a food source for larger recreational / commercial species</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Rainbow Smelt / Smelt	<i>Osmerus mordax</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Preferred temperature: 2-18°C</li> <li>Preferred depth: 0-2m</li> <li>Preferred substrate: cobble, gravel, sand</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Schooling fish species found in mid water column and surface areas of estuaries and lakes</li> <li>Anadromous species which migrate upriver during the spring to spawn</li> <li>Not often found inhabiting riverine areas, apart from during migrations</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Recreational fishery</li> </ul> <p><b>Important prey species for larger commercially and recreationally important species.</b></p> <p><b>Conservation Status</b></p> <ul style="list-style-type: none"> <li>COSEWIC: No Concern</li> <li>SARA: No Status</li> </ul>
American eel	<i>Anguilla rostrata</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Preferred temperature: 0-19°C</li> <li>Preferred depth: typically &lt;1m</li> <li>Preferred substrate: boulder, rubble, gravel, sand, silt and</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<p>mud</p> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• Catadromous species which spawn in the Saragasso Sea</li> <li>• Juvenile eels typically reach Canadian waters 8-12 months after hatching</li> <li>• Seaward migrations of sexually mature adults occur in the fall</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• Recreational fishery</li> <li>• Commercial fishery</li> </ul> <p><b>Conservation Status</b></p> <ul style="list-style-type: none"> <li>• COSEWIC: Threatened</li> <li>• SARA: No Status</li> <li>• NL ESA Status</li> </ul>
Banded Kilifish	<i>Fundulus diaphanus</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>• Preferred temperature: 10-25°C</li> <li>• Preferred depth: Variable</li> <li>• Preferred substrate: mud, sand</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• Distributed throughout Newfoundland</li> <li>• Quiet margins of lakes, ponds and slow streams</li> <li>• Enters brackish water occasionally</li> <li>• Spawn in vegetation</li> <li>• Diet consists of small crustation</li> <li>• Reach maturity at 1 year, can live up to 3 years</li> <li>• Form shoals</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Conservation Status</b></p> <ul style="list-style-type: none"> <li>• COSEWIC: Special Concern</li> <li>• SARA: Special Concern (Schedule 1)</li> </ul>
Atlantic Wolfish	<i>Anarhichas lupus</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>• Preferred temperature: Variable</li> <li>• Preferred depth: 1-600m (usually 18-110m)</li> <li>• Preferred substrate: mud, sand, rocky</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• Distributed throughout northern Atlantic</li> <li>• Solitary, except during mating season.</li> <li>• Guards egg clutches, after internal fertilisation</li> <li>• Diet consists of hardshelled mollusks, crabs, lobster, sea urchin</li> <li>• Important ecological regulator of echinoderm populations</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p><b>Conservation Status</b></p> <ul style="list-style-type: none"> <li>• COSEWIC: Special Concern</li> <li>• SARA: Special Concern (Schedule 1)</li> </ul>
Atlantic salmon	<i>Salmo salar</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>• Preferred temperature: 8-16°C</li> <li>• Preferred depth: Variable</li> <li>• Preferred substrate: gravel, cobble, boulder</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• Distributed throughout Newfoundland and Labrador</li> <li>• Occurs as landlocked (Ouananiche) and anadromous life histories</li> <li>• Spawn in clean, well aerated, gravel bottom riffle sections of stream</li> <li>• Diet depends on the size and habitat of fish, as well as season</li> <li>• Juvenile anadromous salmon remain in natal watersheds for 2-7 years</li> <li>• Adult salmon generally remain at sea for 1-3 years before returning to their natal stream to spawn</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• Recreational fishery</li> <li>• There has not been a commercial salmon fishery in Newfoundland since 1997</li> </ul> <p><b>Conservation Status</b></p> <ul style="list-style-type: none"> <li>• COSEWIC: Not at risk</li> <li>• SARA: No status</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
Lumpfish	<i>Cyclopterus lumpus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>• Preferred temperature: Variable</li> <li>• Preferred depth: 0-868m (usually 50-150m)</li> <li>• Preferred substrate: rocky substrate</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>• Western Atlantic</li> <li>• Undergoes seasonal migration to deep waters (winter)</li> <li>• Feed mainly sessile invertebrates</li> <li>• Juveniles live in coastal areas with algal bloom</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p>Conservation Status</p> <ul style="list-style-type: none"> <li>• COSEWIC: Threatened</li> <li>• SARA: No Status</li> </ul>
Thorny skate	<i>Amblyraja radiata</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>• Preferred temperature: 2-5 °C</li> <li>• Preferred depth: 20-1000m (usually 50-100m)</li> <li>• Preferred substrate: variable, mainly muddy and sandy</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>• Northern Atlantic</li> <li>• Feed mainly fish, crustacea and polychates</li> <li>• Juveniles can take up to 3 years to hatch from "mermaid's purses"</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>• None</li> </ul> <p>Conservation Status</p> <ul style="list-style-type: none"> <li>• COSEWIC: Special Concern</li> <li>• SARA: No Status</li> </ul>
Capelin	<i>Mallotus villosus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>• Preferred temperature: Variable</li> <li>• Preferred depth: 0-725 m</li> <li>• Preferred substrate: gravel (for spawning), otherwise pelagic species</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• Circumpolar in the Arctic</li> <li>• Known spawning beaches in area</li> <li>• Spawns on beaches ("rolling capelin")</li> <li>• Larvae release due to wave action from beaches</li> <li>• Highly important in the North-West Atlantic food web, keystone species</li> <li>• Feeds on zooplankton</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• Recreational fishery</li> <li>• Commercial fishery in Newfoundland</li> </ul> <p><b>Conservation Concern</b></p> <ul style="list-style-type: none"> <li>• Stock is in decline and conservation efforts are under way to remediate beaches</li> <li>• COSEWIC: Not threatened</li> <li>• SARA: No Status</li> </ul>
Herring	<i>Clupea harengus</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>• Preferred temperature: 1-18 °C</li> <li>• Preferred depth: 0 - 364m</li> <li>• Preferred substrate: pelagic</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>• North Atlantic</li> <li>• Seasonal migration</li> <li>• Spawning on rocky or gravel bottom</li> <li>• Feed mainly on zooplankton</li> <li>• Moves inshore for spawning</li> <li>• Spawning grounds around the NP</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>• Some commercial bait fishery in Newfoundland</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>• COSEWIC: Not threatened</li> <li>• SARA: No Status</li> </ul>
Brook trout	<i>Salvelinus fontinalis</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>• Preferred temperature: 11-16°C</li> <li>• Preferred depth: 0.06-0.90 m</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<ul style="list-style-type: none"> <li>Preferred substrate: gravel, cobble, boulder</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Inhabits lakes and rivers throughout Newfoundland and Labrador</li> <li>Can be landlocked or anadromous</li> <li>Feed mainly on aquatic and terrestrial insects and fish</li> <li>Can hybridize with other salmonid species</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Recreational fishery</li> <li>No commercial fishery</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Threespine stickleback	<i>Gasterosteus aculeatus</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Preferred temperature: 9-12°C</li> <li>Preferred depth: variable, generally &lt;1m</li> <li>Preferred substrate: within or near vegetation</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Common throughout Newfoundland and Labrador, in fresh, brackish and marine environments</li> <li>Maximum lifespan is typically 2-2.5 years</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Limited; may be a food source for larger recreational / commercial species</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Softshell Clam	<i>Mya arenaria</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Preferred temperature: 6-14°C</li> <li>Preferred depth: 0-190m (preferred intertidal zone)</li> <li>Preferred substrate: Mud, Sand, rarely gravel</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>10-15cm long and 8 to 19cm wide.</li> <li>Lives in brackish water, estuaries or marine habitats</li> </ul>

<b>Common Name</b>	<b>Scientific Name</b>	<b>Biological/Habitat Details</b>
		<ul style="list-style-type: none"> <li>Spawning events: spring and late summer</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: unknown</li> <li>No commercial fishery</li> </ul> <p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Blue Mussel	<i>Mytilus edulis</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: 5-20°C</li> <li>Preferred depth: 0-10m (preferred intertidal zone)</li> <li>Preferred substrate: Rocky areas</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>5-15cm long</li> <li>Lives in brackish water, estuaries or marine habitats</li> <li>Spawning continuous throughout spring and summer</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: some mussel collecting</li> <li>Commercial fishery: unknown in NL</li> </ul> <p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Scallop	<i>Placopecten magellanicus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: 6.5-16 °C</li> <li>Preferred depth: 15-180m</li> <li>Preferred substrate: sand, gravel, shells, and cobble</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>8-17cm long</li> <li>Form "beds" that are either periodic (several years) or are permanent</li> <li>Spawning occurs in September/October</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: some scallop diving</li> <li>Commercial fishery: unknown in NL inshore</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Whelk	<i>Buccinum undatum</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: 6.5-16 °C</li> <li>Preferred depth: 15-180m</li> <li>Preferred substrate: Soft bottoms</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>Up to 10cm long</li> <li>Drills holes in the shell of its prey</li> <li>Spawning occurs in October to May</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: unknown</li> <li>Commercial fishery: unknown</li> </ul> <p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Snow Crab	<i>Chionoecetes opilio</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: -1-5°C</li> <li>Preferred depth: 13-2100m (generally no deeper than 110m)</li> <li>Preferred substrate: Muddy</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>40mm to 160mm carapace length</li> <li>Egg hatching occurs April to late May (carried by females)</li> <li>Long lived (up to 5 years past terminal molt, longer for males)</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: none</li> <li>Commercial fishery: Highly valued species</li> </ul> <p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
American Lobster	<i>Homarus americanus</i>	<p>Typical Habitat</p> <ul style="list-style-type: none"> <li>Preferred temperature: -1-5°C</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<ul style="list-style-type: none"> <li>Preferred depth: 1-400m (generally no deeper than 40m)</li> <li>Preferred substrate: Rocky outcrops</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Can reach 1m in total length (but generally do not due to fishing pressure)</li> <li>Female carries eggs</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Recreational fishery: none</li> <li>Commercial fishery: Highly valued species</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Eastern River Pearl Mussel	<i>Margaritifera margaritifera</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Clean, fast-flowing streams/rivers</li> <li>Preferred depth: requires a healthy population of salmonids</li> <li>Preferred substrate: gravel, cobbles</li> </ul> <p><b>Biology and Ecology</b></p> <ul style="list-style-type: none"> <li>Up to 14cm length</li> <li>Occurs in beds</li> <li>Long lived</li> <li>Complicated life-cycle involving a salmonid pseudo-host during juvenile stages</li> <li>World-wide populations threatened with some Critically endangered. Canada has the largest population and it is considered safe</li> </ul> <p><b>Recreational/Commercial Value</b></p> <ul style="list-style-type: none"> <li>Recreational fishery: none</li> <li>Commercial fishery: none</li> </ul> <p><b>Conservation concern</b></p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>
Newfoundland Floater	<i>Pyganodon fragilis</i>	<p><b>Typical Habitat</b></p> <ul style="list-style-type: none"> <li>Freshwater</li> <li>Preferred depth: Submerged</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
		<ul style="list-style-type: none"> <li>Preferred substrate: silt, sand, gravel</li> </ul> <p>Biology and Ecology</p> <ul style="list-style-type: none"> <li>Not much is known about this species</li> <li>Reproductive cycle: unknown</li> </ul> <p>Recreational/Commercial Value</p> <ul style="list-style-type: none"> <li>Recreational fishery: none</li> <li>Commercial fishery: none</li> </ul> <p>Conservation concern</p> <ul style="list-style-type: none"> <li>COSEWIC: Not threatened</li> <li>SARA: No Status</li> </ul>

#### 6.1.4 Marine Mammals

The waters off the Great Northern Peninsula support a diverse assemblage of marine mammals. Marine mammals regularly found in areas around Crémallière Harbour include seals (pinnipeds), baleen whales (mysticetes) and toothed whales including porpoises and dolphins (odontocetes). Whale watching tours operate out of St. Anthony, making marine mammals an economically important resource for the area. The Strait of Belle Isle has been identified as an area of importance to marine mammals on the west coast of the Island of Newfoundland. Within the northwest Atlantic, the Strait of Belle Isle supports an exceptionally high abundance of piscivorous marine mammals, likely due to the abundance of feed fish such as capelin in the area (DFO 2007).

Marine mammal species that are likely to be present for at least part of the year in or around Crémallière Harbour include harp and harbour seals, baleen whales (mostly humpback and fin whales), white-beaked and Atlantic white-sided dolphins, and occasionally other toothed whale species including harbour porpoises, killer whales, long-finned pilot whales and sperm whales. Key life history information for each of these species is presented below in Table 6.3.

**Table 6.3 Marine mammal species known to occur in and near Crémallière Harbour**

Common Name	Scientific Name	Biological/Habitat Details
Harp Seal	<i>Pagophilus groenlandicus</i>	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Widespread in pack ice in coastal and offshore waters of the North Atlantic.</li> <li>Highly migratory; summers in the Canadian Arctic and Greenland, and wintering in the waters off Newfoundland.</li> <li>Present in Newfoundland waters December - April.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on a wide variety of fish and invertebrates. Highly social, typically travelling and foraging in groups.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Populations are considered secure; the most abundant pinniped in the northern hemisphere.</li> </ul>
Harbour Seal (Atlantic and Eastern Arctic subspecies)	<i>Phoca vitulina concolor</i>	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Very widespread distribution; occurs in temperate to polar latitudes in the northern hemisphere in coastal waters, bays, rivers, estuaries and intertidal areas.</li> <li>Generally considered to be non-migratory.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Generalist feeders, taking a wide variety of fish, cephalopods and crustaceans from surface, mid-water, and benthic habitats, typically diving to a depth of 100 m. Gregarious at haul-out areas, but at sea, most often seen alone or in small groups.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Populations have been stable and likely increasing since the 1980s.</li> </ul>
Humpback Whale (Western North Atlantic population)	<i>Megaptera novaeangliae</i>	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found in coastal waters, but also may occur in offshore habitats.</li> <li>Highly migratory between temperate-to-arctic feeding areas and tropical breeding areas.</li> <li>Present in Newfoundland waters April - December.</li> </ul>

<b>Common Name</b>	<b>Scientific Name</b>	<b>Biological/Habitat Details</b>
		<p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on krill and small schooling fishes such as capelin. Usually observed singly or in small groups of 2 or 3.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). The humpback whale is the most frequently reported cetacean species within Crémallière Harbour.</li> </ul>
Blue Whale (Atlantic population)	Balaenoptera musculus	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Found in both coastal and pelagic waters; frequently at continental shelf edge where food production is high.</li> <li>Migration patterns are poorly understood, but variable and apparently related to food availability.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Primarily feeds on euphausiids. Usually observed singly or in small groups.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Endangered (SARA Schedule 1 and COSEWIC). Rarely off the east coast of the Northern Peninsula.</li> </ul>
Fin Whale (Atlantic population)	Balaenoptera physalus	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found at shelf edge and further offshore.</li> <li>Migration habitats are not well understood; however, Newfoundland stocks appear to migrate southward in the winter.</li> <li>Present in Newfoundland waters April - December.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on krill and small schooling fishes such as capelin. Usually observed singly or in pairs.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Special Concern (SARA Schedule 1 and COSEWIC). Most frequently observed baleen whale off the east coast of the Northern Peninsula.</li> </ul>
Sei Whale (Atlantic population)	Balaenoptera borealis	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found in offshore waters near the shelf edge.</li> <li>Migrate between tropical to subtropical latitudes in</li> </ul>

<b>Common Name</b>	<b>Scientific Name</b>	<b>Biological/Habitat Details</b>
		<p>winter, and temperate and subpolar latitudes in summer.</p> <ul style="list-style-type: none"> <li>Present in Newfoundland waters June - November.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on copepods, krill and small shrimp. Usually observed singly or in small groups of 2 or 3.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Data deficient (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>
Common Minke Whale (North Atlantic subspecies)	Balaenoptera acutorostrata acutorostrata	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Found in both coastal and offshore waters.</li> <li>Migration patterns poorly understood.</li> <li>Present in Newfoundland waters year-round, but more commonly from April to August.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on small schooling fishes such as capelin and sandlance; copepods and krill also taken. Usually observed singly or in small groups of 2 to 6 individuals.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Occasionally observed off the east coast of the Northern Peninsula.</li> </ul>
Sperm Whale	Physeter macrocephalus	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Generally, a deep-water species (&gt;1000 m) but has also been sighted in coastal waters.</li> <li>Widespread distribution, but most abundant in tropical and temperate waters.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed primarily on squid. Males commonly observed in higher altitudes outside of the breeding season, while females and juveniles generally remain in tropical and subtropical waters.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>

Common Name	Scientific Name	Biological/Habitat Details
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea population)	Hyperoodon ampullatus	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found in deep waters, typically 800 m to 1500 m in depth.</li> <li>The Scotian Shelf population is believed to be non-migratory. While the Davis Strait population appears to move north to south seasonally, patterns are not consistent, as there have been sightings off Newfoundland in the winter months.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on deepwater squid. Usually observed in groups numbering up to 20 individuals.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Special Concern (COSEWIC). Single observation off the east coast of the Northern Peninsula.</li> </ul>
Killer Whale (Northwest Atlantic / Eastern Arctic population)	Orcinus orca	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Found in nearshore and pelagic environments.</li> <li>Not reliably migratory.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on a wide variety of prey including marine mammals, seabirds, fish and squid. Known to use cooperative tactics to herd prey.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Special Concern (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>
Long-finned Pilot Whale	Globicephala melas	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Typically found in deep water with steep bottom topography in temperate to subpolar latitudes.</li> <li>Not known to migrate north-south but undertakes inshore-offshore movements in response to prey availability.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed primarily on squid, but known to consume octopus, cuttlefish and some fish species as well. Highly social, often seen in pods of 20 to 90 individuals.</li> </ul>

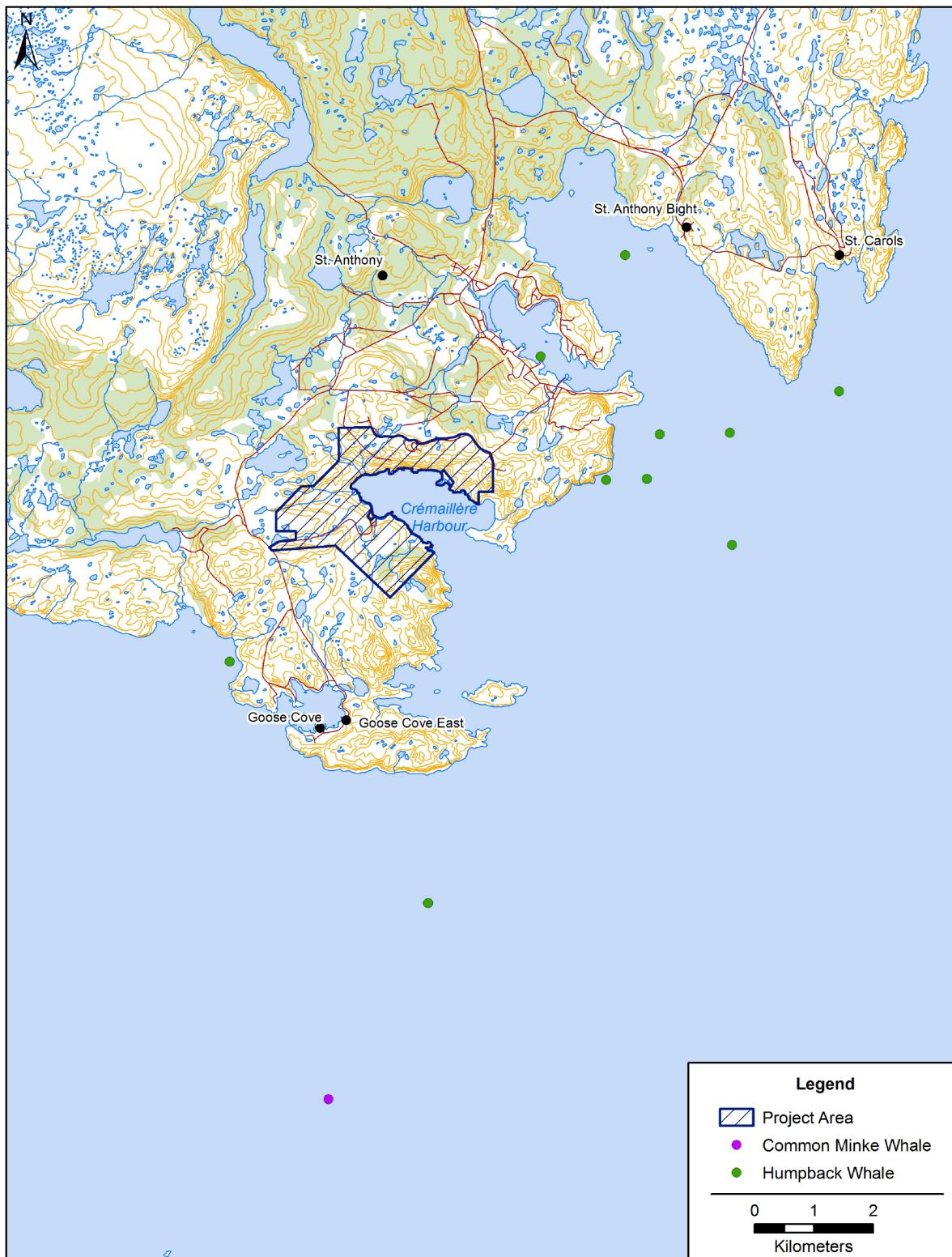
<b>Common Name</b>	<b>Scientific Name</b>	<b>Biological/Habitat Details</b>
		<p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>
Short-beaked Common Dolphin	Delphinus delphis	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Occurs in nearshore and offshore environments.</li> <li>Moves to follow prey aggregations.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on small schooling fishes and squid. Usually observed in small groups of 50 to 200 individuals.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>
Atlantic White-sided Dolphin	Lagenorhynchus acutus	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found along the continental slope and shelf, and offshore.</li> <li>Non-migratory.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on small schooling fishes, shrimp and squid. Usually observed in groups of 30 - 70 individuals, often with other cetaceans including other dolphins and large whales.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Commonly observed off the east coast of the Northern Peninsula.</li> </ul>
White-beaked Dolphin	Lagenorhynchus albirostris	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found in coastal and continental shelf waters.</li> <li>Non-migratory; moves with aggregations of prey.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on small schooling fishes, shrimp and squid. Usually observed in groups of 30 - 70 individuals, often with other cetaceans.</li> </ul>

<b>Common Name</b>	<b>Scientific Name</b>	<b>Biological/Habitat Details</b>
		<p><b>Status</b></p> <ul style="list-style-type: none"> <li>Not at Risk (COSEWIC). Commonly observed off the east coast of the Northern Peninsula.</li> </ul>
Harbour Porpoise (Northwest Atlantic population)	Phocoena phocoena	<p><b>Habitat and Movements</b></p> <ul style="list-style-type: none"> <li>Usually found coastal shelf waters in shallow bays and estuaries less than 200 m in depth, although occasionally observed offshore.</li> <li>Movements are poorly understood.</li> <li>Present in Newfoundland waters year-round.</li> </ul> <p><b>Foraging and Ecology</b></p> <ul style="list-style-type: none"> <li>Feed on krill and small schooling fishes and cephalopods. Usually observed singly or in small groups of 2 or 3.</li> </ul> <p><b>Status</b></p> <ul style="list-style-type: none"> <li>Special Concern (COSEWIC). Rarely observed off the east coast of the Northern Peninsula.</li> </ul>

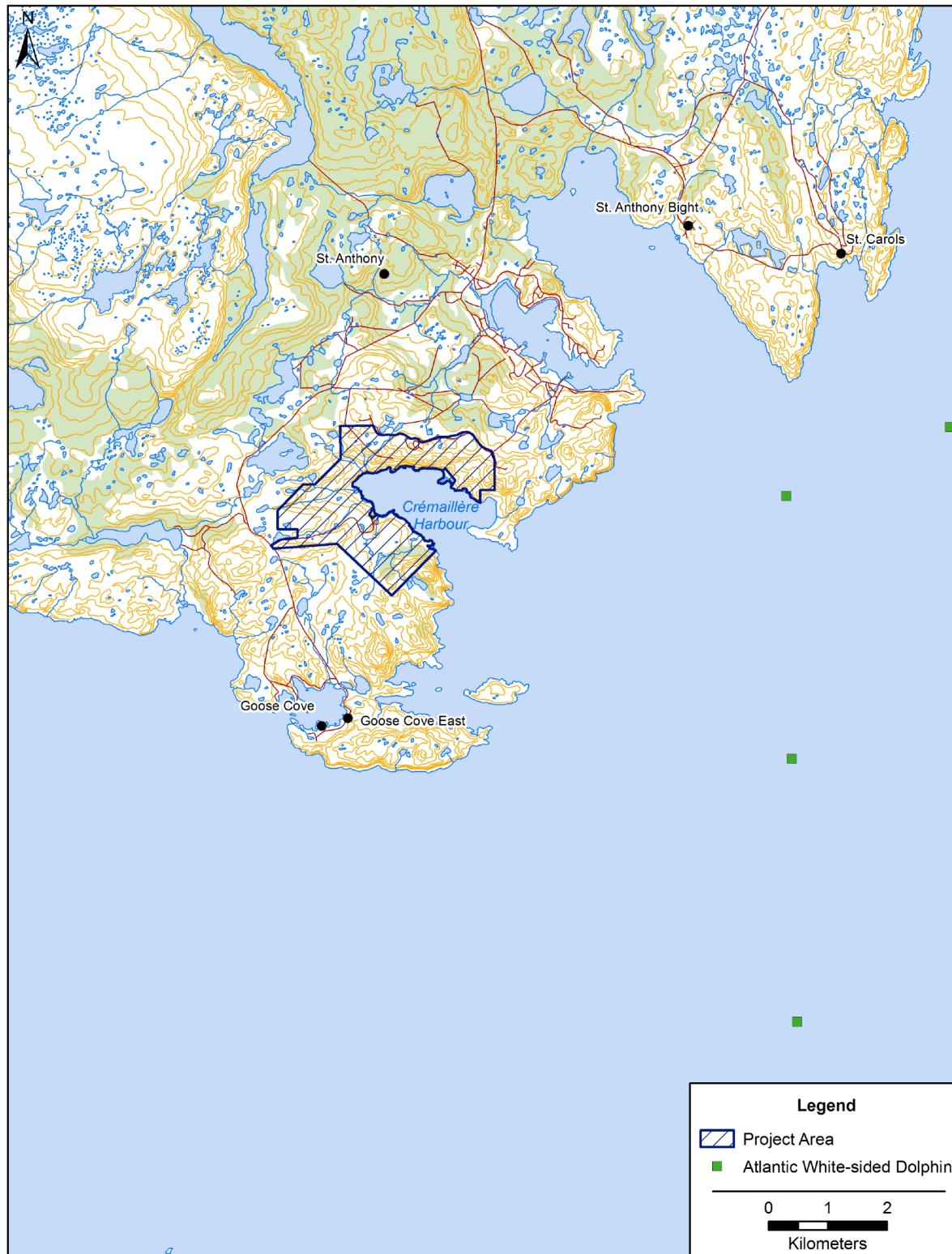
Source: AMEC (2014); SARA (2018)

The Crémallière Harbour entrance channel has a depth of approximately 45 m, and the basin ranges from 22.74 to 33.83 m at lowest normal tide. Based on their distributions, habitat preferences and reported observations (Figures 6-3 and 6-4), the species most likely to occur in Crémallière Harbour, or adjacent waters, include humpback whales, fin whales, common minke whales, Atlantic white-sided dolphins, white-beaked dolphins and harbour porpoises. Of these species, the fin whale is listed as Special Concern on SARA Schedule 1, and both it and the harbour porpoise are considered species of special concern by COSEWIC. Other species listed in Table 6.3 have the potential to interact with Project-associated vessel traffic in the vicinity of the harbour, including the Blue Whale (SARA: Endangered), Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea population; COSEWIC: Special Concern) and Killer Whale (COSEWIC: Special Concern).

**Figure 6-3 Location of Whale Sittings near Crémalière Harbour (Source: Ocean Biogeographic Information System)**



**Figure 6-4 Location of Dolphin Sittings near Crémallière Harbour (Source: Ocean Biogeographic Information System)**



## 6.2 Human Environment

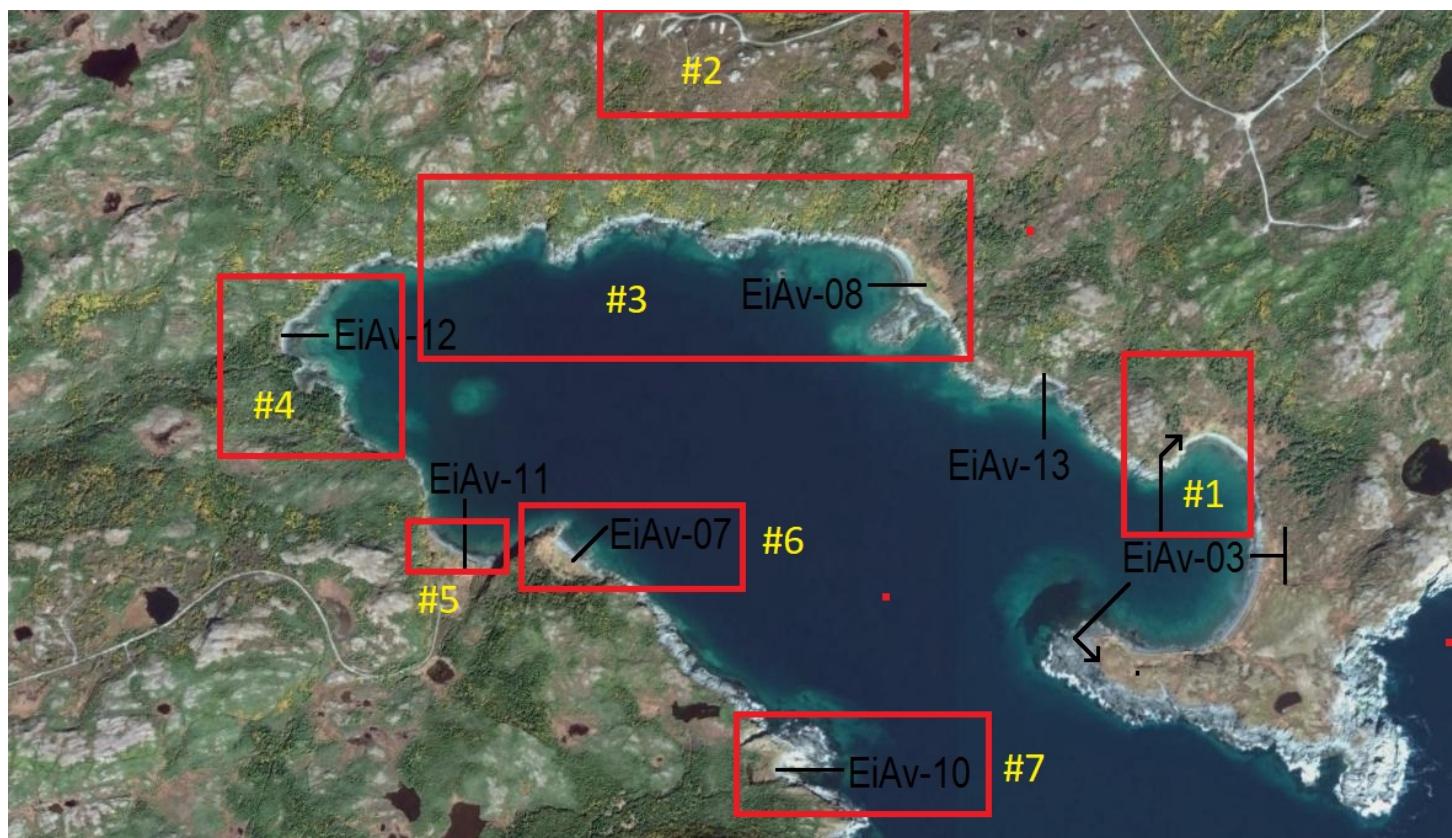
### 6.2.1 Historic Resources

Gerald Penney Associates (GPA) Limited were contracted in July 2018 to undertake a Stage 1 Historic Resources Assessment of Crémallière Harbour in relation to the proposed Project, in consultation with the Newfoundland and Labrador Provincial Archaeology Office (PAO). GPA first completed a desk-based historic resources assessment for the proposed Project at Crémallière Harbour. Based on the desk-based assessment, GPA identified seven areas of interest for subsequent field investigations, Figure 6-5. GPA received an Archaeological Investigation Permit #18.31 from the PAO and conducted field investigations in August 2018. A report detailing the combined results of the desk-based assessment and field investigations is provided in Appendix C.

GPA identified that Crémallière Harbour was a summer base for the French migratory fishery in the 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> centuries (Tapper 2014), and was a small inshore fishing settlement from the late 19<sup>th</sup> century until approximately 1915. Prior to GPA's 2018 field investigations there were six known French fishing rooms in Crémallière Harbour, which are represented by three archaeological sites registered with the PAO. Four of these rooms are encompassed by archaeological site La Crémallière (EiAv-03, designated 2007; Pope et al 2007). One La Crémallière room, historically known as *Grand Rochelle*, is very close to the Project's proposed eastern boundary. A fifth room, *Petit Rochelle*, at Russells Cove, archaeological site La Crémallière North (EiAv-08, designated 2013; Tapper and Pope 2014) is roughly equivalent to an enclave or excluded area, not included within the Project's Crown grant application area as it is private property. On the south side, a sixth French room, archaeological site Crémallière Observation Point (EiAv-07, designated 2013; Tapper and Pope 2014), is in an area which encompasses proposed Project facilities, including two buildings, three piers, a container yard and a graving dock. EiAv-07 is the only archaeological site registered by the PAO prior to this historic resource assessment that lies within the Crown grant application area.

As a result of the historic resources assessment undertaken by GPA the PAO has determined that there are four new archaeological sites in Crémallière Harbour, EiAv-10, EiAv-11, EiAv-12 and EiAv-13, Figure 6-5. However, only one of these (AOI#5/EiAv-11) is in an area where Project groundworks are proposed.

**Figure 6-5 Areas of Interest and designated Archaeological Sites Identified as a Result of Historic Resources Assessment Undertaken by GPA, 2018**



## 6.2.2 Municipal Land Use

The Project is located off Route 430 between the Towns of St. Anthony and Goose Cove East. The Project is located within the Town of St. Anthony Municipal Boundary and/or Planning Area Boundary (Figure 6.5). The Town of St. Anthony Municipal Plan (2010-2020) indicates that this area is zoned as Rural (RU) and Industrial Uses are included as a Discretionary Use. This means that approval of this Project within the Rural Zone is a decision of the Town Council of St. Anthony (TSA 2010).

The process for approval of a Discretionary Use is outlined in subsection 32(3) of Section B of the Development Regulations, which specify that Council must post written notice, including a synopsis of the proposed development, on the Town of St. Anthony's website at least ten (10) days prior to the date scheduled for the Council meeting to consider the application. Council must consider any objections or representations received on the Discretionary Use application. If Council has satisfied the public notification requirements under subsection 32(2) and is satisfied that the application is not contrary to the Municipal Plan and Development Regulations, and to public interest, then it may approve the Discretionary Use application (TSA 2010). St. Anthony Town Council approved the Discretionary Use Application for development of the Project within the Rural Land Use Zone on November 28, 2017.

## 6.2.3 Land Ownership

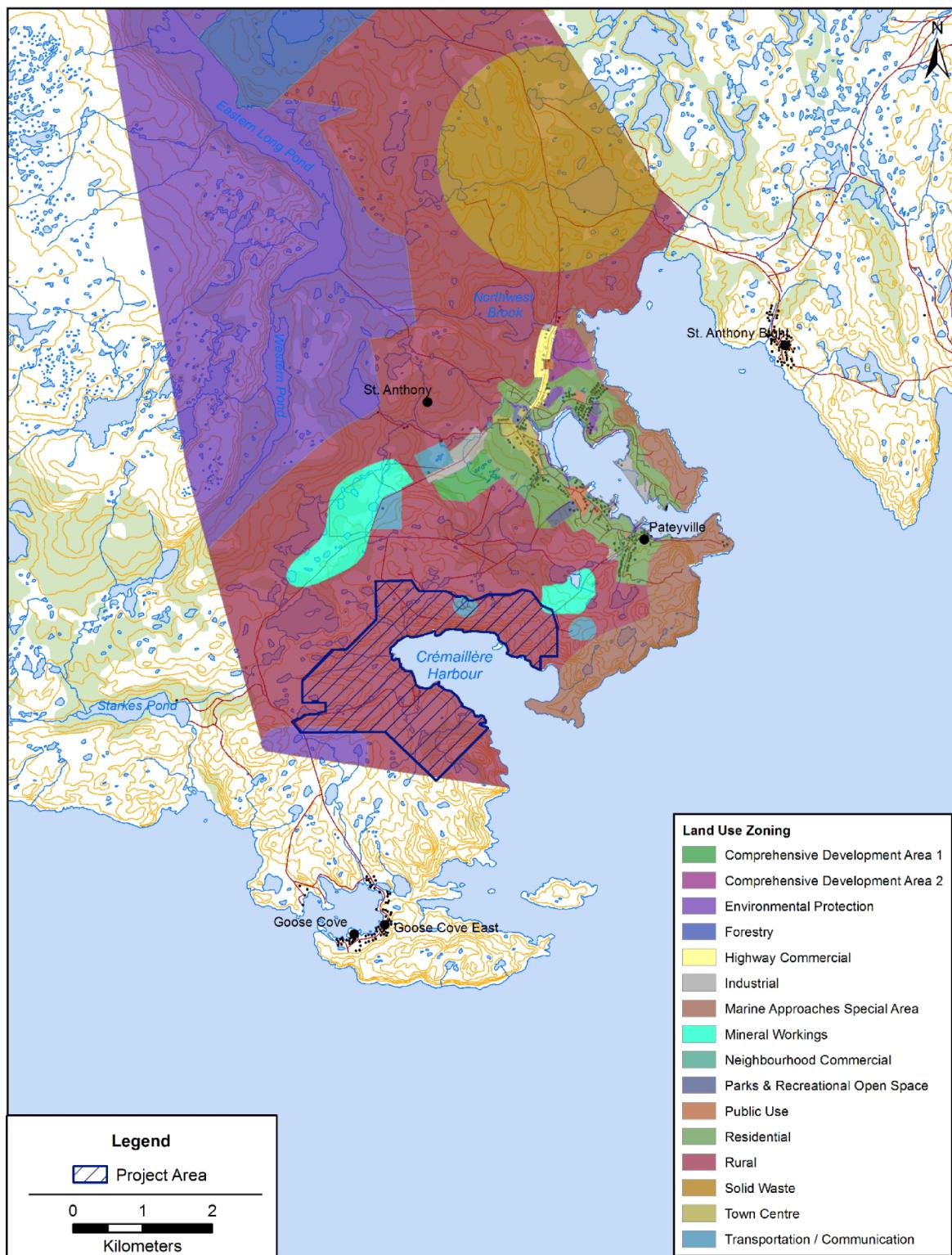
Land to be used for development of the Project area is Crown land (Figure 4-2). GNP has registered applications with Crown Lands File No. 3020712; Application No: 151500 (Grant) and 151508 (Lease). These applications are under review by relevant Government Departments and other agencies: Service NL, Natural Resources (Mines

Branch, Energy Branch, Forestry & Agrifoods Agency), Municipal Affairs and Environment (Water Resources Management Division, Environmental Assessment Division), Department of Tourism, Culture, Industry and Innovation (Provincial Archaeology Office) and Newfoundland & Labrador Hydro. In response to the requirements stated in Application No.: 151508, GNP Inc. advertised a Notice of Intent to acquire title to Crown lands at Crémallière Harbour in the NL Gazette on June 2, 2017 (GNL 2017). GNP anticipates that once the Project is released from the environmental assessment process, the final approval process will be completed.

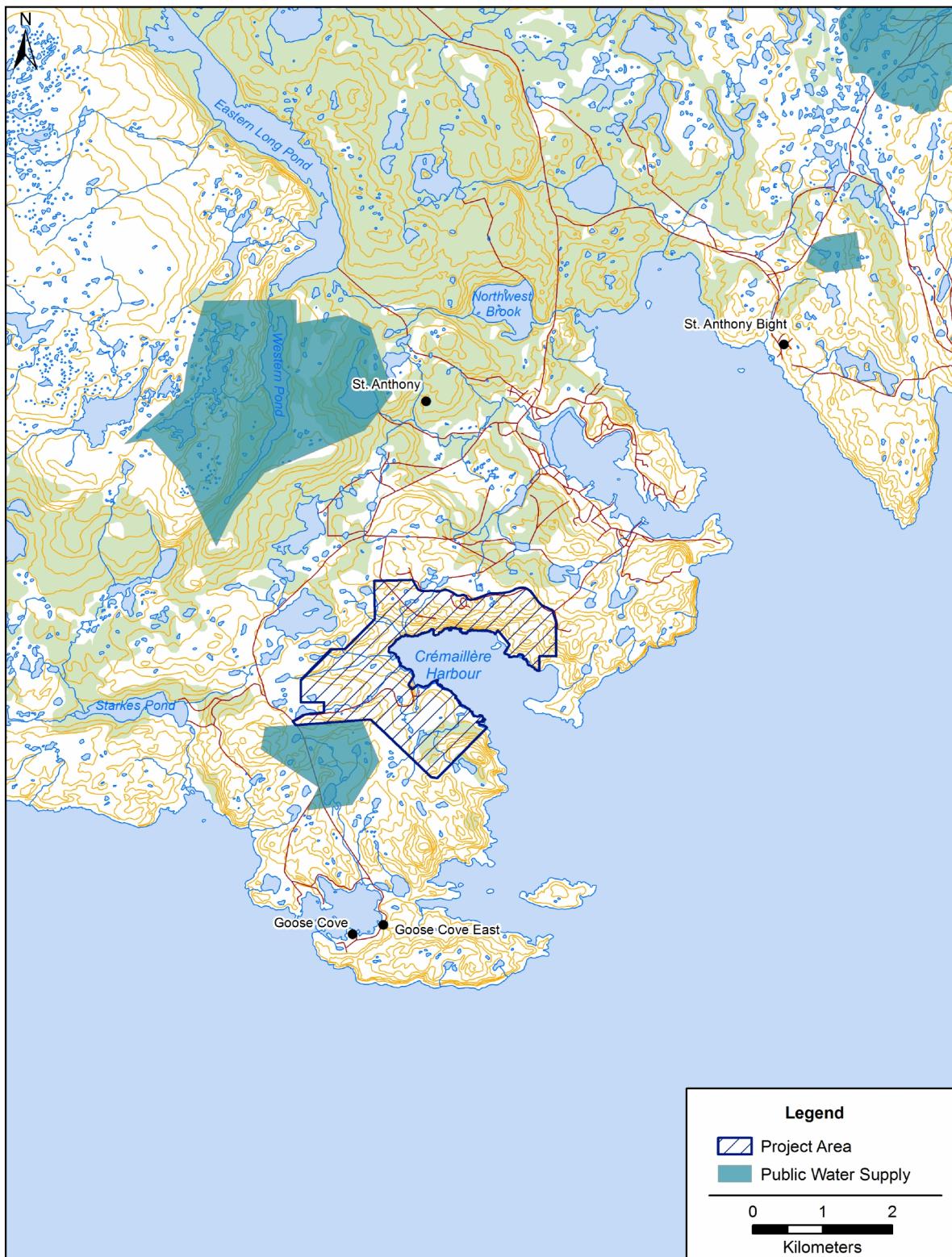
Parcels of privately owned land have been identified within and near the Project area (Figure 4.2). These include two properties surrounded by the Project footprint and six properties in proximity to the Project Area. GNP Inc. will ensure that access is maintained to the private properties identified.

#### **6.2.4 Protected Public Water Supply**

A portion of the original Project area was located inside the Goose Cove East Public Water Supply Area (Jack's Pond), which is protected by the Provincial *Water Resources Act* (DMAE 2018). Industrial uses are not permitted within the Water Supply Area (DMAE 2018a). GNP Inc. has subsequently altered the site plan to avoid the water supply area (Figure 6-6).

**Figure 6-6 Town of St. Anthony Rural Land Use Zone**

**Figure 6-7 Protected Public Water Supplies**



## 6.2.5 Tourism and Recreation

St. Anthony is one of the main service centres for the regional tourism industry. Some concern has been expressed regarding the potential visibility of the Project from tourism and recreation areas.

St. Anthony is located on the east side of the tip of the Northern Peninsula. The Strait of Belle Isle area is home to various provincially, nationally and internationally identified and/or designated sites of interest for tourism and recreation. These include L'Anse aux Meadows National Historic Site/World Heritage Site and Red Bay National Historic Site/World Heritage Site (TNL2018). The region also includes Hare Bay Islands Ecological Reserve, Burnt Cape Ecological Reserve, Watts Point Ecological Reserve, Pistolet Bay Provincial Park and Point Amour Lighthouse Historic Site (DFLR 2018). Several scheduled salmon rivers exist on the tip of the Northern Peninsula but these flow into Pistolet Bay on the Gulf of St. Lawrence (DFO 2018). None of these sites are within a 10-km radius of the Project area.

The majority of tourism and recreation amenities near the Project area are attractions in St. Anthony and walking trails in the community and surrounding areas (Figure 6-8). Local attractions include the Grenfell Interpretation Centre, Grenfell House, Grenfell Memorial Site, Grenfell Park & Dock Facility, Fishing Cove Point Municipal Park and Fox Point Lighthouse. The harbour has two boat tour operators that provide outings to view whales, icebergs and seabirds (TSA No Date). St. Anthony is a cruise ship port-of-call that had six scheduled, and four actual visits, in 2017 (CNL 2018). Two coastal caves and the Hare Bay Islands Ecological Reserve are located in nearby waters (MVL 2014, DFLR 2018).

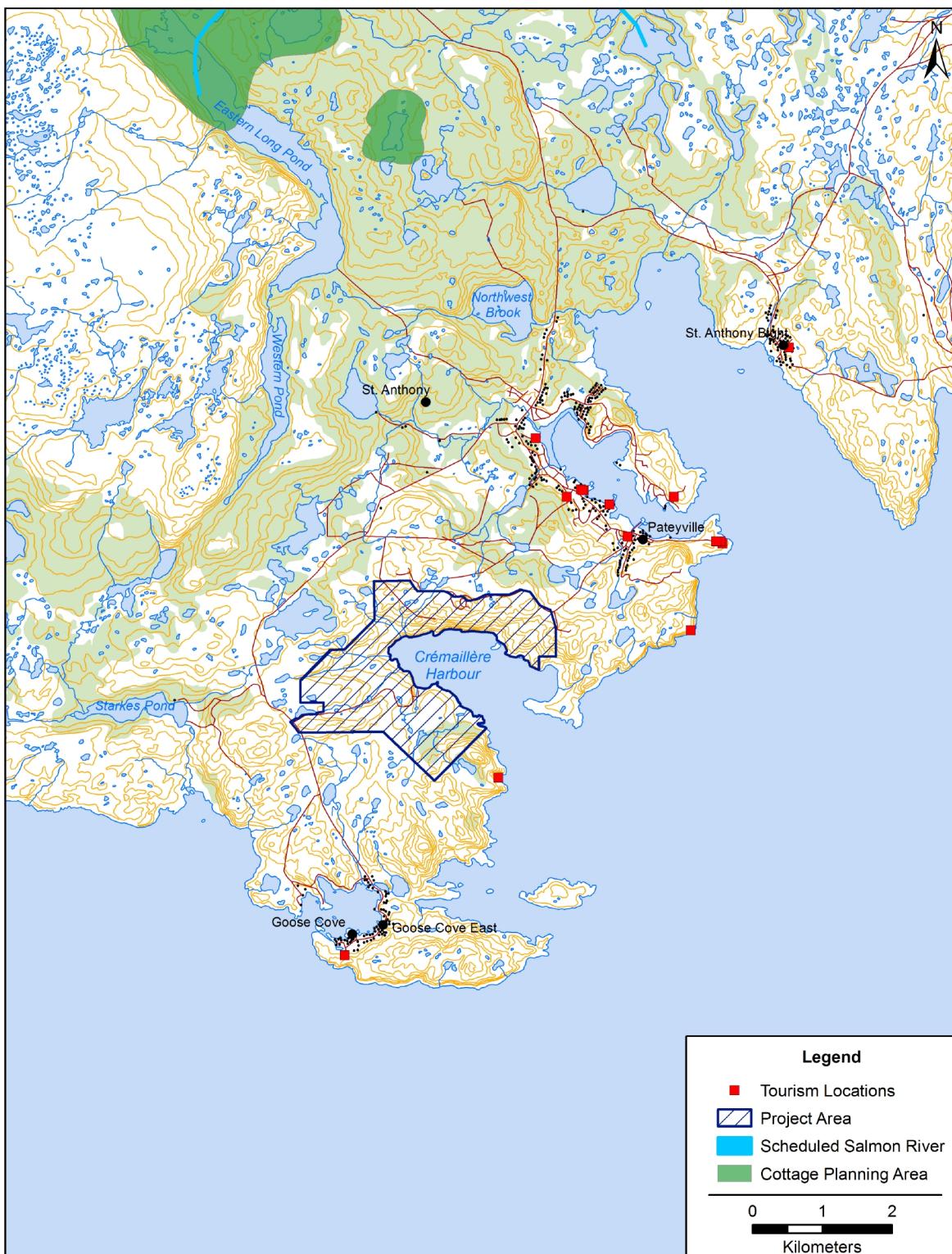
A variety of hiking trails are available in and around St. Anthony. American Drive Trail, Bottom Brook Trails, Fox Point Lighthouse & Fishing Point Trails (i.e., Whale Watchers Trail, Santana Trail, Iceberg Alley Trail, Carter's View Trail), Lamage Point Trail, Military Base Trail and Tea House Trail are located within or near the Town (Figure 6-8). Other trails are located in the surrounding hills and coastal areas. These include Pumley Cove Trail (Goose Cove), John Patey's Trail, Little Brehat Trail and Flat Point Trail (MVL 2014, TSA No Date).

Other recreation amenities include the Northern Drifters Snowmobile Trails, Aurora Cross Country Ski Trails and the Triple Falls RV Park (MVL 2014, TFRVP No Date). The area surrounding the Project area has open areas for hunting moose, caribou, black bear, small game (i.e., willow and rock ptarmigan, ruffed and spruce grouse, snowshoe hare) and migratory game birds as well as trapping furbearers (DFLR 2018 H&T).

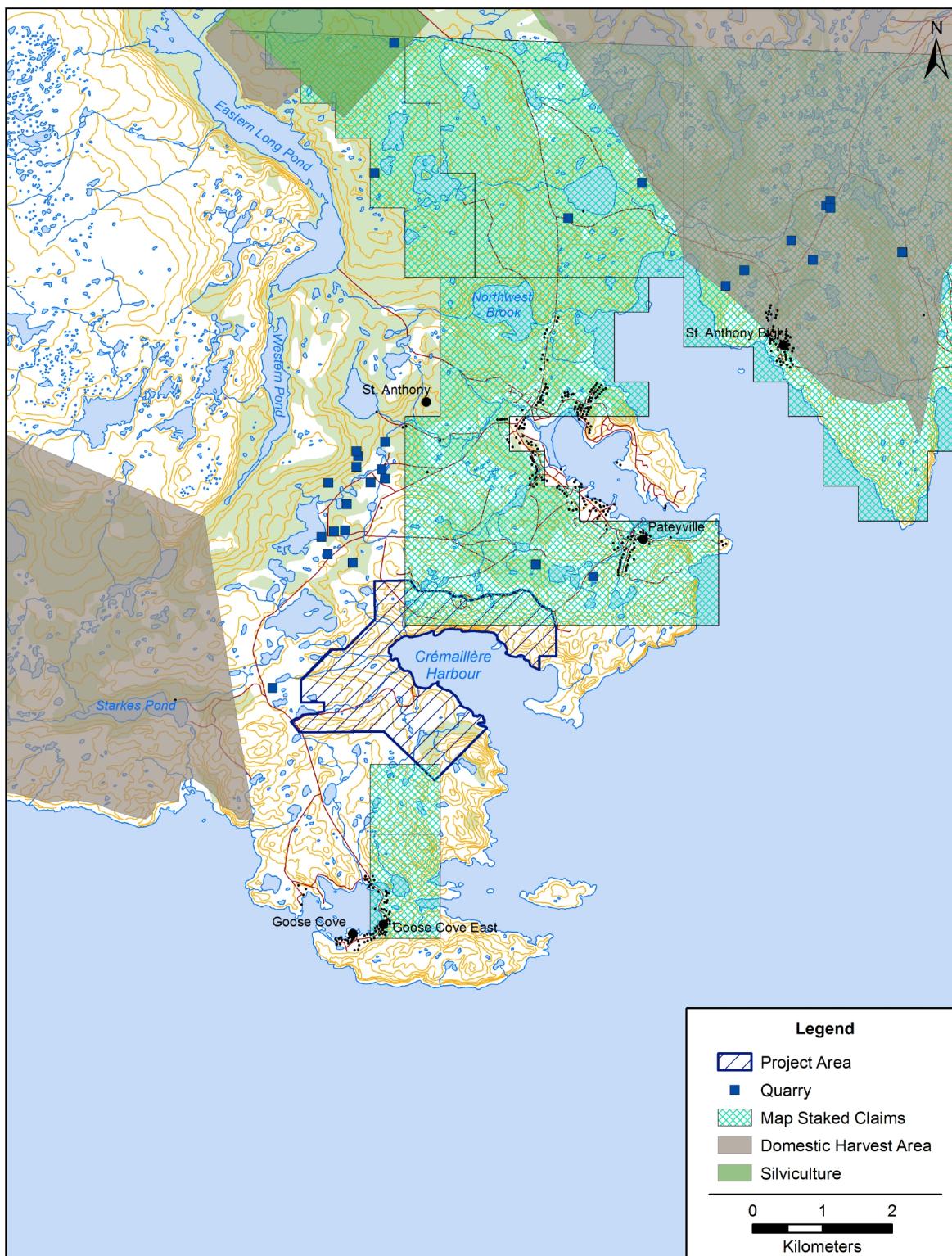
## 6.2.6 Natural Resources

Various resource extraction and harvesting activities occur in the St. Anthony area. These include gravel quarries and domestic wood harvesting areas (Figure 6-9). A number of mineral exploration licences are located in the area, two of which overlap with the Project area footprint (DMAE 2018b).

**Figure 6-8 Tourism and Recreation areas of interest**



**Figure 6-9 Natural Resources Extraction Areas**



## 6.2.7 Stakeholder Engagement and Public Consultation

GNP has actively engaged with stakeholders to identify and address any issues relevant to the Project. The proponent has also held public consultation events to receive input from the public. The following table outlines these activities.

**Table 6.4 Stakeholder Engagement and Public Consultation Activities**

Date	Event	Location	Number of Participants
May 19, 2018	Public information session	St. Anthony	60
November 5, 2018	Meeting with St. Anthony Town Council	St. Anthony	8
November 6, 2018	Meeting with Great Northern Peninsula Joint Council	Anchor Point	5
November 7, 2018	St. Anthony Chamber of Commerce	St. Anthony	30

As well, GNP Inc. has received letters of support for the proposed Project from twenty-six communities on the Great Northern Peninsula.

## 6.2.8 Public Information Session

GNP Inc. held a public information session on May 19, 2018 from 2:00-4:00 PM at the Grenfell Historic Properties in St. Anthony. Notice of the Information Session was advertised in The Western Star, regional newspaper on Saturday May 12th, Wednesday May 16th, Thursday May 17th and Friday May 18th and in weekly The Northern Pen newspaper on Wednesday May 16th. The notice was also posted on the Town of St. Anthony website from May 11th to 19th, inclusive and at the Town Hall, Post Office and Grenfell Historic Properties in St. Anthony.

The meeting was attended by GNP Inc. Directors: Francois-Xavier Morency, Colleen Oliver and Daniel Villeneuve as well as GNP HR Consultant: Nicole Parsons. The purpose of the information session was to describe all aspects of the proposed Project, to describe associated activities and to provide an opportunity for all interested persons to request information or state their concerns. Government representatives included the Honourable Christopher Mitchelmore, Minister of Tourism, Culture, Industry and Innovation and Member for St. Barbe – L’Anse aux Meadows and Dwayne Cull from Fisheries and Oceans Canada. Mayor Desmond McDonald, Councillors and the Town Manager of the Town of St. Anthony attended along with a group of Mayors from the Great Northern Peninsula Joint Council.

The presentation received a favourable response with most questions and comments regarding employment and business opportunities, education and training, Project timeline and willingness to support the Project, along with specific comments about the Project site, opportunities for St. Anthony, relationship to a fixed transportation link to Labrador, potential use by the Canadian Navy and providing additional opportunities to share Project information on the Northern Peninsula. Identified issues or concerns included the presence of private land, access to the Project site, water supply source for the Project and effects on the Goose Cove protected water supply.

Throughout the stakeholder engagement and public consultation, several potential issues have been identified. Table 6.5 provides a summary of these issues, additional information, Project amendments to avoid land use conflicts and identifies the relevant section in the EPR report.

**Table 6.5 Summary of Identified Issues**

Issue	How the Issue has been Addressed	Location in EPR
Private Land	The Project will be located on Crown land and not require any private land	Section 6.2.3
Site Access	The Project will be accessed from an existing road off Goose Cove Road	Section 4.2.1
Water Supply	The Project will have its own proposed water supply and septic systems	Section 4.2.1
Protected Water Supply	The site plan has been redesigned to exclude any of the Goose Cove East Protected Water Supply Area	Section 6.2.4
Municipal Permit	The Project has been approved by the Town of St. Anthony as a Discretionary Use within the Rural Zone	Section 6.2.2
Mineral Exploration Licences	The site plan overlaps with mineral exploration licences	Section 6.2.6
Viewscapes	The Project may be visible from some tourism and recreation areas/activities	Section 6.2.5

### 6.3 Potential Environmental Interactions and Mitigation

The following sections provide the results of an environmental effects analysis for the proposed Project, including each of its associated components and activities. The analysis focuses upon, and is organized according to, the environmental setting components described in sections 6.1 and 6.2:

1. Wildlife
2. Vegetation, Streams and Wetlands
3. Freshwater and Marine Fish
4. Marine Mammals
5. Historic Resources
6. Human Environment

The analysis for each includes a discussion and description of the likely environmental issues (adverse and positive) that may be associated with the Project, with separate subsections for the Construction and Operations and Maintenance phases. Environmental planning and mitigation measures to avoid or reduce environmental effects are identified and considered integrally within the analyses. The assessment also includes possible accidental events and malfunctions that could potentially occur during each phase (construction, operations) of the Project. This is followed by a summary and evaluation of the likely residual (after mitigation) environmental effects of the Project. The environmental analysis concludes with an overview of any environmental monitoring and follow-up which may be required during one or multiple phases of Project implementation.

### 6.3.1 Wildlife

#### Construction

The physical undertaking of the proposed Project consists of three phases and includes the construction of site buildings and structures, lay down and fabrication areas, upgrades and expansion of road networks, the establishment of a power grid, and the creation of docks. These undertakings (as well as possible malfunctions and accidents), will result in habitat degradation and loss in the immediate Project area as naturally occurring vegetation is removed. This will directly affect the distribution and abundance of select wildlife species that are dependent on these habitats for nesting, denning, and foraging and may lead to the local displacement of these species if critical habitats are extensively altered. For example, ground nesting Northern Harriers (*Circus cyaneus*) and Short-eared Owls are low-density raptor species which breed in open, coastal regions and may potentially occur in the Project area. Removal of ground cover and associated noise and traffic disturbance would likely displace these species from the immediate Project area. Similarly, the alteration of ground cover could potentially remove denning sites for coastal river otters as well as foraging habitat for lynx and other mid-sized carnivores.

In addition to the direct effects on wildlife that are typically associated with the construction of industrial sites, there are multiple indirect effects that have the potential to negatively impact the fitness and reproductive output of wildlife species that occur within the terrestrial component of the Project area, as well as within the adjacent marine environment (Crémaillère Harbour). For example, in northern Alberta, Habib et al. (2007) found that some species of warblers were sensitive to excessive noise and had reduced pairing success and reproductive output in areas where active construction was occurring. Although this study only considered one species group, a similar behavioural response for other passerines that rely on auditory cues for establishing territories and attracting mates is likely. Noise may also interfere with the ability of birds and mammals to detect predators and prey which may have consequences on their individual fitness and survival.

#### Operations and Maintenance

In addition to the loss of wildlife habitat, other direct impacts to wildlife may include collisions with vehicles, overhead wires, windows, and other physical structures. Prolonged exposure to these hazards sources could reduce the occupancy of wildlife species that are susceptible to these sources of mortality (e.g. moose, waterfowl and shorebirds; Rioux et al. 2013).

Elevated levels of artificial lighting may also influence the behavioural patterns of wildlife species; particularly for those that are most active during nocturnal and crepuscular time periods that require darkness for concealment from predators (Rich and Longcore 2006). Artificial lighting is also known to influence local migratory patterns of birds that migrate at night (e.g. Atlantic Puffins (*Fratercula arctica*); Gauthreaux and Belser 2006) and is a major source of avian mortality through collisions with illuminated structures (Gehring et al. 2009). Excessive lighting may also negatively impact the behaviour and ultimate survival of endangered bat species though the occurrence of these species in the Project Area is unknown (see above). Where extended work hours are necessitated by schedules or tides, work lights should be concentrated in the area of construction. Peripheral lights should be reduced as much as possible by barriers, direction and spot lighting. At night, only lights deemed necessary for safety, security and site operations should be turned on.

Because of the potential for adverse environmental effects during the construction and operation phases of the Port, a comprehensive EPP is warranted to provide realistic and effective approaches for mitigating deleterious effects to wildlife and other ecosystem components. An integral part of this EPP will include an Avifauna Management Plan (AMP) which will provide a framework for limiting disturbance to both resident and migratory birds that utilize the Project area. The AMP will consist of three levels of protection: 1) general mitigation measures, 2) awareness measures, and 3) directed surveys. General mitigation measures will include specific actions for minimizing the destruction and harm to individuals, nests, and eggs, particularly during the breeding

season. Guidelines will be provided for locating nesting birds, establishing protective buffers and minimizing disturbance to these sensitive areas. Other mitigation measures may include protocols for handling and releasing stranded birds, avoiding nesting in stockpiles and buildings, and actively relocating nests from unwanted structures (e.g. Osprey nests atop transmission line towers). Awareness measures will include basic training that will enable employees and contractors to recognize potential wildlife issues and a process for relaying this information to environmental monitors. The third level of protection (directed surveys) will be critically important given the paucity of site-specific information on the distribution and abundance of birds and the inherent variability in the assemblage of birds that occur in an area in any given year. Dedicated surveys by an experienced ornithologist (plus technical support staff) will provide a thorough description of the species that utilize the Project area and will identify active nesting sites to which mitigating measures can be applied. Although all bird species included under the *Migratory Birds Convention Act* will be recorded during field visits, surveys will be tailored to record the occurrence of both federally and provincially listed species at risk (including Ivory Gull, Red Knot, Short-eared Owl, Harlequin Duck, and Gray-cheeked Thrush) as well as for birds of prey (e.g. Bald Eagle (*Haliaeetus leucocephalus*) and Osprey (*Pandion haliaetus*)) that are likely to breed in the general area. Given the range of sensitive species that may potentially utilize the Project area during different times of the year, all available terrestrial, coastal, and marine habitats should be thoroughly surveyed for bird activity. For example, though shorelines will likely support a low diversity and density of species for most of year, this habitat is critically important for multiple shorebird species (e.g. White-rumped Sandpiper, Dunlin, Red Knot etc.) during the fall migration period. Similarly, Crémalière Harbour may occasionally support high densities of seabirds (e.g. Black-legged Kittiwakes (*Rissa tridactyla*), Common Eider) depending on local prey availability, ice conditions and other environmental factors. An important component of the AMP will be designing and planning the appropriate surveys for key species that utilize the Project Area during different temporal periods.

The Project specific EPP will include best practice measures, including use of sound barriers and work scheduling, as well as scheduled maintenance of equipment and minimizing the amount, and unnecessary idling, of on-site equipment and vehicles, to limit the potential effects of construction noise and emissions on wildlife use of the Project area. Exposure of plants and wildlife to hazardous materials and substances, as well as contamination of habitat will be prevented by appropriate containment and handling practices. The Project site will be equipped with mobile spill response kits at all active construction locations. All waste materials, including recyclable materials, food and beverage waste, camp waste, hazardous waste and scrap construction waste, will be collected in appropriate containers for transport and disposal to off-site disposal/recycling facilities subject to provincial and federal regulatory requirements and guidelines.

### **Environmental Effects Assessment Summary**

The potential effects of project development on wildlife species are summarized in Table 6.6.

**Table 6.6 Examples of construction activities, their interaction with key ecosystem components and proposed measures for mitigating adverse effects**

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Furbearers and avifauna			<ul style="list-style-type: none"> <li>Loss of nesting, denning, and foraging habitat, disruption of migratory routes and foraging patterns, and increased predation</li> <li>Increased mortality as a result of collisions with vehicles.</li> <li>Decreased productivity of birds and mammals due to chronic noise disturbance from construction activity.</li> <li>Habituation of some wildlife to human presence and artificial feeding which may develop 'problem wildlife'</li> <li>Contamination of wildlife and their habitats by oil and other harmful substances</li> </ul>	<ul style="list-style-type: none"> <li>Minimizing the Project footprint by confining vegetation clearing and other forms of ground disturbance to the extent possible</li> <li>Maintain natural buffers around wetlands and riparian areas where feasible</li> <li>Conduct nest searches in advance of site clearing during the breeding season (15 April to 15 August) to avoid disturbance to nesting landbirds.</li> <li>Establish protective buffer zones around all active nests. Buffer sizes are species-specific and are based on the perceived susceptibility of each species to anthropogenic disturbance</li> <li>Avoid wildlife-vehicle collisions by ensuring safe driving practices</li> <li>Avoid construction during the pre-calving/calving season (early May to late June) if woodland caribou are detected in the Project area</li> <li>Minimize the use of artificial lighting to reduce disturbance to nocturnal bird and bat species</li> <li>Prevent harvesting or harassment of wildlife by Project personnel</li> <li>Avoid intentional feeding of wildlife (e.g. red foxes, black bears, gull species etc.).</li> <li>Ensure that waste and other materials are properly disposed of/managed. Ensure that a comprehensive spill response plan is developed and that it can</li> </ul>

<b>Environmental Component</b>	<b>Project Phase / Potential Interaction</b>			<b>Key Considerations and Environmental Mitigation</b>
	<b>Construction</b>	<b>Operations</b>	<b>Issues / Interactions</b>	
Vegetation			<ul style="list-style-type: none"> <li>• Clearing of vegetation</li> <li>• Possible fuel or chemical spills</li> </ul>	<ul style="list-style-type: none"> <li>• Minimizing the Project footprint by confining vegetation clearing and other forms of ground disturbance to the extent possible</li> <li>• Clearly delineate work areas to prevent excessive clearing.</li> <li>• Limit vehicle and ATV traffic to established roadways.</li> <li>• Minimize contaminants (airborne or run-off) through dust control on roads and containment of stockpiles.</li> <li>• Compliance with applicable regulations and permits</li> </ul>

With the implementation of the environmental mitigation measures outlined here, and detailed in the EPP, the proposed Project is not likely to result in significant adverse environmental effects on wildlife or wildlife habitat.

### **6.3.2 Vegetation, Streams and Wetlands**

Vegetation will be cleared from areas to be developed for infrastructure construction. Possible effects on local streams and wetlands include infilling, sedimentation, de-watering, excess dust, and altered flows. Standard mitigations related to vegetation, stream and wetland protection include minimizing project footprint, avoiding areas of wetlands for infrastructure such as roads, and proper sedimentation and dust control during both construction and operation

#### **Construction**

Possible effects of construction of roadways, buildings and laydown areas on local vegetation, streams and wetlands include landscape disturbance, infilling, sedimentation, de-watering, excess dust, and altered flows.

During construction, traversing of the site by equipment and human foot traffic will be limited to clearly delineated roads, paths and laydown areas. The areas to be affected will be determined in the Site Plan based on the principle of smallest necessary footprint. Areas beyond the final footprint of development affected by construction will be revegetated with indigenous plants. Beach and cliff areas that may be subject to disturbance will be assessed prior to development, for presence of plant species that may be rare or threatened.

A primary consideration in engineering of the Project is the proximity of wetlands and natural water courses to construction activities. As is feasible, wetlands, natural riparian buffer zones and areas of indigenous vegetation will be preserved to provide natural drainage and filtration surrounding paved and developed areas. These natural areas will be clearly delineated and all measures taken to ensure they are not affected by disturbances, sedimentation, or contamination during construction.

Responsible engineering and project management, particularly in large scale projects, requires comprehensive drainage and erosion control as an integral part of the initial planning phase for all aspects of the project

including construction. A comprehensive program of proven, effective erosion and sediment control measures will be identified in the Project EPP and implemented before earth moving takes place.

The EPP will include an Erosion and Sedimentation Control Plan (ESCP) based on a complete geological and hydrological survey of the entire Project site including an inventory and assessment of water bodies and water courses. The ESCP will detail surface stabilization practices and provide detailed schematic drawings of drainage and sediment control structures.

Best Management Practices (BMPs) for erosion and sediment control appropriate for the Project will be established in the Project EPP and associated ESCP. While erosion control is the primary means of preventing the degradation of downstream aquatic resources, sediment control serves a contingency/back-up plan. The design of temporary and permanent control measures should be viewed as a flexible process, that evolves as new information is obtained throughout construction phases.

The ESCP will be dictated by site conditions and will detail steps necessary to minimize erosion (e.g. limiting the exposed area, limiting exposure time, installing BMPs early, diverting runoff, limiting velocity and protecting concentrated flow areas) and establish sediment control practices that intercept sediment-laden runoff that may escape erosion control measures. Select erosion and sediment control measures are discussed below.

The simplest way to prevent erosion on a construction site is to prevent existing vegetation from being disturbed and limiting the time any disturbed areas are exposed (Coquitlam 2014, Iowa 2013, Moncton 2009, and Transport Alberta 2011). While some site areas will necessarily be graded and some ground exposed, measures will be taken to minimize the effect on the environment during the construction and operation stages of the project. Integrated site planning and coordination of site preparation and construction time lines will delineate and limit the area of exposed soils and the amount of time that soil is exposed. Clearing and excavation onshore will occur only where necessary and will, as much as practicable, be kept within the footprint of the finished structures. Where necessary, wetlands, natural riparian buffer zones and areas of indigenous vegetation will be preserved to provide natural drainage and filtration surrounding paved and developed areas. These natural areas will be clearly delineated and all measures taken to ensure they are not impacted by disturbances, sedimentation or contamination during construction. Where practical, construction and operation activities will be scheduled to avoid environmental impacts.

Drainage and catchment system design and engineering will mitigate erosion and impact on the natural hydrology. BMPs for on-site water management (e.g. use existing drainage, design drainage channels appropriately, and anticipate and manage groundwater where applicable) will be implemented to ensure there is capacity for handling extreme weather events and projected climate trends. Buffer zones will prevent flushing of runoff catchments into adjacent fresh and saltwater bodies and rivers at peak periods during extreme weather. Exposed areas within and beyond the final footprint of pavements and buildings will be watered and/or covered or stabilized using vegetation and soil stabilization measures that will include, but not limited to, the following:

- *Seeding*: one of the more common methods of stabilizing disturbed ground. Seeding methods include broadcast seeding with a spreader, hydroseeding (seed mixed with mulch and water) and pneumatic seeding (seed mixed with compost). The established vegetation protects the soil from raindrop impact and helps to slow runoff. Typically, seeding is most effective for stabilizing slopes that are 3:1 or flatter (Iowa 2013). Steeper slopes usually require some other form of stabilization (e.g. rolled erosion controlled products)
- *Mulching*: application of organic material (e.g. wood chips) over soil that is bare or immediately over soil that has been seeded. Protects the soil by absorbing the impact of raindrops.
- *Turf Reinforcement Matting*: a three-dimensional product constructed of synthetic, non-degradable materials that provides immediate erosion protection that can permanently reinforce vegetation on steep

slopes.

- *Riprap Armoring*: typically used for channel lining in areas where vegetation is not easily established.
- *Rolled Erosion Controlled Products (RECP)*: prefabricated blankets or netting formed from both natural (e.g. jute) and synthetic materials (e.g. glass-fiber or PVC). Typically used as a temporary surface stabilizing measure on steep slopes to aid in the establishment of vegetation.

The selection of methods used to control erosion by diverting runoff, limiting velocity and protecting concentrated flow areas depend on the size of the disturbed area, the type of runoff (concentrated or sheet flow) and the runoff volume. The site assessment for the Project will include a comprehensive study of surface water, groundwater and marine hydrology necessary to establish suitable runoff control methods. In general, the diversion of runoff (sheet or concentrated flow) away from a disturbed area can be achieved using structural measures such as dikes, berms, drainage swales and diversion ditching. Check dams (a vertical barrier constructed across ditch) can also be implemented to reduce the velocity of concentrated runoff and reduce gully erosion until runoff conveyance channels can be stabilized. The application of suitably engineered Low Impact Development (LID) methodologies (e.g. bioretention cells, pervious pavements and grassed swales) will also serve to capture/reduce storm water runoff and facilitate removal of pollutants from runoff.

Where road construction unavoidably nears sensitive or vulnerable areas, GNP Inc. will employ BMPS to manage road runoff and drainage to minimize erosion and sedimentation. Where applicable in wet meadow areas, permeable fill under the road surface along with culvert arrays will maintain subsurface water flow. In areas of rapid drainage such as exposed bedrock adjacent to roads and paved areas, GNP Inc. will implement structural erosion control measures such as constructed lead-out ditches and rock aprons to disperse water-flow energy and reduce erosion.

The Department of Municipal Affairs and Environment's Policy for Development in Shore Water Zones prohibits infilling, drainage, dredging, channelization, or removal of surface or underwater vegetation on or along shore water zones which could aggravate flooding problems, have unmitigable adverse water quality impacts, have significant impacts on water circulation patterns within the shore water zones or on sediment deposition or accretion or removal rates along the shore water zones. GNP Inc. is proposing the use of a jack-pile dock system that will reduce the sea-bottom footprint, allow ramp access over and above the intertidal zone, and relatively unobstructed movement of water in the basin.

Temporary stockpile control/protection methods, if deemed necessary due to construction scheduling, will be implemented. Stockpiles will be located well away from watercourses and environmentally sensitive areas. Stockpiles scheduled to remain in-place for greater periods of time will be covered as a preventative measure.

The selection of methods taken to remove sediment will depend on site-specific criteria as described in the EPP. Sediment control measures may include, but are not limited, to the following:

- *Check dams*: while their primary purpose is to reduce the velocity of runoff in conveyance channels, check dams constructed from coarse granular material may provide some sediment removal benefits (Iowa 2013).
- *Filter berms*: triangular shaped structures with a filter material (e.g. gravel) that can be used to slow flow velocity and, due to its natural permeability, trap sediment. When installed on a slope, filter berms are typically installed perpendicular to sheet flow.
- *Silt fencing*: temporary sediment barriers of geotextile fabric anchored into the ground and supported by posts on the downstream side of the fabric. Silt fencing does not filter runoff, rather it intercepts and impounds sediment onsite (Coquitlam 2013). This method should only be used when there are small runoff flow rates and volumes (Transport Alberta 2011).

- *Straw bale filter barriers*: in some circumstances, straw bales can control sheet flow and act as temporary sediment barriers. Current BMPs indicate straw bales should not be utilized as the primary sediment control barrier where channelized flows are to be expected (Coquitlam 2013). Straw bales are most effective when used in conjunction with other ESC practices.
- *Sediment traps*: overland flow runoff from disturbed areas can be directed to a small control pond/trap formed either by excavation or by placing an earthen embankment across a low area or drainage swale (Moncton 2009).
- *Sediment basin/ponds*: structures used to detain sediment laden runoff long enough to allow sediment to settle out. Larger than sediment traps and typically used for drainage areas larger than 2 hectares.

In-stream sedimentation control, if deemed necessary, can be achieved using heavy-duty filter fabric weighted at the bottom and attached to a flotation unit at the top. These floating silt curtains are not typically left in place during winter months (Iowa 2006).

Use of explosives in or near water will be avoided wherever possible. Where explosives are required in near rivers, bodies of fresh water, salt water or intertidal zones, impacts to fish and fish habitat (i.e. through sedimentation) will be minimized by adhering to the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters" (Wright and Hopky 1998) and mitigation measures provided therein, where applicable.

Exposure of streams and wetlands to hazardous materials and substances will be prevented by appropriate containment and handling practices. The Project site will be equipped with mobile spill response kits at all active construction locations. All waste materials, including recyclable materials, food and beverage waste, camp waste, hazardous waste and scrap construction waste, will be collected in appropriate containers for transport and disposal to off-site disposal/recycling facilities subject to provincial and federal regulatory requirements and guidelines.

During construction, sanitary wastewater will be stored in portable units (either enclosed portable toilets or containerized sanitary wastewater tanks adjoining temporary construction site buildings). These will be cleaned and the wastewater will be transported to an off-site sanitary fill disposal site.

In keeping with surface water management BMPs, clean water will be kept clean as contaminants will not be allowed to overtop or run into natural surface water and will, where necessary, be siphoned into containerized transport to a suitable disposal site.

BMPs will also be implemented to minimize the potential impact on wetlands and streams of fugitive dust from roadways and laydown areas, use of pressure treated wood, and use of concrete on the Project site.

Preventative measures for on-site roadways and laydown areas may include, but are not limited to, a reduction of vehicle speeds on unpaved areas and the application of dust suppressants. Suppression methods including paving of select areas will be considered, but paving may prove unsuitable for areas used by heavy vehicles. Wherever paving is not practical, high traffic areas may be covered with large aggregates or lower silt material (e.g. gravel) to reduce track-out (MOECC 2017). Implementation of BMPs (TAC 103) will help ensure materials (e.g. calcium chloride) are effectively managed to prevent and reduce any negative impact to water quality.

Guidelines for the use of treated wood in and around aquatic environments and the disposal of treated wood will be implemented. The specification "Treated Wood in Aquatic Environments" (WPC 2012) and the companion document "Specifiers Guide – Best Management Practices for the Use of Preserved Wood in Aquatic and Sensitive Environments" (WWPI 2012) will be followed, where applicable, to guide the selection, installation and management of wood preservation systems in aquatic and wetland environments.

Best practice for using concrete near water, where necessary, may include, but is not limited to, preventing any water that contacts uncured or partly cured concrete (e.g. during rinsing of equipment) from directly or indirectly

entering any watercourse or storm water system. The "Environmental Code of Practice for Concrete Batch Plant and Rock Washing Operations" (Department of Environment and Lands 1992) will be adhered to when necessary.

## **Operations and Maintenance**

Operation and maintenance activities can also result in the inputs of sediment and chemicals into local streams and wetlands that can change flow patterns and the chemical characteristics of the water systems.

Runoff from roofs and paved areas will be captured in storm-capacity catchments and grassed ditches to allow natural filtration before entering ground water or natural water systems.

Road deicing chemicals are an environmental concern. Salt run-off from roads and sidewalks then enters the natural environment through bounce and scatter from spreaders, wind, splash and spray from vehicles, snow melt, and runoff. The greatest environmental impact of salt is its effect on fresh water. Salt in solution contaminates surface water and infiltrates groundwater via storm drains. Chloride from dissolved salt is potentially toxic to fish, macro invertebrates, insects and amphibians and remain in solution with no natural means of removal except dilution with more fresh water.

The best practice for minimizing salt impact is applying the least amount of salt necessary. Custodial managers should understand what ice control products to use, when to use them and how much is necessary. Other strategies include matching de-icer application rate to temperature conditions, reducing accumulation of snow and ice on roadways through the use of snow fences or other measures, predicting when to apply de-icers, improving the application and distribution methods, and allowing de-icers sufficient time to work before plowing and reapplication.

To minimize environmental impacts, the EPP will emphasize the importance of using smaller quantities of de-icers, use of snow fences and barriers, and increased efficiency of mechanical ice removal.

Buildings on the Port development will be engineered and constructed to minimize maintenance. Anticipated environmental effects include runoff from roofs and paved areas which will be captured in storm-capacity catchments and grassed ditches to allow natural filtration before entering ground water or natural water systems

Conformance to the requirements of the *Environmental Control Water and Sewage Regulations (2003)* will be achieved by establishing a monitoring program to monitor water quality that ensures wastewater, effluent or runoff leaving the site conforms to the requirements specified. If necessary, runoff from impoundment areas will be directed to an outflow where drainage can be monitored, sampled and tested for conformance.

The Project will have its own sewer infrastructure completely outside and separate from both surface and groundwater sources currently in use by the Towns of St. Anthony and Goose Cove. The septic system for the Port will be confined inside the boundaries of the Port site. GNP Inc. has investigated and will integrate advanced wastewater treatment technologies into the Development Plan for the Port to facilitate conformance with *Environmental Control Water and Sewage Regulations (2003)* and the Department of Municipal Affairs and Environment's Policy for Development in Shore Water Zones (PDSWZ) (prohibiting the placement, deposit or discharge into shore water zones any raw sewage, refuse, municipal and industrial wastes, fuel or fuel containers, pesticides, herbicides or other chemicals or their containers, or any other material which impairs or has the potential to impair the water quality of the shore water zones). The Project EPP will identify opportunities and provide detailed plans for recycling, wastewater treatment and disposal, composting and solid waste disposal. During the operational stage of the project, drains and drainage systems will require cleaning of brush and debris. Where flushing is required, debris will be caught and disposed of appropriately.

## Environmental Effects Assessment Summary

A summary of potential environmental effects and identified mitigation measures for the Project on the Freshwater Environment is provided in Table 6.7.

**Table 6.7 Environmental Effects Summary: Streams and Wetlands**

Environmental Component	Project Phase/Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations / Maintenance	Issues / Interactions	
Streams and Wetlands			<ul style="list-style-type: none"> <li>• Erosion and sedimentation</li> <li>• Runoff from road de-icing</li> <li>• Accidental spills of deleterious substances (e.g. fuel, oil or drilling mud, wastewater / bilge)</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize activity in and around streams and wetlands</li> <li>• Preserve natural riparian buffer zones;</li> <li>• Limit the area of exposed soils and the amount of time that soil is exposed;</li> <li>• Development of a Project specific erosion and sediment control plan;</li> <li>• Development of an on-site water management program;</li> <li>• Implementation of approved storm water and waste water control designs;</li> <li>• Implementation of Regulatory guidelines for use of treated wood and concrete, and for blasting in or near waters.</li> </ul>
Vegetation			<ul style="list-style-type: none"> <li>• Removal and disturbance</li> <li>• Accidental spills of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>• Clearing and excavation will occur only where necessary and kept within the footprint of finished structures, where practicable;</li> <li>• Conduct rare plant assessment in advance of clearing activities;</li> <li>• Develop emergency response procedures and capability to limit the potential for and effect of accidental events.</li> </ul>

With the implementation of the environmental mitigation measures outlined here and detailed in the EPP, the proposed Project is not likely to result in significant adverse environmental effects on vegetation, streams and wetlands.

### **6.3.3 Freshwater and Marine Fish**

Fish species in both freshwater and marine ecosystems may be directly affected by developments that disrupt or destroy habitat or by deposition of deleterious substances such as sediments, hydrocarbon or other chemicals that impact the quality of the habitat in which they live. They may also be indirectly affected by developments that create barriers to their movement or that affect the presence of other species that are food sources.

#### **Construction**

Construction of roadways, buildings, docks, laydown areas and other infrastructure have the potential to affect both freshwater and marine fish and fish habitat. This will be minimized by limiting work in and around waterbodies where feasible and using environmental protection measures, as specified in the Project EPP to minimize effects where construction in water is required.

#### **Operation and Maintenance**

Operations within the Crémallière Harbour Development will be controlled to ensure that any discharges to freshwater or marine habitat is in compliance with provincial and federal requirements including the *Environmental Control Water and Sewage Regulations* and the *Fisheries Act*, as well as any conditions of permits and approvals received. Accidental or uncontrolled releases will be minimized by secondary containment at all fuel and chemical bulk storage facilities and implementation of SOPs contained in the operational HSEMS for transportation and handling of controlled substances.

#### **Environmental Effects Assessment Summary**

**Table 6.8 Environmental effects summary for the freshwater and marine environment**

<b>Environmental Component</b>	<b>Project Phase/Potential Interaction</b>			<b>Key Considerations and Environmental Mitigation</b>
	<b>Construction</b>	<b>Operations and Maintenance</b>	<b>Issue/Interactions</b>	
Surface Water			<ul style="list-style-type: none"> <li>• Drainage disruption and Sedimentation</li> <li>• Accidental Spills</li> </ul>	<ul style="list-style-type: none"> <li>• No water use is proposed for the construction of the road, water quantity should not be affected;</li> <li>• Work areas will be isolated from running water as much as possible;</li> <li>• When isolation is not possible, silt fencing or another barrier type will be used;</li> <li>• All necessary permits will be acquired and applied throughout the duration of construction and for routine/non-routine maintenance;</li> <li>• A response plan will be developed to address potential accidental releases;</li> </ul>
Fish Habitat			<ul style="list-style-type: none"> <li>• Stream Alteration</li> <li>• Stream crossings</li> <li>• Drainage disruption and Sedimentation</li> <li>• Accidental Spills of deleterious substances</li> <li>• Additional access to fishing areas</li> </ul>	<ul style="list-style-type: none"> <li>• Whenever possible, machinery will be operated above high water mark;</li> <li>• Machinery fording of watercourse will be avoided as much as possible. If not possible the crossing will be limit to one time-events (to and back);</li> <li>• Culverts will be installed following provincial guidelines;</li> <li>• If stream alterations are necessary, provincial guidelines will be followed;</li> <li>• Silt fencing will be in place to reduce effects of potential increased sedimentation;</li> <li>• Water samples will be collected from key areas</li> </ul>

Environmental Component	Project Phase/Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations and Maintenance	Issue/Interactions	
				<p>throughout the construction period;</p> <ul style="list-style-type: none"> <li>• Work sites will be isolated from running water, and appropriate barriers will be installed to prevent accidental released of deleterious substances;</li> <li>• A response plan will be developed to address potential accidental releases of deleterious substances;</li> <li>• All necessary permits will be acquired and applied throughout the duration of construction and for routine/non-routine maintenance;</li> <li>• Prohibition of on-site fishing activity by Project construction and operation personnel</li> </ul>
Fish			<ul style="list-style-type: none"> <li>• Damage to fish and fish habitat destruction</li> <li>• Accidental Spills of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>• Isolation of worksite by the use of air curtains, cofferdams or aquadams. Removal of fish trapped within the isolated area and release without harm;</li> <li>• Minimize subdivide blasting charge weights. The smaller charges should be detonated at least 25 m apart;</li> <li>• Back-fill blast holes;</li> <li>• Use of blast mats to minimize debris;</li> <li>• Avoidance of ammonium nitrate based explosive due to potential of toxic by-products;</li> <li>• Remove debris and other products from blast areas.</li> </ul>

Environmental Component	Project Phase/Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations and Maintenance	Issue/Interactions	
Shoreline			<ul style="list-style-type: none"> <li>• Erosion</li> <li>• Habitat destruction</li> <li>• Vegetation disturbance</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid unnecessary clearing of riparian/coastal vegetation;</li> <li>• Minimization of sediment removal below the high water mark;</li> <li>• Stabilization of shoreline/banks to prevent erosion/sedimentation. IF feasible by the use of re-vegetation using native plant species;</li> <li>• Restoration of bank to stable gradient, taking fish migration into account;</li> <li>• Any use of foreign rock material will be clean;</li> <li>• If riparian area is identified as part of critical habitat for species at risk, appropriate guidelines will be followed.</li> </ul>

With the implementation of the environmental mitigation measures outlined here and detailed in the EPP, the proposed Project is not likely to result in significant adverse environmental effects on freshwater or marine fish.

### 6.3.4 Marine Mammals

The marine environment, including marine mammals and their habitat, has the potential to interact with the Project; in particular, the associated increase in vessel traffic is anticipated to have an effect on marine mammals and their habitat. Vessel traffic and associated noise can be a source of chronic stress for marine mammal populations (Rolland et al 2012). Marine mammals are known to adjust their movement behaviour around ships (Richardson et al 1995), and to modify their vocal patterns (Clark et al 2009). Certain whale species, including fin whales and humpback whales, are at risk of injury or mortality from direct collisions with vessels (Laist et al 2001; Vanderlaan and Taggart 2007; Williams and O'Hara 2010). Although vessel strikes can have serious consequences, these events are rare as avoidance behaviour tends to reduce the risk of collision. Reducing vessel speed has been shown to reduce the number of marine mammal deaths and severe injuries due to collisions (Vanderlaan and Taggart 2007; Vanderlaan et al 2008; van der Hoop et al 2012); lethal strikes are infrequent at vessel speeds less than 25.9 km/h (14 knots) and very rare at less than 18.5 km/h (10 knots) (Laist et al 2001).

Accidental releases of deleterious substances into the marine environment could also have effects on marine mammals and their habitats. Facilities to be constructed at Crémallière Harbour as part of the Project may include a liquid mud plant and a fuel tank farm. Storage / treatment of fluids at these facilities will be conducted

in accordance with all Federal and Provincial regulations to ensure that risk of unplanned or accidental release into the marine environment is minimized.

Mitigation measures will be taken throughout the lifetime of the Project including speed restrictions and limits on marine traffic volumes operating in the harbour. These and additional mitigation measures to reduce effects on marine mammals and their habitat will be detailed in the Project EPP and HSEMS. A harbour pilot and patrol boat will be stationed at the port site during all underwater diving and construction operations to alert and direct marine traffic, and a qualified fisheries observer will be available to observe and implement marine environment impact mitigation measures.

## **Construction**

Relative to the small amount of marine traffic in Crémallière Harbour currently and historically, a significant increase in marine traffic in the harbour basin and approaches will occur during the construction period. The primary potential interactions with marine mammals as a result of the development of the Project are associated with the increase in underwater noise produced by ships involved with construction. Marine mammals may also be affected by accidental releases of small amounts of deleterious substances such as hydrocarbons into the marine environment, and temporary disturbances associated with other construction activities such as drilling, blasting, pile driving, and excavation operations may also occur.

The EPP will provide best practice guidelines and site measures to mitigate noise effects including (but not limited to) sound barriers, reduction of noise from equipment through use of suppression devices, and work scheduling. These will be followed in all aspects of the Project by all persons and companies engaged in port operations.

All construction activities will be performed in a manner that will ensure no deleterious substances enter, either directly or indirectly, the surrounding marine environment. Deleterious substances can include sediments and excess runoff, fuels and oils and any other substance that can have a negative impact on the marine environment. Standard environmental protection procedures as outlined in the EPP will be in place and adhered to for the duration of this phase of the project.

## **Operation and Maintenance**

During planned operations, the primary potential interactions with marine mammals will be due to increased vessel traffic in the port. Projected volumes of marine traffic, as well as Project-specific and cumulative environmental effects, will be detailed in the EPP. The GNP will operate according to the Practices and Procedures for Public Ports, including regulations pertaining to refueling, ballast water discharge, painting, and other operations with potential environmental impacts. The EPP will also take into account current best practices regarding all aspects of navigation and movement and operation of vessels within the Port's authority. As port manager and authority, GNP Inc. will abide by Transport Canada Marine Acts and Regulations and will include contingency planning in the EPP to enforce and ensure the noise level and water activities are within the bounds outlined in the legislation.

## **Environmental Effects Summary and Evaluation**

A summary of the potential environmental interactions, mitigations and potential residual environmental effects of the proposed GNP on Maine Mammals and their habitat is presented below in Table 6.9.

**Table 6.9 Environmental Effects Summary: Marine Mammals**

Environmental Component	Project Phase/Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations / Maintenance	Issues / Interactions	
Marine Mammal Habitat Quality			<ul style="list-style-type: none"> <li>Increased noise due to vessel traffic, construction activities</li> <li>Accidental spills of deleterious substances (e.g. fuel, oil or drilling mud, wastewater / bilge)</li> </ul>	<ul style="list-style-type: none"> <li>GNP will adhere to TC marine acts and regulations regarding noise levels and in-water activities;</li> <li>EPP will provide best practice guidelines and site measures to mitigate noise effects including (but not limited to) sound barriers, reduction of noise from equipment through use of suppression devices, and work scheduling;</li> <li>All necessary permits will be acquired and adhered to throughout the duration of construction and maintenance;</li> <li>Storage and treatment of fluids at LMP and Ballast Wastewater / Bilge Disposal facilities will be in accordance with Federal and Provincial regulations protecting marine water quality;</li> <li>GNP port will be equipped with oil-disposal equipment for environmentally neutral disposal of oil contaminated ballast water, bilge and any other hazardous liquids/solids;</li> <li>All fuels and oils will be stored in properly designed, regulated and certified storage tanks or containers;</li> <li>Containment, transport and handling of fuels and oils will follow all applicable environmental, and health and safety regulations and best practices;</li> </ul>

<b>Environmental Component</b>	<b>Project Phase/Potential Interaction</b>			<b>Key Considerations and Environmental Mitigation</b>
	<b>Construction</b>	<b>Operations / Maintenance</b>	<b>Issues / Interactions</b>	
				<ul style="list-style-type: none"> <li>Containment structures will be constructed or placed around storage tanks to ensure; containment of spills or leakage</li> <li>A response plan will be developed in the EPP to address potential accidental releases.</li> </ul>
Marine Mammal Presence and Health			<ul style="list-style-type: none"> <li>Increased noise due to vessel traffic and construction activities (including drilling, blasting)</li> <li>Potential for collision with vessels</li> <li>Accidental spills of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>Project vessels will maintain constant course and speed to the extent practical, and will detour around marine mammals if it is safe to do so;</li> <li>EPP will provide best practice guidelines and site measures to mitigate noise effects including (but not limited to) sound barriers, reduction of noise from equipment through use of suppression devices, and work scheduling;</li> <li>In the event of a mammal-vessel strike, GNP will report the incident to DFO (Whale Release and Strandings Newfoundland and Labrador at 1-888-895-3003);</li> <li>Use of explosives in or near water will be avoided wherever possible;</li> <li><i>Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) will be adhered to where applicable;</li> <li>GNP will adhere to TC marine acts and regulations regarding noise levels and in-water activities;</li> <li>Storage and treatment of fluids at LMP and Ballast</li> </ul>

<b>Environmental Component</b>	<b>Project Phase/Potential Interaction</b>			<b>Key Considerations and Environmental Mitigation</b>
	<b>Construction</b>	<b>Operations / Maintenance</b>	<b>Issues / Interactions</b>	
				<p>Wastewater / Bilge Disposal facilities will be conducted in accordance with all Federal and Provincial regulations protecting marine water quality;</p> <ul style="list-style-type: none"> <li>GNP port will be equipped with oil-disposal equipment for environmentally neutral disposal of oil contaminated ballast;</li> <li>All fuels and oils will be stored in properly designed, regulated and certified storage tanks or containers;</li> <li>Containment, transport and handling of fuels and oils will follow all applicable environmental, and health and safety regulations and best practices;</li> <li>Containment structures will be constructed or placed around storage tanks to ensure containment of spills or leakage;</li> <li>A response plan will be developed in the EPP to address potential accidental releases of deleterious substances;</li> <li>All necessary permits will be acquired and adhered to throughout the duration of construction and for routine/non-routine maintenance.</li> </ul>

With the implementation of the environmental mitigation measures outlined here and detailed in the EPP, the proposed Project is not likely to result in significant adverse environmental effects on marine mammals or their habitat.

### 6.3.5 Historic Resources

Seven registered archaeological sites have been identified in Crémallière Harbour, Figure 6-5, relating to French migratory fishery activity in the 16<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup>, and 19<sup>th</sup> centuries, however, only two of these are located in areas where Project infrastructure is proposed. Discussions with the PAO has identified that protection of these sites during Project construction and operation can be suitably incorporated into Project design and operational planning by providing buffer zones to separate proposed project infrastructure from the archaeological sites, and incorporating historic resource protection provisions in the Project EPP and HSMS documents.

As well, as is shown by L'Anse aux Meadows and like sites in the Province, archaeological sites can become engines for local and regional economic and social development. In order that the potential value of the historic resources at Crémallière Harbour are realized GNP Inc., in consultation with a qualified Archaeologist, will develop a Historic Resources Preservation and Management Plan based on the Historic Resources Assessment conducted as part of this environmental preview report that will direct historic site development and historic resource management.

It is further the intent of GNP Inc. to maximize the economic and social benefits of the historic resources of the archaeological sites at Crémallière Harbour both in terms of artifacts and the interpretive information. Active archaeological sites will be supported and promoted by GNP Inc. to realize economic and social benefits of these historic resources.

Public access to the archaeological sites identified, by way of walking trails, naturally vegetated park lands and interpretive sites, will be integrated into the HRPMP to accommodate traditional usage and encourage visitors. Based on the findings of the historic resource assessment, and in consultation with a qualified interpretive exhibit planner, a public interpretive display will be installed at the Port Authority office and interpretive panels erected at each of the sites included within the Project area. Plans and detailed design of the exhibit and interpretive panels will be integrated into the HRPMP prior to commencement of Phase I construction.

### Construction

Planning and engineering of the GNP port project will include incorporation of the recommendations of the Gerald Penney Associates, 2018 Crémallière Harbour, Great Northern Port Historic Resource Impact Assessment, Stage 1 report. In particular, planning and engineering for the Project will include the following in relation to the archaeological sites identified in Crémallière Harbour, Figure 6.5:

- EiAv-03

No clearing, fencing, or other development shall occur within 70 m of the western most positive test pit from Gerald Penney Associates, 2018, in this area. This buffer must also ensure that the North Point Hill daymark identified in Gerald Penny Associates, 2018 is located east of this 70 m buffer.

- EiAv-13

No clearing, fencing, or other development shall occur within 50 m of the cleared area of this cove.

- EiAv-08

No clearing, fencing, or other development shall occur within 50 m of the area of the Thomas Penny land grant.

- EiAv-12

No clearing, fencing, or other development shall occur within 50 m of the shoreline in this area.

- EiAv-11

If the John Murrin land grant is to be included in the development proposal at some future date, it will require field investigation, based on proximate finds and possibility of structural remains.

- EiAv-07

No clearing, fencing, or other development shall occur within 50 m of the area encompassed by Observation Point and Penney's beach including the existing area of clearing surrounding the beach.

- EiAv-10

No clearing, fencing, or other development shall occur within 50 m of the shoreline in this area.

Plans for any geotechnical work to be conducted upon, or in vicinity of, known archaeological sites will be submitted to the PAO for review prior to such works being undertaken and archaeological monitoring will be conducted during implementation of any such works.

Archaeological surveys will be undertaken, to the satisfaction of the PAO, prior to any work that could potentially impact underwater historic resources.

The project specific EPP will include provision for protection of any archaeological artifacts discovered during Project construction, in consultation with the PAO.

### **Operation and Maintenance**

All buffers surrounding known archaeological sites identified and implemented during construction will be maintained during operation and maintenance of the proposed Project. Any proposed changes in project infrastructure or operations in the vicinity of known archaeological sites will be submitted to the PAO for review prior to being undertaken.

The project HSEMS will include provision for protection of any archaeological artifacts discovered during Project operation and maintenance, in consultation with the PAO.

### **Environmental Effects Summary and Evaluation**

A summary of the potential environmental interactions, mitigations and potential residual environmental effects of the proposed GNP on historic resources is presented below in Table 6.10.

**Table 6.10 Environmental Effects Summary: Historic Resources**

<b>Environmental Component</b>	<b>Project Phase/Potential Interaction</b>			<b>Key Considerations and Environmental Mitigation</b>
	<b>Construction</b>	<b>Operations / Maintenance</b>	<b>Issues / Interactions</b>	
Archaeological Sites			<ul style="list-style-type: none"> <li>Disturbance of known archaeological sites</li> </ul>	<ul style="list-style-type: none"> <li>No clearing, fencing or other development shall occur within buffer areas around known archaeological sites identified in consultation with the PAO.</li> <li>Plans for any geotechnical work to be conducted upon, or in vicinity of, known archaeological sites will be submitted to the PAO for review prior to such works being undertaken and archaeological monitoring will be conducted during implementation of any such works.</li> <li>Archaeological surveys will be undertaken, to the satisfaction of the PAO, prior to any work that could potentially impact underwater historic resources.</li> <li>Any proposed changes in project infrastructure or operations in the vicinity of known archaeological sites will be submitted to the PAO for review prior to being undertaken.</li> </ul>
Archaeological Artifacts			<ul style="list-style-type: none"> <li>Disturbance of archaeological artifacts</li> </ul>	<ul style="list-style-type: none"> <li>Provision for protection of any archaeological artifacts discovered during Project construction, operation and maintenance will be included in the Project EPP and HSEMS provision.</li> </ul>

With the implementation of the environmental mitigation measures outlined here and detailed in the EPP, the proposed Project is not likely to result in significant adverse environmental effects on historic resources at Crémallière Harbour.

### **6.3.6 Human Environment**

The Project has the potential to intersect with private land, existing transportation routes, a public water supply, mineral exploration interests and scenic viewscapes. These potential issues have been addressed by the proponent through the following mitigation measures:

- The Project will be located on Crown land and not require any private lands that exist near the Project site; Access to private properties near the Project area will not be altered by the Project;
- The Project will be accessed from an existing road off Goose Cove Road;
- The Project will have its own water supply and septic systems;
- The site plan has been redesigned to exclude any of the Goose Cove East Protected Water Supply Area;
- The Project has been approved by the Town of St. Anthony as a Discretionary Use within the Rural Zone.

### **Construction**

Most of the identified issues related to development of the Project have been addressed in the mitigations listed above. An outstanding issue will be potential visibility of the Project. It is anticipated that due to the topography of the land surrounding the Project and distance to various recreation and tourism locations and amenities, that the Project may (depending on the height of the infrastructure) be visible from St. Anthony and some of the identified land-based tourism and recreational activities. This assumption is based on the results of analysis that shows that the top of the hills surrounding Crémallière Harbour will be visible from identified destinations in St. Anthony and St. Anthony Bight, and a trailhead near Goose Cove East. Project construction activities will likely be visible from the ocean, from tourism-based vessels, depending on the transit route to and from St. Anthony, which has an existing industrial port. St. Anthony hosts a small number of cruise ships annually and passengers on such vessels would likely be accustomed to seeing industrial activities in any ports-of-call in the Province, as such harbours are not exclusively used for tourism. In addition, passengers of the two boat tour operators located in the area (i.e., St. Anthony and St. Anthony Bight) may be able to see the Project when transiting the coastline, especially when on route to the Hare Bay Islands Seabird Ecological Reserve. Throughout Newfoundland and Labrador, and elsewhere, ports are used for a variety of activities including tourism and industrial activities. Thus, the visibility of industrial activities will be a routine part of participating in marine boat tours. All construction activities will be performed in keeping with Federal, Provincial, Municipal regulations including those related to use of marine waters.

The Project area may overlap with mineral exploration licences in the St. Anthony area but the Project will require access to surface rights only. The Proponent is in the process of obtaining access to Crown Lands for the purpose of developing the Project and will work with Department of Natural Resources to obtain all appropriate permits and to resolve conflicts prior to commencement of construction.

### **Operation and Maintenance**

During operations and maintenance activities, Project effects will be limited to the visibility of the Project which will not likely be of concern as the area has existing industrial port activities. In addition, tourism and recreation boat tour operators and passengers will likely be accustomed to observing industrial port activities as part of their activities.

## Environmental Effects Summary and Evaluation

A summary of the potential environmental interactions, mitigations and potential residual environmental effects of the proposed access road on surrounding freshwater aquatic environment are presented below in Table 6.11.

**Table 6.11 Environmental Effects Summary: Human Environment**

Environmental Component	Project Phase/Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations and Maintenance	Issue/Interactions	
Tourism and Recreation			<ul style="list-style-type: none"> <li>Visibility</li> </ul>	<ul style="list-style-type: none"> <li>The Project will be visible from marine vessels entering and departing from St. Anthony Harbour and St. Anthony Bight. This includes cruise ships and commercial boat tours especially those that travel south to Hare Bay Islands Ecological Reserve. Such vessels normally use ports where industrial facilities are located;</li> <li>To minimize visual disturbances, all necessary permits will be acquired and adhered to throughout the duration of construction and for routine/non-routine maintenance.</li> </ul>
Mineral Resources			<ul style="list-style-type: none"> <li>The Project may overlap with mineral exploration licences</li> </ul>	<ul style="list-style-type: none"> <li>Access to areas of mineral licences will be resolved with DNR prior to Project commencement;</li> <li>To minimize effects on other resources users, all necessary permits will be acquired and adhered to throughout the duration of construction and for routine/non-routine maintenance.</li> </ul>

The proposed Project is not likely to result in significant adverse environmental effects on the Human Environment.

## 6.4 Environmental Protection and Response Planning

Environmental protection and response planning are an important and integral part of GNP Inc.'s Crémallière Harbour Marine Port Development.

An EPP is an important tool for consolidating environmental information and procedures in a useable format for their timely and effective implementation in the field. An EPP provides clear and concise instructions to all Project personnel and contractors regarding mitigation procedures and techniques to avoid, reduce or respond to environmental issues associated with construction and/or operations activities.

GNP Inc. is committed to developing and implementing an EPP for construction of the Project which incorporates the commitments and controls identified in this EPR. An annotated outline for the proposed EPP is provided in Appendix E. The Project's EPP will continue to be further developed and refined as the EA and permitting processes move forward, so as to fully incorporate the mitigation measures identified through the EA review as well as the eventual terms and conditions of any eventual EA approval and subsequent environmental permits that are required and obtained for the Project.

## **6.5 Effects of the Environment on the Project**

The proposed Project has been planned and designed, and will be implemented, with due consideration of the local environmental conditions in and around the Project site. Once approval in principle is obtained and the framework for environmental and further geotechnical assessment is established, studies and engineering surveys may begin. Detailed topographic terrestrial and bathymetric surveys will precede site planning and determine actual location and time frames for excavation and construction. GNP Inc. anticipates a two year time frame for these activities with a possible start up for environmental and geotechnical site work in 2018.

## **6.6 Environmental Monitoring and Follow-up**

Any potential environmental issues which may be associated with the Project can be addressed and mitigated through the use of good construction and operational practices and procedures, as described throughout this EPR. These will be further addressed through the specific environmental permitting requirements and compliance standards and guidelines which will apply to the proposed Project.

The Project will be subject to regular inspections and maintenance as required. The Proponent is committed to obtaining all required authorizations for the proposed Project, and to complying with all applicable regulations (including any associated compliance monitoring and reporting requirements). No other environmental monitoring or follow-up is considered necessary in relation to the proposed Project.

## 7.0 PROJECT-RELATED DOCUMENTS

In addition to this EPR, GNP Inc.'s project related documents include the EA Registration document Registered with the Department of Municipal Affairs and Environment on November 14, 2017.

## **8.0 APPROVAL OF THE UNDERTAKING**

Following release under the provincial EA Process, GNP Inc. has committed to all attributes contained within the EA registration, and EPR, and will implement the following comprehensive Plans, and assessments during Project planning and implementation:

- Environmental Protection Plan
- Avifauna Management Plan
- Site Monitoring Plan for Migratory Birds
- Historic Resource Preservation and Management Plan
- Marine/Aquatic study to include description of fish, invertebrates and marine mammals that may be present year round
- Habitat Study
- Marine Habitat Protection Plan
- Port Facility Security Plan
- Fire Protection Plan
- Emergency Response/Preparedness Plan
- Occupational Health and Safety Plan
- WHMISS Plan
- Waste Management Plan
- Develop Women in the Workplace Plan in conjunction with:
  - Dept of Advanced Education, Skills and Labour
  - Women's Policy Office
  - Office to Advance Women Apprentice Plan
  - Women in Resource Development

In addition to approval under the provincial EA process, the Project will require a number of environmental permits and other approvals from various provincial, federal and/or municipal authorities in relation to its proposed construction and/or operations and maintenance activities.

A listing of some of the main permits, licences, approvals and other authorizations that may be required for the Project is provided in Appendix D.

## **9.0 DECOMMISSIONING AND REHABILITATION**

Crémaillère Harbour Marine Port operations are projected to begin in 2025, at which point dockage, refuelling, and other port services will be in place. Operations are projected to last into the foreseeable future. As a deep-water, ice-free port, the Crémallière Harbour Marine Port will satisfy long-term logistical needs for marine shipping requirements in Canada's northern and arctic waters.

In the event of the potential decommissioning of Crémallière Harbour operations, the land and marine based infrastructure will be removed and areas rehabilitated with application of environmental protection measures as identified in the project construction EPP. Land based infrastructure will be removed and any waste materials generated removed for appropriate disposal in conformance with provincial environmental standards for construction and demolition waste disposal, as well as applicable federal and provincial hazardous waste handling and disposal regulations and standards. Disturbed areas will be sloped to stable grades and available organic materials will be spread over these surfaces to encourage natural revegetation.

## 10.0 EPR SUMMARY AND CONCLUSION

GNP Inc. is proposing to develop a marine port at Crémallière Harbour, near St. Anthony on the Great Northern Peninsula. The proposed Project is subject to review and required approval under the Newfoundland and Labrador EA process.

This EPR has been prepared and submitted by the Proponent in relation to the proposed Project, the purpose of which has been to provide further information on the proposed port development, the existing environmental setting and potential environmental interactions, and planned environmental protection (mitigation) measures to avoid or reduce any adverse environmental effects. This information will be subject to governmental and public review and will help inform an eventual EA decision by the Minister.

Pending release from the EA process, and the receipt of formal corporate approval and all other required permits and authorizations, Project construction activity would commence with completion of engineering, and environmental studies to allow for detailed site planning prior to beginning excavation and construction. GNP Inc. anticipates a two year time frame to complete these studies. Actual construction of port facilities are proposed to be undertaken in phases between 2020 and 2030.

The proposed Crémallière Marine Port will include shore based and marine infrastructure with potential for impact on land based, freshwater and marine environmental components in Crémallière Harbour. No significant natural environment sensitivities have been identified during the conduct of the environmental preview report and environmental protection measures and mitigations have been identified to minimize the potential for significant adverse environmental effects on wildlife or wildlife habitat, vegetation, streams and wetlands, freshwater and marine fish, and marine mammals resulting from construction, operation and maintenance of the proposed Project. The potential for adverse impacts for the proposed development on the human environment in the area are low and the potential for economic benefits resulting from the Project is high. The proposed Project received positive response during a public information session in the local area and subsequently received letters of support from twenty-six communities located on the Great Northern Peninsula. Seven known archaeological sites have been identified in Crémallière Harbour and two of these are located in areas associated with the Projects planned infrastructure. Mitigative measures, including buffering zones have been identified around these known archaeological sites, in consultation with the PAO, to protect these sites from disturbance as a result of Project development.

Much of the proposed Project infrastructure is subject to further federal and provincial permitting and approval processes and GNP Inc. is committed to working closely with the government agencies involved to ensure that Project construction and operations satisfy high standards of environmental and social responsibility and protection. Conditions of permits and approvals will also be incorporated into Project construction and operation control documents including a Project specific EPP and HSEMS.

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