Project Registration for Great Northern Port Inc.

Nov. 03, 2017 • St. John's, NL • Project No. 200.20.2581

GNP PROJECT

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1.0 Name of The Undertaking

Great Northern Port is a proposed deep water port and marine service and supply base to be located at Crémaillère Harbour on the Northern Peninsula of the island of Newfoundland in the Canadian Province of Newfoundland and Labrador. The Harbour is situated approximately 4.1 kilometres South of the Town of St. Anthony, in the electoral District of St. Barbe/Lanse Aux Meadows. The Proponent, Great Northern Port Inc. (GNP), is a company, registered in the Province, and formed to investigate the feasibility of and generate investment in the proposed port project.

1.1 Introduction

Information contained in this document is for the purpose of Environmental Assessment Registration for activities and installations associated with site assessment, site survey, and site preparation, as well as construction, and operation of the proposed port and marine services base at Crémaillère Harbour as defined under the Newfoundland and Labrador Environmental Protection Act.

The proponent commits, and agrees to commit its assigns, to adhere to all applicable regulations and best practices of environmental stewardship and social responsibility in the planning, engineering, construction and operation of the Great Northern Port project. The proponent and its assigns will obtain all approvals, licenses, and permits as may be required through relevant Federal, Provincial and Municipal permitting processes prior to commencement of any part and/or each Phase of development and as may be required thereafter for any aspect of construction, installation, maintenance, and/or operations at the GNP site throughout the life of the project.

The mandate of GNP Inc. is, and will continue to be, as far as is practicable, the protection of natural and historic resources and mitigation of environmental impacts through informed and environmentally conscious planning, engineering, and oversight through its own offices and through contracts and agreements with contractors, employees, and associates. The mindset of 21st century environmental awareness and responsibility, and a deep appreciation of the value of the region's culture, history, and historic resources drives the GNP approach to the Great Northern Port project and is a key component of the GNP value proposition for the peoples of St. Anthony, the province, and the Arctic.

2.0 Proponent:

Name of Corporate Body: Great Northern Port Inc. (GNP Inc)

Address:
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President:
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3.1 Nature of the Undertaking

Great Northern Port Inc. (GNP) proposes to develop an Industrial Subdivision and Marine Port Development at Crémaillère Harbour on the Great Northern Peninsula of Newfoundland and Labrador. Beyond regional logistical needs and business potential, GNP has taken into account proximate and regional environmental concerns, cultural and social impacts, and direct and dispersed economic benefits of the proposed port at Crémaillère Harbour.

Our economic objective is to create a catalyst for growth based on a cluster of port services driven by current, and projected, onshore and offshore logistics requirements as well as military and Coast Guard needs. The Project has the potential not only to invigorate the Great Northern Peninsula commercially but also to realize the value of the natural and historic resources that already attracts active international interest. Moreover by raising awareness and setting the bar for Arctic and Far North development through research, commitment to best practices, and ice-ready, harsh environment response and rescue, we propose that GNP will be a value-added benefit both economically and environmentally to the Great Northern Peninsula and to the Province of Newfoundland and Labrador.

3.2 Site Selection

Crémaillère Harbour was selected based on the following criteria:

- Location
  - Proximity to Resource Development
  - Proximity to Hydro Electric Grid
  - Proximity to Regional, Arctic, and Global shipping routes
  - Proximity to Land Transportation (TCH link)
  - Proximity to Air Services
  - Proximity to St. Anthony

- Geophysical Factors
  - Harbour Depth and Size
  - Extended Ice-free Season
  - Distance from Residential Areas
  - Available Landside Area
  - Navigational Accessibility

- Market Factors
  - Missing Regional Logistics Link
  - Under capacity in Regional Logistics and Marine Services
  - Congested Regional and Global Ports
  - Highly-Skilled Available Workforce

- Economic Factors
  - Government and Industry Supports
  - Low Corporate Tax Rates
  - Available Crown Land

3.3 Purpose/Rationale/Need for the Undertaking

Historically ports primarily provided a safe haven; a shelter, from waves, tides, currents, ice, and hostile attack. A port was a place where goods were exchanged, supplies and fresh water sourced, repairs made, and crews rested. The early rationale even for intercontinental ports and port-related development evolved according to the needs of shipping technology, trade routes, and colonialism. As political boundaries solidified, and global trade markets increased, and with the eventual rise of globalism, the strategic role of ports within regional and sub continental economic contexts was realized. Ports are now seen as vital hubs of commerce and transportation. The understanding of ports has changed from simply a transport vector where land and sea transport routes meet to strategic International Industrial Zones competing in a global marketplace.

The clustering of industry and port-related services around seaports offers numerous economic advantages; in particular long-term, quality employment, and the inclusion of municipalities and regions in international exchange and trade. Through a multifaceted comparative site selection it was determined that Crémaillère Harbour best fulfilled a key range of criteria for development. The value-added components of 'this' Port's development are noteworthy: proximity to the Arctic and the Northwest passage, proximity to transatlantic shipping routes and offshore natural resources; its proximity to exploration and high-traffic corridors affording quick disaster response time; a deep-water port able to accommodate the largest of vessels, and available land providing exceptional onshore storage.[1]

The Great Northern Port Inc. (GNP) project will compete as a farthest-north, ice-free port and International Industrial Zone located at the eastern extent of the Canadian North and the Arctic Ocean connecting to transatlantic shipping and eastern North America. In its final phase the proposed GNP project will provide advanced port facilities and intermodal transport logistics infrastructure, a full-service capable regional marine services base, onshore human resources and personnel transport, a reliable tax and fiscal legislation environment, and internationally sanctioned environmental stewardship.

Crémaillère Harbour, May 2017; the “worst ice year in recorded history”.

4.1 Project Description

The Great Northern Port Inc. (GNP) proposes to develop a full service marine offshore base through a multi-year, phased land and harbour development.

4.1.1 Site Description

GNP currently has applications registered with Crown Lands, (File No. 3020712; Application No: 151500 and 151508). There is no development within the boundaries of the proposed land area and harbour water lots. The next step in acquiring the applied-for Crown land is a release from the Dept. of Environment to allow for historic resource and environmental surveys and assessment, in order to provide delineation for detailed geological, hydrological, and bathymetric surveys for planning and engineering purposes. These studies must follow the preliminary release as the site is Crown property and requires access permits.

The proposed Crown Land lease area is described as follows:

- Bounded on the North by Goose Cove Road (route 430)
- Bounded on the East by the Atlantic Ocean
- Bounded on the South by the Town of St. Anthony (Crown Land)
- Bounded on the West by Hare Bay (Crown)
- and, Containing an area of 72,450 square metres

4.1.2 Geographical Location

Crémaillère Harbour is located on the eastern coast of the Northern Peninsula of Newfoundland and Labrador at latitude 51° 20' 0.2”(51.3334°) north, longitude 55° 36' 52.8” west. The Harbour lies Approximately 4.1 kilometres south of the Town of St. Anthony. The area designated as Rural.

4.1.3 Demographics

In 2006 the Northern Peninsula's population was 13,140; a decline of 12.6% from 2001. Specific to St. Anthony the decline has been 2.3% between the years 2006-2011, with the current population at 2,049. Of that number 62% of the population is between the ages of 15-64; 24% are over 65 and 14% of the population is below the age of 15. Current estimates predict a 40% decline in the population of the Great Northern Peninsula by 2036, attributed to low birth numbers, aging, and out migration. Without a fresh injection of Economic Activity to stimulate in-migration, as well as reduction in out migration, the Northern Peninsula, and Newfoundland and Labrador alike, face an abysmal future. Aggressively addressing the population decline immediately is the only way to circumvent complete population demise.[2]

4.1.4 Physical Environment

4.1.4.1 Geology

Crémaillère Harbour is contained within the Northern Coastal Subregion which has been described as an “inhospitable natural environment”. This region is flat or gently rolling, with most elevations under 150 m. Bedrock is the subregion's most common surficial feature which is otherwise dominated by rocky dwarf shrub barrens, barren hills, and flat marshy plains. The exposed bedrock is characterized by a glacial scouring with deranged drainage, numerous lakes and ponds, rugged hummocky to hilly topography and numerous cliffs and glacial erosion forms.[3]

Limestone and acidic rock underlies most of the region. Zinc is the only mineral commercially mined in the region between1975-1990 at Daniel's Harbour (270 Km SW of Crémaillère Harbour). Balsam fir is the dominant tree cover at low elevations and black spruce at higher elevations. Numerous large freshwater pools characterize the bogs of the Northern Peninsula. In the southern region, pools become smaller and fewer.[4]

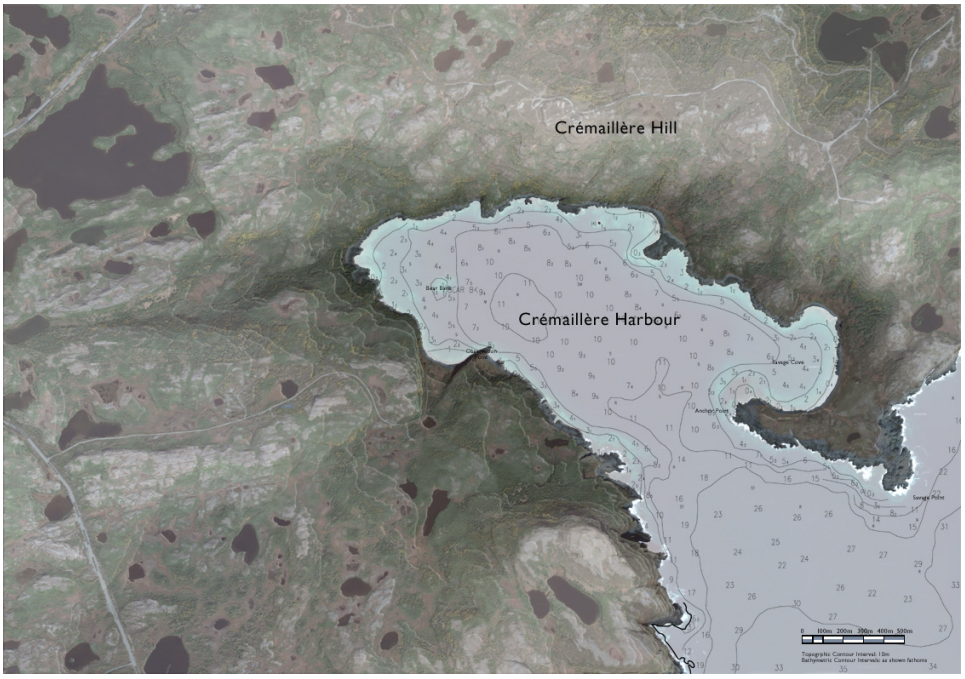
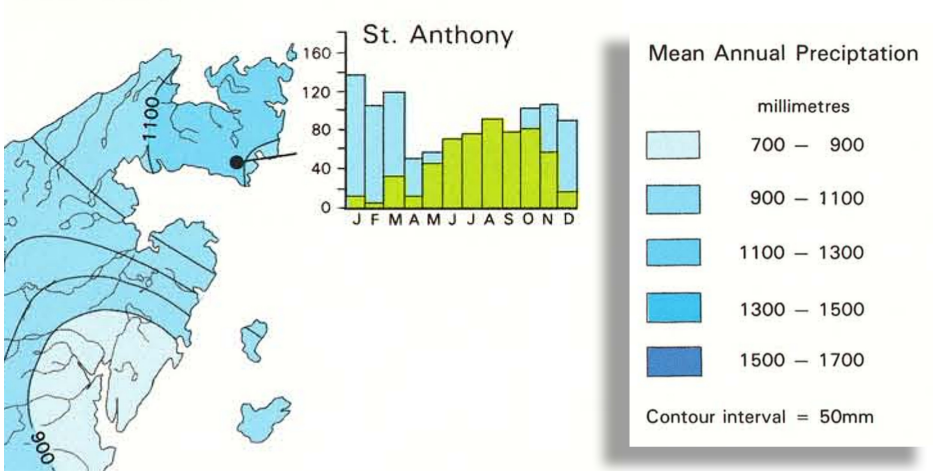


Figure 4.1.3.1. Geology of Crémaillère Harbour. Much of the Northern Coastal Subregion is characterized by exposed bedrock forms extensive rock plains, knobs and ridges. Crémaillère Hill rises to just over 140 metres.

4.1.4.2 Climate and Weather

The Northern Coastal Subregion has a short vegetation season (110-150 days). While the frost-free period is comparable to other areas of Newfoundland, the Subregion has long cold winters and short cool summers. Precipitation is low because of Low summer temperatures result in relatively low amounts of precipitation. The annual rainfall is 1300-1500 millimetres; annual snowfall between 3 and 3.5 metres.

Table 4.1.4.2: Mean Annual Precipitation in St. Anthony



Source: Water_Resources_Atlas_of_Newfoundland 1992. p.18.

4.1.4.2.1 Past Extreme Weather Events

Extreme events resulting from tropical storms tend to take place on the eastern part of the island. While peak winds during Igor exceeded 125km/h in eastern areas of the island, (as high as 155km/h at Bonavista), peak winds at St. Anthony were 81 km/h. Similarly rainfall totals for eastern areas reached as high as 239 mm at St. Lawrence while rainfalls in western areas remained below 50mm. Of 40 areas in Newfoundland and Labrador considered to be a flood risk the Great Northern Peninsula is not indicated as an area of flood risk.[5]

4.1.4.2.2 Low Impact Storm Water Drainage and Runoff Mitigation

Site assessment for the GNP Port Project will include a comprehensive study of surface and ground water and marine hydrology to establish targets for the application of current Low Impact Development (LID) methodologies. The LID approach is taken as an alternative to traditional storm water design. Study of LID practices such as bioretention, previous pavements, and grassed swales has shown LID methods work. Bioretention cells have been effective in retaining large volumes of runoff and reducing concentrations of pollutants. GNP will integrate current knowledge and best practices of LID methodologies in designing drainage and flow regulation models for the GNP Project.

The extent to which extreme weather events in the past are related to climate change and projections for future weather events and other effects of climate change are discussed in the following section.

4.1.4.3 Climate Change

In 2013 the Government of Newfoundland and Labrador Office of Climate Change published "Climate Change Projections for Newfoundland and Labrador Late 20th Century to Mid 21st Century". The report deals with projected weather events and temperature and precipitation trends. The Report offered no data on storm surge. According to this study average amount of precipitation per precipitation event is expected to increase by about 5% across all seasons and all regions of the island. 1-in-100 year storms are projected to become 1-in-50 or 1-in-25 year storms. See also: 4.2.4.1.

4.1.4.3.1 Climate Change / Sea level Rise

Cumulative sea level change since the Paleo-Eskimo era has increased by approximately 1.4 metres. One study estimates the economic impact rising sea level will have on 136 mega-ports worldwide will exceed 28 trillion USD.[6]

Taking into account regional uplift and subsidence (isostatic rebound), cumulative sea level rise on the northeastern coast of the Northern Peninsula, including changes due to climate change is projected to reach ~30 cm by 2049 and ~79 cm by 2099. In many areas of the province, the presence of relatively steep-sloping bedrock-exposed coastlines means that such sea-level rises will have little impact in these areas. While for much of its perimeter Crémaillère Harbour typifies this type of geology, projected sea levels will be factored into the engineering and development of the port.[7]

Sea levels fluctuate in response to the changes in ice sheets, ocean volume, and vertical adjustment of the Earth's crust. After deglaciation there is a lag between the melting of the ice sheet and rebound of the crust to a state of equilibrium, such that formerly glaciated regions experience glacio-isostatic effects 10,000 years after the ice sheet has receded.

During the last glaciation the southeastern edge of the Laurentide Ice Sheet extended to the Atlantic across the northern tip of the Northern Peninsula and abutted a second ice sheet along the Long Range Mountains. As a result sea level history on the peninsula is complex resulting from isostatic rebound or rise due to ice unloading and subsidence due to migration and collapse of the ridge or forebulge associated with the retreating ice sheets.

Great Northern Port Inc. (GNP) will take into account trends and projections based on available research and empirical studies of sea level evidence at the port site. The implications for archaeological resources or environment will be taken into consideration in the relevant documents.

4.1.4.3.2 Climate Change / Extreme Weather Events

Engineering of infrastructure of the proposed GNP port at Crémaillère Harbour will take into account impacts of extreme weather events. Specifically catchment design will take into account capacities needed to capture runoffs during peak rainfall and snow melt. Dock and shoreside infrastructure design will accommodate long term change in intertidal extents and storm surge. Buffer zones will prevent flushing of runoff catchments into adjacent fresh and saltwater bodies and rivers at peak periods.

Taking these factors into account GNP will direct engineering of wharfage and waterside service infrastructure at Crémaillère Harbour to compensate for projected higher than normal sea levels and storm surge. Details of some possible solutions are contained in relevant sections of this document.

Flood risk mapping will be incorporated into the project design, construction, and maintenance plans in order to minimize any risks for flooding in the area. Based on current flood prevention engineering practices, proposed wharf deck elevations are +5.0 m above current low normal tide levels and at +6.5 m uplands areas. These elevations ensure structures will not be over-topped due to sea level rise.

4.1.4.3.3 Climate Change / Temperature

Average temperature in the province have been on a sustained upward trend since 2000 even compared to overall averages and cyclical variations recorded since 1944. Given temperature trends, freezing of the harbour surface is not anticipated. Should freezing occur the presence of a stationed harbour tug and the Canadian Coast Guard at the port are considered adequate to keep the harbour navigable.[8]

4.1.4.3.4 Climate Change / Storm Surges

The Government of Newfoundland and Labrador Office of Climate Change document "Climate Change Projections for Newfoundland and Labrador Late 20th Century to Mid 21st Century" referred to in section 4.1.3.3 offers no data on storm surge. However as sea level continues to rise, the frequency of higher storm surges will increase. Rising sea level is predicted to produce surge events approximately once every 10 to 15 years, even if the frequency and magnitude of the storms did not change. Continued sea-level rise is projected to amplify storm surges and flooding in the Atlantic region.[9]

4.1.4.4 Bathymetry

Crémaillère Harbour entrance Is over 500 metres wide with an average water depth in the channel of approximately 25 metres. Water depths in the harbour basin range between 12.8 and 18.25 metres at lowest normal tide. The harbour basin covers approximately 3.5 square kilometres; 2.25 kilometres east to west by 1.5 kilometres north to south.

Table 4.1.3.4: Water Depth Evaluation

SITES CONSIDERED	WATER DEPTH					
	Distance [km] to depth of 10m	Distance [km] to depth of 15m	Distance Rank to depth of 10 feet	Distance Rank to depth of 15 metres	TOTAL	%
1. Iqualuit	0	0	5	5	10	1.00%
2. Rigolet	0.1	0.1	5	5	10	1.00%
3. Cartwright	0.1	0.1	5	5	10	1.00%
4. Crémaillère Harbour	0.1	0.1	5	5	10	1.00%
Function of Distance: 5 = <=.5 mile 4 = >.5 and <=1 3 = >1 and <=2 2 = >2 and <=5 1 = >5 and <=10 0 = >10						

4.1.4.4.1 Bathymetric Baseline Studies

Once the land acquisition for the proposed port is complete; prior to any construction a geotechnical investigation will be conducted to gather information on the current seabed conditions:

Cone Penetrating Testing (CPTs): Cone Penetrating Testing determines the thickness of surficial soft sediment layers in areas of potential dredging and/or placing of armour stone. Data gathered would determine amount of material to be removed, if required, and areas requiring environmental testing.

Sediment Sampling: Soil samples obtained via split barrel samplers and/or grab sampling tools will be tested and, if contaminants contained within the samples prove appropriate, will be marked for implementation of hazardous material handling and disposal protocols.

Drilled Boreholes: Drilled Boreholes results are examined to determine the depth to sound bedrock. Based on planned placement of subsea structures and anchoring, a number of holes will be bored within the boundaries of the proposed site seabed.

4.1.4.5 Waves/Tides

Prior to the design of the proposed port, data for tides, surges, and wind velocity and direction will be gathered as well as water depths and bathymetric features to establish dock placement and specifications. Adequate water depth (either existing or available) and proximity to landside facilities areas are the main considerations. Potential locations will be examined, and possibly preliminary comparative cost estimates made to determine the most suitable and economical locations. Turning circle, parking areas and natural wind and wave protection will be considered.

Because ship berthing and maneuvering is affected by current, dock alignment is generally parallel to current direction. This also helps keep ice away from the dock face. As heavy winds and large waves can force a ship to leave the dock and anchor in deeper water the construction cost of a breakwater may be justified to avoid damage and disruption of port operations. Should protection in the form of a conventional man-made breakwater prove too costly, due to factors such as distance to a suitable rock and quarry site, other forms of wave attenuation may be considered. Options include anchored floating piers.

4.1.4.6 Sea Ice and Icebergs

Arctic ice is typically carried southwards by the Labrador current and shoved against the northeast coast of Newfoundland by northeast winds. Maximum ice extent is generally reached in March or April. A second major factor influencing ice movement is the North Atlantic Oscillation (NAO). NAO describes fluctuations in atmospheric pressure at sea level in the North Atlantic. During negative NAO years between 1996–1997, maximum ice extent was restricted to the coast north of Cape Bonavista.

Under a positive NAO index (NAO+), regional reduction in atmospheric pressure results in a regional rise in sea level due to the 'inverse barometer effect'. This effect is important to interpretation of historic sea level records and predictions of future sea level trends, as mean pressure fluctuations of the order of millibars can lead to sea level fluctuations of centimeters. In positive NAO years 1990 –1992, 2004 coastal ice extended south of Cape St. Francis. Positive NAO years are marked by increased northeasterly wind activity, which drives ice onshore in Labrador and along the Northern Peninsula.

Crémaillère Harbour remained relatively ice free in April 2017 during the “Worst ice year in living memory.” The harbour entrance is shielded from ice bearing currents and wind-blown ice floes by the geophysical features of the surrounding coast and the southeast to northwest orientation of the harbour. These features figured large in the selection of the harbour as the site for the GNP port proposal.[10]

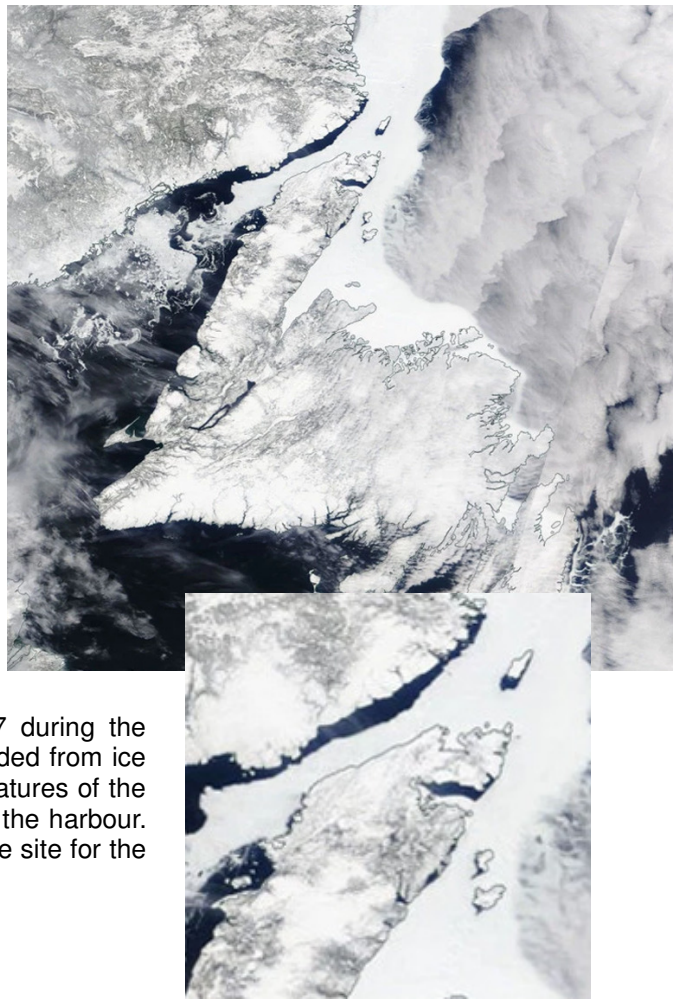


Figure 4.1.4.6 Sea ice April 05 2017.
Source: https://worldview.earthdata.nasa.gov

Table 4.1.4.6a: Navigation Accessibility Evaluation

SITES CONSIDERED	No. MONTHS ICE FREE	NAVIGATIONAL ACCESSIBILITY			
		ICE CONDITIONS	OPERATIONAL CONSIDERATIONS	TOTAL	%
1. Iqualuit	4 to 5	1	2	3	30.00%
2. Rigolet	5 to 6	2	3	5	50.00%
3. Cartwright	4 to 6	1	3	4	40.00%
4. Crémaillère Harbour	7 to 8	3	3	6	60.00%
KEY: 5 = VERY GOOD 4 = GOOD 3 = MEDIUM 2 = LOW 1 = VERY LOW 0 = POTENTIAL					

Crémaillère Harbour receives an average of 142 icebergs per year, ranging from small to very large. The visibility record in Crémaillère Harbour from 1979 – 2013 is also provided. A visibility range of one km is generally taken to represent foggy conditions, visibility of two km is denoted for certain regions as snowstorm conditions.

Table 4.1.4.6b: Average Number of Icebergs in Crémaillère Harbour

Iceberg Size		Number per Year
Small	15 - 60 metres	49
Medium	61 - 120 metres	70
Large	121-200 metres	22
Very Large	> 200 metres	1

4.1.4.7 Effects of the Undertaking on the Physical Environment

Data related to climate and weather and science-based projections will inform the planning and engineering of the proposed port. Buildings, docks, and other structures will be designed and constructed to withstand maximum loads. Drainage and catchment system design and engineering will take into account capacity necessary for extreme weather events and projected trends and mitigate erosion and effects on the natural hydrology.

Measures will be taken to minimize the effect on the environment during the construction and operation stages of the project. Design of temporary structures and areas during construction, will also take into account potential runoff effects such as contamination and erosion. Where practicable construction and operation activities will be scheduled to avoid environmental impacts. General descriptions of approaches to be taken during construction and operation of the Project are given in relevant sections of this document. Detailed measures and practices will be described and illustrated in the Environmental Protection Plan to be developed during the planning, and engineering, and permitting, of the Project.

4.1.5 Biological Environment

On June 26, 2008 the Town of St. Anthony signed a Stewardship Agreement which signifies that the Town will protect habitat of waterfowl, sea ducks, species at risk, and other wildlife. The Town also signed a Coastal Stewardship Agreement in 2008, further to a long involvement concerning the protection of Common Eider habitat. As part of this community Great Northern Port Inc. (GNP) is committed to these agreements and in particular to protecting habitat within and adjacent to the proposed port site. Further, in consultation with wildlife and natural resource experts, GNP will develop and implement a comprehensive Environmental Protection Plan (EPP) which will include but is not limited to the following:

Table 4.1.5: Table of Contents GNP Inc Environmental Protection Plan

1.0 Introduction
1.1 Purpose of the Environmental Protection Plan
1.2 Organization of the Environmental Protection Planning
1.3 Roles and Responsibilities
1.4 Environmental Orientation
1.5 Description of Activities
1.6 Policies and Procedures

2.0 Environmental Protection Procedures
2.1 Surveying
2.2 Buffer Zones
2.3 Laydown and Storage Areas
2.4 Clearing Vegetation
2.5 Grubbing and Disposal of Related Debris
2.6 Overburden
2.7 Excavation, Embankment, and Grading (including cutting and filling)
2.8 Erosion Prevention and Sediment Controllers
2.9 Water Supply
2.10 Watercourse (Stream) Crossings
2.11 Pumps and Generators
2.12 Dewatering Work Areas and Site Drainage
2.13 Equipment Installation, Use and Maintenance
2.14 Storage, Handling and Transfer of Fuel and Other Hazardous Materials
2.15 Waste Disposal
2.16 Sewage Disposal
2.17 Hazardous Waste Disposal
2.18 Vehicle Traffic and Equipment Movement
2.19 Dust Control
2.20 Noise Control
2.21 Road Maintenance
2.22 Building Construction
2.23 Drilling and Blasting
2.24 Abandonment of Work site
2.25 Vessel Operations

3.0 Contingency Plans
3.1 Fuel and Hazardous Material Spills
3.2 Wildlife Encounters
3.3 Forest Fires
3.4 Discovery of Historic Resources and Management
3.5 Avifauna Management
3.6 Migratory Bird Site Management

4.0 Contacts

4.1.5.1 Terrestrial Mammals & Furbearers

Terrestrial mammals that live in the Northern Coastal Subregion include moose, lynx, mink, snowshoe hare, black bear, red fox, beaver, muskrat, otter, and caribou. Due to the limited forest cover in the Subregion many of these species are not as common as in the Great Northern Peninsula forest ecoregion. Both the Species at Risk Act and The Provincial Endangered Species Act clearly identify Terrestrial, Oceanic, flora & fauna that are vulnerable, threatened or endangered. While none of the above terrestrial mammal species are listed as at risk, Great Northern Port Inc. (GNP) will ensure planning, construction and operations at the proposed port comply with all applicable environmental and Healh and Safety regulations.[11]

4.1.5.2 Marine Mammals

Harbour and Harp Seals, dolphins and porpoises, Humpback, Orcas, Fin, Pothead, Sperm and Minke Whales are all present in the waters off the Northern Peninsula. These species do not breed in the waters off Newfoundland and Labrador but are extending their feeding grounds further North as the temperatures increase in Southern waters. It is anticipated that the sighting of new marine mammals will increase over the coming years due to climate change and the need to venture further North to obtain sufficient food supply.

As port manager and authority GNP will abide by Transport Canada Marine Acts and Regulations and include contingency planning in the Environmental Protection Plan to enforce and ensure the noise level and water activities are within the bounds outlined in the legislation.[12]

4.1.5.3 Birds

Bird species occur in both the forested areas and the barrens and shrublands of the Northern Coastal subregion primarily during the spring and summer. Those species inhabiting the forests include osprey, ruffed grouse, black-capped chickadee, boreal chickadee, ruby-crowned kinglet, white-winged crossbill, fox sparrow, white-throated sparrow, yellow-bellied flycatcher, American robin, hermit thrush, blackpoll warbler, Wilson's warbler and Northern Waterthrush. In the barrens and shrublands willow ptarmigan, horner lark, American pipit, song sparrow, mourning warbler, short-eared owl and yellow warbler can occur. Bald eagles can be found in the coastal areas.

No breeding areas are identified within the proposed project boundaries for any of the birds in the Northern Coastal Subregion nor has Crémaillère Harbour been identified as a breeding ground for any of the birds on the endangered list. A Site management plan for migratory birds, specifically the short-eared owl, will be implemented by GNP.

4.1.5.4 Marine Finfish, Shellfish, and Turtles

The waters surrounding the Northern Peninsula include a wide variety of marine species which include: capelin, clam, crab, flounder, halibut, herring, lobster, lumpfish, mackeral, mussel, redfish, salmon, scallop, seals, shrimp, skate, smelt, crab, turbot, whelk, and winter flounder. The presence of Leatherback turtles in the waters of Newfoundland and Labrador occurs predominantly in the Laurentian channel; a protected area on the south coast of the island.[13]

4.1.5.5 Freshwater Finfish and Shellfish Species

The rivers and lakes of this subregion are home to three-spine stickleback, nine-spine stickleback, Atlantic salmon, brook trout, rainbow smelt and American eel. Where practicable a minimum 30-metre naturally vegetated buffer will be maintained along all water bodies and wetlands to protect sensitive riparian and aquatic species and their habitat.

4.1.5.6 Commercial Fisheries

Founded as a fishing station in the 1500's the commercial Fishery has long been an Economic driver of the Northern Peninsula. Fishery Products International operated an offshore fish processing plant, employing over 800 people at it's peak production. The cod moratorium in 1992 all but extinguished the Commercial Cod Fishery.

A state of the art shrimp processing facility started operations in May 1999. The season runs from April until November. A Snow Crab processing plant was also built and went into production in May 2005. St. Anthony Seafoods Limited Partnership employs 200-215 people each year. Shrimp and Crab is shipped world wide to reach international clientele. St. Anthony Seafoods operate three cold storage units capable of holding three million pounds of product and had ice-making capacity to produce 120mt of ice per day. St. Anthony Seafoods hopes to diversify into more of a multi-species operation with the extension of an already existing wharf.

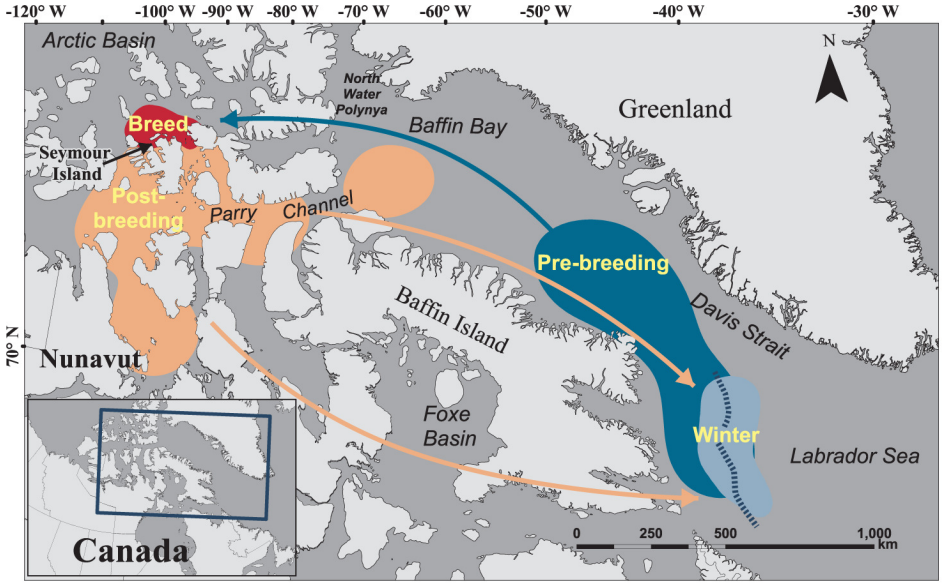
4.1.5.7 Species at Risk

4.1.5.7.1 The Ivory Gull

The Ivory gull (Pagophila eburnea) is an endangered seabird that spends the entire year in the Arctic environment. It breeds in the high arctic and can be found on the pack ice of the Davis Strait, Labrador Sea, Strait of Belle Isle, and the Gulf of St. Lawrence; most likely found over pack ice of 70-90% ice concentration. The Ivory Gull is not often observed over open water and is seen rarely on the Coast of the Great Northern Peninsula.

In the past three decades, threats from various sources have contributed to a greater than 70% decline in Ivory Gull numbers in Canada. Study of the Ivory Gull's migratory behaviour reveals considerable individual difference of post-breeding migratory route selection. Individuals traveled a median of 74 days during post-breeding migration, but only 18 days prior to breeding. The formation and recession of sea ice plays a large role in ivory gull distribution and migratory timing. Contrary to expectations, ivory gulls do not typically use the Greenland coast during migration. Some gulls overwinter near the ice edge in Davis Strait. In late February and March some gulls were seen in the Labrador Sea .[14]

Fig. 4.1.5.7a Ivory Gull Migratory/Breeding Pattern



4.1.5.7.2 Red Crossbill

The only at risk species of woodland bird that may potentially be found at the project site is the Red Crossbill. This species of bird is considered endangered and is protected under the Species at Risk Act (SARA).

Red Crossbills are dependent on conifers for food. Availability of cones determines survival and breeding. Red Crossbills species vary with each specialized to feed on particular conifer species. Large-billed crossbills, including percna, are pine forest associates. Historically, Red and White Pine stands were important habitat for percna in Newfoundland; however, these native pines (particularly Red Pine) are now rare on the Island and do not occur on the Northern Peninsula. Mature Black Spruce forests, and to a lesser extent Balsam Fir and White Spruce forests, can provide habitat for percna. However the Northern Coastal Subregion including Crémaillère Harbour is dominated by exposed, rocky dwarf shrub barrens not suited to woodland species.[15]

4.1.5.7.3 Harlequin Duck

One seabird species at risk that may be found at the site is the Harlequin Duck. The eastern Harlequin Duck is currently listed as a species of special concern on Schedule 1 of SARA and vulnerable under the Newfoundland and Labrador Endangered Species Act. The population of Harlequin Ducks wintering along the eastern seaboard is likely distinct from that wintering in Greenland. The eastern seaboard population is probably in the range of 2,000 to 3,000 individuals, and is concentrated at a small number of traditional wintering sites. Some of these locations, such as Cape St. Mary's, are subjected to chronic oil pollution related to marine vessels transiting the area. No reports were found identifying Crémaillère Harbour as a wintering site for the Harlequin Duck.

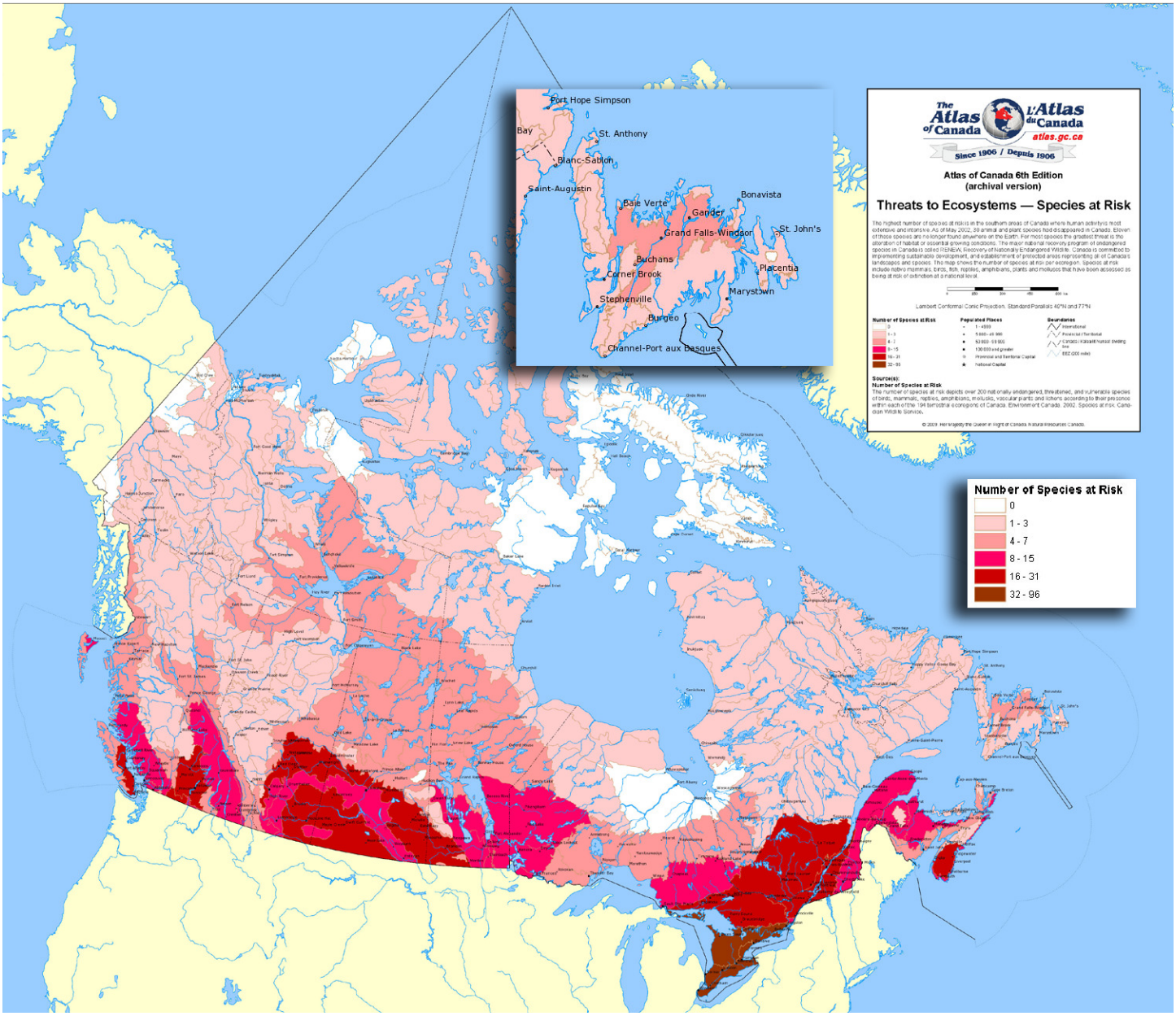
4.1.5.7.4 American Eel

American Eels have been reported throughout Newfoundland and the south-eastern coast of Labrador as far north as Hamilton Inlet. The American eel spends most of its life in freshwater and estuaries but migrating to sea to spawn. Eels typically begin their spawning migration in late summer and fall throughout much of eastern Canada, although migration from lakes that are far inland may begin earlier. In Newfoundland, eels migrate to sea after spending twelve to thirteen years in freshwater. Adult eels presumably die after spawning. Recent concern regarding population decreases in the Great Lakes has prompted COSEWIC to list the American eel as a Species of Concern in 2006 (COSEWIC 2006). This designation is defined as a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

4.1.5.7.5 Leatherback Sea Turtle

The leatherback sea turtle is designated as endangered on Schedule 1 of SARA. For North Atlantic leatherback turtles, nesting occurs from March–July on sandy beaches of the Caribbean and Central and South America. It is thought that leatherbacks follow the Gulf Stream in the Northwest Atlantic because their primary prey, jellyfish, are concentrated where the Gulf Stream meets the colder waters of the Labrador Current. Adult leatherbacks are often sighted in the waters off Nova Scotia and Newfoundland from June to October, with peak abundance in August and September. To date there has been no reported occurrence of leatherback turtles entering Crémaillère Harbour.

Fig. 4.1.5.7b Threats to Ecosystems - Species at Risk Map



4.2 Physical Features of Undertaking

Site Buildings and Structures

The construction of the site buildings will be a combination of pre-engineered buildings for fabrication, oil field supply services, and maintenance and warehouse type structures, and conventional construction for administration type buildings. The buildings will be comprised of concrete foundations, steel framing and metal siding. All buildings will be equipped with electrical and mechanical systems. The number of buildings required and the type of building will be dependent on the number of companies leasing space at the marine base.

Fabrication and Lay down Areas

Fabrication and lay down areas will be present in all areas of the facility. Areas not designated as a roadway, parking area, or occupied by a building or wharf deck, will be considered a potential lay down area or exterior fabrication area. The requirement for lay down and fabrication areas will be dependent on the companies leasing space at the marine base and the space needed for specific projects.

Modules and equipment required for offshore platforms will be fabricated at the marine base and transported by ship from the facility to the offshore platform. Portions of the wharves and lay down areas will be designed to accept higher loads for fabrication and transportation of larger modules.

Storage and Handing of Hazardous Materials

There will be storage and handling of bulk and hazardous materials related to the offshore industry at the project site. Drilling fluids and mud typical to the offshore industry will be stored and handled at the site. There will also be a fuel tank farm for storage and handling of fuels for vessels at the supply dock. Containment systems will be required at the fuel storage facility and chemical storage areas in accordance with the requirement of the Provincial Department of Environment. Storage and handing of hazardous materials will be done by trained personnel according to applicable regulations and best industry practices as specified in Health Canada Workplace Hazardous Materials Information System (WHMIS) , Environment Canada, Pollution and Waste Management and other applicable federal and provincial legislation.

Berthage and Drayage

Docks, ramps, and onshore quays will be used to serve a variety of vessel types including offshore supply vessels, bulk and containerized freight vessels, coast guard, and navy ships. Freight handling equipment such as cranes and bulk loaders and various types of vehicles and equipment will operate at dock side in proximity to the water's edge. Proper operation of this equipment is the responsibility of the respective companies operating at the port. The GNP Port Authority will ensure the condition of the equipment and docks and approaches complies with environmental and health and safety regulation and best practices.

Navigation and Pilotage

A detailed survey of the Crémaillère Harbour basin and approaches will be conducted to provide information on the placement of navigation markers and buoys and beacons according to Transport Canada regulations. Placement and anchoring of markers and buoys are the responsibility of the Canadian Coast Guard. Charting of the harbour basin and approaches will be provided to a qualified harbour pilot, as may be required. Details of applicable port regulation and Standard Operating Procedures are described in relevant sections of this document.

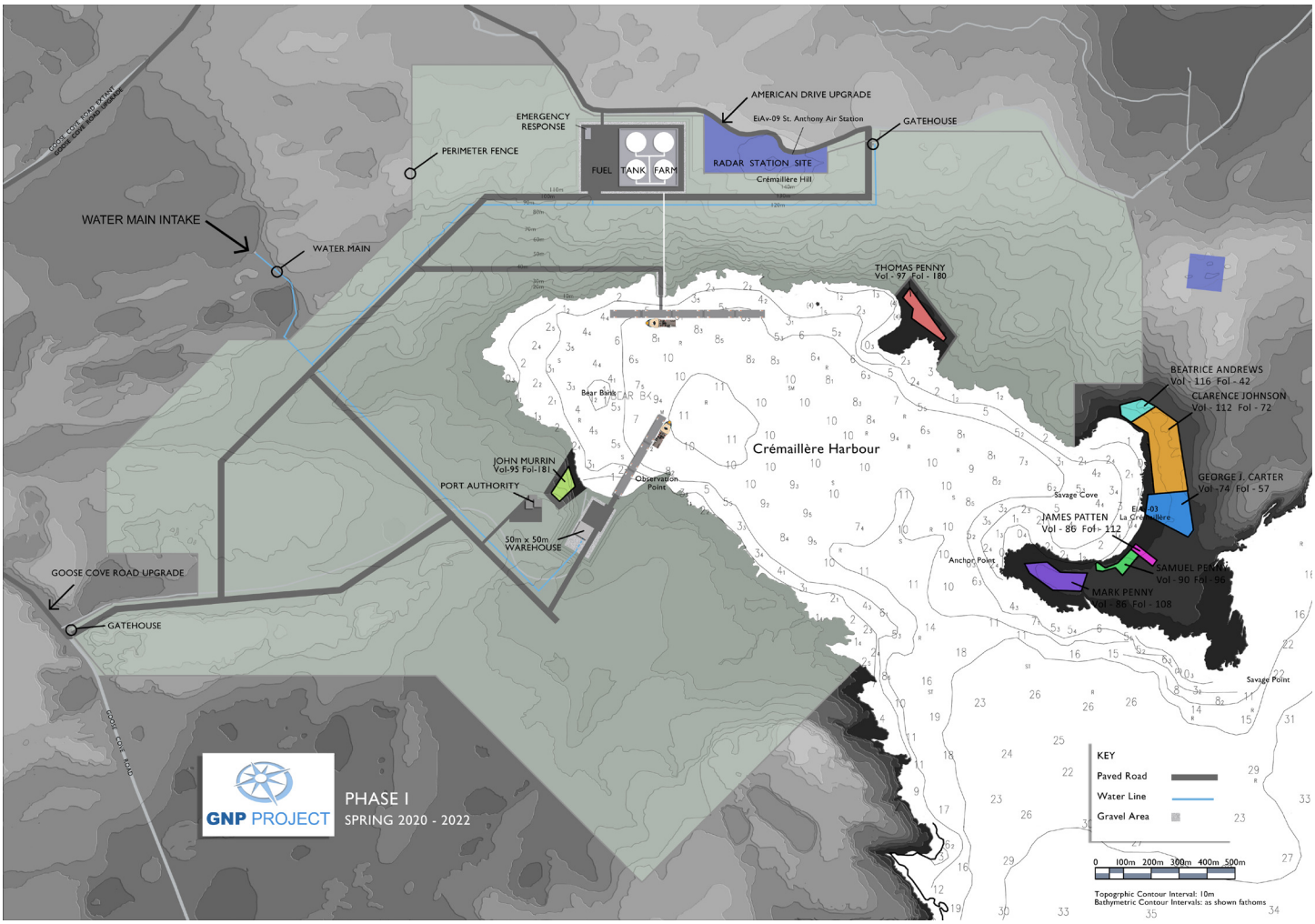
4.2.1 Physical Features of Undertaking / Phase I:

GNP anticipates three Phases of development taking place at once across the entire site area or as contingency allows.

Phase I - Facilities and Infrastructure List:

- Perimeter Security Fencing and Gates, Signage, Lighting, Surveillance, and Gatehouse
- American Drive Road Upgrade
- Goose Cove Road Upgrade
- Site Service Roads (inside site boundaries)
- Electrical Power Service Grid (not shown)
- Communications Cabling (not shown)
- Navigation Markers and Beacons (not shown)
- Service Dock
- 50m x 50m warehouse
- Fuel Tank Farm
- Emergency Response Building
- Potable Water Supply Infrastructure
- Sanitary Wastewater (Sewer) System(s) (not shown)

Fig. 4.2.1 Phase I Site Plan



Notes to Fig. 4.2.1-Phase I Site Plan

Electrical service grid, sanitary wastewater treatment, and communications cabling will be engineered and installed based on a detailed site plan which takes into account geology, ground water and related factors.

Road width as indicated by the 2mm grey lines describe the footprint of a two-lane road with standard 3.7m lane width plus shoulders and ditches for a total of 20 metres.

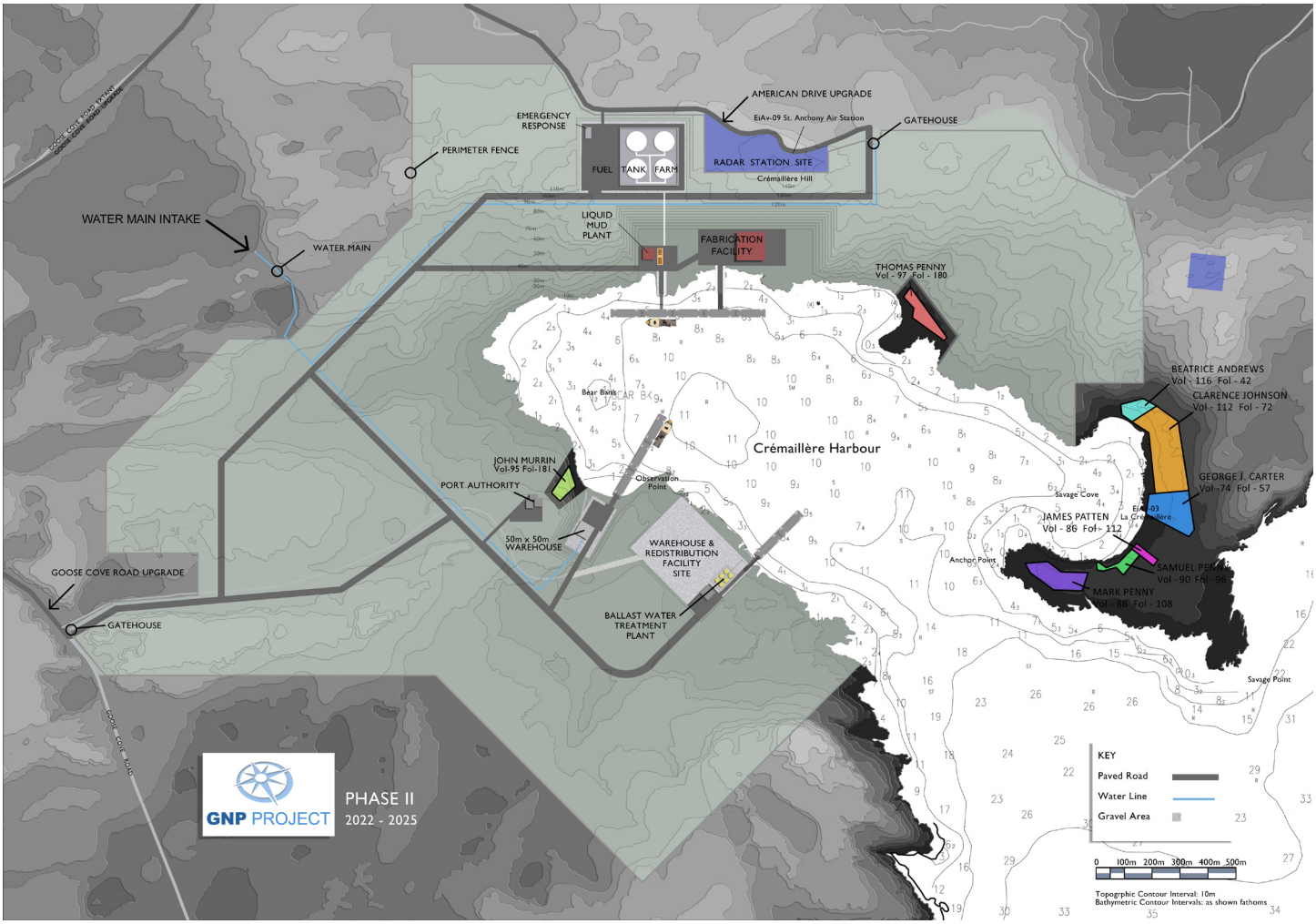
Where proposed road upgrades deviate form existing road bed routes; the road is moved to reduce curves, follow existing grades, and create buffers between the road bed and fresh water ponds.

4.2.2 Physical Features of Undertaking / Phase II

Phase II - Facilities and Infrastructure List:

- Port Authority Administration and Office Complex
- Fabrication Building and Dock
- Liquid Drilling Mud Plant (LMP)
- Ballast Water Disposal and Treatment Facility
- Warehousing and Redistribution Facility Site Preparation

Fig. 4.2.2 Physical Features of Undertaking / Phase II



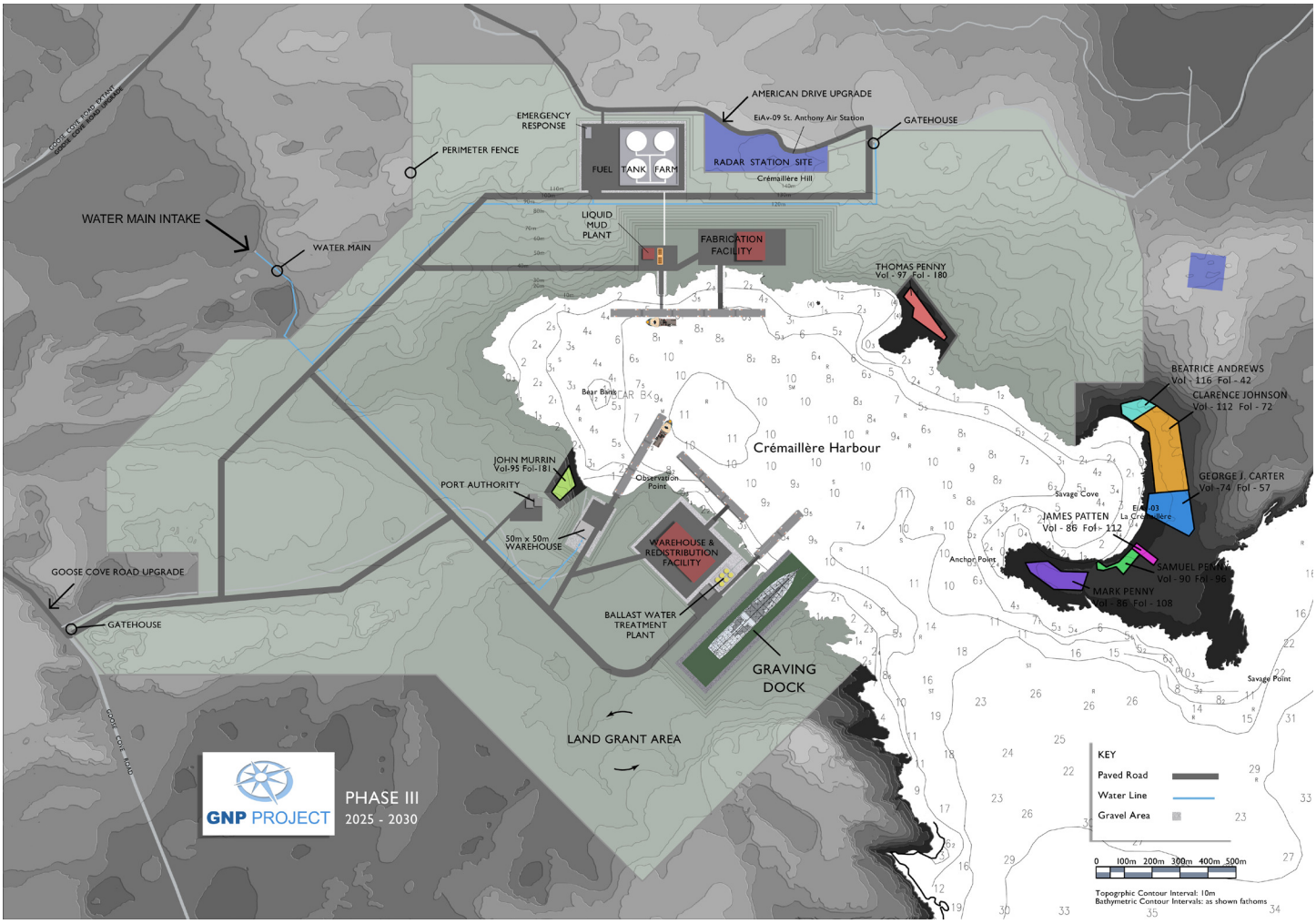
4.2.3 Physical Features of Undertaking / Phase III

Phase III - Facilities and Infrastructure List:

- Enclosed Graving Dock

- Warehouse and Distribution Facility

Fig. 4.2.3 Physical Features of Undertaking / Phase III



4.2.4 Environmental Considerations

Planning, and construction of the port will be done in consideration of and in accordance with all applicable regulations and best practices of environmental stewardship. GNP strives to set a high, innovative standard for port development and operation in the Arctic based on the principles of preservation, conservation, and minimum physical footprint and impacts.

Beyond what is stated and committed to here as general policy, details of specific technologies and practices discovered in the research process such as waste disposal and water treatment are highlighted where these offer advantages in pursuit of environmental objectives.

To establish the baseline parameters for permitting GNP has examined policies and regulatory regimes and available site-specific environmental and climate information. Each aspect of the proposed development will be examined in consultation with qualified environmental consultants and conclusions documented in the detailed Environmental Protection Plan (EPP) to be developed after approval in principle for the Project is obtained. The detailed Site Development Plan will evolve according to the recommendations in this and the Historic Resources Management Plan.

The Department of Environment and Conservation's. Policy for Development in Shore Water Zones (PDSWZ) is an example of policies and legislation that will be taken into consideration in developing the EPP:

Section 5.2 of PDSWZ restricts development in the shore water zone, defined as areas below the high-water level of a water body and establishes criteria for permitting under Section 48 of the Water Resources Act, SNL 2002 cW-4.01, for all development activities in and affecting shore water zones.[16]

This policy prohibits infilling, drainage, dredging, channelization, or removal of surface or underwater vegetation on or along shore water zones which could aggravate flooding problems, have unmitigatable 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, in consideration of these policies and regulations, is proposing the use of a jack-pile dock system which reduces sea bottom footprint, allowing ramp access over and above the intertidal zone, and relatively unobstructed movement of water in the basin. This approach is detailed in following sections of this document.

The PDSWZ also prohibits Placing, depositing or discharging 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.

In cooperation with a Newfoundland company specializing in waste water treatment, GNP has investigated and will integrate the most advanced sewer water treatment technologies into the Development Plan for the port. Some containment and spill response and hazardous materials handling regimes that respond to these policies are detailed in relevant sections of this document. GNP will abide by best practices standards relevant to all hazardous and environmentally injurious materials and substances.

The PDSWZ further prohibits construction of extensive paved surfaces along a shore water zone which changes the intrinsic character of the shore water zone will not be permitted. The GNP Detailed Site Plan will integrate sufficient buffer zones between developed areas and tidewater, freshwater and riparian zones.

4.2.4.1 Climate Change

In addition to existing regulations and policies, engineering of infrastructure of the proposed port at Crémaillère Harbour, GNP will take into account impacts of extreme weather events and projected trends. Specifically catchment design will take into account capacities needed to capture runoffs during peak rainfall and snow melt. Dock and shore side infrastructure design will accommodate long term change in intertidal extents and storm surge. Buffer zones will prevent flushing of runoff during heavy rainfall periods. Following is a summary of some climate research resources reviewed and considered in preparation of this preliminary project description:

4.2.4.2 Precipitation

The destruction caused by Hurricane Igor in 2010 in particular and an overall increase in severe weather events have raised concerns about long-term weather trends and what measures need to be taken to mitigate economic and environmental impacts. There has been a doubling in the average of significant tropical storms and hurricanes in the last decade compared to the previous ten decades; 6 events per decade from 1900 to 1990, compared to 11.5 events per decade between 1990 and 2012.

In 2013 the Government of Newfoundland and Labrador Office of Climate Change published "Climate Change Projections for Newfoundland and Labrador Late 20th Century to Mid 21st Century". The report deals with projected weather events and temperature and precipitation trends. The Report offered no data on storm surge. The average amount of precipitation per precipitation event is expected to increase by about 5% across all seasons and all regions of the island. 1-in-100 year storms are projected to become 1-in-50 or 1-in-25 year storms.

Extreme events resulting from tropical storms tend to take place on the eastern part of the island. While peak winds during Igor exceeded 125km/h in eastern areas of the island, (as high as 155 km/h at Bonavista), peak winds at St. Anthony were 81 km/h. Similarly rainfall totals for eastern areas reached as high as 239 mm at St. Lawrence while rainfalls in western areas remained below 50mm.[17]

Site assessment for the GNP Port Project will include a baseline study of pre development hydrologic function to establish targets for the application of current low impact development (LID) methodologies. The LID approach is taken as an alternative to traditional stormwater design. Study of LID practices such as bioretention, pervious pavements, and grassed swales has shown LID methods work. Bioretention cells have been effective in retaining large volumes of runoff and reducing concentrations of pollutants. GNP will integrate current knowledge and best practices of LID methodologies in designing drainage and flow regulation models for the GNP Project.

4.2.4.3 Sea Level Change

Taking into account regional uplift and subsidence (isostatic rebound), cumulative sea level rise, including changes due to climate change is projected to reach ~30 cm by relatively steep-sloping bedrock-exposed coastlines means that such sea-level rises will have little impact in these areas. While for much of the harbours perimeter Crémaillère Harbour typifies this type of geology, projected sea levels will factor into the engineering and development of the port.[18]

4.2.4.4 Sea Level History on the Northern Peninsula

Sea levels fluctuate in response to the changes in ice sheets, ocean volume, and vertical adjustment of the Earth's crust. After deglaciation a lag occurs between melting of the ice sheet and rebound of the crust. Formerly glaciated regions experience exhibit these effects as much as 10,000 years after the ice recedes. During the last glaciation the southeastern edge of the Laurentide Ice Sheet extended across the northern tip of the Northern Peninsula abutting a second ice sheet along the Long Range Mountains. As a result sea level history on the peninsula is complex resulting from isostatic rebound or rise due to ice unloading and subsidence.

Planning of the GNP project will take into account sea level trends and projections based on available data. The implications for archaeological resources or environment will be taken into consideration in the relevant documents.

4.2.4.5 Storm Surge and Flood Risk Mapping

As sea level continues to rise, the frequency of higher storm surges will increase. Rising sea level will produce surge events approximately once every 10 to 15 years, even if the frequency and magnitude of the storms did not change. Continued sea-level rise is projected to amplify storm surges and flooding in the Atlantic region.[19]

Taking these factors into account GNP will direct engineering of wharfage and waterside service infrastructure at Crémaillère Harbour to compensate for projected higher than normal sea levels and storm surge. Flood risk mapping will be incorporated into the project infrastructure engineering. Based on current engineering standards and regulation, proposed wharf deck elevations at the GNP port are +5.0 m above current low normal tide levels and at +6.5 m uplands areas. These elevations ensure structures will not be over topped due to sea level rise.

4.2.4.6 Sea Ice

Arctic ice is typically carried southwards by the Labrador current and shoved against the northeast coast of Newfoundland by northeast winds. Maximum ice extent is generally reached in March or April. A major factor in ice movement is the North Atlantic Oscillation (NAO); fluctuations in atmospheric pressure at sea level. During negative NAO years 1996–1997, ice extent was restricted to the coast north of Cape Bonavista. In positive NAO years 1990–1992, 2004 ice extended south of Cape St. Francis. Positive NAO years are marked by northeasterly winds, which drive ice onshore and along the coast of Labrador and the Northern Peninsula.[20]

Crémaillère Harbour remained ice free in April 2017 during the “Worst ice year in living memory.” The harbour entrance is shielded from ice bearing currents and wind-blown ice floes by the geophysical features of the surrounding coast and the southeast to northwest orientation of the harbour. These features figured large in the selection of the harbour as the site for the GNP port proposal.

See also: 4.1.4.6 Sea Ice and Icebergs

4.2.4.7 Temperature Change

Average temperatures in the province have been on a sustained upward trend since 2000 even compared to overall averages and cyclical variations recorded since 1944. Given temperature trends, freezing of the harbour surface is not anticipated. Should freezing occur the presence of a stationed harbour tug and the Canadian Coast Guard at the port are considered adequate to keep the harbour navigable.[21]

4.2.5 Archaeological Considerations

In response to the GNP Crown Land Application Numbers 151500 and 151508, the Company received a letter dated May 26, 2017 from the Provincial Archaeology Office (Appendix 4.2.5). The letter identifies 4 sites of archaeological and historical significance on the proposed GNP site. Following are the stipulations stated by Provincial Archaeology Office regarding the responsibilities of the Proponent:

Due to the nature of the proposed land uses, both terrestrial and underwater Historic Resources Impact Assessments are required to determine the full extent, nature and significance of the historic resources in the area. Based upon the results of this work, and a determination of the impact of the development on the historic resources, It is expected that full remediation of said resources will be required if the project is to proceed. You are responsible for hiring an archaeological consultant to have the work carried out. Attached is a map indicating the location of the known archaeological sites as well as a list of archaeological consultants eligible to carry out archaeological work in the area.

The sites referred to are as follows:

1. EiAv-03 La Crémaillère [Cove]

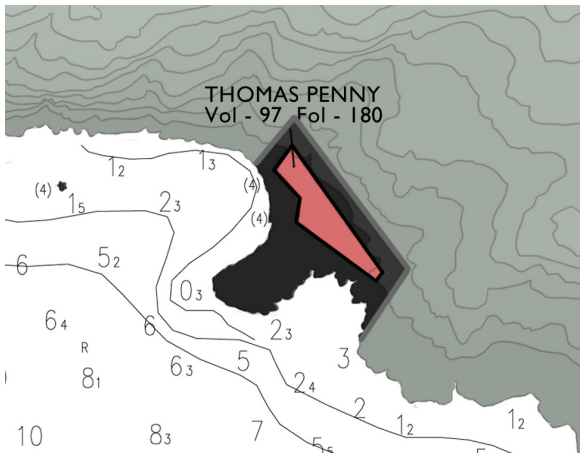
Historic documents and maps indicate that there were four to six fishing rooms at EiAv-03 (top right); the cove at the east end of the harbour called “La Crémaillère”. According to the Provincial Archaeology Office empirical evidence gathered confirms the existence of a fishing room in EiAv-03. While no boundaries are determined for the EiAv-03 La Crémaillère [Cove] site, the greater part of that site apparently lies outside the proposed development area. Allowances are made for investigation of the adjacent littoral, landside, and subsea areas inside the proposed port area as my be required to determine if anything of archaeological interest is present.

2. EiAv-07 Crémaillère Observation Point

The extent of EiAv-07 (at right, second from top) are is not indicated in the letter of May 26 or attached drawing. However as the letter states: “At EiAv-07 (Fishing Room) a survey was taken of the beach and a number of features on the beach terrace were recorded.”

3. EiAv-08 La Crémaillère Harbour North

Nine features were noted at EiAv-08; La Crémaillère Harbour North, the site of a second Fishing Room which corresponds to the parcel of land held by Thomas Penny, Vol 97, Folio 180 as shown in Figure 4.2.3. This site is outside the boundaries of the GNP site. See detail from the drawing supplied by the Provincial Archaeology Office (at right second from bottom) showing the location of EiAv-08 and also the detail from Figure 4.2.3 (at right bottom) showing the Penny land parcel inside light green area indicating GNP site boundary. Additional buffer area will be added if deemed necessary by the Historic Resources Assessment.



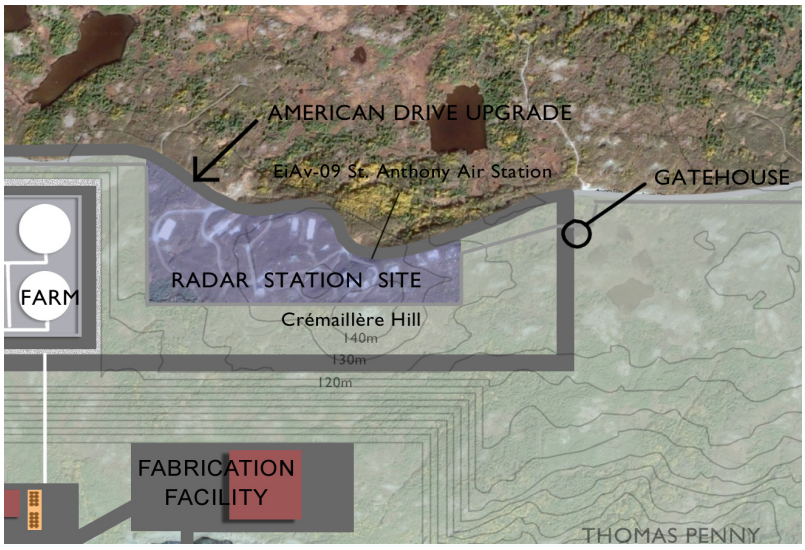
4. EiAv-09 St. Anthony Radar Station

Saint Anthony Air Station (ADC ID: N-26) was built by the United States Air Force in 1953 as a General Surveillance Radar station; part of the Pinetree Line of Ground-Control Intercept (GCI) radar sites. The photo at right top shows the Station during operations in the 1960s. The site location was chosen due to it's superior ocean vantage point approximately 140 metres above Crémaillère Harbour.

The Radar Station was closed in 1968. The current condition of the site is indicated in the photo at right second from the top. Research and discussions with local residents and officials indicate this site is considered to be of local archaeological significance.

In comparing the drawing attached to the letter from the Provincial Archaeological Office (at right, second from bottom) to satellite images (right, bottom) it appears a structure and road section at the west extent of the Radar Station site was excluded from the drawing supplied .

To avoid any question about inclusion of any part of the Radar Station Site in the proposed GNP site, the boundaries of the Radar site were extended as shown in the overlay image below. The final extent of the Radar Site will be determined based on the results of the Historic Resources Assessment.



4.2.5.1 GNP Historic Resources Preservation and Management Plan

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 Crémaillère Harbour are realized GNP, in consultation with a qualified lead Archaeologist, develop a Historic Resources Preservation and Management Plan based on a Historic Resources Impact Assessment that will direct historic site development and historic resource management.

GNP will undertake a full historical resources assessment prior to site development. Both terrestrial and underwater impact assessment will take place prior to each stage of the project to be conducted and monitored by a permitted Archaeologist approved by the Department. Time, access, resource allocation, and funding will be provided to facilitate pedestrian traverse of all high potential areas, sub-surface testing, and reconnaissance and study of natural surface erosion and ground disturbances which may influence artifact and feature displacement. A planned schedule for assessment, development, and remediation of the archaeological sites will be detailed in the HRPMP.

GNP will work with the designated Archaeological consultant to ensure the site is adequately surveyed prior to detailed planning and development scheduling so that assessment and construction time lines do not conflict. A Historic Resources Clearance will be obtained prior to commencement of any construction of each of the three Phases of development.

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

4.2.5.2 Interpretive Site Access, Exhibit, and Panels

Public access to the 4 sites 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 Archaeologist 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 four sites including La Crémaillère beach which lies outside the boundaries of the proposed port. Plans and detailed design of the exhibit and interpretive panels will be integrated into the HRPMP prior to commencement of Phase I construction.

4.2.5.3 Environmental and Historical Resource Considerations

Planning and engineering of the GNP port project will implement the recommendations of the approved Environmental Protection Plan and Historic Resources Preservation and Management Plan. Descriptions of the physical features of the proposed port in this document outline possible scenarios in broad general terms the facilities and operations of the proposed port project. The actual features of the Project will be a product of a planning process that seeks the best possible outcomes for the natural environmental, historic resources, and the long term social and economic benefits the port project has to offer.

4.2.6 Roadways

The planning and engineering of access and service roads for the GNP project will consider road traffic safety and emergency response along with environmental impacts of construction and post-construction road effects. Where increased traffic volumes and loads are anticipated on existing roads, upgrade and re-engineering are proposed. Where possible. existing road routes will be used except where the existing the road encroaches upon buffer zones or where existing road routes are impractically tortuous or their use would result in otherwise avoidable excavation and/or blasting.

4.2.6.1 Existing Roads

Crémaillère Harbour is currently accessed over land via an unnamed public access road running from Goose Cove Road to a cove between Observation Point and a property registered to John Murrin Vol-95, Fol-181. See Fig. 4.2.3 Physical Features of Undertaking / Phase III. Recent photographs taken at the site indicate the road is currently used to access the beach. Satellite images taken from the internet show a roughly square-shaped area of approximately 1000m2 surrounded by a gravel road. What significance if any there is to the road layout is unknown.

Because this road is the singular existing road to the water's edge the Observation Point Beach area will probably be used for access to tidewater for purposes of survey and assessment. For this reason it is anticipated that this site will be the first among the four sites to be assessed for archaeological value and mitigation. Future usage of this road will depend upon the outcomes of the Environmental Protection Plan and Historical Resources Assessment.

Fig 4.2.6.1 Existing Roads - Observation Point Cove Road

Top: South-facing aerial of Observation Point Cove showing area circumscribed by the road as described in 4.2.6.1 Existing Roads. Bottom: North-facing aerial of Crémaillère Harbour basin showing existing road turning west toward Observation Point Cove. The Harbour is mostly enclosed by steep cliffs and rocky shorelines making the Cove the most favourable pre-development landing site within the GNP Project site.

4.2.6.2 Proposed Roads

Fig. 4.2.3 Physical Features of Undertaking / Phase III shows a proposed road route running west to east and then northeast roughly parallel to the existing access road from Goose Cove Road to Observation Point Beach. The actual road route will depend upon roadbed construction requirements and environmental considerations such as drainage and runoff. Similarly the Service Road depicted in the schematic will be altered in relation to geophysical features and topography as required. Roads as shown in the schematic is a general indication of an approach to the layout of the GNP port site road system.

4.2.6.3 Road Effect

Road engineering and construction will adhere to extant regulations while also following the principles of minimum foot print and environmental impacts. GNP will engage direct planners and engineers to conduct an in-depth investigation into best practices for road construction and use in natural environments. As a starting point for planning policy and discussion GNP has examined research findings and proven engineering practices for mitigating negative road effects on wildlife, fish, and plant communities.

In addition to direct loss of habitat and ecosystems caused by the footprint of roads, the "road-effect zone" can extend out from the road sides and/or extend downstream to effect distant aquatic conditions. In forested areas in particular the road-effect zone also affects light conditions and disturbs soils creating conditions suitable for invasive plant species. Road-related impacts can occur not only during road construction but over time from use, and maintenance of the road surface, shoulders, ditches, and slopes.

Where excavation and/or road bed construction is called for, GNP will employ mitigation techniques to reduce the environmental impacts of road construction and use. These measures will apply to engineering, construction, upgrading, maintenance, and access management.

4.2.6.4 Road Drainage and Erosion

Preliminary visual site survey shows the terrestrial surroundings of Crémaillère Harbour consists largely of areas of exposed bedrock or thin vegetation cover, and dispersed depressions hosting small wetland areas or scrubland. Where road construction unavoidably nears sensitive or vulnerable areas GNP will employ best practices to manage runoff and drainage and minimize erosion, sedimentation and disruption of vegetation.

Where applicable in wet meadows areas permeable fill under the road surfaces along with culvert arrays (multiple culverts) will be built to maintain subsurface water flow. In areas of rapid drainage such as exposed bedrock adjacent to roads and paved areas GNP will construct lead-out ditches and rock aprons to disperse water-flow energy and reduce erosion.

4.2.6.5 Invasive Species

Road verges and exposed areas will be bordered by vegetated buffer zones of native plants to inhibit foothold and growth of invasive plants species.

* Of the 21 species of plants on the endangered list none are found in the Crémaillère Harbour area.

4.2.6.6 Road Access Management

GNP will be a federally regulated port. Access to waterside dock areas will be controlled and limited where internationally registered vessels are berthed. Unsecured road access to tide water will be via either unsecured GNP access roads or alternative public access routes and parking areas provided in order to facilitate traditional use access where practicable. Access management measures and practices will be designed to limit unnecessary traffic impacts.

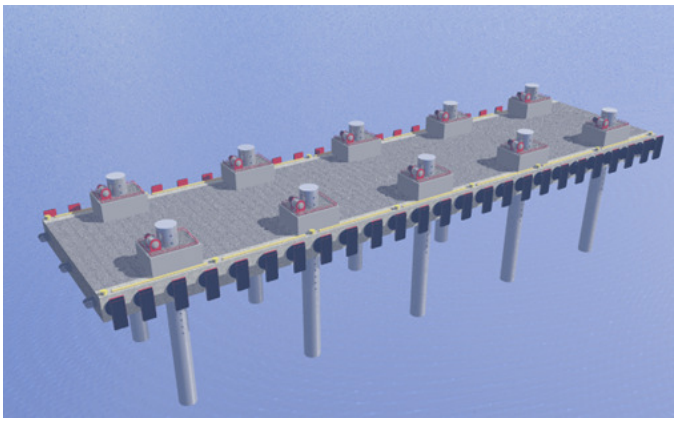
4.2.7 Docks

For initial installations GNP proposes to employ a system of wharfs, docks, and quays based upon prefabricated jackpile dock sections of approximately 25m x 100m. This approach allows for off-site fabrication of the principle components thus significantly reducing on-site environmental impact. It also allows for periodic adjustment of dock heights.

Jackpile docking systems can be installed and removed within a relatively short period of time with a significantly smaller physical footprint than conventional docks. Jackpile docking systems have been shown to reduce impacts and costs related to remediation and decommissioning of sites such as remote mining projects as the dock components can be disassembled and transported intact without the decommissioning impacts associated with conventional docks.

Jackpile elevated docks are more flexible than conventional docks. The proposed docks will be custom-designed to meet maximal loading requirements of the proposed port facility and offshore terminal. As shown in previous applications and installations these docks can accommodate all operational requirements and vessels types: bulk carriers, container ships, oil tankers, LNG carriers, Ro-Ro ships, cruise ships and ferries, general, project and heavy lift cargo etc.

Fig. 4.2.7 Jackpile Dock Model



4.2.7.1 Ramps & Laydown Area

Laydown areas from which the dock sections will be accessed will be constructed above the upper extents of the intertidal zone of the existing and forecast high water mark. Landside construction will consist of steel piling and/or concrete retaining wall, back-filled with stone and crushed rock and surfaced with prefabricated, steel reinforced, concrete paving sections. In the initial stages prior to waterside road access materials and concrete paving sections may be transported by sea to the cove site and offloaded by crane from the offshore dock.

The landside back-filled sheet piling, or concrete retaining wall will be constructed 80 vertical centimeters above the high water mark of the current intertidal zone. The access ramp will span the intertidal zone from the top of the landside laydown area to the dock. Depending on the span length pilings may be driven into the beach.

4.2.8 Fuel Tank Farm

Located on an elevated area located west of the St. Anthony Radar Station site, the tank farm will consist of four holding tanks. Each tank holds 40 million litres of diesel fuel, 160 million litres collectively.

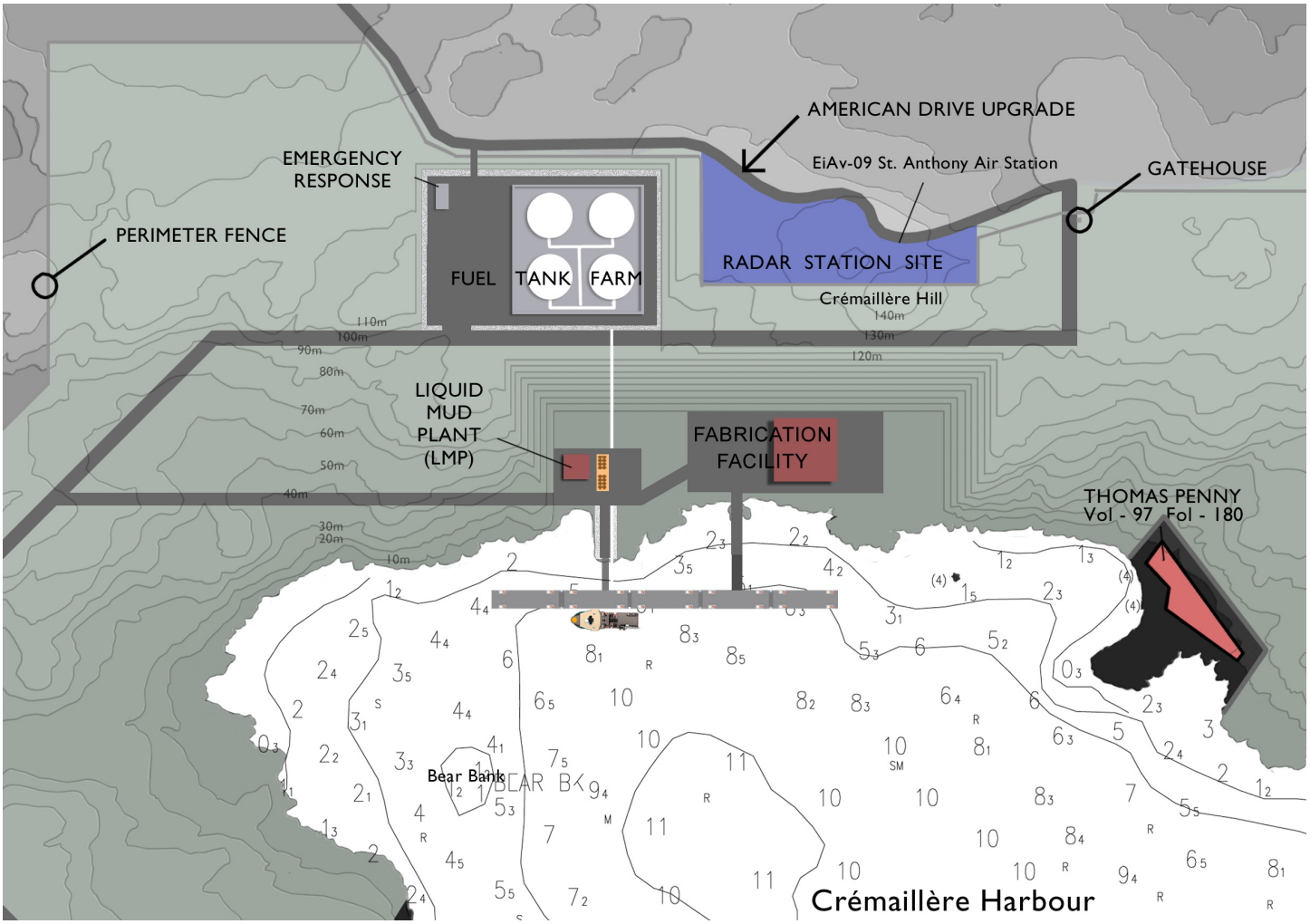
4.2.8.1 Fuel Tank Containment Basin

A lined concrete containment basin will be built around the tanks to prevent spills that can cause fire, property damage or contaminate the environment. The capacity of the basin volume will be equal to the capacity of the largest tank plus 10% of the sum of the capacities of others. To prevent a spill or other emergency the walls of the containment basin will be resistant to the solvent properties of the contained product and will be engineered to exceed the pressure of the containment capacity.

4.2.8.2 Fuel Tank Design

Tank design will ensure the tanks are both liquid and vapour tight. Actual constructiondetails will rely on recommendations from engineers based on current best practices for fixed fuel storage at high latitude. As is required by volumes required to service shipping at the port, it is anticipated the number of tanks at the tank farm will start at one and the others added as needed over the three Phases of construction.

Figure 4.2.8 Fuel Tank Farm and LMP Phase II detail o north shore of Cremaillere Harbour.



4.2.9 Diesel and Base Oil Storage and Handling

Diesel fuels and base oils will be used to refuel and lubricate ships, vehicles, and equipment. All fuels and oils will be stored in properly designed, regulated and certified storage tanks or containers. Containment and transport and handling of fuels and oils will follow all applicable environmental, and health and safety regulations and best practices. Containment structures will be constructed or placed around storage tanks, to ensure containment of spills or leakage.

4.2.10 Liquid Mud Plant (LMP)

A Liquid Drill Mud Plant (LMP) will be located at the supply dock area of the proposed port. See Fig. 4.2.8.

4.2.10.1 Purpose of the LMP

The LMP provides drilling mud to offshore drill rigs engaged in exploratory drilling. The LMP will be used to blend base fluids and materials into drill mud to meet the specifications of its customers. This blending/mixing facility will not be manufacturing chemicals and does not employ processes and equipment used in chemical manufacturing.

Drilling fluids and muds typical to the offshore industry will be stored and handled at the site and may include non-aqueous drilling fluids of Group I, II or III. Depending on predicted demand there could be as many as 12-150 m3 storage tanks full of drilling fluids at one time, for a total quantity of 1800 m3 of drilling fluid. A typical installation is detailed below.

It is noted that a Temporary Liquid Mud Plant to be located at Donovan's Industrial Park in Mount Pearl, utilizing similar compounds and handling procedures was registered in May of 2017 and released in July of 2017. That plant occupies a 465 square metre area with a capacity of 630 cubic metres per batch of drill mud stored in existing storage tanks owned by Pardy's Industrial to be used to store base fluids and blended drill mud.[22]

4.2.10.2 Components of the LMP

The main components of the LMP are the mixing tank and pumping unit. The LMP blends base fluids and materials into drill mud and brines to customer specifications. The pumping unit pressurizes the blended fluids which keeps them combined the solution. The components of the LMP are modular giving the plant the advantage of scalability.

4.2.10.2.1 Mixing Tank

A 75m³ mixing tank for mixing drilling fluid will be situated in the building near the storage tanks. The mixing tank will be surrounded by a steel StradEnergy SuperBerm® containment berm.[23]

4.2.10.2.2 Pumping Unit

The Pumping Unit is connected to the mixing tank to provide additional shear to increase efficiency of the mixing system. The same pumping unit will pressurize the storage to dockside delivery pipe system.

4.2.10.2.3 Mixing and Transfer Pumps

Centrifugal pumps are used for mixing and transferring fluids. These pumps will be electrical with diesel back-up. The amount of diesel stored on-site will be limited to the generator’s tank which has a 100 L capacity.

4.2.10.2.4 Dust Collector

Bulk materials are pneumatically transferred. Dust generated by transfer of dry bulk materials is controlled and contained in dust collectors. This system is built into the equipment as a standard mitigation for dust.

4.2.10.2.5 Mud Mix Hopper

The mix hopper is an in-line platform with a conical opening for adding materials to the fluid mix. The hopper is installed so that a reduction in fluid pressure is created causing materials to be vacuumed" into the flow stream.

4.2.10.2.6 Air Compressor

Air compressors are used to blow out lines.

4.2.10.2.7 Containment Berm

Spill containment capacity will be at least 100% of a single tank plus 10% of the remaining combined tank capacity. The LMP tank storage will be fully enclosed in a warehouse constructed according to applicable regulations. In addition a separate warehouse of approximately 2400 ft² of enclosed storage space for unmixed materials.

4.2.10.2.8 Mud Tank Farm

Blended mud, as well as base fluids (brine and base oil), will be stored in the tank farm. Base fluids will be used in the blending of mud. The mud storage facility will match the specification typified by the StradEnergy brand of storage and containment systems which exceed all provincial, federal and safety regulations.

The active drilling-fluid volume on a deep-water well can be several thousand barrels (bbl). An offshore supply boat typically carries 540 m3 or 3400 bbl of drilling fluid. The proposed tank farm is based on a standard, pre-engineered configuration consisting of 16 - 400 bbl (64m3) upright tanks situated within a spill containment berm. Tank size and volume specifications are as shown.

Specifications	
Volume (BBL)	400 BBL / 64m³
Volume US gallons	16,643
Size (H x D)	24' x 12'
Weight	13,500 lbs

A piping system will be used to connect the mixing tank, pumps, agitator, and storage tanks. The piping system will have secondary containment to contain the contents in the event of an accident. The storage to dockside delivery piping system will have spill prevention and shut off according to industry best practice standards and regulations.

Color coding of tanks valves and piping will be used to ensure that the operator knows what is stored in or traveling through the plumbing of the plant. Colour coding allows operators to be more aware and so efficient with mud transportation and respond more safely and quickly to spills or hazards.

GNP has based its specifications for the LMP on a leading supplier of tank farms in the North American oil and gas industry. The pre-engineered standardized tank and secondary containment package includes liners, mats, tanks, pumps, fire extinguishers, stairs, signage and lighting, and road crossings; all exceeds provincial, federal and safety regulations.

Transport, installation, and operation of the LMP will be performed by highly trained technicians experienced at mobilizing and demobilizing tank farms and are able to handle all logistics for the transportation of fluids and equipment. Fabrication of the LMP components will take place off the port site, thus minimizing environmental impacts.

4.2.10.2.9 LMP Maintenance and Cleaning

A detailed regime of equipment maintenance and cleaning will be provided with the documentation for each project undertaken at the port.

4.2.10.2.10 Drilling Fluids to be Processed at the Site

Drilling fluids and chemicals used or stored at site will be controlled by highly qualified and experienced companies operating to globally recognized standards that lease space at the site. It will be mandatory for any and all chemicals relating to offshore operations to be identified in project registration documents in advance of each individual project or operation for which they may be required.

Companies engaged in these operations will be required to maintain total safety and product management practices. All Federal and Provincial regulations, including Environment Canada's Environmental Emergency Regulations, will be followed during storage and handling of all materials stored on site.

Drilling Fluids to be processed and handled at the GNP port site consist of three types or groups of non-aqueous mixes.

Group I Non-Aqueous drilling fluid is most hazardous with the highest percentage of Aromatic Hydrogen content (5-35%). Group I uses Crude Oil, Diesel and conventional Mineral Oil as it is a Non Aqueous fluid. If a Group I non-aqueous drilling fluid is required to be stored at the site, appropriate handling and storage protocols will be established that follow requirements of the Department of Environment. The storage of such materials will be limited to a tank farm enclosed in designated warehouses specifically designed for such storage. A containment dyke will be constructed around the tanks to prevent environmental contamination.

Group II Drilling fluid contains low-toxicity Mineral Oil as it is Non-Aqueous fluid. It has an Aromatic Hydrocarbon content 0.5-5%.

Group III drilling fluids contain highly refined Mineral Oils (Ester, Linear Paraffin, highly processed Mineral Oil, etc.) as it is Non-Aqueous fluid. It has an Aromatic Hydrocarbon content of less than 0.5%.

Figure 4.2.10.2.10: Typical Non-Aqueous Drilling Fluid Composition by Volume.

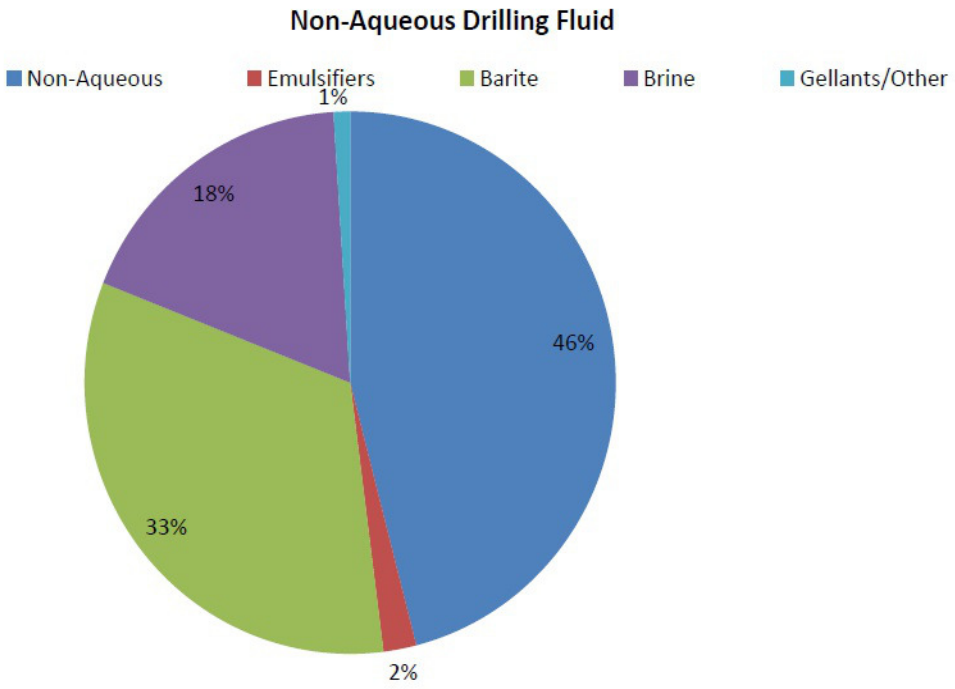


Table 4.2.10.2.10.1 Potential Additives to Drilling Fluids below lists all potential additives to drilling fluids. It is unknown which (if any) of these chemicals will be stored on site. If storage or handling of any of these additives is required, it will be done following all applicable regulations for the storage, handling and transport of such materials.

Table 4.2.10.2.10.1 Potential Additives to Drilling Fluids		
Fresh Water	Sea Water	Brine
Saturated NaCl	CaC12	Salts (KCl)
ZnBr/CaBr	Formates	Barite (barium sulphate)
Calcium Carbonate	Iron Carbonate	Hematite
Ilmenite	Bentonite (or other clays)	Organophillic clay
Biopolymers	Carboxymethyl cellulose	Polyanionic cellulose
Polysaccharide	Synthetic polymers	Modified polyacrylates
Lignosulphonates	Tannins	Starch
Modified lignites	Asphalt	Resins
Gilsonite	Clycols (polyglycols)	Silicate
Gypsum	Polyacrylamides	Modified PAC
NaOH/KOH	Ca(OH)2	Citric acid
NaHCO3	Bactericides	Lubricants
Lost circulation material	Polymer stabilizers	

Outbound drilling fluid service management will vary based on specific offshore production requirements and will include the variety of well-known and accepted chemicals and minerals, e.g., bentonite (gels), barite, calcium carbonite, methanol, glycol, base oil, potassium formate, brinds, gravel packs, cement, etc.

About 80% of these chemicals and minerals are listed as benign under Transport Canada’s Transportation of Dangerous Goods (TDG) safety standards and regulations. The remaining substances fall under TDG rules, e.g., items carrying HAZMAT Class 3 or 8 designations. Potential chemicals carrying Hazmat Class 3 and Class 8 designations can be found in Table 4.2.10.2.10.2 and Table 4.2.10.2.10.3, respectively.

Table 4.2.10.2.10.2 Hazmat Class 3 Substances		
Crude Oil	Tannins	Mineral Oil
Asphalt	Diesel	Lubricates
Biopolymers	Lignosulphonates	

Table 4.2.10.2.10.3 Hazmat Class 8 Substances		
Brine	Ilmenite	ZnBr/CaBr
Bentonite	Barite	Organophillic clay
Calcium Carbonate	Lignosulphonates	Iron Carbonate
Silicates	Hermatite	NaOH/KOH
Ca(OH)2	Citric Acid	Bactericides
Emulsifier		

Table 4.2.10.2.10.4 Estimated Quantity of Chemicals to be Stored on Site		
Substance	% Drill Fluid	Estimated Quantity
Barite	33.00%	600 m3
Brine	18.00%	325 m3
Emulsifier	2.00%	40 m3
Non Aqueous Fluid (Crude, Diesel, Mineral Oil)	46.00%	830 m3
All other Additives Combined	~ 10% of Drilling Fluid Volume	

The volumes of materials and fluids kept on-site will vary, depending on the mud needs of the client. Detailed records of material and fluid volumes on-site, as well as mud volumes produced. When possible, drilling-fluid additives, base fluids, and whole mud will be transported in bulk-tote tanks or are containerized. These transport methods help reduce packaging-related waste, and minimize the risk of harming personnel, polluting the environment, and impairing operations.

4.2.10.2.11 LMP Construction

Construction of the LMP is anticipated to be completed over the course of approximately six months from the completion. Mobile equipment, as listed in 4.2.10.2 will be delivered to site and the LMP will be set-up according to approved and permitted specifications.

4.2.10.2.12 Ballast Wastewater/Bilge Disposal Facility

Crémaillère Harbour lies within Parks Canada's National Marine Conservation Areas, Atlantic Ocean, Area 3; Newfoundland Shelf conservation area. Readily accessible onshore oil disposal facilities for bilge and oil-contaminated ballast water is among the protective measures recommended in the Special Marine Areas Report published by CPAWS in 2009.[24]

Canada is a member of the International Marine Organization (IMO) and a signatory to the International Convention for the Prevention of Pollution from Ships (MARPOL). IMO has recognized that provision of reception facilities is crucial for effective MARPOL implementation, and the Marine Environment Protection Committee (MEPC) has strongly encouraged Member States, particularly those Parties to MARPOL as port States, to fulfill their treaty obligations on providing adequate bilge wastewater reception facilities.

GNP proposes to implement a ballast water treatment system to safely and reliably comply with IMO and USCG regulations at Crémaillère Harbour. This facility will serve to ensure vessels voyaging into the Arctic have a facility that allows them to discharge bilge in an environmentally responsible manner. GNP will comply with relevant regulations including Canada’s Ballast Water Control and Management Regulations TP 13617 E Part B – Guidelines for the Development of Ballast Water Management Plans.

4.3 Construction

Great Northern Port Inc. (GNP) Inc. will be using the precautionary principle throughout all facets of construction to protect marine species, bird populations and wildlife alike and will not proceed with any development until studies and investigation conclude it is safe to do so.

Potential increased marine traffic due to climate change will open up the Arctic. With increased traffic also comes the potential for marine disasters on a multitude of levels. Current spill and emergency response capability is considered inadequate for even existing traffic levels. In consultation and cooperation with the St. Anthony Port Authority and The Canadian Coast Guard GNP will initiate a regional, coordinated, emergency preparedness program and response plan.

The 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. The presence of both offshore service vessels and stationing of Coast Guard ships at the port and its proximity to marine traffic and exploration activities in the Strait of belle Isle and the Arctic will allow GNP to be a base for improved response in terms of time, capacity , and advanced mitigation technologies.

The facilities to be constructed and activities related to their construction as described here are intended as typical examples of approach rather than details of an actual Development Plan.

While the presence of certain operations; fuel and drill mud storage, ballast water disposal, etc. referenced above will likely occur at an offshore and marine service port configured as is proposed here, should the project proceed, it is equally likely that other as-yet-unidentified facilities will be proposed in future.

All applicable Regulations and best practices of health and safety and environmental stewardship apply and will be adhered to in all transport and construction activities and in the conduct of all operational procedures herein referred to.

The list below is not exhaustive and the many ancillary activities related to the listed activities such as refueling of equipment, and logistics will come under the same regulation and oversight.

4.3.1 Activities Related to Construction

4.3.1.1 Terrestrial Construction Activities

- Tree cutting, grubbing and clearing
- Top soil stripping
- Excavation & Grading
- Drilling
- Blasting
- Crushing
- Back-filling
- Road Construction
- Overland Transport and Laydown
- Surface Water Catchments and Drainage
- Construction of Buildings and Other Structures
- Above Ground and Underground Water and Wastewater Piping
- Underground Septic Tanks and Distribution Fields
- Aerial and Underground Power and Communications Cabling
- Paving
- Landscaping

4.3.1.2 Intertidal Construction Activities

- Beaching/Temporary Laydown
- Boat Launching
- Pile Driving

4.3.1.3 Subsea Construction Activities

- Anchoring
- Mooring
- Dredging
- Water Disturbance

Location and dimensions of facilities indicated in the 4.2.3 Physical Features of Undertaking, Phase III are based on estimates of required area, proximity to deep water, and topography. Dock section lengths may be considered relatively accurate as these will be manufactured as components of a modular, reconfigurable and scalable dock system. Actual locations of onshore buildings and infrastructure will be finalized in the fully engineered Site Plan following detailed survey and study of topography, geology, hydrology, etc. of the land areas and harbour basin.

Following are general principles that will be followed and examples of special case measures which will be taken as required in accordance with the Environmental Protection Plan and applicable regulations:

4.3.1.4 Site Preparation

Clearing and excavation onshore will occur only where necessary and will be, as much as practicable, be kept within the footprint of the finished structures. Areas exposed beyond the footprint will be replanted with native plants to prevent erosion and inhibit foothold and growth of invasive plants species.

4.3.1.5 Blasting

Blasting will be required where bedrock has to removed. Handling and transport of explosives will be conducted in accordance with the Explosives Act (Canada), the Fire Prevention Act, 1991, and the Dangerous Goods Transportation Act. All reasonable precautions will be taken to ensure that people, property, wildlife, and vegetation at or near the site are protected as much as is practicable from flying material, air blast, ground vibration and/or fumes caused by the blast. Wherever possible blasting mats will be used to mitigate blasting impacts.

Due to the distance from human habitation, infrastructure such as potable water sources, as well as the topography of the area, contamination or disruption caused by blasting is not expected. Depending on the type of rock, if applicable, to reduce possible acidification, rock piles produced by blasting and/or crushing will be stockpiled under cover until sequestered as back fill beneath foundations and paved areas.

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

4.3.1.6 Construction of Buildings and Other Structures

No extraordinary measures are anticipated in the construction of the structures and service infrastructure beyond what is covered in extant regulations and the site-specific guidelines detailed in the Environmental Protection Plan. In cases such as the LMP and Wastewater Disposal facilities and like installations the relevant regulations and best practices will be applied. GNP will ensure that building design and site planning and engineering are oriented to provide accessible and inclusive workplace.[25]

4.3.2 Construction Period

The physical structures to be installed and erected in the three Phases of the project are listed in 4.2. The actual time frame in which studies and planning will be completed and work begun to construct these and as-yet-unidentified facilities is subject to a number of contingencies. However GNP anticipates the parts of the project described can progress more or less the linear order within the time frames indicated for site preparation and construction. Once approval in principle is obtained and the framework for environmental and historic resource assessment is established, studies and engineering surveys may begin. Detailed topographic terrestrial and bathymetric surveys will precede site planning and determine actual time frames for excavation and construction. GNP anticipates a two year time frame for these activities with a possible start up for environmental and historic resources site work in the second half of 2018.

4.3.2.1 Construction Period / Phase I

It is anticipated that surveys and engineering for Phase I construction will take two years with a startup for site preparation in the Spring of 2020. Site excavation, grading and preparation for roads and building lots and installation of services and utilities infrastructure will take until the Spring of 2022.

4.3.2.2 Construction Period / Phase II

The start of Phase II is marked by construction of the Port Administration building, fuel and drill mud tank farms, docks assemblies, and other structures related to the warehousing, Coast Guard, and Ice Research facility etc. Construction of structures for waterside related services and operations such as supply and freight handling will take place primarily in Phase II. Construction of buildings, structures, and paved areas related to ancillary services such as machine shops for refit and repair will take place as required on back lots of the site. Phase II is anticipated to take 3 to 5 years from the Spring of 2022 until 2025 and beyond.

4.3.2.3 Construction Period / Phase III

Phase III will see the construction of the graving dock and warehousing and redistribution hub on the south shore of the harbour basin. The graving dock will serve as a refit and repair and construction facility for larger vessel including offshore service ships and drill rigs. Construction of the graving dock may require extensive blasting and excavation depending on how it is engineered. For this reason the construction time frame is anticipated to extend into the latter Phase of the Project. The amount of time required to excavate the basin and to build the superstructure is estimated at three to five years; the latter case placing the completion date at 2030 assuming a 2025 start up.

The warehousing and redistribution centre is an intermodal logistics hub intaking trucked and seaborne bulk and containerized freight for redistribution by sea and air to Labrador and the Arctic. The paved laydown yard and warehouse as shown in the will occupy approximately 10,000m2 excluding dock and waterside quay areas. While the warehouse facility may take as long as 5 years to construct, depending on demand and site preparation and permitting requirements the construction start date may be as early as 2022.

Table 4.3 Construction Period Time Table

	START	COMPLETION
Phase I	2020	2022
Phase II	2022	2025
Phase III	2025	2030

4.3.3 Resource Conflict During Construction

Potential conflicts with traditional uses of resources within the Project area and disruptions outside the project boundary during construction activities include those listed below. Other considerations may be added as public feedback and other inputs are gathered. It should be noted what is considered here are resource conflicts. Impacts upon human and wildlife habitats etc. are dealt with under 4.3.4 Environmental Considerations.

GNP will conduct public meetings and surveys and employ social media to engage local residents in discussions and gather inputs from concerned groups and individuals regarding the potential effects and conflicts around past, current, and future use of Crémaillère Harbour and surrounds in regard to all potential resource conflicts herein described or other potential conflicts as may arise from public discourse or other sources.

In general the distance of the project from human habitation mitigates most resource use conflicts or effects for people living in the Town of St. Anthony or outlying areas. Therefore, with the exception of possible vehicular traffic conflicts, this section deals primarily with traditional uses affected in and around the proposed project location. These are as follows:

- Vehicular Traffic
- Water and Sewer
- Noise & Light
- Air Quality
- Marine Traffic
- Fresh Water Access
- Marine Harvesting
- Recreational Trails
- Hunting & Fishing

4.3.3.1 Road Traffic

Town of St. Anthony

No significant increase in vehicular traffic is anticipated in the Town of St. Anthony as a result of construction activities at the Crémaillère Harbour site. Reasoning for this assumption is contained in the following sections.

American Drive

Levels and types of traffic which currently uses American Drive, which skirts the northern boundary of the site, will be examined as this road will serve as the access to the north entrance of the project site. Some increase in passenger vehicle traffic on this road will likely increase between the proposed entrance to be situated east of the abandoned radar site and West Road in St. Anthony as people are employed at the site. See: Appendix B, GNP Schematic Site Plan. Any increase in truck traffic on the section of American Drive between Crémaillère Harbour and the east end of West Street in St. Anthony is not anticipated to be significant as the primary road access for truck traffic to the north side entrance is most likely to be from Goose Cove Road coming from Route 430. Moreover freight and equipment transported to the port site by sea will likely be unloaded at Crémaillère Harbour rather than the port at St. Anthony therefore no significant amount of freight will be trucked from the St. Anthony harbour to the project site.

Goose Cove Road

Goose Cove Road intersects American Drive at about 5 kilometres southwest from the intersection of Route 430 and West Street at the west entrance to the Town of St. Anthony. This section of road will carry the bulk of vehicular traffic moving to and from the proposed port; either turning onto American Drive or traveling onward to the intersection of the Goose Cove Road at the south entrance to the project site near where an existing dirt road to the cove adjacent to Observation Point now lies.

Roads Upgrade Plan

Sections of American Drive and Goose Cove Road where an increase in traffic is anticipated, including the section of American Drive from the radar station to the east end of West Street will be upgraded as part of the proposed development. Detailed traffic studies and projections will inform a Roads Upgrade Plan which will set standards and scheduling for upgrading to commence with the start of site preparation activities at the GNP Project site. The Roads Upgrade Plan will include measures to mitigate and avoid where possible disruptions in traffic flows during upgrading. The features of road improvements; such as paved shoulders, turning lanes etc. will rely on relevant standards for roads with loads and levels and types of traffic anticipated. Standards for road verges, drainage, erosion mitigation, and environmental remediation will be consist ant with road construction standards within the project site boundaries including landscaping and replanting of exposed areas.

Note: Dust suppression in regard to road construction is dealt with in Section 4.3.3.4, Air Quality.

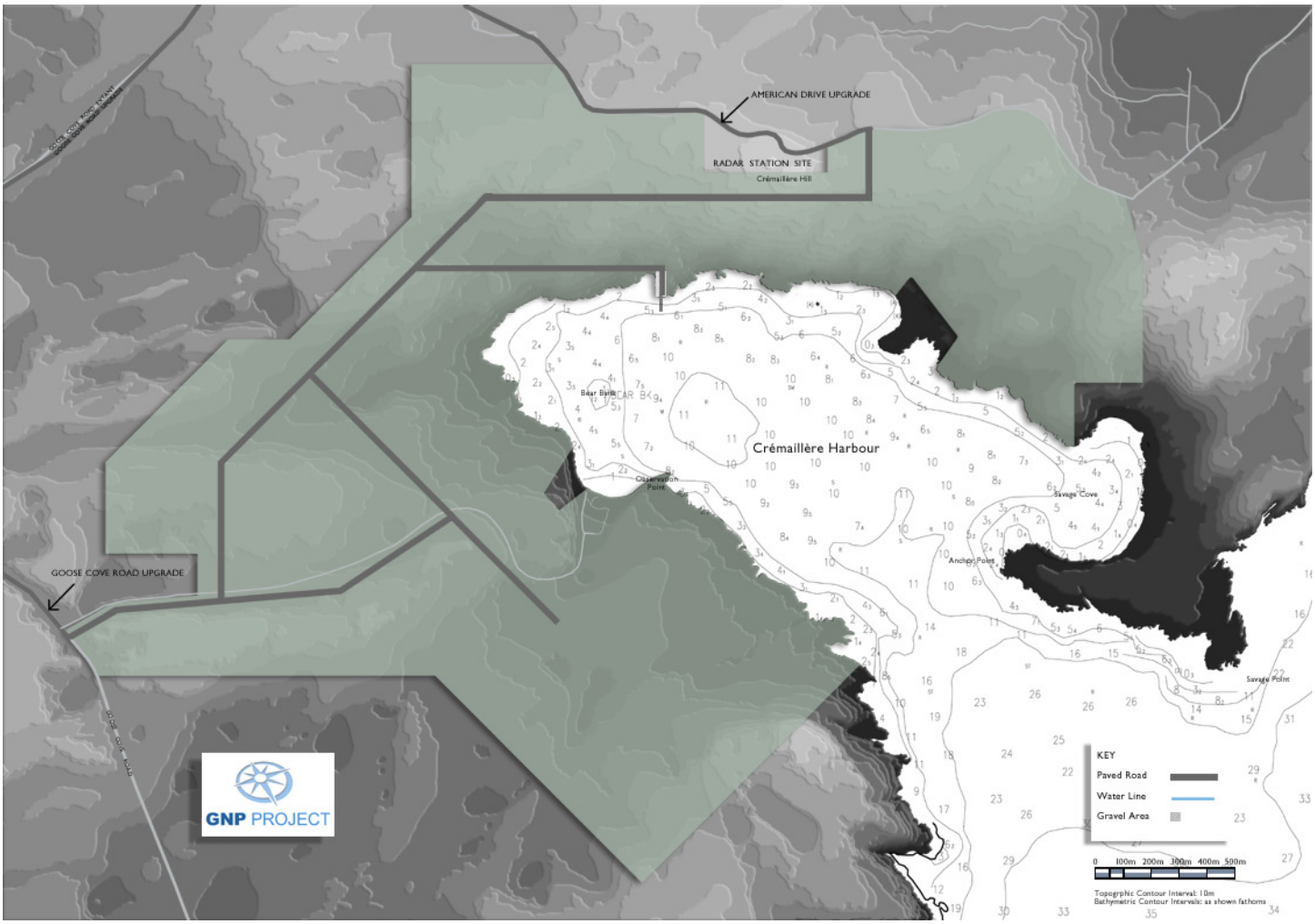


Figure 4.3.3.1 GNP Road Upgrade. American Drive and Goose Cove Road will be upgraded from the intersection of Route 430 and West Street as far as the north and west gates of the GNP project site.

4.3.3.2 Water and Sewer

The GNP port will have its own water and sewer infrastructure completely outside and separate from both surface and groundwater sources currently in use by the Town of St. Anthony. As there is no other human habitation near the proposed site, the proponent foresees no potential for conflict regarding potable water supply and sewer system capacity. Disruption to human activity during construction of the water supply infrastructure for the project is anticipated to be minimal. Human access to the singular lake being considered for the source of water for the GNP project will be restricted during and after construction by means of a security fence. It is not anticipated that this will be regarded as objectionable.

The septic system for the port will be confined inside the boundaries of the port site. It is considered unlikely this aspect of the construction at the site will cause any conflicts beyond possible noise effects. The system being considered is a biofilter technology which has no negative environmental impact beyond its own footprint either in terms of water contamination or operation-related disturbance.

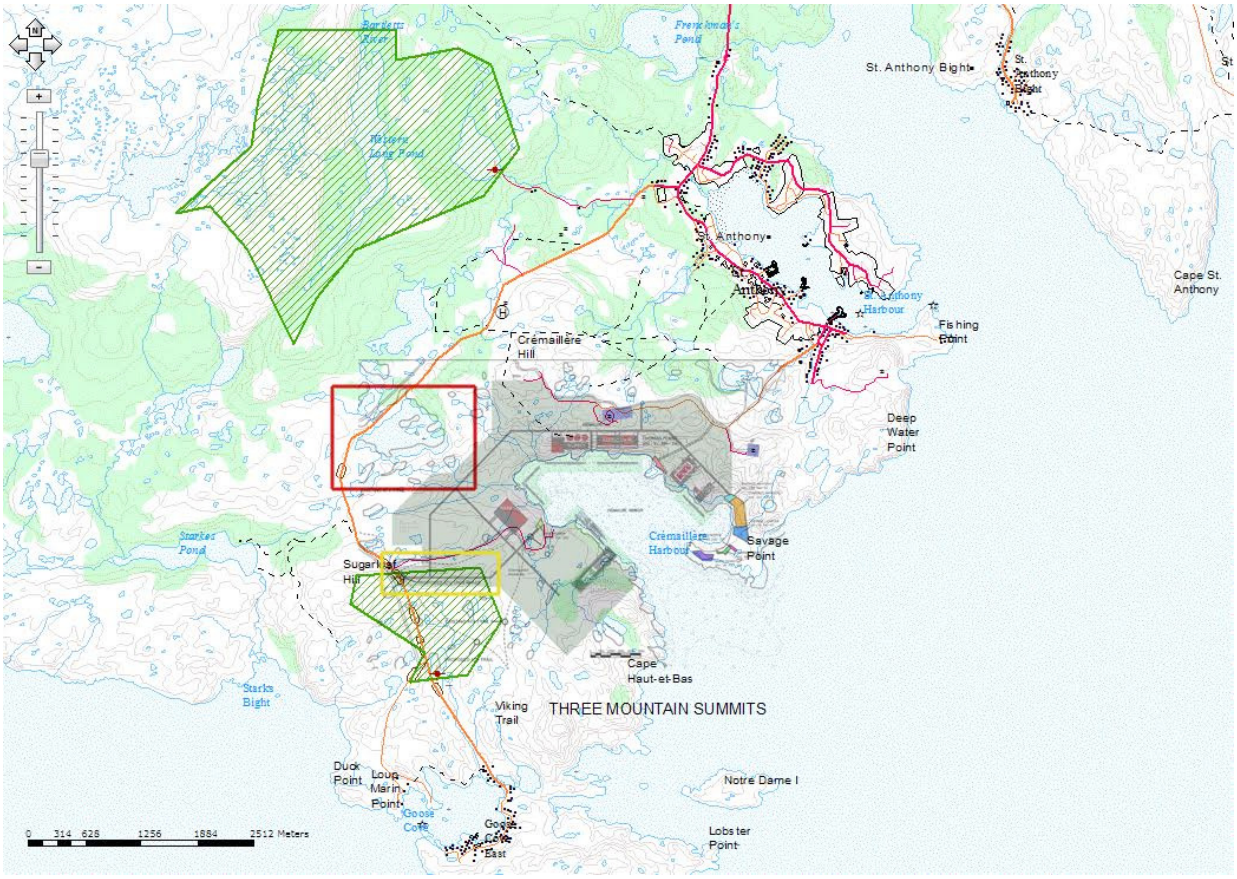


Figure 4.3.3.2 GNP potable water source. Green cross hatch area indicates protected water shed of the Town of St. Anthony water supply. Note reservoir intake (red dot) and water main (red line). Red frame (keyline) indicates proposed water reservoir for GNP Project. Application for protection of the water shed will be made upon approval of the project.[26]

4.3.3.3 Noise & Light

The outer boundary of the proposed Crémaillère Harbour development site is located over 1000m from the closest residential area of the Town of St. Anthony. The harbour basin is mostly bordered by steep cliffs and vegetated slopes rising to over 140m in height on the north side of the basin toward St. Anthony. While little direct effect on human quality of life is anticipated from noise and light emanating from the GNP project site during construction, indirect effects may occur depending on land uses in proximity to the site such as hiking, berry picking, commercial and recreational fishing, and hunting.

Noise and light may cause changes in the number, movement and behavior of wildlife within sight and/or audible distances of the site. Birds and mammals may move out of the area altogether at least during peak periods of construction activity due to noise and light disruption. Sources of the highest levels of noise are blasting, rock drilling, rock breaking, pile driving, and operation of heavy equipment especially engaged in excavation. Construction activities particularly in early Spring and late Fall where artificial light is needed to light work sites will effect localized and ambient light levels in the harbour basin.

GNP will conduct public meetings and surveys and employ social media to engage local residents in discussions and gather inputs from concerned groups and individuals regarding the potential effects and conflicts around past, current, and future use of the Crémaillère Harbour and surrounds in regard to noise and light effects. The findings of this discourse will be included and addressed in the Environmental Protection Plan and in planning and engineering and operational guidelines for the project. GNP will investigate and employ best practices of noise and light effect mitigation in relation to construction activities.

Note: Impacts of construction activities on wildlife are considered in section 4.3.4 Environmental Considerations.

4.3.3.4 Air Quality

Road dust, exhaust fumes and odours from painting and other construction activities and processes will result in a reduction in air quality within the boundaries of the project site and, to a much lesser extent and degree, outside the fenced site perimeter. Steps taken will include watering of roads and application of calcium chloride for the purpose of dust suppression and where applicable posting of warnings around areas of particular concern.

Exhaust Emissions

Diesel-powered construction equipment is the primary source of Green House Gas (GHG) and exhaust emissions during the construction stage of a large infrastructure project. The equipment pollutants such as nitrogen oxides, carbon monoxide, and particulate matter (PM 2.5 and PM 10) endanger people’s health and surrounding environment. During both the construction and operational phases of development air borne emissions from vehicles, heavy/light equipment will be monitored and maintained to ensure they are within the acceptable levels as outlined by Health and Safety and the Clean Air Act.

Reducing engine idling can be an effective way to reduce emissions while saving fuel and maintenance costs for the equipment owner. Diesel equipment often idles for extended periods, often to provide necessary power to operate heating, air conditioning, and other vital services, but sometimes unnecessarily. Training can help to encourage equipment operators to shut down the engine rather than idle unnecessarily. Some on-road truck engines are now equipped with automatic shut-down devices that turn off the engine after a specified time of non-use. For provision of necessary power, an auxiliary power unit (APU) can be used to provide power during idling. APUs typically produce far fewer emissions of PM, NOx, and other pollutants, and have been commercially applied to both trucks and locomotives. All vehicles on-site, whether equipped with auto shut-down or not, will be constrained to the 'no idle' rule and will have engines dis-engaged unless operational.

Table 4.3.3.4 depicts estimated fuel consumption and GHG emissions (hourly) from on site vehicles. This is a variable estimate as an increase or decrease in vehicular traffic will impact the emission output.

Table 4.3.3.4 Greenhouse Gas Emissions (hourly)					
Equipment	Fuel (litre/hr)	Fossil Fuel CO2 (tonnes)	CH4 (kg)	N2O (kg)	Total GHG emissions (tonnes C02e)
Loader	23	0.061	0.003	0.002	0.061
Excavator	38	0.102	0.006	0.003	0.102
Bull Dozer	30	0.081	0.005	0.002	0.082
Grader	28	0.076	0.004	0.002	0.077
Backhoe	20	0.051	0.003	0.001	0.051
Dump Truck	20	0.051	0.003	0.001	0.051
Scraper	70	0.183	0.010	0.005	0.184
Drill Rig	95	0.254	0.015	0.007	0.256
Crane	27	0.071	0.004	0.002	0.072

GNP will investigate and employ best practices of air quality effect mitigation as well as address health and safety concerns regarding air quality within and in proximity to the project boundary during construction and the life of the project. GNP will actively engage Partners and Contractors to explore alternatives to retrofit their equipment and/or employ alternative fuel sources to reduce emissions where possible as depicted in Appendix 4.3.3.4 Diesel Retrofit Options and Fuel Alternatives.

4.3.3.5 Marine Traffic

Disruption of current marine traffic within the boundaries of Crémaillère Harbour is not anticipated to be significant. GNP will address the matter of potential resource conflicts caused by changes in marine traffic volumes and patterns during the period of directly related to construction and port activity in general as may affect recreational and commercial uses of the Harbour.

4.3.3.6 Fresh Water Access

In general a deliberate effort was made to skirt fresh water bodies and rivers in delineating the boundaries of the proposed GNP site. This site plan seeks to limit unnecessary encroachment on fresh water and as much as possible allow public access to the land and waters of the Crémaillère Harbour basin.

Access to rivers and bodies of fresh water within the boundaries of the proposed GNP project will be restricted as is required by the laws governing a port operating under Transport Canada regulation. This restriction will be addressed in the process of the public consultations. Public areas in proximity to historic sites will allow access to shoreline and beaches and areas such as Observation Point and the interpretive exhibit and panels sites. Where walking trails traverse streams and rivers access and fishing may be allowed as relevant regulations permit.

4.3.3.7 Marine Harvesting

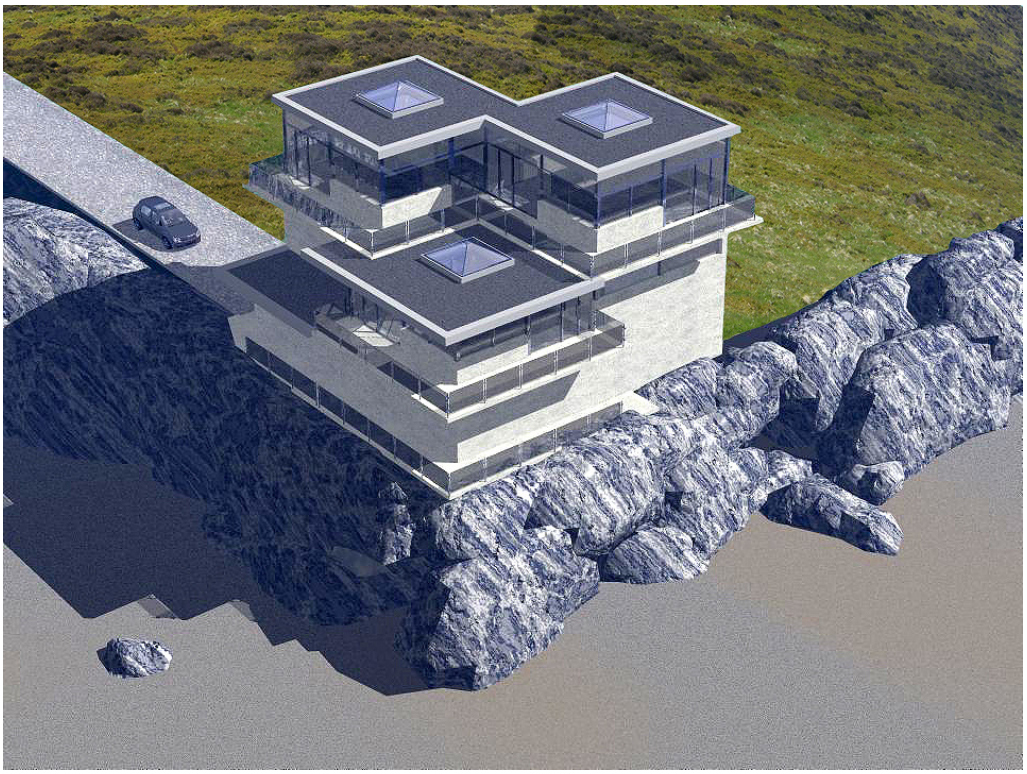
Fishing and marine harvesting within the limits and approaches of the harbour may be restricted but not necessarily excluded as affected by regulations governing the jurisdiction and operation of a Transport Canada regulated port. This restriction will be addressed in the process of the public consolations.

Note: Impacts of construction activities on marine habitat are considered in section 4.3.4 .

4.3.3.8 Recreational Trails

Walking trails will be constructed to allow access to historic sites and the public interpretive exhibits at the port administrative offices. ATV trails that currently traverse areas within the GNP project site will be diverted to allow access to public areas outside the port boundary fence. Where walking trails and/or ATV trails traverse proposed road construction and upgrades within and outside the project boundaries underpasses and/or marked crossings will be constructed. These trails will be depicted in the Site Plan and made available in meetings, on the project's web site and on site signs.

Figure 4.3.3.8 Rendering of GNP port offices. An interpretive exhibit featuring the historic sites at Cremaillere Harbour will be housed at the GNP port offices.



4.3.3.9 Hunting & Fishing

Hunting and freshwater fishing will not be permitted at any time inside the boundaries of the GNP project during construction. Every effort will be made to minimize disruption to hunting and fishing in surrounding areas.

Note: Impacts of construction activities on wildlife and freshwater habitats are considered in section 4.3.4.

4.3.4 Environmental Considerations During Construction

Historical resources overview assessment will be undertaken during the early stages of site development, and throughout the life of the project, to be assessed and/or monitored by a permitted Archaeologist. Topographic, geophysical & Bathymetry surveys; surveys would consist of land/site survey which would include a program of soundings or multi-beam sonar surveys to obtain the most up-to-date bathymetry.

4.3.4.1 Environmental Protection Plan

GNP will develop an Environmental Protection Plan (EPP) which considers all aspects and stages of construction of the port at Crémaillère Harbour. The EPP will list environmental issues and describe mitigation measures and practices for the use of 'processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste and reduce the overall risk to the environment or human health'. The plan will identify opportunities and provide detailed plans for recycling, wastewater treatment and disposal, composting, and solid waste disposal.

4.3.4.1.1 Avifauna Management Plan

As with any development project, site preparation and construction activity results in disturbances to wildlife. Of particular concern are effects on breeding avifauna in the area. To limit disturbances to avifauna species GNP will implement an Avifauna Management Plan (AMP) to be included in the EPP. The Avifauna Management Plan will be divided into three levels of protection: general mitigation measures, awareness measures, and directed surveys.

The GNP Avifauna Management Plan will survey and record both migratory and resident avifauna species and provide protection through mitigating measures according to applicable regulations and best practices. For each field survey associated with the implementation of the Avifauna Management Plan, the contracted firm will ensure the presence of at least one ornithologist with the support from other experienced field support technician. The report generated from the directed surveys will identify active nest sites within or adjacent to the clearing footprint of the GNP Project as well as individuals and populations. The AMP will detail incident reporting procedures and response protocols as well as measures to be taken including cessation of site preparation and/or construction operations.

4.3.4.1.2 Applicable Regulations

Protection of birds and raptors or avifauna and their nesting sites and habitat are governed by federal and provincial regulations; the Migratory Birds Convention Act (MBCA) and the Species at Risk Act (SARA) at the federal level, and the Newfoundland and Labrador Endangered Species Act (NLESA).

The MBCA protects migratory birds and their nests across Canada via the Migratory Birds Regulations (MBR) administered by the Canadian Wildlife Service (CWS) by authority of Environment Canada. The MBCA protects landbirds (e.g., warblers, thrushes, and sparrows), waterfowl (e.g., ducks, loons and geese), and waterbirds (e.g., gulls and terns). The MBCA does not protect grouse, ptarmigan, hawks, eagles, owls, crows or jays. The MBR prohibits the disturbance, destruction, or taking of the nest or shelter of a migratory bird, possession of a live migratory bird, or possession of the carcass, skin, nest or egg of a migratory bird.

SARA provides wildlife species protection against extirpation, extinction, or endangerment from human activity. Species at risk are classified by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as extirpated, endangered, threatened, or of special concern depending on the level of risk. This classification affords protection by prohibiting the killing, harming, harassment, capture or taking, or collection of a listed species, and the damage or destruction of a residence of a listed species.

The NLESA protects wildlife considered endangered, threatened, or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee. Under NLESA it is prohibited to disturb, harass, injure, or kill or, disturb or destroy the residence, or be in possession, of individuals of a listed species. There are currently 14 bird species listed under NLESA.

4.3.4.2 Land Use Area

During construction traversing of the site by equipment and human foot traffic during construction 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 foot print of development affected by construction will be revegetated with indigenous plants.

4.3.4.3 Erosion and Sedimentation

Erosion or the removal of soil is caused by wind, rainfall and surface runoff. Sedimentation is the deposition of soil particles suspended in water or airbourne. Excavation and exposure of soil to precipitation and runoff and wind during construction accelerates erosion. If not properly controlled sedimentation of watercourses and degradation of fish and wildlife habitat occurs.

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 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 GNP Project site including an inventory and assessment of water bodies and water courses. The ECCP will detail surface stabilization practices and provide detailed schematic drawings of drainage and sediment control structures. Measures taken to prevent erosion and sedimentation will include but are limited to the following:

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. Exposed areas within and beyond the final footprint of pavements and buildings will be watered, and/or covered or stabilized with temporary seeding, mulching or matting until these areas are recovered as re vegetated road verges, landscaped areas or replanted with indigenous plants.

Depending on the size of the disturbed area, the type of runoff (concentrated or sheet flow) and the volume of runoff, sediment control devices will include check dams, gravel filter berms, sediment control fences, straw bale filter barriers, sediment traps and settling ponds. The selection of measures to be taken and technology applied depends on site-specific criteria as described in the EPP.

4.3.4.4 Wetlands and Surface Water

A primary consideration in engineering of the GNP 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.

4.3.4.5 Nesting Sites

To prevent disturbance or destruction and harm to nests, eggs, and nesting birds during construction GNP will develop a preservation plan to be included in the EPP based on findings of a wildlife survey conducted by a qualified wildlife consultant. This individual or another equally qualified will be contracted to perform the duties of a wildlife officer during construction including observation and direction of measures as described in the relevant sections of the EPP.

Findings and recommendations resulting from the wildlife survey and contained in the EPP will provide information to planners and contractors of the location of nesting sites, and nesting habits, and behavioral patterns of indigenous birds. The EPP will describe measures to be taken to avoid destruction or harm to nests, eggs, and/or nesting birds.

Where nesting sites are known scheduling of construction operations will consider how best to reduce and mitigate

disruption or displacement of active nesting sites. Should a previously undiscovered active nest be encountered during construction, work will be stopped within a predetermined buffer zone and the wildlife officer consulted to determine the best course of action.

Where displacement of nesting sites is unavoidable, steps will be taken prior to nesting season to encourage birds to nest at another site. Netting and other measures will be taken to prevent birds from initiating nesting on structures and/or equipment, prior to nesting season.

4.3.4.6 Light Effects

Light effects during construction will affect the habitat, well being, and behavior, of all forms of terrestrial wildlife, marine life, birds, bats, and flying insects. Effects of artificial light on wildlife include collision with structures by birds caused by disorientation and attraction. Feeding habits and foraging and hunting routines and migratory patterns and life cycles of species are also affected by changes in light and may expose some species to higher levels of predation.

The Environmental Protection Plan will provide best practice guidelines, physical site measures, adaptive work scheduling and general principles to be applied in all aspects of light effect reduction including localization and intensity to be followed by all contractors engaged in the construction of the GNP Project. Measures taken may include but are limited to the following:

Where extended work hours are necessitated by schedules or tides, work lights will be concentrated in the area of construction. Peripheral light will be reduced as much as possible by barriers, direction and spot lighting. At night, only lights deemed necessary for safety, security, and site operations will be turned on.

Lights, including indoor lights radiating from windows, attract migrating birds many species of which migrate at night to avoid predation. Light is especially disorienting in low clouds or fog. Exterior window baffles, opaque curtains, blinds and unidirectional decals will be used where possible to reduce light.

4.3.4.7 Collision and Trap Hazards

According to Nature Canada "While the attraction of migrating birds to sources of artificial light and subsequent collisions is a serious issue... it turns out to be less significant than daytime collisions with glass." Environment Canada ranks window collision as the second highest cause of human related bird mortality. [27]

Due to the type and limited number of structures on site during construction, it is not expected glass collision will pose a significant risk to birds in daylight hours. Practices regarding collision caused by lit windows are covered under section 4.3.4.6. Measures to mitigate collision with buildings after construction is complete is addressed under operational considerations.

Where glass is used in construction buildings the following measures will be taken:

- Application of unidirectional decals entirely covering window glass.

- Use of frosted glass where more light is required for interior visibility safety requires

- Use of tinted or smoked glass or vertical louvers where transparency is required

During both construction it is possible that birds may be trapped in pipes, grates, etc. Pipes, especially vertical pipes, will be capped or screened immediately as installed. Where possible without impeding ventilation and water flow function grates and openings will be narrow enough to prevent birds from entering and being trapped. Otherwise measures to obscure and prevent entry will be taken as will be investigated and detailed in the EPP.

4.3.4.8 Construction Noise

Construction noise will affect, terrestrial, and marine life. Noise effects have two aspects; level and duration. Studies of startle response and behavioral changes among land and aquatic species also indicate pitch or frequency is a factor. Momentary and intermittent high levels of noise such as blasting and pile driving have different impacts than ongoing high noise levels such as stationary operation of heavy equipment during excavation.

The Environmental Protection Plan will provide best practice guidelines, and site measures such as sound barriers, as well as work scheduling and other methods and practices of noise effect mitigation to be applied in all aspects of site preparation and construction to be followed by all contractors engaged in the construction of the GNP Project.

4.3.4.9 Blasting

Blasting Regulations and best practices will be followed by all contractors engaged in the construction of the GNP Project. The handling and transport of explosives will be conducted as per the Explosives Act (Canada), the Fire Prevention Act, 1991 and the Dangerous Goods Transportation Act. The effects on terrestrial blasting will be mitigated principally by the use of best practices in blast design, stemming and matting. Impacts of blasting near and under water are shown to be potentially catastrophic on aquatic populations. The EPP will outline current recommended mitigation measures for use of explosives beneath or near water. Measures taken may include but are limited to the following:

Blast Planning

1. Evaluation of the need to use explosives.

2. Use of practical alternatives where practicably available.

3. Minimize the total number of shots and weight of charges per shot.

4. Use angular stemming of drill holes to reduce energy dispersal to the aquatic environment.

5. Use staggered and delayed detonation to reduce blast pressure.

6. Avoid the use of submerged detonation cord.

7. Use air decking to distribute and reduce pressure.

Biological Measures:

1. Conduct survey of fish and aquatic species diversity and population.

2. Conduct mathematical mortality modeling to determine magnitude of potential impacts.

3. Develop mitigation plan based on predicted impacts

4. Schedule blasting to avoid migrations, spawning, spawning beds, or larval drift.

5. Use real time detection (hydro acoustics) to detect fish congregations.

6. Use non-explosive noise techniques to move fish from the immediate blast zone.

7. Employ qualified fishery observer, to direct blasting and use of mitigation techniques.

8. Use of bubble curtains or barriers where excessive fish mortality is likely or endangered species present.

4.3.4.10 Solid Waste Disposal and Recycling

Food and beverage wrapping and containers and all other solid waste and recyclable materials associated with human activity will be collected in designated covered receptacles. Compostable materials will be held in separate plastic containers inside and in bear-proof steel boxes outside site buildings. Practices and procedures for the handling and disposition of solid wastes according to best practices and applicable regulation will be detailed in the EPP. All solid waste will be removed to a composting site, recycling facility, or landfill site as determined by the approved EPP and/or applicable regulations.

4.3.4.11 Scrap Construction Materials

Where possible scrap material will be stored, for possible re purposing, reuse, resale, recycling, or donation. Waste materials not reused, resold or recycled, will be disposed of indicated by the approved EPP and/or applicable regulations.

4.3.4.12 Wind Blown Construction Materials

Windblown materials such as plastic wrap, styrofoam scraps, and siding cuttings will be contained during construction by fencing and netting around localized sites and the perimeter boundary. Ongoing surveillance and periodic clean up will ensure as little material as reasonably possible escapes or remains within and beyond the Project boundaries.

4.3.4.13 Hazardous Materials and Substances

Exposure of plants, birds, and wildlife to hazardous materials and substances and contamination of habitat will be prevented by appropriate containment and handling practices as described in the EPP. In the event of exposure or contamination immediate preplanned and remedial measures will be taken to mitigate impacts. In consultation with wildlife and fisheries agencies and in consideration of best practices, the EPP will detail measures to be taken and event-specific Standard Operating Procedures. These measures include but are not limited to:

- Dispatch of trained cleanup crew
- Notification of authorities where required
- Facilitation and assistance of capture and rehabilitation of affected wildlife.

The GNP site will be equipped with mobile spill response kits at all active on-land construction locations including equipment to deal with surface water and ground water contamination.

For the marine environment, spill kits, booms, skimmers and other spill response facilities will be provided according to applicable regulations and best practices for Transport Canada regulated ports. The capabilities of this equipment and SOP will be detailed in the EPP.

In regard to catastrophic offshore and near shore marine oil spill preparedness and response readiness the Government of Canada is providing funding for research and demonstration projects, co-funded with industry and research organizations to develop technologies and processes to optimize recovery of spills in marine environments. GNP recognizes the importance and sensitivity of the pristine Arctic environment to contamination and is actively involved in developing strategies to protect the Arctic for future generations.

GNP is in discussion with NRC regarding research into ice environment response strategies and will engage the Canadian Coast Guard in plans for cooperative response strategy for GNP and the Arctic. GNP envisions both seabourne and heavy lift airbourne spill response capabilities at Crémaillère Harbour. GNP will engage and work with indigenous peoples and territorial governments in line with federal government efforts to support Indigenous participation in marine emergency preparedness with the goal of developing a networked response strategy spanning the Canadian North.

4.3.4.14 Attractive Nuisance

A work site is an attractive nuisance for wildlife as well as humans. It has bright-colored equipment and structures, unusual odors and sounds. While fencing, signage, and security surveillance measures can prevent most human intrusions and injury these measures may not be effective for birds and wildlife.

The GNP site perimeter will eventually be enclosed by an eight foot chain link fence. During construction, temporary site fencing, light, noise and human activity will discourage most terrestrial animal intrusion. The EPP will detail measures to prevent intrusion and injury, particularly for threatened species. These will include but not limited to the following:

Polar bears are known to frequent the region around the proposed GNP project site. They feed mostly on seal and hunt on sea ice with a hunting range determined by ice conditions and seal numbers. Polar bears are very risk adverse. However they are also opportunistic foragers polar bears and routinely investigate their environment particularly when there is no movement or sound. Studies of polar bear behaviour in proximity to human habitation or presence indicate polar bear intrusions typically happen at night when noise levels are reduced.

Some measures dealing specifically with attractive hazards for birds are addressed in general in sections 4.3.4.6 Light Effects, and 4.3.4.7 Collision and Trap Hazards. These sections are indicative of approach. The EPP will address and detail measures specifically addressing endangered or threatened species such as the ivory gull and along with bird populations in general.

As part of the EPP and resulting awareness and training programs and mitigation measures GNP will investigate and implement best practices for discouraging and coping with bird and wildlife intrusions into construction site areas.

4.3.4.15 Exhaust Emissions

During the construction period airborne exhaust emissions will be produced by vehicles and heavy equipment. These emissions will be mitigated through:

1. Use of electric or hybrid vehicles and equipment and mechanical limiters where practicable
2. Scheduled inspection and maintenance of vehicles and equipment
3. Active discouragement of idling and necessary on-site traffic and use of vehicles and equipment
4. Signage and published operational guidelines and instructional briefings derived from the EPP

The EPP will detail numbers and types of vehicles and equipment to be employed during construction with estimates of cumulative emission component oxides and particulates.

4.3.4.16 Marine Traffic

Given the small amount of marine traffic in Crémaillère Harbour currently and historically; a comparatively significant increase in marine traffic in the Crémaillère Harbour basin and approaches will occur during the construction period. Impact mitigation measures to be taken during construction, such as speed restrictions and limits on marine traffic volumes operating in the harbour and other collision avoidance measures will be detailed in the EPP. 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 provide access to a qualified fisheries observer to observe and implement marine environment impact mitigation measures during drilling, blasting, pile driving, and excavation operations.

4.3.4.17 Sanitary Wastewater

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

4.4 Operational Overview

Because Great Northern Port will be a federally regulated international port, and for health and safety reasons certain operational activities will commence as soon as site preparation begins and carry on throughout the life of the project such as security, site and port administration, and environmental monitoring.

Other activities such as docking, and freight handling, related to basic port supply and refueling services will also begin in the early stages of development and operation. In earlier stages facilities for refueling and some other activities will differ from the fixed infrastructure used in long term port operations. Spill prevention and spill effect mitigation measures for refueling operations, for example, will follow Standard Operating Procedures detailed in relevant sections of the Environmental Protection Plan (EPP) covering both the temporary and permanent facilities as applicable.

The Executive of GNP have experience in operation of a Canadian regulated public port and the practices and procedures pursuant to Section 76 of the Canada Marine Act. GNP is also aware of environmental regulations regarding port development in Canada as referred to in the Canada Port Authority Environmental Assessment Regulations SOR/99-318.

The kinds and scope of activities described herein are as presently anticipated and estimated. Where not stated explicitly it is understood that GNP will operate the proposed port in accordance with all applicable regulations and environmental best practices as detailed in the EPP. Impacts related to the listed activities and effect mitigation practices and procedures will be detailed in the Environmental Protection Plan (EPP) and in the Environmental Emergency Response Preparedness Plan (EEPP) contained in the EPP. Operations not considered in the first iteration of the EPP will undergo separate registration and permitting as required.

4.4.1 Operation Activities Descriptions

4.4.1.1 Vessel Traffic

Projections and estimates of volumes of marine traffic and discrete and cumulative environmental effects will be detailed in the EPP. As mentioned above the Port will operate according to the Practices and Procedures for Public Ports including those 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.

4.4.1.2 Pilotage Risk Assessment

GNP will apply to the Atlantic Pilotage Authority to conduct a risk assessment according to the Pilotage Risk Management Methodology (PRMM) of the GNP harbour and approaches to determine whether there is a need for compulsory pilotage designation for the port. Areas of risk examined will include:

- degree of difficulty and hazard in the approaches and within the port
- size and number and maneuverability of vessels entering the port
- design of wharves, slips, and space available for maneuvering
- nature of cargo
- potential for incidental environmental impacts

If it is determined that compulsory pilotage is required no ship that is subject to compulsory pilotage pursuant to the provisions of the Atlantic Pilotage Regulations will be allowed to move within the harbour unless there is a pilot duly licensed by the Atlantic Pilotage Authority on board. Regulations relating to operations of the pilot boat will be cited in the EPP along with Standard Operating procedures specific to GNP.

4.4.1.3 Mooring and Berthing

Moorings, anchorage, and berthage will follow best practices to ensure least amount of disturbance to the sea floor and water column inside the harbour. Berthing will be favoured over mooring or anchoring unless a vessel has need of harbouring necessitated by weather or emergency and there is not sufficient berthage available in the harbour.

4.4.1.4 Drayage

Unloading, dockside handling, and short haul transport of cargo to on-site storage or laydown may take place at any time as determined by schedules and vessel traffic levels. This activity will cause noise and light effects primarily within the harbour basin. Scheduling of freight movement operations and other measures to mitigate light and noise effects as well as environmentally responsible equipment maintenance commitments to reduce emissions and to avoid contamination by fuel and lubricants or other hazardous substances will be detailed in the EPP.

4.4.1.5 Ship Refueling

Refueling operations will be carried out according to Transport Canada regulations and guidelines. Spill kits equipped to contain and recover spills on land or water will be maintained at all refueling sites. Standard Operating Procedures for refueling practices and spill response will be detailed in the EPP.[28]

4.4.1.6 Mechanical Repair / Machining and Milling

Mechanical repairs are anticipated to take place aboard ship or inside an enclosed shop. Should work be performed outside containment of fluids and spill cleanup will be done according to measures detailed in the EPP. Work done outside will be limited to daylight hours where possible. Where work such as welding must be done at night light barriers will be used where practicable. These and other effect mitigation measures will be detailed in the EPP.

4.4.1.7 Ballast Water Treatment

Because of the proposed port's location and growing interest and the possibility of increased marine traffic in the Arctic, GNP believes a land-based ballast water treatment facility at the port may be a possibility. Inclusion here is to suggest what type of facility among others may operate at the port.

Land-based ballast water treatment processes use conventional drinking water treatment processes and can achieve higher levels of treatment than the shipboard treatment systems. Another advantage of a land-based system is that it is easier to monitor discharges of onshore treatment plants. Compliance monitoring of shipboard treatment is proven difficult or ineffective.

The danger of ballast water spill either during unloading, transport, or storage will be mitigated by applying best practices and emergency spill response measures as detailed in the EPP. Models exist for handling procedures as land-based plants such as that at Valdez Alaska have been in operation for decades. Projected volumes and containment capacities along with details of treatment and disposal procedures will be documented in the EPP. [29]

4.4.1.8 Drill Mud Mixing, Storage, and Loading

The physical characteristics of the proposed Liquid Mud Plant (LMP) are detailed in section 4.2.9 of this document. Containment systems specified exceed existing legislated standards and will be verified to do so in the EPP. Handing procedures and best practices are well documented in industry guidelines for both mixture components storage and handing and mixed mud transfers. These guidelines will be documented in the EPP cross referenced with applicable Provincial and Federal Environmental and Health and Safety regulations.

4.4.1.9 Bulk Ore Loading/Offloading/Storage

Should bulk ore storage take place at the GNP port bulk ore storage will be under cover over top of an impermeable laydown surrounded by a catchment berm. Potential environmental effects include dust, noise and light, acidification and/or contamination through seepage and spill. Potential environmental effects specifically related to operation of offloading/loading, and storage of ore at the site will be detailed in the EPP along with mitigating measures SOPs.

4.4.1.10 Freight Handling, Laydown, and Warehousing

Freight handling and storage, either on outside laydown areas or enclosed, will have primarily light, noise and potentially ground contamination effects. SOPs and best practices will be documented in the EPP as well as response and remediation measures pertaining to ground contamination.

4.4.1.11 Security and Administration

Security and port administration operations will take place over the entire life of the project. Effects associated with these activities are primarily light effects and physical barriers in the form of fencing which will affect movement and foraging habits, and present collision hazards for birds.

It has been shown that marking fences significantly reduces bird collisions, particularly those by woodland grouse, and hence is a useful conservation technique. This effect mitigation measure will be examined and best practices determined prior to the planning stage of the Project and implement according to the findings which will be documented in the EPP. Measures to mitigate light effects are refereed to briefly in following sections and will be documented in the EPP with specific reference to security and administration operation practices.[30]

4.4.1.12 Vehicle Traffic

The environmental effects of commercial and passenger vehicle traffic within the site area, those being primarily noise and emissions and contamination of runoff from paved areas, will be considered and mitigating measures to be taken documented in the EPP. It is anticipated that movement of vehicles will tend to be generally intermittent and slow moving, primarily during daylight hours. Wildlife collisions will be rare due to the perimeter fencing, speed limits. Cautionary signage and reflective road centre line, lane marking, and shoulder delineation will be used where indicated to reduce the likelihood of wildlife collision and accidents.

4.4.1.13 Roads

Road repair and repainting, and road clearing and ice control measures are considered under the environmental effects of road maintenance during the operation of the GNP port site. Road maintenance effects will be documented along with mitigating measures and SOPs for implementation in the EPP. Road effects during construction and considerations in engineering and road use during operation stage of roads such as runoff are considered under section 4.3.

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 slat 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 deicer 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 deicers, improving the application and distribution methods, and allowing deicers sufficient time to work before plowing and reapplication.

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

4.4.1.14 Buildings

Buildings on the GNP 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. As relatively little airborne pollution is anticipated the principle sources of potential contamination of roof runoff are leaching of chemical compounds in roofing materials and deposited organic substances deposited on the roof; plant matter, insect matter, and bird excrement. The toxicity of this material is exacerbated by elevated temperature of stagnant water under direct sunlight.

GNP will promote the use of inclined metal roofing with non soluble reflective coatings. This approach reduces loading caused by freezing and drain damming in winter and microbial contamination in warmer months. Reflective coating will reduce artificial atmospheric warming. Rapid runoff will be mitigated by storm-capacity terraced catchments. Capture and repurposing of rooftop rainwater may be considered, however it is anticipated that the long periods of below freezing temperatures will render this option impractical.

Potential environmental effects related to the presence of the buildings and other structures at the GNP site, and mitigating measures and considerations will be documented in the EPP and considered and implemented where practicable in the planning and engineering of the project.

4.4.1.15 Supply and Services

The environmental effects of supply and services related to the operations of the port will be documented in the EPP in reference to operation of each facility. Where new facilities are added the relevant measures and SOPs etc. will be appended to the EPP and associated documentation. Effects may include but are not necessarily limited to:

- Transport of Hazardous Materials
- Refueling of Commercial Vehicles and Equipment (Liquid and Compressed Gas)
- On-site Equipment Servicing

4.4.1.16 Infrastructure Maintenance

The environmental effects of infrastructure maintenance as IT relates to the operations of the port will be documented in the EPP in reference to operation of each facility. Where new facilities are added the relevant measures and SOPs etc. will be appended to the EPP and associated documentation. Environmental effects of infrastructure maintenance during the operation of the proposed GNP port may include but are not limited to:

- Painting and Scaling
- Grass Mowing, Trimming,
- Brush Cutting and Removal
- Pressure Washing and Cleaning of Tanks
- Lubrication
- Repair of Curbs and Catchments and Concrete Structures

4.4.2 Operation Period

Port operations are projected to begin in 2025. At this point permanent docking, refueling, and other port service facilities will be in place. Construction of the graving dock and other larger facilities may be ongoing. Depending on whether a facility is under construction or operational, environmental measures and procedures are applied to areas of the GNP site as described under the relevant sections of the EPP for Construction and Operations.

Operations at GNP are projected to last into the foreseeable future. The impetus for the GNP project comes from the long term logistical requirements of the Canadian Navy and Coast Guard and the need for reliable supply lines serving Arctic communities. Arctic resource development both onshore and offshore will require reliable transportation and logistical supports by sea and air. As a deep-water, ice-free port GNP is a potential site for stockpiling of ore to allow year round shipments of ore originating from mine sites that are ice-bound for much of the year.

Destinational shipping is anticipated to increase in the Canadian Arctic, driven by increasing demand for seasonal re-supply activity, expanding resource development and tourism.

2020 Future Scenario for the Northwest Passage (NWP) and the Canadian Arctic (from AMSA Report 2009)

These activities will all require real time navigational data and information pertaining to weather, currents, and ice delivered by communications systems that overcome the limits of current technologies. As mentioned in other sections of this document, GNP is engaged in discussions with leaders in communications and navigation technologies research and development who have shown an active interest in the GNP project as a northernmost base.

Environmental Concerns

Scientists and indigenous communities contend that in the absence of good governance, detailed navigation charts, sufficient ports, effective oil spill cleanup technology, and timely search and rescue responses, an Arctic shipping boom could lead to a catastrophe. Experts note that cleaning up an oil spill in waters partially covered by ice would be more complex than cleaning up the Exxon Valdez.

Environmental concerns voiced by indigenous leaders and scientists point to the need for "timely response" to oil spills; a need best met by close proximity. As a Northernmost ice-free port GNP is well positioned to become one of a network of "sufficient ports" to address those concerns.

Scientists also worry that noise from Arctic ships could put marine mammals such as narwhal, beluga, bowheads, and polar bears in harm's way or drive them off traditional hunting grounds.

It is now becoming clear that interest in Arctic shipping never really faded, as a host of countries including Russia, China, Iceland, Canada, and the United States continue to make preparations to turn the rapidly warming Arctic into a busy global shipping route. Future volumes and types of shipping transiting the Northwest Passage (NWP) are unknown. Impacts such as noise, emissions, and disruption of ice crossing and migration routes and hunting routines caused by ice breaking are cause for concern.

The impact of the presence of the port is more likely a reduction in distances traveled by vessels that will be venturing into the Arctic regardless of whether the port is available or not. Bulk fuel storage and refueling service at GNP means some large tankers may need not venture any farther into the Arctic and can offload before entering the offshore ice fields.

Impacts of marine traffic detailed in the EPP will be based primarily on projected volumes for offshore exploration, bulk ore shipments, and military and Coast Guard operations. Commercial shipping volumes will also be considered although near term projections are not significant and ships transiting from Asia to Europe will likely bypass the port.[31]

4.4.3 Infrastructure and Utilities

4.4.3.1 Utility Buildings

The construction of the utility buildings will be a combination of pre-fabricated buildings, oil field supply services, and maintenance and warehouse type structures, and conventional construction for storage buildings. Constructed buildings will be comprised of concrete foundations, steel framing and metal siding. All buildings will be equipped with electrical and mechanical systems. The number of buildings required and the type of building will be dependent on the number of companies leasing space at the marine base.

4.4.3.2 Site Drainage

During the operational stage of the project drains and drainage systems will require cleaning and clearing of brush and debris. Where flushing is required debris will be caught and disposed of appropriately. Contaminated will not be allowed to overtop or to run into natural surface water and will where necessary be siphoned into containerized transport to suitable disposal site.

4.4.3.3 Water Supply and Sewage

Beyond filtration and normal treatment operation of the water supply is not anticipated to have significant impacts. The biofilter septic systems will require periodic maintenance, at between two and four year intervals. This process is non locally impacting and will be done according to Service NL standards.

4.4.3.4 Power Supply and Site Lighting

Electrical power will be supplied via the provincial power grid through a link to the Muskrat Falls transmission corridor.

Lighting can cause mortality among bird populations; disorientation, confusion of biological rhythms and death by exhaustion from circling brightly lit buildings (Bailey et al, 2004). The lighting on-site, both building and roadway lighting, will be engineered to minimize any negative impact for the avian wildlife. Road and entrance lighting will be supplied by poles connected to the power distribution system and placed throughout the facility to supply sufficient roadway lighting and to illuminate specific work areas as required.[32]

In consultation with all applicable Departments and GNP Engineering team will it be determined the exact placement of lighting and lights to be utilized within the project area and specifications required for intensity of bulbs, height of towers, light covers and all other attributes that will ensure the safety of personnel working on site as well as to mitigate all avian mortality associated with inadequate site lighting.

During night operations, wharf and site yard lights will be turned on based on operational requirements and will provide sufficient illumination to conform to safety regulations. During night time non-operating hours 1 foot-candle illumination will be initiated. Lighting will be directed downward, away from guards, surveillance cameras, navigable waterways, or the approach to any berthing areas. The pattern and strength of the light produces high contrast with few shadows.

4.4.3.5 Fencing

The perimeter of the site will be fenced in accordance with Transport Canada guidelines and will, at a minimum, include:

- Perimeter fences, and gates, will be constructed of galvanized chain-link, 7 feet in height including a 3-strand barbed wire extension 1 foot above the fence.
- Fence bottoms are within 2 inches of the ground.
- On site areas deemed 'Restricted Areas' will be secured by the same fencing criteria as the perimeter fencing.

4.4.3.6 Communication and Security Systems

Communications Devices for Security Personnel will consist of Land Lines, Marine fixed and portable VHF radio, and Cell Phones. During normal operations a combination of phones and VHF radios are used on both the dock and work areas. Should a power outage occur only Cell Phones and portable VHF radios will be used for communications devices. The cell phones and portable VHF radios are equipped with batteries and during extended power outages an on site generator will be used to charge the systems.

Communications between Ships' Security Officers and the PFSO (Port Facility Security Officer) is established during the initial meeting upon arrival of the vessel. Communication protocol will be contained within the PFSP.

The Berthing Area will be equipped with video surveillance cameras allowing all areas of the Berthing Areas to be scanned, as well as all roadways, buildings and perimeter fencing and much of the area outside the perimeter fences. Video cameras will be operated remotely and cameras will be on continuous recording. The cameras will be monitored both manually and remotely when Security Personnel are on duty. GPS tracking devices will be installed on all commercial vehicles on site so as to ensure exact location can be determined at any time.

4.4.3.7 Fire Protection

Site wide fire protection will be provided by a series of hydrants placed throughout the yard and berth area. Individual buildings will be protected by standpipe systems as dictated by the local authorities.

4.4.3.8 Waste Disposal

Any/all garbage, waste, oil, sludge and hazardous waste will be collected and assessed to determine the most environmentally friendly way to dispose of each item. Items will be treated in accordance with the Environmental Act. Items will be re- purposed or re-cycled where ever possible to reduce the impact on landfills. Waste Materials that can not be re-purposed or recycled will be disposed of at an accredited Waste disposal in accordance with the criteria outlined by Service Newfoundland and Labrador.

GNP Inc will create and implement a Waste Management Plan (WMP) that will satisfy all requirements contained within the Environmental Act regarding proper and safe waste disposal in accordance with the Dept of Environment, the requirements of the Town of St. Anthony, WHMIS and any/all other governing bodies as required. Contained within the WMP and addressed in specific detail GNP Inc will at minimum include:

- Detailed descriptions of all potential waste materials that could be encountered at the site.
- Specific identification and disposal criteria for each and every waste items
- Items deemed Hazardous/dangerous will have very specific disposal criteria associated with it based on it's identity.
- Locations of all storage containers for all waste items.
- Storage containers for dangerous/hazardous goods will be clearly outlined on a site map, contained within the WMP.
- The site map to indicate storage locations and will be depicted in red.
- Hazardous goods site maps will be located throughout the site for ease of viewing should an accident occur.
- Hazardous materials storage containers will be located in areas of the site that will afford the best protection for the environment and persons on/off site as well as to mitigate and potential disaster,
- Staff Orientation to educate all on the types of waste and hazardous materials they could potentially encounter and specific criteria to identify the dangerous/hazard product. Only after correct identification can the product be adequately disposed of.
- Post waste item identification the criteria will be set for the handling, storage, transport, treatment and disposal of the waste product.
- Specific criteria will be outlined that has to be adhered to for the disposal of any/all waste materials deemed dangerous goods and/or hazardous waste. This criteria will include all registrations, paperwork and all applicable guidelines that must be adhered to as per WHMIS.
- Ongoing training programs for all staff to educate and update on any new strategies for the proper handling of hazardous/dangerous goods.
- Quarterly drills to keep all staff familiar with proper care, handling and disposal of hazardous materials.

4.4.3.9 Compressed Air

Compressed air will be provided by a system of on site compressors and will be used to operate the pneumatic systems for loading solid bulk materials onto offshore supply vessels.

4.4.3.10 Containment Systems

Containment systems will be required at the fuel storage facility and the chemical storage areas in accordance with the requirement of the Provincial Department of Environment.

4.4.4 Vessel Traffic and Navigation

The recognized authority for navigational guidelines is the Permanent International Association of Navigation Congresses (PIANC). The selection of appropriate design criteria is a complex task, which requires consideration of several factors including meteorological conditions, environmental conditions, vessel characteristics, etc. Such a detailed analysis is not considered warranted at this time. It may require the use of navigation simulators.

4.4.5 Health, Safety and Environmental Management Systems

The Environmental Protection Plan (EPP) will detail considerations and Standard Operating Procedures for currently anticipated port activities. As operations change over time, new activities are introduced, or improved effect mitigation measures become available, the EPP will be updated and/or appended and the table of contents revised. Each new undertaking will require its own registration and permitting process.

An integral part of the EPP, the Health, Safety and Environmental Management System (HSEMS) will document policy and define Environmental, and Health and Safety responsibilities and commitments and procedures to be applied to all operational activities.

The HSEMS will be designed to ensure project activities are carried out according to environmentally-responsible best practices, with minimum adverse impact on the natural environment, or human health and safety. The proponent will ensure the HSEMS is known to all project personnel, the port owner/s, their consultants, vendors, contractors, and operators and that they are aware of and understand environmental responsibilities and applicable Standard Operating Procedures as defined in the HSEMS. The conditions of the HSEMS will be applied in planning, engineering, construction, operation, and decommissioning of the Project.

As part of the HSEMS, the Environmental Emergency Preparedness Plan (EEPP) will provide rapid notification and response SOPs for spill response and other emergency situations that may occur during the construction, operation, and decommissioning of the Project.

4.4.5.1 Scope

An all encompassing Health, Safety and Environmental Management System (HSEMS) will be developed and implemented on day 1 in the life of the project.

4.4.5.2 Objective

To ensure that all project activities are carried out in an environmentally-responsible manner, with minimum adverse impact on the environment, human health and safety during all phases of the project. To ensure that all project personnel, including the owner, their consultants, vendors, contractors, and operators are aware of and understand their environmental responsibilities when conducting their respective activities associated with the Project. The local environmental conditions will affect, and must be considered in, the design of the project components, the construction methods, and operations and decommissioning of the Project. The Project will be designed and constructed with full consideration of the environmental setting and sensitivities.

4.4.5.3 Relevant Codes and Standards

Where applicable design of the port facilities will be in compliance with the following codes and standards:

- American Association of State Highway and Transportation Officials (AASHTO)
- American Iron and Steel Institute (AISI)
- American National Standards Institute (ANSI)
- American Petroleum Institute (API)
- Recommended Practice for Planning, Designing (API RP 2A-LRFD) and Constructing Fixed Offshore Platforms – Load and Resistance Factor Design
- Specification for Fabricated Structural Steel Pipe (API SPEC 2B)
- Specification for Line Pipe (API 5L)
- Carbon Steel bolts and Studs (ASTM A307)
- Structural bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength (ASTM A325)
- Part 1: British Standard Code of Practice for Maritime Structures – Part 1 General Criteria (BS 6349)
- Part 2: British Standard Code of Practice for Maritime Structures – Part 2 Design of Quay Walls, Jetties & Dolphins (BS 6349)
- Part 4: British Standard Code of Practice for Maritime (BS 6349) Structures – Part 4 Design of Fendering and Mooring Systems
- CAN/CSA-S6: Canadian Highway Bridge Design Code (CHBDC)
- CSA A23.1: Concrete Materials & Methods of Concrete Construction
- CSA A23.2: Methods of Test for Concrete
- CSA A23.3: Design of Concrete Structures
- CSA A23.4: Precast Concrete – Materials and Construction
- CAN/CSA-S16.01: Limits States Design of Steel Structures
- N/CSA G40.20 General Requirements for Rolled or Welded Structural Quality Steel
- CAN/CSA G40.21 Structural Quality Steels
- CSA S37 : Antennas, Towers and Antenna Supporting Structures
- CISC Handbook of Steel Construction
- CISC Design Guide for Hollow Structural Section Connections and Trusses
- CPCA Concrete Design Handbook
- NBCC National Building Code of Canada
- NFCC National Fire Code of Canada
- NFPA National Fire Protection Association
- Fire Commissioner of Canada FC No. 373 Standard for Piers and Wharves
- OCIMF : Oil companies International Marine Forum
- Permanent International Association of Navigation Congresses (PIANC)
- SSPC Steel Structures Painting Council Transport Canada TP 743 : Code of Recommended Standards for the Safety and Prevention of Pollution for Marine Transportation Systems and Related Assessment Procedures (TERMPOL CODE)
- Workplace Hazards Materials Information System (WHMIS)
- Canadian Foundation Engineering Manual

In accordance with the applicable rules and regulations of the NFPA, the National Electrical Code, OSHA and API RP-500. All material and equipment shall be new and in accordance with Ul, ANSI, IEEE, NEMA or applicable Standards.

Fire Protection and Life Safety Systems and equipment in accordance with the best practices of industry. The protection systems shall conform to applicable codes and standards of the National Fire Protection Association (NFPA).

4.4.5.4 Health, Safety and Environment Management Systems

The Proponent's Health, Safety and Environmental Management System (HSEMS) is the principal mechanism by which GNP will integrate the project activities including design and engineering, construction and operation with the environment. The Permitting, Approval and Authorization requirements, Environmental Protection Plan (EPP) and Emergency Preparedness Plan are key elements of this HSEMS and the Proponent representatives, contractors/vendors and other project personnel are responsible for ensuring they are familiar with and abide by these requirements. Detailed Project–specific Environmental Management Plans will be developed as part of the proposed Project Environmental Management System.

Environmental Protection Plan (EPP) to include, at a minimum:

- Waste Management
- Water Management
- Noise and Dust Control
- Air Emission Control
- Marine Safety
- Emergency Preparedness
- Community Liaison

The above EPP will be prepared and implemented for all project activities, i.e., Construction and Operations. A specific Occupational Health and Safety Plan will also be developed under the HSEMS to ensure the undertaking is carried out in accordance with the Occupational Health and Safety Act and Regulations. These measures will provide the necessary equipment, systems and tools to ensure a safe workplace is maintained and that proper information, instruction, training, supervision, and facilities

4.4.5.5 Permits, Approvals and Authorizations

An initial list of the required permits, approvals and authorizations has been identified in section 5.1. Contractors will submit a list of all required permits, authorizations, licenses and certificates to the Company's Representative upon award of contract. Contractors will be responsible for obtaining all permits, approvals, authorizations and certificates directly related to their contract activities, which were not identified as being the responsibility of the Proponent/Owner or Company's Representative. The Vendors/Contractors will also identify any additional permits, approvals, authorizations and certificates that do not appear on the above mentioned list. The Contractor will submit their respective applications to the Company's Representative, in sufficient time prior to the date required to commence on-site activities.

4.4.5.6 Documentation

Documentation submitted in support of, and copies of the permits, approvals and authorizations obtained by the Proponent/Owner, Company's Representative and Contractors will be maintained at the site and at the offices of the Owner and/or Company's Representative and for the duration of time as outlined by the applicable Governing Bodies and/or submitted to the applicable Governing Bodies as legislation dictates.

4.4.5.7 On-Site Monitoring and Control

The Contractor including all their sub-contractors/suppliers and associated personnel will be responsible for the implementation and compliance with all conditions specified on the permits, approvals or authorizations and practices and procedures identified in the EPP.

4.4.5.8 Emergency Preparedness Plan

As part of GNP's HSEMS, an Emergency Preparedness Plan will be developed and implemented during all phases of the Project and continue for the life of the project. The Emergency Preparedness Plan will provide an appropriate and consistent response to emergency situations that may occur during the construction, operation, and decommissioning of the Project. As stated in GNP's commitment, the proponent is dedicated to making investments in infrastructure to enhance the response capacity to environmental threats or accidents as will be thoroughly addressed within the Port Facility Security Plan.

The Port Facility Security Plan (PFSP) is designed to put into practice Security requirements as required by the Government of Canada as contained in the Marine Transportation Security Regulations, made pursuant to the International Ship and Port Facility Security (ISPS) Code. GNP Inc., in conjunction with Transport Canada, and all applicable governing bodies, will implement a PFSP that will be reviewed at least annually with any changes submitted to Transport Canada for approval prior to implementation.

Facility Security can be defined as those measures employed to protect against seizure, sabotage, piracy, pilferage, or terrorism. It can also be considered as embracing all measures taken to prevent interference with lawful operations. It must also include measures to prepare to respond to breaches of security. Agencies that may be involved in dealing with a security incident or a breach of Facility Security include police agencies (Federal & Municipal), GNP Port Authority, Fire Dept. other applicable local emergency response agencies, and Regional offices of the Government of Canada.

The PFSP is an all-encompassing document that contains all information related to the Port operations and is governed by Transport Canada. PFSP to include but not limited to the following:

- Detailed description of the duties of the Marine Facility Security Officer (MFSO)
- Port/Dock Inspection criteria to be conducted by the MFSO.
- Duties of the Security personnel.
- Security levels and relevance of change in Marsec security levels 1, 2 and 3.
- Detailed physical security criteria
- Video communication, surveillance systems and intruder alert systems
- Security Check criteria
- Security incidents and breaches of security
- Key control/access control
- Identification procedures
- Vehicle control and parking
- Cargo Security
- Waterside security
- Training and security awareness
- Drills and exercise
- Record compilation and storage
- Response procedures

4.4.6 Fire Fighting / Emergency Preparedness

Emergency Preparedness and fire-fighting will be addressed in the site PFSP and the Environmental Protection Plan (EPP). Site-specific plans will be developed in accord with provincial regulation, and in consultation with the Fire Commissioner, and Emergency Measures Office (EMO). Fire emergency response and preparedness will be addressed in the HSEMS as part of the Environmental Protection Plan in reference to a discrete Fire Emergency Response Preparedness document. Emergency response and evacuation plans, will follow provincial Occupational Health and Safety standards the Fire Commissioner and EMO, and will, based on prioritized risk assessment criteria, detail measures to be taken in the event of a fire emergency and, where possible, protect and prevent damage to wildlife and terrestrial, fresh water and marine environments.

4.4.7 Potential Effects on the Environment

Potential interactions with the Project during operation activities may include those associated with:

- General Safety
- Noise Effect
- Visual Effect
- Lighting Effect
- Odour Effect

General safety will be covered within the PFSP, it is an all-encompassing document that will be created by the GNP Port Authority and will be Federally regulated adhering to the strictest guidelines as set out by Transport Canada. After completion the PFSP will be submitted to Transport Canada for final approval prior to implementation.

For security and safety reasons, site access will be restricted to persons working or engaged in port business. Persons and vehicles requiring access to the site, will be vetted prior to entry at the security gate by Security Personnel before gaining access to the Facility.

4.4.7.1 Noise Effect

Noise impact on the human residential population will be mitigated due to the distance of Crémaillère Harbour from the adjacent community. The external limits of noise for residential area is 40 decibels (db). Any noise- generating activities exceeding 40 db would have to be 60 metres away from residential areas to not exceed the external noise level limits. (Lloyd's Register ODS, 2010)

Blasting, pile driving or other high level noise-creating operations will occur during normal work hours between the daylight hours of 0800-1500 hours. On-site noise impacts will be mitigated by the appropriate ear protection as per Occupational, Health and Safety (OHS) Act and will be monitored by OHS staff on site.

Blasting, and other noise related activities, in close proximity to marine life can have a detrimental effect on the swim bladder of fish and their internal organs if blasting occurs in close proximity to their habitat. Post-acquisition a Marine habitat survey will be completed to determine the marine species present in/around Crémaillère Harbour.

The most effective means of noise effects on human populations is to use a “setback”, or minimum distance to human habitation. Where humans work near sources of high noise, ear protection can be used. Given the distance of the port from the nearest residential areas of St. Anthony and the topography of the harbour basin, noise disruption is not anticipated to be a problem. Noise levels studies and field testing results and recommendations will be documented in the EPP.

Noise will affect, terrestrial, marine life, and bird, habitat, behavior, and well being. Noise effects have two aspects; level and duration. Studies of startle response and behavioral changes among land and aquatic species also indicate pitch or

frequency is a factor. During operations at the port certain activities; loading and unloading of containerized freight, movements of equipment such as trucks, fork lifts, sounding of ship horns and equipment back-up beepers, etc. will cause noise effects especially during daylight hours.

The Environmental Protection Plan will provide best practice guidelines, and site measures such as sound barriers, as well as work scheduling and other methods and practices of noise effect mitigation to be applied in all aspects of operations to be followed by all persons and companies engaged in port operations. Noise effect mitigation measures including reduction of noise from equipment through use of suppression devices and operation practices and site sound barriers will be detailed in the EPP.

4.4.7.2 Visual Effect

Given the distance of the port from the nearest residential areas of St. Anthony and the topography of the harbour basin, the visual impact of the port for the human population is anticipated to be minimal. If necessary three dimensional models of insitu buildings and structures can be rendered simulating typical distances and positions likely to be experienced by local residents. These renderings will provide a preview of what if any visual impact the port structures and light effects will have on human populations.

Figure 4.4.7.2.a The North shore of Crémaillère Harbour rises over 140 metres or about 460 feet from the harbour surface.

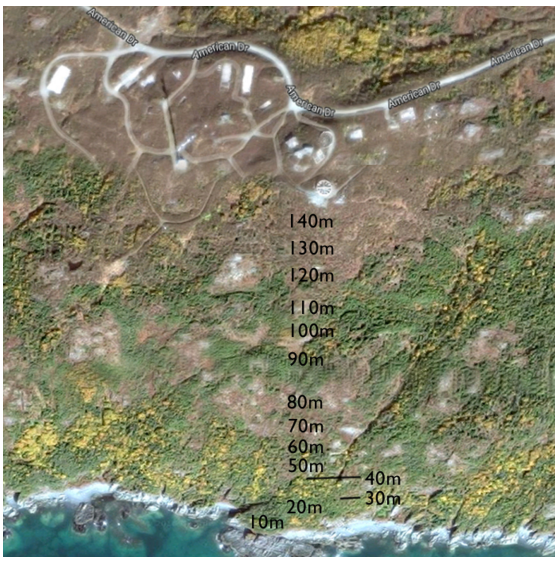


Figure 4.4.7.2.b Crémaillère Harbour basin is over 1.5 km from the closest residences in the Town of St. Anthony.

4.4.7.3 Light Effect

Light effects during operation of the Port will affect the habitat, well being, and behavior, of all forms of terrestrial wildlife, marine life, birds, bats, and flying insects. Effects of artificial light on wildlife include collision with structures by birds caused by disorientation and attraction. Feeding habits and foraging and hunting routines and migratory patterns and life cycles of species are also affected by changes in light and may expose some species to higher levels of predation.

The Environmental Protection Plan will provide best practice guidelines, physical site measures, adaptive operation scheduling and general principles to be applied in all aspects of operation to mitigate the effects of light including localization and modulation of intensity to be followed by all persons and companies engaged in the operation of the GNP Project.

Light effects will be mitigated by limits on use and distribution of light as detailed in the EPP. Measures taken may include but are not limited to the following:

• Where extended work hours are necessitated by schedules or tides, work lights will be concentrated in the area of operation.

• Peripheral light will be reduced as much as possible by barriers, direction, and spot lighting.

• At night, only lights deemed necessary for safety, security, and site operations will be turned on.

• To reduce distraction and disorientation caused by light from windows buildings on the GNP site exterior window baffles, opaque curtains, blinds and unidirectional decals will be used where possible to reduce light.

4.4.7.4 Odour Effect

Airborne exhaust emissions will be produced by vehicles and heavy equipment. Emissions will be mitigated through:

- Use of electric or hybrid vehicles and equipment and mechanical limiters where practicable
- Scheduled inspection and maintenance of vehicles and equipment
- Active discouragement of idling and necessary on-site traffic and use of vehicles and equipment
- Signage and published operational guidelines and instructional briefings derived from the EPP

The EPP will detail numbers and types of vehicles and equipment to be employed during construction with estimates of cumulative emission component oxides and particulates.[33]

4.4.7.5 Collision and Trap Hazards

Environment Canada ranks window collision as the second highest cause of human related bird mortality. To prevent bird collision with windows and buildings the following measures will be taken:

- Application of unidirectional decals entirely covering window glass.
- Use of frosted glass where more light is required for interior visibility safety
- Use of tinted or smoked glass or vertical louvers where transparency is required

It is possible that birds may be trapped in vent pipes, grates, etc. Pipes, especially vertical pipes, will be capped or screened. Ventilation and water flow function grates and openings will be narrow enough to prevent birds from entering. Measures to obscure and prevent entry will be considered in the planning and engineering of port infrastructure.[34]

4.4.7.6 Avifauna Management Plan

To limit disturbances to avifauna species caused by the various operations at the port GNP will document, distribute and implement the Avifauna Management Plan (AMP) to be included in the EPP. (See 4.3.4.1). Throughout the GNP site, in all aspects of operation, and for the duration of the GNP project, the principles and objectives of the EPP and the Avifauna Management Plan will be an integral part of GNP Standard Operating Procedure.

GNP will provide protection for both migratory and resident avifauna species according to applicable regulations and best practices. In accordance with the AMP where active nest sites are identified within or adjacent to the footprint of the GNP Project persons involved in all operations will, according to AMP reporting procedures and response protocols, take prescribed measures including where necessary cessation of operations and establishment of a delineated buffer zone.

4.5 Employment Criteria and Strategies

GNP will adhere to all attributes contained within, and not limited to:

- Canadian Labour Code
- WRDC
- OAWA
- Labour Legislation
- OHSS
- WHMISS
- Canadian Human Rights Activities

GNP will be an equal opportunity Employer and will endeavour to target and attract higher participation among Women throughout the life of the project for all employment opportunities especially those that are deemed non-traditional for Women.

In conjunction and consultation with the Women in Resource and Development Corporation (WRDC) and the Office to Advance Women Apprentices (OAWA) GNP will foster a communication process and create a GNP Development Plan to address Women's Employment Strategies. Whereby Woman can access all information related to potential employment opportunities, as well as future opportunities, and provide access to any/all training requirements or education requirements that could potentially prepare them for upcoming employment opportunities should they not be currently qualified. An annual meeting with all proponents to review contents of the GNP Development Plan and report on successes and areas requiring improvement.

GNP will enlist WRDC and OAWA to facilitate Contractors where necessary on the sourcing of qualified tradeswomen and apprentices.

GNP Inc will ensure that early engineering and planning will encompass the universal design components necessary to provide an all-inclusive workplace usable by all regardless of age, size or ability. Accessibility regulations for buildings, parking lots, parking spaces, ramp grades, floors and counters will be adhered to and form part of GNP Inc's mandate of an 'all-inclusive' workplace.

Washrooms and change facilities, where applicable, will be available for Male, Female and Gender neutral employees.

As part of Employee orientation Workplace diversity training will be conducted for all employees and Contractors to help support an inclusive and supportive workplace environment. GNP will implement a zero-tolerance discrimination and harassment policy. GNP will have a zero tolerance policy for anyone who condemns any other person based on colour, gender, religion, nationality or political views.

As part of the tender process Contractors vying for a specific project will have to outline in detail their Women's employment strategies, targets, potential apprentice and training opportunities. Preference will be given to those tender applicants that exhibit and foster, Women in the workplace as a Societal priority.

GNP hiring practices will be such that Residents of Newfoundland and Labrador will be given priority based on their abilities to perform the specified job for which they are applying. GNP does not anticipate having to go extra-provincially to fulfill any job placements and will do so only after it has exhausted the job pool provincially or a specialized area is required that can not fulfilled inter-provincially.

4.5.1 Occupations

GNP will be engaging a diverse consortium of Individuals, Groups, Companies and Organizations to fulfill the requirements in bringing the project from inception to completion. A host of experts, trades people, apprentices and Journey persons will be engaged to bring the project to fruition. Each phase of the project will require input from varying sources with specific areas of expertise. Following is a list of Employment opportunities, to include but not limited to, that GNP and their affiliated Partners are likely to employ, either part/ full time, contractual, consultative or as Partners.

- Surveyors
- Archaeologists
- Marine Biologists
- Geologists
- Engineers (Construction, Civil, Marine)
- Procurement
- Contractors (Road)
- Contractors (General)
- Housing requirements and opportunities contained therein.
- Supervisors
- Crane Operators
- Heavy Equipment Operators
- Truck Drivers
- Labourers
- Power Linesmen
- Electricians
- Plumbers
- Welders
- Millwright/Carpenters/Painters
- Security Officers
- Administration
- Stevedores

Details the phased employment opportunities and the anticipated duration of each phase. Employment duration would be subject to completion of the specific task and could be extended of shortened pending job completion.

Construction work will be tendered locally, where practicable, and tenders awarded based on the ability and expertise of the Contractor to complete the project within the tender guidelines and within the applicable time lines. Successful Contractors will be responsible for utilizing their own workforce and/or hiring the required personnel to complete their specific project.

GNP will be responsible for, and oversee, the hiring of all Management related to the Development to include, at a minimum, Project, Controllers, Construction and Operations Management.

4.5.2 Construction Employment

Through preliminary Construction consultation it has been estimated that between 75-100 job opportunities will be created during the construction phase of development.

During the Construction phase quarterly employment reports will be compiled from all Contractors, as well as GNP, and submitted to AES. Reports to include, at a minimum:

- Total employment numbers by 4 digit National Occupancy Classification (NOC) code
- Full/Part-time employment numbers
- Location and source of workforce
- Employment by gender
- Number of apprentices and journey persons for each NOC

It is anticipated that the demand for accommodations through the Construction phase of development will surpass the accommodation availability in the immediate area and therefore accommodations in the form of a work camp will be required during the Construction Phase.

The successful tender will be experts in providing accommodations and services to remote commercial site locations and will be responsible to provide accommodations and services in each phase of the camp from initial construction to permanent accommodations as need dictates. Additionally, the successful tender will be responsible for all applications, permits and any/all requirements for the inception, management and decommissioning on the Commercial Camp.

4.5.3 Operations Employment

Throughout the life of the operations the job opportunities will be a cumulative process with each phase of development adding additional job opportunities targeting a wide range of professionals over a wide range of areas of expertise. It is anticipated that the maximum number of opportunities throughout the life of the project will exceed 350 positions. Employment positions will be provided by Contractors, Sub-Contractors, Partners and GNP Inc.

GNP Inc will have a core Staff that would be maintained throughout the life of the project. GNP Inc will enlist local businesses on a contractual basis to supply building, property, and systems maintenance. It is estimated that 4-6 person-hour months per year will be associated with the contractual opportunities and will include at a minimum labourers(NOC 7611), plumbers (NOC 7251) carpenters (NOC 7271), electricians (NOC 7241) and IT Manger (NOC 0213).

All positions cited in Table 4.5.3 will be Direct Hire, Full time positions. Additional positions, either full time or part time, will be Direct hire as business would dictate.

Table 4.5.3: Estimated Employment Potential during Phase 1

Occupation	NOC 2006	# of Personnel	Employment Status
General Manager	0013	1	Direct Hire/Full Time
Chief Financial Officer	0013	1	Direct Hire/Full Time
EOHS Manager	0112	1	Direct Hire/Full Time
HR Manager	0112	1	Direct Hire/Full Time
Admin Assistant	1241	1	Direct Hire/Full Time
Warehouse Manager	0714	1	Direct Hire/Full Time
Dockworkers/Stevedores	7451	6	Direct Hire/Full Time
Crane Operators	7371	2	Direct Hire/Full Time
Truck Drivers	7511	3	Direct Hire/Full Time
Security Guards	6541	6	Direct Hire/Full Time

5.0 APPROVAL OF UNDERTAKING

Post release from further Environmental Assessment (EA) GNP Inc. has committed to all attributes contained within the EA registration and EPP and will, at a minimum, conduct, implement the following comprehensive Plans, assessments:

- Environmental Protection Plan
- Avifauna Management Plan
- Site Monitoring Plan for Migratory Birds
- Archaeological Impact Assessment
- Historic resource Impact Assessment
- Marine/Aquatic study to include description of fish, invertebrates and marine mammals that may be present year round
- Habitat Study
- Marine Habitat Protection Pan
- 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

5.1 Relevant Legislation & Associated Permits

The project will/may be subject to the following Federal, Provincial and Municipal environment legislation:

Government Agency	Permits/Approvals required	Compliance required
Department of Environment and Conservation		
Environmental Assessment Division	Release from EA	General
Water Resources Division	Alteration to a body of water (schedule A-H)	Any activity in or near a body of water. Marine infilling
	Schedule H - Environmental Approval of other alterations	Other works within 15 metres of a body of water
	Certificate of Approval for Site Drainage	Water run-off from the project site
Environmental Assessment Division	Environmental Protection Plan	General
Department of Natural Resources		
Mines and Energy Branch	Magazine License	
	Explosives Transportation Permit	
	Quarry Permit	
Department of Government Services		
Government Services	License to occupy Crown Land	Crown Land is currently registered (registration #……..) Approval pending.
	Certificate of approval – storage and handling of gasoline and associated products	
Government Services	Permit for flammable and combustible liquid storage and dispensing (above or below ground); bulk storage (above ground)	
	Storage Tank System Application	All Storage tanks on site
	Compliance Standards: National Fire and Building codes and life safety code.	All buildings, structures on site
	Building accessibility exemption	All buildings, structures on site
	Statutory Declaration for registration of Boiler and Pressure vessel fittings fabricated in NL	
	Contractor's license – Pressure piping systems	
	Examination and certification of Welders and Blazers	
	Examination and certification of propane system installers	

Department of Transportation and Works		
Transportation and Works	Compliance Standard: Storing, handling and transportation of dangerous goods	
Department of Human Resources and Labour Development		
HR Labour and Employment	Compliance Standard – Occupational Health and Safety (OHS)	Project-related employment
	OHS Manuel	General
Department of Tourism, Culture and Recreation		
Tourism, Culture and Recreation	Compliance Standard – Historic Resources Act	Construction and Operation
Town of St. Anthony		
Town of St. Anthony	Compliance Standard/Development Plan	Construction and Operation
Transport Canada		
Transport Canada	Permit to store, handle and transport hazardous goods	
Transport Canada	Implementation of Port Facility Security Plan.	
Canada Customs		
Canada Customs	Vetting International Ships	Operations
Department of Fisheries and Oceans		
Marine Environment and Habitat Management Division	Authorization for Harmful Disruption of Destruction (HADD) of Aquatic Habitat	Marine, wharf construction and infilling and any in-stream work that may impact fish habitat in freshwater.
	Letter of Advise	
	Project Referral	
Canadian Coast Guard	Navigable Waters protection Act (NWPA)	Wharf and/or any other construction that may affect the navigable waters.
Environment Canada		
Environment Canada	Compliance Standard – Fisheries Act, section 36(3), deleterious substances	Any/all project related run-off
Canadian Wildlife Services	Compliance Standard, Migratory Birds Convention Act and Regulations.	Any/all activities which could result in the mortality of migratory birds and endangered species and any species under federal authority.

6.0 FUNDING

The Great Northern Port projects' Stakeholders have self-funded the project to date. Significant financial investment from the Private Sector, Governmental Agencies, Municipal, Provincial and Federal Governments will be required to bring the project to a successful completion. Strategic Partners from the private sector are engaged and upon EA completion, and approval, are prepared to advance the project forward. Meetings with Municipal, Provincial and Federal Representatives have yielded positive results and feedback with all hopeful in the promise that the project represents.

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APPENDICES

APPENDIX 4.2.5

Letter dated May 26, 2017 from the Provincial Archaeology Office in response to the GNP Crown Land Application Numbers 151500 and 151508, page 1.

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Tourism, Culture, Industry and Innovation
Provincial Archaeology Office

Mr. Daniel J. Villeneuve
78296 Newfoundland & Labrador Inc.
180 Patrick St.
St. John's, NL
A1C 5C4

May 26, 2017

Dear Mr. Villeneuve:

Re: Crown Land Application Numbers 151500 and 151508 (Marine Port Development at Cremaillere Harbour)

The Provincial Archaeology Office (PAO) has reviewed the above Crown Land Applications for proposed Marine Port Development at Cremaillere Harbour. The proposed project is in an area of high archaeological potential and contains four known archaeological sites - three that date from the 1600s to 1900s, and a fourth adjacent site is a Radar Station which dates from 1953-1968. In view of the known archaeological resources in this area, the subject lands appear to have potential for further archaeological discovery. Historic documents and maps indicate that there were four to six fishing rooms at EiAv-03 and during an investigation in the area a Fishing Room was identified. At EiAv-07 (Fishing Room) a survey was taken of the beach and a number of features on the beach terrace were recorded. Nine features were noted at EiAv-08, the site of a second Fishing Room.

Based on the proposed plans, the project will have a negative impact on known and potential archaeological sites in the area. Due to the nature of the proposed land uses, both terrestrial and underwater Historic Resources Impact Assessments are required to determine the full extent, nature and significance of the historic resources in the area. Based upon the results of this work, and a determination of the impact of the development on the historic resources, it is expected that full remediation of said resources will be required if the project is to proceed. You are responsible for hiring an archaeological consultant to have the work carried out. Attached is a map indicating the location of the known archaeological sites as well as a list of archaeological consultants eligible to carry out archaeological work in the area.

If you have any questions or require further information please do not hesitate to contact me at 729-2462 or John Erwin at 729-5581.

Regards,

Martha Drake

Martha Drake
Provincial Archaeologist

P.O. Box 8700, St. John's, NL, Canada A1B 4J6 t 709.729.2462

APPENDIX 4.2.5

Letter dated May 26, 2017 from the Provincial Archaeology Office in response to the GNP Crown Land Application Numbers 151500 and 151508, page 2.

Known archaeological sites located in Cremaillere Harbour

APPENDIX 4.3.3.4 Air Quality

Diesel Retrofit Technologies:

Diesel oxidation catalysts use a chemical process to convert PM into less harmful components through oxidation with the excess air inherent in diesel exhaust. They have been used for over 20 years and are perhaps the most proven after-treatment device. Diesel oxidation catalysts can lower emissions of PM by 20 to 30 percent, but do not affect NOx emissions. They work best when used with lower sulfur diesel fuel (less than 350 ppm), but do not require ULSD less than 30 ppm.

Diesel particulate filters collect particulate matter in the exhaust stream. The high temperature of the exhaust heats the filter's internal structure (typically composed of ceramic) and allows the particles inside to be converted into the less harmful components of carbon dioxide and water vapor. These filters can be installed on both new and used vehicles, but they must be used with ULSD and appropriate duty cycles with sufficiently high exhaust temperatures. Diesel particulate filters can reduce PM emissions by 50 to 90 percent, but do not affect NOx emissions.

NOx catalysts employ a chemical process to lower NOx emissions, although these devices have not been tested extensively in off-road applications. Lean NOx catalysts employ a diesel fuel spray in the exhaust to lower NOx emissions by up to 25 percent. NOx adsorbents can eliminate more than 70 percent of NOx, but require the use of diesel fuel with very low sulfur levels (typically no more than 10 to 15 ppm) and to date are not commercially available even for on-highway applications.

Selective catalytic reduction (SCR) technology is currently employed at many power plants to chemically reduce NOx emissions to nitrogen and water, but has only recently been adapted to vehicles and other mobile sources. SCR requires a reducing agent (ammonia or urea) to be injected into the exhaust stream. SCR has been shown to lower NOx emissions by 75 to 90 percent but has no effect on PM emissions. An SCR system can be used in conjunction with a diesel particulate filter to achieve significant PM and NOx reduction (potentially 80 to 90 percent for both pollutants).

Examples of Alternative Fuels

Emulsified diesel is a blended mixture of diesel fuel, water, and other additives that reduces emissions of PM and NOx. Emulsified diesel can be used in any diesel engine, but the addition of water reduces the energy content of the fuel, so some reduction in power and fuel economy can be expected. Emulsified diesel sold under the name Lubrizol PuriNOxTM has been certified by both EPA and CARB for emission reductions in off-road applications. Expected NOx reductions are in the range of 17 to 20 percent; PM emission reductions range from 17 to 50 percent.

Biodiesel is a renewable fuel that can be manufactured from new and used vegetable oils and animal fats. Biodiesel is safe and biodegradable and reduces emissions of PM, CO, hydrocarbons (HC), and air toxins However, some studies have demonstrated small NOx emissions increases (up to 10 percent using B100, i.e. "pure" biodiesel). Biodiesel is often used as a blend, typically 80 percent petroleum diesel and 20 percent biodiesel (B20).

Natural gas, in the form of compressed natural gas (CNG) or liquefied natural gas (LNG), can be used to power off-road engines. Existing diesel engines can sometimes be converted to run on natural gas, or the existing engine can be replaced with a natural gas engine. There is often a fuel penalty incurred when migrating from traditional diesel fuel, as well as a power loss (unless the engine is recalibrated), due to lower heating content of natural gas, when compared with diesel fuel. In addition, the use of natural gas raises some challenges with respect to storage and safe handling of the fuel, and the infrastructure (CNG station, transfer lines, etc.) to deliver this fuel to customers.

Propane can also be used to power diesel engines in some applications. Commercial kits are available for retrofitting diesel engines to operate on liquid propane gas (LPG). A number of diesel yard tractors at southern California ports were recently converted to LPG. Compared to unregulated (Tier 0) yard tractors, LPG can significantly reduce NOx and PM emissions, although can increase HC emissions.

Ethanol can be blended with diesel to reduce some emissions. Sometimes known as "E-diesel" or "oxydiesel", these blends typically have 10 percent ethanol. Ethanol-diesel blends have not been widely used.