GREAT NORTHERN PORT INC.
Crémaillère Harbour Marine Port Development
Environmental Preview Report

Submitted by:

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Prepared with the assistance of:

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4 December 2018
Wood Project #: TA1883001

IMPORTANT NOTICE

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1.0 INTRODUCTION AND NAME OF THE UNDERTAKING

This Undertaking is referred to as the "***Crémaillère Harbour Marine Port Development***" (also referred to herein as "the Project").

Great Northern Port Inc. (GNP Inc.) is proposing to develop an Industrial Subdivision and Marine Port at Crémaillère Harbour on the Great Northern Peninsula of Newfoundland and Labrador (Figure 1-1).

The Project was registered by the Proponent for environmental assessment (EA) review pursuant to the Newfoundland and Labrador *Environmental Protection Act* (Part X) (*NL EPA*) on November 14, 2017 (Registration # 1933). Following public and governmental review of that EA Registration the Minister of Municipal Affairs and Environment announced, on January 21, 2018, that an Environmental Preview Report (EPR) was required for the Project. An EA Committee was appointed to provide advice to the Minister on the EPR on March 6, 2018, and on March 22, 2018 Guidelines for the preparation of the EPR were issued to the Proponent (Appendix A).

This EPR has been prepared and submitted by GNP Inc. with the assistance of Wood Environment & Infrastructure Solutions, in accordance with the *NL EPA* and its *Regulations* and the above referenced EPR Guidelines. The document is intended to provide further information on the Project and its existing environmental setting, potential environmental interactions, and proposed mitigation in order to address the questions and environmental considerations raised during governmental and public review of the EA Registration. The EPR has been planned and prepared in accordance with the organization and structure of the EPR Guidelines themselves in order to optimize its utility and readability, and a Table of Concordance indicating where each of the specific requirements of the Guidelines are addressed is also included in Appendix A.

The EPR will be subject to governmental and public review, and eventually, a decision will be made by the Minister of Municipal Affairs and Environment as to whether the Project may proceed, subject to any associated terms and conditions resulting from the EA and/or subsequent permitting, or whether further environmental review may be required.

Figure 1-1 Crémaillère Harbour Marine Port Development: General Location

2.0 THE PROPONENT

GNP Inc. is a St. John's, NL based company, registered in the province, and formed to investigate the feasibility of, and generate investment in, the proposed port Project.

Name of Corporate Body:	Great Northern Port Inc.
Address:	180 Patrick Street St. John's, Newfoundland & Labrador A1C 5C4 Canada Tel. (709) 770-8040 Email: dvilleneuve@gnpnl.ca
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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 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 Project 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 Inc. approach to the Crémaillère Harbour Marine Port Project and is a key component of the GNP Inc. value proposition for the peoples of St. Anthony, the province, and the Arctic.

3.0 THE UNDERTAKING: NATURE, PURPOSE AND SCOPE

The following sections provide a brief introduction to, and overview of, the proposed Project, including its overall nature and its underlying purpose, need and rationale, as background and context for the EPR.

3.1 Nature of the Project

GNP Inc. proposes to develop an Industrial Subdivision and Marine Port at Crémaillère Harbour on the Great Northern Peninsula of Newfoundland and Labrador. Beyond regional logistical needs and business potential, GNP Inc. 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.

GNP Inc.'s 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, GNP Inc. proposes that the Crémaillère Harbour Marine Port 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 Project Purpose, Need and Rationale

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 (Jakomin 2003). It was determined, through a multifaceted comparative site selection assessment, that Crémaillère Harbour best fulfilled a key range of criteria for development as a northern marine port. 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.

The 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. Crémaillère Harbour is normally ice-free for 7-8 months annually and such an extended ice-free port is necessary to support the north as arctic shipping routes open up with the reduction of multi-year sea ice and the shortening of the single year ice season. In its final phase the proposed 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.

GNP Inc.'s Canadian North proximity and access criteria is driven in part by the need to react quickly in potential emergency situations. Currently the Arctic has minimal means to mitigate the impact of potential disasters on the environment and lives. There is a need for proactive infrastructure planning to help prevent and respond to

these potential risks. As the Arctic opens for more commercial and domestic traffic, there will be further demand for Arctic emergency support and search and rescue. GNP Inc.'s Crémaillère Harbour Project is strategically located to be an all-encompassing, one-stop Arctic support location that can provide emergency response, search and rescue, Coast Guard and military support. Crémaillère Harbour is ideally located to serve the "New Arctic" and help fulfil Canadian involvement in Arctic preparedness and response.

It is GNP Inc.'s intent that the Crémaillère Harbour Marine Port will provide the range of services required to address the needs of potential full-service harbour users including wharfage, fuelling, warehouse and lay down areas as well as maintenance and repair requirements while minimizing the potential for negative environmental, social and economic effects. This will address a growing need for such services on the northern coast related to transportation to the north, oil and gas exploration and development, mining, and other economic development.

Figure 3-1 Crémaillère Harbour North to South View

Crémaillère Harbour was selected based on the following criteria:

- Location
  - Proximity to Resource Development
  - Proximity to Regional Electrical 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

4.0 DESCRIPTION OF THE UNDERTAKING

The following sections provide a description of the Project, including its location, main components, and the various activities that will be associated with its construction and operations phases. The information provided in this Chapter addresses each of the Project description information requirements specified in the EPR Guidelines (see Appendix A).

4.1 Geographic 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, Figure 4-1.

Figure 4-1 Google Earth View of Crémaillère Harbour and St. Anthony Harbour

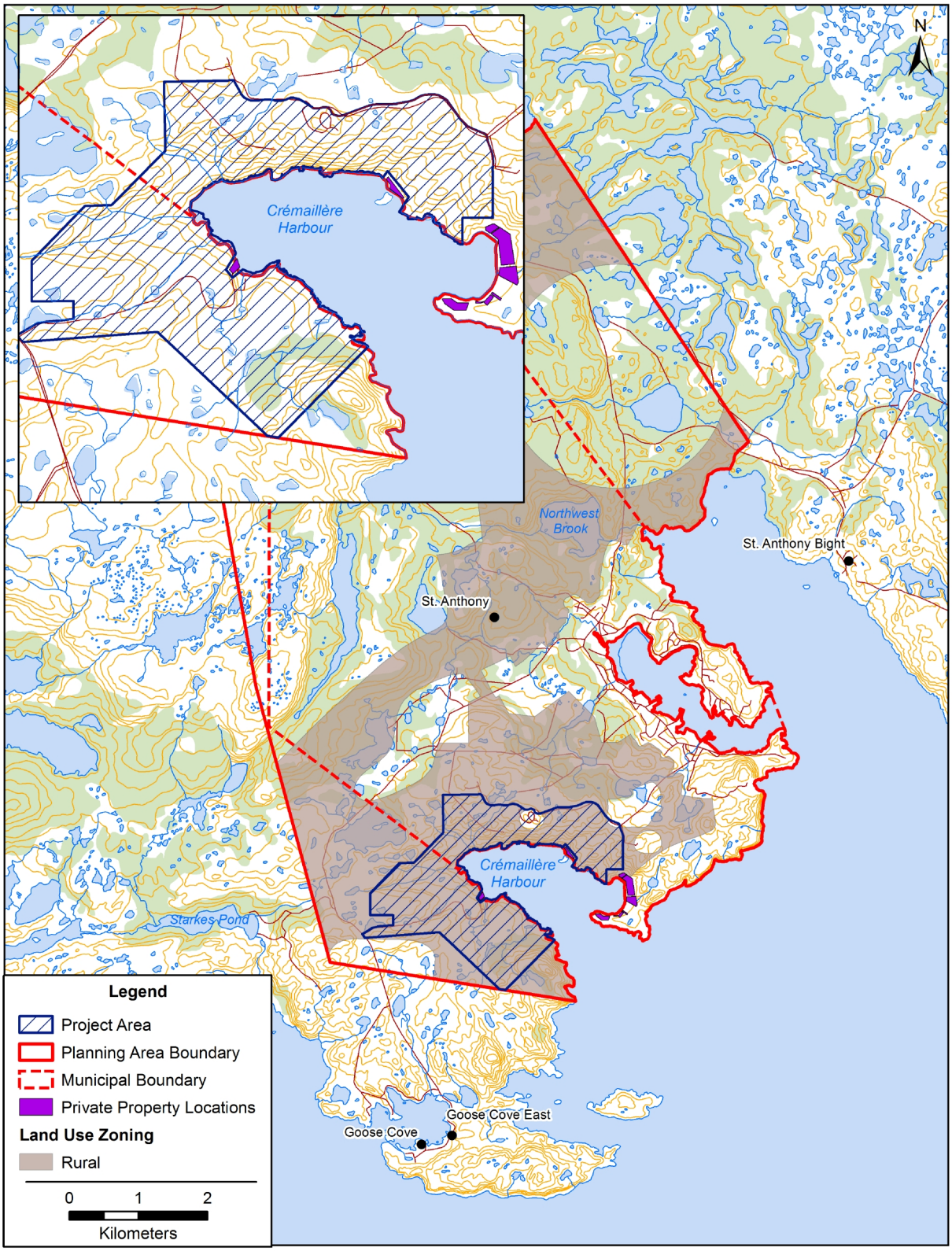
GNP Inc. currently has applications registered with Crown Lands, (File No. 3020712; Application No: 151500 and 151508) for the proposed Project area, Figure 4-2. There is presently no development within the boundaries of the proposed land area and harbour water lots. The next step in acquiring the applied-for Crown land is a release from the Dept. of Fisheries and Land Resources to allow for environmental surveys and geotechnical assessments, 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

The Project is located within the Town of St. Anthony Municipal Boundary and/or Planning Area Boundary, Figure 4-2. The proposed Project area is generally within the municipality of St. Anthony but outside of the developed area of the Town, off Route 430 and between the Towns of St. Anthony and Goose Cove East. Private property identified in Figure 4-2 is excluded from the Project area and existing access to these properties will be maintained.

Figure 4-2 Project Boundary in Relation to Existing Municipal Boundaries and Private Properties in Crémaillère Harbour



4.1.1 Project Components

GNP Inc. anticipates three Phases of development taking place across the entire site area or as contingency allows. GNP Inc. anticipates the parts of the project described can progress more or less within the time frames indicated for site preparation and construction. Once approval in principle is obtained and the framework for environmental and geotechnical 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 geotechnical site work in 2019.

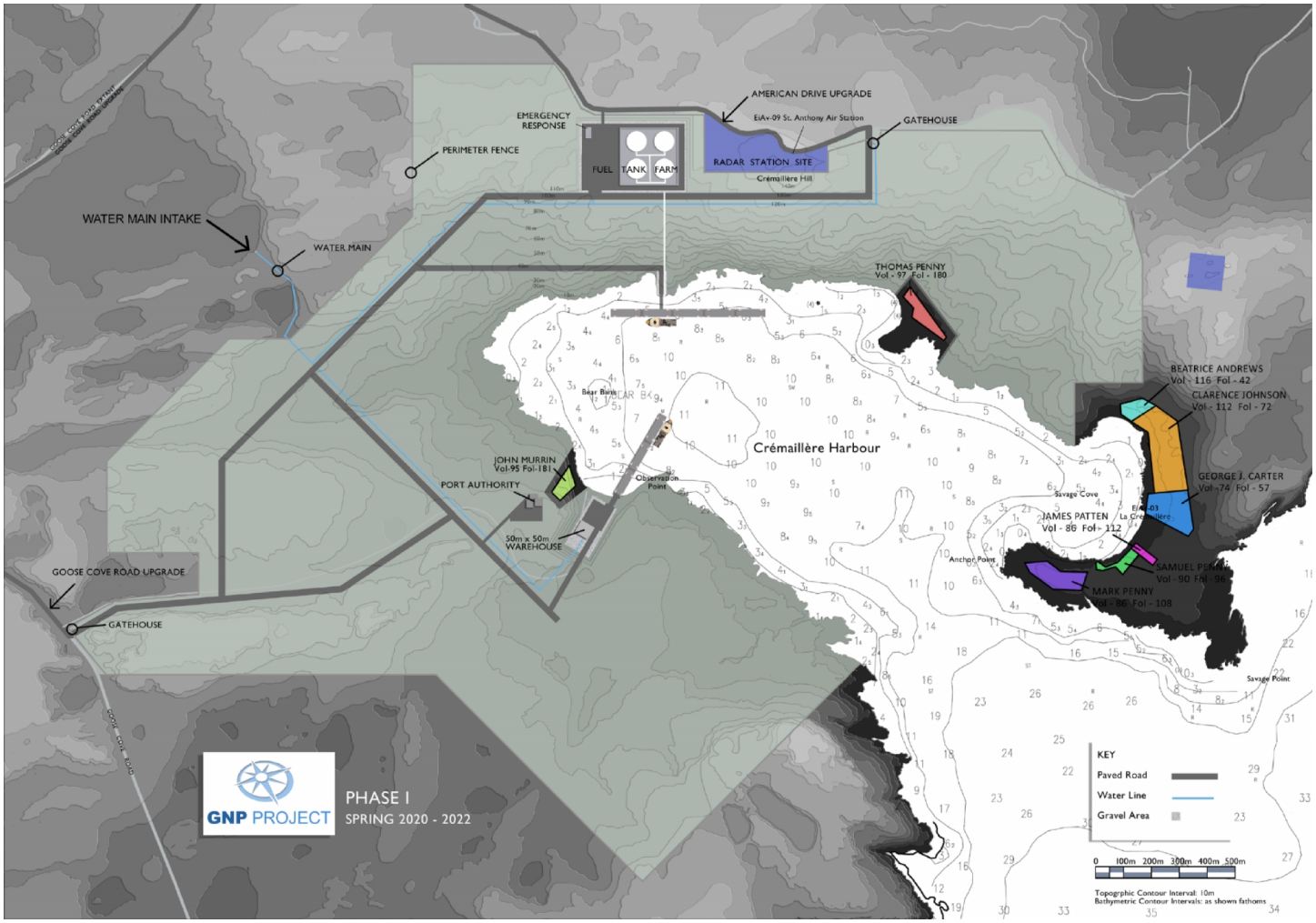
- Phase I - Facilities and Infrastructure List:

  - 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)

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.

The location of the facilities and infrastructure proposed in Phase I of the harbour development are identified in Figure 4-3 These locations are not referenced to specific geographical coordinates at present and may be adjusted in response to site specific engineering and environmental considerations from future engineering studies and environmental protection planning. The infrastructure will also be subject to specific regulatory permit and approval processes, as identified in Appendix D.

Figure 4-3 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 from 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.

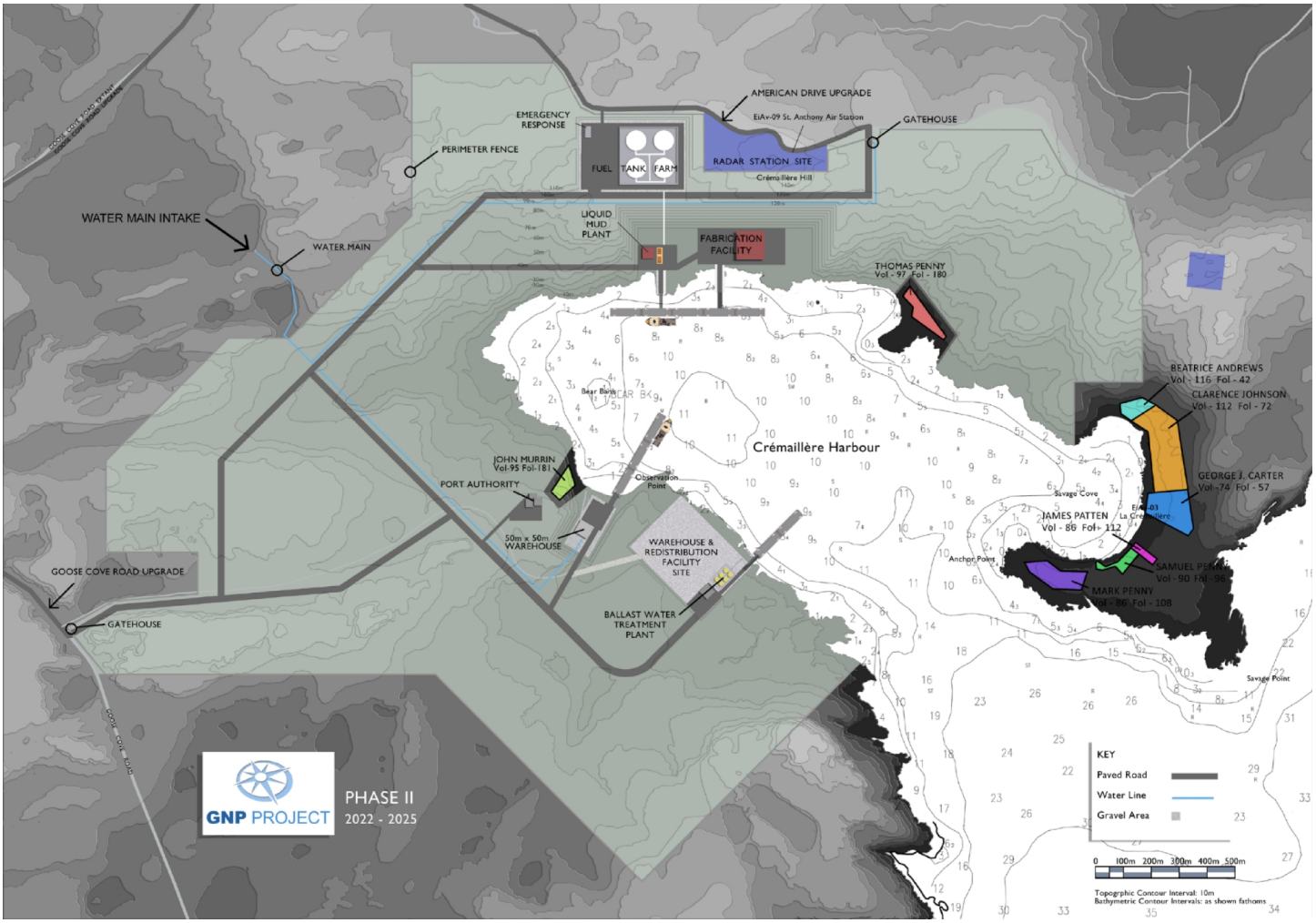
- Phase II - Facilities and Infrastructure List:

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

The start of Phase II is marked by construction of the Port Administration building, fuel tank farm and possible drill mud tank farm, docks assemblies, and other structures related to the warehousing. 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.

The location of the facilities and infrastructure proposed in Phase II of the harbour development are identified in Figure 4-4. These locations are not referenced to specific geographical coordinates at present and may be adjusted in response to site specific engineering and environmental considerations from future engineering studies and environmental protection planning. The infrastructure will also be subject to specific regulatory permit and approval processes, as identified in Appendix D.

Figure 4-4 Physical Features of Undertaking / Phase II



- Phase III - Facilities and Infrastructure List:
  - Enclosed Graving Dock
  - Warehouse and Distribution Facility

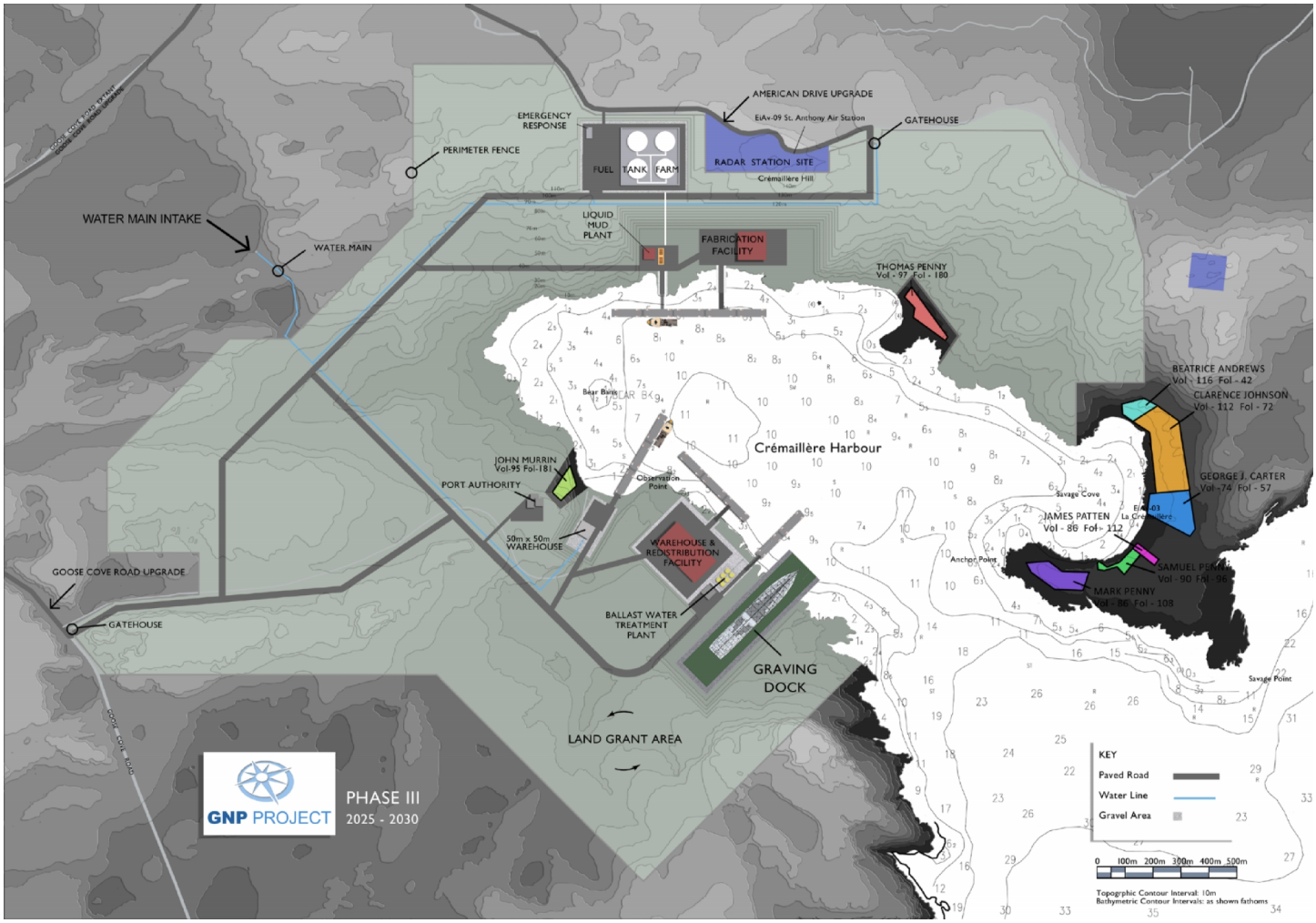
Phase III will see the construction of the graving dock and warehousing and redistribution hub on the south shore of the harbour basin. The graving dock will serve as a refit and repair and construction facility for larger vessels including offshore service ships and drill rigs. Construction of the graving dock may require 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 Figure 4-5 will occupy approximately 10,000m^2 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.

The location of the facilities and infrastructure proposed in Phase III of the harbour development are identified in Figure 4.5. These locations are not referenced to specific geographical coordinates at present and may be adjusted in response to site specific engineering and environmental considerations from future engineering studies and environmental protection planning. The infrastructure will also be subject to specific regulatory permit and approval processes, as identified in Appendix D.

Figure 4-5 Physical Features of Undertaking / Phase III



4.2 Construction

The physical infrastructure to be constructed during Phases I, II, and III of construction, identified in Figure 4-5, include upgraded and new roadways, office, warehouses and fabrication buildings, a bulk fuel storage tank farm, potentially a liquid drilling mud plant, a ballast water treatment facility (if required), berthing docks, and an enclosed graving dock. Construction activities associated with these major features of the proposed Project are described in the sections below.

Location and dimensions of facilities indicated in Phases I, II and 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.

4.2.1 Roads and Utilities

The proposed Project area is presently accessible via American Drive, between St. Anthony and Goose Cove road, to the north, and Goose Cove Road to the east. American Drive is located along the northern boundary of the proposed Project area, but does not provide access to the harbour. Goose Cove Road is located between the communities of St. Anthony and Goose Cove, Figure 4-2, to the west of the proposed development area, and intersects with an existing access road that provides access to the south side of Crémaillère Harbour

Figure 4-3 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. The actual road route will depend upon roadbed construction requirements and environmental considerations such as drainage and runoff. Similarly, a proposed access road route from American Drive provides access to proposed facilities and the north side of Crémaillère Harbour. Roads as shown are a general indication of an approach to the layout of the Project road system.

Proposed roads will be a total of 20 metres in width with two standard 3.7 metre wide lanes plus shoulder and ditches. Sections of American Drive and Goose Cove Road will be upgraded as part of the proposed development. A traffic impact study will be conducted as part of the proposed road upgrade plan and a traffic impact statement may be issued if warranted based on the results. Detailed traffic studies and projections will inform a roads upgrade plan which will set standards and scheduling for 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 consistent with road construction standards within the project site boundaries including landscaping and replanting of exposed areas.

Although the Project is in close proximity to the water supplies for the towns of St. Anthony and Goose Cove East, it is proposed that the Project will have its own water and sewer infrastructure, outside and separate from that of either of these towns. GNP Inc. proposes to utilize an unnamed pond adjacent to the western Project boundary, near Goose Cove Road, as the primary water source for the Project, Figure 4-3. At this stage in the Project design it is proposed to construct a water intake on the eastern shoreline of the pond to supply a main water line which will distribute water to Project facilities. This will be subject to design engineering determining suitability of the quality and quantity of the water from this source for the needs of the Port development, and subsequent approval under the *Water Resources Act*. GNP Inc. has investigated waste water treatment options and will integrate advanced sewage treatment technologies into the Development Plan for the Project. Waste water treatment proposals will be developed, based on an engineering study of the suitability of sewage treatment options and on-site conditions, and implemented, subject to receiving approvals from Service NL under the *Water Resources Act* or *Health and Community Services Act*, as appropriate.

An electrical service grid and communications cabling system will also be developed based on future design engineering, taking into account Project specific factors and environmental considerations.

Site assessment for the Project will include a comprehensive study of surface and ground water and marine hydrology to establish targets for the application of Low Impact Design (LID) methodologies for storm water design. GNP Inc. will integrate current knowledge and best practices of LID methodologies in designing drainage and flow regulation models for the Project area.

4.2.2 Office, Warehouses and Fabrication Buildings

Proposed buildings include a port authority and office complex, as well as two warehouses on the south side of Crémaillère Harbour, and a fabrication facility on the north side of the Harbour, Figure 4-5

Construction of all buildings will ensure building envelope design and construction are engineered utilizing best energy-efficient practices in minimizing energy consumption, to include, heating/cooling systems, lighting, ventilation, sound/air control, as well as fire and safety. Engineering and construction will utilize and adhere to, at a minimum, building code practices Leadership in Energy and Environmental Design (LEED), ASHRAE 90.1 and the National Energy Code for Building (NECB) in the engineering and design of all buildings on site. Prior to the start of construction, all building drawings will be registered with Services NL for compliance with *Fire and Life Safety Act* and the *Buildings Accessibility Regulations* as contained within the *Building Accessibility Act* (O.C. 96-865).

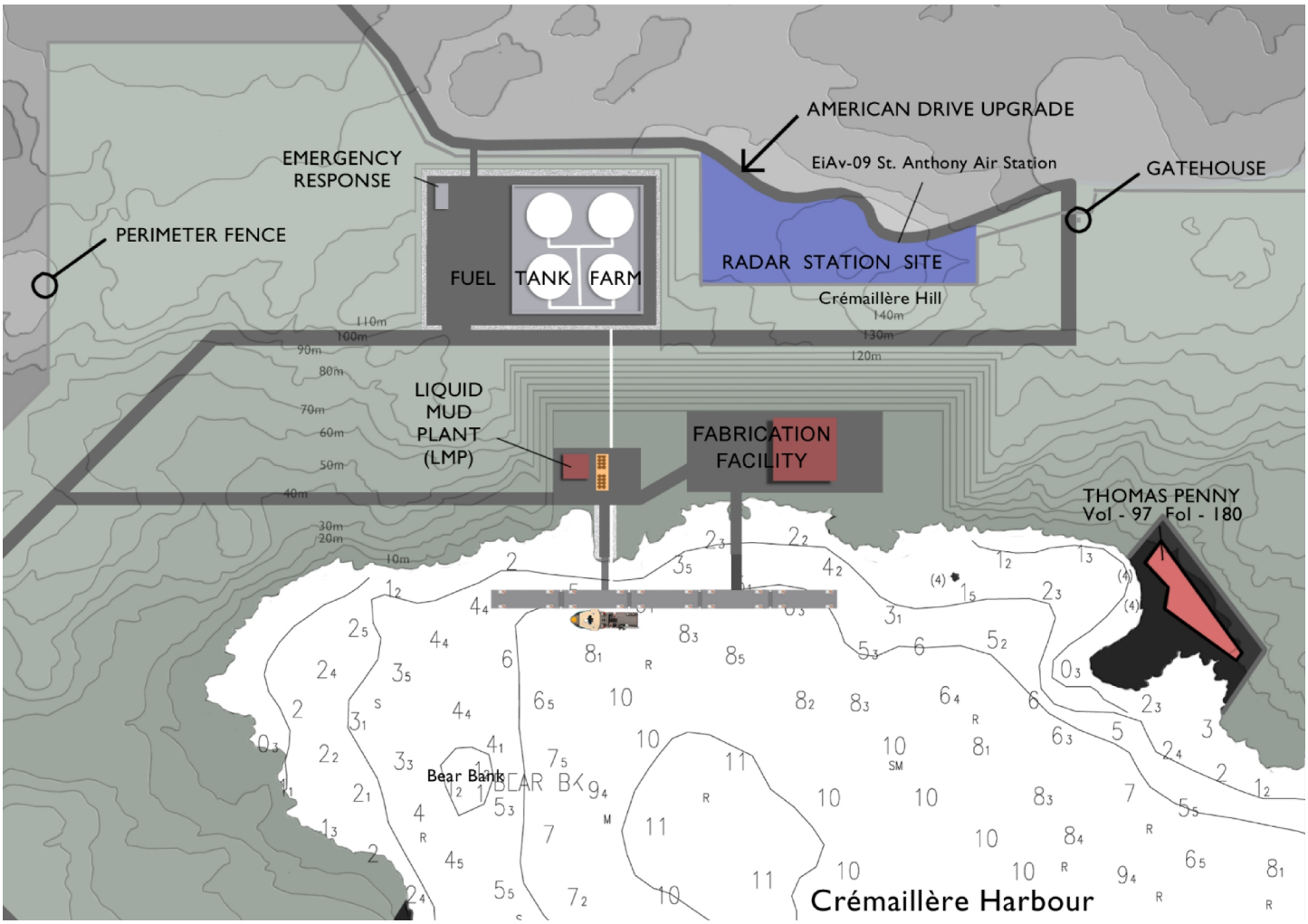
Buildings included in the Project will be engineered and constructed to minimize maintenance. Anticipated environmental effects include runoff from roofs and paved areas which will be captured in storm-capacity catchments and grassed ditches to allow natural filtration before entering ground water or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

GNP Inc. 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.

4.2.3 Bulk Fuel Storage Tank Farm

Located on an elevated area west of the St. Anthony Radar Station site, the tank farm will consist of four holding tanks, Figure 4-6. Each tank will hold 40 million litres of diesel fuel, 160 million litres collectively.

Figure 4-6 Fuel Tank Farm and LMP Phase II detail of north shore of Crémaillère Harbour Including Proposed Fuel Storage Tank Farm



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.

Tank design will ensure the tanks are both liquid and vapour tight. Actual construction details 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. All petroleum storage tanks will be registered in accordance with Services NL guidelines.

4.2.4 Liquid Drilling Mud Plant (If Required)

Present Project planning includes development of a Liquid Drill Mud Plant (LMP). to be located at the supply dock area of the proposed port, Figure 4-5. However, the need for this infrastructure will be dependent on service needs identified during the detailed project planning phase.

The LMP will provide 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.

The active drilling-fluid volume on a deep-water well can be several thousand barrels (bbl). An offshore supply boat typically carries 540 m^3 or 3400 bbl of drilling fluid. The proposed tank farm is based on a standard, pre-engineered configuration consisting of 16 - 400 bbl (64m^3) upright tanks situated within a spill containment berm. Tank size and volume specifications are as shown in Figure 4-7.

Figure 4-7 Typical Liquid Mud Tank Farm Arrangement

Specifications	
Volume (BBL)	400 BBL / 64m^3
Volume US gallons	16,643
Size (H x D)	24' x 12'
Weight	13,500 lbs

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 ft^2 of enclosed storage space for unmixed materials.

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.

A 75m^3 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 (Strad Energy Services No Date).

A 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.

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.

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.

A 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.

Air compressors are used to blow out lines.

4.2.5 Ballast Water Treatment Facility (If Required)

Canada is a signatory of the 2004 International Convention for The Control and Management of Ship's Ballast Water and Sediments. The convention aims to prevent the spread of harmful aquatic organisms from one region to another. Canada has enacted regulations, including Canada's *Ballast Water Control and Management Regulations,* and the guidance document "A Guide to Canada's Ballast Water and Management Regulations", TP 13617 E (2018), to guide compliance with the requirements of the Convention. These Conventions and Regulations place responsibility for compliance with vessel owners/operators. Modern vessels are equipped with, or are being equipped with, ballast treatment plants on board the vessel, as opposed to onshore, to enact compliance.

Should the requirements for vessel-based compliance, or requirements surrounding treatment of ballast water, change, GNP Inc. is proposing to utilize a mobile and fully autonomous system such as Invasave 300 as described in Appendix E, to ensure compliance. The system is supplied in a CSC- certified standard size container and complies with the most stringent European regulations. The system allows for both the supply and treatment of ballast water. The treatment system is a combination of UV lights and filtration and does not use chemicals. The sediments can be sent to approved disposal facilities after analysis.

GNP Inc. will secure all required permits including approvals to construct and operate a ballast water treatment facility, if required, under the *Environmental Protection Act* during the planned engineering phase. In particular, this infrastructure may require a Certificate of Approval from the Department of Municipal Affairs and Environment, as indicated in Appendix D.

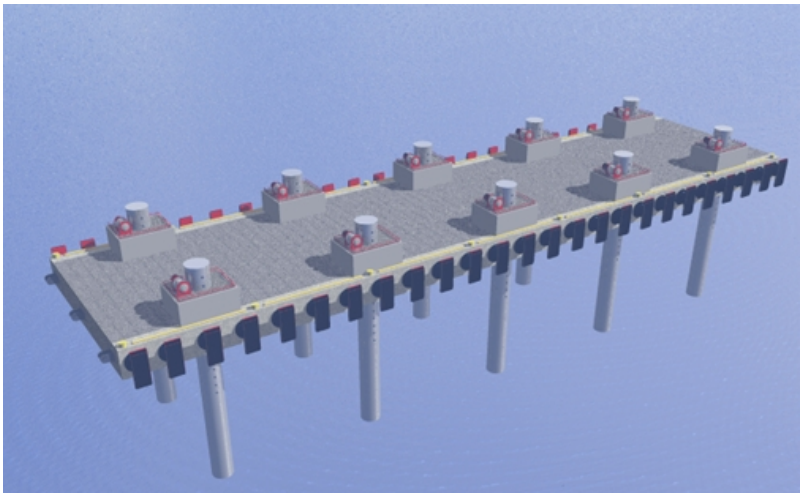
4.2.6 Berthing Docks

For initial installations GNP Inc. proposes to employ a system of wharfs, docks, and quays based upon prefabricated jackpile dock sections of approximately 25m x 100m, Figure 4-8. 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.

Figure 4-8 Jackpile Dock Model



The Project specific Environmental Protection Plan (EPP) will be prepared in advance of construction and will include environmental protection and control requirements associated with construction and operation of berthing docks within the Crémaillère Harbour Development and will, as a minimum, ensure adherence to the Department of Municipal Affairs and Environment's *Environmental Guidelines for Construction and Maintenance of Wharves, Breakwaters, Slipways and Boathouses*, latest edition, pursuant to the *Water Resources Act, SNL 2002 cW-4.01*.

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.

4.2.7 Ore Loading Infrastructure

Should bulk ore storage take place at the Crémaillère Harbour Development the area supporting the storage would be a section of 100m berthing, likely of the Flexiport family of designs customized to transport materials safely and efficiently. The wharf will be designed to follow Canadian Coast Guard guidelines.

The storage area will be a simple surface allowing for offloading of products and, should the project proceed, this facility will be designed to receive material from mining sites, store it and then transport it to the ship loader for eventual shipment to markets. A storage yard will be built to the right size to allow sufficient storage and shipment of materials during the season where it is challenging to ship from the North. The material will simply by piled for retrieval by mechanical means.

The substrate of the yard will contain a liner that will act as a barrier to ensure that water from rain and snow (i.e., runoff water) is collected and treated to prevent seepage water issues.

A stacker-reclaimer will be designed to meet yard and ship loading requirements. Supply conveyors will be constructed in the yard to feed material to and from dumper and from there to the stacker-reclaimer. The yard will also include maintenance facilities.

GNP Inc. will secure all required permits including approvals to construct and operate ore loading infrastructure under the *Environmental Protection Act* during the planned engineering phase. In particular, this infrastructure may require a Certificate of Approval from the Department of Municipal Affairs and Environment, as indicated in Appendix D.

Photographs of the current set up in the port of Sept-Iles, QC are provided in Figures 4-8 and 4-9 as an example of infrastructure associated with such an operation.

Figure 4-9 Photographs of Current Iron Ore Loading Infrastructure at Sept Iles, QC

Figure 4-10 Overview Photograph of Current Iron Ore Loading Infrastructure at Sept Iles, QC

4.2.8 Enclosed Graving Dock

The graving dock is conceptual at this point in time and subject to engineering and the required technical studies. There are several alternatives considered and final selection will depend on market opportunity and cost. The basis of design for the tonnage to be serviced will be a railway dock system, which involves a mechanical means of moving and hoisting the vessel out of water to an elevation above high tides. Such design minimizes costs and footprint in the wet section by having most of the work performed in the dry. For the section where excavation would be necessary, the dock will be excavated using conventional earth moving equipment and, only if and when necessary, blasting operations.

The preliminary size of the excavation will be 100m x 30m, subject to revision for ship size. Depending on the final location of the dock and the ability of the proponent to minimize the excavation, the volume of material moved could be from 3,000 m^3 to 15,000 m^3. The exact type of material is yet unknown and initial plans are to reuse the material to allow flat working surfaces. The excavated material will be used around the site and within the area as approved by the relevant regulatory authorities. Material suitable for shoreline protection, for example, may be used along the port to mitigate shoreline erosion or facilitate navigation. The opportunity also exists to use suitable surplus materials in other parts of the harbour for infilling and levelling, subject to approvals under the *Water Resources Act,* the *Fisheries Act*, and the *Navigation Protection Act*. An appropriate material testing program will be developed in conjunction with regulatory authorities to ensure all material is handled and used or disposed of in an environmentally responsible and safe manner. However, confirmatory soil sampling will be conducted during the engineering design stage and during excavation of the graving dock. A soil sampling plan will be developed and if contamination is detected above applicable guidelines the material will be moved to a quarantined area and treated, as necessary. Excavation and aeration would be considered the preferred remediation method.

Seepage water entering the graving dock excavation during construction will be controlled by pumping and treatment to ensure that all discharge is in compliance with applicable regulations, including provincial Environmental Control Water and Sewage Regulations, and the federal Fisheries Act. Drainage water from the areas surrounding the graving dock excavation will be diverted away from the excavation area to minimize the quantity of water requiring treatment.

4.2.9 Ancillary Activities Related to Construction

Development of areas for roads and infrastructure requires site preparation, excavation, and construction activities that will result in disturbance to the landscape of the Project area.

Clearing and excavation onshore will occur only where necessary and will be, as much as practicable, 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 plant species.

Blasting will be required where bedrock has to be 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.

Where quarry materials are required for any aspect of the Port development the source will be from a site within the Project boundary, wherever practicable. All quarry materials will be sourced from sites, whether within the Project boundary or from outside of the Project site, that have been permitted under the *Quarry Materials Act, 1998,* and for which required royalties will be paid. It is planned to minimize the footprint of the Port by using aggregates produced from excavations when creating outside storage areas which may be required. This will minimize the environmental footprint and construction traffic in the area. The excavated material will be used, when practicable, around the site and within the area, subject to approval by the relevant regulatory authorities. As well, material suitable for shoreline protection may be used along the Port to mitigate shoreline erosion or facilitate navigation. The opportunity also exists to use suitable surplus materials in other parts of the harbour for infilling and levelling. An appropriate material testing program will be developed, in conjunction with regulatory authorities, to ensure all material is handled and used, or disposed of, in an environmentally responsible and safe manner. If contamination is detected above applicable guidelines, the material will be moved to a quarantined area and treated, as necessary. Excavation and aeration would be considered the preferred remediation method.

Dredging of materials may be required as part of the construction and operations associated with components of the Project. Should this be required, dredging will be managed in compliance with all applicable regulatory requirements and the Project specific EPP. This will include application of the Department of Municipal Affairs and Environment's Policy for Development in Shore Water Zones and applicable approval under the *Water Resources Act*, as well as, the *Fisheries Act,* the *Canadian Environmental Protection Act*, and Transport Canada's Navigation Protection Program. If disposal of dredged materials is required, sufficient samples will be collected, and analysed at an accredited laboratory, to accurately assess any potential contaminants and to further inform intended use or disposal of the dragged material. Land based use or disposal of dredged materials is preferred, however, if disposal at sea is considered necessary, then compliance with the *Disposal at Sea Permit Application Regulations* of the *Canadian Environmental Protection Act* will be applied.

It is anticipated that a construction camp may be required during phases of the construction period as the number of contractors and workers required for site construction components exceeds local capacity. Camp construction and operation will be contracted to a supplier with proven expertise in providing accommodations and services. Associated camp services including water supply, waste water disposal and solid waste disposal will be subject to approval requirements under the *Environmental Protection Act* and the *Water Resources Act*.

Solid wastes will also be generated during construction of the Project infrastructure. Solid and hazardous waste handling and disposal requirements and procedures will be detailed in the Project specific EPP and will be subject to approval requirements of the provincial *Environmental Protection Act*.

All construction activities will be controlled to limit the extent of potential disturbance and ensure that appropriate planning is in place to address emergency situations that may occur. Project specific EPPs and Emergency Response Plans (ERPs) will be developed which will identify responsibilities and requirements for implementation of these controls and response requirements.

4.2.10 Construction 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

- National Building Code of Canada (NBCC)
- National Fire Code of Canada (NFCC)
- National Fire Protection Association (NFPA)
- Fire Commissioner of Canada FC No. 373 Standard for Piers and Wharves
- Oil companies International Marine Forum (OCIMF)
- Permanent International Association of Navigation Congresses (PIANC)
- Steel Structures Painting Council (SSPC) 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 will be in accordance with the best practices of industry. The protection systems shall conform to applicable codes and standards of the NFPA.

4.2.11 Construction Period

The physical structures to be installed and erected in the three Phases of the project are listed in Table 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 Inc. anticipates the parts of the project described can progress more or less within the time frames indicated for site preparation and construction. Once approval in principle is obtained and the framework for environmental and geotechnical 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 Inc. anticipates a two year time frame for these activities with a possible start up for environmental and geotechnical site work in 2019.

4.2.11.1 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 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.

4.2.11.2 Construction Period / Phase II

The start of Phase II is marked by construction of the Port Administration building, fuel tank farm and possible drill mud tank farm, docks assemblies, and other structures related to the warehousing. 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.

4.2.11.3 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 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 taking in 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 10,000m^2 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 4.1 Construction Period Time Table

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

4.2.12 Labour Force and Diversity

The Project, through its construction and operations phases, will result in positive economic effects. The Project will create employment opportunities in a variety of occupations. In addition, the requirement for goods and services during Project construction and operation will provide opportunities for local businesses. These direct economic benefits will be supplemented by indirect and induced "spin-off" effects through, for example, spending by Project employees and contractors.

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

- Canadian Labour Code
- Women in Resource Development Corporation
- Office to Advance Women Apprentices
- Labour Legislation
- OHSS
- WHMISS
- Canadian Human Rights Activities

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 Inc. will implement a zero-tolerance

discrimination and harassment policy. GNP Inc. 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 Inc. 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 Inc. 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.

GNP Inc. 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, those that GNP Inc. and their affiliated partners are likely to employ, either part/ full time, contractual, consultative or as partners.

- Surveyors
- Archaeologists
- Marine Biologists
- Ornithologist
- 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

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. In addition to all other responsibilities, successful contractors will be responsible for ensuring compliance with all aspect of the Newfoundland and Labrador *Occupational Health and Safety Act* and Regulations.

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

Preliminary construction consultation indicates that between 75-100 job opportunities will be created during the construction phase of Project.

During the construction phase quarterly employment reports will be compiled from all Contractors, as well as GNP Inc. 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 the Project 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.

GNP Inc. values gender diversity and more broadly a workplace that promotes equality, equity, acceptance and promotion of both females and males in the work environment. More to this is the acceptance and promotion of a workplace that brings together the collective and diverse talents, perspectives, behaviours and attributes of all individuals. Although much effort has been made to improve the inclusion and advancement of women in construction projects, GNP Inc. recognizes the challenges women face in securing stable employment and biased-free work environments where occupational opportunities have traditionally been male-dominated.

GNP Inc. will develop a Women's Employment Plan, for implementation during Project construction and operation. GNP Inc. commits to review this proposal with the Women's Policy Office (WPO) representatives and will welcome advise on areas for improvement or suggestions for development. The anticipated relationship with the WPO will enable GNP Inc. to receive advice and useful best practices based on experiences from other Provincial projects that collaborate with the WPO. The goal will be to have a final Women's Employment Plan that is suitable for this project and meets the expectations of the WPO.

The approach proposed in this Women's Employment Plan would support a strategic and focused effort on diversity, inclusion and gender equity. The Women's Employment Plan will progress as various stages or phases of the project comes on stream. For the next two years and after EA approval is received, the work will primarily focus on survey and engineering studies. The Construction Period will include three Phases and a preliminary Construction consultation has estimated that between 75-100 job opportunities will be created during the Period.

GNP Management is accountable and responsible for both administration and implementation of the Women's Employment Plan. All employees of the Company and contractors hired to support construction activities related to the project have a role to play in implementing the Company's policies and programs, including increasing the overall opportunities for and employment by women. Senior level support and governance over diversity and inclusion will be established by identifying an executive sponsor, creating a diversity Council (committee), and assigning responsibility for diversity leadership to a member of the management team, such as the HR Manager, for championship of diversity initiatives.

As majority of the workforce during Construction will be through contractual arrangements, GNP Inc. will ensure that contractors follow and implement employment policies and practices that demonstrate a commitment to equity and diversity, and report progress on a regular and frequent basis. During the Construction Phases of the project, GNP Inc. will use a reporting system whereby all companies hired to support the project will report monthly to the Company. This information will include employment reports containing, but not limited to, the following:

- Quantitative data: total number of employees and hours worked by gender and in a breakdown displaying the National Occupational Classification (NOC) categories; number of apprentices and journey persons by NOC and by gender; full/part-time employment numbers by NOC and gender.

- Qualitative date: will include all actions taken within the month promoting diversity and inclusion and supporting GNP's Women's Employment Plan.

GNP Inc. will submit an annual report to the Women's Policy Office and have an annual meeting with them on accomplishments of the women's employment strategies, including the status of both quantitative and qualitative measures identified.

4.3 Operations and Maintenance

Because the Crémaillère Harbour Marine 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.

The Executive of GNP Inc. 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*.

GNP Inc. will develop a Health, Safety and Environmental Management System (HSEMS) as the principal mechanism by which GNP Inc. will integrate the project activities including design and engineering, construction and operation, with the environment and health and safety responsibilities of the operation of the Port. Permitting, approval and authorization requirements, Standard Operating Procedures (SOPs) and Emergency Preparedness and Response Plans (EPRPs) are key elements of this HSEMS and the Proponent representatives, contractors/vendors and other Project personnel will be 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 HSEMS.

Environmental Management Plans (EMPs) incorporated within the HSEMS will include, at a minimum:

- Waste Management
- Water Management
- Noise and Dust Control
- Air Emission Control

- Marine Safety
- Emergency Preparedness
- Community Liaison
- Avifauna Management
- Historic Resources

The HSEMS will be prepared and implemented for all Port operational activities. Components of the HSEMS such as waste management, water management, and air emission control may be subject to approval requirements of the provincial *Environmental Protection Act* and *Water Resources Act*. 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.

The kinds and scope of activities described herein are as presently anticipated and estimated. Where not stated explicitly it is understood that GNP Inc. will operate the proposed port in accordance with all applicable regulations and environmental best practices, which will be detailed in the HSEMS. Potential concerns related to activities and proposed mitigation practices and procedures will be detailed in the HSEMS and in the EPRP contained in the HSEMS. Operations not considered in the first iteration of the HSEMS will undergo separate registration and permitting as required.

Specific operation and maintenance activities and requirements associated with the proposed Project infrastructure and operations are detailed in the sections below.

4.3.1 Vessel Traffic

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 Project HSEMS will take into account current best practices regarding all aspects of navigation and movement and operation of vessels within the Port's authority.

4.3.2 Pilotage Risk Assessment

GNP Inc. will apply to the Atlantic Pilotage Authority to conduct a risk assessment according to the Pilotage Risk Management Methodology (PRMM) of the 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 Project HSEMS along with Standard Operating procedures specific to GNP Inc.

4.3.3 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.

4.3.4 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 Project HSEMS.

4.3.5 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 refuelling sites. SOPs for refueling practices and spill response will be detailed in the Project HSEMS and EPRP.

4.3.6 Mechanical Repair / Machine 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 for accidental events will be identified according to measures detailed in the Project HSEMS and EPRP. 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 Project HSEMS.

4.3.7 Ballast Water Treatment (If Required)

Canada is a signatory of the 2004 International Convention for The Control and Management of Ship's Ballast Water and Sediments. The convention aims to prevent the spread of harmful aquatic organisms from one region to another. Canada has enacted regulations, including Canada's *Ballast Water Control and Management Regulations,* and the guidance document "A Guide to Canada's Ballast Water and Management Regulations", TP 13617 E (2018), to guide compliance with the requirements of the Convention. These Conventions and Regulations place responsibility for compliance with vessel owners/operators. Modern vessels are equipped with, or are being equipped with, ballast treatment plants on board the vessel, as opposed to onshore, to enact compliance.

Should the requirements for vessel based compliance, or requirements surrounding treatment of ballast water change, GNP Inc. is proposing to utilize a mobile and fully autonomous system such as Invasave 300 as described in Appendix C, to ensure compliance. The system is supplied in a CSC- certified standard size container and complies with the most stringent European regulations. The system allows for both the supply and treatment of ballast water. The treatment system is a combination of UV lights and filtration and does not use chemicals. The sediments can be send to approved disposal facilities after analysis. Construction and operation of ballast water treatment facilities may require approval under the *Environmental Protection Act* and will require consultation with the Department of Municipal Affairs and Environment during detailed design planning.

4.3.8 Drill Mud Mixing, Storage, and Loading (If Required)

Drilling fluids and muds typical to the offshore industry may be stored and handled at the site and may include non-aqueous drilling fluids of Group I, II or III, Figure 4-11. Depending on predicted demand there could be as many as 12-150 m^3 storage tanks full of drilling fluids at one time, for a total quantity of 1800 m^3 of drilling fluid.

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 use 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 and Climate Change. 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 4-11 Typical Non-Aqueous Drilling Fluid Composition by Volume

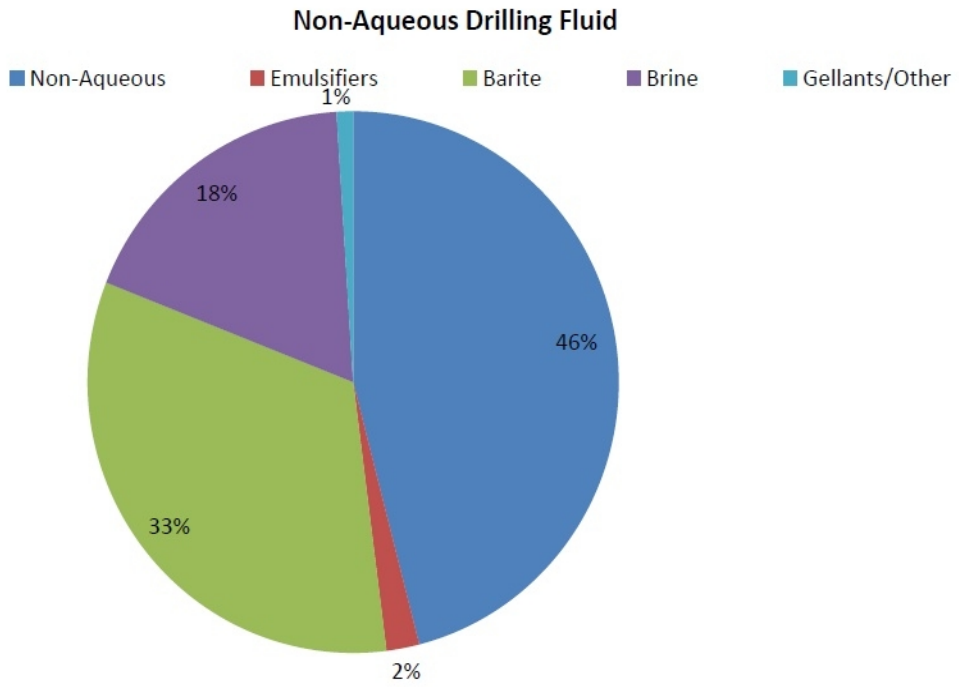


Table 4.2 Potential Additives to Drilling Fluids below lists all potential additives to drilling fluids. It is unknown which (if any) of these chemicals will be stored on site. If storage or handling of any of these additives is required, it will be done following all applicable regulations for the storage, handling and transport of such materials.

Table 4.2 Potential Additives to Drilling Fluids

Fresh Water	Sea Water	Brine
Saturated NaCl	CaC12	Salts (KCI)
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 4.3 and Table 4.4, respectively. Estimated quantities of chemicals to be stored on site are provided in Table 4.5

Table 4.3 Hazmat Class 3 Substances

Crude Oil	Tannins	Mineral Oil
Asphalt	Diesel	Lubricates
Biopolymers	Lignosulphonates	

Table 4.4 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 4.5 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.

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 physical characteristics of the proposed Liquid Mud Plant (LMP) are detailed in Section 4.2.4 of this document. Containment systems specified exceed existing legislated standards and will be verified to do so in the HSEMS. Handing procedures and best practices are well documented in industry guidelines for both mixture components storage and handling and mixed mud transfers. These guidelines will be documented in the HSEMS, cross referenced with applicable Provincial and Federal Environmental and Health and Safety regulations. Operation of the drilling mud storage facility may require approval under the *Environmental Protection Act* and will be subject to standard operating procedures under the HSEMS. As well, the Project EPRP will include emergency response procedures developed to address requirements that may arise during drilling mud storage operations.

4.3.9 Graving Dock

The graving dock is conceptual at this point in time and subject to engineering and the required technical studies. There are several alternatives considered and final selection will depend on market opportunity and cost. The basis of design for the tonnage to be serviced will be a railway dock system, which involves a mechanical means of moving and hoisting the vessel out of water to an elevation above high tides. Operation of the graving dock may require approval under the *Environmental Protection Act* and will be subject to standard operating procedures under the HSEMS, developed to address the human and environmental safety of the graving dock operations. As well, the Project EPRP will include emergency response procedures developed to address requirements that may arise during graving dock operations.

4.3.10 Bulk Ore Loading, Offloading and Storage

Should bulk ore storage take place at the port, bulk ore storage will be under cover over top of an impermeable laydown surrounded by a catchment berm. Construction and operation of bulk ore storage facilities may require approval under the *Environmental Protection Act* and will require consultation with the Department of Municipal Affairs and Environment during detailed design planning. Potential environmental effects specifically related to operation of offloading/loading, and storage of ore at the site will be detailed in the Project HSEMS along with mitigating measures.

4.3.11 Freight Handling, Laydown and Warehousing

Freight handling and storage will occur either on outside laydown areas or in enclosed warehouses. SOPs and best practices will be documented in the Project HSEMS. The Project EPRP will address requirements for response to any emergencies involving products with the potential for causing air, soil, or groundwater contamination.

4.3.12 Security and Administration

Security and port administration operations will take place over the entire life of the project. 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 HSEMS.

4.3.13 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 Inc. site. Road maintenance effects will be documented along with mitigating measures and SOPs for implementation in the HSEMS.

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

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

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

4.3.14 Buildings

Buildings 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 Inc. 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.

4.3.15 Supply and Services

The environmental effects of supply and services related to the operations of the port will be documented in the HSEMS in reference to operation of each facility. Where new facilities are added the relevant measures and SOPs etc. will be appended to the HSEMS 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

Consideration will be given to the applicability of the *Canadian Environmental Protection Act* and associated regulations for substance stored or used on site, including *Environmental Emergency Regulations*, *Interprovincial Movement of Hazardous Waste Regulations*, and *New Substances Notifications Regulations*. In addition, any reporting requirements under the National Pollutant Release Inventory process will be assessed and identified.

4.3.16 Infrastructure Maintenance

The environmental effects of infrastructure maintenance as it relates to the operations of the Port will be documented in the HSEMS in reference to operation of each facility. Where new facilities are added the relevant measures and SOPs etc. will be appended to the HSEMS and associated documentation. Environmental effects of infrastructure maintenance during the operation of the proposed 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