SNC·LAVALIN

ENVIRONMENTAL PREVIEW REPORT

FERMEUSE HARBOUR DEVELOPMENT PROJECT

Fermeuse Enterprises Limited

INDUSTRY

27 | 08 | 2012

REPORT
Rev. 1 > Internal ref. 629647-0001-T-4E-REP-000-0001_C01 > Volume 1/1

ENVIRONMENTAL PREVIEW REPORT

IN ACCORDANCE WITH THE
Guidelines for an Environmental Preview Report for the Fermeuse Offshore Marine Base

FOR

FERMEUSE HARBOUR DEVELOPMENT PROJECT
AT
FERMEUSE, NL

Submitted to:
Minister
Environment and Conservation
P.O. Box 8700

Submitted by:
Fermeuse Enterprises Limited
P.O. Box 580,
Harbour Grace, NL
A0A 2M0

August 27, 2015

TABLE OF CONTENTS

APPENDICES

1 NAME OF UNDERTAKING

The name of the undertaking is the Fermeuse Offshore Marine Base. It is located in the community of Fermeuse approximately 77 kilometres south of St. John's on the Avalon Peninsula.

2 PROPONENT

Name of Corporate Body:

Fermeuse Enterprises Limited (FEL)

Address:

Fermeuse Enterprises Limited
P.O. Box 580,
Harbour Grace, NL
A0A 2M0

President:

Name:	Mr. Steinar Engeset
Official Title:	President
Address:	P.O. Box 580 Harbour Grace, NL A0A 2M0 Phone: (709) 596-8000

Principal Contact Persons for purposes of environmental assessment:

Proponent Contact	Mr. Mike Rose P.O. Box 580 Harbour Grace, NL A0A 2M0 Phone: (709) 765 – 1000 Email: mrose@nl.rogers.com

FEL and its main shareholder - Harbour Grace Shrimp Co Ltd. – view the opportunity to develop Fermeuse Harbour (at Lumley Cove and Lawe's Point) as an effective method of long-term reinvestment in rural Newfoundland and Labrador. Since the 1970s, the Harbour Grace Shrimp Co Ltd. has been a pioneer in the development of the Northern Shrimp fishery supporting sustainable communities in rural Newfoundland and Labrador.

3 THE UNDERTAKING

3.1 NATURE OF THE UNDERTAKING

3.1.1 Overview

Fermeuse Enterprises Limited (FEL) proposes to construct and operate an offshore marine base to service the offshore oil and gas industry in Newfoundland and Labrador out of Fermeuse Harbour.

To function as a successful offshore marine base a location must possess a number of characteristics, including:

- Safe harbour in all weather conditions,
- Sufficient deep water and berthing space,
- Sufficient laydown areas,
- Sufficient upland development area for offshore support services buildings,
- Adequate infrastructure to efficiently handle offshore supply vessels,
- Strategic location to cost-effectively access offshore oil fields off the coast of Newfoundland Labrador.

Fermeuse Harbour possesses all of these important characteristics.

3.2 RATIONALE FOR THE UNDERTAKING

Long valued by the fishing industry for its natural “safe haven” characteristics, the size and scale of Fermeuse Harbour make it an ideal port to expand into alternate industrial uses while, at the same time, protecting and advancing the commercial interests of all current users.

The Fermeuse supply base represents a significant opportunity for direct and indirect job creation and alternative economic developments at the local and regional level. In effect, development of the supply base in Fermeuse represents a regional economic development strategy designed to generate and drive industry-led or

industry-supported innovation based on cooperation between the supply base, industry, the university/colleges, municipalities, and Provincial and Federal Governments.

Prior to the 1992 ground fish moratorium, Fermeuse/Port Kirwan harbour was a fishing industry commercial hub. Since that time there has been limited and declining shore-based fishing activity. Given its natural attributes for shelter and availability for fishing industry services, however, Fermeuse Harbour continues as a home base for independent fishermen. While very positive, these remaining industrial activities provide a limited and declining municipal tax base. The Towns and region have suffered dramatic losses of employment and population base. This project supports existing industrial activity, especially fishing, and will attract new industry as a means to grow the available tax base through which improved municipal and harbour services can be maintained and improved.

Since first oil production from Hibernia in 1997, Newfoundland and Labrador's oil and gas industry has progressed steadily. Production comes from the prolific Jeanne d'Arc Basin and includes the Hibernia, Terra Nova, White Rose, and Hebron discoveries and their various subsea tie-backs. Statoil's announcement of three significant discoveries in the Flemish Pass Basin in 2013, will most likely initiate additional expansion of the industry.

In addition to the Jeanne d'Arc and Flemish Pass Basins, there are more than 20 other unexplored and prospective offshore basins. Furthermore, the island of Newfoundland is targeted as a natural centre for industry expansion into the Arctic, e.g., off Greenland. All of these facts support the requirement for a new, modern offshore supply base.

Many global service providers are now focusing their attention on this geographical area. Increasing exploration and production investments expected between 2014 and 2020 from Statoil, Exxon, Husky, Suncor, BP and Shell. These companies and well-known global suppliers already established in the Province have indicated they will be expanding their subsea servicing activities in the region. They also indicate that there are infrastructure limitations which must be overcome for greater efficiencies; for example, cost effective sub-sea operations demand large spaces

and heavy lifting capacity near a waterfront, but such specialized services are rare to non-existent in Newfoundland and Labrador.

4 DESCRIPTION OF THE UNDERTAKING

The undertaking that is proposed is the development of a marine offshore supply base to support the offshore oil and gas industry of Newfoundland and Labrador. The preferred choice of location is in the Town of Fermeuse. It is anticipated that the offshore marine base will be a multi-use facility. The completed facility will consist of 12 berths, a deep water servicing quay, multiple laydown areas, crane and heavy lift capabilities, and various site buildings, e.g., maintenance, administration etc. The total land area of the completed facility will be approximately 15.3 hectares.

All design and construction will follow relevant Canadian building codes and standards including by not limited to:

- National Building Code of Canada (NBCC) for building construction;
- Canadian Bridge Code (CAN/CSA S6) for wharf and marine structures constructed;
- Handbook of Steel Construction (CAN/CSA S16) for steel design;
- Design of Concrete Structures (CAN/CSA A23.3) for concrete design;
- Canadian Electrical Code (CAN/CSA C22.1) for electrical system design;
- National Fire Code of Canada (NFCC).

To ensure that the site remains operable over its intended design life, industry standards for maintenance will be followed and site specific operation and maintenance (O&M) documents will be developed for the facility. The intended design life for the structures on site will be 30 years.

Fermeuse is located on the eastern portion of the Avalon Peninsula approximately 77 kilometers south of St. John’s via paved two-lane highway. It has historically served as a summer fishing station and today the fishery is still the main economic contributor for the Town.

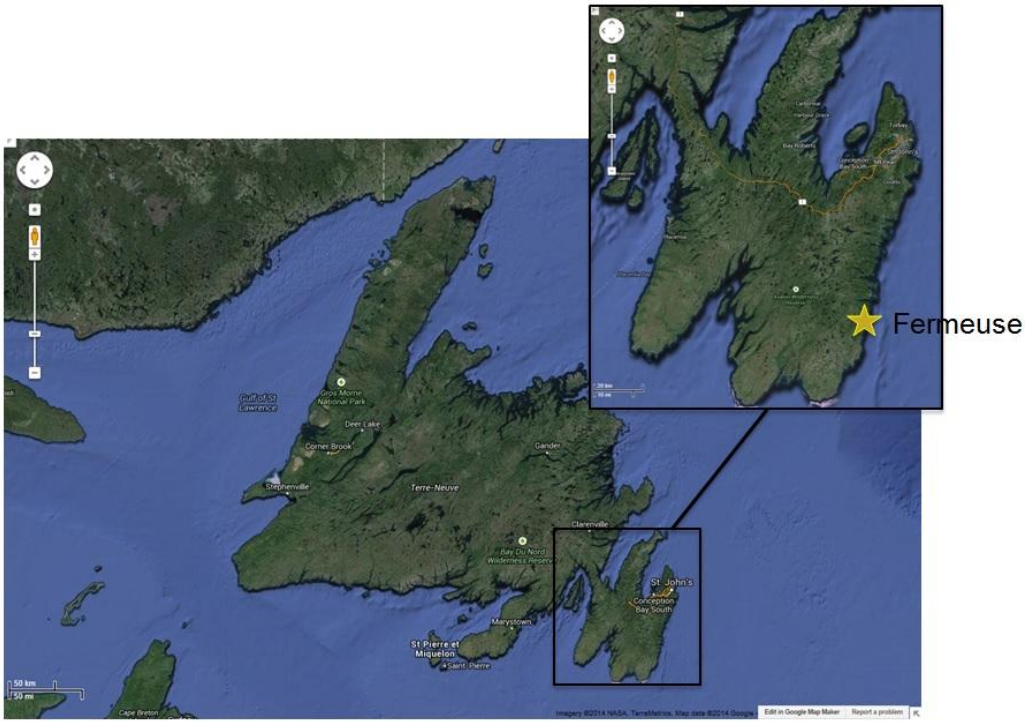


Figure 1: Fermeuse Location Map (http://www.google.ca)

The harbour has excellent proximity to the offshore oil and gas operations off the coast of Newfoundland and Labrador. The Hibernia platform is approximately 298 kilometres from Fermeuse Harbour.

Fermeuse Harbour is long (approximately 5 kilometers) and well protected. It provides a naturally sheltered port with hilly terrain to the north and south. The size, scale and water depths make Fermeuse Harbour an ideal port for the development of an offshore marine base.

4.1 GEOGRAPHICAL LOCATION / PHYSICAL COMPONENTS / EXISTING ENVIRONMENT

4.1.1 Geographical Location

Strategically located on the East coast of Newfoundland and Labrador, Fermeuse is an ideal location to construct an offshore marine base to service the oil and gas industry off the island of Newfoundland. Fermeuse is situated on the southeast shore of Newfoundland's Avalon Peninsula. The site will be situated along the Fermeuse Harbour, a deep fiord-like inlet, between Sheep's Head and Lawes Point.

Construction activities in the harbour will occur in Lumley Cove. The approximate coordinates for the site location are 46° 58' 12", -52° 56' 48".

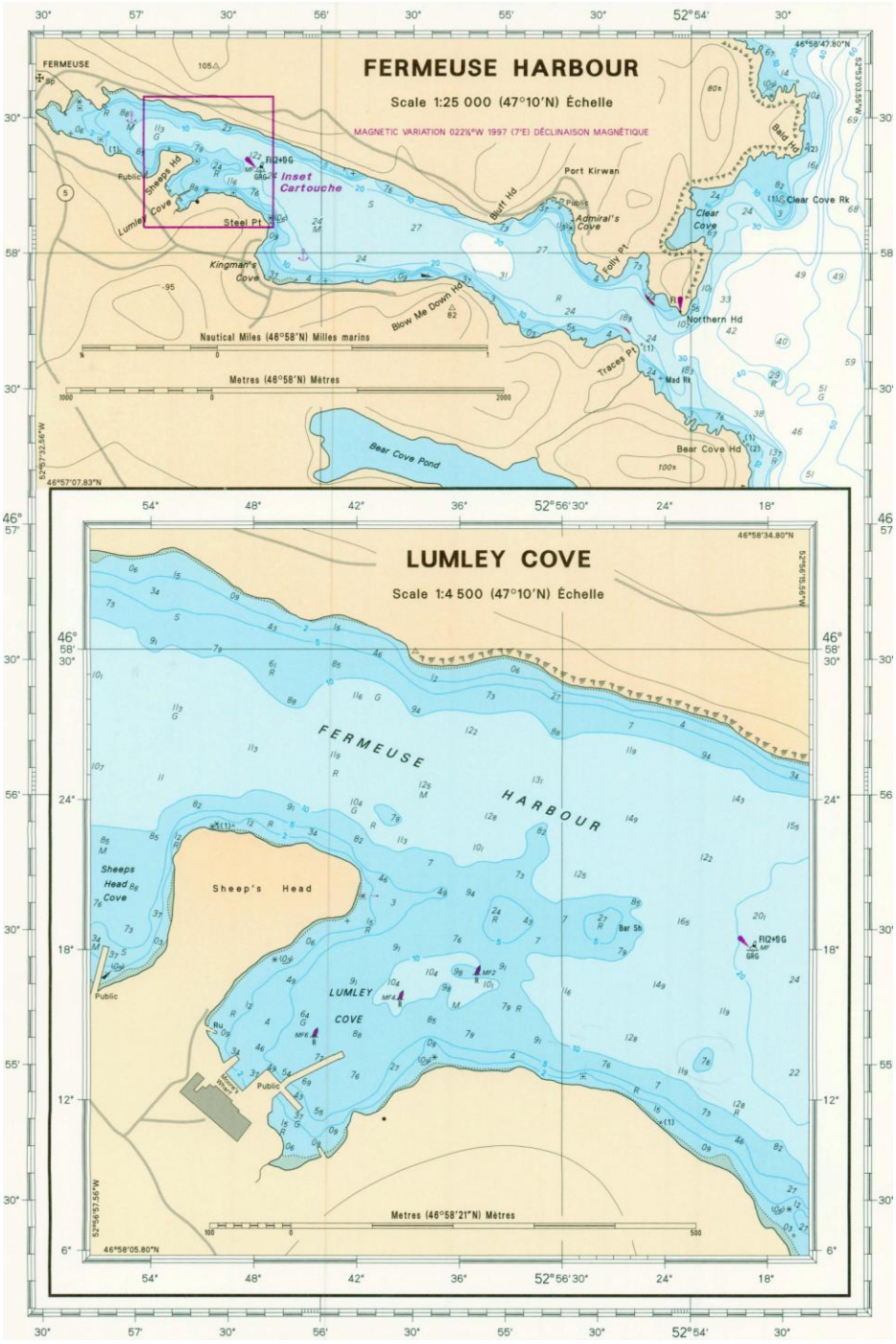


Figure 2: Fermeuse Harbour (Canadian Hydrographic Services Chart 4845)

To allow ease of travel to site and safer access, an alternative access road is planned for the beginning of Phase 2 of the project. A new access road will ensure

that traffic going to and from the marine base will not have to travel through residential areas to reach the site. Also, heavy equipment used in construction will not have to travel on residential municipal roads during the construction of Phases 2-4, thus reducing wear and tear and improving safety. The proposed access road will intersect the Southern Shore Highway and extend down to the project site at the location of an existing intersection near the existing plant (see Figure below). A significant majority of land required for the access road is owned by the Town of Fermeuse. To ensure a safe intersection at the site, realignment may be necessary. Any required realignment is easily achievable given that the land to the north of the existing intersection is owned by the proponent.

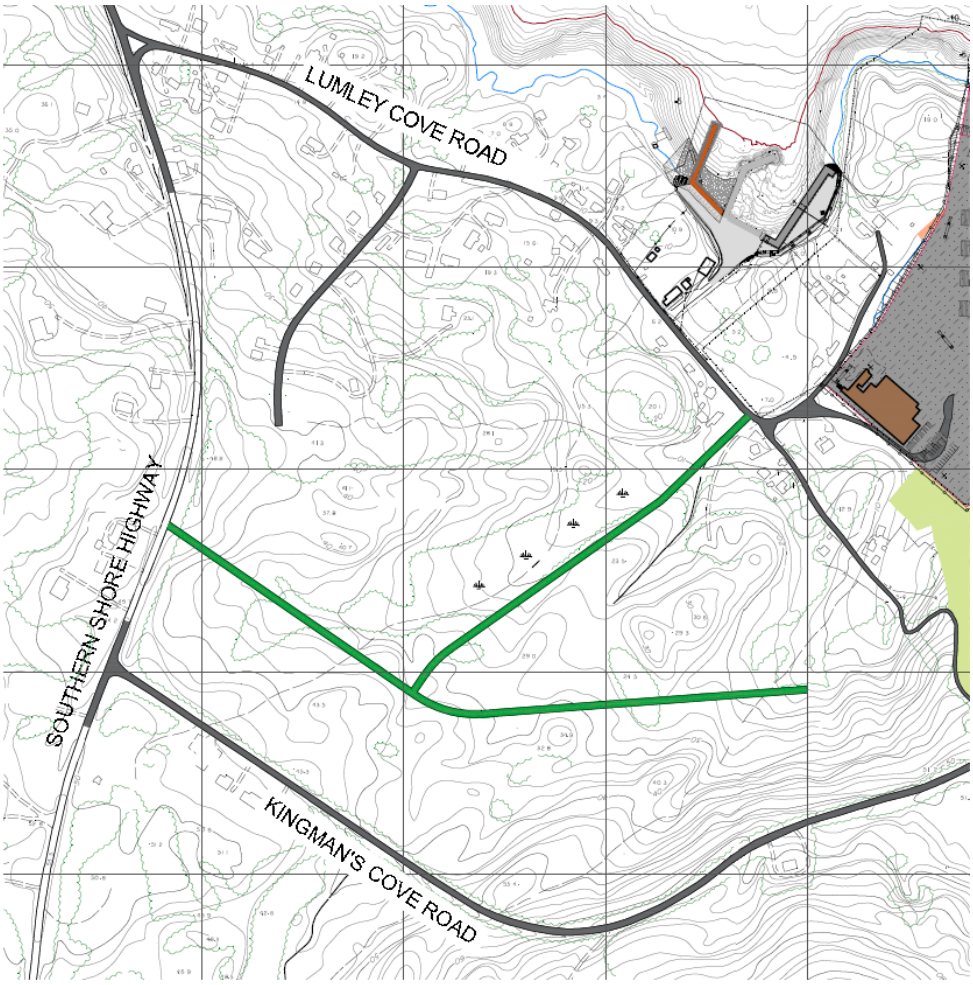


Figure 3: Proposed access road shown in green.

4.1.2 Physical Environment

4.1.2.1 Existing Site

Apart from the existing fish plant property, the proposed project site is made up of rocky shoreline with inland areas covered by small trees, shrubs and grass. There is an existing oil tank on the west side of Lawe's Point that was historically used to provide fuel for the fish plant and visiting vessels. There are residential properties to the west and the south of the proposed site. The proposed footprint of the marine based does not physically impact any of the residential properties that are adjacent to the site. Figure 4 shows an aerial view of Sheep's Head and Lawe's Point.

Figure 4: Existing site at Sheep's Head and Lawe's Point.

There is an existing shoal area to the east of Sheep's Head as can be seen in the upper right quadrant of Figure 4. This has always been a navigation issue for ships entering the harbour. The marine base development will encompass the shoal with a proposed pier and eventually eliminate this navigation issue.

The harbour in Fermeuse is surrounded by hills (see Figure 5 for aerial photograph of Fermeuse Harbour). It is expected these hills will contain bedrock with little overburden. Early in the design phase of the project, a geotechnical program will be carried out to determine the subsurface conditions. Rock found in the hilly terrain on the project site will be utilized during construction and used as rock fill. Any other suitable material that is excavated during construction will be stock piled and used during construction.

Figure 5: Aerial photograph of Fermeuse Harbour (Department of Fisheries and Oceans)

4.1.2.2 Physical and Biological Description of Lumley Cove

In November 2014 a Marine Habitat Characterization Survey was completed by LGL Limited for Fermeuse Enterprises Limited. The report gives a detailed physical and biological description of Lumley Cove and can be found in Appendix B of this report.

4.1.2.3 Residential Areas

The Municipal Plan currently under development for the Town of Fermeuse identifies the area proposed for the marine base as being zoned for Marine Industrial.

There are a number of properties with existing houses that are adjacent to the development to the south and to the west. There are also two properties with existing homes that are adjacent to the proposed access road development. These residences are outlined in blue in Figure 6 below. Note that properties adjacent to the site that have no buildings on them have not been identified in the figure.

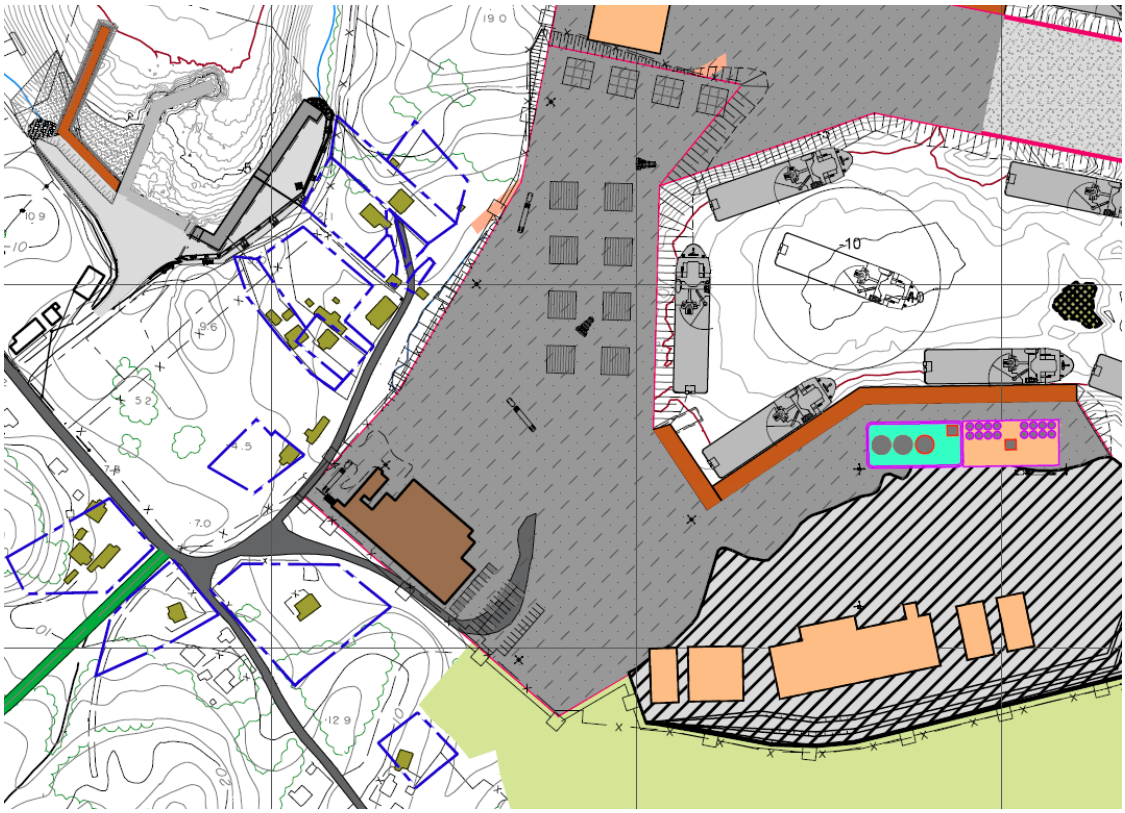


Figure 6: Dwellings located adjacent to the project site. Note that properties with no dwellings have not been shown for clarity.

4.1.2.4 Transportation Routes

The main transportation routes in the area are the Southern Shore Highway, Kingman's Cove Road, and Lumley Cove Road (identified in Figure 3).

The Southern Shore Highway is located approximately 0.85 kilometers to the west of the proposed development. All traffic travelling from neighboring communities and larger centres, i.e., St. John's, Mount Pearl, etc. will use this road.

Kingman's Cove Road is approximately 0.4 kilometers south of the development and connects Fermeuse to the small community of Kingman's Cove. This transportation route will not be impacted by the development.

Lumley Cove Road is the main municipal road that runs through Fermeuse. This street will be used by construction equipment and workers during Phase 1 of development, although it is anticipated that once the main equipment has been moved on site it will remain there throughout the construction phase resulting in minimized movements. As noted previously, an alternative site access road will be constructed at the beginning of Phase 2 to further reduce traffic going to the marine base via Lumley Cove Road, including the virtual elimination of larger vehicles using Lumley Cove Road.

4.1.2.5 Fresh Water Inventory

There are two protected surface water intakes that supply Fermeuse with fresh water. One is located approximately one (1) kilometer from the project site at Merrymeeting Pond while the other is 1.6 kilometers from the project site at Bear Cove Pond.

There are three public wells located on the North Side of Fermeuse Harbour at Port Kirwan. The closest well to the project site is located 900 metres away and is an unprotected groundwater wellhead site. The remaining two public well sites are greater than 1.4 kilometers from the project site.

4.1.2.6 Hiking Trails and Tourist Attractions

A small dirt road to the east of the existing intersection near the fish plant has been identified as being part of the East Coast Trail. This road is known locally as Corkscrew Road. The East Coast Trail Association does not list the road as part of the East Coast Trail. The nearest listed trail is at the end of Kingman's Cove Road, approximately 1.35 kilometers from site (see Figure 7).

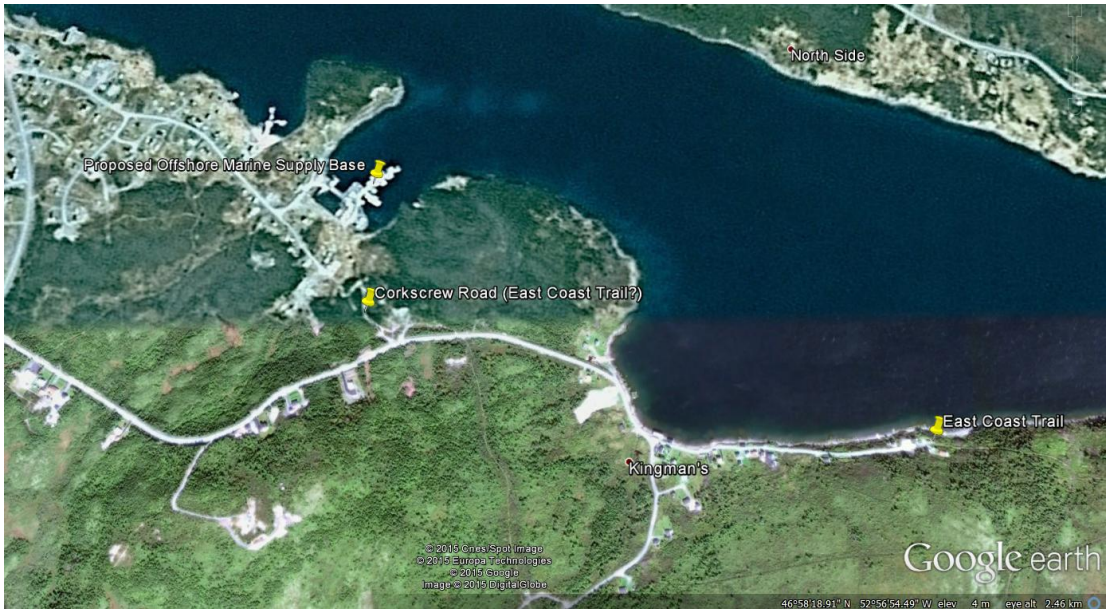


Figure 7: Walking trails near proposed site (Google Earth).

No other tourist attractions have been identified in the Town of Fermeuse. The Southern Avalon Development Association's website lists "Hunting and Fishing" and "Bird and Whale Watching" as other tourist attractions. However, there are no known tour guides or outfitters operating out of Fermeuse.

4.1.2.7 Effect of Physical Environment on the Undertaking

The physical environment will provide the dominant set of design criteria for the project and will govern the design of many aspects of the proposed facility. The area is subject to high winds, large amounts of precipitation both in the form of rain and snow, seasonal fog and seasonal cold temperatures. All structures either located on land or in the marine environment will be designed to withstand the maximum expected environmental loads with the appropriate safety factors to provide a robust design. Measures will be taken to minimize the effect of the environment during the construction and operation stages of the project. The physical design of temporary structures for the aid of construction will take into account winter conditions, maximum wind and wave action, and extreme sea states. Construction activities will be scheduled to avoid environmental impacts if safety concerns are identified.

4.1.2.8 Climate

The climate in the Maritime Barrens ecoregion is influenced by the Atlantic Ocean which causes long periods of fog. The east coast of the Avalon Peninsula experiences relatively mild winters with varying snow cover. The summers are cool with low clouds and fog. The figure below shows climate data obtained by Environment Canada from the Cappahayden climatological station, located near Fermeuse. The average annual precipitation between 1981 and 2010 was 1583.4mm, with an average monthly temperature of 4.9ºC.

Winter temperatures on the island of Newfoundland are characteristic of a stormy maritime climate due to its day-to-day variability. Incursions of moist, mid-Atlantic air are frequent. On the southeast coast, where the moderating influence of the ocean is greatest, the winter average is between -2°C and -4°C (Environment Canada, 2014).

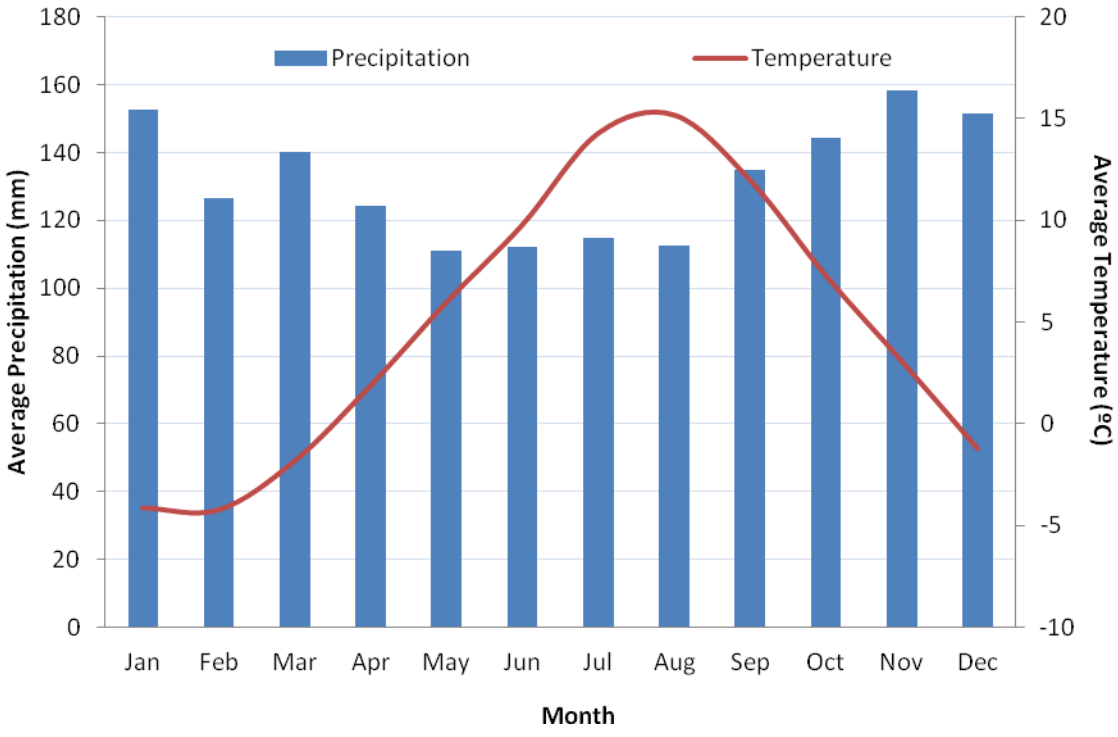


Figure 8 - Average Monthly Precipitation and Temperature near Project region.

The mean annual rainfall is approximately 1411.4 mm, with the months of September, October, and November experiencing the highest amount. The mean

annual snowfall amount is 171.8 cm. Snow typically begins in November and ends in May, with the maximum mean snowfall of 51.3 cm occurring in January. The average date of the last spring frost is June 5th and the average date of the first fall frost is October 8th. The average length of time per year experiencing frost-free conditions is 124 days (Environment Canada, 2014).

Newfoundland and Labrador has the strongest winds of any province in Canada, with most stations recording average annual wind speeds greater than 20 km/h. Generally, coastal stations tend to have stronger winds than inland stations. Winds are predominately from the west year-round, but variations are common both from month to month and location to location (Environment Canada, 2004 website). The wind rose for the Fermeuse area is shown in the following figure.

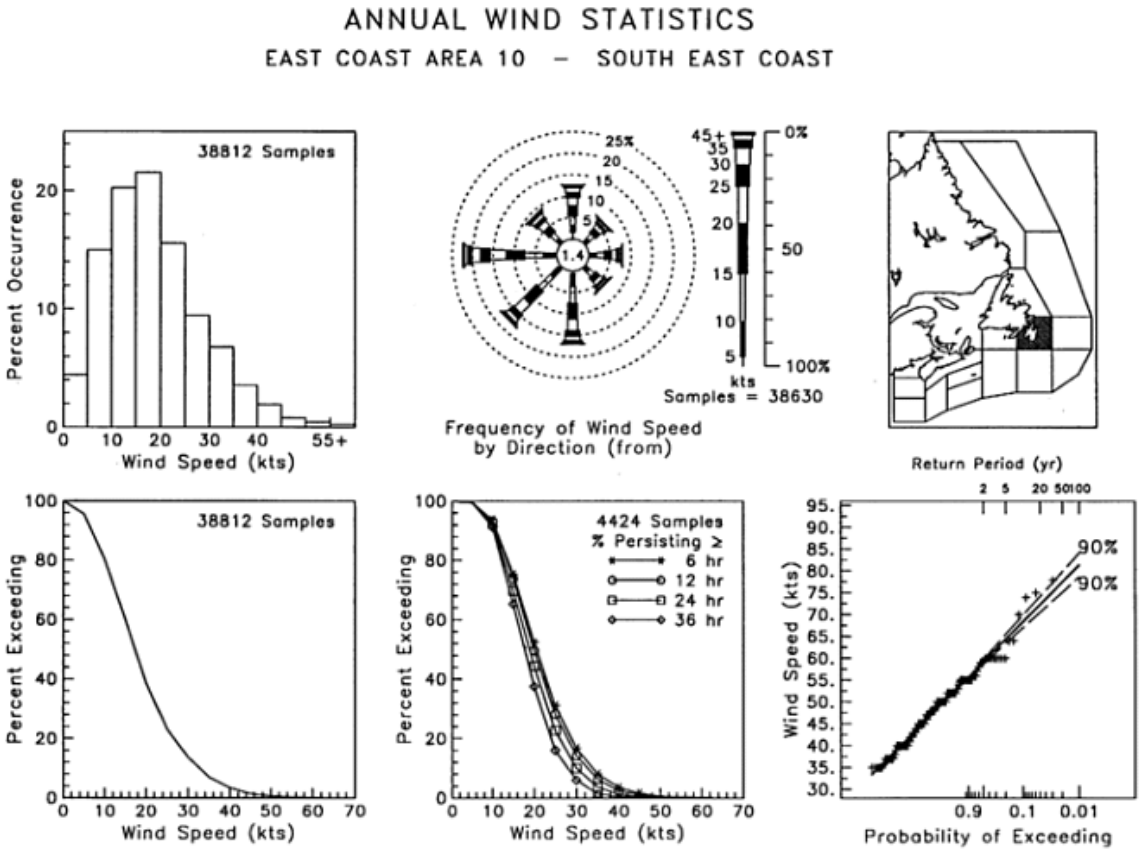


Figure 9 - Annual Wind Statistics (Wind and Wave Climate Atlas, http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/atlas-eng.htm)

Climate change is expected to cause warming of the oceans and the partial melting of glaciers and ice-caps, resulting in global rise in sea level. By the end of this century the global mean sea-level rise could amount to 0.09 to 0.88 meters (Intergovernmental Panel on Climate Change 2001 Natural Resources Canada Website). Sea level rise in Canada is a significant issue because the coastline exceeds 203,000 km.

See Figure 10 for a map showing the sensitivity of the coastlines of the south east coast of Newfoundland and Labrador to sea-level rise due to climate warming. Sensitivity here indicates the degree to which a coastline may experience physical changes such as flooding, erosion, beach migration, and coastal dune destabilization. It is measured by a sensitivity index which is obtained by manipulating scores of 1 to 5 attributed to each of the seven values: relief, geology, coastal landform, sea-level tendency, shoreline displacement, tidal range, and wave height. This index is a modified version of the coastal vulnerability index of Gornitz (1990).

The blue-shaded area on the map shows the expansions of the submerging areas in Canada's coasts due to climate warming.

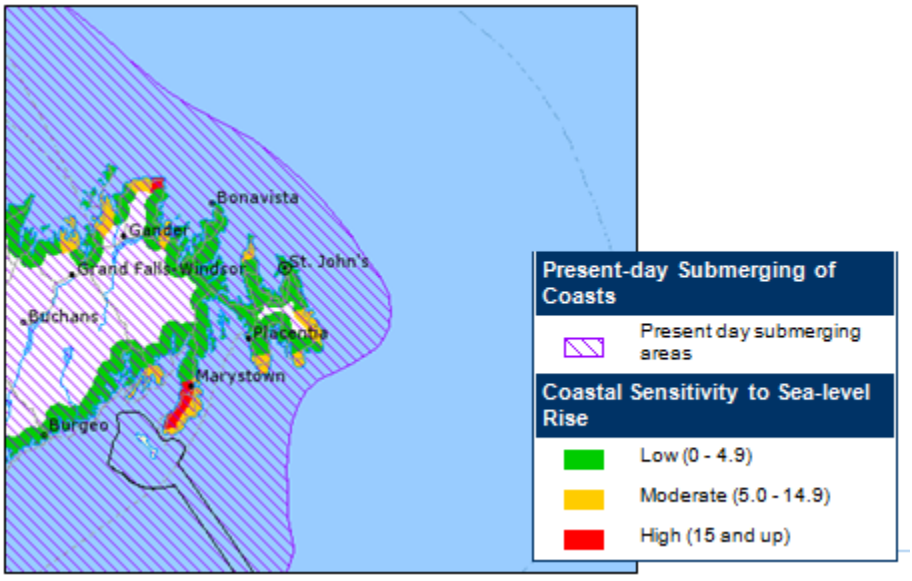


Figure 10: Coastal Sensitivity to Seal Level for South East Coast of Newfoundland and Labrador

Storm surges will cause more damage to the communities located close to the level of the ocean as sea levels rise. Fermeuse is one of the communities that will be affected by this.

The Newfoundland Labrador Department of Environment and Conservation indicates that seawater rise due to climate change is between 3-5 millimeters per year on the Avalon Peninsula. Over the next 50 years, it is expected that the sea level will rise at least 250 millimeters. Sea-level rise has been taken into account in the preliminary design of marine structures.

4.2 CONSTRUCTION

The construction of the marine base involves demolition of the existing wharf structures in Lumley Cove. Following the demolition and removal of these structures the contractor will begin site clearing, excavation and backfilling, as well as phased construction of the new wharf structures. Clearing and excavation onshore will occur only when absolutely necessary to maintain construction schedule and will be kept within the project footprint.

The activities related to construction include:

- Tree cutting, grubbing and clearing;
- Top soil stripping;
- Construction of site road;
- Marine construction, including pile driving;
- Infill behind wharf structures;
- Installation of site services, e.g., water, sewer, electrical, fuel, etc.;
- Installation of new site buildings, e.g., administration, warehouses, fabrication shops, etc.;
- Paving and landscaping;
- Transportation.

A site plan for each phase of development has been developed and is presented in Appendix C. Visual renderings of the fully developed facility from various vantage points can be found in Appendix D.

4.2.1 Construction Period

The Construction period is envisioned in this document as occurring across multiple phases across the entire project footprint. Construction is expected to start in spring or early summer of 2016. Table 1 indicates the anticipated construction periods for each phase if they are to proceed as described and planned. The style and pace of development, however, will be influenced by market demands and opportunities. Therefore, it is possible – and perhaps likely - that project construction may not exactly follow the above-described four phases. It is expected that the project will be developed over the course of many years as market demands dictate. Market demand will also dictate which Phases precede first and to what degree. Hypothetically, portions of Phase 4 may be developed before Phase 2 or 3. Or, perhaps, the above-described Phase 1 is larger than the market may require in the beginning. As well, development may proceed with further subdivision of phases, e.g., five or more phases instead of four, or phases may be combined or partially combined where advisable. In these respects, the phased development plan described above remains flexible, although the total possible footprint and main activities under this application remain unchanged.

Table 1: Construction Phase Construction Period

Phase	Construction Duration	Estimated Start of Construction
1	12-18 Months	2016/2017
2	12-18 Months	2020/2021
3	24-30 Months	2025
4	18-24 Months	2030
Total	66-90 Months	

In any case, Phase 1 would include the demolition and backfilling of an existing Small Craft Harbours site between Sheep's Head and Lawe's Point. Preliminary discussions with the Harbour Authority, DFO, and the Province indicate that it will be possible to move the berthing space of this site to DFO's newer boat basin facility west of Sheep's Head.

All of the phases described include the development of land at the facility. For the majority of this development, backfill will be required to fill in low areas. It is proposed that backfill material be taken from the south side of the development, i.e.,

Lawe's Point, which is at a higher elevation. Removing material from the south will allow that area to be developed into a usable space.

4.2.2 Construction Materials and Methodology

Each phase of construction includes similar construction materials and the construction methodology is similar. What will change in each phase is the location and magnitude of construction.

4.2.2.1 Earthwork

A large component of the development will be earth work. Early in construction earthworks will include tree cutting, grubbing, clearing and top soil stripping. Once these items are completed, cut and fill operations will occur at the project site. An area within the project boundaries has been identified as an area that material will be borrowed from to use as backfill as needed on other parts of the project site. Material will be excavated from this area until bedrock is encountered. Bedrock will have to be drilled and blasted to allow further excavation. All required blasting will be completed between 0800 and 1800 hours and will follow all Government regulations.

The equipment used will be similar to that used in any earthwork construction project and may include excavators, loaders, backhoes, dump trucks, bull dozers, graders, scrapers, and a small drill rig for blasting operations.

Generally, earthworks will start in early spring and end mid fall. The construction season for earthworks will be dependent on the weather.

4.2.2.2 Wharf Construction

Each berth consists of a wharf structure measuring roughly 100 metres in length and 10 metres wide. Each phase of construction has multiple berths; Phase 1 includes two (2) berths, Phase 2 has two (2) berths, Phase 3 includes three (3) berths, and Phase 4 has six (6) berths.

The wharf structures will consist of driven steel pipe piles with reinforced concrete pile caps and a reinforced concrete deck. A properly designed rubber fender system will be attached to the front face of all berths. Steel bollards will be strategically located to give vessels optimal mooring line configurations. Safety ladders will be incorporated into all wharves that meet the guidelines set forth in Newfoundland and

Labrador Regulation 70/09, Occupational Health and Safety Regulations (2009) under the Occupational Health and Safety Act.

Pile driving activities will be limited on the site and will only occur between 0800 and 1800 hours. This will limit the amount of noise during construction to general working hours.

The equipment used during construction will be consistent with any heavy construction marine project and may include cranes, excavators, boom trucks, backhoes, and smaller tools such as welding machines, compressors, generators, etc.

It is envisioned that pile driving and wharf construction will be completed entirely from land and, therefore, a marine plant will not be required.

4.2.2.3 Buildings

All site buildings including warehouses, fabrication buildings, and administration buildings are expected to be pre-engineered and use typical steel building construction methods and materials. Materials would include concrete foundations, steel columns and beams, steel girts and purlins, metal siding and standing seam metal roofs. Typical construction equipment will be used including cranes, excavators, backhoes, personnel lifts, and various smaller tools including generators, welding machines and compressors. New buildings will be designed to and comply with the recent updates to the National Building Code, including all energy efficiency requirements.

4.2.3 Site Preparation

Site preparation will occur as necessary within the project boundaries. Preparation will include vegetative clearing, grubbing, topsoil stripping excavating and infilling. As a part of the excavating and infilling process, blasting will be required when bedrock is encountered. Site clearing and preparation will only occur when necessary to maintain the construction schedule and only to facilitate the work required for each of the phases of construction. Site preparation will be required for each phase of construction.

4.2.4 Site Access Road

To avoid potential traffic congestion a separate, alternative access road would be constructed at the beginning of Phase 2 of the project. The proposed access road extends from the Southern Shore Highway (Route 2) to the existing intersection on Lumley Cove Road near the existing fish plant (see Figure 3). To avoid encroaching on property owners, the proposed road does not align properly with the existing intersection. Therefore, a realignment of the intersection would be investigated to ensure safe travels for local residents and direct access to the marine base. Realignment of this intersection is easily achieved by moving the existing intersection west onto the property currently owned by the proponent.

Access during Phase 1 will include Lumley Cove Road which is a 6 m wide municipal road.

All vehicular access at the site, including parking areas and site roadways, will be developed and constructed for each phase of construction as required.

4.2.5 Potential Sources of Pollutants

There are potential sources of pollutants associated with the construction phases of the project. These include:

- Noise
- Light
- Airborne emissions
- Dust
- Hazardous Liquids
- Solid Waste Materials
- Surface Water Drainage
- Sedimentation
- Re-suspension of Marine Pollutants

Noise will be consistent with any heavy construction marine project. The most impact will be caused by pile driving activities and blasting operations. Pile driving and blasting will be limited to common work hours and will only be completed between 0800 and 1800 hours. Generally, construction will not be ongoing for 24 hours and will occur during daylight hours.

Light during construction will be minimal due to construction activities generally being completed during daylight hours. However, it is possible when completing marine projects that certain activities must follow tide schedules. It's possible that construction would have to occur when tides are at the lowest levels which may be between dust and dawn. Flood lights would be used but concentrated in the area of construction. Night construction would be minimized and avoided whenever possible.

Proper measures will be taken to ensure that airborne emissions and dust are controlled during construction. Equipment will be inspected and monitored on a regular basis to ensure that they are not producing additional airborne emissions. Required maintenance will be completed on a timely basis. Dust will be controlled by wetting surfaces that are causing excess dust. Site roadways and site preparation will be completed as efficiently as possible to help reduce the overall risk of dust.

The most hazardous substance that will be hauled on site during construction is diesel fuel. Fuel will be hauled to the project site to supply heavy machinery, namely cranes and earth moving equipment. The presence of fuel on site creates the possibility of spills which could potentially affect vegetation and the marine environment. The risk of such spills will be minimized by ensuring that all fuel trucks are inspected and compliant to industry standards. Heavy equipment will be fuelled from the fuel trucks. Refuelling will follow accepted industry practices and procedures. All refuelling will occur at designated refuelling sites and away from potentially sensitive areas. Emergency response spill kits will be maintained on site to contain any spill of hazardous fluids.

During construction a solid waste management plan will be developed to divert as much material away from landfill sites as possible. Measures will be taken to recycle construction materials whenever possible.

A plan will be developed between the owner and contractor(s) to mitigate the amount of surface water drainage during construction. This plan will be developed in the early stages of Phase 1 construction.

Silt and sedimentation fencing will be provided on land and, if necessary, in the water during construction to control any identified sedimentation concerns at the site.

The largest area of concern for marine pollutants is in the area of the existing DFO wharf located near the existing fish plant. To ensure that marine pollutants are not re-suspended at this site, backfill will be used to encapsulate the seabed. The area of concern will become reclaimed land and used as general laydown area until Phase 4 when berthing space will be developed in the area.

4.2.6 Existing Infrastructure and Demolition

Within the proposed project footprint there are several structures that will be demolished or relocated to facilitate construction. Structures requiring demolition include an existing fish plant building, an abandoned storage tank, and the existing DFO Small Craft Harbours wharf. An existing Harbour Authority building would be relocated closer to the Small Craft Harbours site west of Sheep's Head, or elsewhere at the preference of the Harbour Authority.

To compensate for the loss of berthing space at the existing DFO wharf in Lumley Cove, a finger pier extension will be constructed at the DFO's new boat basin facility west of Sheep's Head. The total amount of berthing space provided at the finger pier extension is equal to what will be lost at the Lumley Cove site. The figure below shows a conceptual layout of the additional berthing space to be added to the Small Craft Harbours site west of Sheep's Head.

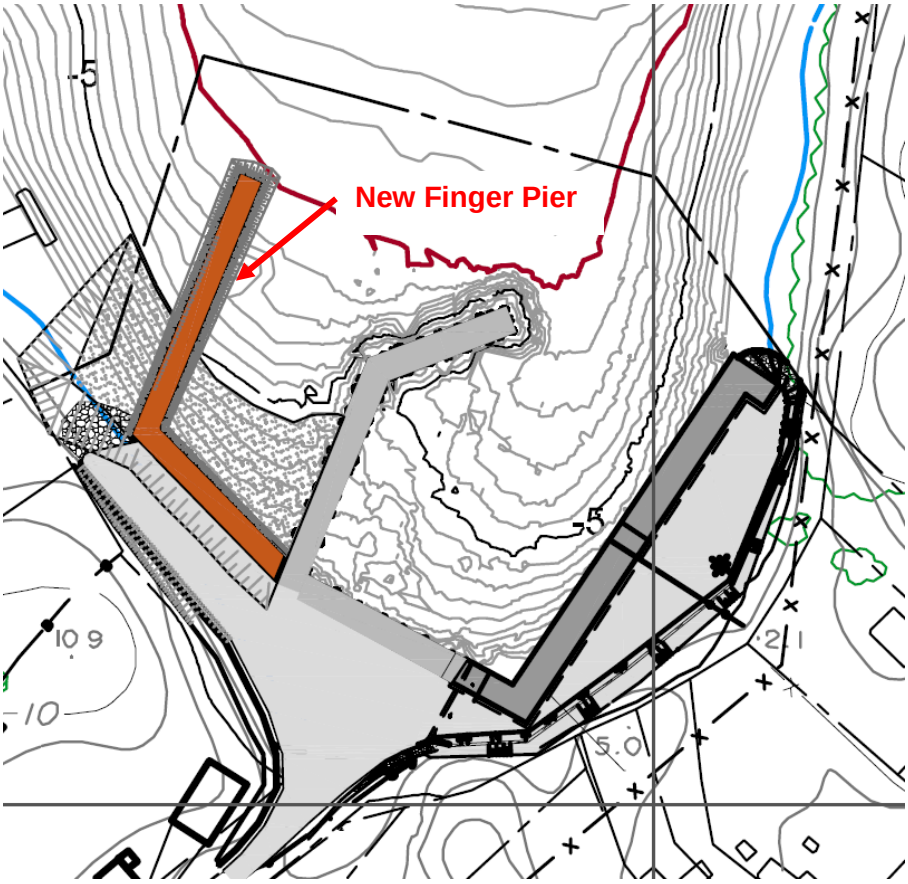


Figure 11: Additional berthing space provided by new figure pier at existing Small Craft Harbours site west of Sheep's Head.

4.2.7 Fresh Water Inventory

There are two protected surface water intakes that supply Fermeuse with fresh water. One is located approximately one (1) kilometer from the project site at Merrymeeting Pond while the other is 1.6 kilometers from the project site at Bear Cove Pond.

There are three public wells located on the North Side of Fermeuse Harbour at Port Kirwan. The closest well to the project site is located 900 m from potential blasting operations and it is an unprotected groundwater wellhead site. The remaining two public well sites are greater than 1.4 kilometers from the project site.

4.2.8 Water, Sewer, and Electrical Services

The Town of Fermeuse is currently involved in a three year project to upgrade their town water system. Currently the town has tendered the first of three tenders for the

upgrade. Currently the Town uses Merrymeeting Pond as its source of water. Merrymeeting pond has always been sufficient to supply the town and the fish plant (historically, often in production for 24 hours a day). The new upgrade will change the water source to Bear Cove Pond, a much larger water source. The new system is expected to increase pH and reduce colour, the only two parameters currently outside the Guidelines for Canadian Drinking Water Quality. It is expected that once the upgrades are completed, the Town will have sufficient capacity to accommodate the demands associated with the project.

There are no current plans by the Town of Fermeuse to upgrade sewage infrastructure. The existing fish plant is connected to the existing infrastructure and there are no issues with demand. Phase 1 of the project is not expected to employ as many people as the fish plant during peak operation. Therefore, it is expected that the Town's existing infrastructure will be sufficient to meet the demands of Phase 1 of the project. During construction of Phase 2, a wastewater treatment facility will be placed on site to treat wastewater. The proponent feels that there should be an opportunity for the Town and the marine base to introduce a shared wastewater treatment plant that would be designed to meet the demands of the marine base and the Town. The capital cost for the treatment facility could be cost-shared or negotiated between the Town and the marine base. For example, if the population of the Town increases due to employment at the marine base, there may be new requirements for the Town to upgrade their treatment methods. This should further make the opportunity for a shared system much more attractive from the Town's point of view, but in any case the proponent will look forward to working cooperatively with the Town to address such common infrastructure requirements.

Currently, the Town of Fermeuse has a sewer outfall pipe at Sheep's Head. The proposed development shows that in Phase 2 the outfall would be impacted by construction. If a shared wastewater facility is not used, the Town's outfall pipe would have to be extended to ensure that it is outside of the proposed development. All work required for sewer upgrades would occur during the early stages of Phase 2 of the project.

Electrical services for the facility should not pose any risk to current capacity in the area. There is a 69 kV line near the Town with several power generation plants and power generating wind turbines in the area (see figure below). Upgrades may be

required to bring electrical services into the site, but the overall capacity available will be sufficient.

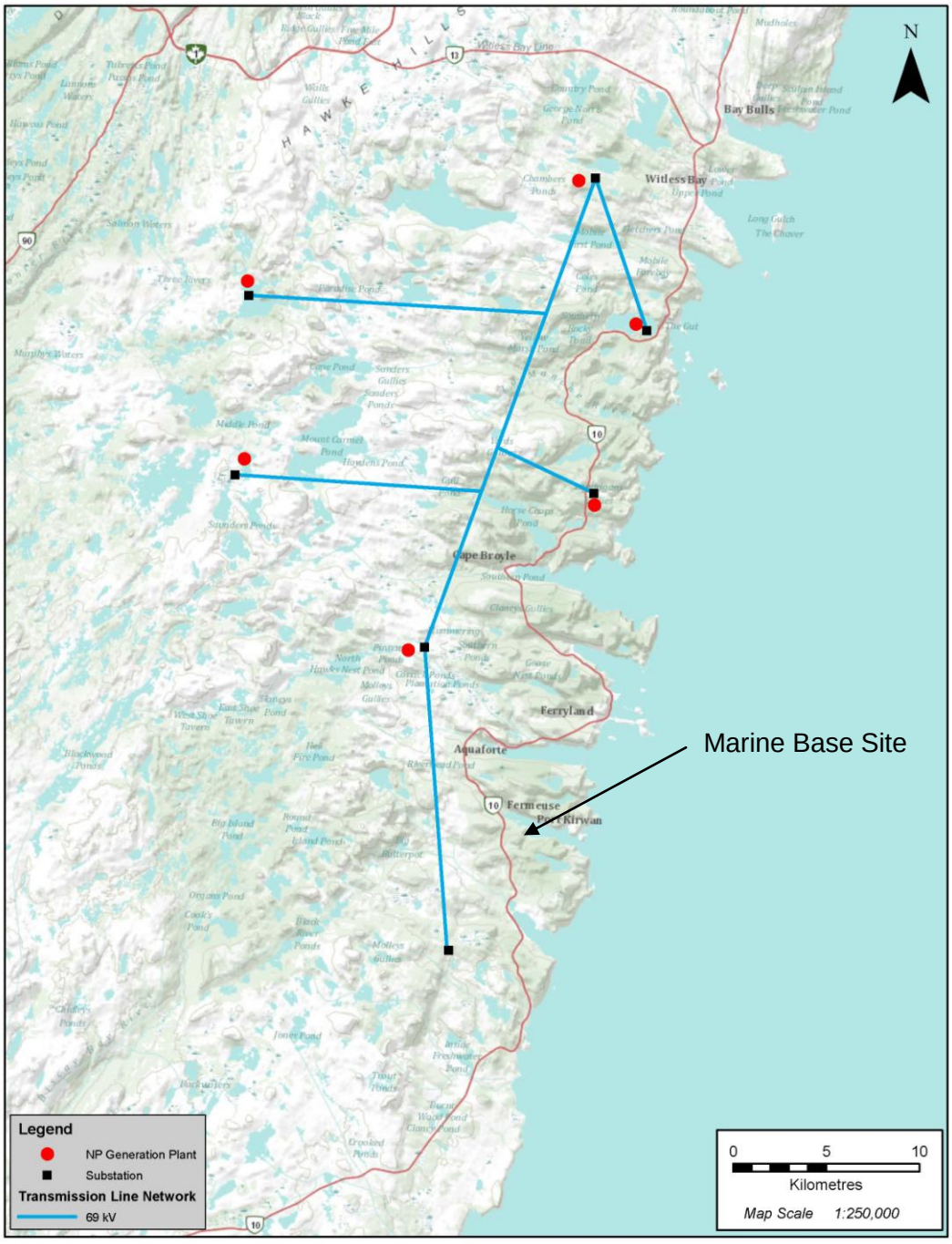


Figure 12: Transmission line network along Southern Shore Highway

4.2.9 Employment

There will be employment opportunities during the construction phase of the offshore marine base in Fermeuse. The construction period will require between 25 and 50 people per phase to build site roads, construct wharf structures and site services.

Occupations anticipated to be essential for this project include, but are not limited to:

- Contractors and supervisors (construction trades);
- Crane operators;
- Electrical power line and cable workers;
- Engineers (construction);
- Heavy equipment operators;
- Iron workers;
- Labourers and helpers;
- Truck drivers;
- Welders;
- Carpenters.

Table 2 outlines the expected employment volumes for a typical 15 month construction phase. At this time, it would be assumed that if construction is longer or shorter for a particular phase, the employment portions required would be a ratio of the given numbers.

Construction work will be tendered locally to construction contractors capable of completing construction projects of the proposed magnitude. Therefore, construction employment will not be directly hired through the marine base but through the construction contractors completing the work. Employment related to project management during construction would be directly hired through the marine supply base and would include a senior project manager, project controller, construction manager and operations manager.

Offshore Base Construction Project																			
Total construction period of 15 months																			
Fermeuse Enterprises Limited																			
Month			Employment Status	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	Total Months
Occupation		NOC 2006		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
Project Management	Senior Project Manager	**0016**	Direct hire	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**15**
	Project Controller	**0111**	Direct hire	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**11.25**
	Site Construction Manager	**0711**	Direct hire	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	**22.50**
	Operation Manager	**0721**	Direct hire	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**11.25**
Ground Work Preparation	Foreman	**0721**	Contract Out	1	1	1	1	1	1	1	1	1	1	1					**11**
	Labourers / trade helpers	**7611**	Contract Out	10	12	12	13	13	13	10	10	10	10	2					**115**
	Surveyor	**2154**	Contract Out	1	1	1	1	1	1	1	1	1	1	1					**11**
	Heavy Equipment Operators	**7421**	Contract Out	4	4	4	4	6	5	5	5	4	4						**45**
Quay And Harbour Dev.	Foreman	**0721**	Direct hire			1	1	1	1	1	1	1	1						**8**
	Labourers / trade helpers	**7611**	Contract Out			5	5	6	8	10	9	3	6	1					**53**
	Crane Operator	**7371**	Contract Out			1	1	1	1	1	1	1	1	1					**7.00**
	Heavy Equipment Operators	**7421**	Contract Out			1	1	2	2	2	2	1	1	1					**13**
	Iron Worker	**7236**	Contract Out			1	1	1	1	1	1			1					**7**
	Surveyor	**2154**	Contract Out			1	1	0.5	0.5	0.5	0.5		1	1					**6**
	Welders	**7237**	Contract Out			1	1	1	1	1	1			1					**7**
Building construction	Building Const. Foreman	**7205**	Contract Out			1	1	1	1	1	1	1	1	1	1	1	1		**12**
	Carpenters	**7271**	Contract Out			4	6	9	6	5	8	1	2	1					**42**
	Welders	**7237**	Contract Out			2	2	2	2	2	2	2	2	2					**18**
	Iron Worker	**7236**	Contract Out			2	2	2	2	2	2	2	2	2					**18**
	Labourers / trade helpers	**7611**	Contract Out			6	8	10	8	7	9	3	4	4	3	2			**64**
Electrical Installation	Electrical Foreman	**7202**	Contract Out				1	1	1	1	1	1	1	1	1	1	1		**11**
	Electricians	**7242**	Contract Out				1	2	3	4	5	4	3	2	2	2	1		**29**
	Labourers / trade helpers	**7611**	Contract Out						1	3	4	3	3	3	3				**20**
	Programmer / Technician	**2241**	Contract Out										1	1	1	1			**4**
HVAC Installation	HVAC Foreman (Mech. Engineer)	**2132**	Contract Out						1	1	1		1	1					**5**
	Technicians	**2232**	Contract Out						1	3	3		1	1	1	1			**11**
Piping Installation	Piping Foreman	**7203**	Contract Out				1	1	1	1	1	1	1	1	1				**9**
	Pipefitters / plumbers	**7252**	Contract Out				1	1	1	1	2	2	1	3	1	1			**14**
Total persons per month / total months				**20**	**22**	**48**	**57**	**66.5**	**66.5**	**68.5**	**75**	**45.5**	**52.5**	**36.5**	**18**	**13**	**7**	**4**	**600**

Table 2: Construction employment estimates

4.2.10 Women's Employment Strategies during Construction

The offshore marine supply base will be an equal opportunity employer but will attempt to target higher participation among women in the work force during construction by:

- Requiring contractors to indicate in their tender bids the number of women they intend to employ and to propose women's employment strategies that they will utilize during the life of the construction phase.
- Communicating the importance in supporting women in non-traditional roles throughout the process, including delivery of specific employment opportunity information sessions in the local area which highlight opportunities for women in the short and long term.
- Execute a zero-tolerance discrimination and harassment policy to contractors working on site.
- Ensure that appropriate washroom and change facilities are available to accommodate women on site.

4.2.11 Accommodations during Construction

It is anticipated that during construction accommodations for workers may be required in the area. It is expected that construction workers would commute from larger centres such as St. John's, Mount Pearl, Conception Bay South, etc. However, workers may elect to rent property in the area during construction to decrease travel time. It is not anticipated that workers involved in construction would relocate permanently to Fermeuse.

4.2.12 Occupational Health and Safety

The Environmental Protection Plan (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 Health, Safety, and Environmental Management System (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 during construction. Proper

information, instruction, training, supervision, and facilities will also maintain the health and safety of personnel for all stages of the project.

4.2.13 Archeological Impact Assessment

Gerald Penney Associates Limited conducted research and field investigations to produce a Historic Resources Impact Assessment for the project area. As a result of the field investigations two potential archaeological sites were identified near the project foot print.

The Historic Resources Impact Assessment can be found in Appendix B.

4.2.14 Sea bottom imaging

LGL Ltd. prepared a Marine Habitat Characterization Survey for the project area. Included in this survey was a bathymetric survey, drop camera survey of biota and substrate, and shoreline photography. This report can be found in Appendix B.

4.2.15 Flood Risk Mapping and Sea Level Rise

Flood risk mapping will be incorporated into the project design, construction, and maintenance in order to minimize any risks for flooding in the area.

Sea-level rise is estimated to be approximately 3 millimeters per year. Therefore, for an estimated project life of 30 years, there is an expectation that the approximate sea-level rise will be 90 millimeters. The conceptual design completed has wharf deck elevations at +5.0 m above current low normal tide levels and the uplands areas are at +6.5 m. These elevations will ensure that the structures will not be overtopped and there should be no flooding on site due to sea- level rise.

4.2.16 Potential Causes of Resource Conflict

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

- Noise and light;
- Marine and vehicular traffic;
- Fish and fish habitat (both freshwater and marine);

- Resource harvesting, e.g., fisheries, hunting;
- Surface groundwater;
- Demolition of public wharf;
- Impact on local walking trails;
- Quality of life for residence of Fermeuse.

Noise and light during construction can have adverse effects on human, marine and avian life. Human effects will be experienced largely in the daylight hours. Activities that will cause the greatest effect are pile driving and blasting operations. These activities will occur during normal work hours and daylight hours between 0800 and 1800 hours. Pile driving activities will have the greatest effect on marine life. Pile driving has been known to effect fish with swim bladders. A habitat survey has been completed which indicates that marine life in the area of construction is minimal.

There is a potential for disruption to marine and vehicular traffic during construction. Marine construction should be minimally impacted, or not at all, because only a small portion of the harbour will be occupied during construction. Marine traffic lanes will be kept clear and traffic in and out of the harbour will be undisturbed. The greatest impact on vehicular traffic will occur during Phase 1 of construction. During this time, the alternative site access road will not be completed. Therefore, during Phase 1 construction materials and construction vehicles will have to use Lumley Cove Road.

Required backfilling and pile driving activities can potentially impact fish and fish habitat. Fish habitat surveys have been conducted within marine environment of the project footprint which indicate minimal fish and fish habitat within the backfill and pile driving areas.

Resource harvesting including fishing and hunting should be minimally impacted during construction. In the area of construction and nearby areas, there have been no fish grounds or hunting grounds identified.

There are two surface water supplies within one (1) kilometer radius of blasting operations. Located approximately one (1) kilometer from the project site is Merrymeeting Pond. This supply has a protected intake. There is one public well

located on the North Side of Fermeuse Harbour at Port Kirwan, approximately 900 metres from the project site. Both of these water supplies are at the outer limits of the one (1) kilometer radius and are not expected to be a concern for blasting.

The DFO wharf located near the existing fish plant building will be demolished to facilitate construction at the site. However, any impact to the public will be minimal as the berthing space lost at this site will be gained by a finger pier extension planned for the Small Craft Harbour site located west of Sheep's Head. The finger pier extension is expected to occur as early as possible in construction of Phase 1.

There are no identified walking trails within the footprint of the project site. The nearest featured East Coast Trail path is the Bear Cove Point path leading from Kingman's Cove to Renews. The north trailhead is located at the end of Kingman's Cove Road approximately 1.2 kilometers from the project site.

The greatest negative effect on quality of life of residence near the project site will be noise and light during construction, as described earlier in this section. However, positive effects on quality of life are possible with construction workers present in the Town and the economic spinoffs associated with this. Currently there is one restaurant and one convenience store/gas bar in the Town. It is expected that business will increase dramatically for these two establishments during construction and operations of the marine base, and there will be new small business opportunities created as well.

4.3 OPERATION AND MAINTENANCE

4.3.1 Infrastructure

In addition to the berths and laydown areas, marine base infrastructure will be required to support and maintain operations.

The marine base set up will require infrastructure to support complete port operations. This will include the following:

- Administration building
- Maintenance shop
- Site drainage
- Site power
- Site lighting
- Site water supply
- Communications
- Site security (fencing)
- Fire protection
- Site roadways
- Sanitary
- Waste disposal
- Storage and handling of bulk and hazardous materials
- Mobile equipment
- Compressed air

4.3.1.1 Site Utilities

Potable water will be supplied to the site buildings from the existing Town water distribution system. Water supplied to offshore structures and supply vessels will have to meet the Guidelines for Canadian Drinking Water Quality. It has been identified that the Town water supply has two parameters that do not meet the criteria set out in the guidelines, i.e., colour and pH. To ensure that the water

supplied meets the Guidelines, standard treatments will occur onsite to bring these values within the acceptable ranges. Testing of drinking water will occur periodically onsite to ensure that water meets the Guidelines for Canadian Drinking Water Quality.

There is an existing sewage outfall at Sheep's Head that will require extension, protection, or decommissioning. Sewage facilities will be tied into the existing Town system, or a new sewage treatment plant will have to be installed to handle sewage requirements if the Town's system is inadequate.

Adequate site roadways will be required to safely handle on-site vehicular traffic, including site cranes.

A power distribution system will be incorporated into the terminal to supply the various buildings and equipment. Site lighting will be provided by 30m masts.

The marine base will have to be equipped with voice and data communication both internally and to external sources. A sophisticated tracking system will installed for tracking the movement of materials throughout the facility, and of materials entering and exiting the facility.

4.3.1.2 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.

4.3.1.3 Fabrication and Laydown Areas

Fabrication and laydown 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 laydown area or exterior fabrication area. The requirement for laydown and fabrication areas will be dependent on the companies leasing space at the marine base and the space needed for specific projects.

4.3.1.4 Storage and Handling of Bulk and 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 muds typical to the offshore industry will be stored and handled at the site. The most hazardous drilling fluids are non-aqueous, Group I (high-aromatic content) fluids. These fluids use crude oil, diesel and conventional mineral oil as the primary phase. 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 as identified on the conceptual drawings, or to designated warehouses specifically designed for such storage. A containment dyke will be constructed around the tanks to prevent any environmental contamination due to tank malfunction. 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.

4.3.2 Marine Vessels

The majority of the vessel fleet that will use the offshore marine base will be offshore supply vessels. There is also a need to accommodate offshore construction vessels including subsea installation vessels.

4.3.2.1 Supply Vessels

Supply vessels typically used in the offshore oil and gas industry range in size from approximately 75 metres to 100 metres overall length. The primary function of a supply vessel is to deliver cargo and personnel to and from the offshore oil platforms. Typical cargo includes drilling pipe, drilling mud (including associated chemicals and weighting materials used in drilling processes), construction materials for offshore modification, repairs and maintenance to offshore facilities, consumables and supplies for offshore facilities operations, potable and non-potable water, fuel, and wastes coming from the offshore facilities back to land. Table 3 outlines the typical range of vessel criteria.

Table 3: Range of Criteria for Offshore Supply Vessels

Criteria	Approximate Minimum	Approximate Maximum
LOA (Length Overall)	67 m	91 m
Beam (Width)	15 m	23 m
Dead Weight Tonnage (DWT)	1930 t	4500 t
Draft	6.2 m (max loaded)	7.8 m (max loaded)

Figure 13: Maersk Chancellor offshore supply vessel (http://www.shipsandharbours.com)

Figure 14: Blue Guardian offshore supply vessel (http://www.ulsteingroup.com)

4.3.2.2 Construction Vessels

Offshore construction vessels have multiple roles in the offshore industry. They can be used for tasks such as transportation and aid in the installation of topside modules, subsea installations, and ROV operations. Typical vessels used in the offshore industry range in size from 100 metres to 160 metres overall length. The beam ranges from 20 to 30 metres. These vessels normally draft 6 to 9 metres when fully loaded.

Figure 15: Deep Pioneer offshore construction vessel (http://www.gcaptain.com)

4.3.2.3 Survey Vessels

Offshore survey vessels are used for both the survey of the seafloor (bathometry) and to conduct seismic surveys to aid in discovery of oil. Survey vessels are generally similar in size to a supply vessel but generally draught less water.

Figure 16: Fugro Searcher offshore survey vessel (http://www.fassmer.de)

Figure 17: MG Columbus offshore survey vessel (http://www.shipspotting.com)

4.3.2.4 Heavy Lift Vessels

There are two types of heavy lift vessels used in the offshore oil and gas industry: heavy lift vessels with large cranes; and, heavy lift vessels with a large submersible deck used to transport large, heavy equipment.

During offshore construction, heavy lift vessels with large cranes are used to lift modules that are too large or heavy for regular offshore construction vessels. These

are sometimes referred to as crane vessels. Crane capacities can reach as high as 14,000 tonnes for semi-submersible vessels and 7,500 tonnes for monohull vessels. The Subsea7 ship *Seven Borealis* has a 5,000 tonne capacity crane. It has an overall length of 182 metres and an operating draught of 8.5 metres to 11.35 metres.

Figure 18: MV Seven Borealis heavy lift (crane) vessel (http://www.shipspotting.com)

When offshore modules or equipment is either too large or too heavy to be transported on a supply vessel or construction vessel, a heavy lift vessel is required to transport the load. These ships are usually semi-submersible to allow for easier loading/offloading. A well known semi-submersible heavy lift vessel is the *MV Blue Marlin* owned by Dockwise. It has an overall length of 224.8 metres, a beam of 63 metres, and draughts 10.24 metres while sailing.

Figure 19: MV Blue Marlin heavy lift vessel (http://www.dockwise.com)

4.3.2.5 Mobile Equipment

It is anticipated that multiple mobile cranes will be used at the site to transfer goods and equipment to and from vessels. Mobile harbour cranes similar to the LHM product line offered by Liebherr would be used. These cranes have lifting capacities between 42 and 208 tonnes. Infrastructure supporting the mobile crane will be designed to sufficiently handle all loads during lifting.

4.3.2.6 Site Drainage

Roadways, wharves and laydown areas will be sloped to provided drainage and prevent the accumulation of water. Individual drainage systems may have to be provided in areas where sloping is insufficient or impractical. Containment areas are required in areas that have a potential for spills of deleterious liquids or materials

such as fuel storage areas and any chemical storage facilities, especially any area which risks spillage into harbour waters.

4.3.2.7 Waste Disposal

FEL is committed to ensuring that appropriate waste management is implemented during all phases of the project. A waste disposal system will be established to effectively handle the waste stream from the facility in accordance with the Provincial requirements of the Department of Environment and the requirements of the Town of Fermeuse.

4.3.2.8 Site Security

To maintain security at the marine base site, perimeter fencing will be provided and site security personnel will be present 24 hours a day. All traffic entering and leaving the facility will be monitored, i.e., stopped, and proper marine base entry and exit protocols will be implemented and followed.

4.3.2.9 Fire Protection

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

The use of sea water will be considered for firefighting to reduce the demand on the fresh water supply.

4.3.3 Operation Activities

Activities relating to the operations include:

- Marine vessel operations;
- Fabrication;
- Storage, handling, and transportation of bulk materials to supply offshore operations.

Marine vessel operations at the marine base will be consistent with operations ongoing at similar facilities in the Province and worldwide. The majority of vessel operations would be those associated with marine supply vessels that will continually service offshore oil platforms. Marine supply vessels will require

maintenance and refitting which will be performed at the marine supply base, unless dry-docking of the vessels is required. Maintenance and refitting of larger vessels during shut down periods will be possible at the deep-water site that will be constructed in Phase 3.

It is anticipated that 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 laydown areas will be designed to accept higher loads for fabrication and transportation of larger modules.

The majority of operation activity at the site will be the storage, handling and transportation of bulk materials to and from offshore platforms. Bulk materials include drilling fluids, construction materials, food, potable and non-potable water, and other necessities. Loading and unloading of supply vessels will be a daily operation at the site.

4.3.3.1 Noise and Light Concerns

During the December 18, 2014 public meeting in Fermeuse, there were questions from residents regarding the potential for noise and light during operations of the proposed facility. As discussed at the meeting, it was noted that the facility will be a 24-hour operation, not unlike the fish plant when it operated during peak production years. When the fish plant was at peak operation, it employed over 500 people and had both day and night shifts. As with any 24-hour operation, a certain amount of light and noise will be expected from the facility. However, since the December 2014 meeting FEL has studied matters and identified measures which will be taken to reduce these factors as much as possible.

To reduce the impacts of noise on residents, a number of measures will be incorporated into the design of the facility. These will include, but will not necessarily be limited to:

- Using the natural topography to deflect or isolate noise. This will include situating more noisy operations in areas where hilly terrain will naturally block the noise from entering the residential areas;
- Earth berms can be constructed around the perimeter of the site to shield and block noise;

- Perimeter security fencing will incorporate additional acoustic barrier materials. There are many products currently on the market for use in industrial areas that act as an acoustic barrier;
- Provide green space buffer areas, wherever possible, between the supply base and residential areas. Added vegetation including trees will help to reduce noise and also add visually pleasing green spaces in the community and promote healthy living.

Light distraction may result from upward and outward lighting in the night time. A preliminary lighting study was conducted by SNC-Lavalin Inc. to determine the extent of lighting required at the supply base in Fermeuse. All lighting fixtures to be used will be downward and inward light reflectors. Also all light sources will use LED lights which by their very nature are directional and do not disperse light like other types of lights. The results of the lighting study as well as the types of lights expected can be found in Appendix E. The number and location of light sources was used to create a visual 3D rendering of the facility in the night time. The 3D rendering can be seen in Appendix D. As can be seen in the 3D rendering, very little (if any) light spills from the supply base and should not be a concern to residents.

4.3.3.2 Potable Water for Marine Vessels

Water supplied to offshore structure and supply vessels must meet the Guidelines for Canadian Drinking Water Quality. It has been identified that the Town water supply currently has two parameters that do not meet the criteria set out in the Guidelines, i.e., colour and pH. To ensure that the water supplied meets the Guidelines, recognized treatment(s) will occur onsite to bring these values within acceptable ranges. Water will also be treated with 5% sodium hypochlorite to maintain a free chlorine level of 0.2 to 0.5 mg/L. A minimum free chlorine level of 0.2 mg/L ensures a sufficient amount of chlorine was added to inactivate unwanted bacteria and prevent the water from being re-contaminated during storage. Chlorine levels will be tested daily to ensure free chlorine does not drop below 0.2 mg/L. In addition to daily chlorine measurements, quarterly microbial and chemical sampling will be performed on the treated water to ensure the water meets the Guidelines for Canadian Drinking Water Quality. An annual inspection of potable water tanks and associated equipment will be conducted to check for coating breakdown, damage, rust, deposits, or organic growth. All findings from water quality testing or tank inspections

will be recorded and remedial actions will be taken when needed. A regular turn-over of water will be enforced to prevent stagnation.

Before connecting the fill station to a vessel's fill hose, hoses will be inspected and then flushed for a minimum of five minutes to prevent standing water from entering the potable water supply. All hoses used for potable water will not be used for any other purpose and will be drained and kept capped when not in use. All pipes and hoses used for potable water will be regularly disinfected with a chlorine solution for one hour and then flushed with water for 5 minutes prior to use. If pipes or hoses are found uncapped they will be disinfected before use.

4.3.3.3 Chemicals Used or Stored

The 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.

Diesel fuels and base oils will be maintained on site. Fuel, for example, will be used to refuel ships using the marine supply base and to refuel land-based equipment, while base oils may be used as a lubricant, motor oil, etc. All fuels and oils will be stored in properly designed, regulated and certified storage tanks or containers. Properly designed containment structures will be constructed around fuel tanks, or oil tanks, if applicable, to ensure containment of diesel fuel or oil in the event of a tank fail.

While outbound (to the offshore) drilling fluid services, i.e., drilling mud plant, and inbound (from the offshore) tank cleaning services will be provided at the base, there are no intentions to provide inbound waste management or drilling mud/cuttings recycling services (inbound slops or waste will be quickly transitioned off site to designated management facilities elsewhere on or off the island). Dry bulk, e.g., barite, and related drilling fluids will be stored in properly designed and maintained vertical storage silos or tanks near the water. As well, temporary storage tanks will be established and used for transitioning tank cleaning remains and inbound cuttings or waste to designated offsite treatment facilities. The drilling fluid tank farm and all

permanent or temporary storage tanks will have properly designed (fully bunded) containment areas to ensure that no fluids enter the water in the event of a leak.

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. The majority (80%) of these chemicals and minerals are benign under Transport Canada's Transportation of Dangerous Goods (TDG) safety standards and regulations, whereas additional measures will be implemented to cover the approximate 20% of items that may fall under TDG rules, e.g., items carrying HAZMAT Class 3 or 8 designations. As stated above, these specialized services and product management activities will be provided by expert companies who will be required to maintain total safety and product management practices. Furthermore, a dedicated and secure warehouse of 8,000-10,000 square feet will be established onsite to house and protect the various the outbound drilling fluid service management and product storage services.

4.3.3.4 Employment

There will be employment opportunities in the operation phase of the offshore marine base in Fermeuse.

Global experience indicates that normal supply base activity will result in the need for 25-40 service companies operating out of the base. In the near term we would expect the number of companies operating out of Fermeuse to be at this low end. A benchmark analysis of operating supply bases conducted for FEL projects that a new supply base in Fermeuse will create between 275 and 325 direct jobs over the life of the facility. However, these employment positions will be provided by the service companies leasing space at the facility. Ultimately, the employment positions associated with these service companies will be part of project registrations submitted by these companies for individual onsite contracts or projects that they are servicing.

The marine supply base will have a staff of direct hires that would last for the lifetime of the base. Table 4 outlines the anticipated direct hires and the employment status of each position. Note that building and systems maintenance would be contracted

out to local businesses on a yearly or longer term basis. The associated employment is anticipated to be approximately 3-4 man-hour months per year. The positions that would be contracted out include labourers (NOC 7611), plumbers (NOC 7251), carpenters (NOC 7271), electricians (NOC 7241) and IT manager (NOC 0213).

Table 4: Operation employment estimates

Offshore Base Operations			
Phase One (Estimate based on potential initial demand)			
Fermeuse Enterprises Limited			
Occupation	**NOC 2006**	**# of personnel**	**Employment Status**
General Manager/Chief Executive Officer (CEO)	**0013**	**1**	Full time (Direct hire) 10+ years
Chief Financial Officer (CFO)	**0013**	**1**	Full time (Direct hire) 10+ years
EOHS Manager	**0112**	**1**	Full time (Direct hire) 10+ years
HR Manager	**0112**	**1**	Full time (Direct hire) 10+ years
Administrative Assistant	**1241**	**1**	Full time (Direct hire) 10+ years
Warehouse Manager	**0714**	**1**	Full time (Direct hire) 10+ years
Dock workers / stevedores	**7451**	**5**	Full time (Direct hire) 10+ years
Crane Operator	**7371**	**1**	Full time (Direct hire) 10+ years
Truck Driver	**7511**	**2**	Full time (Direct hire) 10+ years
Security Guard	**6541**	**2**	Full time (Direct hire) 10+ years

4.3.4 Women's Employment Strategies during Operations

To ensure that qualified women are afforded every opportunity during the operation phase of the project, FEL will pursue every opportunity to endorse equal opportunity and gender diversity for all employees.

Promoting equal opportunity and gender diversity will be done in the following ways:

- The collection and analysis of women's employment statistics throughout all phases of the project.

- Communicate the importance of equal opportunity and gender diversity to all contractors and companies leasing space at the offshore supply base
- Communicating diversity through FEL media communications and notices.
- Continued communication with the Women's Policy Office and other women's groups.
- Every effort will be made to provide a wide range of informational material promoting the education and training of women in non- traditional roles.
- Execute a zero-tolerance discrimination and harassment policy to contractors working on site.
- Ensure that appropriate washroom and change facilities are available to accommodate women on site.

4.3.5 Living Accommodations

Although it may be possible for some workforce to travel daily from larger centres to the marine supply base, it is expected that some workforce would like to relocate to Fermeuse or surrounding communities, if only on a temporary basis. As such, there should be increased demand in the local housing rental market with the possibility of some new home construction within the community to meet workforce needs. At this time, worker camps and commercial accommodations are not considered necessary and the local housing market – which includes other Towns in the region - will be sufficient.

4.3.6 Occupational Health and Safety

The Environmental Protection Plan (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 Health, Safety, and Environmental Management System (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 during construction. Proper information, instruction, training, supervision, and facilities will also maintain the health and safety of personnel for all stages of the project.

4.3.7 Communications Strategy

Fermeuse Enterprises Limited is committed to keep the public and the Town of Fermeuse aware of construction activities and operations. Prior to construction of any phase of the project, a construction schedule will be submitted to municipal officials. For any activities that will impact the public during construction, public announcements will be made on local radio stations and, where appropriate, appropriate signage will be erected. Additionally, notification flyers will also be distributed to residents of Fermeuse and any other municipality that may be affected.

4.3.8 Firefighting/ Emergency Preparedness

Emergency Preparedness and Firefighting will be addressed in the site Emergency Contingency Plan (ECP). Site plans will be developed in conjunction with Provincial standards and in consultation with the Fire Commissioner and Emergency Measures Office.

Fermeuse shares many municipal services among neighboring towns, including emergency services. The Port Kirwan Volunteer Fire Department services the Town of Fermeuse and consists of volunteers from Port Kirwan, Fermeuse, and surrounding communities.

The marine base will provide its own firefighting services for the base and workers will receive the necessary training to perform fire protection duties on site. As is the tradition, the marine base will be pleased to cooperate very closely with all local Fire Departments in the region.

5 ALTERNATIVES

Over many years the long-term viability of selecting Fermeuse Harbour for this project has been carefully weighed against potential alternative sites, including harbour sites where the project owners have strong land positions. The analyses consistently lead to the conclusion that Fermeuse Harbour holds strong and clear comparative advantages over the very few other possible options for a modern supply base. There are many reason why this is so, though no single reason, and it is the combination of all advantages that act together to make Fermeuse Harbour the obvious long term developmental choice. No other alternative harbour within reasonable distance of the producing and projected oil fields possesses all of the advantages of Fermeuse Harbour.

Prominent and unique among the reasons is the natural advantages offered by the harbour itself. It is important to recognize that there are, in any case, very few potential alternative sites either on or near the Avalon Peninsula that approach having the slate of site characteristics as does Fermeuse Harbour. It is a natural safe harbour that has been a refuge for seafarers for centuries because of its unique protective features. Unlike some other potential harbours, for example, there are no underwater restrictions or obstructions (i.e. ledges, sandbars, etc). As well, given its five (5) kilometre long, high-walled, inland harbour there is minimal to no open-ocean fetch or troubling undertows or currents that may hamper vessels at rest. The harbour is protected from most winds and ice-free year round, plus the wide, protected harbour entrance allows vessel entry under all sea-state conditions. Furthermore, the harbour is wide (ranging from 350 to 600 meters) with plenty of room to accommodate and handle a wide assortment of vessels in the port. The harbour is also very deep throughout - various deep water anchorages in depths of up to 30 meters are readily available - and there are never delays associated with tide waters.

This project has significant benefits for the Town of Fermeuse and the larger southern shore region. There will be some challenges and trade-offs, as there would be anywhere, but they will be fewer than might be expected in some other potential alternative sites. There has been careful development with the needs, expectations

and future benefits of the Town of Fermeuse, local residents, and other harbour users kept top of mind. Unlike other potential port developments, in addition to adequate space for supply base development, there are also significant nearby lands controlled by the Town of Fermeuse that can be offered for future industrial and residential developments. The lack of space for such future development options is a major hindrance and disincentive for large scale capital investment.

Compared to many other communities where such a project may be considered, it is believed that the number and types of land-based usage or ownership issues are fewer in number in the selected area of Fermeuse Harbour. For the smaller number of homes closer to the site various mitigations measures (see sections above) will be adopted to minimize future impacts. As well, the proponents are working closely with residents who may be more directly affected to ensure positive solutions are implemented for that group. It is also necessary to point out that a significant portion of the land to be developed is either Crown Land or well-established private properties, so there will be fewer concerns with, for example, disputed land ownership, heritage property matters, usage conflicts, etc.

User conflict was identified very early in the process related to concerns voiced by well-established harbour tenants (i.e. harbour authority, fishermen, etc). Their concerns about loss of dock space in Lumley Cove were well stated and have been understood and accepted. In order for the project to proceed, the proponent agrees that the lost dock space in Lumley Cove must be made up elsewhere in the harbour. The proponent is working closely with the harbour authority, fishermen, Town, Provincial and Federal Governments to ensure that plans are executed to resolve the identified concerns of these key harbour users. Ultimately, the positive approach that has been demonstrated in Fermeuse will lead to effective accommodations which will support commercial fishing activities.

An abundant supply of freshwater is critically important for a project of this nature, and it is noteworthy that the Town of Fermeuse has two significant freshwater sources located nearby. The main location for the proposed site is already tied into the municipal water system and, at minimum, there will be no disruptions, stress, or inconvenience placed upon existing municipal infrastructure because of the supply base. While readily available freshwater is an obvious requirement, it is not clear that

all potential harbour locations in the region would have abundant supply and infrastructure already in place.

Compared to certain harbour development or expansion options that may exist elsewhere, there will be minimal environmental impact in Fermeuse. The shape, lay and availability of the land and water will enable much of the development work to be completed using raw materials on site. Furthermore, due to the development approach the main result will be infilling of the harbour using materials, i.e., rocks, gravels, etc. found at the site. This eliminates extensive harbour dredging, distant transport of raw material fills, higher construction traffic, and other associated disruptions that would be required if certain other alternative ports were developed.

On top of these fundamental and critical comparative advantages, the reasoning for development of Fermeuse Harbour over alternative ports is strategically underpinned by its immediate proximity to existing offshore installations, planned exploration fields (north and south), and the two existing supply bases in St. John’s and Bay Bulls. Nearness to these existing and future industry activities and hubs makes practical and economic sense, and it will promote and accelerate the development of a specialized industrial cluster along the eastern coast of the Avalon.

6 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

This section describes potential environmental effects associated with the construction and operations of a marine offshore base and the details of the proposed mitigation.

6.1 MARINE AND VEHICULAR TRAFFIC, NOISE, LIGHT, AND DUST

Disruption to marine and vehicular traffic is expected during the construction period. Marine construction should be minimally impacted, or not at all, because only a small portion of the harbour will be occupied during construction. Marine traffic lanes will be kept clear and traffic in and out of the harbour will be undisturbed. The greatest impact on vehicular traffic will occur during Phase 1 of construction. During this time, the proposed alternative site access road will not be completed. Therefore, construction materials and construction vehicles will have to use Lumley Cove Road during Phase 1, although it is anticipated that once the main construction equipment has been moved on site it will remain there throughout the construction phase resulting in minimized movements.

During Phase 1, the expected traffic to and from the facility will be mainly personnel working at the site and also semi-trailer truck traffic making deliveries to and from the site. Semi-trailer truck traffic has occurred on Lumley Cove Road for many years servicing the fishing industry. The site and eventual (Phase 2) access road layout will allow adequate access and parking for personnel working at the marine base, and will help minimize traffic congestion caused by the new facility. Once Phase 2 commences, the site can be alternately accessed by Lumley Cove Road.

Noise will be consistent with any heavy construction marine project. The most impact during construction will be caused by pile driving activities and blasting operations. Pile driving and blasting will be limited to common work hours and will only be completed between 0800 and 1800 hours. Generally, construction will not be ongoing for 24 hours and construction activity will occur during daylight hours. To reduce noise levels during construction and operations, a setback or minimum distance between the areas of highest noise and the nearest residence will be used. In addition to using setbacks, wherever possible earth berms will be incorporated into site development to act as a sound barrier between the site and residences.

Lighting during construction will be minimal because construction activities will generally be completed during daylight hours. However, it is possible when completing marine projects that certain activities must follow tide schedules. It's possible that construction will have to occur when tides are at the lowest levels which may be between dusk and dawn. Flood lights would be used in such a case, but concentrated in the area of construction. Night construction will be minimized and avoided whenever possible. To prevent unnecessary light during normal site operations, the amount of light projected upward will be reduced as much as possible by projecting all light fixtures downwards. During the night, only lights deemed necessary for site operations will be turned on.

Proper measures will be taken to ensure that dust is controlled during construction and operations. Exposed soil, stockpiles, and earthmoving activities are expected to suspend dust into the air. Dust will be controlled during the construction phase by spraying storage piles and/or exposed soils/surfaces with water, when deemed necessary. Vehicles carrying soil, aggregates, or fine material that are likely to cause excessive dust will be covered. Construction activities will be planned to limit the area of exposed soils and the amount of time that soil is exposed. Exposed areas will be revegetated or covered as soon as it is reasonable to do so to prevent excessive dust during both construction and operation period. There are very few dust control concerns associated with operations, but monitoring will occur and effective controls will be implemented as necessary.

6.2 EFFECTS OF CONSTRUCTION/OPERATIONS ON MIGRATORY BIRDS

Lumley Cove is approximately 10 km from the Witless Bay Ecological Reserve. Mitigation measures will be implemented to minimize the attraction of seabirds to site lights, to minimize the risks to birds blown onto the site due to environmental conditions, to prevent and contain the accidental release of fuel, and to prevent destruction and harm to nests, eggs, and nesting birds during construction and operations. Increased awareness of migratory birds will be maintained during the breeding season, i.e., April 15th to August 15th.

In order to minimize the attraction of seabirds to site lights, all lights on site will be effectively projected downwards to minimize the amount of light projected upward,

spill light, glare, and artificial sky glow. In addition, lighting will be reduced by turning off all unnecessary lights, especially at night and during migratory season.

Several measures will be taken to minimize the risks to birds blown onto the site due to environmental conditions. In order to prevent birds from coming into contact with hazardous substances, an emergency contingency plan will be developed to help prevent accidental releases and ensure adequate preparedness and capacity to respond to and recover from any accidental events should they occur. The destruction or harm to nests, eggs, and/or nesting birds will be avoided. During both the construction and operation periods, if there is a potential to disturb migratory birds and/or their nests/eggs, work will be stopped immediately and a qualified professional will be consulted to determine the best course of action. If a nest is found it should be protected with a buffer zone if possible, or work in the area should be delayed until the nest has been evacuated. The setback distance of the buffer zone is dependent on the species found, and therefore consultation with a professional will be conducted. Since a portion of the construction will be occurring during breeding season, it may be necessary to install netting to prevent birds from initiating nesting on structures, especially prior to the arrival of migratory birds in the spring.

To reduce the likelihood of birds being injured by collision with structures, glass windows will be evaluated after construction to determine if they pose a risk to birds. Due to the design of the structures on site, it is not expected that the glass used will pose a significant risk to birds. If, after construction, it is determined that the glass may cause issues, one or more of the following mitigation measures can be taken:

- Installation of interior window coverings such as blinds or curtains;
- Use of frosted glass, or other non-transparent materials instead of transparent or highly reflective glass;
- High-quality adhesive tape which is 2 cm wide could be applied to the windows vertically, spaced a maximum of 10 cm apart. The tape would be applied on the outside of the window whenever possible.

During both construction and operation periods it is possible that birds may be trapped in pipes, grates, etc. Pipes, especially vertical pipes, will always be capped, when possible, or covered with netting to prevent birds or other animals from entering. If any grates are installed, the openings will be narrow enough to prevent most birds from entering and being trapped.

6.3 FABRICATION AND PRODUCTION ACTIVITIES

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 laydown areas will be designed to accept higher loads for fabrication and transportation of larger modules.

6.4 DISPOSAL OF MATERIALS

Appropriate waste management will be implemented during all phases of the project, including establishing a waste disposal system to handle the waste stream from the facility in accordance with the Provincial requirements of the Department of Environment and the requirements of the Town of Fermeuse. During construction a solid waste management plan will be developed to divert as much material away from landfill sites as possible.

All waste material will be considered, prior to disposal, for reuse, resale or recycling.

Waste materials not reused, resold or recycled, will be disposed at an approved waste disposal site, provided the owner/operator is willing to accept such waste and the local Service Newfoundland and Labrador (SNL) has agreed with the disposal of the waste materials at the site.

6.5 BLASTING OPERATIONS

Blasting will be required when bedrock is encountered at the site property during site preparation. The 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 all people and property at or near the site are protected from flying material, air blast, ground vibration and/or

fumes caused by the blast. If there is a perceived danger to people or property due to blasting, a blasting mat of adequate size and strength will be used to help reduce the risk.

There are two surface water supplies within one (1) kilometer radius of blasting operations. Located approximately one (1) kilometer from the project site is Merrymeeting Pond. This supply has a protected intake. There is one public well located on the North Side of Fermeuse Harbour at Port Kirwan, approximately 900 metres from the project site. Due to the distance from the blasting activities, and the topography of the area, contamination or disruption of these water bodies or water wells are not expected.

Rock piles caused by blasting activities will be removed from the site and properly disposed of as soon as reasonably possible to prevent contamination of surface water or groundwater caused by runoff.

6.6 ROAD CONSTRUCTION AND UPGRADING

The construction and/or upgrading of roads has the potential to cause negative environmental effects, including:

- Erosion, mass wasting, and sedimentation
- Disturbance to existing drainage systems
- Loss of habitat

Erosion, mass wasting, and sedimentation will be minimized by implementing silt and sedimentation fencing when required, avoiding driving vehicles on uncovered/exposed soil when possible, and revegetating or covering exposed soils as soon as possible during the construction period. All roads created or upgraded will be adequately sloped to provide drainage and prevent the accumulation of water. A plan outlining the drainage of surface water will be developed by the owner and contractor during the early stages of Phase 1 construction. Potential habitat loss due to the construction of new access roads will be minimal due to the small areas that the roads will occupy.

6.7 EXISTING WHARF REMOVAL

The DFO wharf located near the existing fish plant building will be demolished to facilitate construction at the site. However, any impact to the public will be minimal as the berthing space lost at this site will be gained by a finger pier extension planned for the Small Craft Harbour site located west of Sheep's Head. The finger pier extension is expected to occur early in construction Phase 1.

6.8 STORAGE AND HANDLING OF HAZARDOUS AND NON-HAZARDOUS MATERIALS

An Environmental Contingency Plan (ECP) will be developed prior to the operational period to help prevent accidental releases, reduce consequences, and ensure adequate preparedness and capacity to respond to and recover from any accidental events should they occur. The ECP will be included as part of the Environmental Protection Plan (EPP).

6.9 ENVIRONMENTAL PROTECTION PLAN

An Environmental Protection Plan (EPP) will be developed and implemented to prevent accidental releases, reduce consequences, and ensure adequate preparedness and capacity to respond to and recover from any accidental events, should they occur. The information to be included in the EPP is outlined in the table below.

Table 5: Table of contents for the Environmental Protection Plan.

TABLE OF CONTENTS

6.10 EROSION AND SEDIMENTATION RESULTING FROM ON LAND ACTIVITIES

Mitigation measures to control soil erosion and sedimentation during construction activities such as vegetative clearing, grubbing, topsoil stripping, road construction, excavating, and landscaping will be implemented during the construction period. In order to minimize soil erosion and sedimentation, vehicle traffic will be minimized on exposed soils and high traffic areas will be stabilized using a layer of clean gravel if not already paved. Silt and sedimentation fencing will be utilized on land and, if necessary, in the water during construction to control sedimentation at the site.

Construction activities will be planned to limit the area of exposed soils and the amount of time that soil is exposed. Exposed areas will be revegetated or covered as soon as it is reasonable to do so.

6.11 ENVIRONMENTAL EFFECTS RESULTING FROM MARINE ACTIVITIES

The largest area of concern for marine pollutants is in the area of the existing DFO wharf located near the existing fish plant. Any disturbance of this sediment may cause marine pollutants to become re-suspended. For this reason, the water lot will be carefully backfilled with suitable material to encapsulate the sediment, and therefore pollutants, preventing dispersion into the harbour. The area of concern will become reclaimed land and used as general laydown area until Phase 4 when berthing space will be developed in the area.

Activities such as pile driving and construction of berths may also cause a temporary release or re-suspension of sediments and/or contaminants. Fish habitat surveys have been conducted within marine environment of the project footprint which indicate minimal fish and fish habitat within the backfill and pile driving areas.

To further minimize re-suspension of marine pollutants, construction activities will be conducted onshore whenever possible.

6.12 DISCHARGES FROM PROJECT WORK INVOLVING THE USE OF HIGH PH MATERIALS

Discharges from work involving materials such as cement, concrete, mortars, and other lime containing materials have the potential to pollute water, soil, and harm vegetation and/or aquatic life due to the toxic metals, high pH, and caustic and corrosive properties. Concrete washout water, which is wastewater produced when equipment carrying concrete is rinsed out, will be handled with care to ensure it does not reach any nearby water bodies. If possible, concrete trucks and equipment will be washed out at offsite ready mixed batch plants. If it is not possible to rinse all concrete containing equipment offsite, all equipment will be rinsed an adequate distance away from the harbour, ensuring the wash water cannot enter any water body, including groundwater, directly or indirectly. Areas that are intended to be vegetated will also be avoided, as concrete wash water can alter soil chemistry and inhibit plant growth. Before concrete or other lime containing materials are used on

site, it will be determined whether or not it is necessary to collect and retain all of the washout water and solids in leak proof containers to be brought to an appropriate disposal facility or recycled.

6.13 GREENHOUSE GAS PRODUCTION BY HEAVY EQUIPMENT

During the construction period the main source of airborne emissions will be vehicle emissions, including heavy equipment. Equipment will be inspected and monitored on a regular basis to ensure that they are not producing additional airborne emissions. Required maintenance will be completed on a timely basis. Idling and operation of vehicles will be actively discouraged and minimized to reduce airborne emissions.

Table 6 outlines the expected fuel use and greenhouse gas (GHG) emissions from each piece of equipment that may be used during the construction phase. Fuel consumption values are estimates only. Actual fuel consumption is highly variable and has been conservatively overestimated.

Table 6: Estimated fuel consumption and GHG emissions (per hour)

Equipment	Fuel Consumption (L/hour)	Fossil Fuel CO_2 (tonnes)	CH_4 (kg)	N_2O (kg)	Total GHG Emissions (tonnes CO_2e)
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

6.14 VISIBILITY OF THE FACILITY FROM PUBLIC AREAS

The facility will be within the existing Town limits, therefore the facility will have some visual impact on the area. The effect of the impact is subjective and as such varies from one person to another, and, of course, from one vantage point to another. As much as possible, the supply base will be configured by taking advantage of topography and other site features to minimize the visual impact. Buffer zones occur

naturally for the largest sections of the Town due to natural topography, but additional buffer zones will be created, wherever possible, to increase the distance between the public and the marine base, thereby reducing the visual impact of the facility. Visual renderings of the fully developed facility from various vantage points can be found in Appendix D.

6.15 RESOURCE CONFLICTS DURING CONSTRUCTION AND OPERATION PHASES

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

- Noise and light;
- Marine and vehicular traffic;
- Fish and fish habitat (both freshwater and marine);
- Resource harvesting, e.g., fisheries, hunting);
- Surface groundwater;
- Demolition of public wharf;
- Impact on local walking trails;
- Quality of life for residents of Fermeuse.

Noise and light during construction can have adverse effects on human, marine and avian life. Human effects will be experienced largely in the daylight hours. Activities that will cause the great effect are pile driving and blasting operations. These activities will occur during normal work hours and daylight hours between 0800 and 1800 hours. Pile driving activities will have the greatest effect on marine life. Pile driving has been known to effect fish with swim bladders. A habitat survey has been completed which indicates that marine life in the area of construction is minimal.

There is a potential for disruption to marine and vehicular traffic during construction. Marine construction should be very minimally impacted because only a small portion of the harbour will be occupied during construction. Marine traffic lanes will be kept clear and traffic in and out of the harbour will be undisturbed. The greatest impact on vehicular traffic will occur during Phase 1 of construction. During this time, the alternative site access road will not be completed. Therefore, construction materials

and construction vehicles will have to use Lumley Cove Road during Phase 1, although it is anticipated that once the main construction equipment has been moved on site it will remain there throughout the construction phase resulting in minimized movements.

Required backfilling and pile driving activities can potentially impact fish and fish habitat. Fish habitat surveys have been conducted within marine environment of the project footprint which indicate minimal fish and fish habitat within the backfill and pile driving areas.

Resource harvesting including fishing and hunting should be minimally impacted during construction. In the area of construction, there have been no fish grounds or hunting grounds identified.

There are two surface water supplies within one (1) kilometer radius of blasting operations. Located approximately one (1) kilometer from the project site is Merrymeeting Pond. This supply has a protected intake. There is one public well located on the North Side of Fermeuse Harbour at Port Kirwan, approximately 900 metres from the project site. Both of these water supplies are at the outer limits of the one (1) kilometer radius and are not expected to be a concern for blasting.

The DFO wharf located near the existing fish plant building will be demolished to facilitate construction at the site. However, any impact to the public will be minimal as the berthing space lost at this site will be gained by a finger pier extension planned for the Small Craft Harbour site, i.e., new boat basin, located west of Sheep's Head. The finger pier extension is expected to occur early in construction Phase 1.

There are no identified walking trails within the footprint of the project site. The nearest promoted East Coast Trail path is the Bear Cove Point path, leading from Kingman's Cove to Renews. The north trailhead is located at the end of Kingman's Cove Road approximately 1.2 kilometers from the project site.

The greatest negative effect on quality of life of residence near the project site will be noise and light during construction, as described earlier in this report. However,

positive effects on quality of life are possible with construction workers present in the Town and the expected economic spinoffs associated with this project.

7 PROJECT-RELATED DOCUMENTS

Department of Environment and Conservation. 2015. Guidelines for an environmental preview report for the Fermeuse offshore marine base.

Gerald Penney Associates Limited. 2015. Rumley Cove, Fermeuse - Historic resources impact assessment.

LGL Limited. 2015. Marine habitat characterization survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL.

SNC-Lavalin Inc. 2014. Project registration for Fermeuse Harbour development project at Fermeuse, NL.

SNC-Lavalin Inc. 2014. Fermeuse offshore marine base infrastructure study.

SNC-Lavalin Inc. 2014. Port feasibility study - Fermeuse, NL.

8 PUBLIC INFORMATION MEETINGS

An open house information session was held in Fermeuse on Tuesday, August 18, 2015 to present information about the Offshore Marine base and the findings included in this Environmental Review Report. This was the third advertised public meeting held by FEL since November 2014.

The August 18, 2015 meeting took place at the Community Hall in Fermeuse. Prior to this meeting to Town Council of Fermeuse and all residents of Fermeuse and Port Kirwan were notified of the meeting. The positive result was that approximately 45 local residents attended this meeting. A 57-slide PowerPoint presentation, entitled "**Fermeuse Offshore Base; Environmental Assessment Public Meeting**" was provided FEL's project manager, Mr. Mike Rose, and he was supported by technical representatives of SNC Lavalin, Mr. Peter Fudge and Mr. Mike Smith. In particular, the presentation highlighted studies, analyses, actions and recommendations taken by FEL, with support from SNC Lavalin, as a result of concerns raised by local

residents in public meetings held in November and December 2014. The presentation also highlighted studies, analyses, actions and recommendations taken by FEL, with support from SNC Lavalin, as a result of directions for further study and review provided by the Minister of Environment and Conservation in April 2014.

Over the last number of years it has been well known in the Fermeuse and southern shore area that FEL has been considering the option of proceeding with a supply base development. In that regard, over the last number of years – and prior to the August 18, 2015 Public Meeting - there have been many informal, formal and public meetings.

The first publicly advertised meeting took place at the Community Hall in Fermeuse on Wednesday, November 5, 2014. That meeting was well attended with approximately 40 people in attendance. The majority of attendees were Town of Fermeuse residents. There were a small number of attendees from neighbouring communities, as well as individuals who own land in Fermeuse but live elsewhere.

As well, a second well-advertised public meeting took place at the Community Hall in Fermeuse on Thursday, December 18, 2014. There were close to 100 people at this meeting. The purpose and direction of the project was discussed. There was significant feedback received from local residents at that time concerning potential impacts of the operation, and many wanted FEL to review and answer how they would manage factors such as potential noise, light, dust, traffic, etc.

Prior to these public meetings, FEL had been in close contact concerning this proposal with the Town Council of Fermeuse, and other key organizations, for more than two years. During those years the social and economic benefits to the Town Council of Fermeuse, the Fermeuse-Port Kirwan Harbour Authority (representing fishery interests), and interested local residents were discussed many times.

Formal and informal presentations and meetings have occurred with these groups on a regular basis since, at least, October 2012. FEL has heard and understands the Town's responsibility to plan effectively for the future. FEL will continue to work with and support the Town of Fermeuse, and all surrounding communities that will realize social and economic benefits and a growing municipal tax base as a result of our project. FEL also appreciates and understands the continuing importance of Fermeuse/Port Kirwan harbour as a fishing industry port. Fermeuse Harbour

continues as a home base for many independent fishermen. Therefore, a priority objective of this project has always been to create a mixed-use industrial port serving the interests of Fermeuse residents, the fishing industry, municipalities, and the local business community.

9 APPROVAL OF THE UNDERTAKING

The project will be subject to the following federal and provincial environmental legislation.

Table 7: Potentially Applicable Provincial and Municipal Authorizations

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Department of Environment and Conservation		
Environmental Assessment Division	Release from Environmental Assessment	General
Water Resources Division	Alteration to a Body of Water (Schedule A to H). This application form is required as well as the appropriate Schedule application form (see below).	Any activity in or near any body of water Marine Infilling
Water Resources Division	Schedule H - Environmental Approval of Other Alterations	Other works within 15 meters of a Body of Water.
Water Resources Division	Certificate of Approval for Site Drainage	Water run-off from the project site.
	Environmental Protection Plan (EPP) – Construction	General
Department of Natural Resources		
Mines and Energy Branch	Magazine Licence	
Mines and Energy Branch	Explosives Transportation Permit	
Mines and Energy Branch	Quarry Permit	
Department of Government Services		
Government Services	Licence to Occupy Crown Land	
Government Services	Certificate of Approval – Storage and Handling of Gasoline and associated products.	
Government Services	Permit for Flammable and Combustible Liquid Storing and Dispensing (Above or Below Ground) and for Bulk Storage (above ground only)	

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Government Services	Storage Tank System Application	All Storage Tanks on Site Including Waste Oil Tanks.
Government Services	Compliance Standards – National Fire Code, National Building Code and Life Safety Code	All Buildings on Site.
Government Services	Building Accessibility Exemption	All Building on Site
Government Services	Statutory Declaration for Registration of Boiler and Pressure Vessel Fittings Fabricated in Newfoundland and Labrador	
Government Services	Contractor's Licence – Pressure Piping System	
Government Services	Examination and Certification of Welders and Blazers	
Government Services	Examination and Certification of Propane System Installers	
Department of Transportation and Works		
Transportation and Works	Compliance Standard – Storing, handling and transporting dangerous goods	General
Department of Human Resources Labour and Employment		
Human Resources Labour and Employment	Compliance Standard – Occupational Health and Safety	Project-related employment
Department of Tourism, Culture and Recreation		
Tourism, Culture and Recreation	Compliance Standard – Historic Resources Act	Construction and operation.
Department of Human Resources, Labour and Employment		
Human Resources, Labour and Employment	Occupational Health and Safety Manual	General
Town of Fermeuse		
Town of Fermeuse	Compliance Standard/ Development Plan	Project Construction and Operation

Table 8: Potentially Applicable Federal Authorizations

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Transport Canada		
Transport Canada	Permit to Store, Handle and Transport Dangerous Goods	

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Department of Fisheries and Oceans		
Marine Environment and Habitat Management Division	Authorization for Harmful Alteration, Disruption of Destruction (HADD) of Aquatic Habitat	Marine - Wharf construction and marine infilling. Freshwater - any in-stream work that will impact fish habitat.
Marine Environment and Habitat Management Division	Letter of Advice	
Marine Environment and Habitat Management Division	Project Referral	
Canadian Coast Guard	Navigable Waters Protection Act (NWPA)	Wharf Construction or any activity affecting navigable waters.
Environment Canada		
Environment Canada	Compliance Standard – *Fisheries Act*, Section 36(3), Deleterious Substances	Any project-related water run-off
Canadian Wildlife Service	Compliance Standard, Migratory Birds Convention Act and Regulations	Any activities which could result in the mortality of migratory birds and endangered species and any species under federal authority.

APPENDIX A

Table of Concordance

TABLE OF CONCORDANCE

Requirement	Report Section
NAME OF THE UNDERTAKING	**1**
PROPONENT INFORMATION	**2**
THE UNDERTAKING	**3**
State the nature of the Project	3.1
State the purpose/rationale/need for the Project from the perspective of the proponent	3.2
Identify needs that are immediate as well as potential future needs.	3.2
Identify any broader private or public sector policies, plans, or programs to which the objectives of the Project contribute	3.2
Identify any potential opportunities to partner with local business	4.2.16
DESCRIPTION OF THE UNDERTAKING	**4**
Provide complete information concerning the preferred choice of location, design, construction standards, maintenance standards, etc.	4
Explain why Fermeuse Harbour was selected as the location for this facility	4, 4.1.1
Describe the design of the new buildings to be constructed. Incorporate local climate change projections, flood risk mapping, sea level rise and coastal erosion information into the project design, construction, and maintenance.	4.1.2.8, 4.2.2.3
Geographical Location / Physical Components / Existing Environment	**4.1**
Provide an accurate description of the location of proposed site, access road, facilities, and equipment, including GPS location coordinates.	4.1.1
Describe the proposed site and surrounding land and marine environment prior to project development	4.1.2.1, 4.1.2.2
Give a detailed physical and biological description of Lumley Cove.	4.1.2.2, Appendix B
Clearly indicate proximity of the site relative to existing residential areas, transportation routes, structures, cabins, trails, water bodies, floodplains, wetlands and wildlife migration corridors.	4.1.2.3 to 4.1.2.6
Identify any nearby tourist attractions, hiking trails, scheduled salmon rivers, interpretative sites, look-off points, parks, ecological reserves, wilderness reserves, etc.	4.1.2.6
Attach an original base map and/or recent air photos, identifying the above-noted features	Figure 6
Provide a detailed site plan of the proposed offshore marine base facility, identifying all features.	Appendix C
Provide a visual rendering of the envisioned fully developed facility from various vantage points	Appendix D

Requirement	Report Section
Provide information regarding ownership and/or zoning of the land upon which the Project is to be located and any restrictions imposed by that ownership or zoning.	4.1.1, 5
Construction	**4.2**
State the total project construction period and proposed date of first physical construction-related activity.	4.2.1
Provide details, materials, methods, schedule, and location of all planned construction activities.	4.2.2
Indicate site preparation activities that will be undertaken including vegetative clearing, grubbing, topsoil stripping, excavating, infilling, and landscaping.	4.2.2.1
Describe any new road construction and upgrading of existing roads that will be required to accommodate vehicular access to and within the proposed project area.	4.2.4
Describe the potential sources of pollutants during the construction period(s).	4.2.5
Describe existing structures inside the project footprint and identify any existing structures that will be demolished, disassembled, and/or removed to accommodate this facility.	4.2.6
Provide and inventory of surface water bodies and private and public wells that are located within a one kilometer radius of blasting activities during construction	4.2.7
Define plans for water, sewer, and electrical services for the facility.	4.2.8
Identify the drinking water source for the base	4.2.8
Identify expected water usage from the base during each phase of construction and whether there is sufficient capacity at the source of supply and/or capacity in the distribution system of the public drinking water system of the Town of Fermeuse.	4.2.8
Identify the location of wastewater discharge.	4.2.8
Specify plans for the Town's sewer outfall.	4.2.8
Ensure that the capacity of the Town of Fermeuse wastewater collection system is adequate to accept wastewater flows from the base, if connected to the public wastewater system, for each phase of construction of the base.	4.2.8
Provide a detailed description of each anticipated employment position associated with the construction of the Project.	4.2.9
Describe women's employment strategies that will be incorporated into hiring plans during the construction phase of the Project.	4.2.10
Specify anticipated living accommodations for the Project workforce during construction phases.	4.2.11

Requirement	Report Section
Describe measures that will be undertaken to ensure that activities associated with the construction of an Offshore Marine Base are conducted in compliance with the Occupational Health and Safety Act, O.C. 2012-005 and its Regulations.	4.2.12
Provide an archeological impact assessment from Sheep's Head to Steel Point prior to any ground disturbing activities.	4.2.13, Appendix B
Provide an overview of the history of Fermeuse Harbour including informant interviews with residents knowledgeable of the history and land tenure of Lumley Cove.	4.2.13, Appendix B
Provide side-scan sonar imaging of the sea bottom for the entire area between Sheep's Head and Steel Point.	4.2.14, Appendix B
Provide historical information on the sea bed at Fermeuse Harbour from informant interviews with local fishermen and recreational divers familiar with the Project area including knowledge of shipwrecks, unusual findings, etc.	4.2.14, Appendix B
Describe potential causes of resource conflicts during the construction phases including temporary disruption of marine and vehicular traffic, interference with resource harvesters and harvesting activities, destruction of fish habitat as the result of infilling, adverse impacts on surface and groundwater within one kilometer of blasting operations, demolition of existing public wharves, impacts on the East Coast Trail, impacts on the quality of life for residents who live within and nearby the Project footprint, and impacts of noise and light on human, terrestrial, marine, and avian life.	4.2.16
Operation and Maintenance	**4.3**
Detailed description of all aspects of the operation and maintenance of the marine offshore base, including site utilities and infrastructure, buildings and structures, fabrication and laydown areas, the storage and handling of bulk hazardous materials, marine vessels, fixed and mobile equipment including transport vehicles, site drainage, solid waste disposal, site security, and fire protection services.	4.3
Describe fabrication and production activities that will occur at the facility and list materials and substances that will be used and the resultant compounds.	4.3.3
Describe marine vessel service and maintenance activities that will be undertaken at the facility.	4.3.2
Describe plan to ensure that drinking water supplied to marine vessels from the marine offshore base meets the Guidelines for Canadian Drinking Water Quality.	4.3.3.1
Provide and inventory of surface water bodies and private and public wells that are located within a one kilometer radius of operations.	4.1.2.5, 6.15

Requirement	Report Section
Provide a comprehensive list of chemicals to be used and/or stored during the construction and operation phases, including chemical state and estimated volume.	4.3.3.2
Provide a detailed description of each anticipated employment position associated with the operation of the Project.	4.3.3.3
Describe women's employment strategies that will be incorporated into hiring plans during the operation phase of the Project.	4.3.4
Specify anticipated living accommodations for the Project workforce during operations	4.3.5
Describe measures that will be undertaken to ensure that activities associated with the operation of an Offshore Marine Base are conducted in compliance with the Occupational Health and Safety Act, O.C. 2012-005 and its Regulations.	4.3.6
Identify a communications strategy for apprising municipal officials and stakeholders of construction and operation activities associated with the Project.	4.3.7
Define how fire protection services will be provided at the facility.	4.3.8
ALTERNATIVES	**5**
Identify and describe alternative means and locations of carrying out the Project that are technically and economically feasible.	5
Identify any alternative means and locations to carry out the Project.	5
Provide reasons for the rejection of alternative sites.	5
POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION	6
Provide detailed information regarding the potential effects of the proposed facility on the environment and details of proposed mitigations, including:	-
Increased marine and vehicular traffic, noise, light, and dust	6.1, Appendix E
Migratory birds becoming stranded on the Project site during construction and operations phases	6.2
Fabrication and production activities	6.3
Materials associated with the demolition, disassembling, and/or removal of structures	6.4
Impact of blasting operations on private property, as wells as surface and groundwater within a one kilometer range of blasting	6.5
Increased demands on municipal infrastructure and services	4.1.2.4, 4.2.8, 5, 6.6
New road construction and upgrading of existing roads	6.6

Requirement	Report Section
Storage and handling of hazardous and non-hazardous materials and waste	6.8
Erosion and sedimentation resulting from on land activities	6.10
In-filling of fish habitat, sedimentation, and re-suspension of sediments and contaminants resulting from in water activities	6.11
Discharges from project work involving the use of cement, concrete, mortars, and other lime containing materials that may have a high pH	6.12
Greenhouse gas production by heavy equipment	6.13
Visibility of the facility from public areas	6.14
Resource conflicts during construction and operation phases.	6.15
Description of activities that will be undertaken and mechanisms that will be put in place to reduce the impacts of increased vehicular and marine traffic, noise and light, on human, marine, and terrestrial life.	6.1
Describe methods and materials that will be used to suppress dust during site preparation activities and regular operations.	6.1
Describe mitigative measures that will be implemented to minimize the attraction of seabirds to site lights, minimize risks to birds blown onto the site due to environmental conditions, prevent and contain the accidental release of fuel, and to prevent destruction and harm to nests, eggs, and nesting birds during construction and operations.	6.2
Indicate plans for resale, reuse, recycling, and/or final disposal of the materials resulting from the demolition, disassembling and/or removal of structures that currently exist in the proposed project footprint.	6.4
Identify methods that will be employed to protect surrounding homes, surface water and groundwater wells from adverse effects resulting from blasting activities.	6.5
Identify any additional infrastructure that may be required to be added to the Town's public drinking water and wastewater system to accommodate the connection of the base. Describe plans for upgrading municipal infrastructure as required.	4.2.8
Specify plans for the re-location of a public wharf (wharves) that is/are currently located within the Project footprint.	6.7
Identify procedures for the safe handling and storage of hazardous materials and waste. Develop, test and implement an environmental emergency contingency plan.	6.8

Requirement	Report Section
Develop, test and implement an Environmental Protection Plan to prevent accidental releases, reduce consequences, and ensure adequate preparedness and capacity to respond to and recover from any accidental events should they occur.	6.9
Identify provisions for the disposal of construction and other non-hazardous wastes (wood, concrete, steel). Identify opportunities for reuse and recycling.	6.4
Describe mitigative measures that will be undertaken to minimize and control soil erosion and sedimentation during construction activities.	6.6, 6.10
Define measures that will be implemented to control the release or resuspension of sediments or contaminants resulting from in-water activities including pile driving, construction of berths, and backfilling.	6.11
Describe methods that will be used to prevent discharges from project work involving concrete, cement, mortars, and other lime-containing construction materials from entering the aquatic environment.	6.12
Describe strategies and best available control technologies that will be used to minimize the projects impact on climate change with respect to greenhouse gas emissions. Provide an outline of projected fuel use as well as the estimated greenhouse gas emissions for the project.	6.13
Consider the sensitivity of the Project to long-term climate variability and provide a discussion of the potential environmental effects of the environment on the Project.	6
Describe methods that will be implemented to utilize existing site topography, buffer zones, and other site features to minimize the visual impact of the Project.	6.14
Indicate measures that will be undertaken to resolve potential conflicts during construction and operations phases, including private homes that lie within the Project area.	6.15
PROJECT RELATED DOCUMENTS	**7**
PUBLIC INFORMATION MEETING	**8**
APPROVAL OF THE UNDERTAKING	**9**

APPENDIX B

Related Reports

DRAFT 9 July 2015

Rumley Cove, Fermeuse

Historic Resources Impact Assessment

Archaeological Investigation Permit #15.21

James Yonge's map of "Firmose" [Fermeuse], 1663. Rumley Cove is on the south [left] side of the Harbour, right of the word "planters" (Poynter 1963:177)

Submitted to
Provincial Archaeology Office
Department of Business, Tourism, Culture and Rural Development
Confederation Building, St. John's, NL
A1B 4J6

and to
SNC-Lavalin Inc.
1133 Topsail Road, Mount Pearl, NL
A1N 5G2

Submitted by
Gerald Penney Associates Limited
P.O. Box 428, St. John's, NL
A1C 5K4

9 July 2015

CONTENTS

Letter of Transmittal

Gerald Penney
ASSOCIATES LIMITED

9 July 2015

Martha Drake
Provincial Archaeologist
Department of Business, Tourism, Culture and Rural Development
Confederation Building
St. John's, NL
A1B 4J6

Dear Martha,

Please find enclosed our report "Rumley Cove, Fermeuse Historic Resources Impact Assessment," under Archaeological Investigation Permit #15.21.

Sincerely,

Gerald Penney
President

/encls

cc. Mike Smith, SNC-Lavalin Inc.

104-40 Quidi Vidi Road · St. John's · NL · A1A 1C1
T 709.739.7227 · **E** gpaltd@nl.rogers.com · **W** geraldpenneyassociates.com

Executive Summary

Under Archaeological Investigation Permit #15.21 the footprint of a proposed offshore marine to be located on the south side of Fermeuse Harbour was researched and field-tested by Gerald Penney Associates Limited (hereinafter, GPA). As a result of field investigation, two new archaeological sites were located: CfAf-36 (Lawes Point 1) and CfAf-37 (Steel Point 1). Both these late-19th century sites are likely to be impacted by Phase 4 of the proposed development.

GPA also revisited archaeological site CfAf-31 (Lumleys Cove). Here, testing did not encounter any artifacts. However, documentary research indicates that early historic occupation of this area is likely and that the formerly inhabited areas lie just outside the Phase 1-4 footprint.

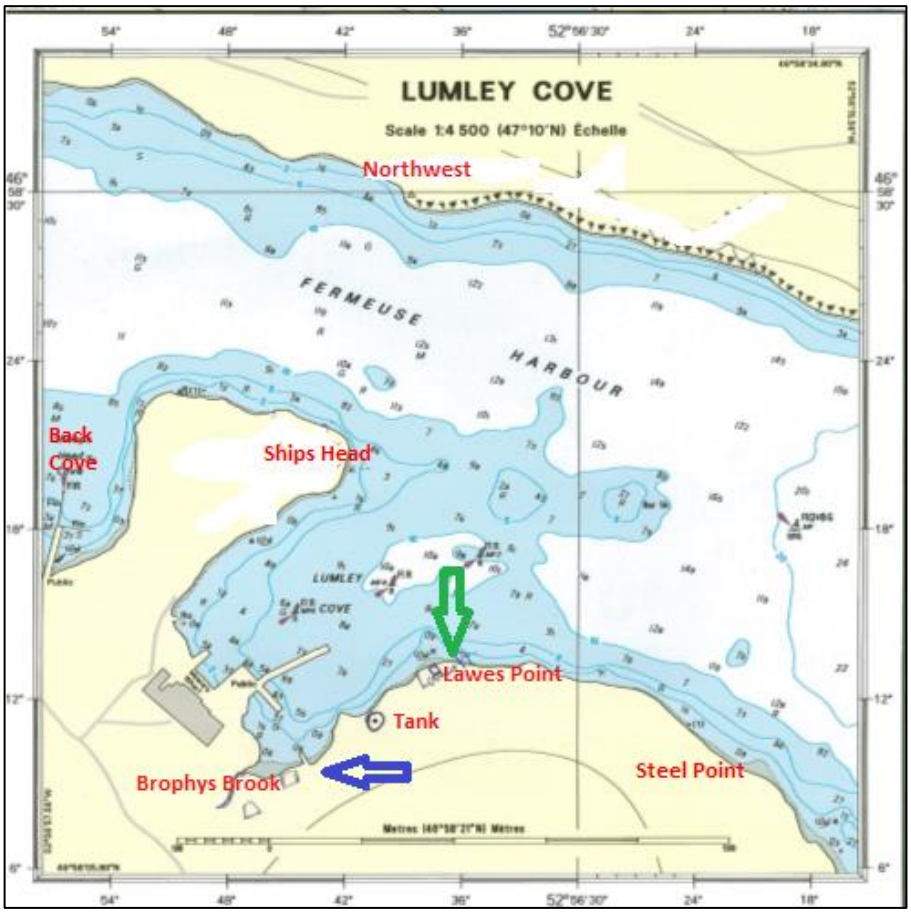
Participants

Gerald Penney, M.A.	principal investigator
Robert Cuff, M.A.	historical research; report preparation
Catherine Hawkins, B.A.	field assistant
Blair Temple, M.A.	field archaeologist; report preparation
Toby Simpson, B.A.	drafting/digital mapping

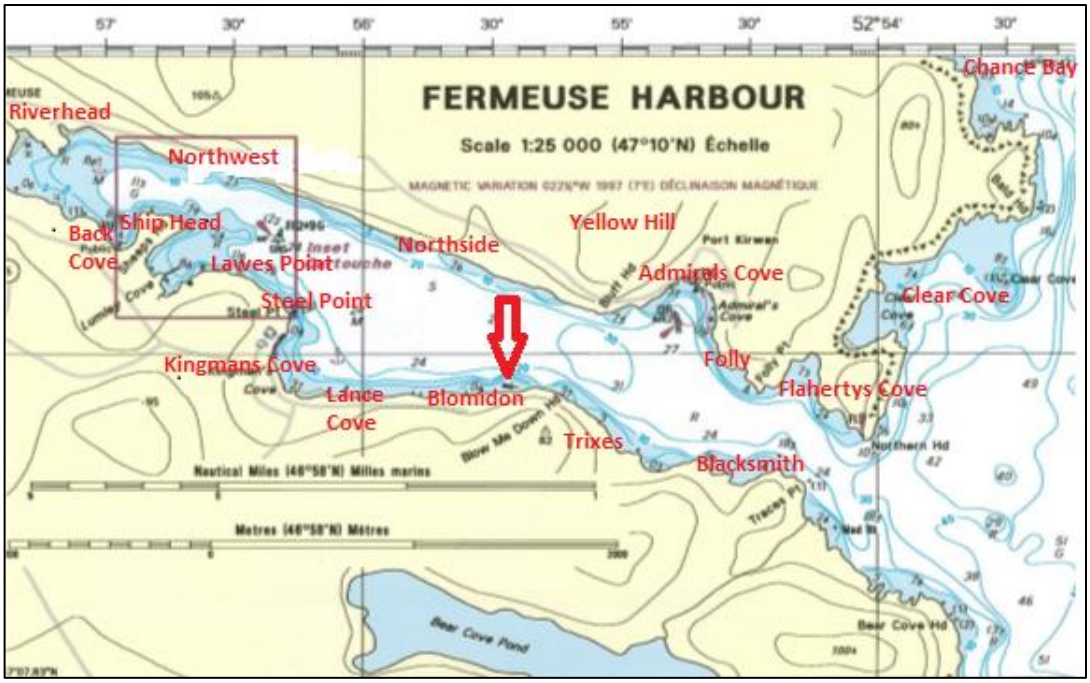
The assistance of Peter Fudge (SNC-Lavalin Inc.), Mike Smith (SNC-Lavalin Inc.), and the Provincial Archaeology Office are also acknowledged. Edward Curran (of Rumley Cove, Fermeuse), John Chidley (of Renews) and Sylvester Hawkins (of Brigus South) assisted with field inquiries.

Introduction

Fermeuse Harbour was extensively used by European migratory fishermen beginning in the 16th century, and was one of the first settled places in North America. Its historic advantages as an anchorage and potential as an onshore processing facility close to the Grand Banks propel the presently-proposed development. The proposed offshore marine base, on the south side of Fermeuse Harbour, between Back Cove and Kingmans Cove, will transform approximately 1.2 km of shoreline. Historically, there have been numerous inhabitation sites at Fermeuse, several of which were abandoned in the 20th century. That the proposed development will certainly impact some of these inhabitation sites is the rationale for archaeological investigation under permit #15.21. Just how old, and how extensive, are these inhabitation sites at Rumley Cove?



GPA's fieldnames, Rumley Cove, superimposed on an inset of Canadian Hydrographic Service Chart #4845. Green arrow points to the indicated location of an early 20th century wreck. The blue arrow points to the approximate location of a former wharf ballast bed (wpt "Ballst").



GPA's fieldnames, Fermeuse Harbour, superimposed on an inset of Canadian Hydrographic Service Chart #4845. Red arrow points to the 1948 wreck of the Ilex, *off Blomidon***.** *Rumley Cove (NTS Lumley Cove) is located between Ships Head and Lawes Point, inside the box at left – see above.*

Study Area/Natural Features

As is fairly typical in Newfoundland, National Topographic Service maps and Canadian Hydrographic Service charts employ many names for features which are incorrectly placed, or otherwise at variance with local usage. A case in point is the cove on the south side of Fermeuse Harbour which is the primary focus of analysis and field investigation, locally known as Rumley Cove.[1]

For the sake of clarity we will introduce field names for the various once-inhabited locales around Fermeuse Harbour, starting in the northeast and working around the Harbour counterclockwise. Outside the Harbour and facing the open Atlantic are Chance

[1]The cove appears in 19th century voters' lists as "Romneys Cove," likely from Peter Romney, merchant and JP of Fermeuse c. 1789-1800 (Marshall 2015). The cove was recorded as Lumley Cove on a 1927 Admiralty chart and it is so named on current National Topographic Service topographic sheets. However, in keeping with GPA's long-establish practice of gathering, recording and employing local nomenclature, our field name for this feature is Rumley Cove (NTS Lumley Cove). Similarly, the headland on the west side of Rumley Cove will be referred to below as Ships Head (NTS Sheeps Head) and the cove west of Rumley Cove as Back Cove (NTS Sheeps Head Cove).

Bay and Clear Cove, both now abandoned, with Clear Cove being just outside the harbour mouth. Here, most settlement took place on a neck of land which separates Clear Cove from Flahertys Cove. Moving west along the north side, there were two families at Folly Point (former the site of a fortification, c. 1788-1820, archaeological site CfAf-06), then Admirals Cove (renamed Port Kirwan).[2]

Next west is Northside, now abandoned, although there are a scattering of modern houses along the road to Port Kirwan, some of which are inhabited by former residents of Northside or their descendants. West again there are a few modern houses near shore at "Northwest," but this area has also been substantially abandoned for the Port Kirwan road.

Northwest (GPA's field name), from Steel Point. Note the road to Port Kirwan above the shoreline, at 40-50 m asl. Richard Whitbourne described the north of Fermeuse Harbour as "something rocky, where grow store of Firre and Spruise trees" (RCF.2290).

The head, or western end, of the harbor is known as Riverhead, presently the most populated part of the municipality of Fermeuse, being on the main road (Route 10, the Irish Loop). Riverhead is usually regarded as also including those living at, or along, the road to, Back Cove, but not those at Rumley Cove. The local name for the east point of Rumley Cove is Lawes Point, with Steel Point forming the western headland of Kingsmans Cove (all within the municipality of Fermeuse). East of Kingmans Cove there are three formerly settled sites – Blomidon, Trixes[3] and Blacksmith.

[2] As Port Kirwan is an incorporated municipality that includes most of the north side of Fermeuse Harbour, GPA employs the name Admirals Cove for the historic community and geographic feature.
[3] Also recorded as Tricks Cove and Trixie, while the NTS name of the point to the east of Trixes is "Traces Point."

Blomidon, from Steel Point (RCF.2294).

Rumley Cove is the site of a fish plant and government wharf. Construction of these facilities affected the west side of the cove towards Ships Head by fill exacavations.

Looking south from the road to Port Kirwan towards the clearing at Lawes Point (centre, and to left), showing a fuel storage tank (RCF.2304).

On the east side of Rumley Cove there is a fuel storage tank from the former fish plant operations and a cleared area where there was once a house and fishing room, at Lawes Point. East of Lawes Point, Steel Point is steep-to the water, becoming slightly flatter, with overgrown clearings, towards Kingmans.

Looking SW across Rumley Cove, from Lawes Point (BTF.3624).

Previous Archaeology

The earliest investigation of an archaeological site in Fermeuse Harbour was at Folly Point (CfAf-06) in the 1960s, by David Webber, then curator of the Newfoundland Naval and Military Museum. This fortification (c. 1778-1820) consisted of two small gun batteries. It was revisited by Stephen Mills in 1993 (Mills 1998; see also map p.9).

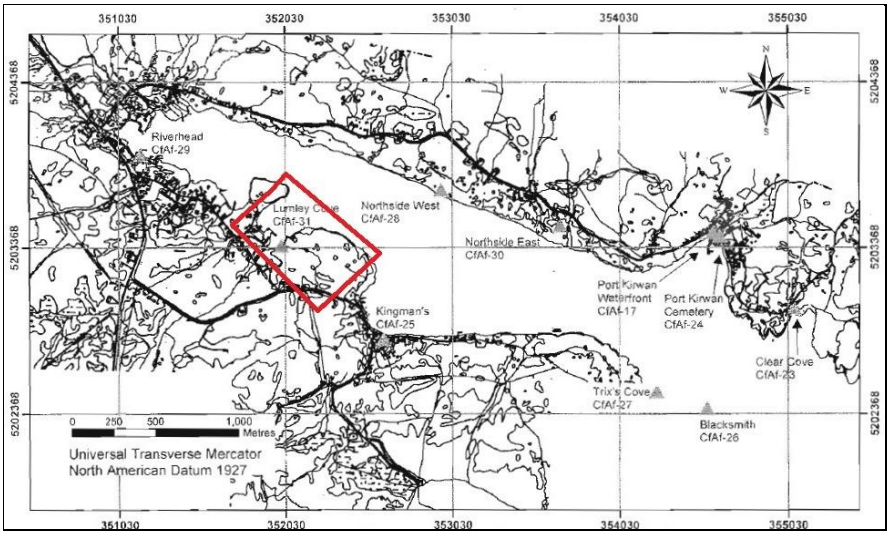
Premises at Kingmans. It appears likely that the three Kingmans underwater sites [CfAf-02; CfAf-09; and CfAf-21] are off a former wharf in this general vicinity, also indicated as the locale of a stage and anchorage mapped in 1663 [see p. 13] and a double wharf 1810-12 [see p.15](RCF.2276).

Prior to the *Historic Resources Act* (1985) there were numerous unrecorded explorations of underwater sites in Fermeuse Harbour by recreational divers, a case in point being the four bags of pipe stems held by the Newfoundland Museum labelled "Kingmans 1976" (CfAf-21). Underwater sites recorded by divers in the late 1980s are slightly better-documented, during a period of cooperation between the diving community and provincial authorities. There are 12 recorded wreck, or underwater, sites including Kingmans Cove 1 (CfAf-02) and Kingmans Cove 2 (CfAf-09), located about 500 m SE of Steel Point, which have yielded a variety of artifacts, including eight intact Spanish olive jars (see Carter 1982).

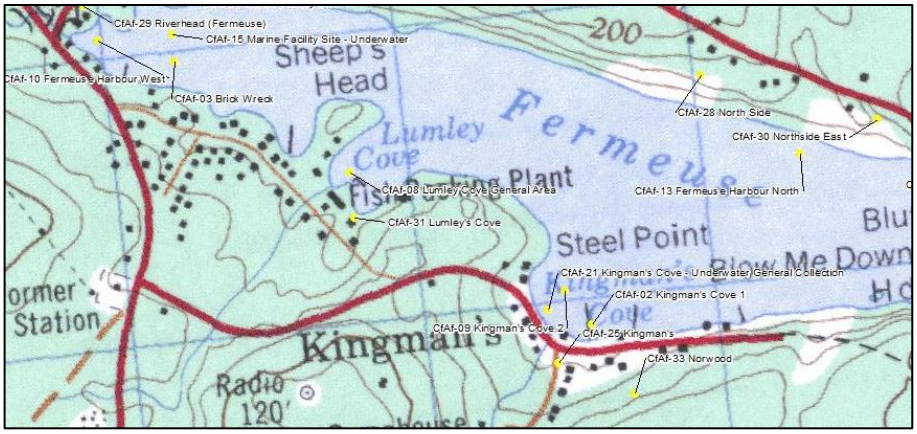
There is also a well-known visible wreck on the south side, the *Ilex* (1948), which has not been designated an archaeological site.

Wreck of the Ilex, *off Blomidon (BTF.3717).*

Investigation of the proposed Fermeuse Marine Service Centre site in 1989 by Marianne Stopp added one site on land – Marine Facility Site (CfAf-04), about 500 m NE of Ships Head—and other underwater sites. In 2002, Dr. Peter Pope of Memorial University of Newfoundland conducted a survey of the Harbour, and recorded nine new sites. These range in date from the mid-17th to the 20th century. Five sites have 17th and/or 18th century components or artifacts and provide material evidence of early modern usage and occupation. The sites judged most promising in 2002 were Port Kirwan Waterfront (CfAf-17), Clears Cove (CfAf-23), and Kingmans (CfAf-25), while there was also some 18th century artifacts recovered at Northside (CfAf-28) and Riverhead (CfAf-28).



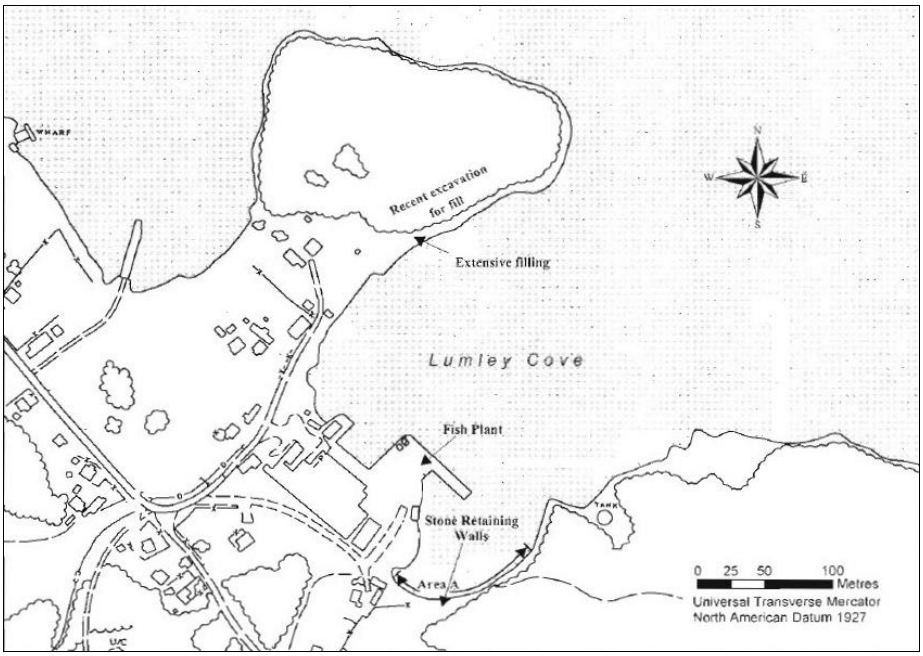
Map of sites recorded in Fermeuse Harbour (Pope 2003:fg.1). The marine base study area is in red.



Approximate location of land and underwater sites near the proposed Fermeuse Harbour Development (courtesy Stephen Hull, PAO).

Three sites are in close proximity to the proposed marine base development: underwater and land sites at Rumley Cove (CfAf-08 and CfAf-31) and a 17th to 19th century site at Kingmans (CfAf-25). Lumley Cove General Area (CfAf-08) is noted as being an underwater shipwreck, with no further detail as to type or location. GPA's informants suggest that this well-known wreck was at Lawes Point – see below, Field Investigation PA3.

Pope's Lumley's Cove (CfAf-31) finds consisted of seven artifacts surface-collected along the beach near Brophys Brook (our PA2), and the remnants of a stage and a stone retaining wall. Pope noted disturbance from construction of the fish plant, adding that Ithe cove suffered from "pollution in the form of household refuse and raw sewage" (Pope 2003:24) and concluded that prospects were low. However, Pope concluded that the planter's house depicted on Yonge's 1663 was at Kingmans (Ibid:14-16).



Map of Rumley Cove, 2002 (Pope 2003:fg.26).

Kingmans (CfAf-25) has a 17th to 18th century site component, 19th century material and a large stone with an incised inscription. Pope investigated several areas, identifying early material throughout. The inscribed stone has several examples of initials and dates, the seeming oldest being "ꟻK 1684." Pope described this site, particularly the 17th century components, as "very promising and certainly merit[ing] further study" (Ibid:16).

Historic Context

Fermeuse, on the Avalon Peninsula approximately 100 km south of St. John's, is one of the oldest fishing stations and settlements in Newfoundland and was likely an important fishing area for French, Basque, Portuguese and West Country fishermen as early as the 16th century. It and nearby Renews are the closest ship harbours to the Grand Banks. The migratory fishery prevailed at Fermeuse throughout the 17th century, with permanent settlement established during the late 17th to early 18th century (Pope 2003:1).

Local tradition is that the first places settled by Europeans were Clear Cove and Admirals Cove, closest to the mouth of the harbour and the fishing grounds. Admirals Cove is a fairly common place name in Newfoundland, and is usually an indication of status as the first fishing room chosen by migratory fishers. Not being suitable for fishing ships, Clear Cove was used as a small-boat harbour at a very early date.

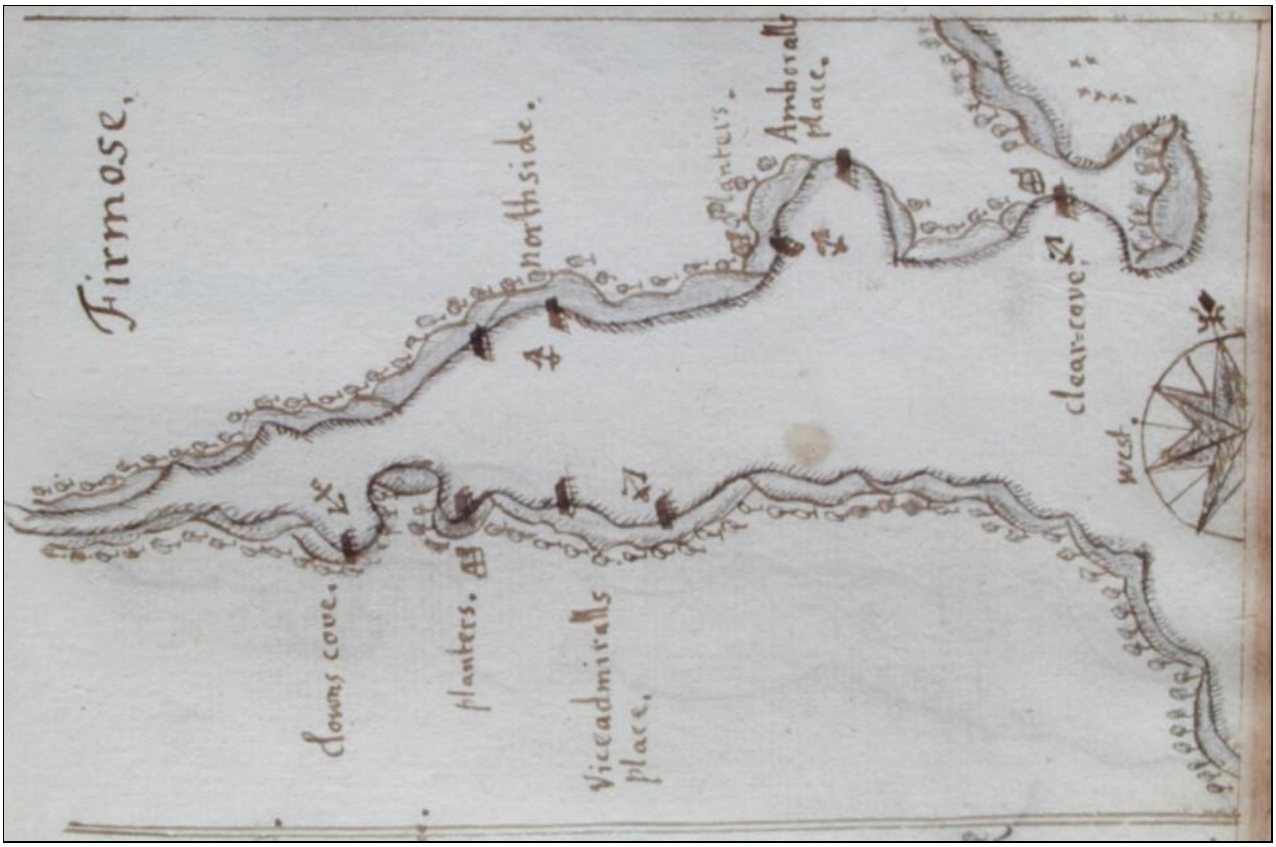
17th and 18th Century Exploration and Settlement. In 1622, Richard Whitbourne described the harbour as a good place to establish a colony:

> Formosa is a Harbour fit for any Ship, of what burthen soeuer, there to ride well at Anchor, and stretcheth towards the West from the entrance thereof, neere foure miles; into which Harbour there yeerely comes above 20. saile of English Ships, which haue commodious places to salt and dry fish on; and also diuers Portugall Ships; It is a Harbour that with small charge may be well defended, so as no Pirats might come in there, but by leaue. The Land on the North side of the said Harbour, neere a mile in length by the Harbours side, is fit for drying of fish, and other purposes; the rest of the North side of the said Harbour, to the innermost part thereof, by the Harbours side, is something rocky, where grow store of Firre and Spruise trees, and other fruits. There are diuers commodious places on the South side of the said Harbour, for salting and drying of fish, and building of houses, and many more such conuenient places may very fitly be made there, when people begin to inhabite that place. (Cell 1982:207-208)

Although details are lacking, it is believed that Sir Francis Tanfield founded a colony at Fermeuse in about 1623 (Pope 2004:53). Sir Henry Cary, the first viscount Falkland, owned lands at both Renews and Fermeuse, which he called South Falkland. Cell concludes that a colony was indeed established in South Falkland in 1623 by Tanfield (under Cary's command), but it is undetermined whether it was located in Renews or

Fermeuse (Cell 1982:44). In either case, the South Falkland colony did not last long and apparently Cary was encouraged by Robert Hayman to make a fresh start, in 1628 (Ibid:44).

In 1663 James Yonge, surgeon to a vessel fishing at Renews, visited Fermeuse Harbour. At "Firmose" he met seven men from Barnstaple, North Devon (Poynter 1963:56). Fortunately, Yonge drew a detailed map of the Harbour, which indicates an anchorage, dwelling and stage at Flahertys Cove (labelled "Clear-cove" by Yonge), an anchorage, two stages and a dwelling at Admirals Cove ("Amboralls place"), two stages and an anchorage at Northside, a stage and anchorage at Back Cove ("Clowns cove"), a dwelling and stage at Rumley Cove, and an anchorage and two stages at Kingmans Cove ("Viceadmiralls place").



James Yonge's map of "Firmose" [Fermeuse], 1663 (Poynter 1963:177)

Although a complete documentary record is lacking, it appears that the areas where Yonge found activity in 1663 continued to be the focus of migratory fishing activity and of year-round settlement in the 18th century. There were 376 people fishing out of Fermeuse Harbour in 1732, and about 120 year-round inhabitants in 1752 – comprising 10 families and a number of wintering fishing servants. Likely many of the over-winterers fished during the summer from the coves at the east end of the Harbour, closest to the fishing grounds, and wintered at Riverhead, Back Cove or Rumley Cove, where there was better shelter and access to wood.

As is typical of the Southern Shore, the earliest settlers were from the English West Country, and particularly North Devon. During the late 1700s and early 1800s, however, most new arrivals were from southeastern Ireland, arriving firstly as fishing servants of English planters. The misnomer "Sheeps Head Cove" is likely reflective of a Devonshire pronunciation of "ships." The modern hydrographic service's insistence on attaching this name to Back Cove can be traced to an imprecise label by 18th century hydrographer Michael Lane. A map published in 1794, based on the surveys of Lane, depicts "Fermouse Harbour" and labels an area on the harbour "Sheeps Head Cove" (Jefferys 1794). The label is positioned so that it could refer either to Rumley Cove (the western headland of which is Ships Head) or to Back Cove.

Jeffreys (1794, detail). Note that there appear to be structures indicated on shore at Northside, Admirals Cove and Clear Cove, but none on the south side of the harbour.

However, Lane's sailing directions are descriptive of Rumley Cove, and particularly the shoal or bank east of Ships Head which is integral to the proposed development:

> Near 3 miles further north [from Renews] is Fermose or Fermouse Harbour, and between them is Bear's Cove, off which a sunken rock lies a cable's length from the shore. There is no danger in sailing into Fermose Harbor, though the entrance is narrow… Further in is Admiral's Cove, where merchant vessels ride land locked in 7 and 8 fathoms; and one mile within that is Vice Admiral's Cove. Large ships anchor on its south side in 12 and 15 fathoms, muddy ground, and very convenient for both wood and water. On the same side, further in, is Sheep's Head Cove, directly off which, near the middle of the channel, is a bank with only 9 feet, constituting the only known danger within this harbour (cited in Mobilewords 2011:38).

The name Rumley Cove is presumed to have its origins in another local pronunciation, in this case of the surname Romney, after an English-born merchant and local Justice of the Peace, Peter Romney, who lived somewhere in Fermeuse Harbour 1789-1800.

A chart of "Fermouse-Harbour" dated to 1810-12 indicates the location of many dwellings and fishing stages, primarily on the north side, at Admirals Cove, Flaherty Cove and Clear Cove. On the south side there far fewer structures indicated, four dwellings at Lance Cove (east of Kingmans Cove), one at Trixes and one at Blacksmith. There were no structures indicated, however, at the western end of Kingmans Cove ("Vice Admirals Cove"), Rumley Cove ("Sheeps Head Cove"), Back Cove, Riverhead, or Northside.

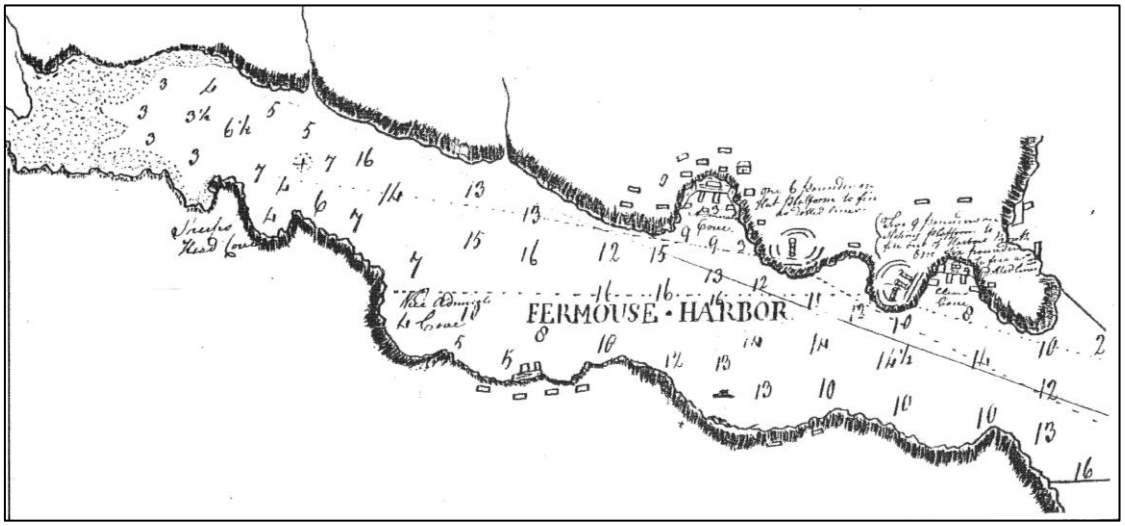


Chart of "Fermouse" Harbour in 1810-12, as reproduced in Stopp (1989).

By 1836 there were 406 people living at Fermeuse, the vast majority Irish and Roman Catholic (Martin 1973:5). Some idea of their distribution can be gleaned from surviving voters' lists 1840-59, which give not only the personal and family names of heads of households, but also an indication of where they lived.[4] By this time merchant Romney would appear to have been long gone. Other early settlers of presumed English origin include John Rogers (a blacksmith), and fishermen named William Lane and Thomas Laws – while common Irish family names of Fermeuse include Brennan, Brophy, Coady, Flaherty, Kenny, O'Neill, Reddy and Walsh.

The Brophy, Kenny and Laws families are of particular interest. Voters lists consistently have John Brophy and Andrew Kenney residing at Romneys Cove. Thomas Laws is listed in the 1840s as residing at Blomidon, but in 1855 William Laws is listed as living at "Steals Point" and in 1859 Thomas Laws resided in Romneys Cove. Our hypothesis is that Thomas Laws fished out of Blomidon in the 1840s and had a winterhouse farther in the harbour, moving to Lawes Point sometime in the 1850s.

GPA's primary source of local history in Rumley Cove, Mr. Edward Curran, is a descendent of Andrew Kenney. His understanding is that the first settlers of Rumley Cove were Irishmen named Kenney and Brophy, and that the Kenneys settled on the west side of the cove and the Brophys on the south side. The point on the east side belonged to a Mr. Lawes, who sold his land there to Mr. Curran's grandfather, also Edward Curran (1869?-1912), for $10.[5] Grandfather Curran came from Ferryland, but moved to Fermeuse and bought the point shortly after his marriage to Mary Agnes Kenney, in 1897.

[4] "Addresses" in the voters lists include most of the coves or locales listed above, but also include Chance Bay (north of Clear Cove) and Yellow Hill (NW of Admirals Cove). Two listed – Bowers (alt., Bowles) Room and White Horse – could not be located with certainty.
[5] Voters lists indicate that a "Thomas Lawze" lived on the north side of Renews in 1900 and 1908.

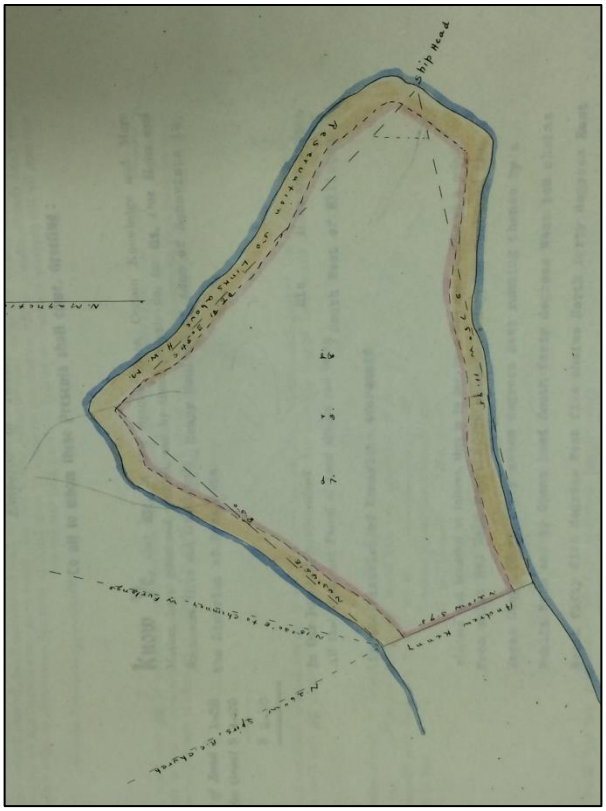


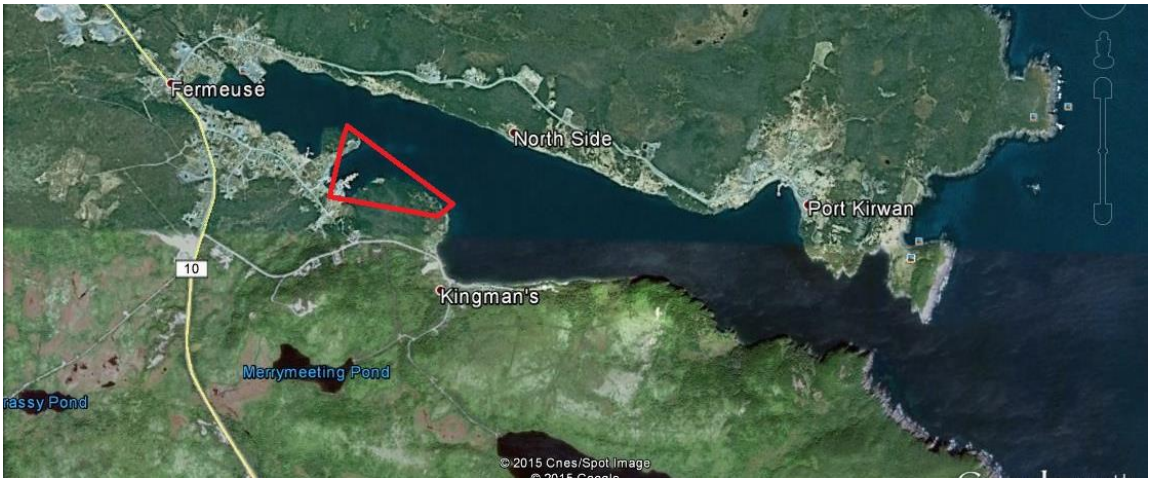
Diagram accompanying a 1915 Crown grant of Ships Head to Richard Kenney.

If Lawes Point was settled from about 1855 to 1908, this would be consistent with settlement patterns observable in many Newfoundland communities, whereby marginal shore space was taken up in the mid-19th century. This is coincident with a considerable population increase in many outharbours and an attendant reliance on employment in offshore and/or migratory fisheries, such as the Banks and Labrador fisheries, rather than a local shore fishery. The rise of a commercial lobster fishery in the late 19th century also contributed to the spread of settlement to marginal areas. Fermeuse Harbour saw its population increase from 406 in 1836 to 713 in 1884 – nearly twice the combined population (389) of Fermeuse and Port Kirwan in 2011.

The area's social and economic structure underwent a major change when a fish plant was built in Rumley Cove 1950-52 by the Moores family of Harbour Grace. Before the opening of the fish plant, the area's economy was still subsistence-based (O'Dea et al 1972:6). Agriculture and fishing provided goods for both home consumption and

exchange with merchants, and credit was more common than the exchange of money. The construction of the fish plant changed this way of living. As Gerald Barnable observes, "the effect of the new project were felt immediately. There was a minor construction boom as the buildings began. Even we, who were children cashed in on it, and gathered piles of stones for its foundations" (Barnable 1973:2). Ed Curran also worked on construction of the fish plant, firstly by selling stones for concrete at $0.80 per ton, and later helping to excavate an area on the east side of Rumley Cove for an oil storage tank. During the 1970s, the plant handled about 200,000 pounds of fish per day and employed 200-300 workers.

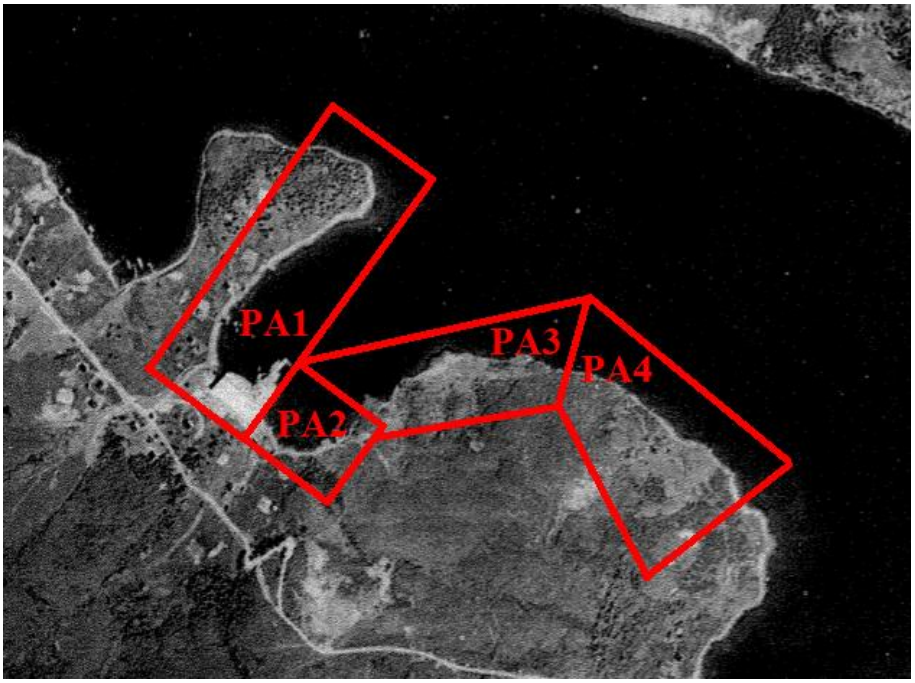
A settlement survey of Fermeuse in 1954 stated that "Riverhead is the section which serves most nearly as a focal point for the settlement because it is here where the church and school are located… [also] the main road from St. John's passes through Riverhead" (Department of Mine and Technical Surveys 1954:7). The fish plant also had the effect of concentrating settlement around Fermeuse Harbour along the main roads, fewer households keeping livestock and growing vegetables, and the abandonment of Clear Cove, Northside, Blomidon, Trixes, and Blacksmith.



Google Earth image of Fermeuse harbour, showing the location of the assessment area.

Field Investigation

On 8 June 2015, GPA field investigators Blair Temple, Robert Cuff and Catherine Hawkins visited the assessment area between Ships Head and Steel Point and surveyed/tested the area under Archaeological Investigation Permit #15.21. From west to east between Ship Head and Steel Point, they identified four project areas (PAs): PA1 (Ships Head), PA2 (Brophys Brook), PA3 (Lawes Point), and PA4 (Steel Point).



GPA's Project Areas superimposed on a 1951 aerial photograph.

PA1: Ships Head – Ships Head forms the west side of Rumley Cove. Only the eastern half of this headland was surveyed. It is covered in trees and shrubs, with a few small garden clearings in the interior, but otherwise inhabited only at the "neck" of land between Rumley Cove and Back Cove. Between the houses on the neck and the bill of Ships Head the shoreline is quite rocky and shows signs of having been disturbed by earth-moving. The north side of the Head is steep-to the water.

Rumley Cove, from the road to Kingmans. Ship Head is at centre, the bill of the Head to the right of centre (RCF.2280).

Shoreline on the north side of Ships Head, looking west, Riverhead in the distance (RCF.2246).

It quite evident that PA1 has been extensively modified. A road extends NE from the last houses towards the bill of the Head, leading to an area which was dug out with heavy equipment in the early 1950s in order to obtain fill for construction of the fish plant. Because of readily apparent and dateable recent disturbance no test pitting of PA1 occurred.

The west side of Rumley Cove, looking north along a transformed shoreline, towards Ships Head (RCF.2241).

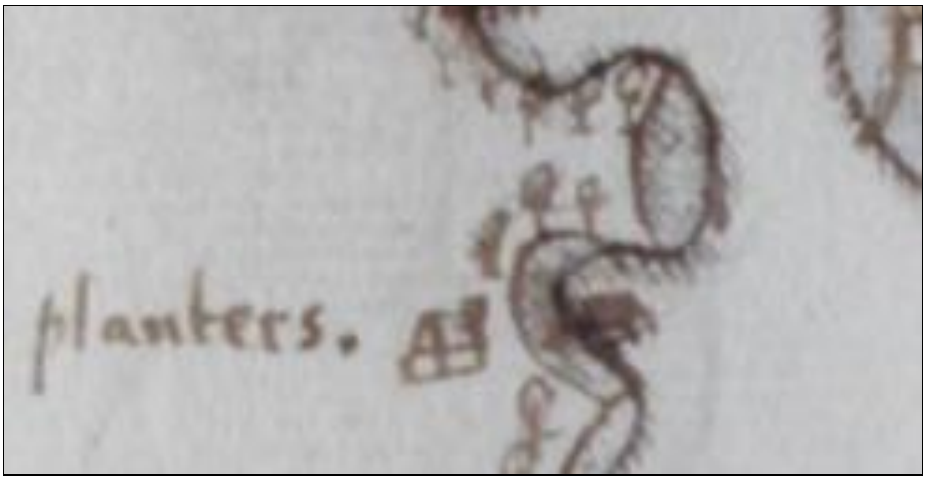
The bill of Ships Head from Lawes Point, showing the area of 1950s disturbance (RCF.2254).

PA2: Brophys Brook – This project area is a narrow strip of land on the south side of Rumley Cove, to the east of the fish plant. In addition to this being close to the location where James Yonge drew a planters house on his 1663 map, this area is one of the only pieces of flat land on the south side of Rumley Cove, located on the bottom of a steep slope. Brophys Brook divides a man-made platform into the harbour built for the present fish plant/wharf to the west from a less-disturbed but still modified shore to the east.

Brophys Brook, looking east. Mr. Temple and Ms. Hawkins are testing an apparent structural platform just left of centre, with the quay or roadbed to their left. The hill which fills the right half of the frame shows considerable alder growth, but was once cleared for gardens (RCF.2266).

Ballast bed (wpt "Ballst") and quay/roadbed, looking towards Brophys Brook (BTF.3617).

East of the brook there is a retaining wall or quay that supports a road towards Steel Point and Kingmans Cove. At the east end of the retaining wall/roadbed there is a stone platform or ballast bed for a wharf or stage. This is clearly an area of some natural advantage for the fishery, given the indicated position of a stage in 1663.



On Yonge's 1663 map the label "planters." appears near Rumley Cove, along with symbols for a dwelling and stage.

Meanwhile, just outside the assessment area/Phase 4 project footprint, there is a possible house platform in the valley of Brophys Brook. According to Ed Curran, James Brophy (b 1884) lived in this area during the early 20th century while his brother Philip (b 1887) lived just a bit further in under the hill. This area, which was not tested by Pope in 2002 or GPA in the current investigation, seems the "best fit" as the location of Yonge's stage and planters' house in 1663.

Brophys Brook, bottom of cove, location of the Brophy brothers' houses in the early 20th century and indicated location of Yonge's planters' house in 1663 (RCF.2270).

PA3: Lawes Point – This project area on the east side of Rumley Cove is where the Lawes family likely had premises from the mid-19th century and where the Curran family settled in about 1900. From the west side of Rumley Cove the grass-ground at Lawes Point is unmistakably cultural: the only area cleared of trees and the only area flat enough for habitation. As a result of GPA's field investigation, this area has been designated Lawes Point 1 (CfAf-36).

South of Lawes Point there is an artificial platform, built in the early 1950s to support a fuel storage tank for the fish plant. East of the tank, an overgrown trail can be discerned, a continuation of the Brophys Brook roadbed towards Kingmans Cove. This was "only a footpath" in living memory. There are also several lengths of piping along the shoreline, which once connected the tank to the plant, and numerous warping pins or bolts set in large boulders, through which cables were reeved in order to warp vessels at the plant wharf.

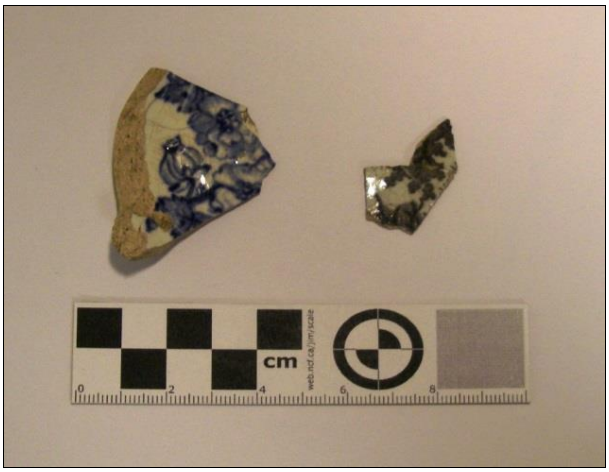
Warping pin set in a rock on the east side of Rumley Cove (RCF.2265).

Ed Curran's father, Richard Curran, was born at Lawes Point in 1899, but the family moved the house across Rumley Cove to Ships Head in about 1908 at the insistence of his grandmother, Mary Agnes, reputedly because they were plagued by ghosts of "pirates." Grandfather Edward Curran died young, in 1912, and the Curran family lived among their Kenney uncles, their house being shoreward of where Ed Curran lived in

2015. Up until the 1940s, the Currans continued to set potatoes on Lawes Point and Ed frequently walked over to the point along the footpath ("you were never able to get a horse over there"). Near shore in the southeast of the clearing there is a likely cellar pit (wpt "Celrpit"), while in the northeast there is platform which likely supported the Curran's stage.

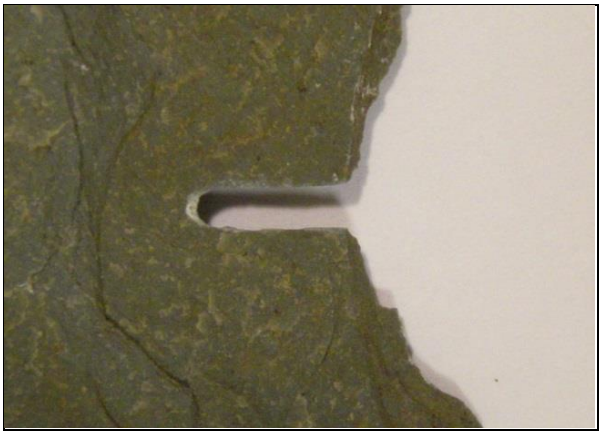
Hypothesized location of the Curran house at Lawes Point, location of tests FM4 and FM5 at centre (BTF.3649).

Test pit FM4 at Lawes Point (RCF.2257).



Artifacts from test pit FM4: blue printed whiteware bowl and brown printed whiteware sherds.

Collected sample of roof slate debitage or waste, test pit FM5. Note the saw marks on two specimens (left and top, right).



Closeup of saw mark on roof slate waste fragment.

.

Making inquiries as to possible shipwrecks in Rumley Cove, Mr. Cuff was told that there was well-known wreck off Lawes Point which could be viewed from shore within living memory, possibly the wreck referenced above as CfAf-08. Ed Curran had vivid memories of this wreck, although the event itself had occurred during his father's early years – after the Curran family had left Lawes Point c. 1908, but prior to the Great War.[6] As related by Richard Curran, a vessel bound to Europe with a load of pig iron was forced into Fermeuse as a harbor of refuge, after which the owners elected to moor her for the winter at Rumley Cove, where there was then a large wharf in the bottom, approximately where the fish plant is now. During another storm she came off her moorings and was forced back on shore at Lawes Point. In his youth Ed Curran several times tried to salvage her brass fittings from shore, unsuccessfully, as they were clearly visible. Mr. Cuff did observe some rusting metal on the bottom off Lawes Point, but concluded that what he saw could have easily been part of an oil drum.

Platform for a stage (?), Lawes Point. Ed Curran informed that there was a wreck visible on the bottom off this point in his youth. The grass-grounds of Northside can be seen at top, right (BTF.3661).

[6] List of wrecks along the Southern Shore contain two candidates. *SS Caravona* is depicted as having wrecked off Fermeuse Harbour in December 1913 (Venture Graphics and Design 1990). The better prospect may be *SS Navada* in 1912 (Prim1992).

Steel Point, from Northside. Kingmans at left, overgrown clearings representing former habitation sites at centre (RCF.2303).

PA4: Steel Point – Steel Point is the headland between Rumley Cove and Kingmans Cove. Similar to Ships Head, the shoreline along Steel Point is steep-to with boulders/scree to tidewater. While Steel Point is primarily tree covered, there are numerous overgrown clearings, one of which has been designed Steel Point 1 (CfAf-37).

"Reddy" house clearing at Steel Point (RCF.2297).

Concentrating on the western parts of the point, within or proximate to the proposed project footprint, field investigators identified three principle cultural features during our survey: a large rock feature (wpt "Bigpile"); a roadway towards Kingmans Cove; and a house clearing near the road. Test pits were dug at all locations, although no artifacts were found proximate to the rock feature. At the house clearing near the road, a number

of bricks were found at surface, while test pits yielded 19th century artifacts. No function could be ascribed with certainty to the rock feature, which possibly represents a Herculean effort to clear the rocky slope of stones in order to set gardens ("picked rock"). Although the pile appeared at first glance to be haphazard, there was a small section visible which had clearly been dry-laid in courses (left of Mr. Temple in the photograph at bottom), allowing the possibility that the feature represented collapse of a structure.

Roadbed at Steel Point (BTF.3674).

Large rock feature at Steel Point, course-laid stone to Mr. Temple's left (RCF.2284).

Test pit FM13 at Steel Point (RCF.2300).

The roadbed was constructed with some effort, principally through cut-and-fill. It was not readily discernable west of Steel Point, towards Rumley Cove, but relatively easy to follow east towards Kingmans Cove. Near the road, at the north end of the house clearing, bricks were visible at surface and 19th century artifacts (including window glass) were found in test pits.

Artifacts from test pit FM13 at Steel Point.

Both Ed Curran's recollections and the sequence of households in the 1921 nominal census support the hypothesis that the house clearing and possibly the rock feature

represent the household of Thomas J. Reddy,[7] born in 1876 to Jeremiah and Mary (Kenny) Reddy and deceased by 1935. According to Mr. Curran, others who lived on the point were Dominic Walsh (b 1892 per 1921 Census) and a family named Jackman. William Jackman (b 1858) and family probably lived on the side of the point facing Kingmans Cove, outside the present study area/project footprint, where Michael Jackman (1898-1943) was later the proprietor of a cod-liver oil factory. Steel Point was abandoned in the 1940s or 1950s.

[7] Mr. Curran had been told that a Reddy family lived in the house at Steel Point closest to Rumley Cove, but had no personal recollection of the family or dwelling. The 1921 nominal census supplied the personal name and birthdate of Thomas Reddy.

Review of Underwater Videos

GPA was supplied with approximately five hours of underwater video footage for review, filmed 30 November and 1 December 2014. Over 14 hours were devoted to reviewing video, tracking cultural material viewed on the bottom in a spreadsheet, with each find identified by time code and associated latitude and longitude coordinates. See Appendix C for mapping of tracks.

30 November 2014

	Start	*Finish*	*Locale*
T1 -	2:48:39 pm	4:00:51 pm	Steel Point
T2 -	5:09:26 pm	5:58:47 pm	Rumley Cove-Ships Head

1 December 2014

T3 -	8:36:31 am	9:20:21 am	Rumley Cove-Lawes Point
T4 -	9:22:21 am	10:27:21 am	Shoal-Ships Head
T5 -	10:28:40 am	11:27:19 am	Rumley Cove

Typical scatter of bottles near the Rumley Cove wharf. T3-8:45:09am / 46.97037700 lat / -52.94423100 lon (UV.1288).

Generally, the underwater survey revealed a great deal of detritus on the bottom at Rumley Cove, most particularly in the vicinity of the extant fish plant wharf. Detritus included a household appliance, several tires, plastic and wicker (?) lawn chairs, and hundreds of pop and beer bottles and cans. Most of the material observed was judged to

be quite recent garbage. For instance, of the approximately 40 dozen beer bottles the majority were of the post-1984 "long neck" type, while there were only two of the older "stubbies," dating from 1964-84.

Plank? With three holes at top, right, wpt "Timber (holes)" (UV.1284).

Unidentified cultural feature, wpt "Timber2" (UV.1287).

These findings are in keeping with Peter Pope's 2002 assessment of Rumley Cove suffering "the blight of pollution in the form of household refuse and raw sewerage"

(Pope 2003:24). Meanwhile, local diver John Chidley offered that such detritus and an attendant lack of clarity in the waters of Rumley Cove make it an unattractive prospect for recreational diving, adding that he was not aware of any wrecks or indeed any other finds of interest in this area.

Only 14 features of interest were identified during video review:

Field name	*Longtitude*	*Latitude*	*Track*	
Wicker	52.944343	46.972664	T2	
Large bottle	52.945069	46.970676	T2	
Timber?	52.945136	46.970517	T2	
Wine bottle	52.944081	46.970473	T3	
Timber1	52.945272	46.970060	T3	
Timber2	52.944319	46.970272	T3	
Timber (holes)	52.945338	46.970056	T3	
Plank	52.942930	46.970306	T3	
Feature?	52.940983	46.970325	T3	
Jvx	52.941690	46.971821	T4	(lug-handled bottle)
Ball	52.943176	46.971342	T5	
Stubby 2	52.942390	46.972162	T5	
Liquor	52.941812	46.971610	T5	
Stubby 1	52.944328	46.970497	T5	

*The features of interest, plotted on a Google earth image of Rumley Cove***.**

Unidentified possible feature, possibly natural, wpt "Feature?" (UV.1289).

Unidentified possible feature, possibly natural, wpt "Feature (UV.1291).

Discussion/Recomendations

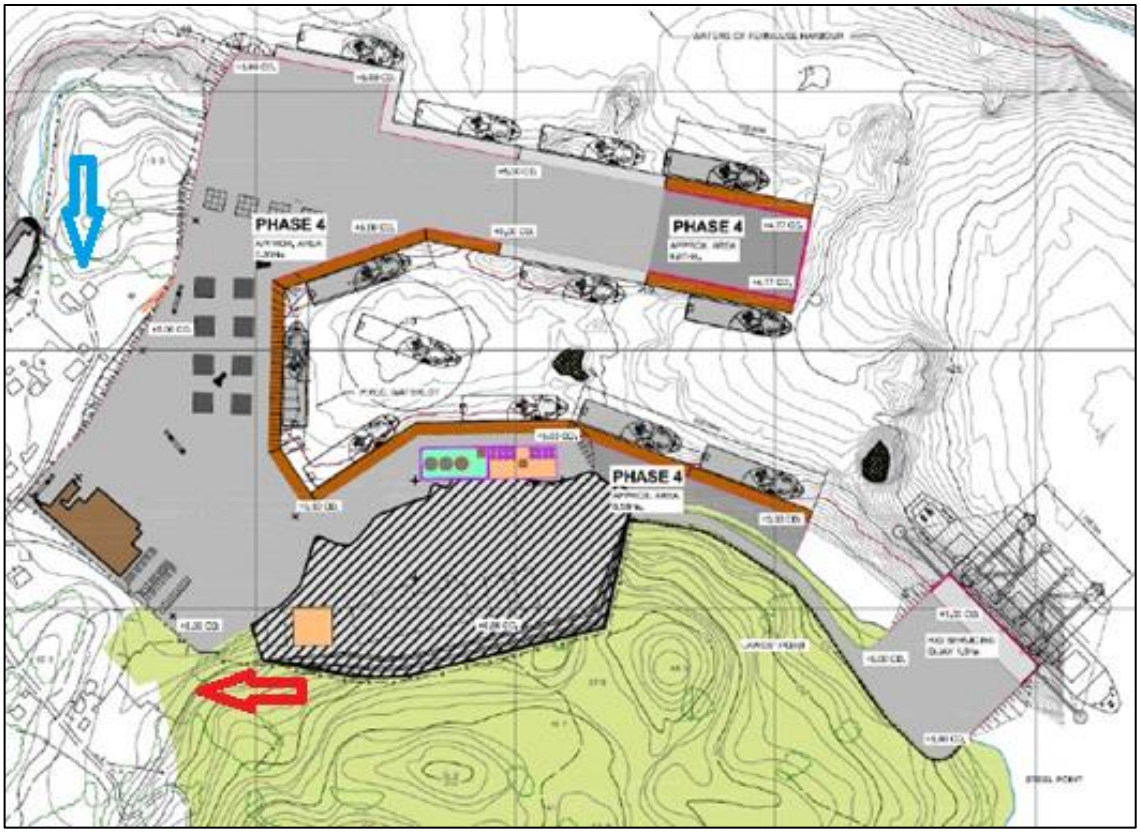
Fermeuse Harbour abounds with 19th century settlement/homestead sites, including several which are poignant features of the East Coast Trail – such as Blacksmith (CfAf-26) and Trixes (CfAf-27) – and are unlikely locales for future development, through inaccessibility. There are also a number of early-historic sites on its north side for which continued protection and eventual further investigation are certainly warranted – such as Port Kirwan Waterfront (CfAf-17); Folly Point (CfAf-06); and Clear Cove (CfAf-23).

Of GPA's four project areas, the narrow strip of affected shoreline on the east side of Ships Head (PA1) is least likely to contain significant historic resources, having been profoundly disturbed by fill extraction using heavy equipment in the mid-20th century. Further investigation should only be required if construction activities include ground disturbance west of the present project footprint, on the neck of land between Back Cove and Rumley Cove.

Surface survey and testing encountered cultural materials dating to the19th century at both Lawes Point (PA3) and Steel Point (PA4). Lawes Point was inhabited by a single family, c. 1855-1908. The outline of a presumed dwelling is faintly visible, as well as what is presumed to be a pathway to a stage or wharf, and a small cellar. This former habitation site will be impacted by the proposed offshore marine base development. The part of Steel Point which is proposed as a dock was likewise settled for little more than a generation, c. 1890-1935. Archaeological findings, informant interviewing and documentary research all support a conclusion that these were marginal areas for the fishery, settlement, and subsistence agriculture. They were settled during a time of increasing population pressure, and were later abandoned as priorities and opportunities shifted and they were left without a road conenction. The PAO may wish to consider whether to require further testing/recording of the impacted features at Lawes Point and Steel Point as planning for the project proceeds.

Potentially, the most significant features (wall/quay and ballast bed) are at PA2, Brophys Brook. The PAO may wish to consider whether fuller recording of these features should

be required prior to their removal and also whether construction activities in this area should be monitored. Should the Brophys Brook area be impacted by the planned removal of the hillside to the east during Phase 1, this area could be tested, given its proximity to the early-historic planters' habitation are indicated as by James Yonge in 1663.



Proposed Fermeuse offshore marine base, Phase 4 (Fermeuse Enterprises Limited 2014:27). Added blue arrow indicates an area of continuing interest on the neck between Back Cove and Rumley Cove. Added red arrow indicates the area of continuing interest near Brophys Brook – both outside the indicated project footprint.

Regarding prospects for underwater archaeological sites, the area proximate to the ballast bed/wharf in Rumley Cove is perhaps a prospect for discarded material. It is also worthy of note that all the possible timbers or planks observed during our video review are located on the southeast side of Rumley Cove, close to shore. Further, a reputed early-20th century wreck site off Lawes Point, 200 m NE of the ballast bed, will be impacted by the proposed development. The PAO may also wish to consider requiring further investigation and recording at these two areas on the east side of Rumley Cove.

Sources

Anon.
1948 "S.S. Ilex is Destroyed by Fire at Fermeuse." *Western Star* (5 November 1948), Corner Brook.

Barnable, Gerald
1973 *The Fermeuse Fish Plant: A Sketch in Social Geography. Forwarded to Prof. Novak*. Department of Geography, Memorial University of Newfoundland, St. John's.

Carter, John
1982 "Spanish Olive Jars from Fermeuse Harbour, Newfoundland." *Material History Bulletin* 16: 99-108.

Cell, Gillian T.
1982 *Newfoundland Discovered: English Attempts at Colonization, 1610-1630*. The Hakluyt Society, London.

Crummell, Dan (Minister)
2015 "Guidelines for an Environmental Preview Report for the Fermeuse Offshore Marine Base." Department of Environemnat and Conservation, St. John's.

Department of Mines and Technical Surveys Geographical Branch
1954 *Newfoundland Settlement Survey, 1954: Fermeuse***.** Ottawa.

Department of Municipal Affairs
1966 *Fermeuse and Renews*. Provincial Planning Division. Map held at Queen Elizabeth II Library, Memorial University of Newfoundland [G 3436 A1 S2 N4], St. John's.

East Coast Trail Association
2002a "Spurwink Island Path (East) #16." Waterproof Maps [set], East Coast Trail Assocaition, St. John's.
2002b "Bear Cove Point Path #17." Waterproof Maps [set], East Coast Trail Assocaition, St. John's.

Fermeuse Enterprises Limited
2014 "Project Registration in Accordance with the Requirements of the Newfoundland and Labrador Environmental Protection Act for Fermeuse Harbour Development Project at Fermeuse, NL."

Fitzpatrick, Ashley
2014 "New offshore marine base proposed." *The Telegram* (29 November 2014), St. John's.

Galgay, Frank and Michael McCarthy
1987 *Shipwrecks of Newfoundland and Labrador* Volume 3. Creative Publishers, St. John's.

Galgay, Frank, Michael McCarthy, Sr. Teresina Bruce, and Sr. Magdalen O'Brien
1983 *A Pilgrimage of Faith: A History of the Southern Shore from Bay Bulls to St. Shott's*. Harry Cuff Publications Limited, St. John's.

Holy Apostles' Parish
1980 *Establishment of the Presentation Congregation at Admiral's Cove-Renews 1853.* 2nd Annual Archdiocesan Convention, May 10 1980. St. John's.

Howley, M. F.
1909 "Newfoundland Name-Lore." *The Newfoundland Quarterly* 9 (1):1-3.

Marshall, N. Jill
2015 "Re: Romney and Rogers of Fermeuse." Personal communication, 23 June 2015.

Martin, Kent Oliver
1973 *"The Law in St. John's Says…": Space Division and Resource Allocation in the Newfoundland Fishing Community of Fermeuse*. Unpublished Masters Thesis, Department of Anthropology, Memorial University of Newfoundland.

Mills, Stephen
1998 "Southern Shore Battery Survey Project." On file, Historic Resources Division, St. John's.

Mobilewords Limited
2011 *What we call things: a coastal toponomy of the Irish Loop*. Mobile.

O'Dea, Noel, Michael Mulrooney and Ignatius Dunne
1972 *"Socio-Economic Study": Fermeuse-Renews Area Southern Shore, Newfoundland*. Centre for Newfoundland Studies, Memorial University of Newfoundland.

O'Neill, Ed
2012a "Fermeuse – Around the Harbour Preview." https://www.youtube.com/watch?v=8U3EgX72eIw
2012b "Fermeuse and Kingman's Cove – Free as a Bird." Video posted to YouTube.c https://www.youtube.com/watch?v=3wUVbe25P6Q (accessed 24 June 2015).
2012c "Fermeuse – A Stroll Down Memory Lane." https://www.youtube.com/watch?v=VZlTcH0mZzk

Parsons, Robert
2000? *Notable Shipwrecks off and near Newfoundland Labrador*. Map held at Queen Elizabeth II Library, Memorial University of Newfoundland, St. John's [G 3436 P57 200- N6].

Pitt, Janet E.
1984 "Fermeuse." In *Encyclopedia of Newfoundland and Labrador*, vol. 2, p.35-37. Newfoundland Book Publishers (1967) Ltd., St. John's.

Pope, Peter E.
1999 *1998 Surface Finds at Port Kirwin, CfAf-17 Site Report.* St. John's Waterfront Archaeology Project, Archaeology Unit, Memorial University of Newfoundland.
2003 *Fermeuse Area Survey, 2002.* Final Report for Archaeology Office, Province of Newfoundland and Labrador, August 2003.
2004 *Fish into Wine: The Newfoundland Plantations in the Seventeenth Century.* University of North Caroline Press, Chapel Hill.

Poynter, F.N.L. (ed.)
1963 *The Journal of James Yonge [1647-1721]: Plymouths Surgeon*. Longmans, Green & Co. Ltd., London.

Prim, J[oseph]
1979 *This is a part list of Vessels lost on the Avalon Peninsula."* Map held at Queen Elizabeth II Library, Memorial University of Newfoundland, St. John's [G 3437 A87 P57 1979 P7].
1992 *"Supplement" to record of vessels lost in Newfoundland and Labrador Area.* Complied list held at Center for Newfoundland Studies, Memorial University of Newfoundland, St. John's [G 525 P75 1992].

Seary, E. R.
1971 *Places Names of the Avalon Peninsula of the Island of Newfoundland*. University of Toronto Press, Toronto.

Stopp, Marianne
1989 "Stage 1 Overview Assesment of Marine Service Facility, Fermeuse (Borden No. CfAf-4)." M.P. Stopp Consulting, St. John's. Refport on file, Historic Resources Division, St. John's.

Venture Graphics and Design
1990? *Graveyard of the Atlantic: Southern Avalon Shipwrecks.* Map held at Queen Elizabeth II Library, Memorial University of Newfoundland, St. John's [G 3437 A87 P57 199- V4 C2].

Voter Lists
1840 "Fermews," Ferryland District, Newfoundland's Grand Banks Website: http://ngb.chebucto.org/

1841 "Fermews," Ferryland District, Newfoundland's Grand Banks Website: http://ngbchebucto.org/
1849 "Fermews," Ferryland District. Newfoundland's Grand Banks Website: http://ngb.chebucto.org/
1859 "Fermews," Ferryland District. Newfoundland's Grand Banks Website: http://ngb.chebucto.org/

White, Richard
1903 *Map Showing Position of Wrecks Around the Coast [of Newfoundland]*. Map held at Center for Newfoundland Studies, Memorial University of Newfoundland, St. John's [G 3436 P57 1903 W49].

Winter, Kathleen A.
1993 "Port Kirwin." In *Encyclopedia of Newfoundland and Labrador*, vol. 4, p.396. Harry Cuff Publications Ltd., St. John's.

Appendix A – Permit

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Business, Tourism, Culture and Rural Development

ARCHAEOLOGICAL INVESTIGATION PERMIT

granted by:
Provincial Archaeology Office
Dept. of Business, Tourism, Culture and Rural Development
P.O. Box 8700
St. John's, NL
A1B 4J6

PERMIT NO. 15.21

NAME Gerald Penney

ADDRESS Suite 104, Caledonia Place, Quidi Vidi Road, St. John's, NL – A1A 1C1

INSTITUTION Gerald Penney Associates Limited

is authorized to conduct archaeological investigations at the location(s) stated below, subject to the terms and conditions of the Application for Permit and the *Historic Resources Act*, RSNL 1990, c. H-4

LOCATION(S) Fermeuse

All material recovered is the property of the Province.

VALID FOR THE PERIOD June 8, 2015 to June 30, 2015

NOTE: All material recovered during excavation is to be recorded using three dimensional provenience unless permission to do otherwise has been granted from the Provincial Archaeology Office

Minister of Business, Tourism, Culture and Rural Development

Date: June 5, 2015 per: cmurphy

Appendix B – Waypoints (NAD 1983)

Test Pits

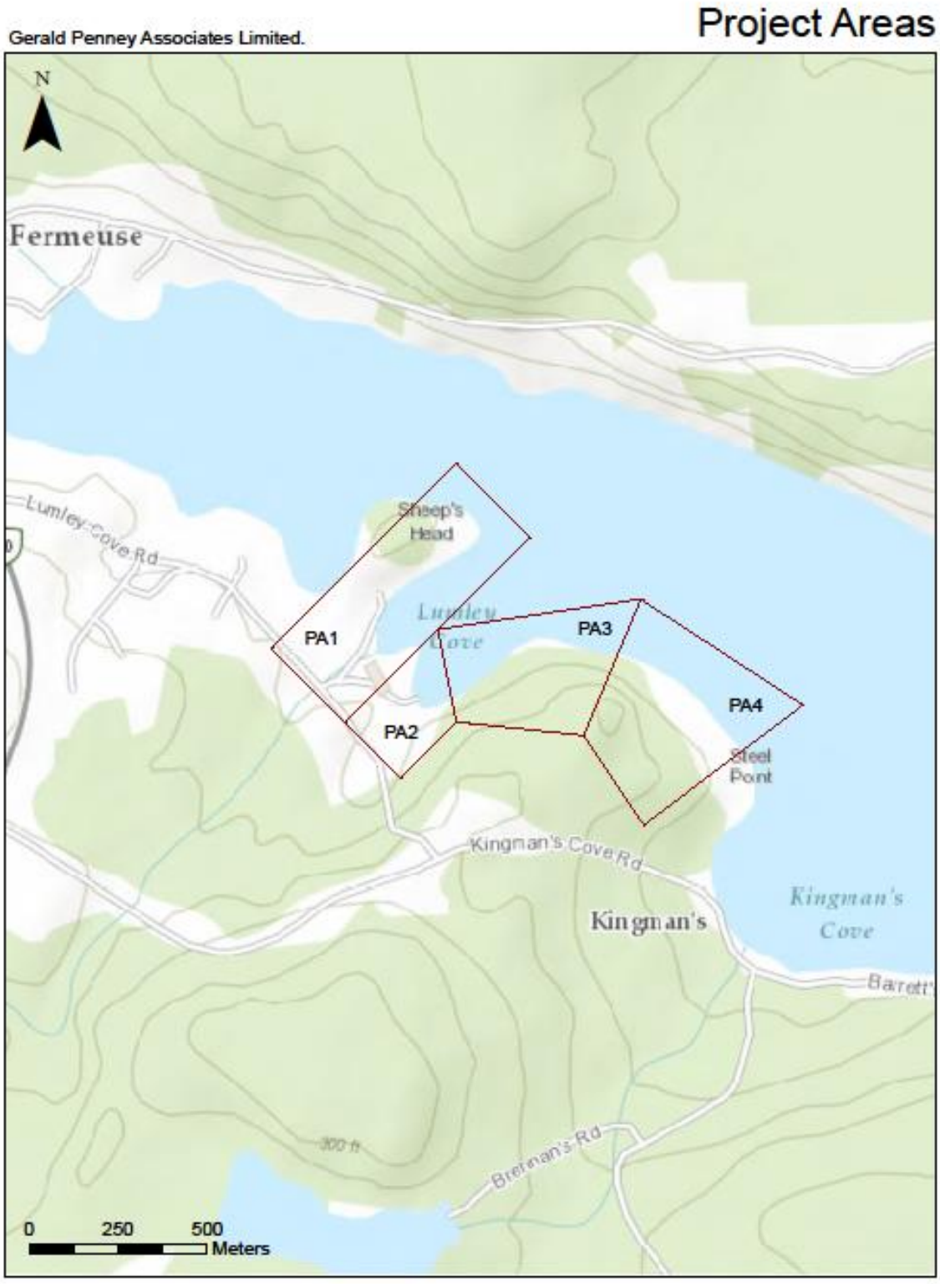
Name	Date	Coordinate	Elevation
FM1	08-JUN-15	352199 5203690	3 m
FM2	08-JUN-15	352192 5203694	0 m
FM3	08-JUN-15	352187 5203689	-0 m
FM4	08-JUN-15	352184 5203670	2 m
FM5	08-JUN-15	352177 5203684	
FM6	08-JUN-15	352175 5203688	2 m
FM7	08-JUN-15	351967 5203569	0 m
FM8	08-JUN-15	351963 5203573	-3 m
FM9	08-JUN-15	352422 5203569	12 m
FM10	08-JUN-15	352417 5203574	10 m
FM11	08-JUN-15	352412 5203564	12 m
FM12	08-JUN-15	352479 5203525	8 m

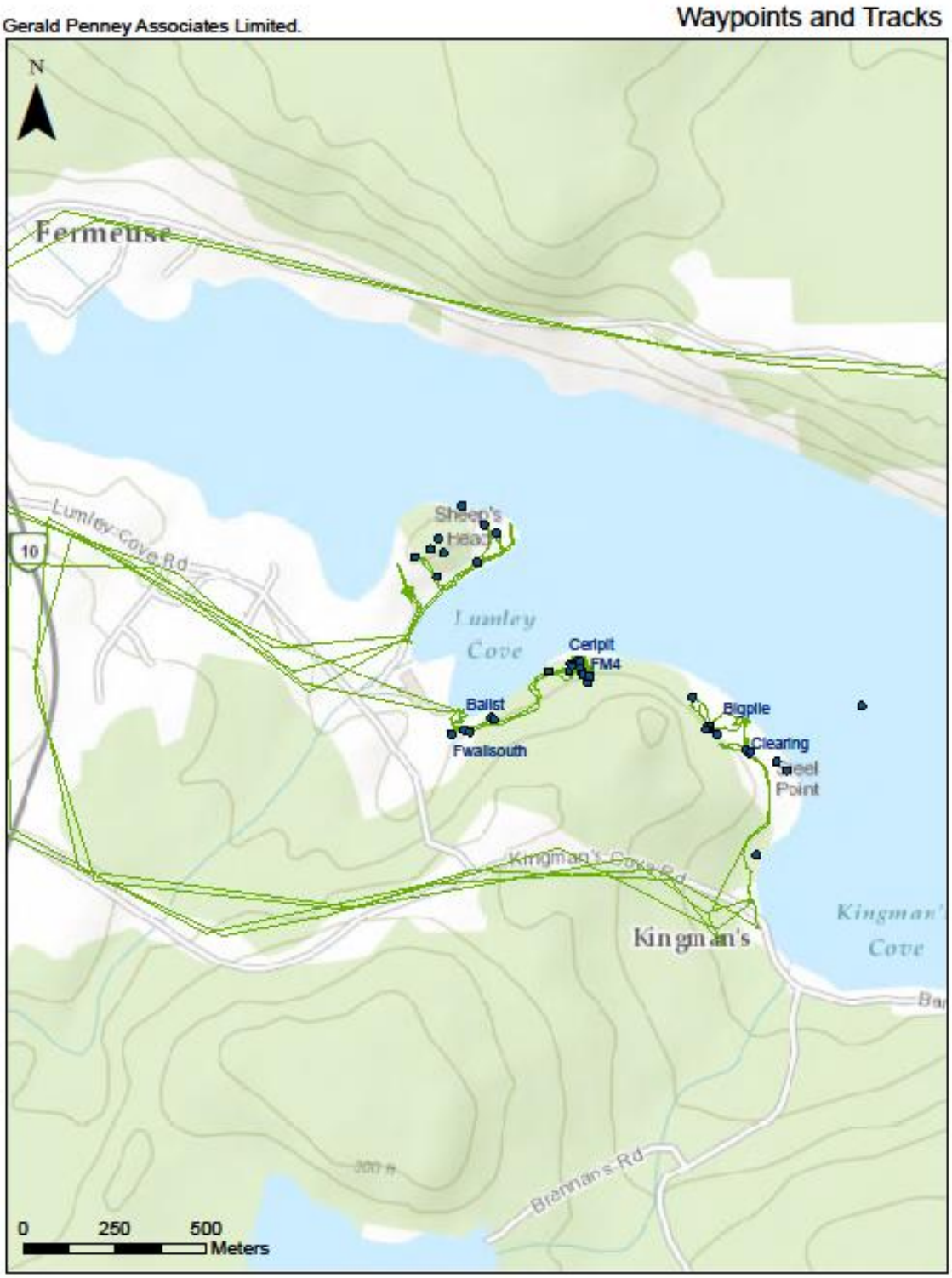
Waypoints

Name	Date	Coordinate	Elevation
644	08-JUN-15	352700 5203604	-7 m
Flint	08-JUN-15	352497 5203331	-8 m
FMENDEAST	08-JUN-15	352557 5203487	-8 m
645	08-JUN-15	352539 5203504	-7 m
Flint2	08-JUN-15	352539 5203504	-7 m
WallA	08-JUN-15	352429 5203559	9 m
WallB	08-JUN-15	352413 5203567	9 m
WallC	08-JUN-15	352409 5203567	10 m
FerMOUND	08-JUN-15	352416 5203572	8 m
Corner	08-JUN-15	352412 5203574	10 m
FMBLD	08-JUN-15	352491 5203524	8 m
FENDWEST	08-JUN-15	351963 5203995	-3 m
FerCABIN	08-JUN-15	351872 5203901	9 m
Fclear	08-JUN-15	351902 5203915	12 m
Fclear2	08-JUN-15	351918 5203935	17 m
Fstone	08-JUN-15	351926 5203908	6 m
Fwallsouth	08-JUN-15	351956 5203577	-3 m
Fwallnorth	08-JUN-15	352013 5203596	-4 m
FMHOLE	08-JUN-15	352177 5203700	-1 m
Atree	08-JUN-15	351933 5203571	6 m
Ballst	08-JUN-15	352008 5203599	5 m
Bence	08-JUN-15	352385 5203629	17 m
Bigpile	08-JUN-15	352415 5203571	19 m
Bpit	08-JUN-15	352178 5203683	8 m
Briron	08-JUN-15	352171 5203700	8 m
Brrric	08-JUN-15	352489 5203522	16 m
Cbb	08-JUN-15	352416 5203572	5 m

Celrpit	08-JUN-15	352159 5203695	3 m
Clllearing	08-JUN-15	352483 5203528	15 m
Fick	08-JUN-15	352004 5203959	12 m
Hopl?	08-JUN-15	352177 5203688	5 m
Htoo	08-JUN-15	351967 5203574	5 m
Kpit	08-JUN-15	352181 5203676	9 m
Moslate	08-JUN-15	352156 5203682	8 m
Npin	08-JUN-15	352117 5203682	8 m
Plite	08-JUN-15	351914 5203864	9 m
Pool	08-JUN-15	352190 5203660	15 m
Rockbolt	08-JUN-15	352162 5203692	4 m
Rocpile	08-JUN-15	352027 5203942	12 m
Shed?$	08-JUN-15	352181 5203676	11 m
Well?$	08-JUN-15	352194 5203672	14 m
X53	08-JUN-15	351989 5203889	7 m

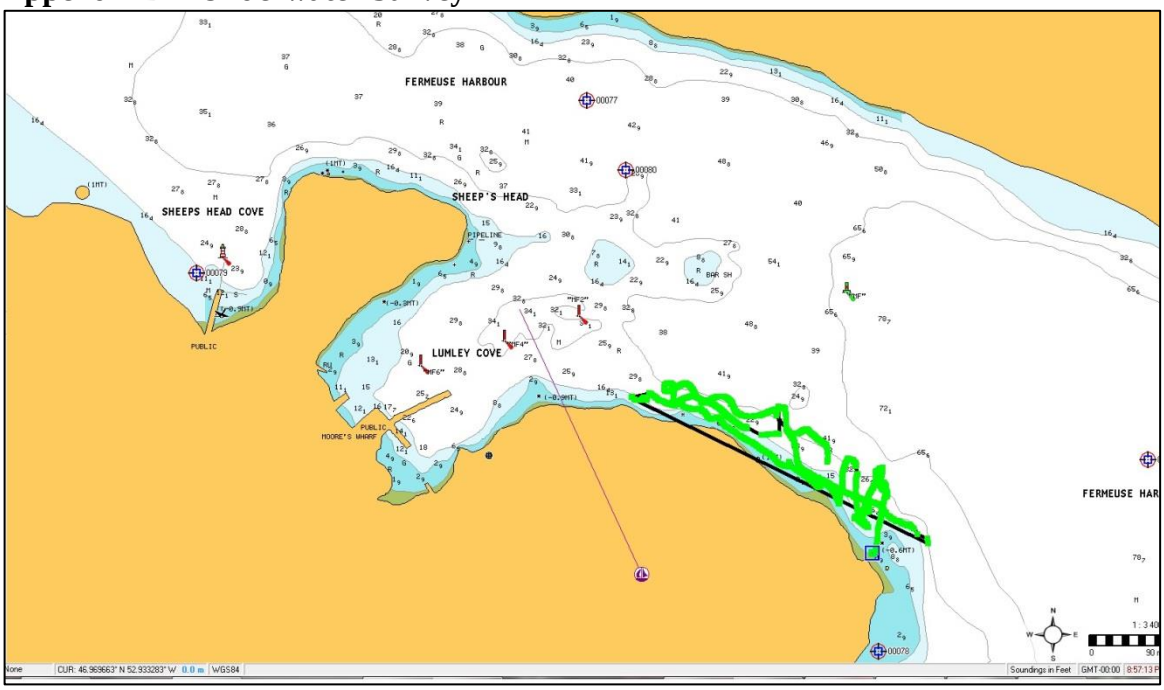

Construction Phases
Gerald Penney Associates Limited.
N
Fermeuse
Lumley Cove Rd
Sheep's Head
2
3
4
Lumley Cove
4
1
3
Steel Point
Kingman's Cove Rd
Kingman's
Kingman's Cove
Barre
Brennan's Rd
0
250
500
Meters


Project Areas
Gerald Penney Associates Limited.
N
Fermeuse
Lumley Cove Rd
Sheep's Head
Lumley Cove
PA1
PA2
PA3
PA4
Steel Point
Kingman's Cove Rd
Kingman's
Kingman's Cove
Barett
Brennan's Rd
300 ft
0 250 500
Meters

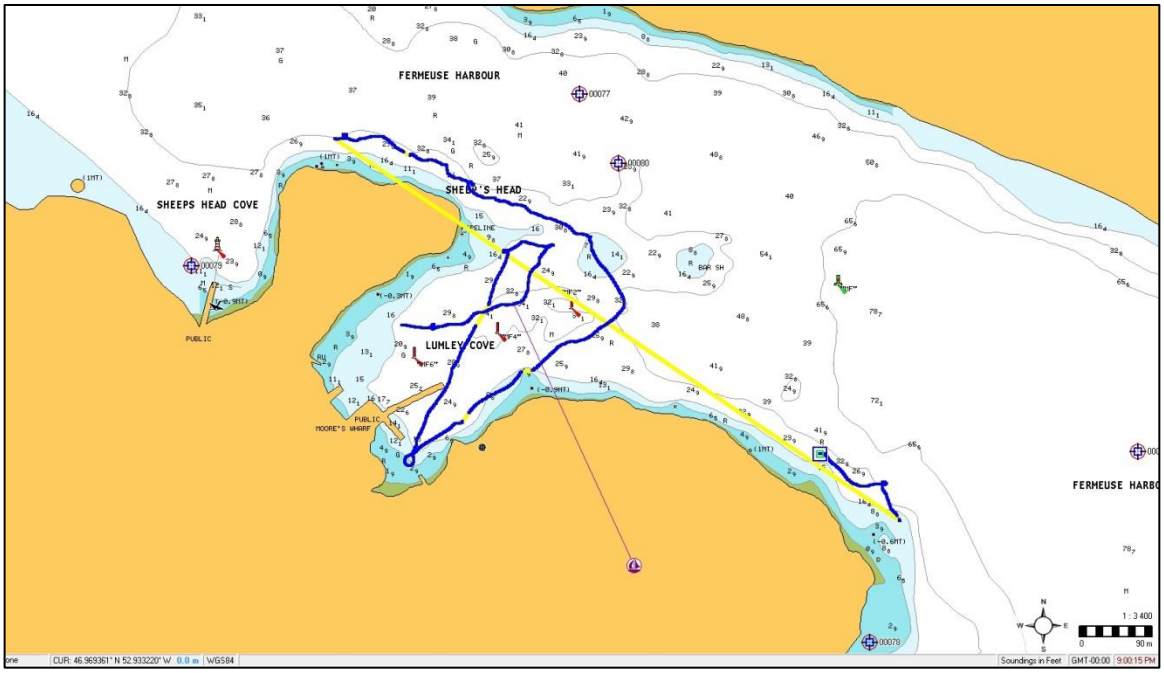

Gerald Penney Associates Limited.
Waypoints and Tracks
N
Fermeuse
Lumley Cove Rd
10
Sheep's Head
Lumley Cove
Ceripit
FM4
Ballst
Fwallsouth
Bigpile
Clearing
Point
Kingman's Cove Rd
Kingman's
Kingman's Cove
Brennans Rd
0
250
500
Meters

Test Pits 8 June 2015.

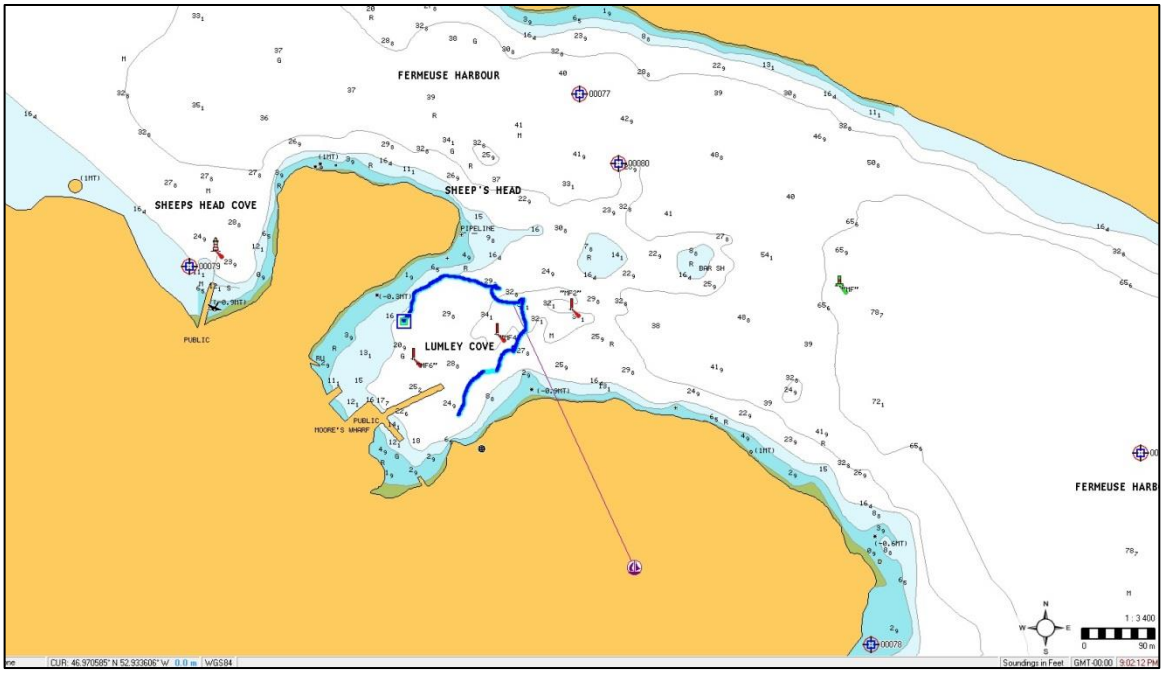
Appendix D – Underwater Survey



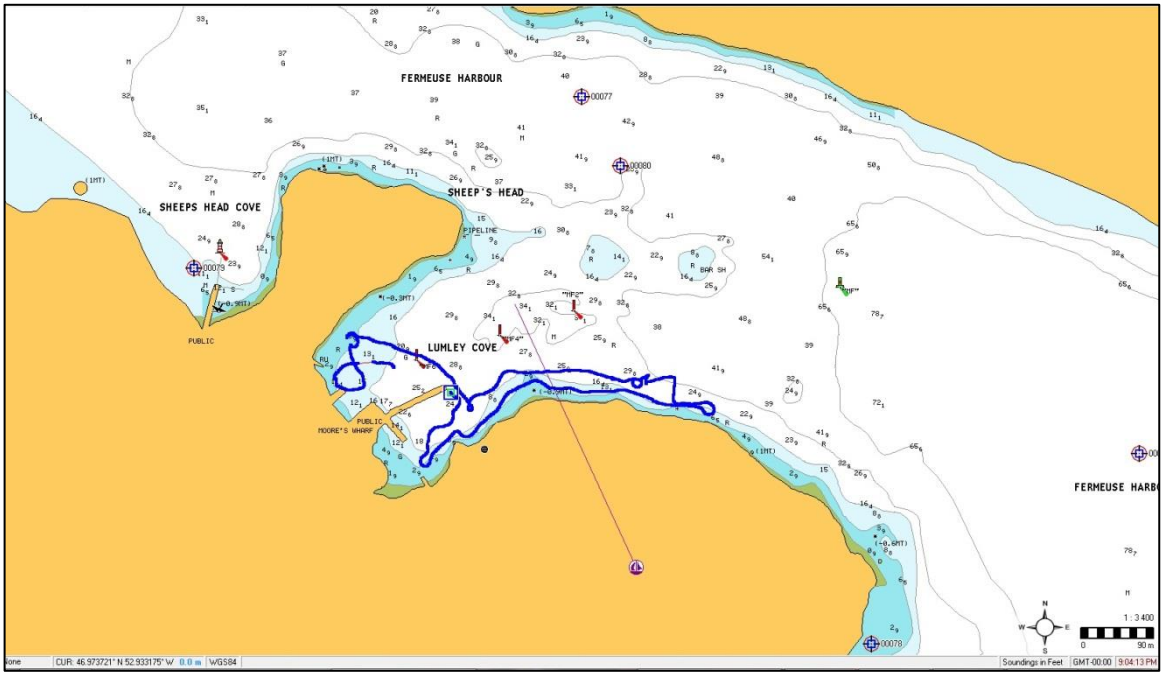
T1 track.



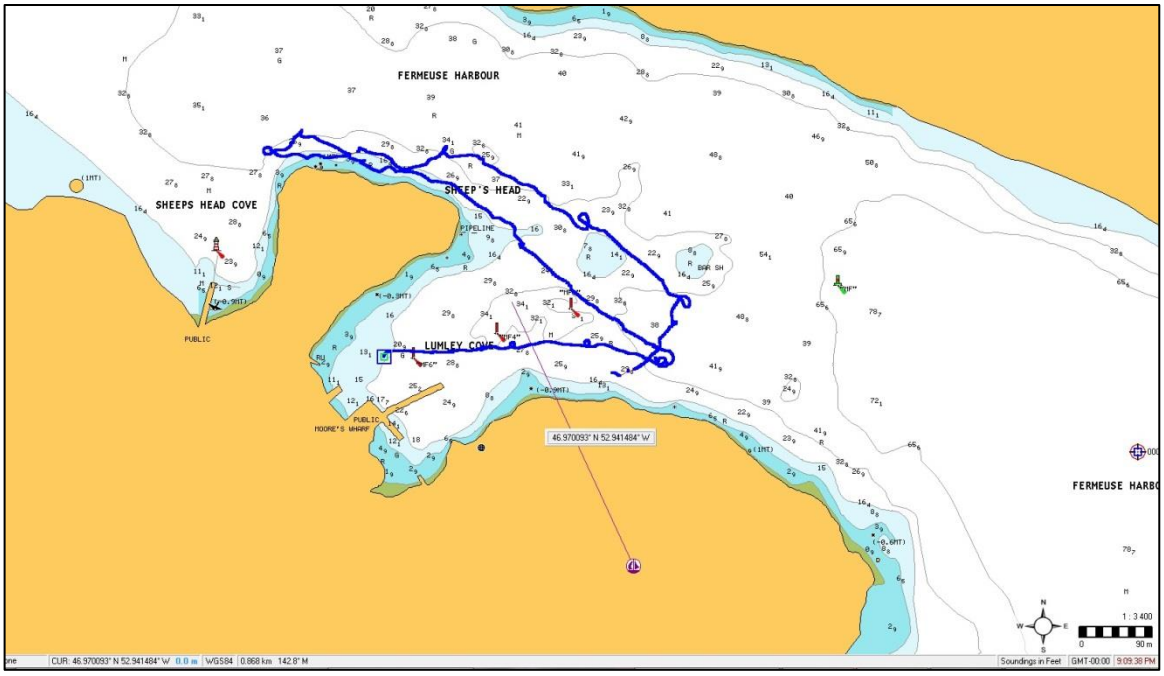
T2 track.



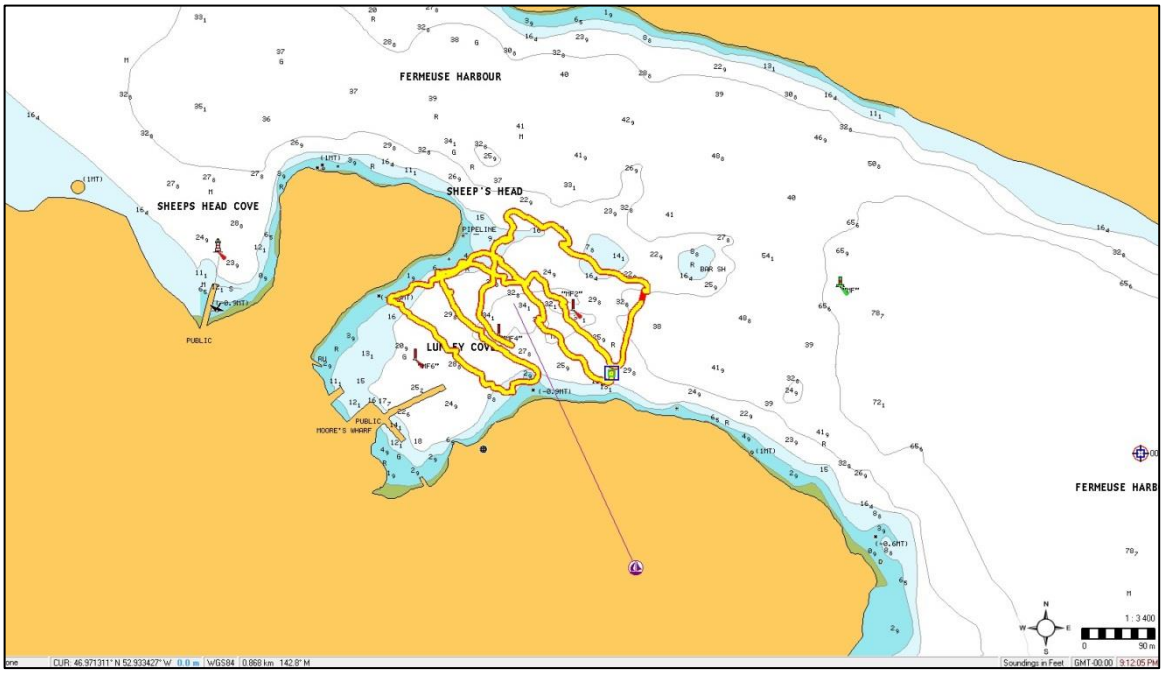
T3A track.



T3B track.

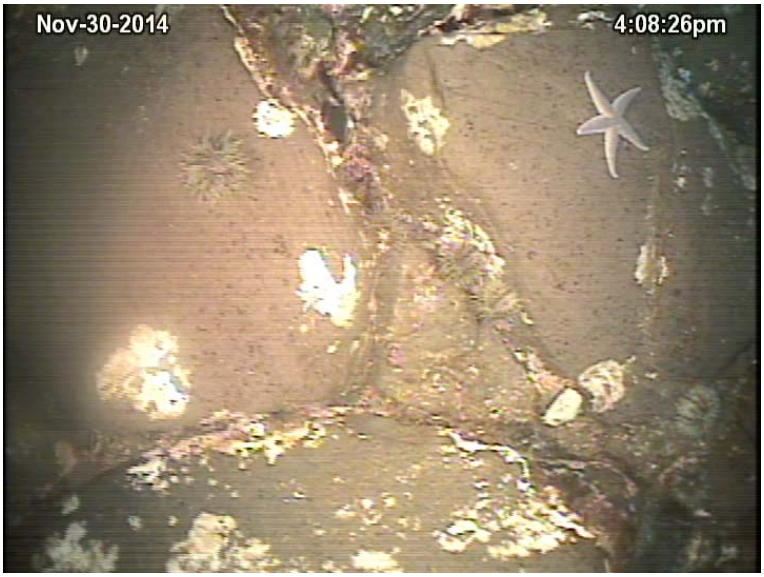


T4 track.



T5 track.

MARINE HABITAT CHARACTERIZATION SURVEY FOR FERMEUSE ENTERPRISES LIMITED'S OFFSHORE MARINE BASE HARBOUR DEVELOPMENT PROJECT IN FERMEUSE, NL



Prepared by

LGL LIMITED
environmental research associates

Prepared for

SNC·LAVALIN

LGL Report FA0032
13 January 2015

MARINE HABITAT CHARACTERIZATION SURVEY FOR FERMEUSE ENTERPRISES LIMITED'S OFFSHORE MARINE BASE HARBOUR DEVELOPMENT PROJECT IN FERMEUSE, NL

Prepared by

Sarah N. Penney-Belbin and John Christian

LGL Ltd., environmental research associates
388 Kenmount Rd., P.O. Box 13248, Stn. A
St. John's, NL A1B 4A5
(709) 754-1992; jchristian@lgl.com

Prepared for

SNC-Lavalin Inc.
1133 Topsail Road
Mount Pearl, NL A1N 5G2

LGL Report FA0032
13 January 2015

Suggested format for citation:

Penney-Belbin, S.N. and J. Christian. 2015. Marine habitat characterization survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL. LGL Limited Report FA0032. Report by LGL Limited, St. John's, NL, for SNC-Lavalin Inc., Mount Pearl, NL. 28 p. + appendices.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

1.0 INTRODUCTION

Fermeuse Enterprises Limited (the proponent) is proposing to develop an offshore marine base in Fermeuse Harbour, Fermeuse, NL (Fermeuse Enterprises Limited 2014). As summarized on the Government of Newfoundland and Labrador Department of Environment and Conservation (DEC) website (DEC 2015):

> "The purpose of the undertaking is to service the offshore oil and gas industry in Newfoundland and Labrador. The completed facility will consist of 12 berths, a semi-submersible rig servicing quay, multiple laydown areas, crane and heavy lift capabilities and various site buildings for maintenance, administration and other related purposes. The total land area of the completed facility will be approximately 15.3 hectares. Construction is expected to commence in late summer/early fall 2015. The facility is expected to be in operation in late 2016 or early 2017."

As per Subsection 4.1.4.4 of the Project Registration document (Fermeuse Enterprises Limited 2014), a marine habitat characterization survey (the survey) was conducted within the project site area (study area). The objectives of the survey were as follows:

1) Collect bathymetric data;
2) Identify marine flora and fauna;
3) Characterize the surficial substrate; and
4) Collect digital, GPS-referenced shoreline photographs.

Section 2.0 of this report describes the methods used to complete the survey. Section 3.0 presents the survey results, and Section 4.0 provides a summary of the survey. Sections 5.0 and 6.0 contain acknowledgements and literature cited, respectively.

This report is intended to provide a general characterization of the marine fish habitat occurring within the study area, and it will be submitted to Fisheries and Oceans Canada (DFO) with the proponent's Request for Review. This report does not include detailed habitat quantification.

2.0 METHODS

2.1 Overview

The survey was completed by Narwhal Environmental Consulting Services Inc. (Narwhal Environmental) and LGL Limited between 29 November and 1 December 2014. The survey vessel used was a 5.8 m Zodiac™ Mark V HD, equipped with twin 30 HP 4-stroke outboard motors, owned and operated by Narwhal Environmental. All critical survey positioning was determined with a Hemisphere™ VS 111 DGPS. Additional surveying using a Lowrance HDS 10 Gen2 side scan sonar equipped with a StructureScan™ transducer was conducted simultaneously with the bathymetric and drop camera surveys. Note that the side scan survey results were used for real-time groundtruthing and confirmation of depth readings for the bathymetric survey (see Section 2.2) rather than for in-depth analysis.

2.2 Bathymetric Survey

The bathymetric survey was conducted prior to the drop camera survey (29–30 November 2014), using a Syqwest™ Hydrobox data logging, single beam depth sounder in connection with the GPS unit described in Section 2.1. This equipment provided time-stamped, geo-referenced depth soundings with a resolution of 0.01 m and an accuracy of ±0.1% of depth. Combined with the shallow draft of the survey vessel, bathymetric data were collected to the 1 m contour (on high tide). The final bathymetric depth data were processed and corrected for tidal elevation, and referenced to chart datum using CHS tide tables for Fermeuse. Tidal corrections were applied based on changes within a 15-minute time interval.

2.3 Drop Camera Survey – Biota and Substrate

The marine fish habitat survey was conducted between 30 November and 1 December 2014 using a weighted, light-equipped drop camera (Deep Sea Power and Light) in connection with the GPS unit described in Section 2.1. The camera and lights were connected to an on-board power source via a single umbilical cord, and were deployed directly below the survey vessel. The video feed was displayed on a viewing screen aboard the survey vessel, and was recorded using a MiniDv-format tape deck. The GPS data were encoded on the tapes during video collection using a Red Hen ™ Media mapper system. The encoded GPS data corresponded to the video time stamps and were extracted from the tapes as database files during post-processing by Narwhal Environmental. In addition, a GPS track log of the video survey positioning was recorded as a back-up measure. Prior to video analysis, the video files were edited by Narwhal Environmental to remove inutile footage (e.g., recording while the drop camera was retrieved to remove brown algae [kelp] caught on the camera unit).

The drop camera video footage was analyzed by LGL Limited. Marine flora and fauna were identified and surficial substrate was typified and classified in accordance with the following DFO guidelines (Kelly et al. 2009):

Substrate Class:

i. Bedrock = Continuous, solid bedrock
ii. Coarse = Boulder (>250 mm); Rubble (130-250 mm)
iii. Medium = Cobble (30-130 mm); Gravel (2-30 mm)

iv. Fine = Sand (fine deposits, 0.06-2 mm); Mud (silt and clay, <0.06 mm)
v. Organics/Detritus = Soft material, 85% or more organic material
vi. Shell = Calcareous remains of shellfish or invertebrates containing shells

Still images of representative biota and substrate types were captured from the survey videos, using the VLC Media Player (Version 2.1.5) program.

2.4 Shoreline Photography

High-resolution (12 MP; FX format), GPS-referenced photographs were acquired from the survey vessel along the shoreline within the study area using a digital SLR camera in combination with a WAAS-enabled GPS (Garmin Geko 301). GPS data reflecting the camera's position were embedded in the EXIF file data for each photograph. Several overview shots of the study area were also taken from a proximate elevated viewpoint in Fermeuse.

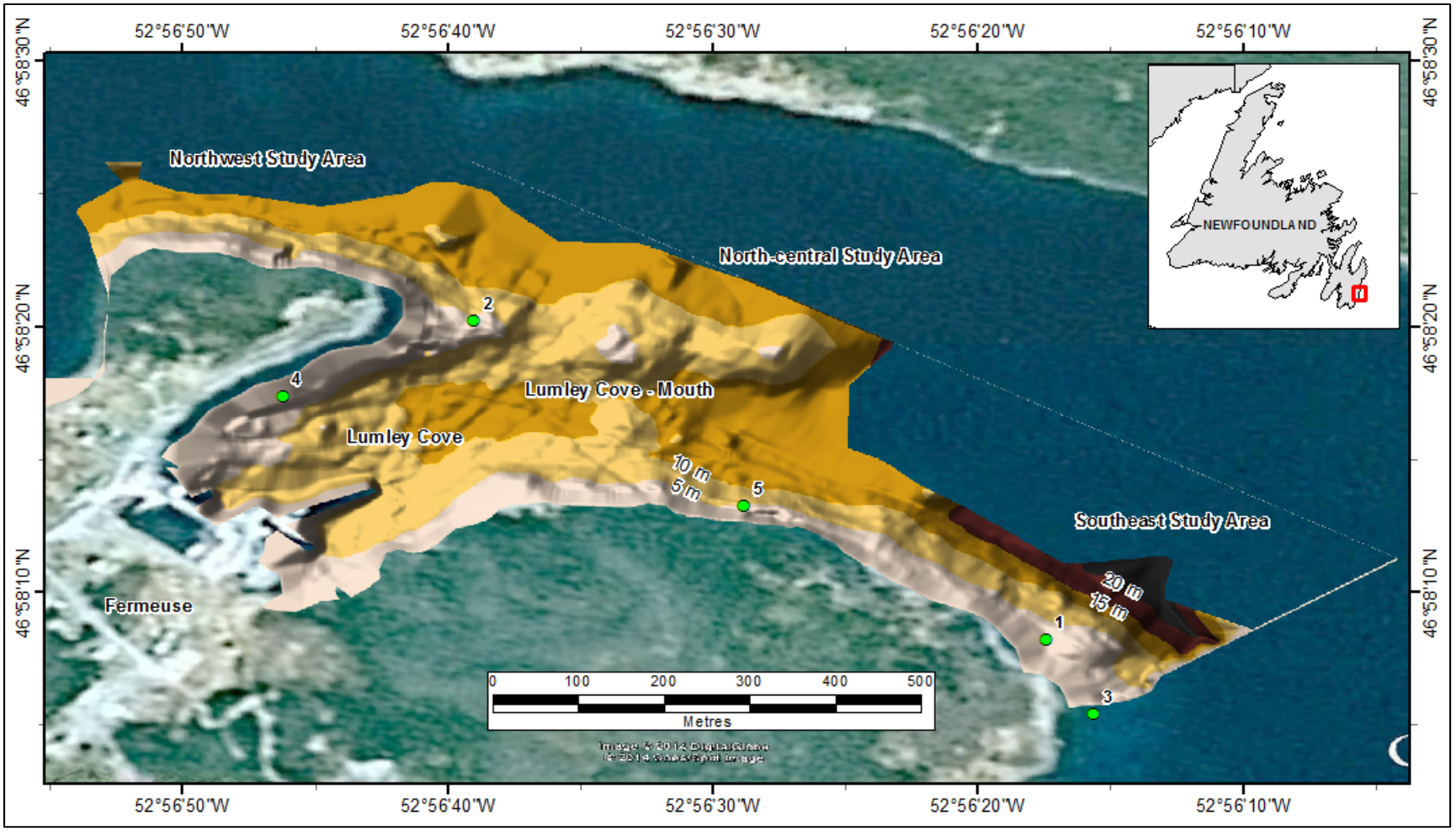
3.0 SURVEY RESULTS

3.1 Bathymetric Survey

Depths in the study area ranged from <1 m (near the shorelines and at the shallowest portions of coarse, rocky shoals; see Section 3.2) to 20 m (southeast portion of the study area) (Figure 3.1). The majority of the study area has depths ranging between 5 and 15 m. Two shoals extended into the north-central portion of the study area, in a west-east orientation. Of particular note, the following large items were observed on the seabed by eye and/or via the side scan sonar (Figure 3.1):

1) Large boulder (46º 58.137' N; 52º 56.294' W);
2) Large object, possibly an anchor (46º 58.337' N; 52º 56.651' W);
3) Large boulder (46º 58.09' N; 52º 56.26' W);
4) Large boulder (46º 58.290' N; 52º 56.773' W); and
5) Large boulder (46º 58.221' N; 52º 56.489' W).

The continuous side scan sonar imagery was combined into a single image by Narwhal Environmental. It is presented in Appendix A; note that it is necessary to zoom-in on the image to view substrate details (e.g., boulders).



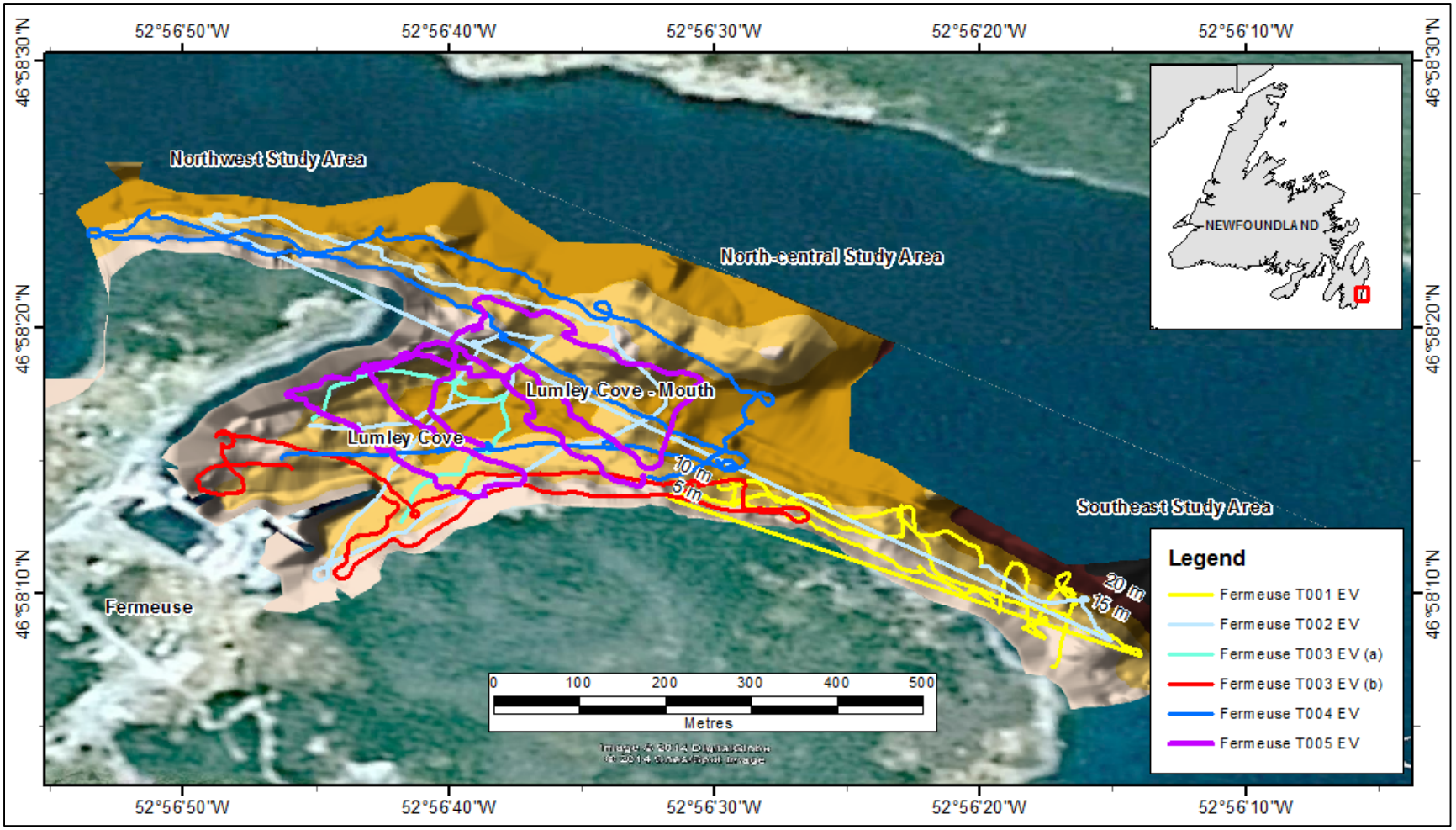
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).
Note: Green points are large items observed on the seabed: 1, 3–5 = Large boulder; 2 = Large object, possibly an anchor (see Section 3.1).

Figure 3.1 Bathymetric contours and large items observed on the seabed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL.

3.2 Drop Camera Survey - Biota and Substrate

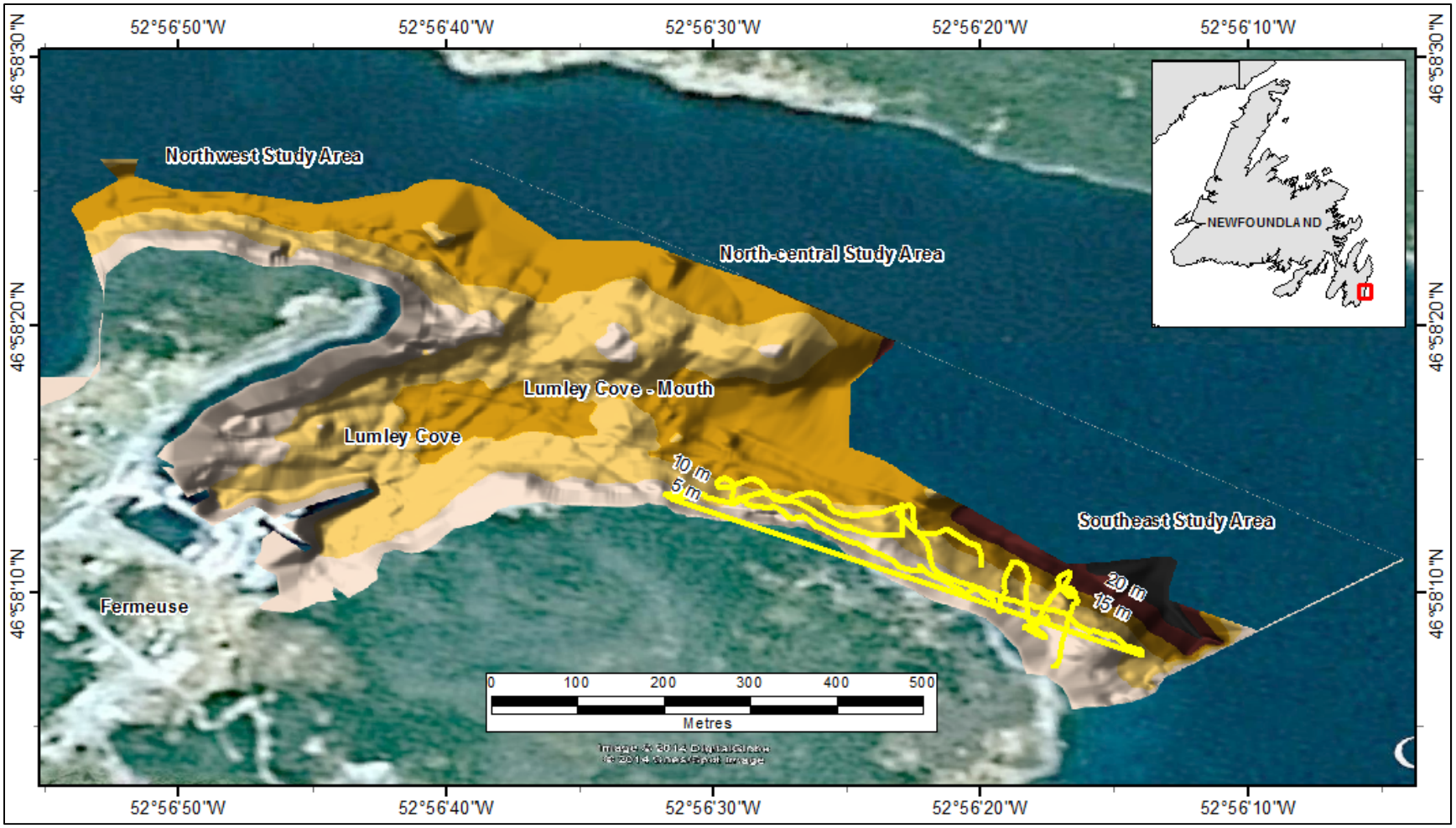
Five drop camera video files were acquired during the survey and subsequently analyzed. A total of approximately five hours of video footage, equivalent to about 10.6 km of survey track line was collected within the study area. For analysis purposes, one video file ('Fermeuse T003 EV') was divided into two parts ('a' and 'b') to account for an overnight break in surveying along this particular track line. All of the video track files are presented in Figure 3.2, while individual tracks are presented in Figures 3.3-3.8. The empirical data for observed biota and surficial sediment type are included in Appendix B, and the survey videos (and accompanying files) are in Appendix C (see accompanying DVD and USB flash drive, respectively).

Observed biota and surficial substrate types are summarized in Table 3.1. Representative biota and substrate images captured from the drop camera video footage are presented in Figures 3.9-3.15. The observed biota, typical for coastal Newfoundland, included various types of algae, hydroids, blue mussels, barnacles, sea anemones, sea stars, sea urchins, sea cucumbers, rock crabs, gastropods, and finfishes. The surficial substrate along the shorelines in the study area was generally coarse, typically consisting of boulder and rubble. The surficial substrate in the central portion of Lumley Cove was medium to medium/fine, predominantly composed of gravel, sand and shell. The remaining portions of the study area were characterized by surficial substrate classes coarse, coarse/medium and medium (i.e., boulder, rubble, cobble, gravel and shell). As indicated in Section 3.1, there were two coarse-substrate shoals extending in a west-east orientation in the north-central portion of the study area. These shoals consisted of very large boulders, with interspersed smaller substrate types. As also indicated in Section 3.1, several large boulders, some of which were very close to the sea surface, were also observed. The surficial substrate classes observed during the survey corresponded with substrate "relative hardness" data collected by the depth sounder during the bathymetric survey (a secondary function of the depth sounder unit). An indication of the substrate "relative hardness" within the study area is presented in Figure 3.16.



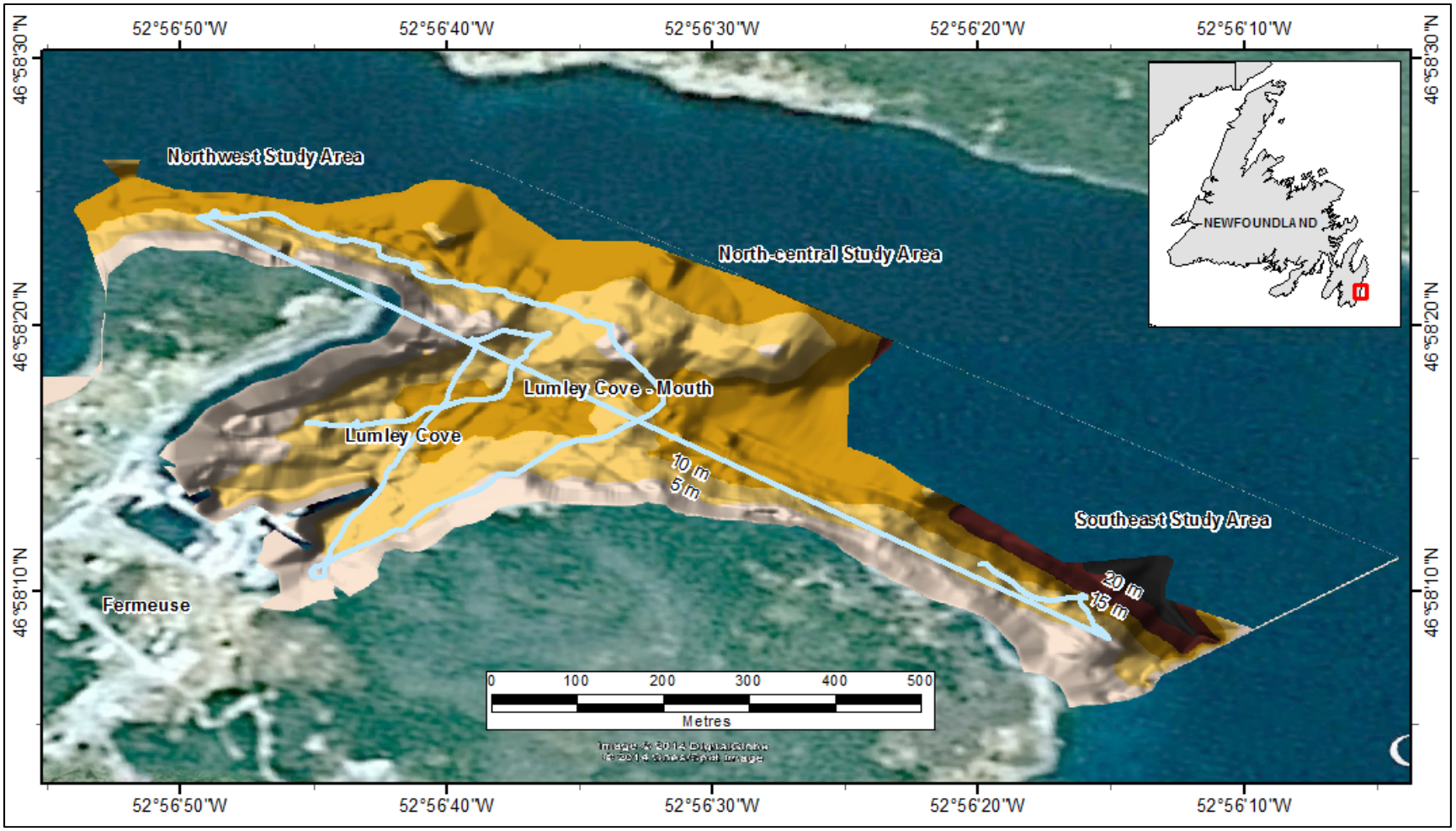
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.2 Locations of all drop camera video tracks surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL.



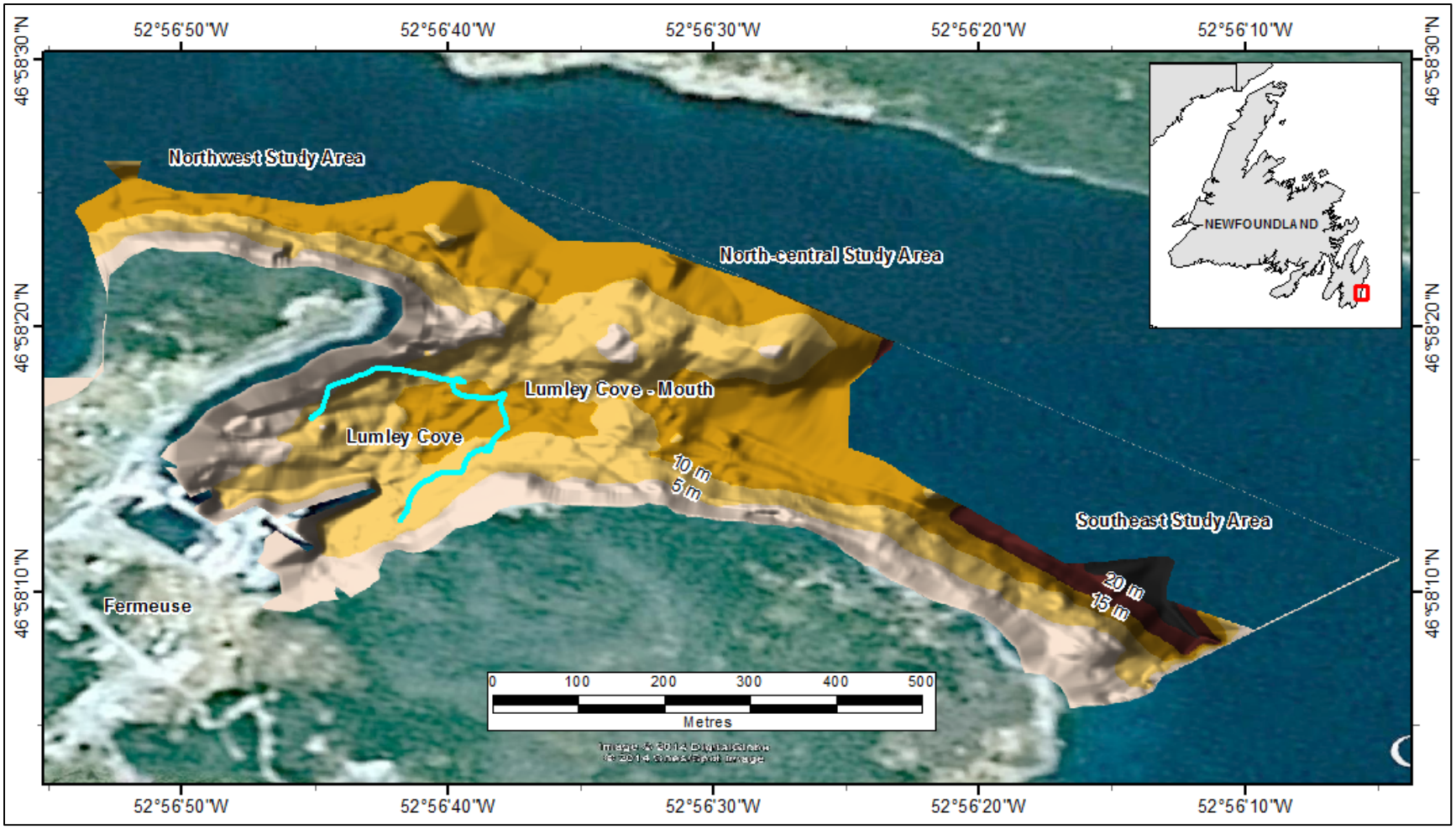
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.3 Location of Fermeuse T001 EV drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 2.12 km).



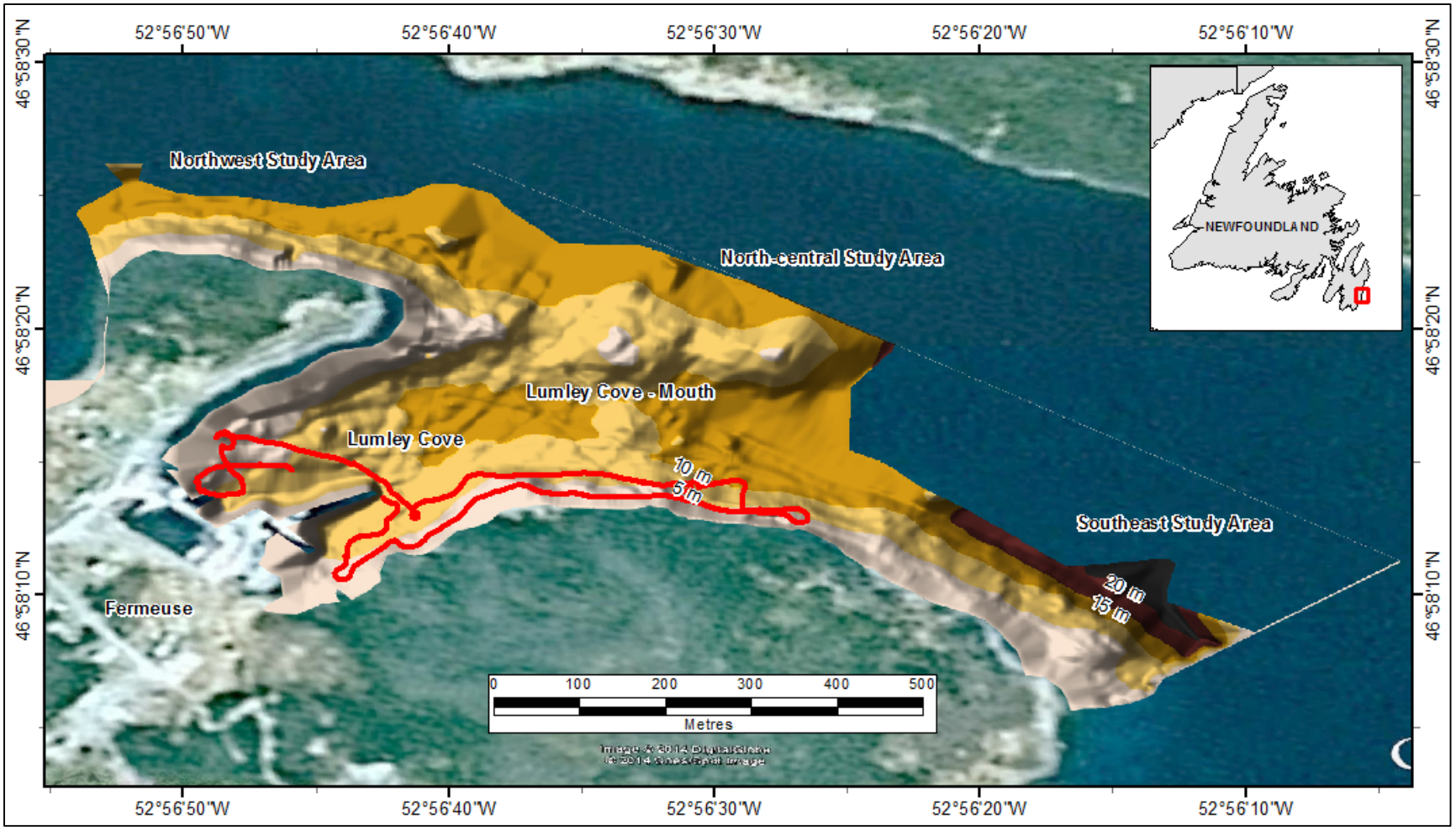
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.4 Location of Fermeuse T002 EV drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 2.57 km).



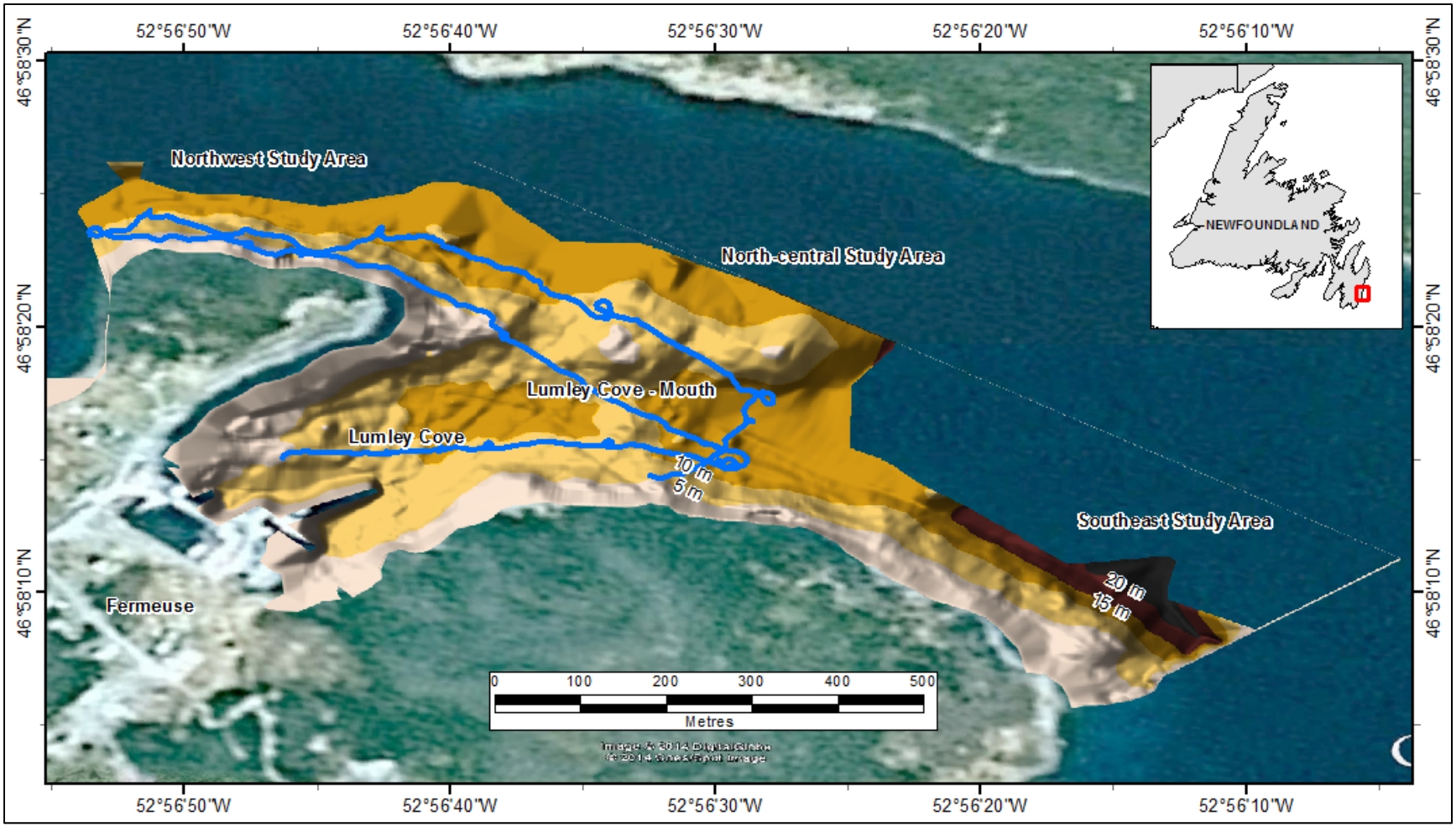
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.5 Location of Fermeuse T003 EV (a) drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 0.43 km).



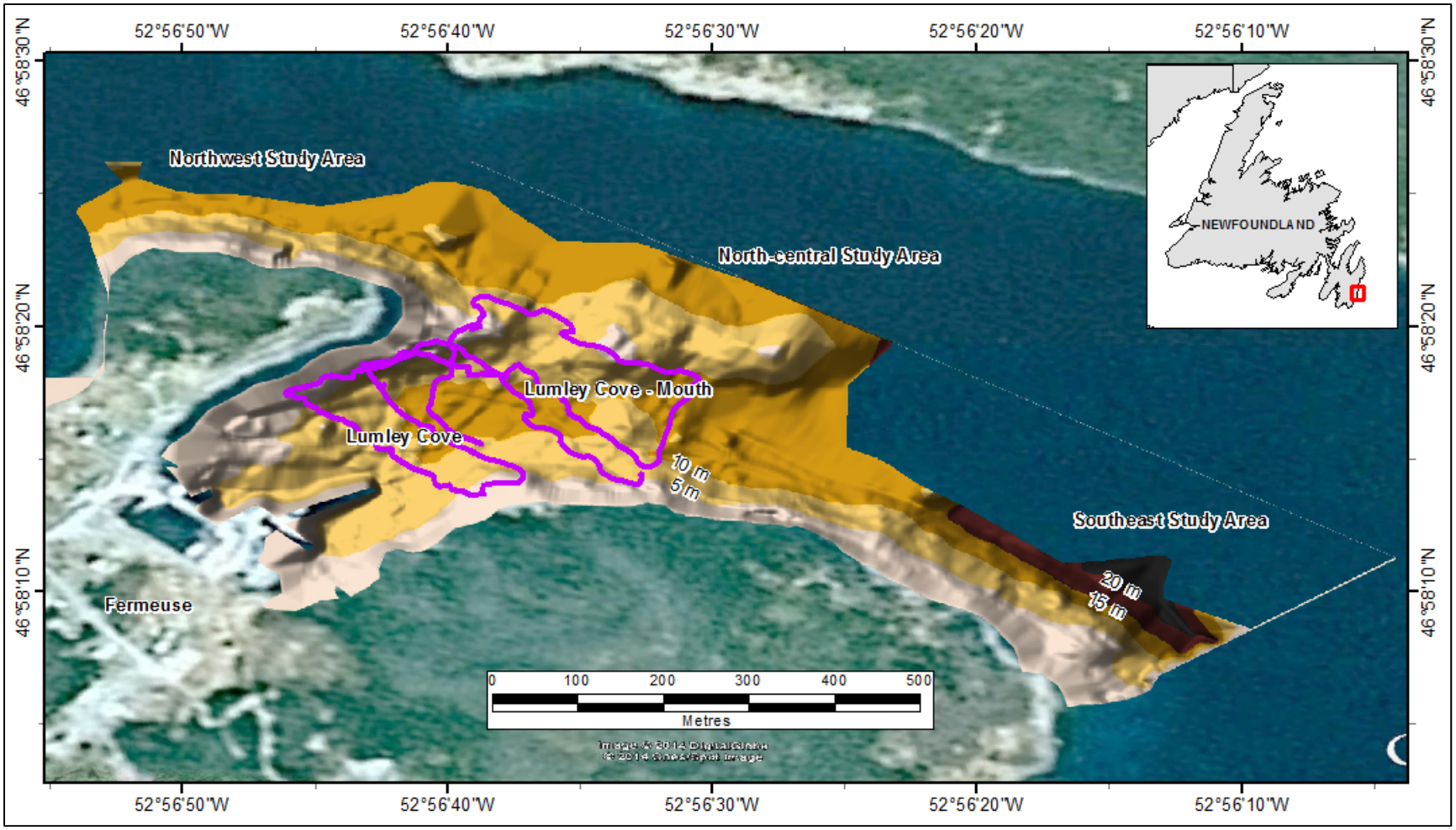
Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.6 Location of Fermeuse T003 EV (b) drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 1.48 km).



Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.7 Location of Fermeuse T004 EV drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 2.14 km).



Sources: Bathymetric contours (Narwhal Environmental); Background (Google Earth 2013).

Figure 3.8 Location of Fermeuse T005 EV drop camera video track surveyed within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (track length = 1.87 km).

Table 3.1 Summary of marine biota and surficial substrate classes and types observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.

Location	Video File ID	Depth Range (m)	Biota	Substrate Class and Type
Southeast Study Area	Fermeuse T001 EV Fermeuse T002 EV*	<1 – <20	Flora Coralline algae Coralline algae (rhodolith) (*Lithothamnion glaciale*) Brown algae (*Laminaria* sp.) Brown filamentous algae (Phaeophyceae) Sea colander (*Agarum cribrosum*) Fauna Hydroid (*Eudendrium* sp.) Blue mussel (*Mytilus edulis*) White barnacles Frilled anemone (*Metridium senile*) Unidentified sea anemone Blood star (*Henricia* sp.) Northern sea star (*Asterias vulgaris*) Orange-footed sea cucumber (*Cucumaria frondosa*) Unidentified gastropod (possibly periwinkle)	Coarse (primarily nearshore) *Predominant:* Boulder Rubble *Other:* Gravel Shell Coarse/Medium (primarily <10 m depth) *Predominant:* Boulder Cobble *Other:* Gravel Shell Medium (primarily >10 m depth) *Predominant:* Cobble Gravel *Other:* Boulder Rubble Shell
Northwest Study Area	Fermeuse T002 EV* Fermeuse T004 EV*	<1 – <15	Flora Coralline algae Coralline algae (rhodolith) (*Lithothamnion glaciale*) Brown algae (*Laminaria* sp.) Brown filamentous algae (Phaeophyceae) Sea colander (*Agarum cribrosum*) Fauna Hydroid (*Eudendrium* sp.) White barnacles Frilled anemone (*Metridium senile*)	Coarse (primarily nearshore) *Predominant:* Boulder *Other:* Rubble Cobble Gravel Shell Coarse/Medium (primarily <10 m depth) *Predominant:*

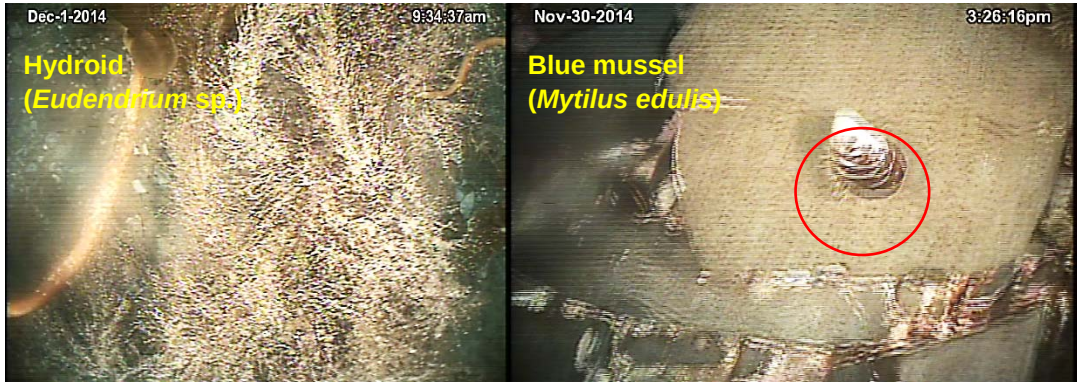
Location	Video File ID	Depth Range (m)	Biota	Substrate Class and Type
			Unidentified sea anemone Blood star (*Henricia* sp.) Northern sea star (*Asterias vulgaris*) Green sea urchin (*Strongylocentrotus droebachiensis*) Orange-footed sea cucumber (*Cucumaria frondosa*) Rock crab (*Cancer irroratus*) Unidentified finfish (possibly cunner)	Boulder Gravel *Other:* Rubble Cobble Shell Medium (primarily >10 m depth) *Predominant:* Gravel Cobble *Other:* Boulder Rubble Shell
North-central Study Area	Fermeuse T004 EV*	<5 – <15	Flora Coralline algae Coralline algae (rhodolith) (*Lithothamnion glaciale*) Brown algae (*Laminaria* sp.) Brown filamentous algae (Phaeophyceae) Sea colander (*Agarum cribrosum*) Fauna Hydroid (*Eudendrium* sp.) White barnacles Frilled anemone (*Metridium senile*) Blood star (*Henricia* sp.) Northern sea star (*Asterias vulgaris*) Green sea urchin (*Strongylocentrotus droebachiensis*) Orange-footed sea cucumber (*Cucumaria frondosa*)	Coarse (two shoals) *Predominant:* Boulder *Other:* Rubble Cobble Gravel Shell Medium (beyond shoals) *Predominant:* Cobble Gravel *Other:* Shell
Lumley Cove – Mouth	Fermeuse T002 EV* Fermeuse T004 EV* Fermeuse T005 EV*	<5 – <15	Flora Coralline algae Coralline algae (rhodolith) (*Lithothamnion glaciale*) Brown algae (*Laminaria* sp.) Brown filamentous algae (Phaeophyceae) Sea colander (*Agarum cribrosum*)	Coarse (primarily nearshore and shoal edges) *Predominant:* Boulder Rubble *Other:* Cobble

Location	Video File ID	Depth Range (m)	Biota	Substrate Class and Type
			Fauna Hydroid (*Eudendrium* sp.) White barnacles Frilled anemone (*Metridium senile*) Unidentified sea anemone Blood star (*Henricia* sp.) Northern sea star (*Asterias vulgaris*) Sun star (*Crossaster papposus*) Green sea urchin (*Strongylocentrotus droebachiensis*) Orange-footed sea cucumber (*Cucumaria frondosa*) Unidentified finfish (possibly cunner)	Gravel Shell <u>Medium</u> (beyond shoals) *Predominant:* Cobble Gravel *Other:* Boulder Rubble Sand Shell <u>Medium/Fine</u> (primarily near southeastern portion of study area) *Predominant:* Gravel Sand *Other:* Shell
Lumley Cove	Fermeuse T002 EV* Fermeuse T003 EV (a) Fermeuse T003 EV (b)* Fermeuse T004 EV* Fermeuse T005 EV*	<1 – <15	Flora Coralline algae Coralline algae (rhodolith) (*Lithothamnion glaciale*) Brown algae (*Laminaria* sp.) Brown filamentous algae (Phaeophyceae) Red fern (*Ptilota* sp.) Sea colander (*Agarum cribrosum*) Bladder wrack (*Fucus vesiculosus*) Fauna Hydroid (*Eudendrium* sp.) White barnacles Frilled anemone (*Metridium senile*) Blood star (*Henricia* sp.) Northern sea star (*Asterias vulgaris*) Polar sea star (*Leptasterias polaris*) Green sea urchin (*Strongylocentrotus droebachiensis*)	<u>Coarse</u> (primarily nearshore) *Predominant:* Boulder Rubble *Other:* Cobble Gravel Sand Shell <u>Coarse/Medium</u> (primarily <5 m depth) *Predominant:* Boulder Cobble Gravel *Other:* Shell

Location	Video File ID	Depth Range (m)	Biota	Substrate Class and Type
			Orange-footed sea cucumber (*Cucumaria frondosa*) Rock crab (*Cancer irroratus*) Cunner (*Tautogolabrus adspersus*) Unidentified finfish (possibly cunner)	Medium (primarily >5 m depth) *Predominant:* Cobble Gravel *Other:* Boulder Rubble Sand Shell Medium/Fine (primarily central portion of Lumley Cove) *Predominant:* Gravel Sand *Other:* Cobble Shell

* Denotes a portion of the video file was collected within the location of interest.

Figure 3.9 **Examples of flora observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.**



Note: it was not possible to obtain a clear, representative image of white barnacles from the available video footage.

Figure 3.10 Examples of sessile fauna observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.

Figure 3.11 Sea anemone species observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.

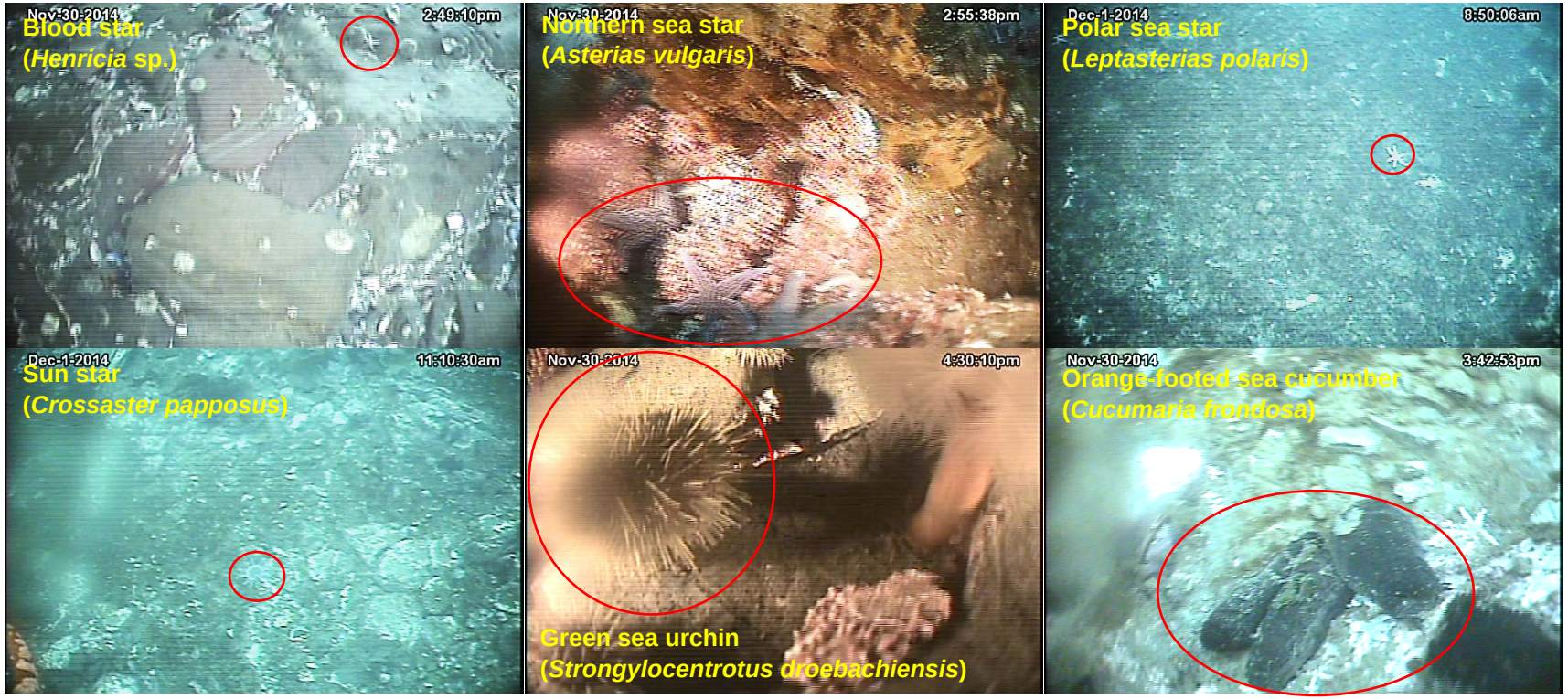


Figure 3.12 **Sea star, sea urchin and sea cucumber species observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.**

Figure 3.13 **Crab and gastropod species observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.**

Figure 3.14 **Finfishes observed during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.**

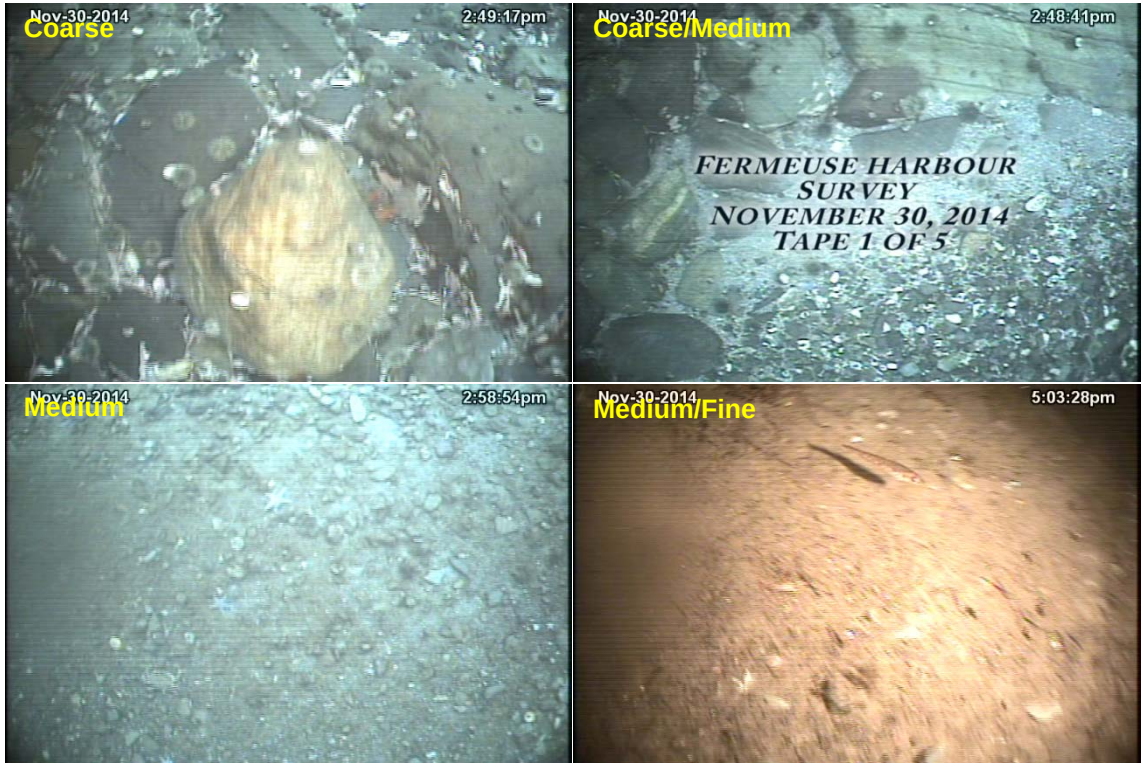
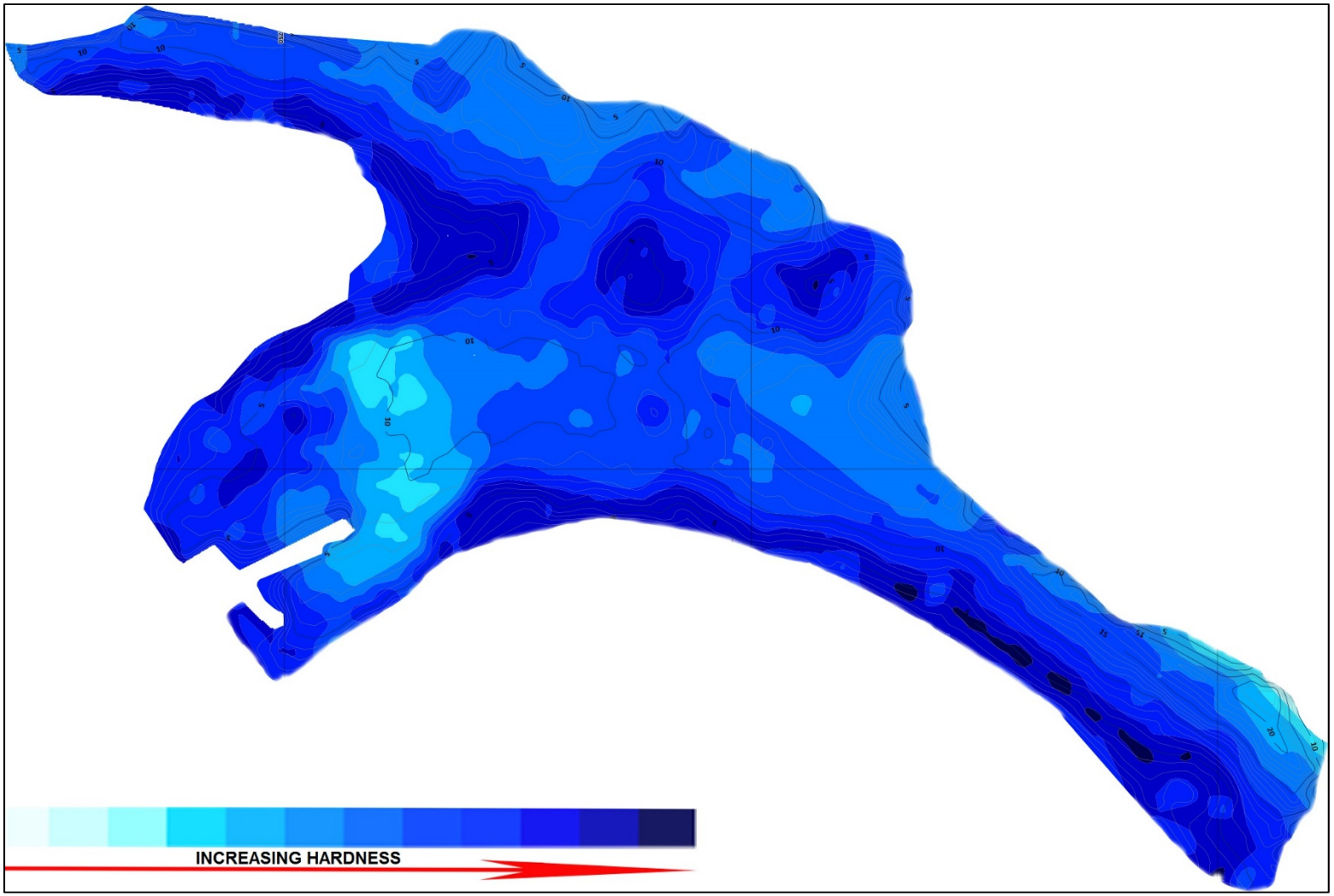


Figure 3.15 Typical surficial substrates observed in the study area during the drop camera video survey for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL, 30 November - 1 December 2014.

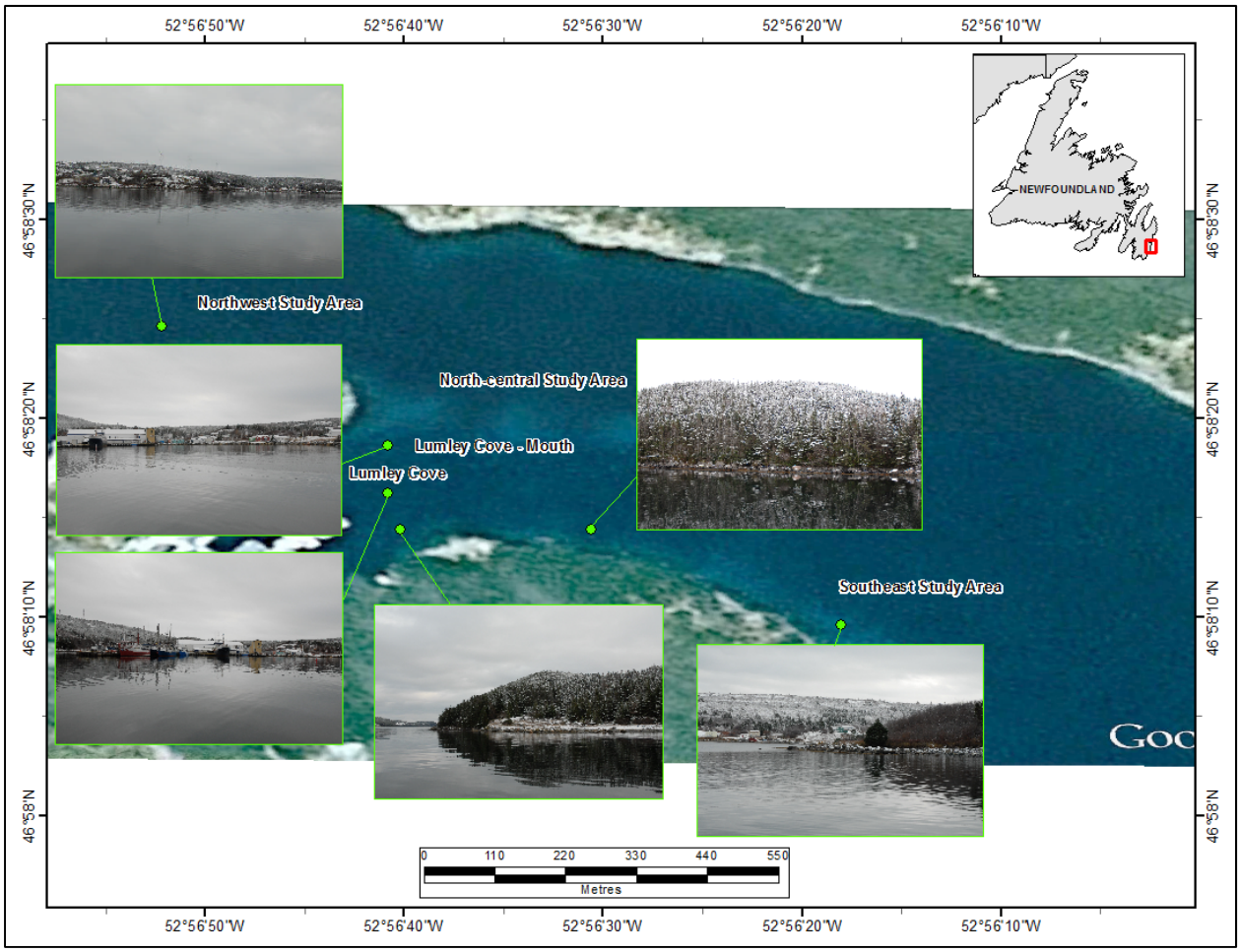


Source: Narwhal Environmental.

Figure 3.16 Substrate "relative hardness" contours within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL (lighter blue-coloured regions indicate finer substrate, while darker blue-coloured regions indicate coarser substrate).

3.3 Shoreline Photography

A total of 85 high-resolution still images of the shorelines in the study area were taken from the survey vessel, and an additional 19 images were taken from land-based positions overlooking the study area. There were no recorded GPS positions for 14 of these images due to an unknown equipment-based error. The majority (11) of these 14 images were in the northwest portion of the study area. Figure 3.17 includes several shoreline images taken from the survey vessel, and Figure 3.18 includes several images taken from land-based positions overlooking the study area. All photographs and their associated detailed date, time, and GPS position data are included in Appendix D (see accompanying DVD).



Note: Images were acquired while on-board the survey vessel.

Figure 3.17 Geo-referenced shoreline photographs related to the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL.

Note: Images were acquired from land-based positions nearby the study area.

Figure 3.18 Geo-referenced photographs overlooking the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL.

4.0 SUMMARY

The various marine biota and surficial substrate types observed within the study area during the survey are very typical of the Newfoundland coastal region. No marine species at risk were observed within the study area.

5.0 ACKNOWLEDGEMENTS

LGL Limited and Narwhal Environmental Consulting Services Inc. would like to thank the Town of Fermeuse, NL for allowing the use of their Small Craft Harbour to launch, moor and retrieve the survey vessel.

6.0 LITERATURE CITED

DEC (Department of Environment and Conservation). 2015. Fermeuse Offshore Marine Base summary of environmental assessment process. Department of Environment and Conservation, Government of Newfoundland and Labrador.

Available at http://www.env.gov.nl.ca/env/env_assessment/projects/Y2014/1773/index.html.

Fermeuse Enterprises Limited. 2014. Project registration for Fermeuse Harbour Development Project at Fermeuse, NL. Rep. by Fermeuse Enterprises Limited, Fermeuse, NL, for Environmental Assessment Division, Department of Environment and Conservation, St. John's, NL. 49 p. + appendix.

Google Earth. 2013. Google Earth Version 7.1.2.2041. Google Inc.

Kelly, J., R. Power, L. Noble, J. Meade, K. Reid, S. Kuehnemund, C. Varley, C. Grant, M. Roberge, E. Lee, and M. Teasdale. 2009. A system for characterizing and quantifying coastal marine habitat in Newfoundland and Labrador. 70 p. + appendices.

APPENDIX A:

Side Scan Sonar Imagery Collected during the Marine Habitat Characterization Survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL, November-December 2014

Source: Narwhal Environmental.
Note: it is necessary to zoom-in on the image to view substrate details (e.g., boulders).

Figure A.1 Side scan sonar imagery within the study area for the proposed Fermeuse Offshore Marine Base, Fermeuse, NL.

APPENDIX B:

Empirical Data Collected during the Marine Habitat Characterization Survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL, November-December 2014

See accompanying DVD.

APPENDIX C:

Survey Videos and Accompanying Files Collected during the Marine Habitat Characterization Survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL, November-December 2014

See accompanying USB flash drive.

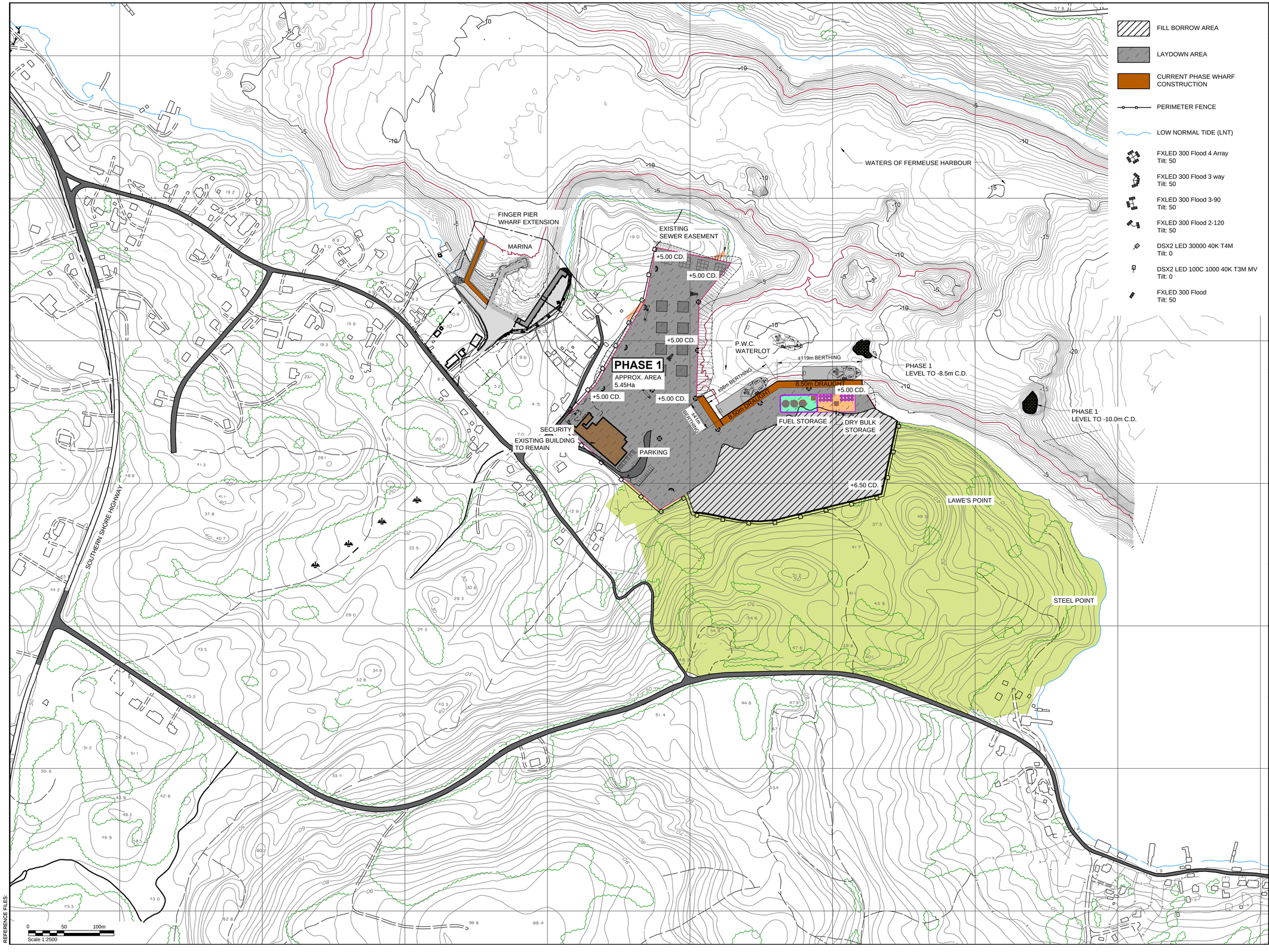
APPENDIX D:

Shoreline Photographs and Image Data Collected during the Marine Habitat Characterization Survey for Fermeuse Enterprises Limited's Offshore Marine Base Harbour Development Project in Fermeuse, NL, November-December 2014

See accompanying DVD.

APPENDIX C

Detailed Site Plans



REFERENCE FILES:

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND CONDITIONS ON SITE BEFORE PROCEEDING WITH ANY PORTION OF THIS WORK. REPRODUCTIONS OF THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. REFER TO GRAPHIC SCALE. DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

INFORMATION ONLY
NOT FOR CONSTRUCTION

REV.	REVISIONS	CHECKED BY	APP. BY	DATE
B01	ISSUED FOR REVIEW			15/07/31

NORTH

PROFESSIONAL STAMP

PERMIT HOLDER STAMP

SNC·LAVALIN
1133 TOPSAIL RD., MOUNT PEARL, NL, A1N 5G2
TEL: (709) 368-0118 FAX: (709) 368-3541

CLIENT
FERMEUSE ENTERPRISES LIMITED

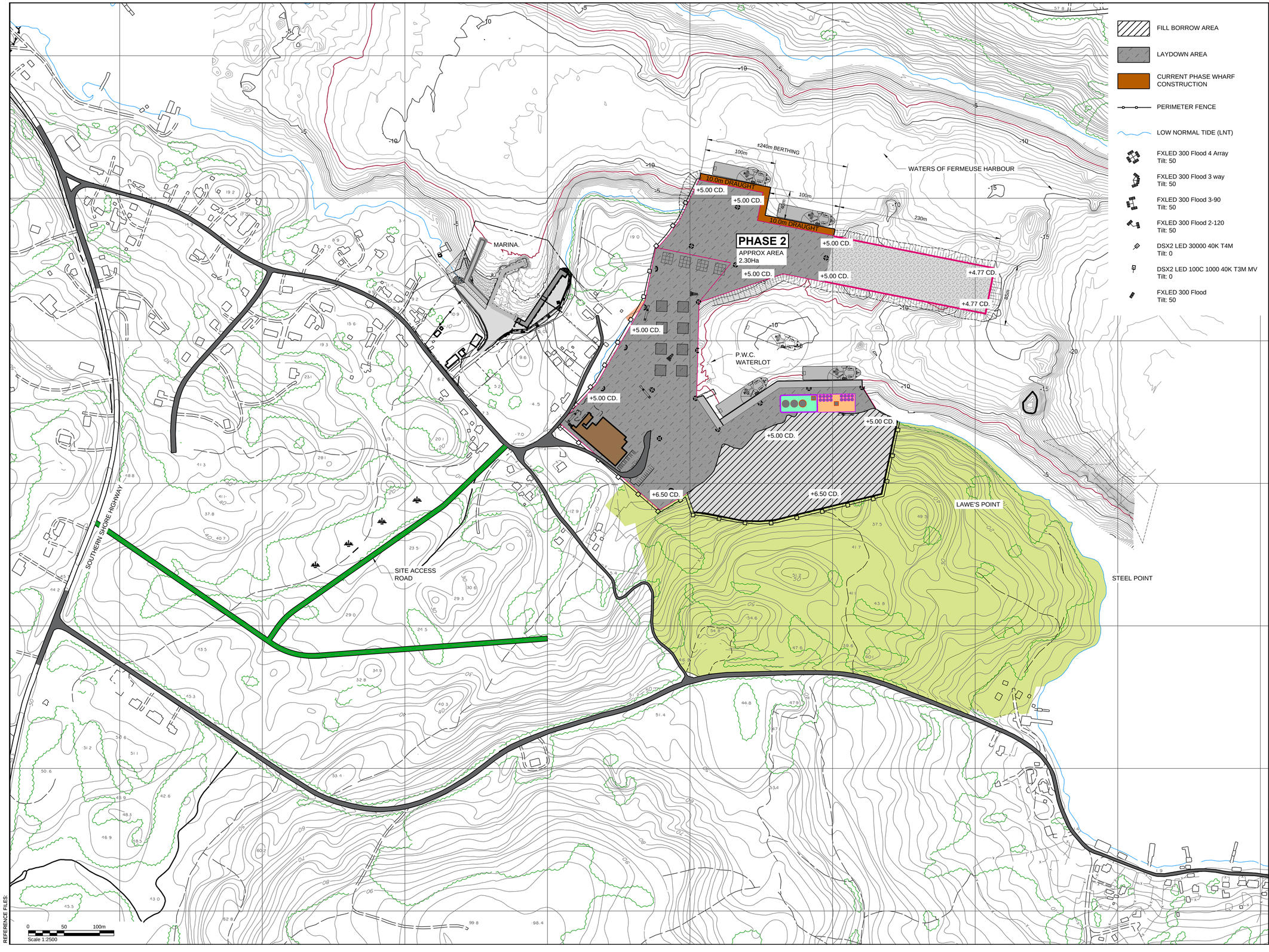
PROJECT
FERMEUSE HARBOUR DEVELOPMENT

TITLE
SITE DEVELOPMENT PLAN PHASE 1

DESIGNED BY P.F.	CHECKED BY	DATE	15/07/31
DRAWN BY J.V.	APPROVED BY	DATE	15/07/31
SCALE AS SHOWN	SNC LAVALIN PROJ. No.	629647	
	CLIENT PROJ. No.		

DRAWING No. DW1–XX–MA–XX–001 REV. B01

629647-0001-D-4P-DWG-000-0001-01_B01



REFERENCE FILES:

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND CONDITIONS ON SITE BEFORE PROCEEDING WITH ANY PORTION OF THIS WORK. REPRODUCTIONS OF THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. REFER TO GRAPHIC SCALE. DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

INFORMATION ONLY
NOT FOR CONSTRUCTION

REV.	REVISIONS	CHECKED BY	APP. BY	DATE
B01	ISSUED FOR REVIEW			15/07/31

NORTH

PROFESSIONAL STAMP

PERMIT HOLDER STAMP

SNC·LAVALIN
1133 TOPSAIL RD., MOUNT PEARL, NL, A1N 5G2
TEL: (709) 368-0118 FAX: (709) 368-3541

CLIENT
FERMEUSE ENTERPRISES LIMITED

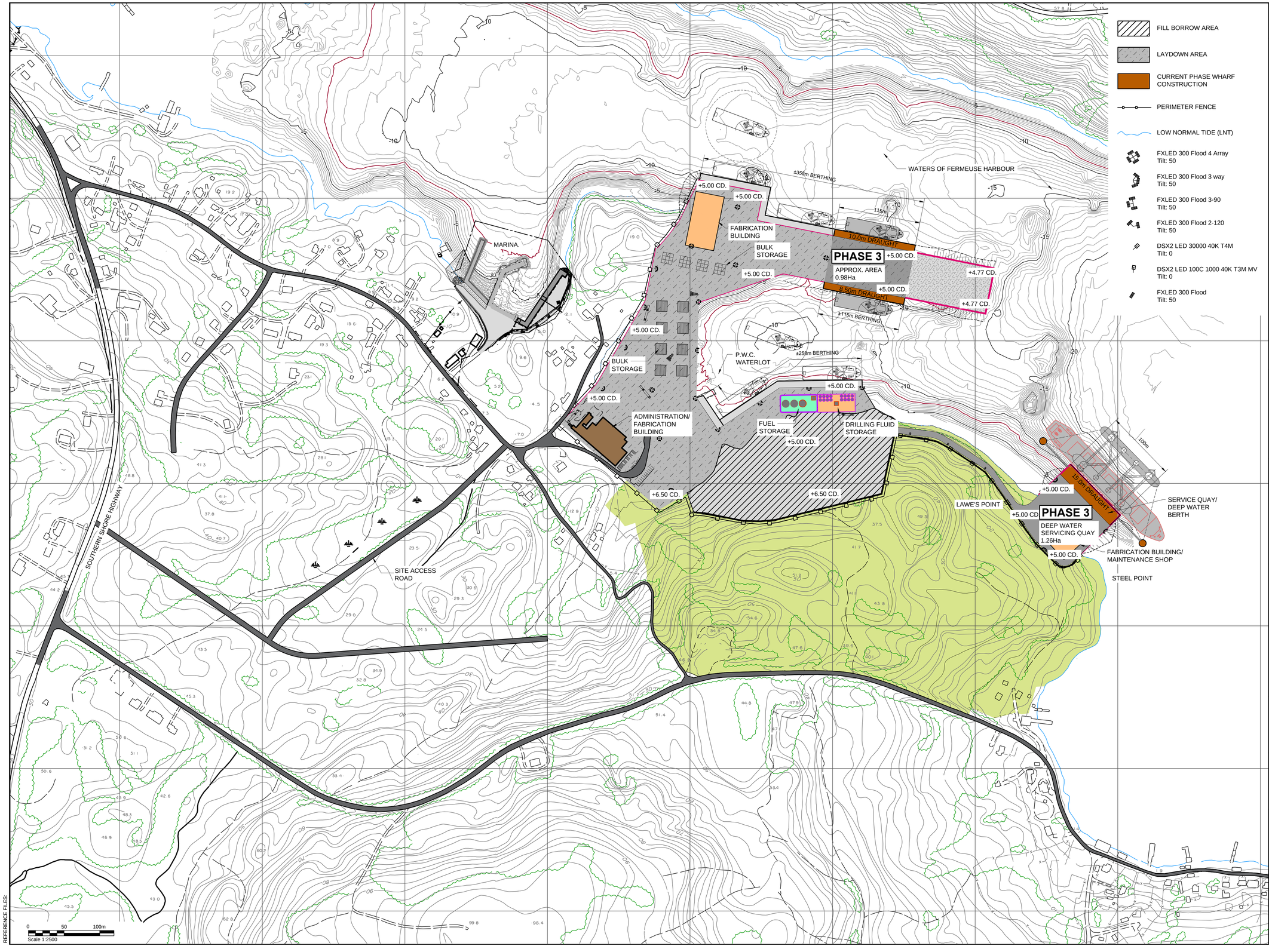
PROJECT
FERMEUSE HARBOUR DEVELOPMENT

TITLE
SITE DEVELOPMENT PLAN PHASE 2

DESIGNED BY	P.F.	CHECKED BY	DATE 15/07/31
DRAWN BY	J.V.	APPROVED BY	DATE 15/07/31
SCALE	AS SHOWN	SNC·LAVALIN PROJ. No.	629647
		CLIENT PROJ. No.	

DRAWING No. DW1–XX–MA–XX–002 REV. B01

629647-0001-D-4P-DWG-000-0002-01_B01



REFERENCE FILES:

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND CONDITIONS ON SITE BEFORE PROCEEDING WITH ANY PORTION OF THIS WORK. REPRODUCTIONS OF THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. REFER TO GRAPHIC SCALE. DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

INFORMATION ONLY
NOT FOR CONSTRUCTION

REV.	REVISIONS	CHECKED BY	APP. BY	DATE
B01	ISSUED FOR REVIEW			15/07/31

NORTH

PROFESSIONAL STAMP

PERMIT HOLDER STAMP

SNC·LAVALIN
1133 TOPSAIL RD., MOUNT PEARL, NL, A1N 5G2
TEL: (709) 368-0118 FAX: (709) 368-3541

CLIENT
FERMEUSE ENTERPRISES LIMITED

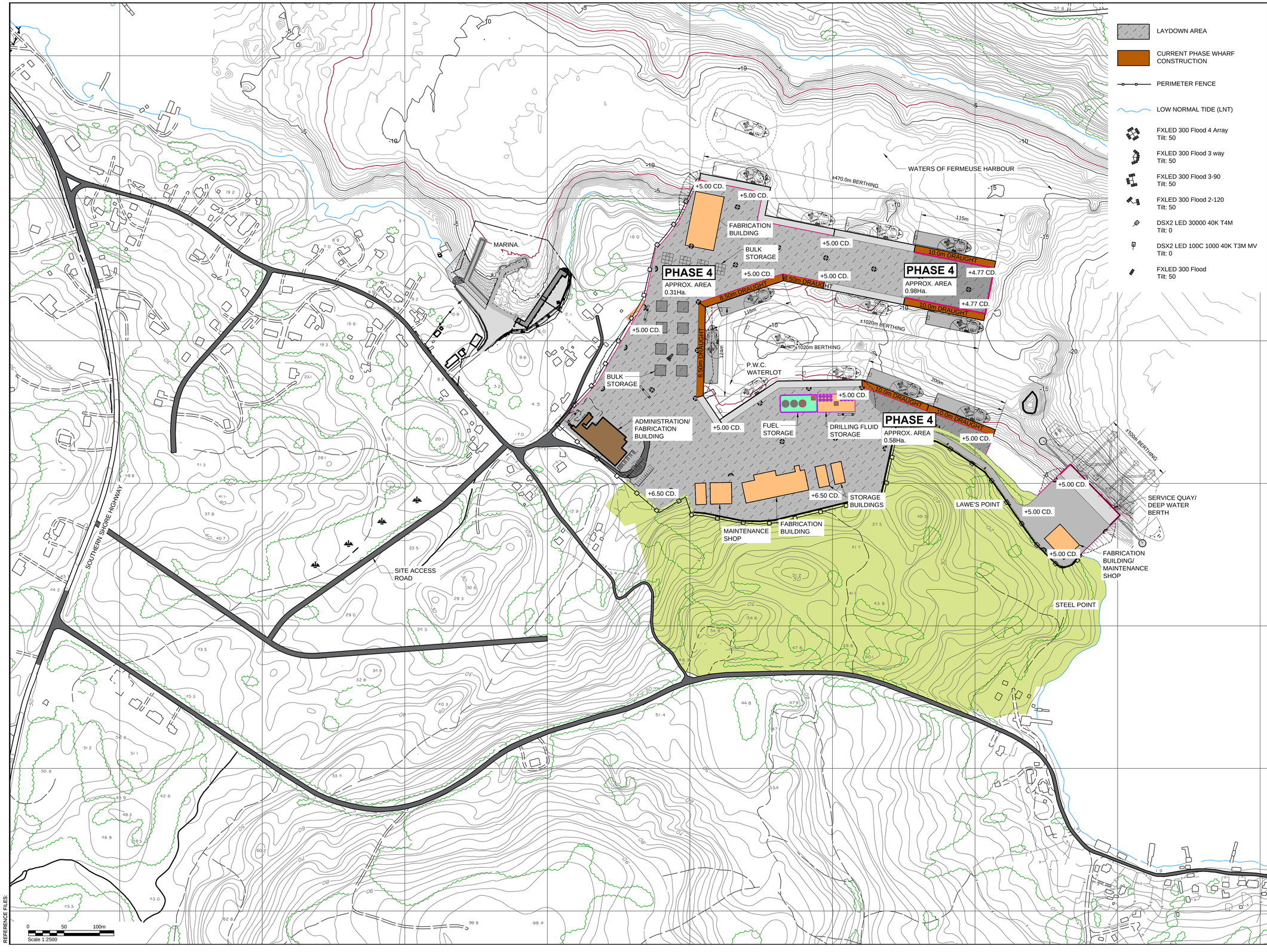
PROJECT
FERMEUSE HARBOUR DEVELOPMENT

TITLE
SITE DEVELOPMENT PLAN PHASE 3

DESIGNED BY P.F.	CHECKED BY	DATE	15/07/31
DRAWN BY J.V.	APPROVED BY	DATE	15/07/31
SCALE AS SHOWN	SNC LAVALIN PROJ. No.	629647	
	CLIENT PROJ. No.		

DRAWING No. DW1–XX–MA–XX–003 REV. B01

629647-0001-D-4P-DWG-000-0003-01_B01



REFERENCE FILES:

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND CONDITIONS ON SITE BEFORE PROCEEDING WITH ANY PORTION OF THIS WORK. REPRODUCTIONS OF THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. REFER TO GRAPHIC SCALE. DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

INFORMATION ONLY
NOT FOR CONSTRUCTION

REV.	REVISIONS	CHECKED BY	APP. BY	DATE
B01	ISSUED FOR REVIEW			15/07/31

NORTH

PROFESSIONAL STAMP

PERMIT HOLDER STAMP

SNC·LAVALIN
1133 TOPSAIL RD., MOUNT PEARL, NL, A1N 5G2
TEL: (709) 368-0118 FAX: (709) 368-3541

CLIENT
FERMEUSE ENTERPRISES LIMITED

PROJECT
FERMEUSE HARBOUR DEVELOPMENT

TITLE
SITE DEVELOPMENT PLAN PHASE 4

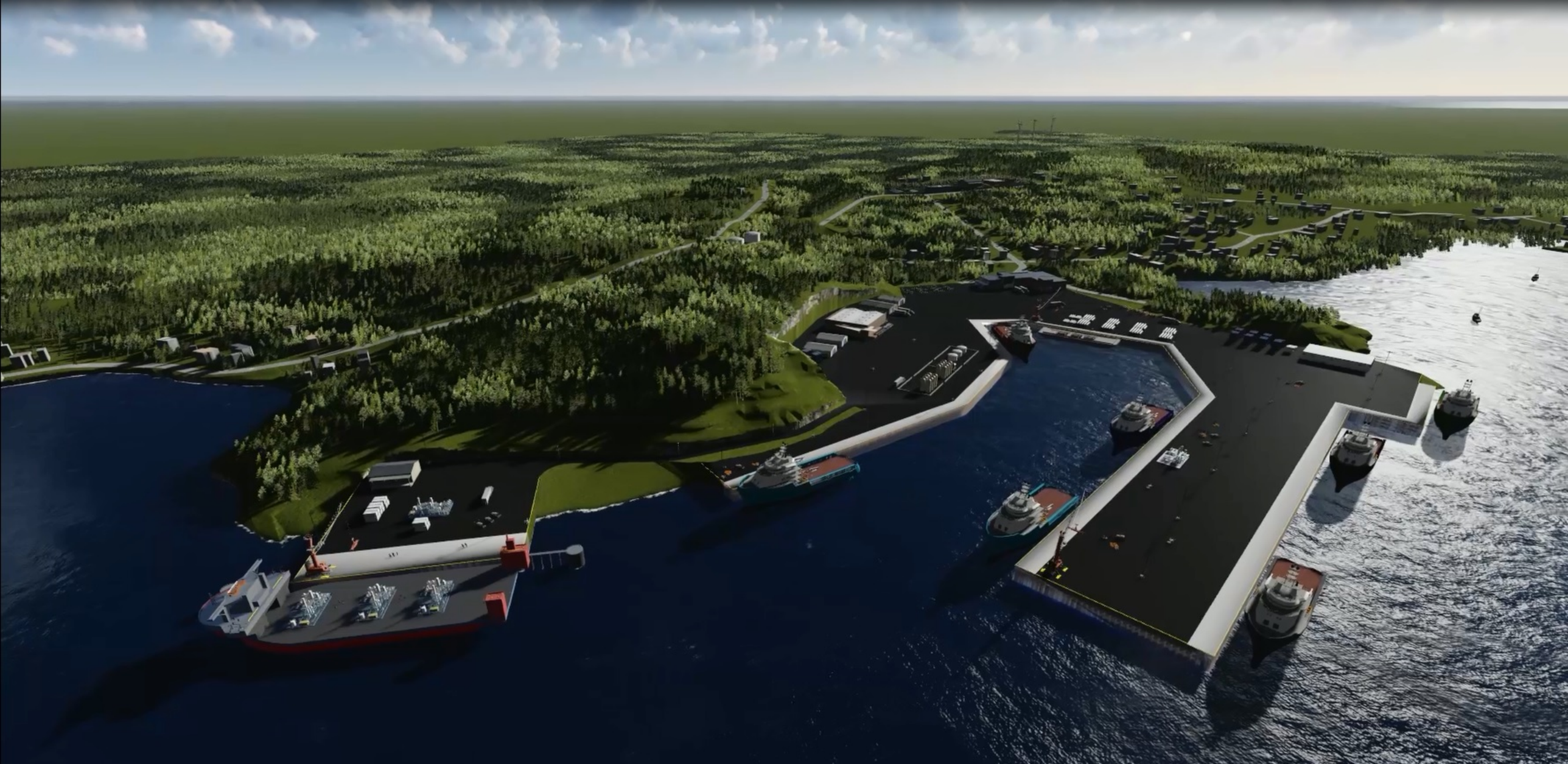
DESIGNED BY	P.F.	CHECKED BY	DATE 15/07/31
DRAWN BY	J.V.	APPROVED BY	DATE 15/07/31
SCALE	AS SHOWN	SNC·LAVALIN PROJ. No.	629647
		CLIENT PROJ. No.	

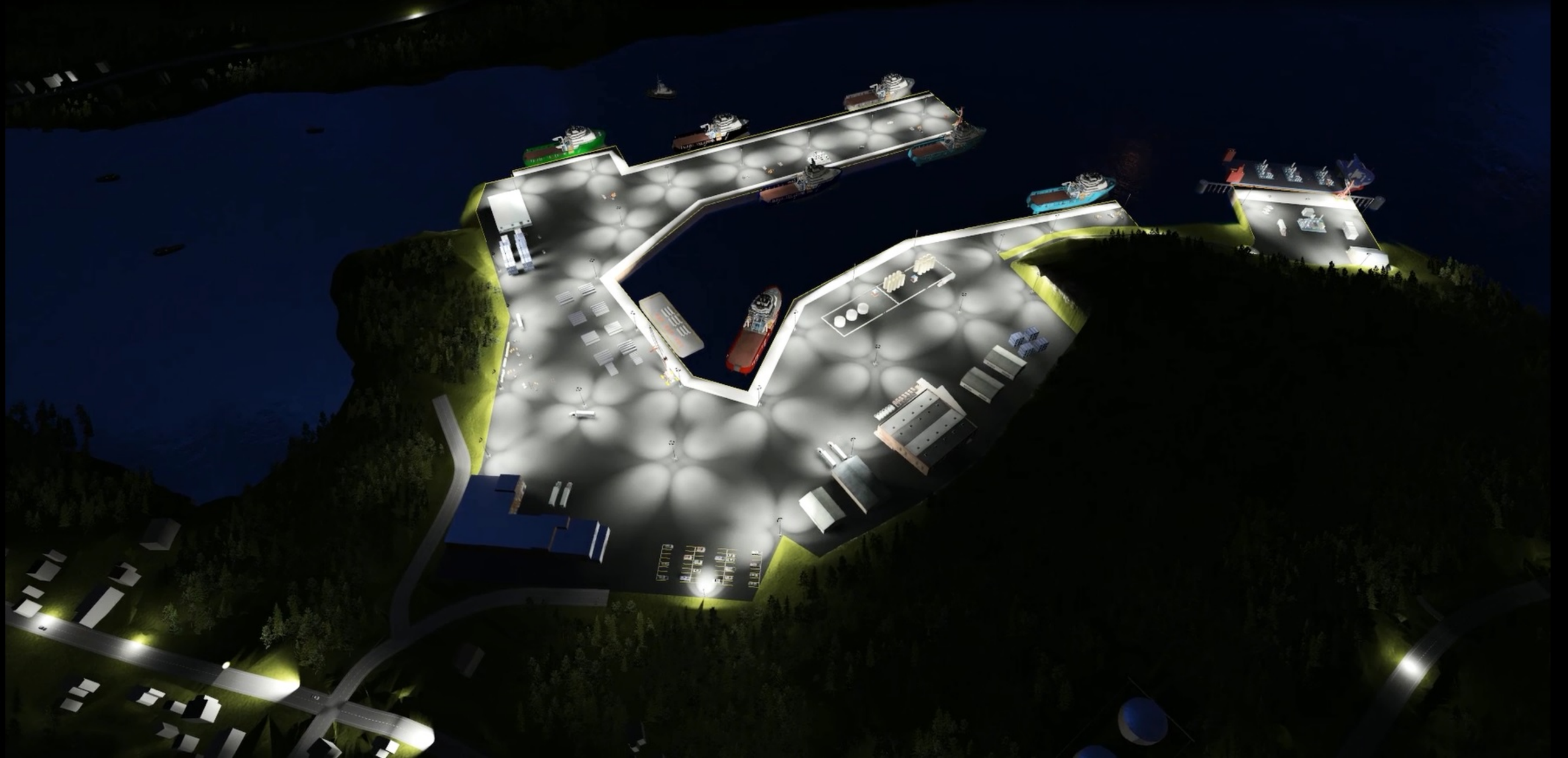
DRAWING No. DW1–XX–MA–XX–004 REV. B01

629647-0001-D-4P-DWG-000-0004-01_B01

APPENDIX D

Visual Renderings





APPENDIX E

Lighting Study

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01

Luminaire Schedule

Symbol	Qty	Label	Description	Arrangement	LLF	Arr. Watts
	1	DSX2_LED_30000_40K_T4M	DSX2 LED 1000 T4M	SINGLE	0.900	357
	1	FXLED_300_Flood	FXLED300SFN RCL	SINGLE	0.900	316.1
	14	FXLED_300_Flood-4Array	FXLED300SFN RCL	4 @ 90 DEGREES	0.900	1264.4
	9	FXLED_300_Flood-3way	FXLED300SFN RCL	3 @ 60	0.900	948.3
	4	DSX2_LED_100C_1000_40K_T3M_MV	DSX2 LED 1000 T3M	SINGLE	1.000	357
	2	FXLED_300_Flood-2_120	FXLED300SFN RCL	2 @ 120	0.900	632.2
	7	FXLED_300_Flood-3-90	FXLED300SFN RCL	3 @ 90 DEGREES	0.900	948.3

Calculation Summary

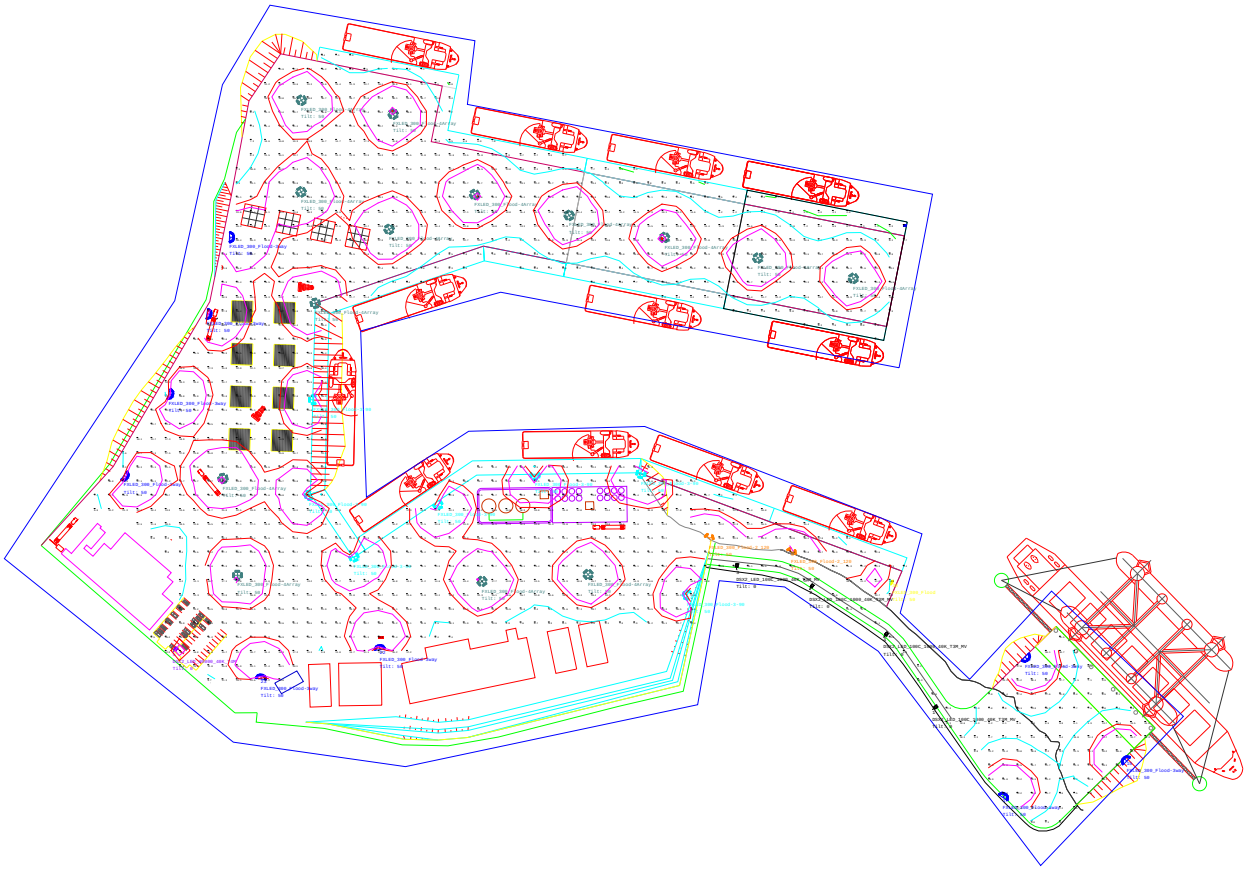
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_1	Illuminance	Lux	19.41	58.3	2.7	7.19	21.59

Luminaire Location Summary

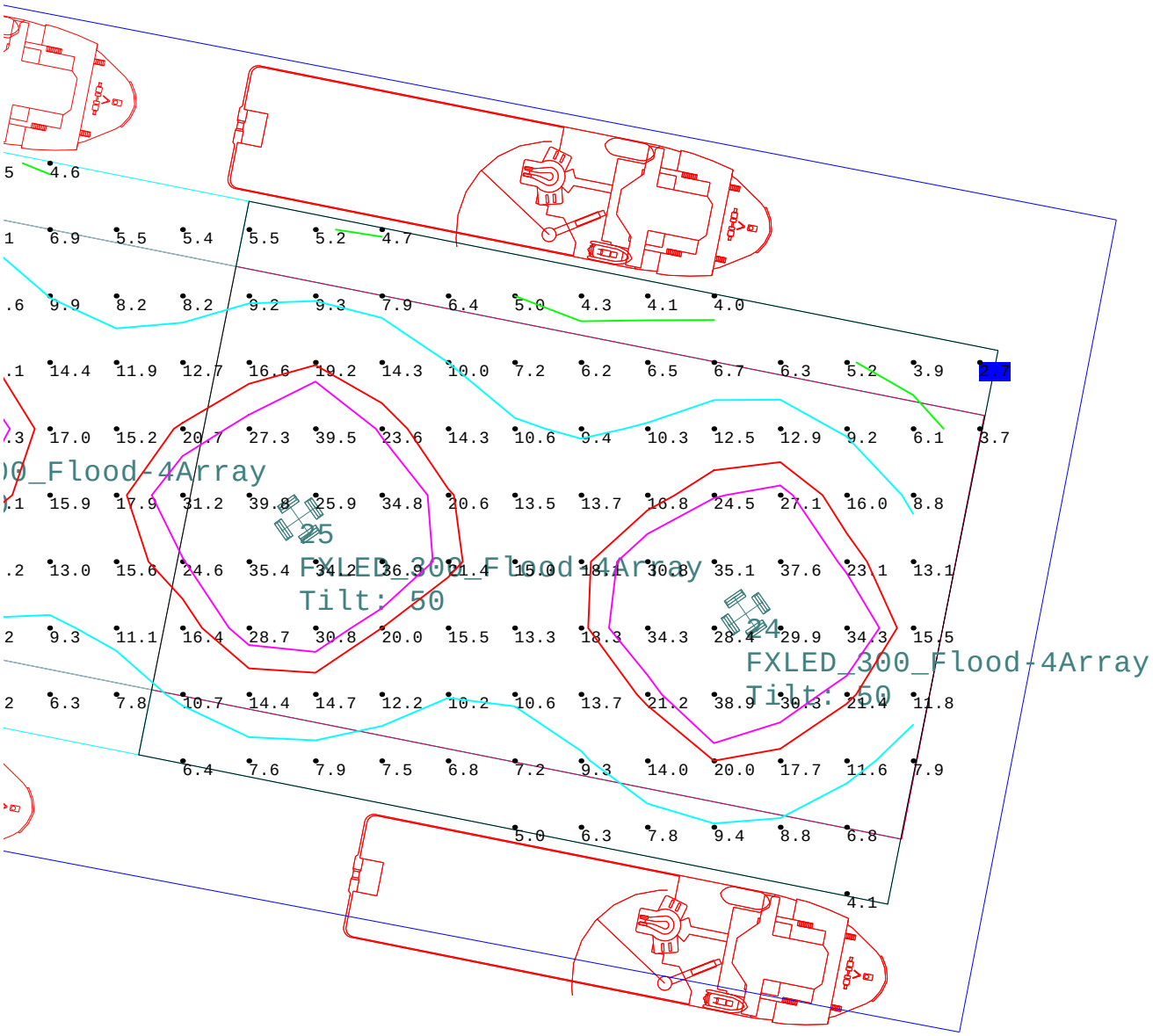
UserField5	Label	X	Y	Z	Orient	Tilt
	DSX2_LED_100C_1000_40K_T3M_MV	352446.696	5203568.27	12	37.877	0
	DSX2_LED_100C_1000_40K_T3M_MV	352360.137	5203652.869	12	55.617	0
	DSX2_LED_100C_1000_40K_T3M_MV	352308.566	5203666.863	12	83.014	0
	DSX2_LED_100C_1000_40K_T3M_MV	352412.314	5203619.17	18	49.707	0
	DSX2_LED_30000_40K_T4M	351911.575	5203608.933	12	43.391	0
	FXLED_300_Flood-2_120	352347.239	5203679.057	18	4.256	50
	FXLED_300_Flood-2_120	352289.349	5203689.005	18	13.86	50
	FXLED_300_Flood-3-90	352007.736	5203719.297	18	192.642	50
	FXLED_300_Flood-3-90	352010.753	5203786.5	18	179.459	50
	FXLED_300_Flood-3-90	352039.113	5203675.849	18	294.102	50
	FXLED_300_Flood-3-90	352098.349	5203712.687	18	305.274	50
	FXLED_300_Flood-3-90	352166.846	5203733.387	18	270	50
	FXLED_300_Flood-3-90	352241.416	5203734.63	18	258.869	50
	FXLED_300_Flood-3-90	352274.015	5203648.912	18	160.428	50
	FXLED_300_Flood-3way	352583.588	5203532.017	18	134.992	50
	FXLED_300_Flood-3way	352511.992	5203605.412	18	315.39	50
	FXLED_300_Flood-3way	352496.432	5203506.316	18	55.649	50
	FXLED_300_Flood-3way	351951.538	5203901.054	18	358.532	50
	FXLED_300_Flood-3way	351935.667	5203847.016	18	351.254	50
	FXLED_300_Flood-3way	351908.738	5203790.727	18	342.217	50
	FXLED_300_Flood-3way	351877.162	5203733.208	18	325.144	50
	FXLED_300_Flood-3way	352057.458	5203610.507	18	96.79	50
	FXLED_300_Flood-3way	351973.632	5203589.815	18	82.424	50
	FXLED_300_Flood-4Array	352391.002	5203872.049	18	34.836	50
	FXLED_300_Flood-4Array	352323.719	5203886.323	18	34.836	50
	FXLED_300_Flood-4Array	352258.062	5203900.808	18	34.836	50
	FXLED_300_Flood-4Array	352190.829	5203916.397	18	31.631	50
	FXLED_300_Flood-4Array	352124.151	5203931.131	18	31.631	50
	FXLED_300_Flood-4Array	352066.847	5203987.766	18	31.631	50
	FXLED_300_Flood-4Array	352002.184	5203997.577	18	31.631	50
	FXLED_300_Flood-4Array	352063.948	5203906.603	18	31.631	50
	FXLED_300_Flood-4Array	352001.961	5203932.914	18	31.631	50
	FXLED_300_Flood-4Array	352011.91	5203854.542	18	281.639	50
	FXLED_300_Flood-4Array	351946.906	5203731.1	18	13.391	50
	FXLED_300_Flood-4Array	352204.158	5203663.434	18	42.273	50
	FXLED_300_Flood-4Array	352129.38	5203658.582	18	40.172	50
	FXLED_300_Flood-4Array	351957.131	5203662.905	18	0	50
	FXLED_300_Flood	352418.517	5203657.363	18	147.662	50

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

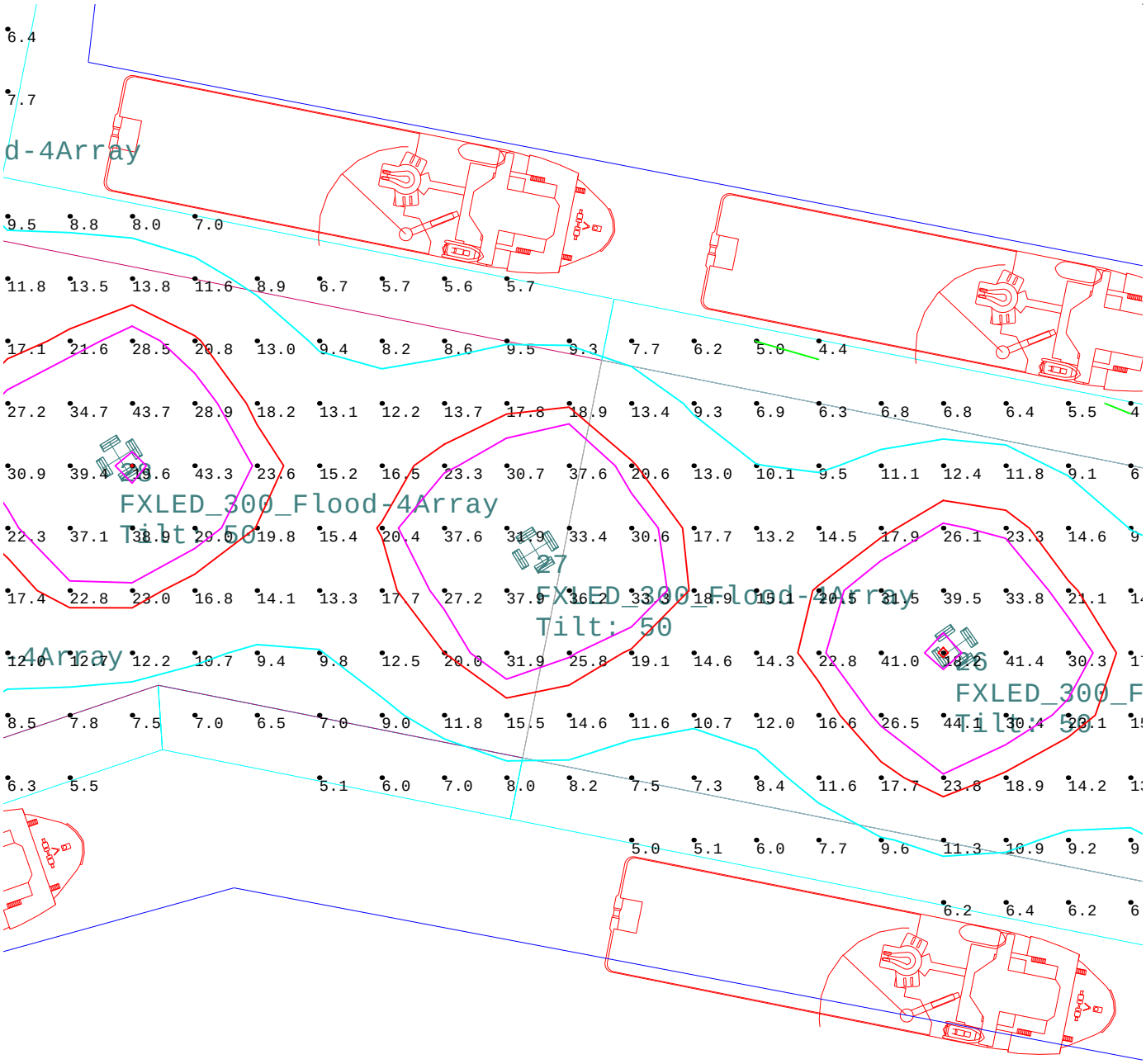
Image File : SNC-Lavalin logo



View of point by point



View of point by point



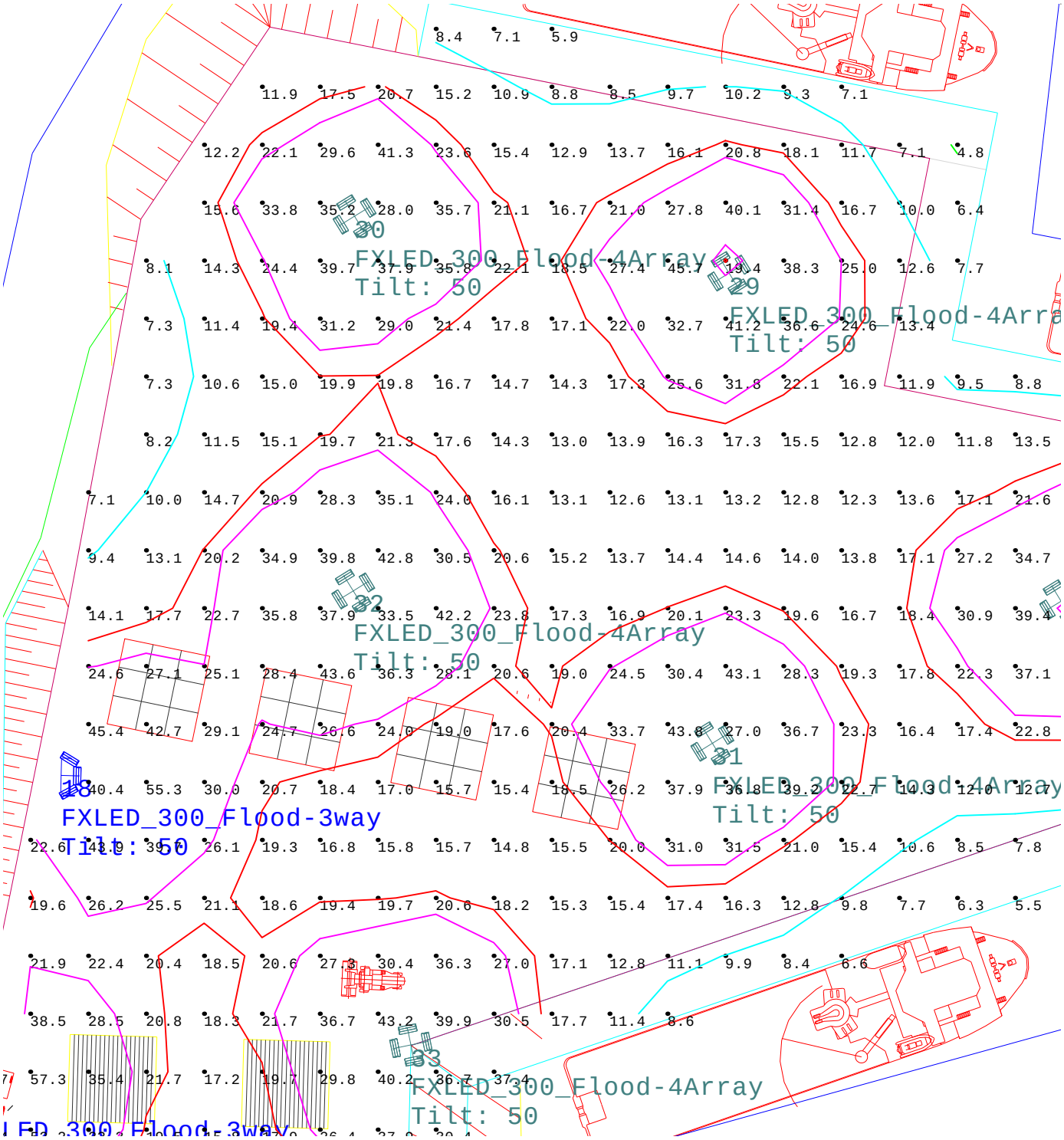
View of point by point

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01



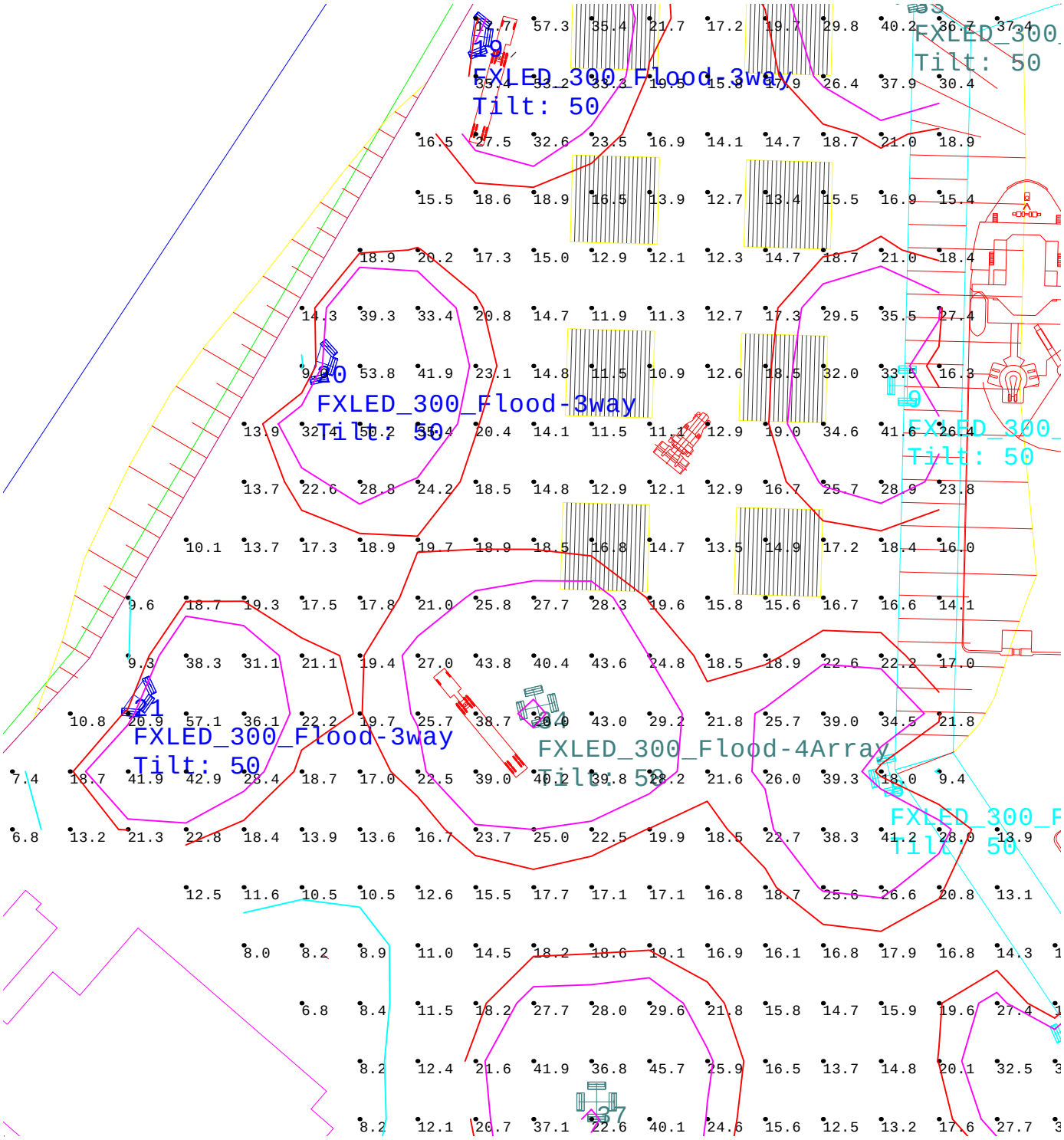
View of point by point

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01



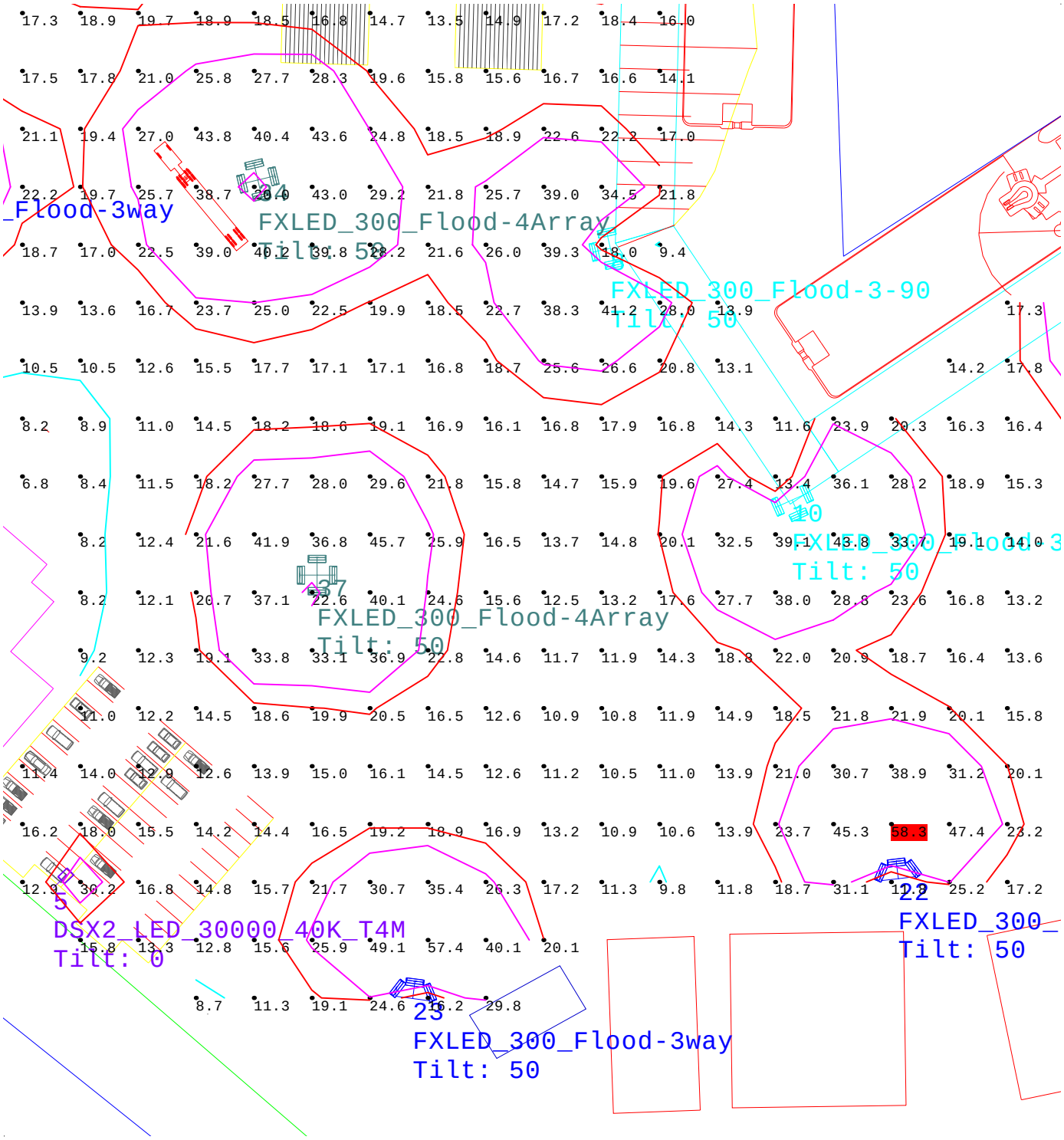
View of point by point

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01



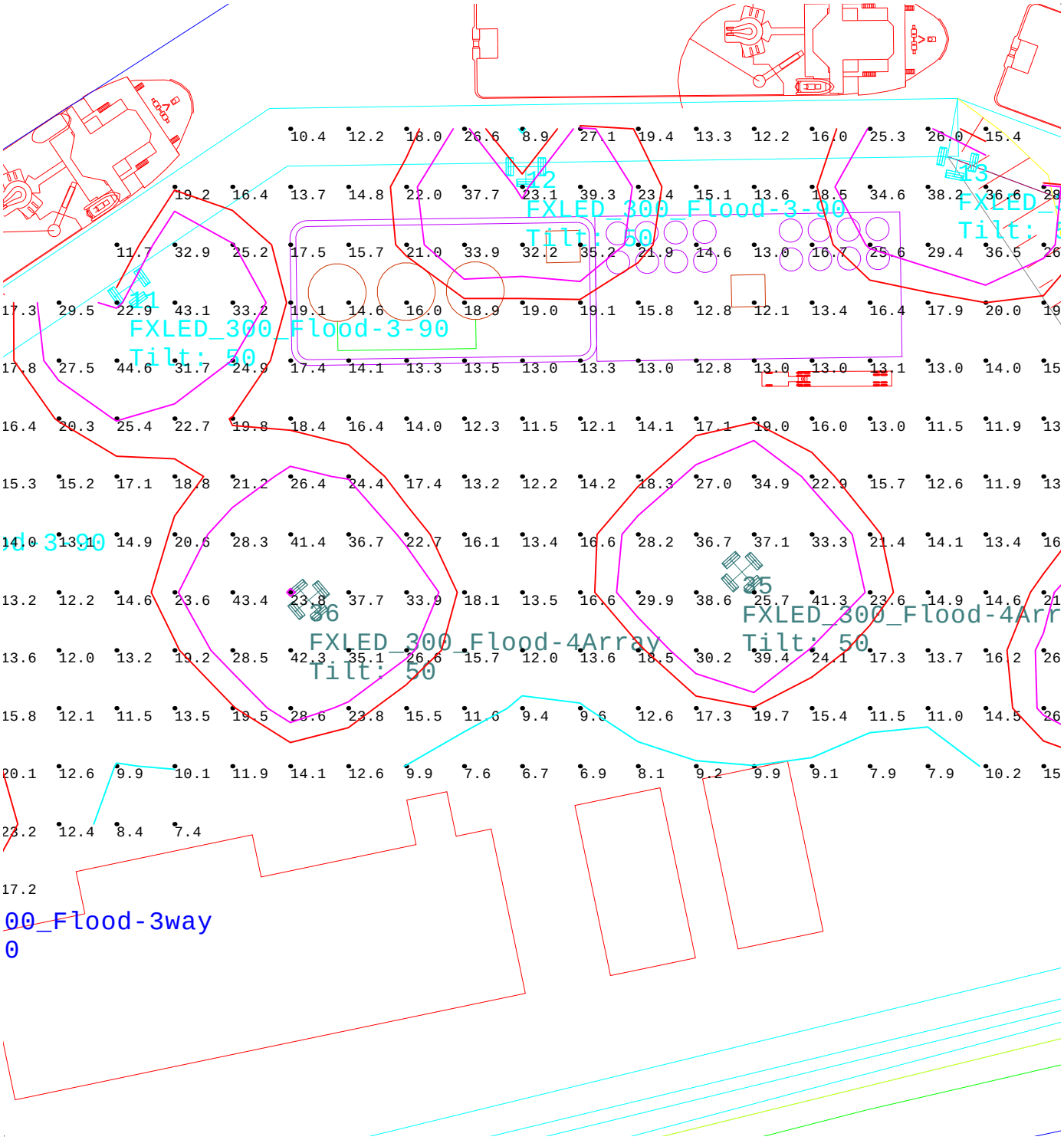
View of point by point

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01



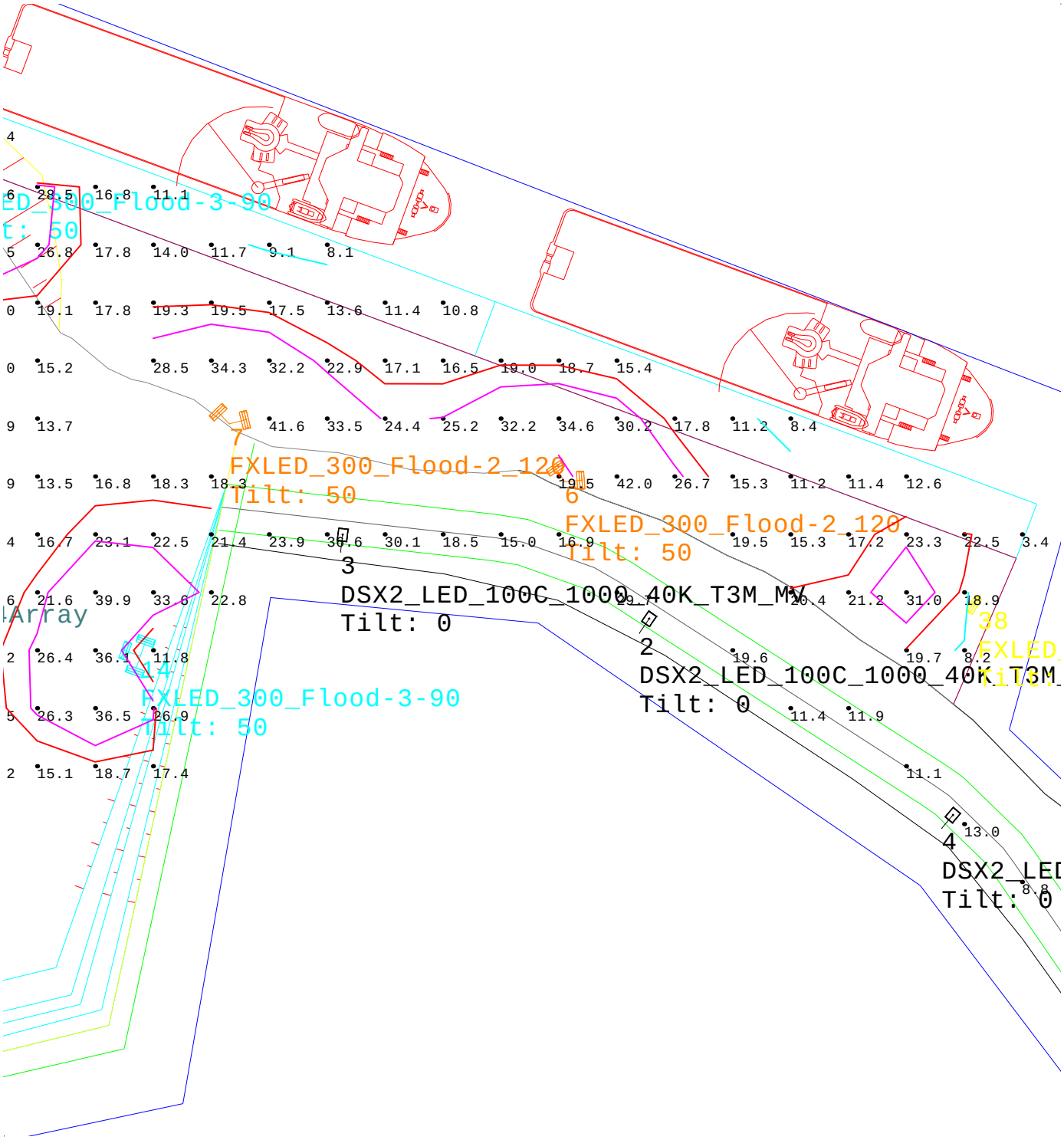
View of point by point

Fremeuse Marine Base
Site Lighting Calculations
High Activity Area
Project Number: 629647

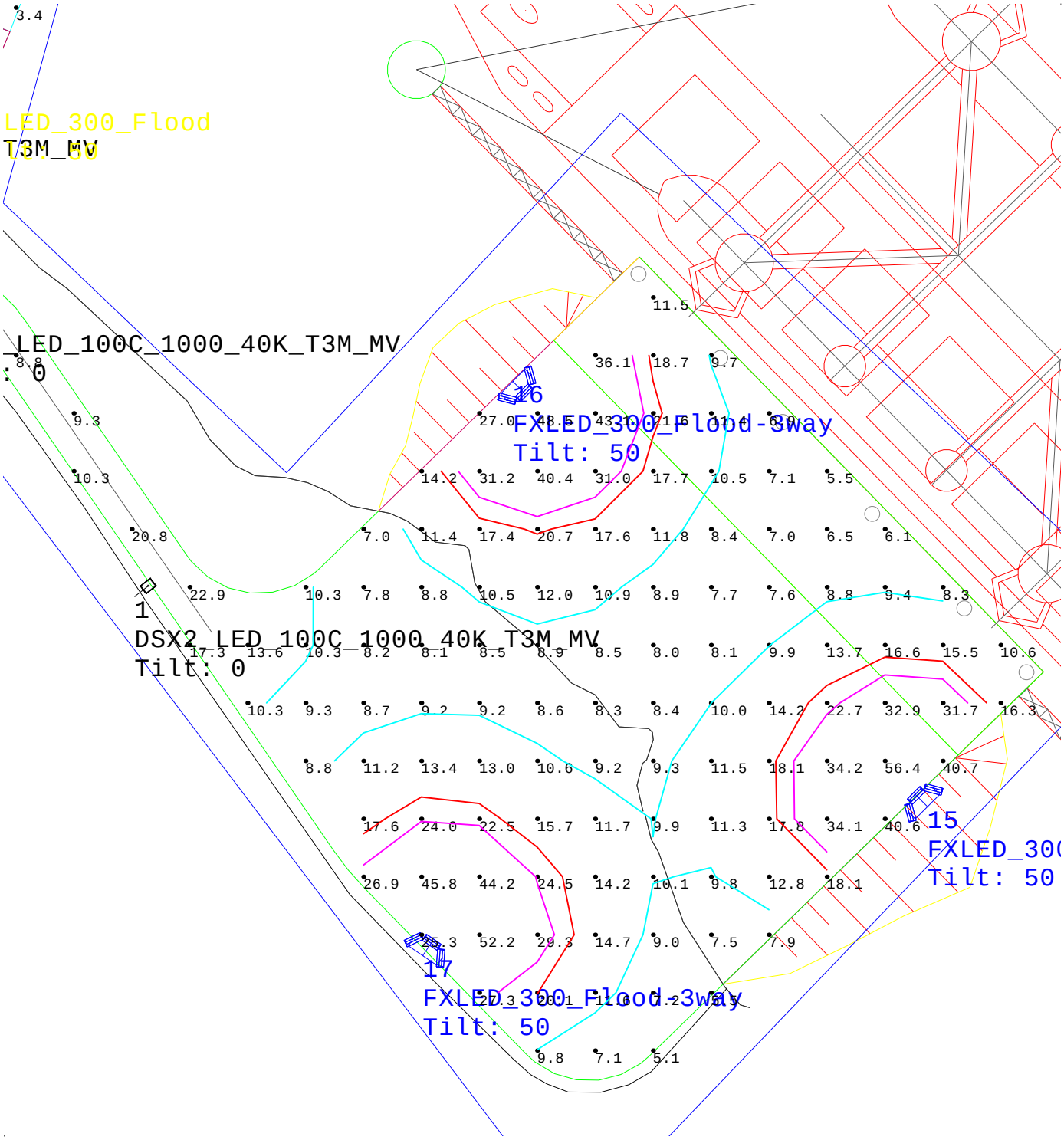
SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Image File : SNC-Lavalin logo

Date:2015/07/01



View of point by point



View of point by point

SNC·LAVALIN

1133 Topsail Road
Mount Pearl, NL A1N 5G2
709-368-0118 - 709-368-3541