ENVIRONMENTAL REGISTRATION DOCUMENT

FOR

FERMEUSE HARBOUR SPOOL BASE
AT
FERMEUSE & PORT KIRWAN, NL

Submitted to:
Minister
Municipal Affairs and Environment
P.O. Box 8700

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

June 25, 2019

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APPENDICES

1 NAME OF UNDERTAKING

The name of the undertaking is the Fermeuse Spool Base. It is located in Fermeuse Harbour straddling the boundaries of the communities of Fermeuse and Port Kirwan, approximately 80 kilometres south of St. John's on the Avalon Peninsula.

2 PROPONENT

Name of Corporate Body:

Fermeuse Enterprises Limited (FEL)

Address:

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P.O. Box 580,
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President:

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Principal Contact Persons for purposes of environmental assessment:

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FEL and its leading shareholder - Harbour Grace Shrimp Co Ltd. - view the opportunity to develop Fermeuse Harbour 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 a spool base on the north side of Fermeuse Harbour.

A spool base is a specialized onshore construction facility which uses advanced welding and piping technologies to cost-effectively support offshore oil and gas production. It provides advanced welding and other technologies to methodically assemble rigid pipes of various diameters into predetermined lengths for spooling onto a reel lay vessel for offshore deployment. See spool base details in Section 3.2 below.

Spool bases serve the oil and gas sector from locations such as the USA, UK, Norway, Brazil, and Angola. Temporary spool bases are sometimes used for specific projects. There are, however, no spool bases in Canada; this project offers the Province of Newfoundland and Labrador and the local oil and gas industry technological advantages and cost savings over time because new projects can incorporate a local spooling option.

To function as a successful spool base, a location must possess various key characteristics. The North side of Fermeuse Harbour possesses all important characteristics which include:

- Sufficient and appropriate onshore area, e.g., straight and narrow shoreline for fabrication of pipe for spooling,
- Safe harbour in most weather conditions,
- Sufficient deep water, berthing space, and supportive laydown areas,
- Sufficient area for support service buildings,
- Adequate supportive infrastructure to efficiently handle pipe spooling vessels,
- Strategic location to cost-effectively access offshore oil fields off the coast of Newfoundland and Labrador.

3.2 RATIONALE FOR THE UNDERTAKING

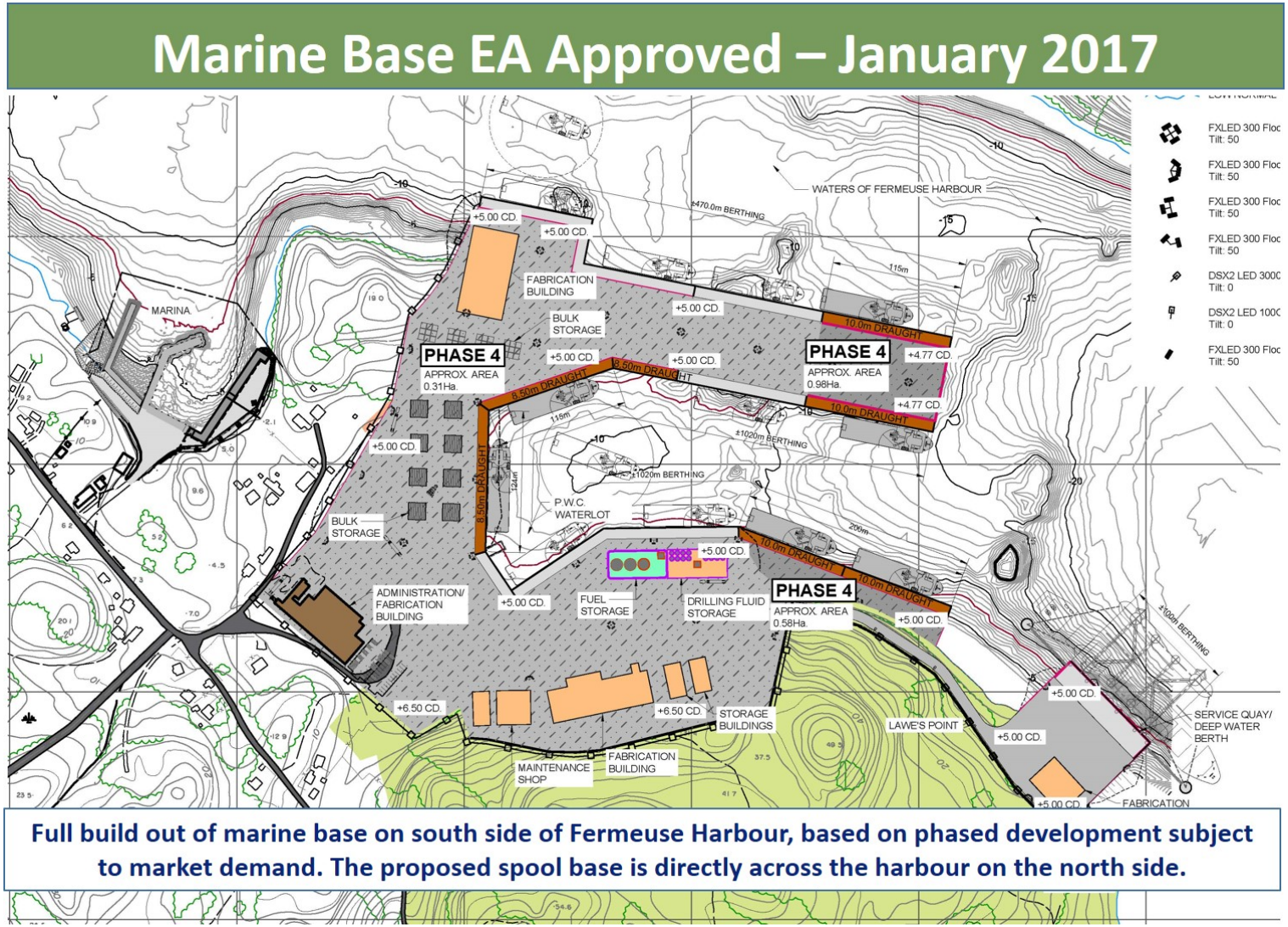
Since first oil production from Hibernia in 1997, Newfoundland and Labrador's oil and gas industry has progressed steadily. Production comes from the prolific Jeanne d'Arc Basin and includes the Hibernia, Terra Nova, White Rose, and Hebron discoveries. Equinor's (or, Statoil's, as it was then) announcement of significant discoveries in the Flemish Pass Basin in 2013, and their current planning to potentially move ahead with a commercial production model, will most likely initiate additional expansion of the industry.

In addition to the Jeanne d'Arc and Flemish Pass Basins, as well as the highly prospective Orphan Basin, there are more than 20 other unexplored and prospective offshore basins. Furthermore, Newfoundland and Labrador is targeted as a natural centre for industry expansion into the Arctic, e.g., off Greenland. Within the last three years over $2.5 billion in bids have been placed for offshore drilling exploration rights by various global operators who are now focusing their attention on this geographical area. Increasing exploration and production investments are expected between 2020 and 2030 from highly capable companies such as ExxonMobil, Husky, Equinor, Chevron, Murphy, Suncor, BP, Shell, Anadarko Petroleum Corp., Hess and Noble, Navitas Petroleum, CNOOC (formerly Nexen), BP and Total.

Having anticipated this now apparent industrial expansion trend, FEL has been actively planning to meet new and emerging industrial requirements for more effective marine infrastructure. Specifically, FEL has carefully positioned Fermeuse Harbour to become a modern 'one-stop-shopping' marine base to provide intelligent shore-based, whole-chain services to the growing oil and gas industry. Feedback from industry indicates that effective future development of the offshore fields will require specialized waterfront infrastructure offering integrated supply chain services to support increasingly demanding subsea projects.

A specialized subsea service centre will support sustainable industrial growth and new technological developments that will enable new wealth creation for the Province and all of Canada. In fact, FEL proposed plan to construct a purpose-built marine facility on the south side of Fermeuse Harbour received **Environmental Approval,** subject to pre-construction conditions, from the Governments of Newfoundland and Labrador and Canada in January 2017. Construction of this approved marine base on the south side of

the harbour has not started yet because, as stated in the original environmental planning documents, the facility would likely progress in stages in response to defined market demands. Here is a graphic showing the proposed full build-out, i.e., four phased build-out, of the south side integrated marine base.



Full build out of marine base on south side of Fermeuse Harbour, based on phased development subject to market demand. The proposed spool base is directly across the harbour on the north side.

The availability of specialized services at Fermeuse Harbour, including large working spaces, subsea technologies, and heavy lifting capacity at the waterfront, will deliver logistical efficiencies in the coming years, especially for drilling support services and subsea developments. Both of these major activities will lead industrial activity over the next 5-10 years.

Subsea development strategies and activities are expected to increase in the coming years and this Province can develop subsea technological expertise. Fermeuse Harbour is being designed to offer specialized subsea support services and advantages that currently do not exist in Newfoundland and Labrador or Canada.

To supplement its subsea specialities focus, FEL will extend its service offerings to include a spool base. The north side of Fermeuse Harbour is an ideal location for a spool base. This will be immediately across the harbour from the approved marine base (south side) and will consist of a very narrow strip, e.g., runway, of approximately 40 meters wide that will very tightly hug the north shore of Fermeuse Harbour. The northern shoreline of Fermeuse is straight, uninhabited and mostly uninhabitable (due to very steep hillsides), yet amendable to minor onshore construction and easily accessible by water.

The spool base will offer specialized subsea services as an adjunct service of the marine base. Spool bases use advanced welding and piping technologies, and a combination of onshore and offshore pipeline construction to support offshore oil and gas production.

At a basic level, a spool base allows the welding of single or double joints of rigid pipes of various diameters into predetermined lengths for spooling onto a reel lay vessel.

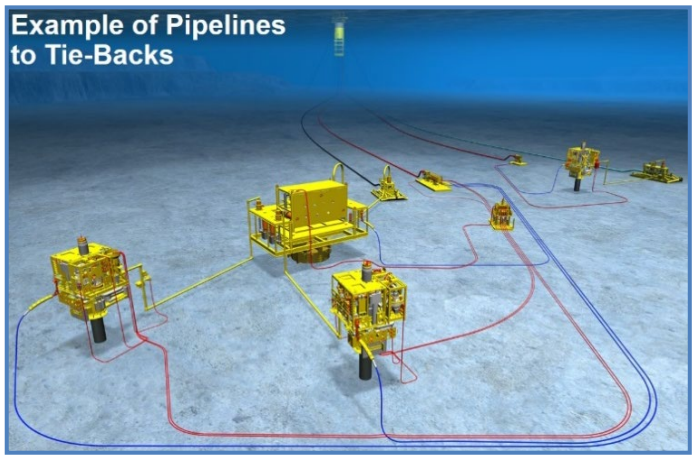
Shore-based spool bases serve the oil and gas sector from locations in the USA, UK, Norway, Brazil, and Angola. Temporary spool bases are sometimes used for specific projects.

There are, however, no spool bases in Canada. This project offers the Province of Newfoundland and Labrador and the local oil and gas industry technological advantages and cost savings over time because new projects can incorporate a local spooling option.

By way of example, the two photos above show opposite ends of the purpose-built spool base at Evanton, UK. It specializes in advanced pipeline fabrication for deployment by pipe-lay vessels servicing the UK offshore industry.

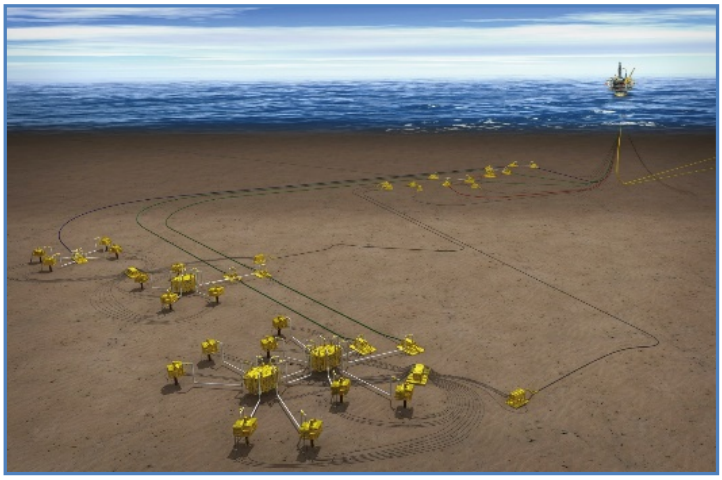
When it comes to subsea developments, Fermeuse will offer significant infrastructure advantages that currently do not exist in Newfoundland and Labrador. This is very important because subsea activities will necessarily increase in the coming years. Aging oil fields, including shallow water fields and deep water fields naturally require subsea development, and both conditions apply to Newfoundland and Labrador. Terra Nova and White Rose developments have subsea built into the original design, and Husky and ExxonMobil have already undertaken subsea tie-back projects (circa 2014).

Aging fields normally increase subsea infrastructure over time to capture marginal barrels. It is now anticipated that existing operators may have 4-6 tie-backs, i.e., specialized



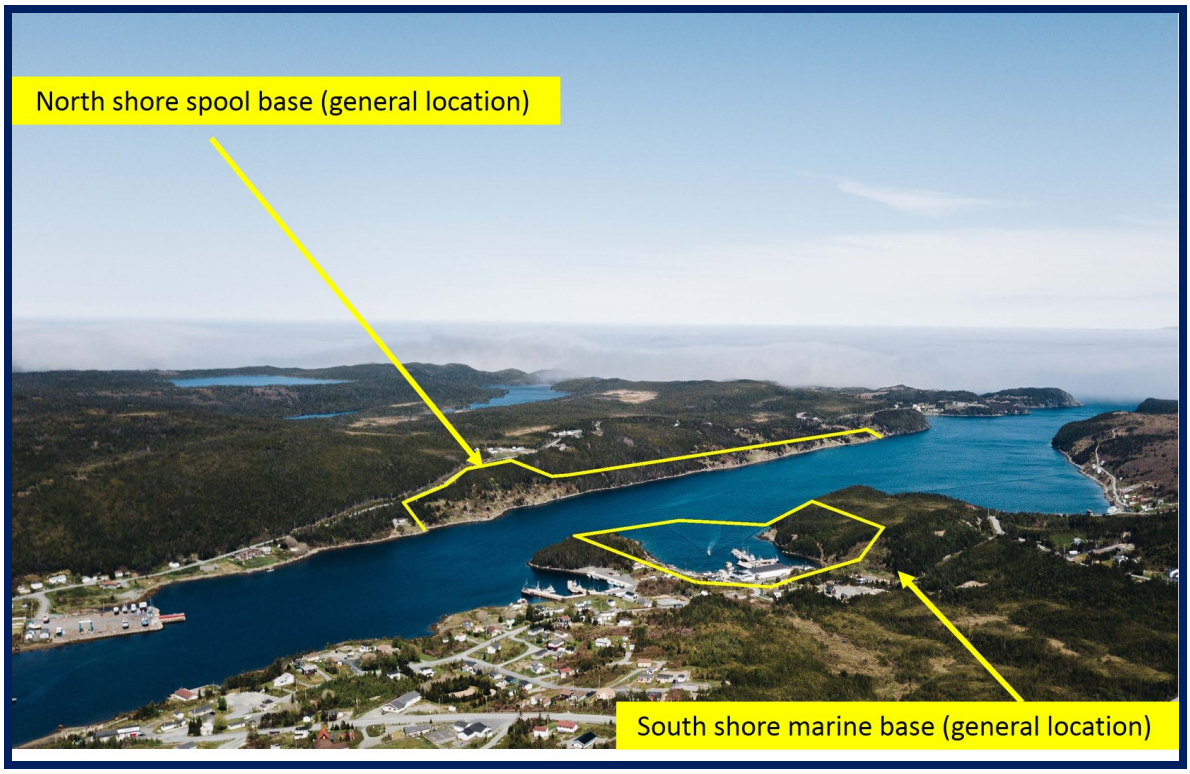
subsea projects, in next 10 years or more representing about 50-80 new wells, plus 90-180kms of flowlines/pipelines. Major subsea deep water project costs $3+ billion or more, excluding drilling costs.

The availability of a spool base will offer design and cost advantages to support subsea industrial development in the Province of Newfoundland and Labrador. The current option open to industry for using spooled pipe is to incur additional costs and delays related to sailing to and from overseas spool bases. The availability of a local base will add savings, especially important for marginal projects in an era of lower oil prices and tighter budgets.



Over the last 10 years it is estimated that over $1.5 billion has been spent on Newfoundland and Labrador subsea projects. However, these were smaller scale projects and, in any case, proper shore-based facilities to carry out these projects did not exist to allow these projects to be optimally engineered or constructed. Projects were sometimes engineered by taking shore-based limitations into account. In other words, subsea and other structural designs are often being designed around onshore infrastructure or seasonal construction limitations, rather than to maximum construction or oil field efficiencies.

Long valued by the fishing industry for its natural “safe harbour” characteristics, the size and scale of Fermeuse Harbour make it an ideal port to expand as a subsea centre pf excellence while, at the same time, protecting and advancing the commercial and social/recreational interests of all current users.



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. There is no doubt that the Towns and southern shore region generally have suffered dramatic losses of employment and population base.

The development of Fermeuse Harbour represents a significant opportunity for direct and indirect job creation and alternative, long term economic developments at the local and regional level. This project will help support the existing population base and industrial activity, especially fishing, by attracting new technologies and industry as a means to grow the available tax base through which improved municipal, harbour and regional services can be maintained and improved for the benefit of all harbour users and local residents.

As seen in other parts of the world, especially well established marine bases in Norway, positive and supportive co-existence relationships between various industrial, residential and recreational users is very achievable. Development of Fermeuse Harbour represents a regional economic revitalization strategy which will generate and drive industry-led and

industry-supported innovation. It will flourish based on cooperation between the marine subsea services base, all industry including fishers, the municipalities, residents, university/colleges, and the Provincial and Federal Governments.

4 DESCRIPTION OF THE UNDERTAKING

The name of FEL's undertaking is the Fermeuse Spool Base. The proposed spool base will support the offshore oil and gas industry of Newfoundland and Labrador and deliver new subsea technological capabilities to Canada. The preferred choice of location is along the north shore of Fermeuse Harbour straddling the boundaries of the communities of Fermeuse and Port Kirwan due to its straight shape and general habitation challenges.

Fermeuse Harbour is located on the eastern portion of the Avalon Peninsula approximately 80 kilometers south of St. John's via paved two-lane highway (see Figure 1 below). It has historically served as a summer fishing station and today the fishery is still the main economic contributor for the Town.

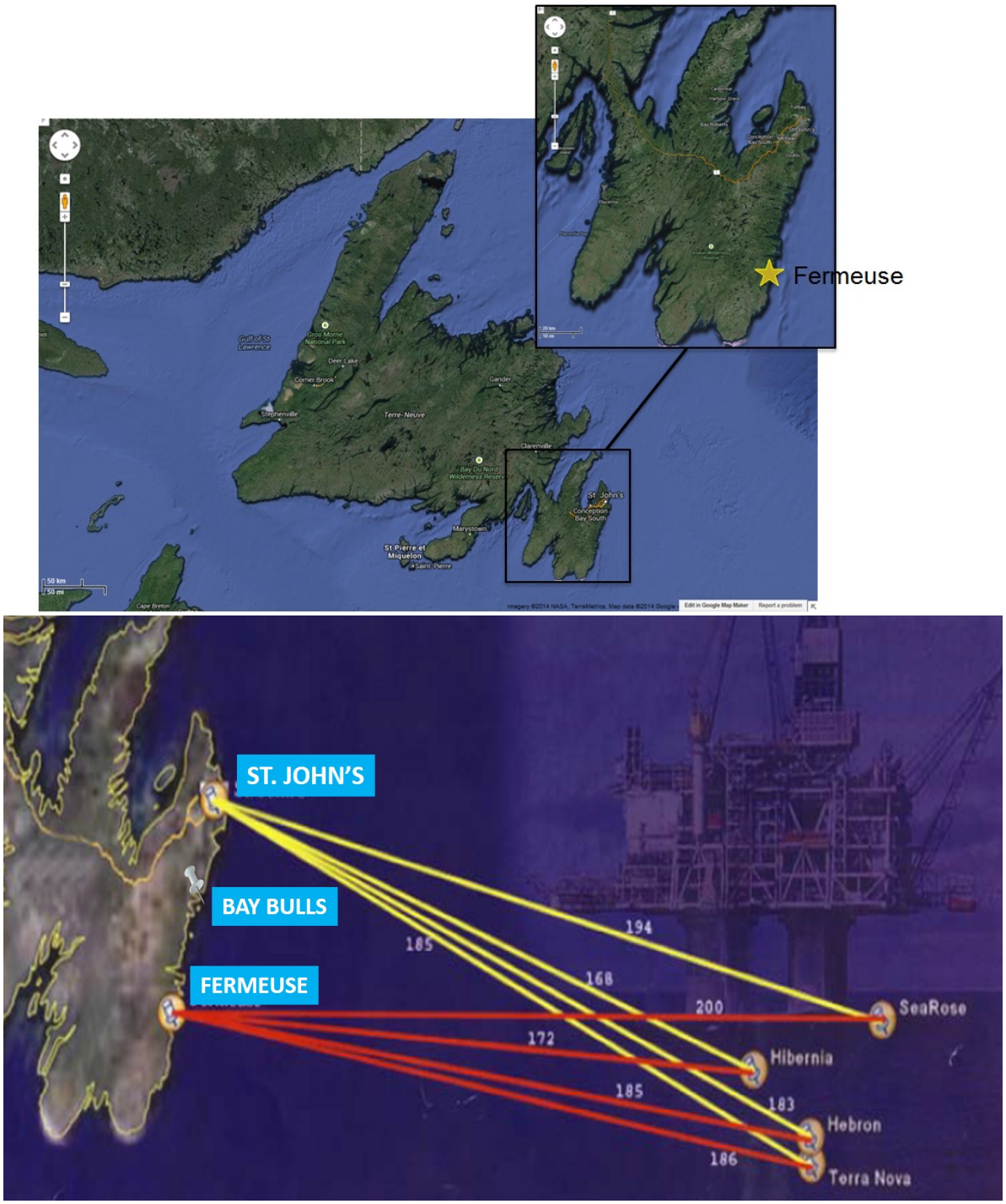


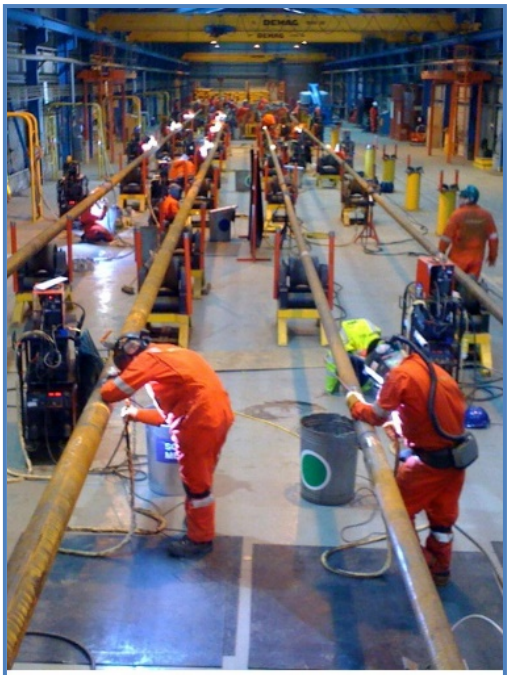
Figure 1: Fermeuse Location Map (http://www.google.ca)

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 which is very similar to current logistical support services, mainly St. John's and Bay Bulls.

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 a spool base and associated services to create a subsea service centre of excellence.

The spool base operation will allow FEL to enable cost-effective pipeline fabrication solutions. Pipelay vessels can effectively load project equipment and spool pipelines which minimizes vessel time in the port. Additionally, new welding techniques, coatings, pipe-in-pipe, and heat-tracing technologies will eventually result in technology transfers to the Province. For example, a rigid line can be low complexity for a water injection system, or high complexity using insulated pipe-in-pipe with electrical heat tracing for special applications related to low flow process fluids. Most rigid projects, however, are of lower complexity and will be the initial products manufactured in this Province.

The spool base is conceived and designed to work intimately with the south side offshore base. It will be located on the north shore of Fermeuse Harbour straddling the boundaries of the communities of Fermeuse and Port Kirwan.



View Inside Fabrication Building

The facilities at the site are of a very high specification, but cover only a small operating area (total 4.5 hectares). This total area is essentially comprised of a narrow runway that is approximately 40 meters wide that very tightly hugs the uninhabitable shoreline of Fermeuse Harbour for 1.8 kilometers. It is the very straight and narrow nature of the north shoreline that makes the spool base track possible in Fermeuse. For overhead illustration see Figure 3 below.

The west end will include a fabrication building encompassing a series of production line stations, a small temporary, i.e., just-in-time, pipe storage area with a fully automated pipe handling system.

The fabrication building will be accessible by a designed road that will diverge off Port Kirwan Road. It is very important to note that road access to the fabrication building will not be used for transporting pipe or other construction materials during normal operation of the spool base. Instead pipe and other heavy materials will be unloaded and stored at south side marine base and floated across to the spool base by barge to a basic dock for unloading and temporary storage on an as-needed, just-in-time basis.

Therefore, the road will be for access to and from the fabrication building for routine deliveries, visitors, and the workers that will be employed there when projects are underway.

At the east end of the spool base a berthing / mooring dolphin will be installed that will allow uploading of fabricated piping on a reel lay vessel that will be managed in place using dynamic positioning technology. There are natural deep water depths along the north shore, especially at the east end where the reel lay vessels will comfortably position themselves for loading in 12-15 meters or more of water depth.

Rigid Pipe Assembly to Spool

All design and construction will follow relevant Canadian building codes and standards including but 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 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.

4.1 GEOGRAPHICAL LOCATION, PHYSICAL COMPONENTS, AND EXISTING ENVIRONMENT

4.1.1 Geographical Location

Strategically located on the East coast of Newfoundland and Labrador, Fermeuse Harbour is an ideal location to construct a spool base to service the oil and gas industry from the island of Newfoundland. Fermeuse is situated on the southeast shore of Newfoundland's Avalon Peninsula, approximately 80 kilometres south of St. John's.

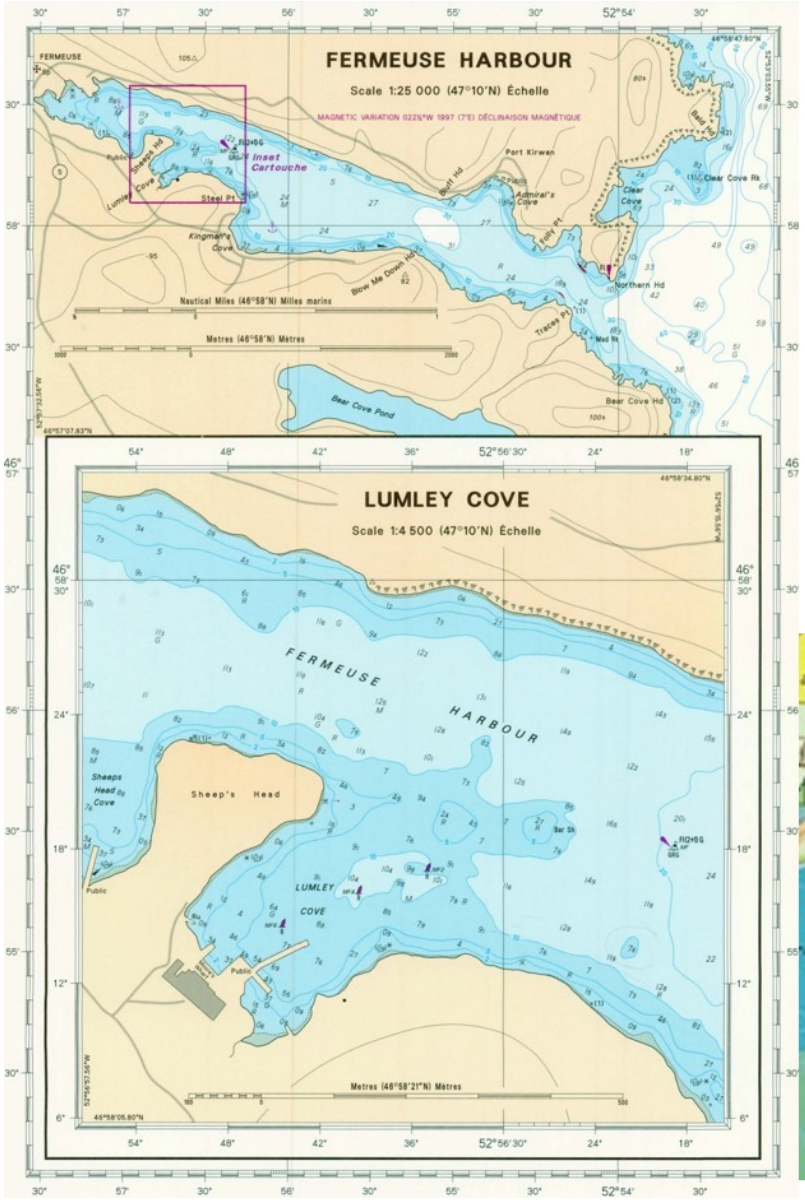


Figure 2: Fermeuse Harbour (Canadian Hydrographic Services Chart 4845)

The spool base will be located on the north shore of Fermeuse Harbour in the communities of Fermeuse and Port Kirwan. Specifically, the site is at the base of the high hill which lines the north shore. Historically and currently the land to be used for the project has proven to be largely uninhabitable. The approximate coordinates for the spool base are 46° 58' 31", -52° 56' 43".

The spool base is comprised of a fabrication facility and dock (western end), a 40-meter runway that will tightly hug the shoreline for 1.8 kilometers, and a vessel loading area on the eastern end. Operating area is approximately 4.5 hectares.

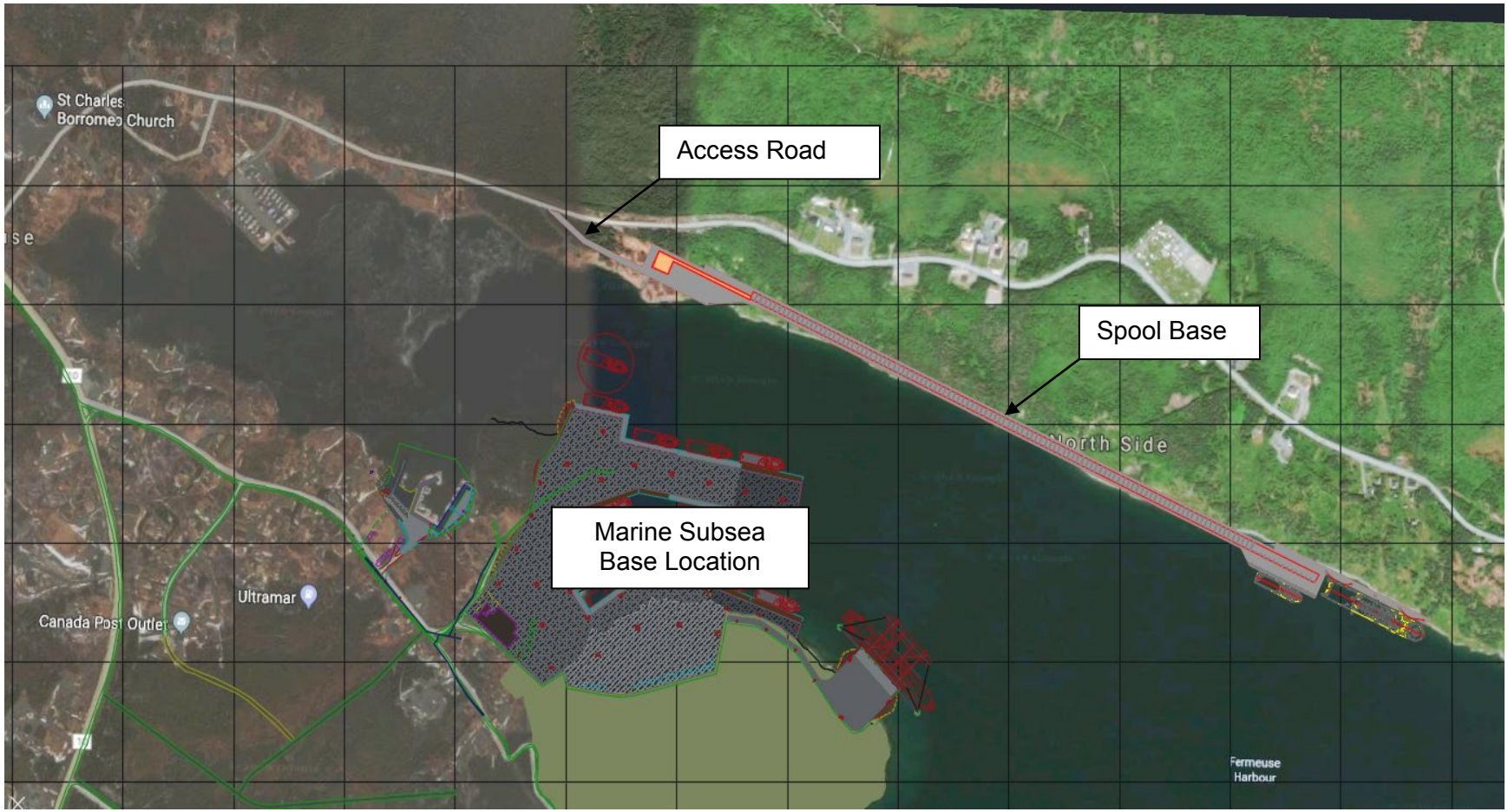


Figure 3: Spool Base Location (Map by Google Maps)

The configurations for the spool base site naturally take advantage of topography. For example, the site will be totally invisible for residents living along Port Kirwan road on that north side because of the very steep drop to the harbour directly behind their houses. The spool base access road, fabrication building, pipe runway, and vessel loading area will be cut into the hillside below resulting in no affect on view plane.

As well, the spool base site should not cause any significant view plane issues for individuals permanently living on the south side of the harbour, e.g., Fermeuse or Kingman's Cove. This is because the spool base will be at water level and essentially the only visible new activity will be the fabrication building and reel vessels which will visit at the end of projects for limited periods of time. The remainder of the site will be low-lying land close to water level, with no significant change to the northern hillside other than the benched hillside cut above water level for the required runway layout. The visual impact, however, may be subjective and will vary among people.

Notably, this project will minimize construction in and near the water. The objective will be to create the required space along the shore by cutting into the hillside to gain the required 40 meters. Plus, the hillside cuttings will be used to create a reinforced shoreline earth wall along the edge of the harbour. This will mitigate against harbour impacts generally by preventing soil and shoreline erosion. Furthermore, the reinforced rocky substrate will generate new habitat for local species such as lobster and in the future there is no reason why local fishers cannot access much of the north side shorelines for fishing purposes (not including the dock areas). Section 4.2 (below) covers Construction in greater detail.

Access to the spool base will be from Port Kirwan Road. This access road will be constructed to minimize impact to adjacent properties and the public. See Figure 4 below and Sections 4.2.4 and 6.6.

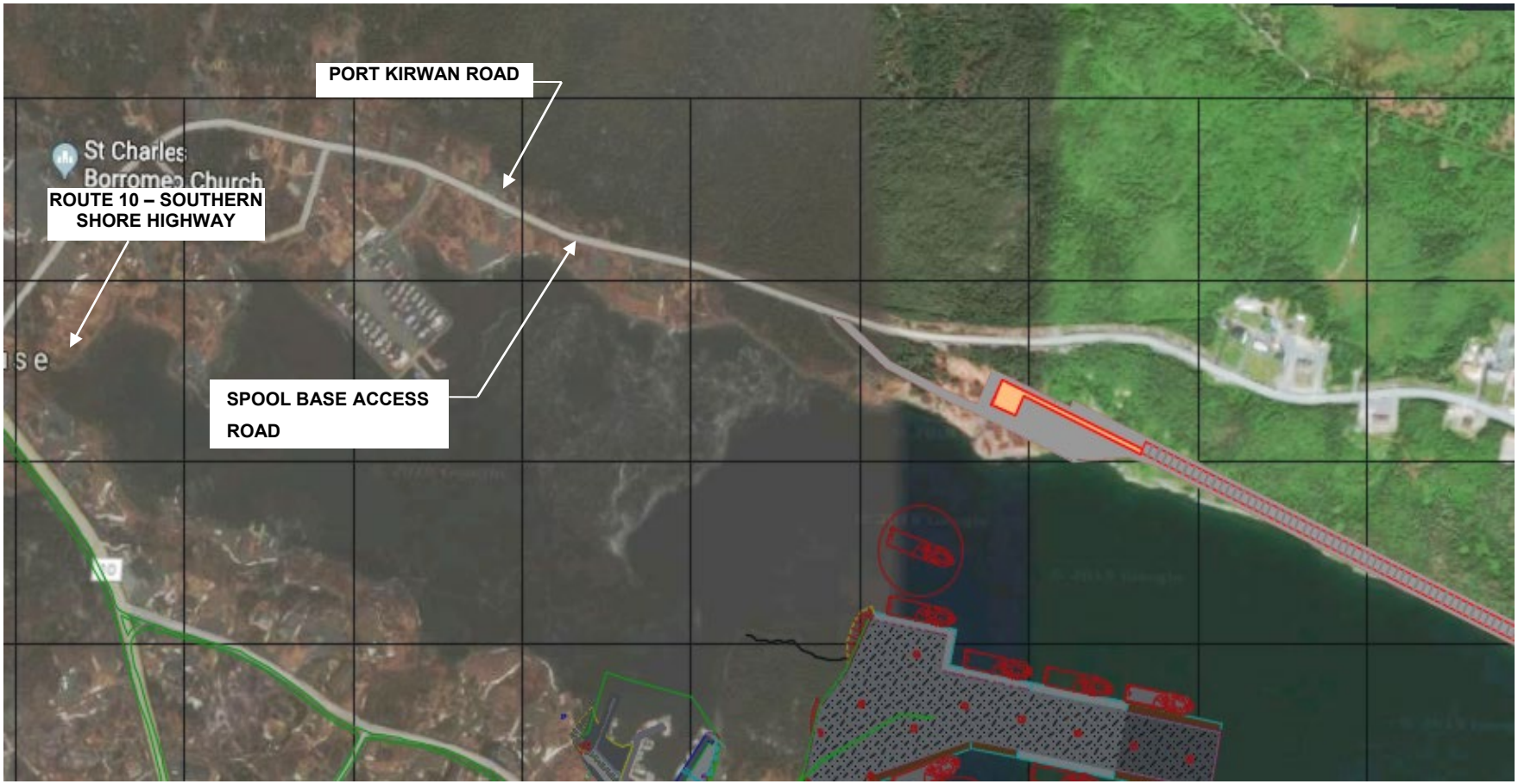


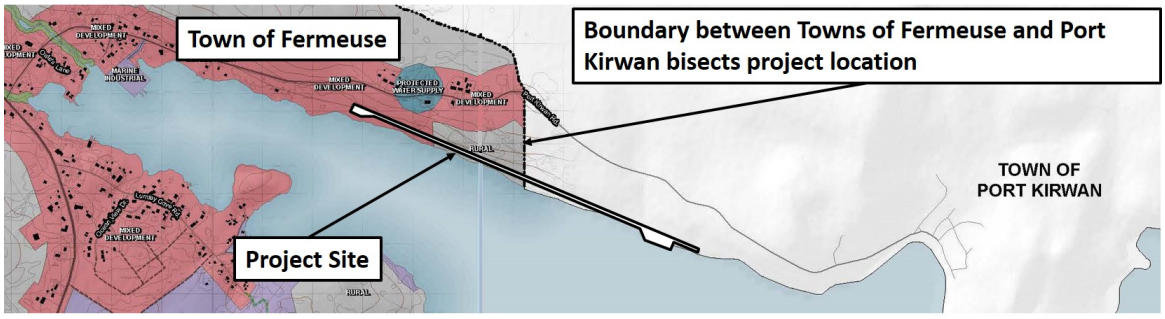
Figure 4: Proposed Access Road to Spool Base

4.1.1.2 Municipal Plan (Town of Fermeuse)

As a direct result of the proposed Marine Supply Base project, the Town Council of Fermeuse commenced development of a formal Municipal Plan in 2014. This plan was undertaken to accommodate future industrial growth and to ensure effective municipal management of anticipated growth. Formal approval of the Municipal Plan was achieved on March 12, 2015 under the Urban and Rural Planning Act, 2000 and it recognises the Fermeuse Municipal Planning Area. As stated in the April 25, 2019 letter (see Appendix D) from Mayor Jerome Kenney, "The Town of Fermeuse Town Council, is well aware that Fermeuse Enterprises Limited (FEL) is proposing development of a Spool Base on the Northside of Fermeuse Harbour." Reflecting on their current preferences, Mayor Kenney also wrote:

> "The Council has reviewed the location for the Spool Base and believes it is an entirely suitable location for the proposed use. As a matter of fact, most of the Spool Base falls within an area zoned as Mixed Development and as such is an allowable use under the Town's Municipal Plan. A small portion of the proposed development falls within a Rural zoning designation and the Town of Fermeuse will seek an amendment to the Town Plan for this area from Rural to either Mixed Development or Marine Industrial to clarify the planning use intentions of the Town."

The Town of Port Kirwan does not have a Municipal Plan, but as Mayor Eugene Brothers indicates in his June 11, 2019 letter (see Appendix D), there are no restrictions and they strongly support the Spool Base project. The following map shows how the project cuts across the boundary between Fermeuse and Port Kirwan.



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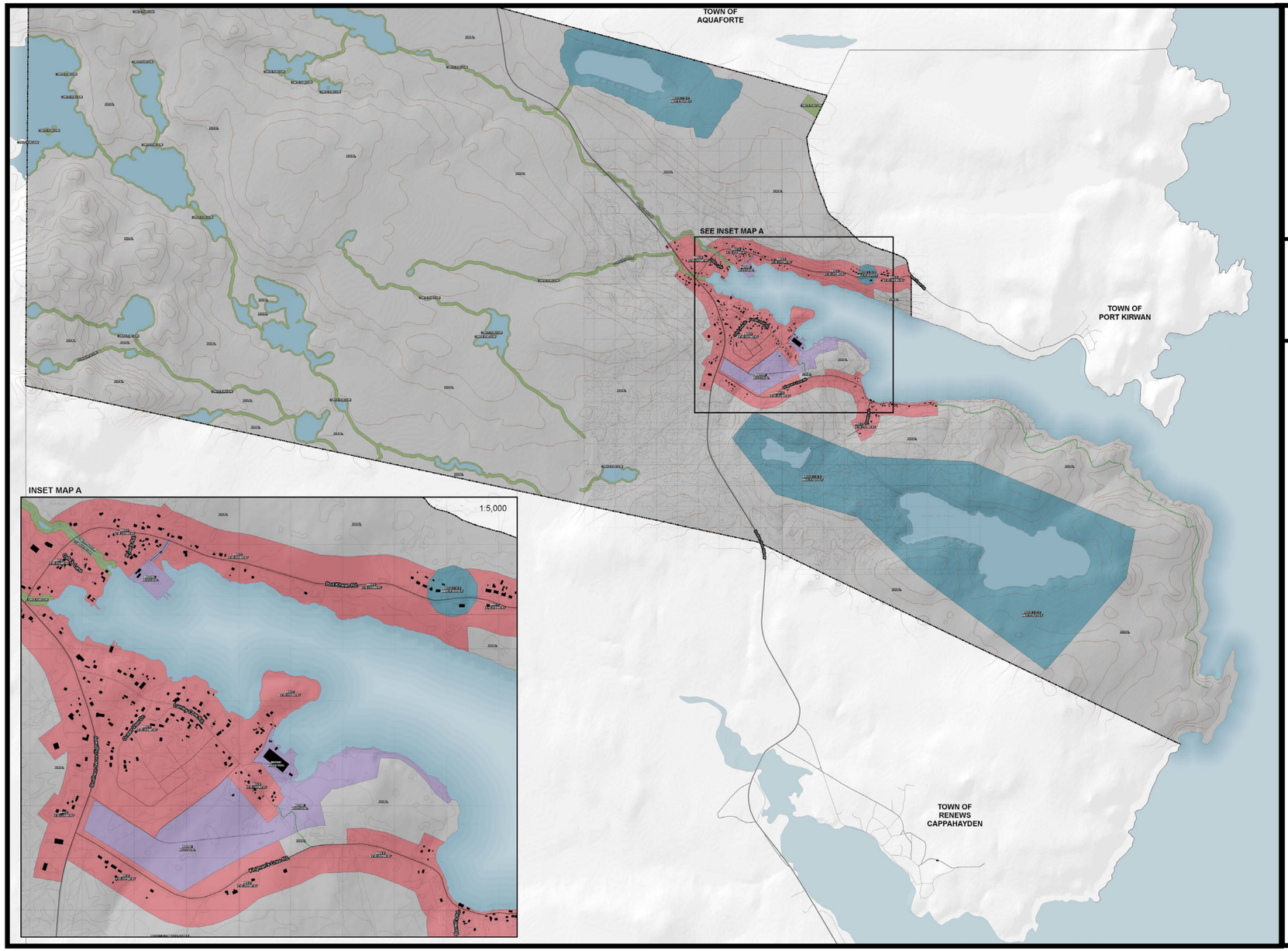

FERMEUSE NFLD INCORPORATED 1967
Built on the Strength of the Sea

TOWN OF FERMEUSE MUNICIPAL PLAN 2016

FUTURE LAND USE MAP

Land Use Designation

- Mixed Development
- Marine Industrial
- Conservation
- Rural
- Protected Water Supply

Transportation Hierarchy

- Highway
- Collector
- Local
- East Coast Trail
- Future Road

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4.1.3 Physical Environment

4.1.3.1 Existing Site and Residential Areas

The proposed spool base site (refer to Figure 3 above) is uninhabited and mainly located at the base of a hillside which is very steep. As a result of this steep terrain, the shoreline has remained uninhabited with no physical buildings located there. The nearest residents would be atop the hill living along Port Kirwan Road and their views to the south would not include the spool base below.

The harbour in Fermeuse is surrounded by hills (see Figure 5 for aerial photograph of west end 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 assess subsurface conditions for most efficient construction. Rock found in the hilly terrain on the project site will be utilized during construction and used as rock fill, as necessary. Any other suitable material that is excavated during construction will be stock piled and used during construction. Estimated quantity of rock fill for the project is 350,000 cubic meters.

Figure 5: Aerial photograph of Fermeuse Harbour – spool base east end only on lower right (Department of Fisheries and Oceans)

4.1.3.2 Physical and Biological Description of Spool Base North Shore Location

In July 2018, a Marine Habitat Characterization Survey was completed by LGL Limited for FEL. The report gives a detailed physical and biological description of the potential site and can be found in Appendix A of this report.

The various marine and surficial types observed within the project area during the marine survey are very typical of the Newfoundland coastal region and it would be reasonable to expect that various finfish, marine mammals and shellfish species that are typical to the Newfoundland coastal region could possibly be transient in the project area. The survey noted, however, that there are no at risk species in the project area.

4.1.3.3 Transportation Routes

The main transportation routes in the area are the Southern Shore Highway, Kingman's Cove Road, Lumley Cove Road, and Port Kirwan Road (identified in Figures 3 and Figure 4 above).

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 (see Figure 4 above).

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.

Impact on the traffic on Port Kirwan Road will be minimized because bulks items used for spool base construction, i.e., long pipes, will not be transported by roadway. Instead they will be transported by water. This means that industrial traffic to and from the spool base site will be limited to small vehicle traffic produced by workers and occasional visitors at the spool base, although occasional tractor trailer traffic may be required from time to time especially during construction.

4.1.3.4 Fresh Water Inventory

There are two protected surface water intakes that supply Fermeuse with fresh water. One is located approximately 1.5 kilometers from the project site at Merrymeeting Pond, while the other is 1.6 kilometers from the project site at Bear Cove Pond, both of which are located across the harbour and protected by cliffs and hillside on that south side. See Figure 6.

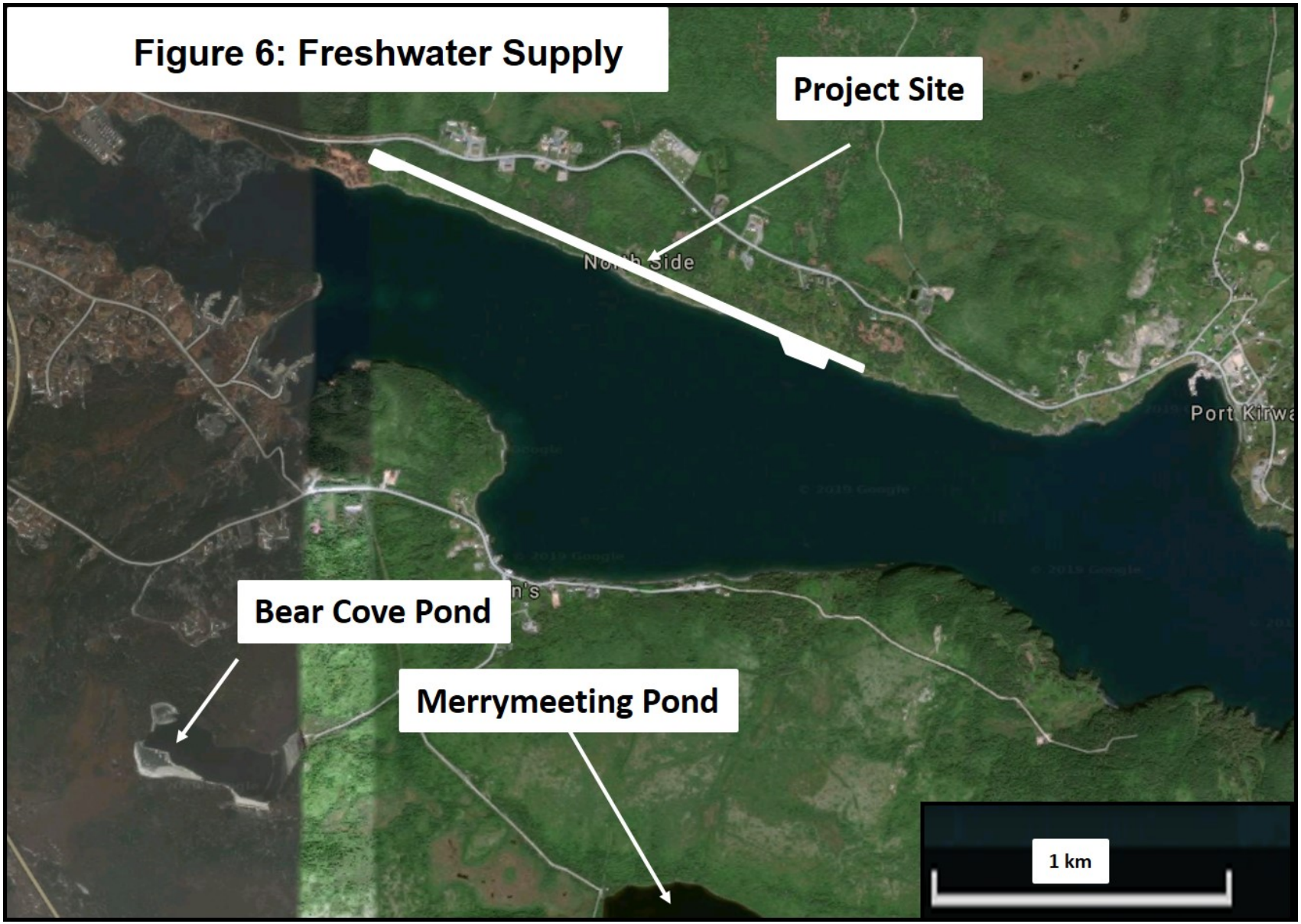


Figure 6: Freshwater Supply
Project Site
Bear Cove Pond
Merrymeeting Pond
1 km

There are two public wells located on the North Side of Fermeuse Harbour at Port Kirwan. The closest public well to the project site is located approximately 200 metres away and is an unprotected groundwater wellhead site. See Figure 7 below. However, due to the large elevation difference between the property and the project site, blasting operations (limited to construction only) will not affect the wells at these properties. For greater certainty, relevant wells will be actively monitored during construction of the project site and local residents will be engaged to ensure they are aware of activities and how any concerns may be reported by them to FEL.

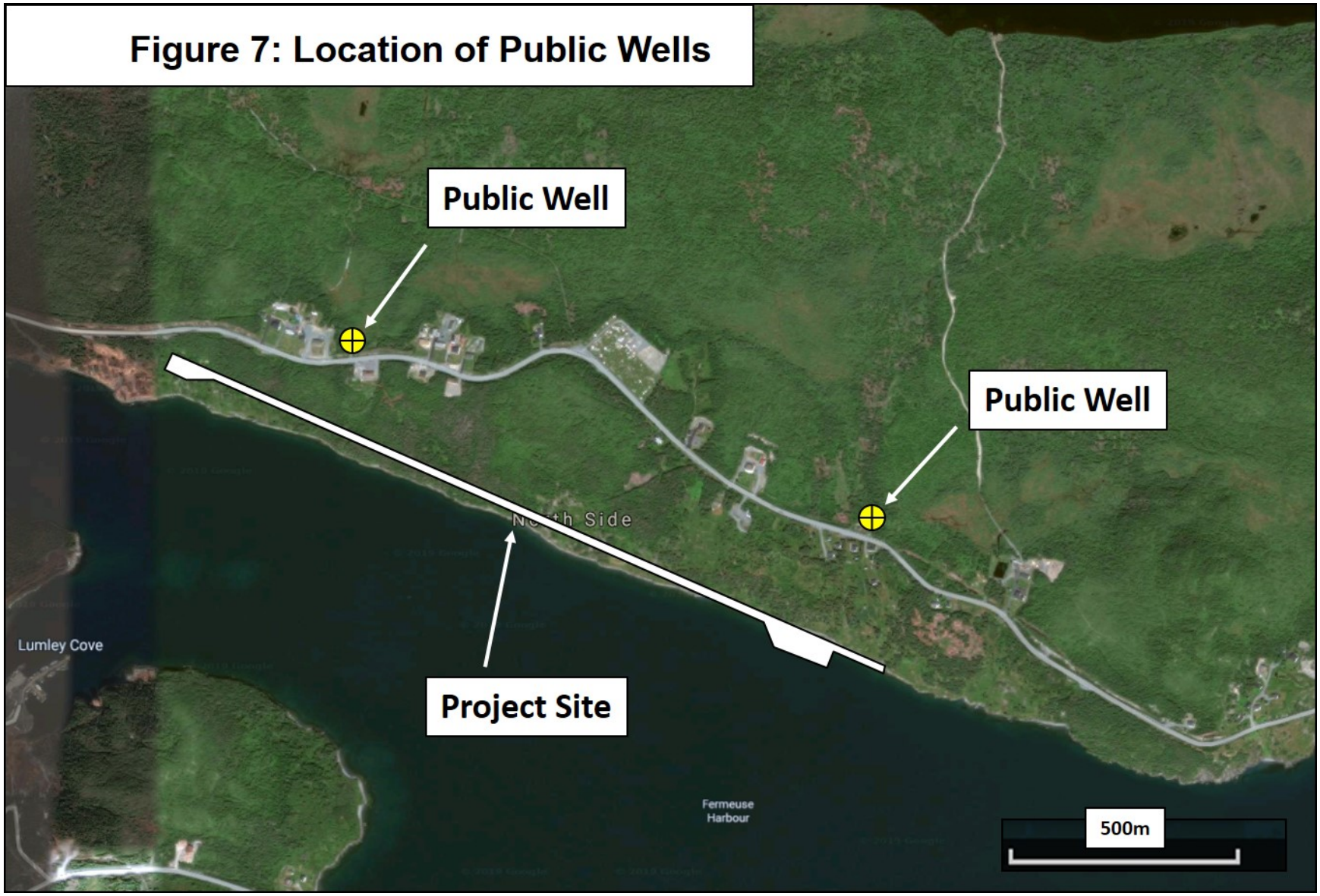


Figure 7: Location of Public Wells
Public Well
Public Well
Project Site
Lumley Cove
Fermeuse Harbour
500m

4.1.3.5 Hiking Trails and Tourist Attractions

No hiking trails or other tourist attractions have been identified at the site along the north side of the harbour. 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 Harbour. The East Coast Trail (Spurwink Island Path) offers a trail between Aquaforte and Port Kirwan. The Port Kirwan access point to the Spurwink Island Path begins/ends behind a church at the eastern end of Port Kirwan which is over one kilometer away from the end of the eastern end of the proposed spool base site.

4.1.3.6 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 (see Section 6 below for further discussion about mitigation assessments and planning). 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 (see Section 6 below for further discussion about mitigation assessments and planning). Also, Section 4.2 (below) covers Construction in greater detail.

4.1.3.7 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. Figure 8 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 with 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).

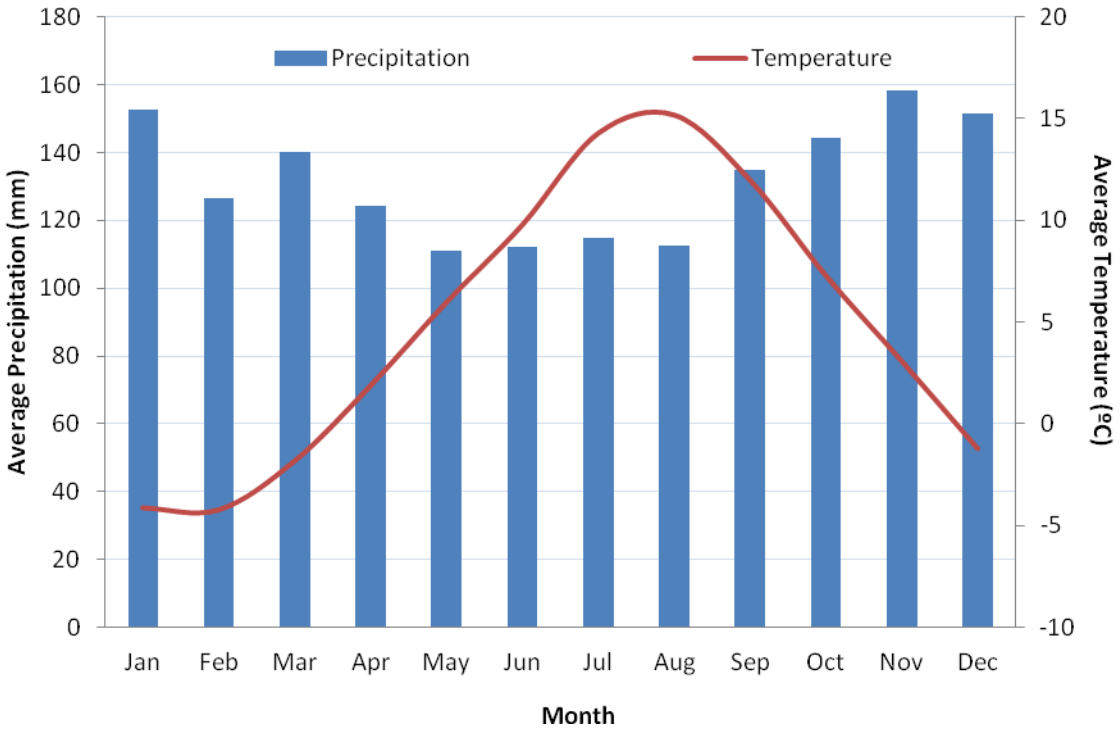


Figure 8 - Average Monthly Precipitation and Temperature near Project region.

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 Figure 9.

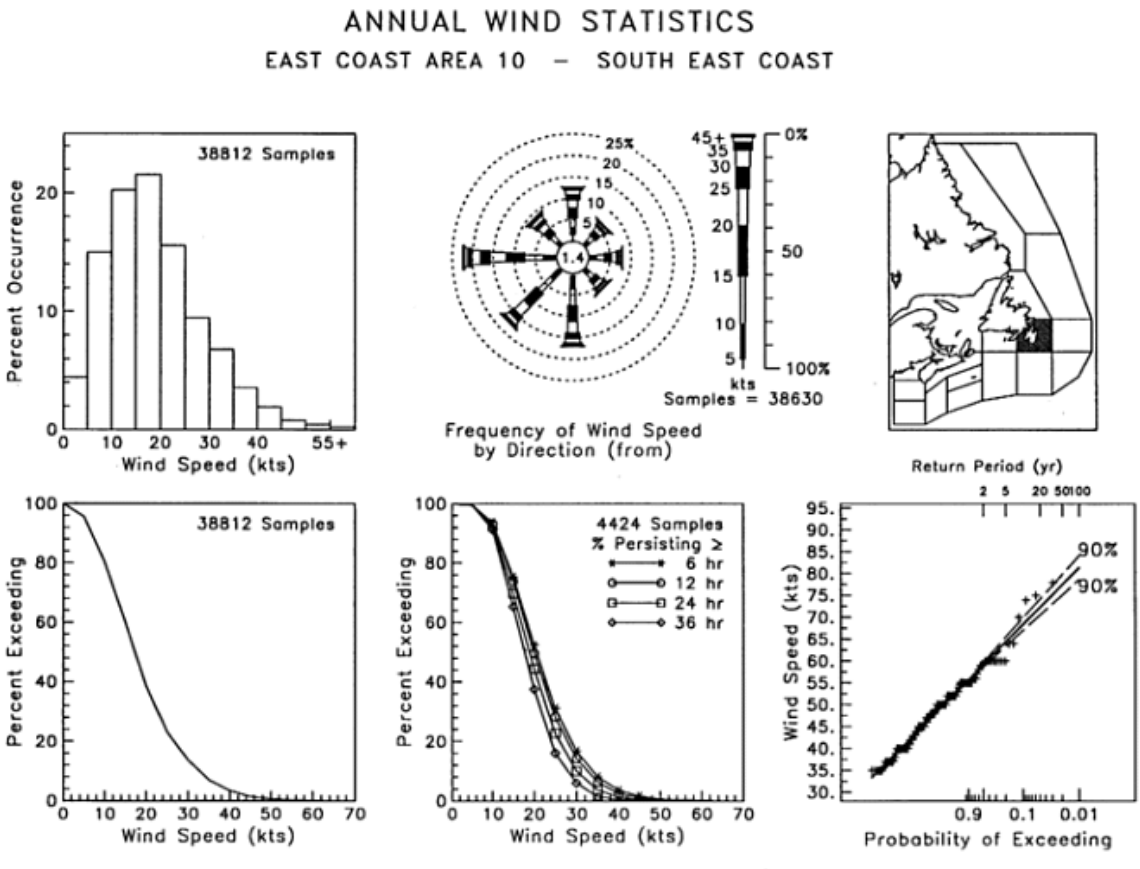


Figure 9 - Annual Wind Statistics (Wind and Wave Climate Atlas, http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/atlas-eng.htm)

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 below for a map showing the general sensitivity to sea-level rise due to climate warming of the coastlines of the south east coast of Newfoundland and Labrador. 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. While this scale may be imprecise it affords an effective best estimate for future trending.

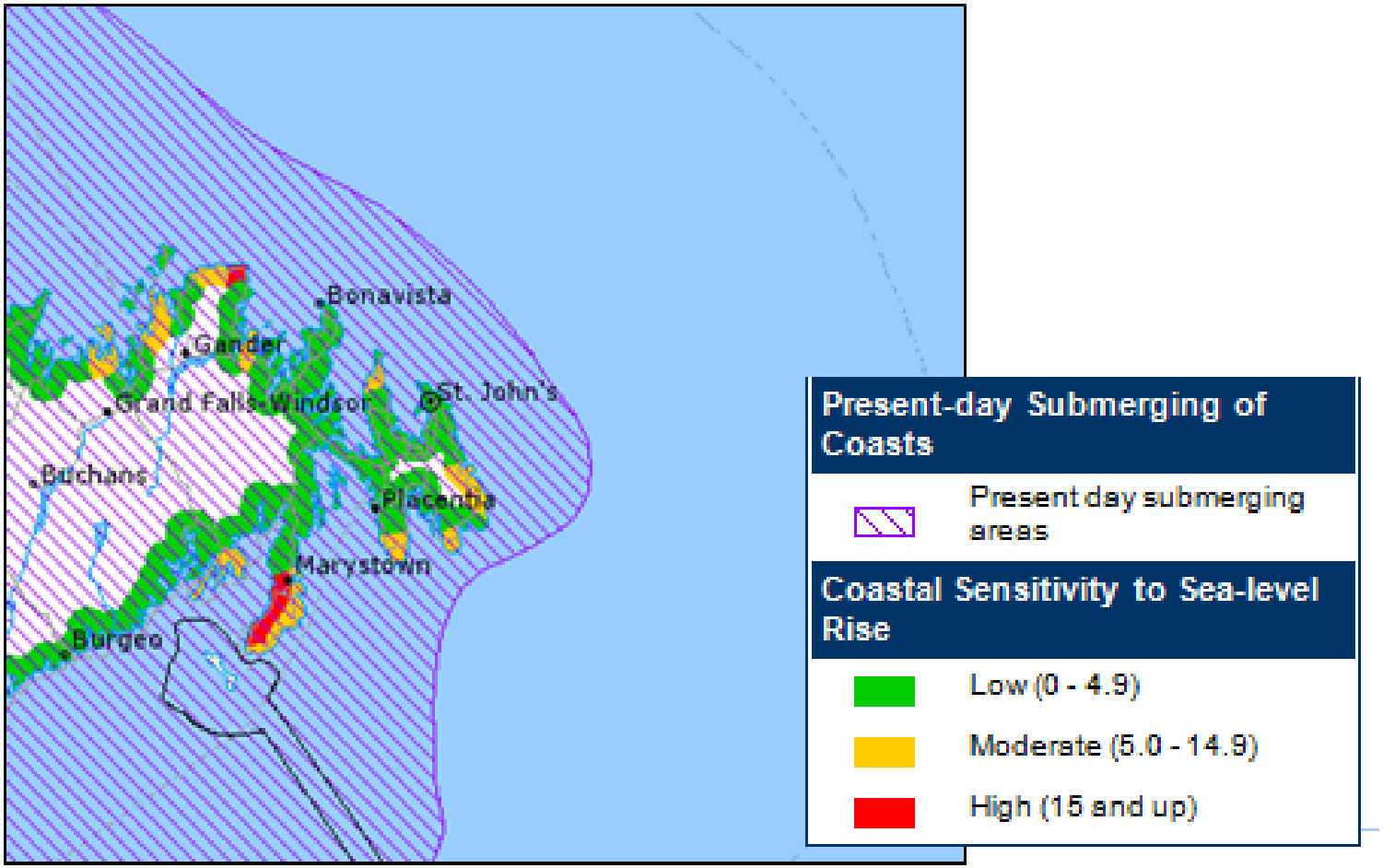


Figure 10: Coastal Sensitivity to Sea Level for South East Coast of Newfoundland and Labrador

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, although the harbour itself is very well protected from the open sea.

The Newfoundland Labrador Department of Municipal Affairs and Environment 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 (see Section 4.2.15).

4.2 CONSTRUCTION

The construction of the spool base involves clearing and excavation onshore. This 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 access road;
- Marine construction, including pile drilling;
- Infill behind wharf structures;
- Installation of site services, e.g., water, sewer, electrical, fuel, etc.;
- Installation of new fabrication building and pipe racks;
- Paving and landscaping;
- Transportation.

A site plan for the development has been established and is presented in Appendix B. The conceptual site plans include locations for buildings and pipe racks. The final location of these items will be determined during the design phase of the project.

Visual renderings of the fully developed facility from various vantage points can be found in Appendix C.

4.2.1 Construction Period

Construction of the spool base is expected to start in 2020. Construction is estimated to take 12 to 16 months to complete. The project will begin with the construction of the access road and from there clearing of the land for the fabrication building, temporary storage site and dock. Once that landing area is cleared, cut and fill activities will follow to open the 40 meter wide runway and to build the reinforced earth wall along the shoreline with proper site drainage. This will include excavation and blasting. Backfill material for the earth wall will be taken from the on-site cuts.

Once the cut and fill activities have advanced eastward there will be concurrent construction, including erection of the fabrication building, dock development, and continuing cut and fill operations. Finally, the berth / dolphin facilities for receiving the reel lay vessels will be constructed. Additionally, the spool base will require establishing three-phase electrical power services.

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, although construction season for earthworks will be dependent on the weather.

Estimated quantity of rock fill for the project is 94,000 cubic meters, with approximately half of this fill below high water. A majority of this fill is to widen the laneway for the spooling conveyors and to provide a pad for the fabrication building. Modifications to the site layout have been done to angle it more toward the land to minimize fill in the water. It is anticipated most of the rock fill will be produced by blasting operations. With blasting the existing hillside, it helps produce area to build the required project infrastructure and minimize fill into the water. The current layout will be further modified during detailed design to minimize impact to the existing shoreline. Excess fill will be utilized in development of the southside marine base, access roads, or sold to other developers. Development of the south side marine base – at mimimum a limited initial phase development - will be required to assist with spool production at the north side spool base.

Rockfill used for construction of the facility and placed in the water will be of relatively large stone size with potential for voids, which will become habitat for marine lifeform including fish and crustaceans.

4.2.2.2 Wharf Construction

The wharf structure at the spool base is expected to be either concrete caisson or pile supported concrete deck. Should piles be chosen, it is envisioned they would be installed by drilling them into the seabed and eventually into bedrock. This construction method produces very little noise during installation of the piles. 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.

All construction activity will take place between the hours of 8:00 and 18:00 hours.

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

4.2.2.3 Buildings

All site 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 construction.

4.2.4 Site Access Road

Access to the site will be via Port Kirwan Road by way of a dedicated road. All vehicular access at the site, including parking areas and site roadways, will be developed and constructed as required. See Figure 4 above. Current access road layout is intended to have the least impact to residents. Road construction will be standard granular base with asphalt topping, wide enough for standard tractor trailers with appropriate safety measures including guiderails and/or fencing.

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

N.B. - Section 6 below provides more discussion concerning potential environmental effects associated with the construction and operations of a spool base and details of proposed mitigations.

Noise will be consistent with any heavy construction marine project. The most impact is usually caused by pile driving activities and blasting operations. However, piles will be drilled which will reduce the construction noise. 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 dusk and dawn. Flood lights would be used but concentrated in the area of construction. Night construction will 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.

As stated in Section 5.1 of the Migratory Birds Convention Act, “no person […] shall deposit or permit to be deposited oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.” As such, FEL will ensure that all precautions and appropriate best practices are taken by staff and contractors to prevent fuel leaks from equipment, and that a spill contingency plan is prepared. FEL will ensure that staff and contractors are made aware of this prohibition. Biodegradable alternatives to hydraulic fluid for heavy machinery are commonly available from major manufacturers. Such biodegradable fluids will be used in place of petroleum products whenever possible as a standard for best practices. Fueling and servicing of equipment will not take place within 30 meters of environmentally sensitive areas, including shorelines and wetlands.

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.

4.2.6 Existing Infrastructure and Demolition

Demolition of existing structures at the spool base site will be minimal to nil.

4.2.7 Fresh Water Inventory

There are two protected surface water intakes that supply Fermeuse with fresh water. One is located approximately 1.5 kilometers from the project site at Merrymeeting Pond, while the other is 1.6 kilometers from the project site at Bear Cove Pond, both of which are located across the harbour and protected by cliffs and hillside on that south side. See Figure 6 above.

There are two public wells located on the North Side of Fermeuse Harbour, one owned by the Town of Fermeuse and the other by the Town of Port Kirwan, each one located approximately 200 metres from the site and potential blasting operations. See Figure 7 above. The Town of Fermeuse well is an unprotected groundwater wellhead site which services 12 houses along Port Kirwan Road. However, due to the large elevation difference between the high location of the wells in relation to the low lying project site, blasting operations should in no way affect these two wells. Refer to Figures 6 for well locations.

The Water Resources Management Division (Groundwater Section) was consulted extensively in 2016-2017 during the preparation of the Environmental Review Report for the south side marine base. At that time a response from the Manager, Groundwater Resources, Water Resources Management Division, included an Excel file with a list of all water wells in the Fermeuse area. The list was further discussed with the Town of Fermeuse officials and it was determined and agreed that the majority of private wells listed were abandoned and not in use, although there are private wells on Kingman's Road and along Route 10.

4.2.8 Water, Sewer, and Electrical Services

4.2.8.1 Potable Water

Potable water for the spool base will be supplied by linking into the Town of Fermeuse's eight-inch water line which currently ends very close to the proposed spool base site on the north eastern side of the harbour. It must be noted that spool base fabrication processes require minimal water; for example, for cooling of joint field coatings. Additionally, the water used for these purposes will be recirculated and is virtually free from pollutants. Therefore, this spool base development will require potable water and basic sewer services only. Section 6 below provides more discussion concerning

potential environmental effects associated with the construction and operations of a spool base and details of proposed mitigations.

Water Demand

Water demand for the spool base facility is limited to drinking water, washroom demand, and general site maintenance including general wash down of the facility. Additional water demand from the spool base will be minimal and will not, therefore, place strain on the existing Town water system.

Water Supply

Due to the limited amount of water required for site operations, joining up to the existing and nearby eight-inch waterline owned by the Town of Fermeuse will be more than sufficient for the spool base facility. It is also noted that the Town of Fermeuse is currently considering extending this water line in the near future and that will take it past the spool base area. In the event the Town does this they will decommission the artesian well which currently services 12 houses and they would also extend their fire hydrant coverage. This level of awareness and proactive planning by the Town may present effective opportunities for future infrastructure cooperation.

Water Quality

Water quality will be that of the municipal supply. Water from this site will not be used to supply potable water to ships.

4.2.8.2 Wastewater

There are no immediate plans by the Town of Fermeuse to upgrade sewage infrastructure. There will be no requirements for wastewater lines on the eastern end of the spool base. However, sewer services meeting regulatory environmental compliance will be installed on the western end for the fabrication building.

The wastewater from this development will not increase volumes of wastewater into the Town sewerage system and, therefore, there will be no trigger for Federal Wastewater Systems Effluent Regulations.

Transport Canada's "Vessel Pollution and Dangerous Chemicals Regulation" states in Division 4, Subdivision 5 that "...sewage may be discharged if in the case of a vessel that is in Section I waters or Section II waters, but not in the inland waters of Canada or a designated sewage area, and that is of 400 gross tonnage or more or is certified to carry more than 15 persons, the discharge is made at a distance of at least 12 nautical miles from shore and, if it is made from a holding tank or from facilities for the temporary storage of sewage, at a moderate rate while the vessel is enroute at a speed of at least 4 knots." Therefore, it is fully anticipated that vessels using the facility will follow Transport Canada regulations and discharge waste at least 12 nautical miles from shore as they travel to and from the spool base. No wastewater from vessels will be offloaded at the spool base.

FEL is committed to ensuring that appropriate waste management be 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 requirement of the Department of Environment and the requirements of the Towns of Fermeuse and Port Kirwan.

4.2.8.3 Electrical Services

Electrical services for the facility will 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 11 below). Upgrades may be required to bring electrical services into the site.

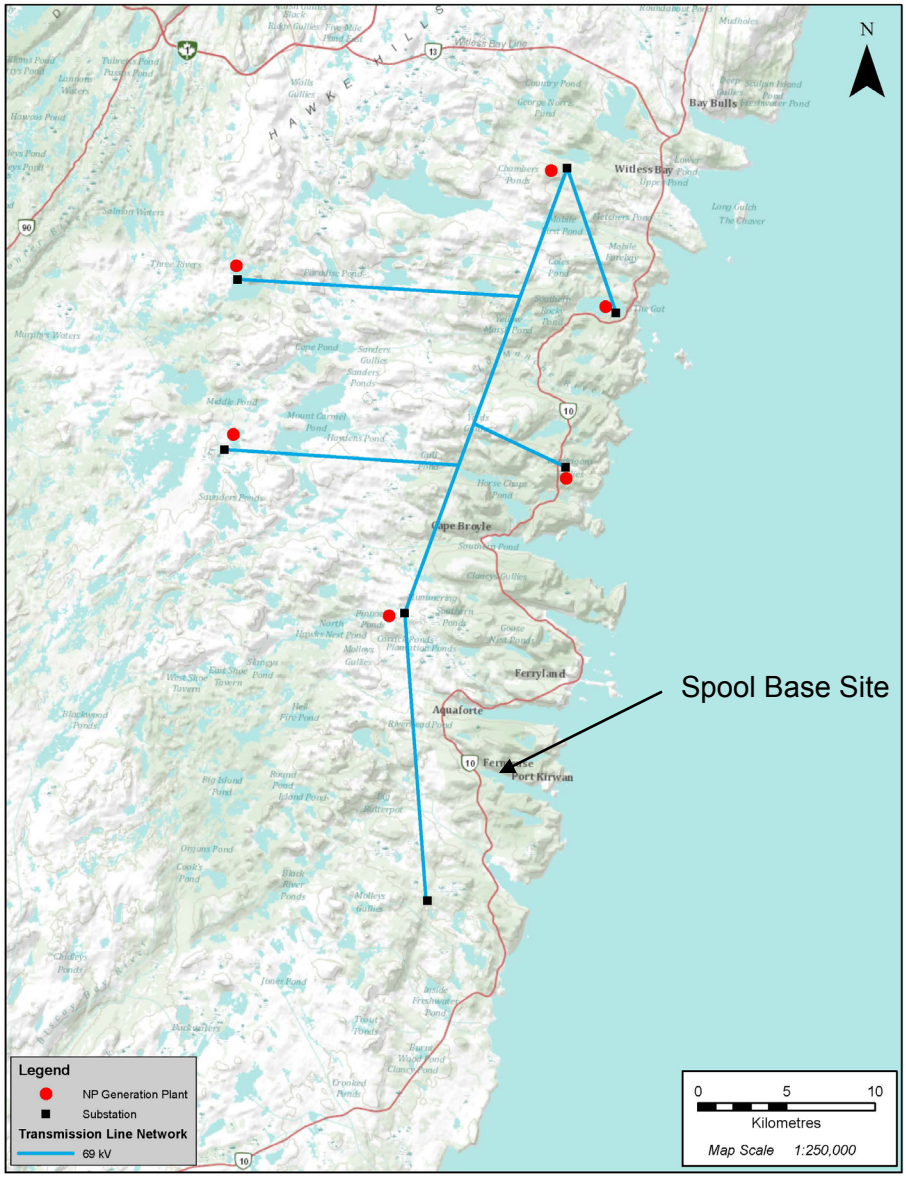


Figure 11: Transmission line network along Southern Shore Highway

4.2.9 Employment

There will be employment opportunities during the construction phase of the spool base in Fermeuse. The construction period will require between 25 and 50 people 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 1 below outlines the expected employment volumes for a typical 12 to 16 month construction phase. At this time, it is assumed that if construction is longer than anticipated then 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 spool base owner 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.

Table 1: Construction Employment Estimate

Spool Base Construction Project																				
Total construction period of 16 months (12-16 Months)																				
Fermeuse Enterprises Limited																				
Month		**NOC 2006**	**Employment Status**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**	**Total Months**
Occupation				**No.**	**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	1	**16**
	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	0.75	**12**
	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	1.50	**24**
	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	0.75	**12**
Ground Work Preparation	Foreman	**0721**	Contract Out	1	1	1	1	1	1	1	1	1	1	1	1	1				**13**
	Labourers / trade helpers	**7611**	Contract Out	12	16	16	17	17	17	12	12	12	12	12	10	5				**170**
	Heavy Equipment Operators	**7421**	Contract Out	5	5	5	5	7	6	6	6	5	5	5	5	5				**70**
Spool Base And Harbour Dev.	Foreman	**0721**	Direct hire			1	1	1	1	1	1	1	1	1	1	1	1	1	1	**14**
	Labourers / trade helpers	**7611**	Contract Out			5	5	6	10	12	11	11	11	11	6	6	6	3	2	**105**
	Dock workers / stevedores	**7451**	Contract Out						3	5	5	5	5	5	5	5	2	2	1	**43**
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	10	6	5	8	1	2	1						**43**
	Labourers / trade helpers	**7611**	Contract Out			8	10	14	10	9	11	3	5	5	4	2				**81**
Electrical Installation	Electrical Foreman	**7202**	Contract Out				1	1	1	1	1	1	1	1	1	1	1	1		**12**
	Electricians	**7242**	Contract Out				1	2	3	4	5	4	3	2	2	2	2	1		**31**

Table 1: Construction Employment Estimate

Spool Base Construction Project																				
Total construction period of 16 months (12-16 Months)																				
Fermeuse Enterprises Limited																				
Month		**NOC 2006**	**Employment Status**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**	**Total Months**
Occupation				**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	
	Labourers / trade helpers	**7611**	Contract Out						1	3	4	3	3	3	3	3	3	1		**27**
	Programmer / Technician	**2241**	Contract Out										1	1	1	1	1			**5**
HVAC Installation	HVAC Foreman (Mech. Engineer)	**2132**	Contract Out						1	1	1		1	1			1	1		**7**
	Technicians	**2232**	Contract Out						1	3	3		1	1	1	1	1	1		**13**
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**
Cranes and devices	Foreman	**7302**	Contract Out										0.50	0.50	0.50	0.50	0.50			**2.5**
	Crane Operator	**7371**	Contract Out											0.50	0.50	0.50	0.50			**2**
Total persons per month / total months				**22**	**26**	**45**	**54**	**66**	**68**	**70**	**77**	**55**	**59.5**	**60**	**48**	**40**	**24**	**15**	**8**	**737.5**

At this time the number of apprentices and journeypersons that will be employed during the construction and operational phases of the project is unknown by the Proponent. Each phase of construction will be tendered to local contractors who will perform the construction work with their own workforces. FEL is committed to monitor employment throughout the life of the Project, including construction and operation phases and to providing quarterly summary reports to the Department of Advanced Education, Skills and Labour (AES). Quarterly employment reports will include but may not be limited to:

- Total employment numbers by 4 digit National Occupational Classification (NOC) code;
- Full-time and part-time employment numbers;
- Location and source of workforce;
- Employment by gender; and
- Number of apprentices and journeypersons for each NOC code.

During construction phase, quarterly employment reports will be completed by FEL project managers with input from the contractor and reports will be submitted directly to AES.

FEL anticipates no additional/specialized training for construction or operations of this project. The construction of the offshore supply base will be basic marine construction and earthworks similar to many other projects constructed by local contractors in Newfoundland and Labrador. The need for additional/specialized training for operations is not anticipated and we expect that qualified personnel would be available in the workforce to fill all fulltime positions at the offshore marine supply base.

4.2.10 Women's Employment Strategies during Construction

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

- Requiring contractors to indicate in their tender bids how they intend to employ women by outlining their proposed women's employment strategies, including employment targets, apprenticeship opportunities, and training opportunities to be carried out during the term of the construction contract.

- 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.

- Requiring all contractors to report to FEL on employment metrics by NOC code, gender, number of workers, and duration of work (hours) within three months of the start-up of contracted work.

- FEL will submit an annual report to the Women's Policy Office, and have an annual meeting with them on accomplishments of FEL's Women's Employment Strategies, including the status of both quantitative and qualitative measures identified in the Development Plan.

- FEL will engage with the Women in Resource Development Corporation (WRDC) and The Office to Advance Women Apprentices (OAWA) as necessary to assist contractors in sourcing qualified tradeswomen and apprentices as well as to develop and/or deliver workplace diversity training and policies to help ensure an inclusive and supportive work environment.

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 the entire southern shore region, as well as from larger centres such as St. John's, Mount Pearl, Conception Bay South, etc. It is not anticipated that commuting workers involved in construction would relocate permanently to the Fermeuse area. Commuting workers may, however, elect to rent property in the area during construction to decrease travel time.

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. The Historic Resources Impact Assessment can be found in Appendix A. This harbour-wide report was produced for the marine base development on the south side of the harbour and its direct applicability for the Spool Base project has been reviewed with the Provincial Archaeology Office.

4.2.14 Sea bottom imaging

LGL Ltd. prepared a Marine Habitat Characterization Survey for the project area in 2018. 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 A.

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 (mainly d 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 and Port Kirwan.

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. The greatest effects will be from blasting operations. These activities will occur during normal work hours and daylight hours between 0800 and 1800 hours. Pile installation through drilling means will have minimal effects on marine life. Drilling piles does not produce the same magnitude of underwater sound and vibration as pile driving. The use of explosives in or near water can cause damage to the swim bladder of fish and there are marine species that it can also cause rupture and hemorrhage to internal organs if within close proximity during these operations. A habitat survey has been completed which indicates that commercial marine life in the area of construction is minimal.

There is some, but limited, potential for disruption to marine and vehicular traffic during construction. Marine construction should be minimally impacted, or not at all, because only a very small and isolated 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, with frequent communications with the local Harbour Authority.

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 drilling areas.

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

The two main surface water supplies with protected intake are located approximately 1.5 kilometers from the project site at Merrymeeting Pond, while the other is 1.6 kilometers from the project site at Bear Cove Pond, both of which are located across the harbour and protected by cliffs and hillside on that south side. Within a one kilometer radius of blasting operations there are two public wells located on the north side of Fermeuse Harbour at Port Kirwan. No harm is anticipated during blasting operations, but the wells will be closely monitored (see section 4.1.2.4 above).

The greatest negative effect on quality of life for residents 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 activity bringing associated economic spinoffs for the benefit of the Towns and local commercial interests. Currently there is one restaurant and one convenience store/gas bar in Fermeuse. It is expected that business will increase markedly for these two establishments during construction and operations of the spool base, and there may even be the emergence of new small business opportunities.

Section 6 below provides more discussion concerning potential environmental effects associated with the construction and operations of a spool base and details of proposed mitigations.

4.3 OPERATION AND MAINTENANCE

4.3.1 Infrastructure

In addition to the berths and small laydown areas, the spool base will require the following infrastructure to support operations:

- Fabrication/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 building from the existing Town water distribution system. Sewage facilities will be tied into the existing Town system.

Adequate site roadways will be required to safely handle on-site vehicular traffic, including site cranes. A power distribution system will be incorporated to supply the building and equipment. Site lighting will be provided by appropriately sized masts.

The spool base will be equipped with voice/data communication both internally and externally. A computerized 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 and maintenance 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 will be limited in any case and the type of building will be determined during design phase.

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. Additional area is required for pipe rollers to allow continuous fabrication of pipe to be spooled onto the vessel, i.e., along the long narrow runway.

4.3.1.4 Storage and Handling of Bulk and Hazardous Materials

There will be no storage of bulk and hazardous materials at the spool base facility.

4.3.1.5 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.

4.3.1.6 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. Section 6 below provides more discussion concerning potential environmental effects associated with the construction and operations of a spool base and details of proposed mitigations.

4.3.1.7 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 Towns of Fermeuse and Port Kirwan.

4.3.1.8 Site Security

To maintain security at the spool 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 spool base entry and exit protocols will be implemented and followed.

4.3.1.9 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.

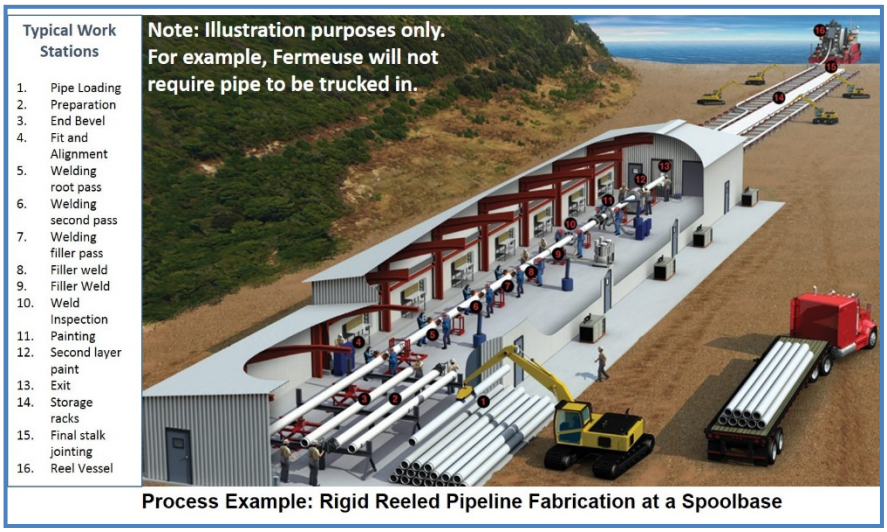
The use of sea water will be considered for firefighting to reduce the demand on the fresh water supply.

4.3.2 Operation Activities

The spool base operation will follow a simple production line format involving sophisticated and closely monitored welding fabrication and coating methods.

Rigid or other piping and related materials destined for spool base fabrication will be shipped into Fermeuse Harbour and unloaded at the marine base (south side). They will be stored on the south side until required for spool base fabrication.

When ready for spool base fabrication the pipe will be inspected and placed on a small barge at the marine base. The barge will be towed across to the spool base receiving dock on the north side of the harbour. The pipe will be offloaded with a small crane or tractor and, following satisfactory re-inspection, will be placed in ready racks at the front-end of the production line in preparation for inclusion into the pipe stalk production line.



Process Example: Rigid Reeled Pipeline Fabrication at a Spoolbase

Sophisticated Welding Equipment

Factory bevelled pipes will be cleaned using a powered wire brush or re-bevelled to comply with project-specific welding procedure specifications (WPS). If any bevel is considered outside of the acceptable limits after inspection it will be re-bevelled in accordance with the approved WPS. In some cases, a factory supplied bevel could be considered damaged beyond effective repair. The pipe joint would be removed from the ready rack and not allowed to enter the production line.

When a pipe is ready for production it will enter the fabrication building. Once there, in essence, a simple production line format is followed involving sophisticated and closely monitored welding fabrication methods. All fabrication takes place inside the fabrication building.

Mainline production welding verification activities include: welding consumables type, batch/lot number and size, pipe alignment, fit-up and clamping, preheat processes, and all welding passes. All mainline production welding activities take place on the spool base production line under the control of quality control supervisors and highly experienced welding forepersons to ensure that WPS are met. Typical quality control inspection activities are extensive and include: alignment fit up, clamping, preheat and inter-pass temperatures (and gas purge levels, where applicable, in the range of the approved WPS), travel speed and heat input, verification of welder identity number, stalk/weld number, WPS number, pipe joint number, etc.

On completion of the first (root bead) pass and the initial check by the welder(s), visual inspections of the partially completed joint are required. Any remedial work identified at this point shall be immediately re-worked by the welder(s) according to pre-approved procedures including mandatory re-inspection. Fermeuse will employ the latest welding

technologies and train workers accordingly resulting positive technology transfer benefits for the Provincial workforce.

New Technologies
Welding / Tensioning / Coatings

Following acceptance of first pass welding, prior to and during subsequent welding, monitoring of inter-pass temperature is required. On completion of the welded joint and the initial check by the welder(s), visual inspection of the completed joint is required. The initial check, visual inspection and any required remedial work identified at this point must be completed while the joint remains above the minimum pre-heat temperature of the accepted WPS.

Quality control processes are critical. Inspectors must carry out frequent welding audits on the production line. The frequency of the audit will vary according to the project stipulations, but shall be carried out at a minimum of once during each shift. As well, all mainline production welds shall be subjected to 100% “on line” non-destructive examination (NDE) in accordance with approved project supplied procedures. All NDE reports shall be signed and approved by an evaluating and qualified NDE Technician. At the end of each shift, NDE documentation shall be submitted by the responsible NDE Technician supervisor to the spool base quality control manager for review.

Field joint painting and, often special coatings, are normally applied to finished welds. The nature of the paint and / or coatings will vary in accordance with approved project procedures and may be applied by qualified employees or specialized and approved subcontractors. A field joint coating supervisor will report to the spool base superintendent.

As often required by industry projects, finished and approved pipe stalks will be marked with paint at each weld location, typically using 2” high stencils. The relevant stalk number and weld number will be marked on the pipe at 2 locations 180 degrees apart on

each side of the joint. Numbers will be marked prior to completion of field joint coating. The completed pipe string (stalk) will then be lifted from the outbound rollers to the stalk rack to await deployment upon the reel lay vessel.

To ensure minimum impacts occur during daily operations of the spool base, the facility will operate in compliance with all required regulations and permits, and in accordance with the requirements of the building permit.

Fortunately, the daily activities relating to operations of the spool base are largely benign. Other than the assembly, transport and storage of pipe, most of the work will be completed inside the fabrication building.

It must also be noted that the spool base will not be a year round operation. It is a facility that will be used only when a specialized offshore project demands servicing. This means that there will be seasonal industrial activity only, e.g., 4-6 month projects.

The facility is expected to have a 30 year operational life. Its typical daily operating hours will be 7:00am to 5:00pm, although evening shifts may be added for special projects.

4.3.3 Marine Vessels

The spool base will accommodate pipe spooling vessels and small barges.

4.3.3.1 Pipe-Laying Vessels

Pipe-laying vessels are used in the construction of subsea infrastructure. Pipe is loaded onto a large spool on the vessel. The ship’s spool is large enough to allow steel pipe to coil. Pipe is placed through a feeder at the stern of the vessel. These ships use dynamic positioning systems or anchor spreads to maintain position while laying pipe. Pipe can be placed using these vessels at up to 2,500 meters of water depth.

Figure 12: **Seven Oceans Pipe-Laying Vessel** (http://www.shipspotting.com)

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.

4.3.4 Vessel Traffic and Navigation

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

For conceptual design, PIANC navigation guidelines were used. Table 2 summarizes the navigational guidelines recommended by PIANC.

Table 1: PIANC Navigational Guidelines

Feature	Minimum Width	Minimum Water Depth
Approach channels	5-8B: 1-way 10-15B: 2-way	1.15-1.25D
Turning basins (tug assisted)	2L: Sheltered 2.5L: Less sheltered	1.15-1.20D
Alongside berth	4B	1.15D
Anchorage areas	2-3L: Diameter	1.15D

L, maximum overall vessel length
B, maximum vessel beam

D, maximum vessel draft

Applying PIANC's recommendations to the Fermeuse spool base design vessels gives the navigational dimensions in

Table 2. Only the spooling vessel is considered in this calculation. Note that special vessels such as a semi-submersible drill rig or heavy lift vessel is not considered as a design vessel for navigational dimensions. Semi-submersibles and heavy lift vessels will not be part of regular vessel traffic and special navigation criteria as well as transportation weather windows will be typically provided by the marine warranty surveyor for the operator if such vessels are brought into the marine base.

Table 2: Navigational Dimensions Fermeuse Spool Base

Feature	Minimum Width		Minimum Water Depth	
	Required	Actual	Required	Actual
1-way approach channel	5B 140 m	250 m	1.20D 9.0 m	Varies Min: 10 m
Turning basin	2L 314 m	600 m	1.15D 8.63 m	Varies Min: 10 m
Alongside berth (to centreline)	4B 112 m	700 m	1.15D 8.63 m	Varies Min: 10 m

L, maximum overall vessel length, 157 m
B, maximum vessel beam, 28 m
D, maximum vessel draft, 7.5 m

4.3.5 Noise and Light Concerns

The fabrication work at the spool base is not loud. In fact, the style and type of welding equipment is such is that the operation will not be as loud as a typical fabrication shop which, normally, is not overly loud in any case. To the extent that there may be noises from time to time, it may be expected that noise will not be a major concern for residents at all during operations due to the unique location of the fabrication site, i.e., at the base of a large hill and across the harbor from the main community.

To reduce the impacts of noise on residents, a number of measures will be incorporated into the design of the facility. This includes using the natural topography to deflect or isolate noise; the steep terrain will naturally block the noise from entering the residential areas.

Light distraction may result from upward and outward lighting in the night time. 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.

Section 6 below provides more discussion concerning potential environmental effects associated with the construction and operations of a spool base and details of proposed mitigations.

4.3.6 Employment

There will be employment opportunities in the operations phase of the spool base in Fermeuse. It is expected that normal spool base activity will result in the need for 50-70 direct jobs over the life of the facility. The spool 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. Table 5 outlines the expected increase in employees during spooling operations. Note that building and systems maintenance may 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 for building and systems maintenance include labourers (NOC 7611), plumbers (NOC 7251), carpenters (NOC 7271), electricians (NOC 7241) and IT manager (NOC 0213).

Table 4: Operation employment estimates – Full Time Personnel

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	714	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

Table 5: Operation employment estimates – During Spooling Operations

Fermeuse Enterprises Limited			
Occupation	NOC 2006	# of Personnel	Employment Status
Pipe Fitting Superintendent	7213	1	Casual
Welding Superintendent	7214	1	Casual
Pipe Fitting Foreman	7213	2	Casual
Welding Foreman	7214	2	Casual
Welder	7265	15	Casual
Pipe Handler	7252	15	Casual
Labourer	7611	10	Casual

4.3.7 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, Women in Resource Development Corporation (WRDC) and The Office to Advance Women Apprentices (OAWA) to advance women in non-traditional occupations and in apprenticeship.
- 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.

4.3.8 Living Accommodations

Although it may be possible for some workforce to travel daily from larger centres to the spool base, it is expected that a large part of the operational workforce may 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 southern shore region - will be sufficient.

4.3.9 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.

As soon as the project is commissioned, all necessary precautions will be taken to ensure safety of people working at or people visiting the site. Strict procedures will be implemented to ensure that the people responsible are properly trained and that procedures are followed. Personal protective equipment (PPE) guidelines and procedures will be implemented including that all workers within 1.2 metres of the water's edge will be required to wear life vests.

4.3.10 Communications Strategy

FEL is committed to keep the public and the Towns aware of construction activities and operations. Prior to construction 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 social media, FEL's website, local radio stations and, where appropriate, appropriate signage will be erected. Additionally, notification

flyers will also be distributed to residents of Fermeuse, Port Kirwan, and any other municipality that may be affected.

4.3.11 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 and Port Kirwan share many municipal services among neighboring Towns, including emergency services. For example, the Port Kirwan Volunteer Fire Department services the Town of Fermeuse and consists of volunteers from Port Kirwan, Fermeuse, and surrounding communities.

Fire protection for the spool base will be provided throughout the fabrication building yard and in the berth area for loading vessels. The use of sea-water will be considered for fire-fighting to reduce the demand on the fresh water supply.

5 ALTERNATIVES

Prominent and unique among the reasons for the selection and preference of Fermeuse Harbour for the spool base site are 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 the slate of site characteristics possessed by 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, 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 is 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 Towns of Fermeuse and Port Kirwan, as well as the entire 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 local residents and other harbour users kept top of mind. Unlike other potential port developments, in addition to adequate space for supply and spool base development, there are also significant nearby lands within the boundaries of the Town of Fermeuse that can be utilized 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 in many other potential locations.

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 small number of homes

closer to the site, various mitigations measures (see sections above) will be adopted to minimize future impacts.

Compared to certain harbour development or expansion options that may exist elsewhere, there will be minimal environmental impact in Fermeuse. The natural shape, layout and availability of land and water will enable much of the development work to be completed using raw materials on site.

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.

Ultimately, the ability to co-locate the north side spool base with the south side marine service centre makes this the preferred location for a spool base in Canada. This rational co-location of services will establish Fermeuse Harbour as a subsea centre of excellence.

6 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

This section describes potential environmental effects associated with the construction and operations of a spool 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 traffic will be minimally impacted, or not at all, because only a small and isolated 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. FEL will ensure frequent communications with the local Harbour Authority.

During construction, 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 Port Kirwan Road in the past so this will not be unique. The site and access road layout will allow adequate access and parking for personnel working at the spool base, and will help minimize traffic congestion caused by the new facility.

Noise will be consistent with any heavy construction marine project. The most impact during construction will be caused by blasting operations. 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. Piles will also be drilled as opposed to driven. This will significantly reduce construction noise.

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.

FEL has learned that noise from spooling to the vessel has been an issue at other spool base facilities. In particular, the spooling alarms on the vessel have generated noise that can persist during the pipe loading phases. This is a limited problem that may occur during loading of final product only, so may occur a few days a year only. In any case, the natural topography will help mitigate noise pollution at the Fermeuse Spool Base site. The steep cliff faces at the site will help prevent noise travel to nearby residents. The closest residential sites are approximately 150 meters away over a high cliff. Sound can travel at night over water; however, the closest residents near water would be across the harbour, some 600 to 800 meters away. If noise does become an issue during loading exercises, the problem can be largely mitigated by adjusting the volume of the spooling alarms at the facility. This mitigation measure has been successfully used at other spooling facilities with success. If reducing the spooling alarm volume still does not mitigate the issue, spooling at night would be avoided.

Proper measures will be taken to ensure that dust is controlled during construction and operations (although dust is not an operational concern). 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 re-vegetated 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, if any, dust control concerns associated with operations, but monitoring will occur and effective controls will be implemented if necessary.

The project will avoid using explosives in or near water wherever possible. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

If explosives are required as part of a project in or near the water the potential for impacts to fish and fish habitat will be minimized by adhering to "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters" (Wright and Hopky, 1998) and mitigation measures provided therein where applicable.

As recommended by Environment Canada, the following beneficial management practices for working on shorelines will be followed:

- Staff, contractors and visitors will not approach concentrations of seabirds, sea ducks or shorebirds;
- All vessels will use the main navigation channels to get to and from the site; and will have well muffled machinery;
- Staff and contractors will undertake any measures that may minimize or eliminate discharge of oily waste into the marine environment;
- Food scraps and other garbage left on beaches and other coastal habitats can artificially enhance the populations of avian and mammalian predators of eggs and chicks. FEL will ensure that no litter (including food waste) is left in coastal areas by their staff and/or contractors; and
- If there is any noticeable change in seabird numbers or distribution at the location during operations, Environment Canada shall be notified.

6.2 EFFECTS OF CONSTRUCTION/OPERATIONS ON MIGRATORY BIRDS

The project site 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.

Due to the proximity of the Witless Bay Ecological Reserve and due to the propensity of seabirds (particularly storm petrels and newly-fledged puffins) from that reserve to be attracted to light, it is possible that migratory birds could be attracted to and potentially be stranded on the site. Environment Canada has recommended that a site monitoring plan be developed for the migratory bird breeding season, as well as the spring and fall migration periods, and implemented while floodlights are being used during nighttime hours. A site monitoring plan will include protocols such as dusk and dawn site inspections to look for petrels or puffins that may have landed on site, and/or inclusion of migratory bird searches into standard occupational health and safety daily inspections, etc.

Should puffins and/or storm-petrels become stranded on the project site, both during construction and operations phases, FEL will adhere to The Leach's Storm-Petrel: General Information and Handling Instructions. If a permit is required, FEL will advise that such a permit is in place prior to the initiation of proposed activities. If any other migratory birds, e.g., Black-legged Kittiwake, Black Guillemot, etc., are found stranded on-site, FEL shall immediately contact Environment Canada for further instructions.

Several measures will be taken to minimize the risks to birds blown onto the site due to environmental conditions. The spool base will not normally have any hazardous materials on site, but in order to prevent birds from coming into contact with any possible 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. These actions shall be codified in an Avifauna Management Plan or will be included in the Environmental

Protection Plan. To develop this plan the documents “Planning Ahead to Reduce Risks to Migratory Bird Nests” and “Avoidance Guidelines” found on the Environment Canada’s website will be consulted. Planning will include processes to follow should an active nest be found at any time of the year.

Since a portion of the construction will be occurring during breeding season, it may be necessary to install commercially available bird deterrent systems to prevent birds from initiating nesting on structures, especially prior to the arrival of migratory birds in the spring. Commercially available bird deterrent systems such as wire grids and spike belts have proven effective for preventing nesting on roofs and ledges.

To reduce the likelihood of birds being injured by collision with structures, glass windows will be evaluated during/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 to be 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

Pipe fabrication will occur at the spool base facility. Pipe arriving at the spool base will be shipped via barge from the offshore marine base across the harbour.

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 any requirements of the Towns of Fermeuse and Port Kirwan. During construction a solid waste management plan will be developed to divert as much material away from landfill sites as possible.

Prior to disposal all waste material will be considered 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.

FEL acknowledges the need to implement a Waste Management Plan which includes, but will not be limited to, the following information:

- Description of the handling of waste dangerous goods/hazardous waste (WDG/HW) at the project;
- Identification of waste materials and information regarding the handling, storage, transport, treatment and disposal of waste materials associated with the project;
- Contingency plan;
- Site plan indicating the storage of WDG/HW containers and proximity to other buildings; and
- Training programs for employees such as WHMIS and transportation and handling of dangerous goods and hazardous waste.

This information will be provided during the permitting of the project. A Waste Management Plan will be included in the Environmental Protection Plan.

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.

The two main surface water supplies with protected intake are located approximately 1.5 kilometers from the project site at Merrymeeting Pond, while the other is 1.6 kilometers from the project site at Bear Cove Pond, both of which are located across the harbour and protected by cliffs and hillside on that south side. Within a 200 meter radius of blasting operations there are two public wells located on the north side of Fermeuse Harbour at Port Kirwan. Due to the topography of the area, i.e. much higher elevation of the wells compared to the project site, contamination or disruption of these water bodies or water wells is not expected. Even though no harm is anticipated during blasting operations, the wells will be closely monitored during blasting operations. See Figure 6 and 7 above.

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.

The project will avoid using explosives in or near water wherever possible. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

If explosives are required as part of a project in or near the water the potential for impacts to fish and fish habitat will be minimized by adhering to “Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters” (Wright and Hopky, 1998) and mitigation measures provided therein where applicable.

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, where there is a risk of sedimentation, avoiding driving vehicles on uncovered/exposed soil when possible, and re-vegetating 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 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. FEL is committed to ensuring that a proactive approach rather than a reactive approach is taken with regards to sedimentation and erosion control.

6.7 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). It is expected there will be minimal to no hazardous materials on this project site.

6.8 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 EP is outlined in Table 6 below.

Table 6: Table of contents for the Environmental Protection Plan.

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6.9 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.

6.10 ENVIRONMENTAL EFFECTS RESULTING FROM MARINE ACTIVITIES

Activities such as pile drilling and construction of berths may also cause a temporary release or re-suspension of sediments. 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 drilling areas.

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

The project will avoid using explosives in or near water wherever possible. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

If explosives are required as part of a project in or near the water the potential for impacts to fish and fish habitat will be minimized by adhering to “Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters” (Wright and Hopky, 1998) and mitigation measures provided therein where applicable.

6.11 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.

In general volumes of chemicals on site will be very low, but there may be typical incidents with low volume spills related to refuelling of vehicles or burst hydraulic hoses from vehicles and equipment on-site. Also, minor maintenance on the movable equipment can create such minor spills. An additional issue may arise with wash water coming from the cleaning of vehicles on site (mainly heavy duty excavators used for pipe handling and stalk pulling). This water can be oily and dirty, staining the gravel and creating a diffused effluence, which can ultimately end up in sea. The majority of these issues will be resolved by constructing a concrete wash bay and refuelling station with integrated oil water and sediment separator.

6.12 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 7 below 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 7: 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

6.13 VISIBILITY OF THE FACILITY FROM PUBLIC AREAS

The facility will be within the existing municipal boundaries of Fermeuse and Port Kirwan; therefore, the facility will have some visual impact on the harbour area. The effect of the impact is subjective and as such will vary from one person to another, and, of course, from one vantage point to another. Most visibility of the site will be from the southern side of the harbour, although there will be limited visibility from the more populated south western end of the harbour; and, there will be virtually no visibility from the northern side of the harbour. As much as possible, the spool 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 Towns due to natural topography, but additional buffer zones will be created, wherever possible, to increase the distance between the public and the spool base, thereby reducing the visual impact of the facility.

6.14 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 (mainly marine);

- Resource harvesting, e.g., fisheries, hunting;
- Surface groundwater;
- Quality of life for residents of Fermeuse and Port Kirwan.

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, with frequent communications with the local Harbour Authority.

Required backfilling and pile drilling 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 resident within the backfill and pile drilling 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 public fresh water wells located on the North Side of Fermeuse Harbour, one owned by the Town of Fermeuse and the other by the Town of Port Kirwan. The closest public well to the project site, i.e., owned by the Town of Fermeuse, is located approximately 200 metres from potential blasting operations and it is an unprotected groundwater wellhead site which services 12 houses along Port Kirwan Road. There are also private wells on Kingman's Road and along Route 10 (both areas are over a kilometer from the project site and on the other side of the harbour). None of these wells,

particularly the closest ones off of Port Kirwan Road, will be affected by construction or operational activities, especially blasting because of their higher elevations.

There are no identified walking trails within the footprint of the project site. An East Coast Trail emerges from the nearby community of Port Kirwan, but those trail users follow Port Kirwan Road which is separate and apart from the proposed spool base site.

The greatest negative effect on quality of life of residence near the project site may be noise and light during construction, as discussed in earlier sections of this report. However, positive effects on quality of life are possible with construction activity bringing associated economic spinoffs for the benefit of the Town and local commercial interests. Currently there is one restaurant and one convenience store/gas bar in the Town. It is expected that business will increase markedly for these two commercial establishments during construction and operations of the spool base, and there may even be the emergence of new small business opportunities.

As also discussed earlier in this report, the spool base site will be totally invisible for resident living along Port Kirwan road because of the very steep drop to the harbour directly behind their houses. The configurations for this project naturally take advantage of topography. The spool base access road, fabrication building, pipe runway, and vessel loading area will be cut into the hillside below resulting in no loss of view plane. The site will be visible from certain parts of the southern side of the harbour, although less so for the predominantly populated south western end.

During the Operations phase, the fabrication work at the spool base is not a loud activity. The style and type of welding equipment is such is that the operation will not be as loud as a typical fabrication shop which, normally, is not overly loud in any case. To the extent that there may be noises from time to time, it may be expected that noise will not be a major concern for residents at all during operations due to the unique location of the fabrication site, i.e., at the base of a large hill and across the harbor from the main community.

FEL has learned that noise from spooling to the vessel has been an issue at other spool base facilities. In particular, the spooling alarms on the vessel have generated noise that can persist during the pipe loading phases. This is a limited problem that may occur during loading of final product only, so may occur a few days a year only. In any case,

the natural topography will help mitigate noise pollution at the Fermeuse Spool Base site. The high cliff face at the site will help prevent noise travel to nearby residents. The closest residential sites are approximately 150 meters away up over a steep, high cliff. Sound can travel at night over water; however, the closest residents near water would be across the harbour, some 600 to 800 meters away. If noise does become an issue during loading exercises, the problem can be largely mitigated by adjusting the volume of the spooling alarms at the facility. This mitigation measure has been successfully used at other spooling facilities with success. If reducing the spooling alarm volume still does not mitigate the issue, spooling at night would be avoided.

7 PUBLIC INFORMATION MEETINGS

Since, at least, October 2012, FEL has conducted many informal, formal and public meetings to inform and explain that FEL is studying and promoting various options for the development of Fermeuse Harbour to support the oil and gas industry. The nature and extent of FEL's plans are very well known in the Fermeuse and southern shore areas.

Over the years FEL has maintained continuing close contact concerning its development proposals with the Town Councils of Fermeuse and Port Kirwan, the Fermeuse-Port Kirwan Harbour Authority (representing fishery interests), individual fishers, local residents and other local organizations. Past consultations included three publicly advertised open house information sessions in Fermeuse, including November 2014 (40 people attended); December 18, 2014 (close to 100 people attended); and on August 18, 2015 (45 people attended). All residents of Fermeuse and Port Kirwan were notified of these meetings in advance and invited to listen and share their opinions.

Consultations directly related to this proposed spool base project have built on this history of full disclosure to the Towns and residents most likely to be directly impacted by harbour development. In particular, the first groups that FEL spoke to about the proposed north shore side spool base were the local residents living near there or owning properties on that north shore of Fermeuse Harbour, as well as the two Town Councils.

Specifically related to the spool base proposal, FEL conducted two public meetings at the Community Hall in Fermeuse in 2018: July 17, 2018 (35 people attended) and on December 18, 2018 (42 people attended). As before, all residents of Fermeuse and Port Kirwan were notified of these meetings in advance and invited to listen and share their opinions. A 46-slide PowerPoint presentation was provided at each of these meetings by FEL's project manager, Mr. Mike Rose. This presentation highlighted studies, analyses, actions and recommendations taken by FEL since previous public meetings in the area and, in particular, highlighted and explained FEL's plans to construct a spool base on the north shore of Fermeuse Harbour.

A very similar presentation was made by Mr. Rose to the Southern Shore Joint Council (SSJC) on November 8, 2018. The SSJC is an association composed of representatives of municipal councils and local service districts of the eastern portion of the Irish Loop of the Avalon Peninsula of Newfoundland and Labrador. This event included a dozen senior municipal leaders from the area.

In all meetings the purpose and direction of the Fermeuse project was openly discussed. The views expressed by those attending the spool base consultation meetings were generally very supportive with most people acknowledging and accepting the positive significance for economic revitalization, new jobs, and social benefits that the Fermeuse projects can deliver. The municipalities also understand that new development will create new challenges such as increasing service requirements, road traffic increases, infrastructure improvements, municipal sharing options, etc. It is anticipated that economic growth may generate new demands.

FEL has heard and understands the Town's and SSJC's responsibility to anticipate and plan effectively for the future. If permitted to do so, FEL will gladly continue to work closely with and support the Towns and SSJC to realize positive social and economic benefits, such as a growing municipal tax base, as a result of our project. But, it will also be critical to work with the Towns and SSJC - and Provincial and Federal Governments - to forecast and plan for any and all services and infrastructure improvements advisable to support and alleviate new demands or challenges that may arise from economic growth.

FEL especially appreciates and understands the continuing importance of Fermeuse/Port Kirwan harbour as the home for nearly 400 residents and as an active 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 and Port Kirwan residents, the fishing industry, neighbouring municipalities, and the local business community.

8 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. Lumley Cove, Fermeuse - Historic resources impact assessment.

LGL Limited. 2018. Marine habitat characterization survey in Fermeuse Harbour, NL, July 2018.

9 APPROVAL OF THE UNDERTAKING

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

Table 8: Potentially Applicable Provincial and Municipal Authorizations

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Department of Municipal Affairs and Environment		
Environmental Assessment Division	Release from Environmental Assessment	General
Water Resources Division	Permit for Development Activity in Protected Public Supply Area	Piping, intake and pump house construction near Bear Cove Pond
Water Resources Management 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 Management Division	Schedule H - Environmental Approval of Other Alterations	Other works within 15 meters of a Body of Water.
Water Resources Management Division	Certificate of Approval for Site Drainage	Water run-off from the project site.
Water Resources Management Division	Section 36 – Permit to Construct Wastewater Infrastructure	Extension/Rerouting of Town's Existing Sewer Outfall in Phase 2 of the Project. If it is Agreed On-Site Wastewater Treatment System will be Public and Shared Between the Proponent and the Town, Approval from ECC is Required
	Environmental Protection Plan (EPP) – Construction	General
Department of Natural Resources		
Mines and Energy Branch	Magazine Licence	

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Mines and Energy Branch	Explosives Transportation Permit	
Mines and Energy Branch	Quarry Permit	
Department of Fisheries and Land Resources		
Fisheries and Land Resources	Licence to Occupy Crown Land	
Service NL		
Service NL	Permit for Approval of Waterworks Under Section 37 of Water Resources Act.	Development of Private Water Source
Service NL	Permit for Approval of Sewage Works Under Section 36 of Water Resources Act.	Development of Private On-Site Wastewater Treatment System – in case where Wastewater Treatment System is not shared with Town
Service NL	Water Supply Testing	Development of Private Water Source
Service NL	Certificate of Approval – Storage and Handling of Gasoline and associated products.	Fuel Storage and handling.
Service NL	Permit for Flammable and Combustible Liquid Storing and Dispensing (Above or Below Ground) and for Bulk Storage (above ground only)	Fuel Storage and dispensing.
Service NL	Storage Tank System Application	All Storage Tanks on Site Including Waste Oil Tanks.
Service NL	Compliance Standards – National Fire Code, National Building Code and Life Safety Code	All Buildings on Site.
Service NL	Building Accessibility Exemption	All Building on Site
Service NL	Statutory Declaration for Registration of Boiler and Pressure Vessel Fittings Fabricated in Newfoundland and Labrador	
Service NL	Contractor's License – Pressure Piping System	
Service NL	Examination and Certification of Welders and Blazers	
Service NL	Examination and Certification of Propane System Installers	

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
Service NL	Occupational Health and Safety Manual	General
Department of Transportation and Works		
Transportation and Works	Compliance Standard – Storing, handling and transporting dangerous goods	General
Department of Tourism, Culture, Industry and Innovation		
Human Resources Labour and Employment	Compliance Standard – Occupational Health and Safety	Project-related employment
Department of Tourism, Culture, Industry and Innovation		
Department of Tourism, Culture, Industry and Innovation	Compliance Standard – Historic Resources Act	Construction and operation.
Town of Fermeuse		
Town of Fermeuse	Compliance Standard / Municipal Development Plan	Project Construction and Operation

Table 9: Potentially Applicable Federal Authorizations

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

Government Agency	Permit, Authorization, Approval	Activity Requiring Compliance
		mortality of migratory birds and endangered species and any species under federal authority.

10 REFERENCES

2016, NL Department of Environment and Conservation (DOEC), Water Resources Management Division, Water Resources Portal, Open Water Resources Map Viewer, Fermeuse Watershed, https://maps.gov.nl.ca/water/mapbrowser/Default.aspx

2005, NL Department of Environment and Conservation (DOEC), Water Resources Management Division, *Guidelines for the Design, Construction and Operation of Water and Sewerage Systems*

1989, NL Department of Environment and Conservation (DOEC), *Water Resources Management Division, Regional Water Resources Study of the Eastern Avalon Peninsula*

2003, Metcalf and Eddy, McGraw-Hill, *Wastewater Engineering, Treatment and Reuse*, Fourth Edition

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APPENDIX A: 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

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.

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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.

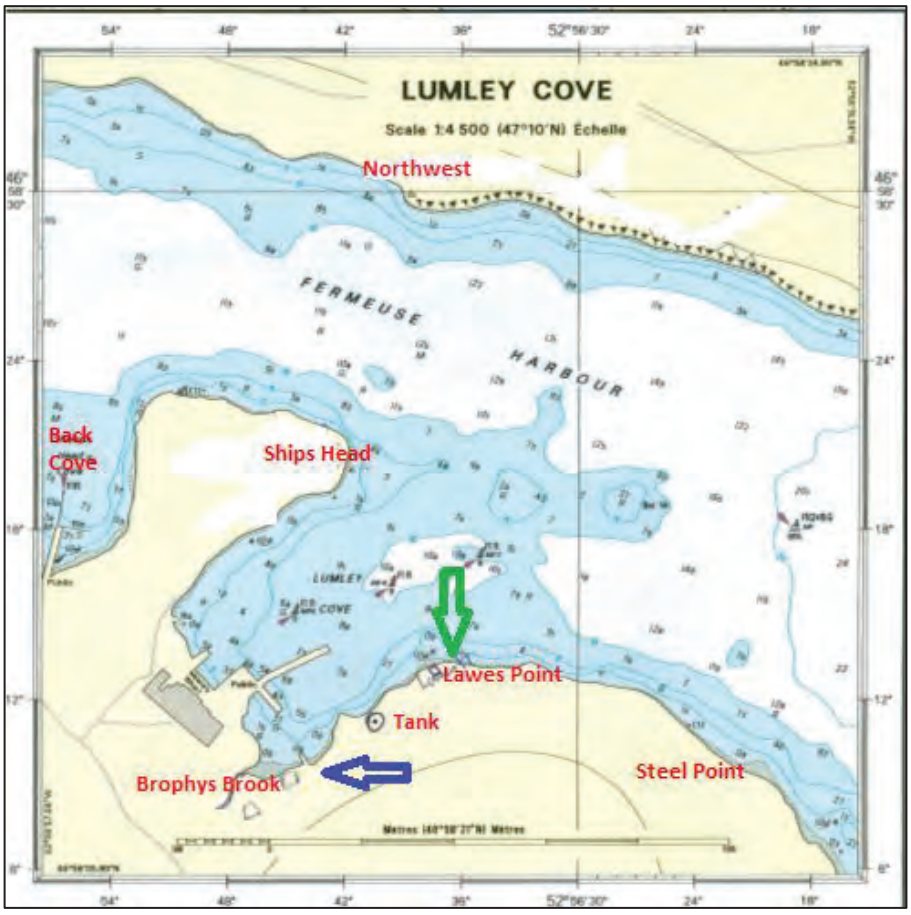
Participants

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

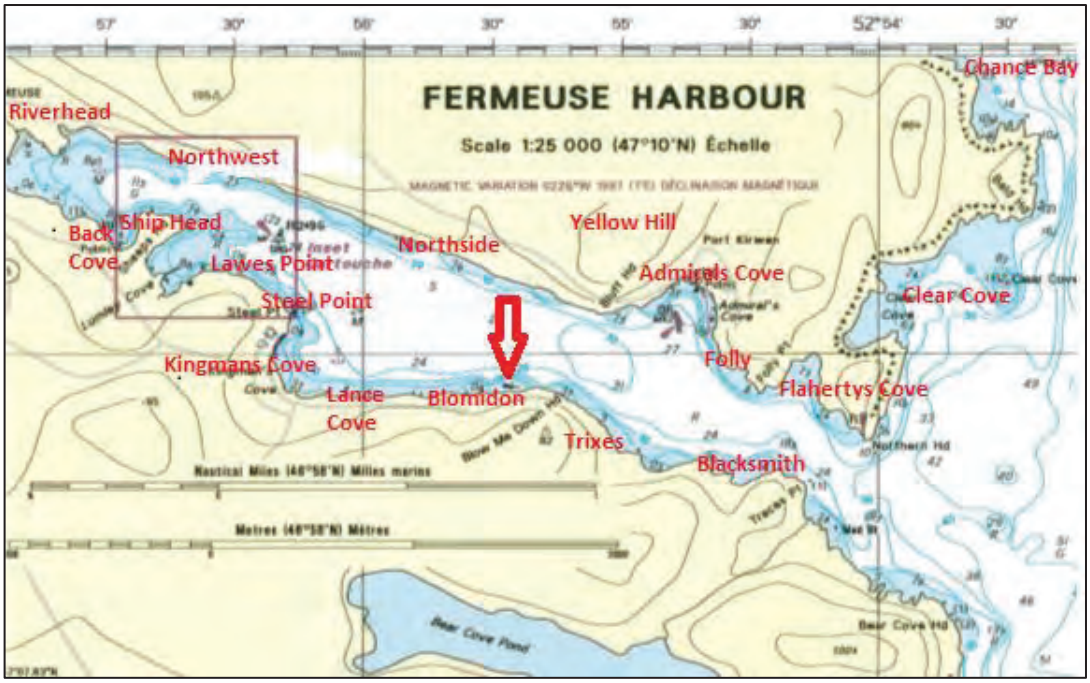
The assistance of Peter Fudge (SNC-Lavalin Inc.), Mike Smith (SNC-Lavalin Inc.), and the Provincial Archaeology Office are also acknowledged. Edward Curran (of Rumley Cove, Fermeuse), John Chidley (of Renews) and Sylvester Hawkins (of Brigus South) assisted with field inquiries.

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).

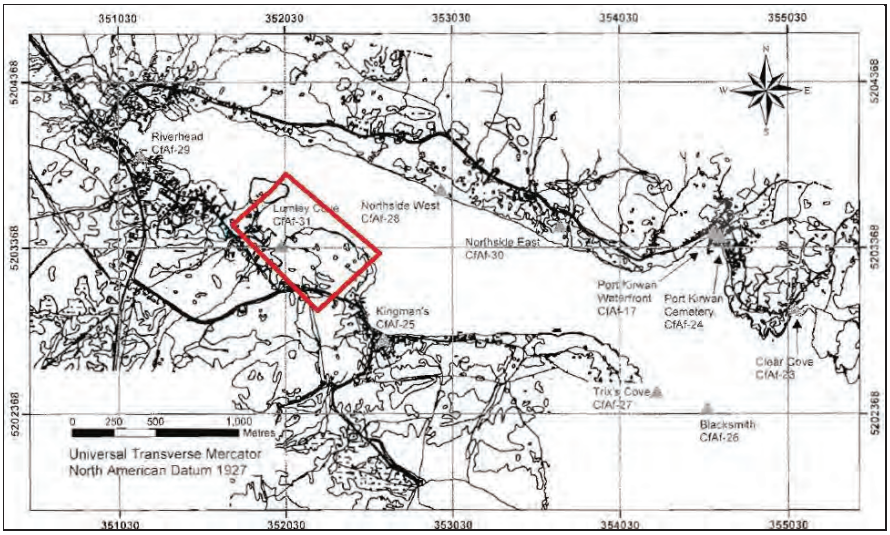
Premises at Kingmans. It appears likely that the three Kingmans underwater sites [CfAf-02; CfAf-09; and CfAf-21] are off a former wharf in this general vicinity, also indicated as the locale of a stage and anchorage mapped in 1663 [see p. 13] and a double wharf 1810-12 [see p.15](RCF.2276).

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).

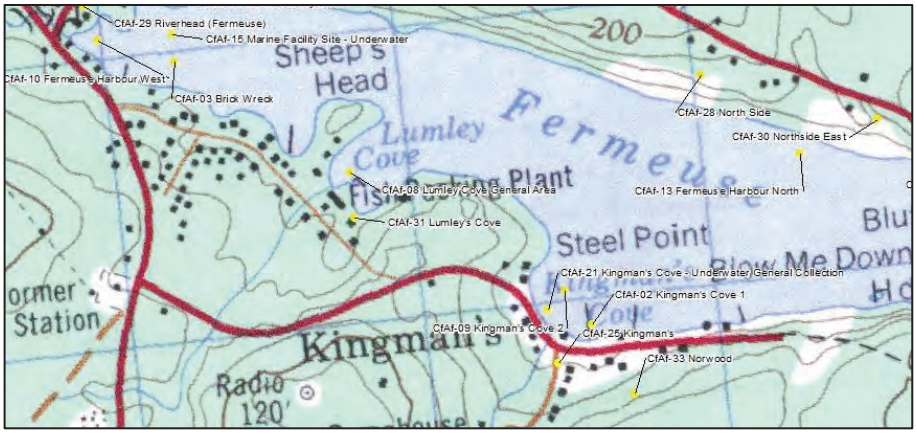
There is also a well-known visible wreck on the south side, the *Ilex* (1948), which has not been designated an archaeological site.

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-17thto 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).



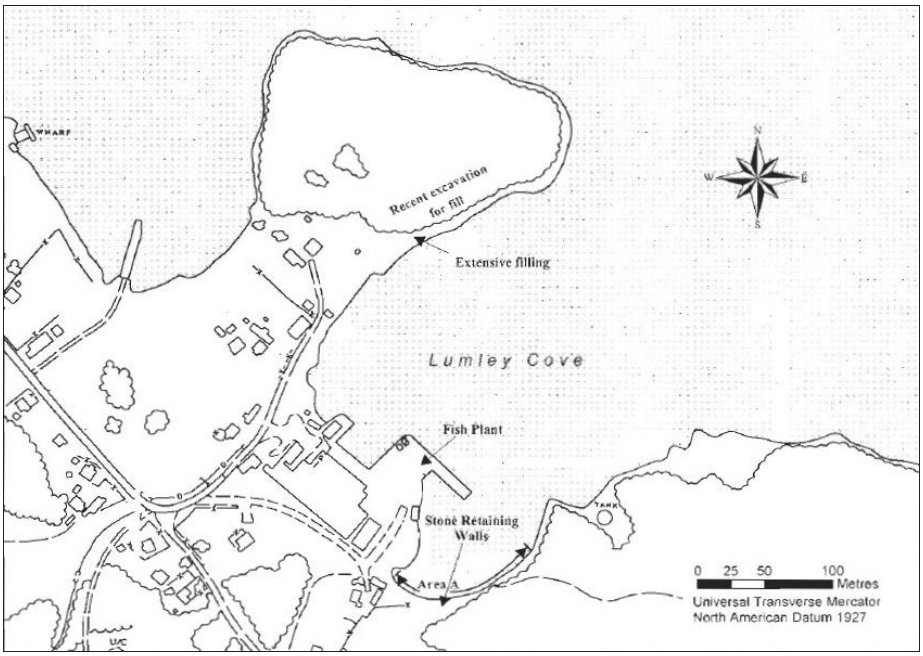
Map of sites recorded in Fermeuse Harbour (Pope 2003:fg.1). The marine base study area is in red.



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.

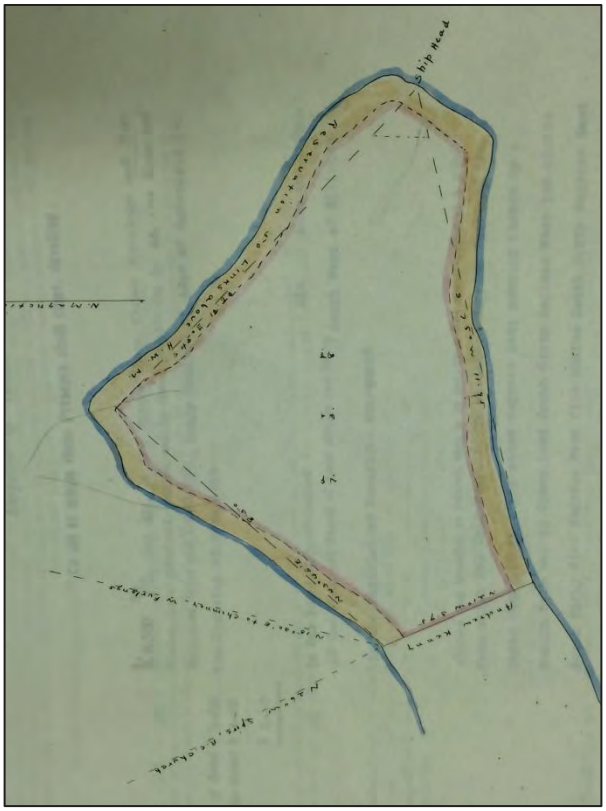


Diagram accompanying a 1915 Crown grant of Ships Head to Richard Kenney.

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

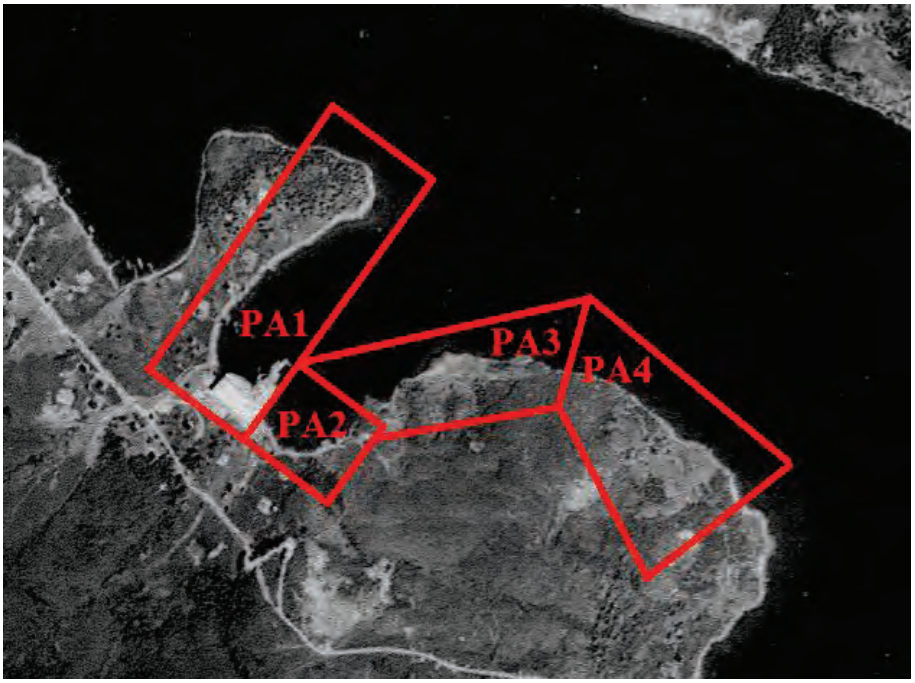
exchange with merchants, and credit was more common than the exchange of money. The construction of the fish plant changed this way of living. As Gerald Barnable observes, “the effect of the new project were felt immediately. There was a minor construction boom as the buildings began. Even we, who were 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).

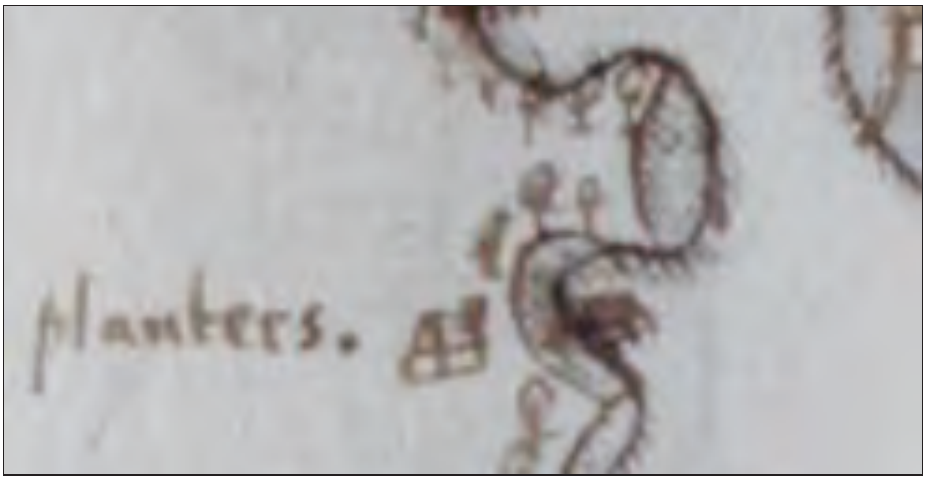
The bill of Ships Head from Lawes Point, showing the area of 1950s disturbance (RCF.2254).

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.

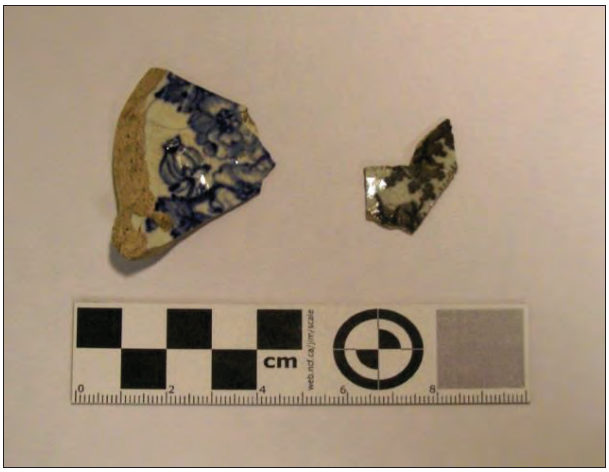
Warping pin set in a rock on the east side of Rumley Cove (RCF.2265).

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.

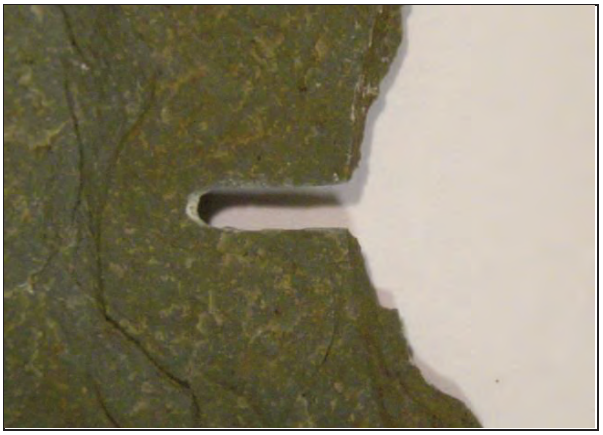
Hypothesized location of the Curran house at Lawes Point, location of tests FM4 and FM5 at centre (BTF.3649).

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.

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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).

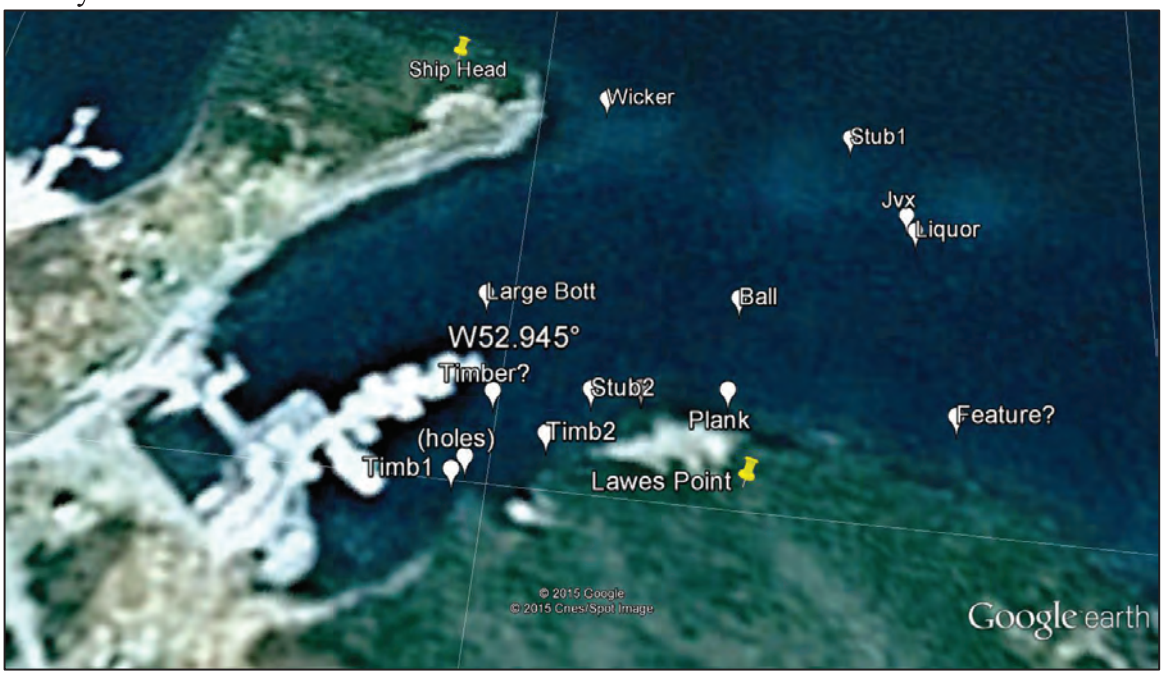
Unidentified cultural feature, wpt "Timber2" (UV.1287).

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

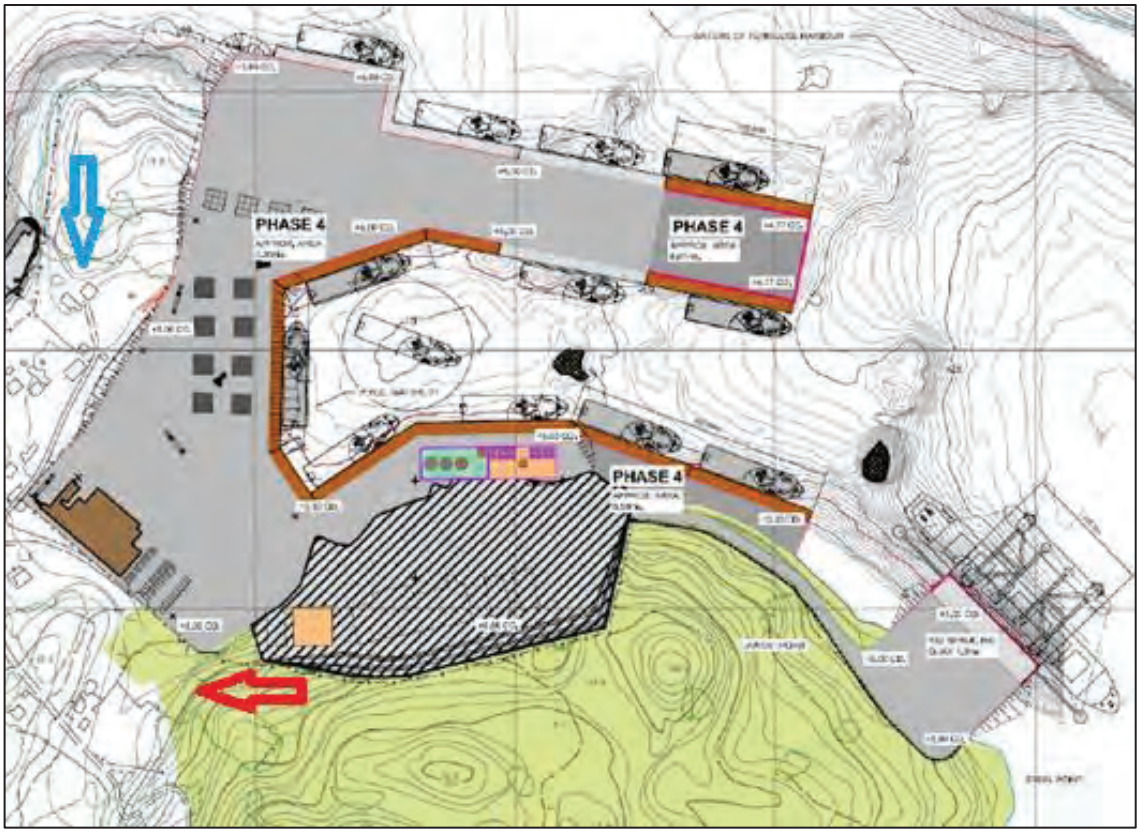
Fermeuse Harbour abounds with 19th century settlement/homestead sites, including several which are poignant features of the East Coast Trail – such as Blacksmith (CfAf-26) and Trixes (CfAf-27) – and are unlikely locales for future development, through inaccessibility. There are also a number of early-historic 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.

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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

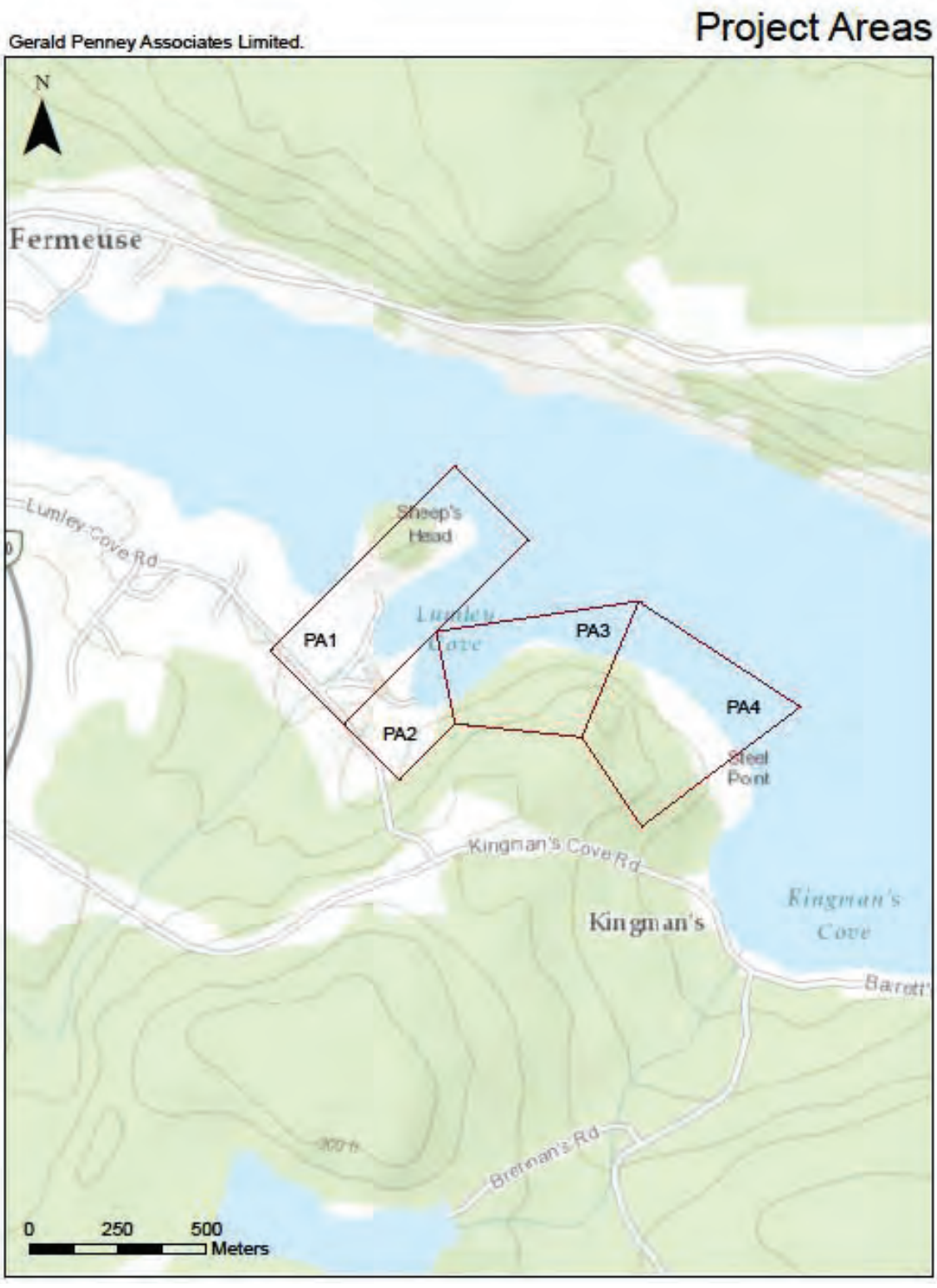
Name	Date	Coordinate	Elevation
FM1	08-JUN-15	352199 5203690	3 m
FM2	08-JUN-15	352192 5203694	0 m
FM3	08-JUN-15	352187 5203689	-0 m
FM4	08-JUN-15	352184 5203670	2 m
FM5	08-JUN-15	352177 5203684	
FM6	08-JUN-15	352175 5203688	2 m
FM7	08-JUN-15	351967 5203569	0 m
FM8	08-JUN-15	351963 5203573	-3 m
FM9	08-JUN-15	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

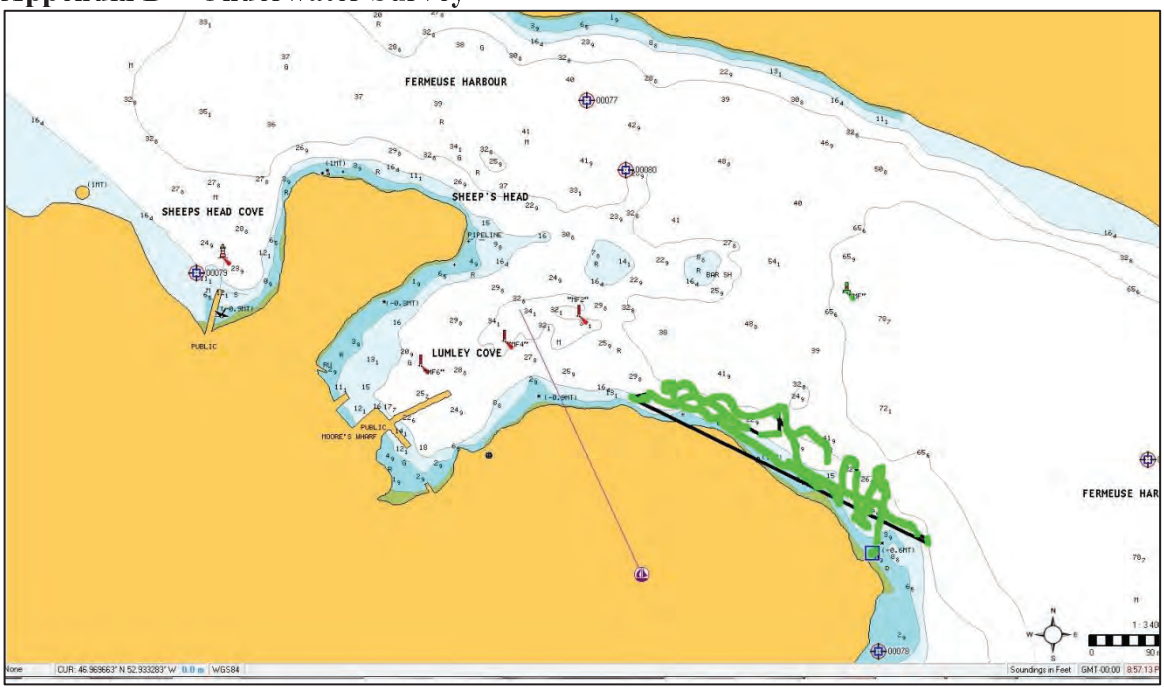

Construction Phases
Gerald Penney Associates Limited.
N
Fermeuse
Lunley Cove Rd
Sheep's Head
2
3
4
Lunley Cove
4
1
3
Steel Point
Kingman's Cove Rd
Kingman's
Kingman's Cove
Barre
Brennan's Rd
0
250
500
Meters


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

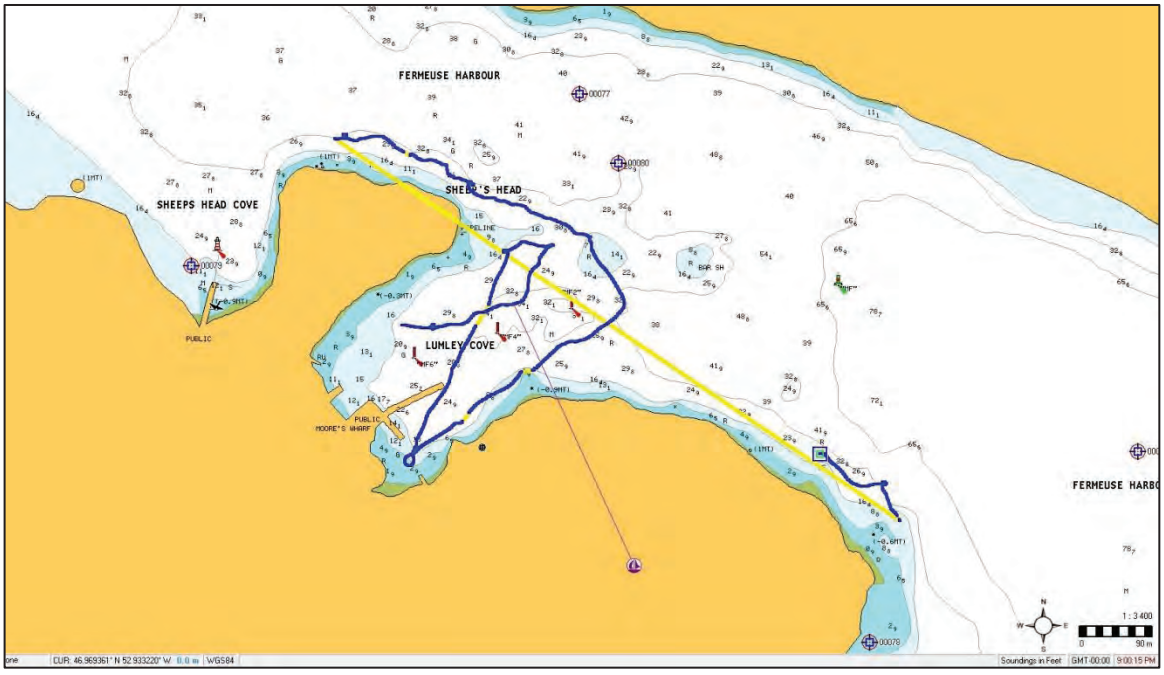

Gerald Penney Associates Limited.
Waypoints and Tracks
N
Fermeuse
Lumley Cove Rd
10
Sheep's Head
Lumley Cove
Ceripit
FM4
Ballst
Fwallsouth
Bigpile
Clearing
Seal Point
Kingman's Cove Rd
Kingman's
Kingman Cove
Brennan's Rd
0
250
500
Meters

Test Pits 8 June 2015.

Appendix D – Underwater Survey



T1 track.



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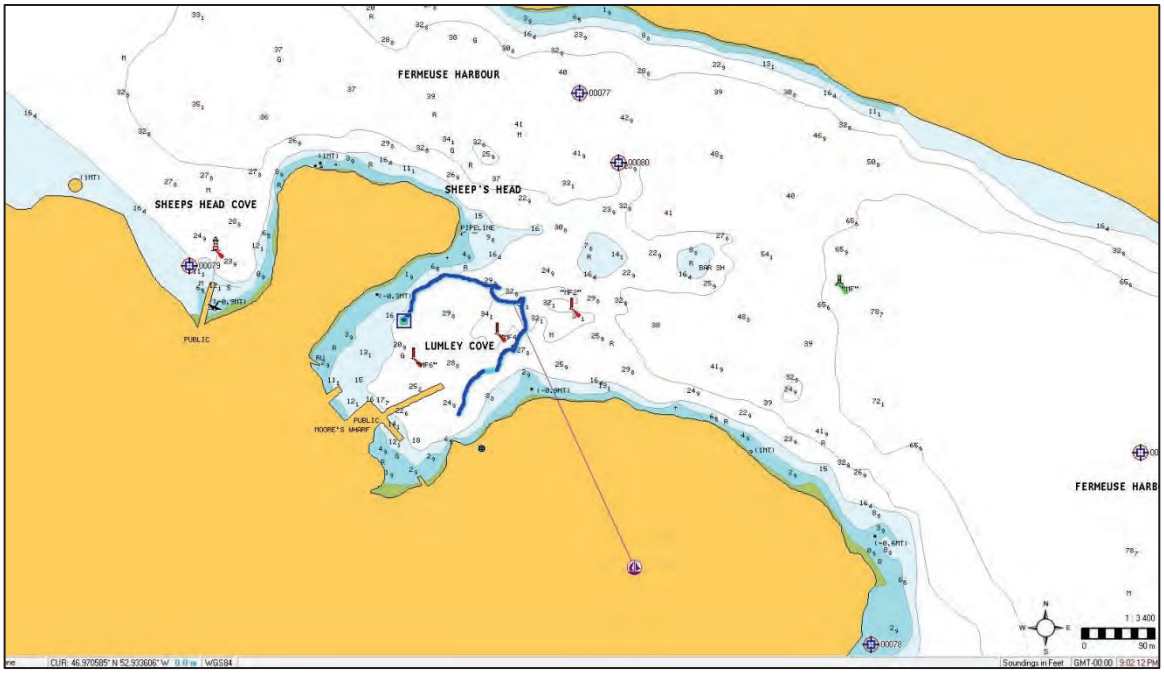
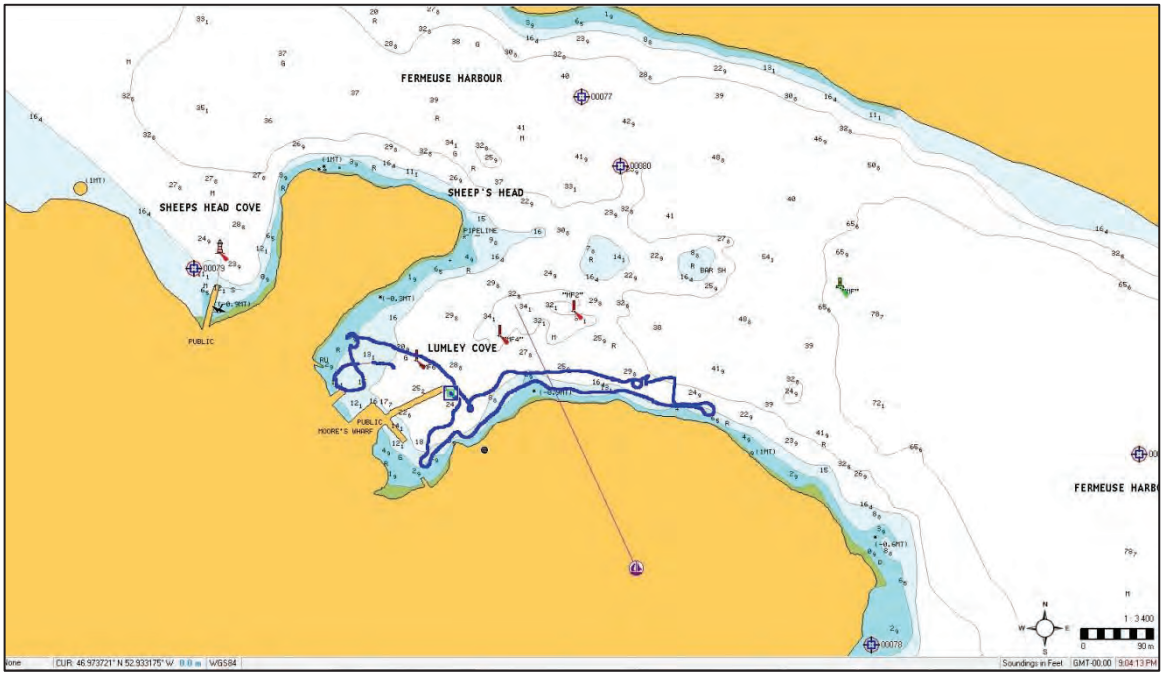
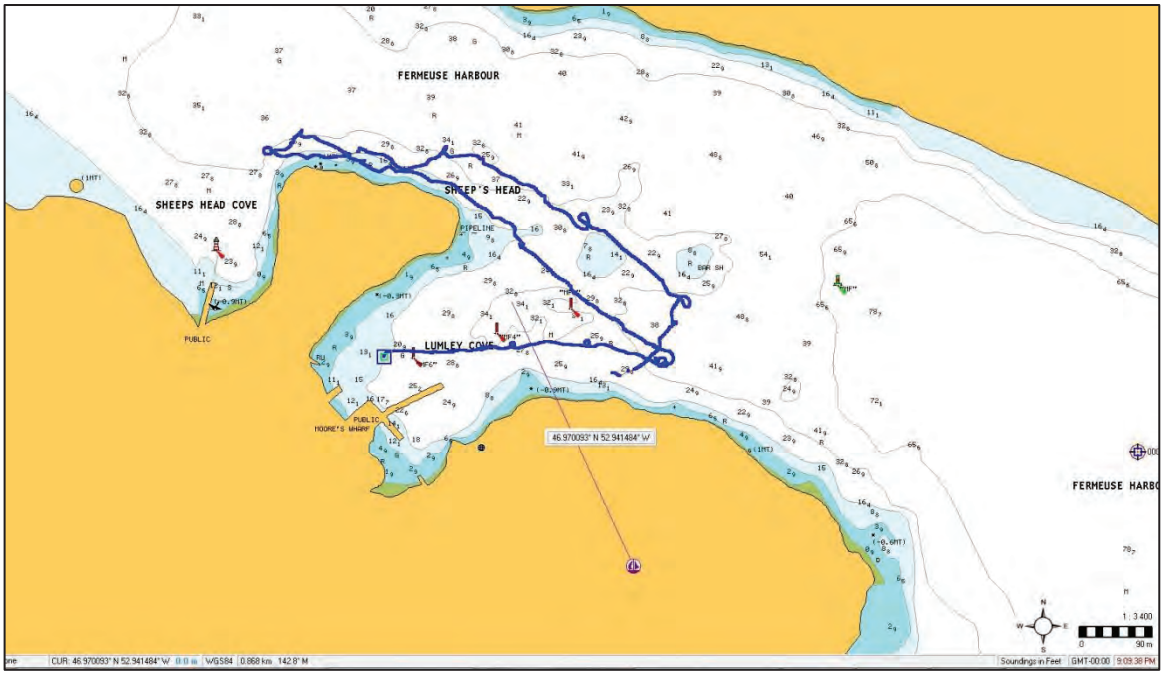


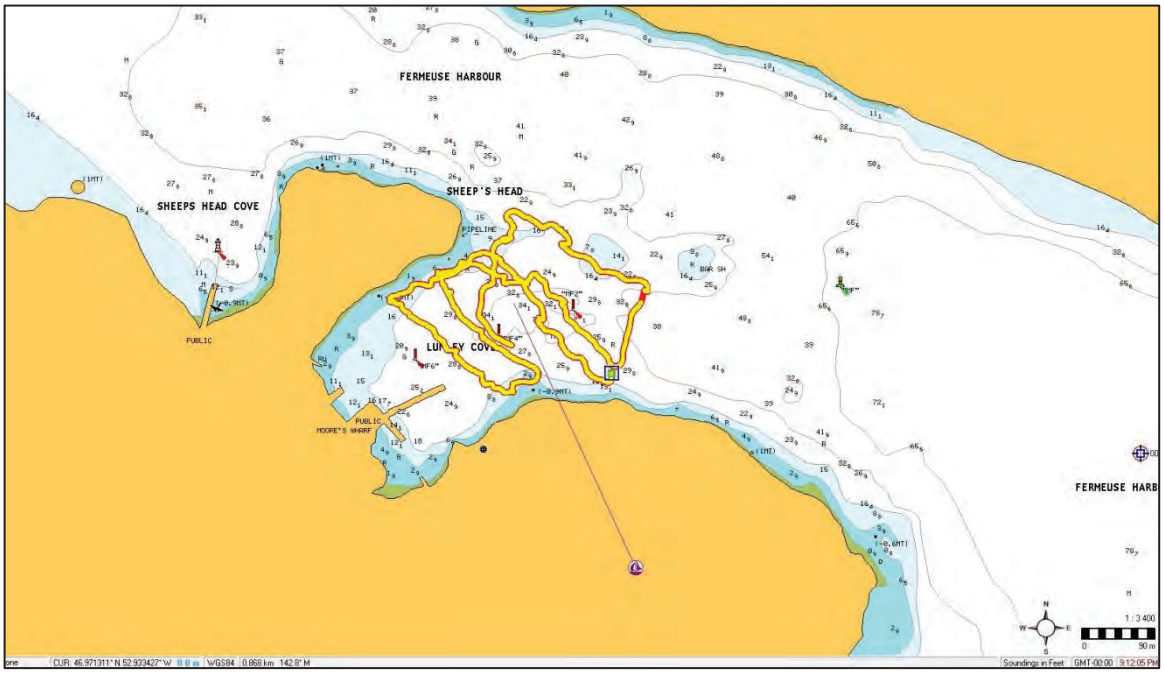
T3A track.



T3B track.



T4 track.



T5 track.

MARINE HABITAT CHARACTERIZATION SURVEY IN FERMEUSE HARBOUR, NL, JULY 2018

Prepared by

LGL LIMITED
environmental research associates

Prepared for

Fermeuse Enterprises Limited

LGL Project No. FA0165
December 2018

MARINE HABITAT CHARACTERIZATION SURVEY IN FERMEUSE HARBOUR, NL, JULY 2018

by

Sarah N. Penney-Belbin

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for

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

LGL Project No. FA0165
December 2018

Suggested format for citation:

Penney-Belbin, S.N. 2018. Marine habitat characterization survey in Fermeuse Harbour, NL., July 2018. LGL Rep. FA0165. Rep. by LGL Limited, St. John's, NL, for Fermeuse Enterprises Limited, Harbour Grace, NL. 13 p. + appendices.

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1.0 INTRODUCTION

Fermeuse Enterprises Limited (the Proponent) contracted LGL Limited (LGL) to conduct a marine habitat characterization survey (the survey) within Fermeuse Harbour, Newfoundland and Labrador (NL) (Figure 2.1). 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.

This report is intended to provide a general characterization of the marine fish habitat occurring within the survey area. 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) during July 2018. The survey vessel used was a 5.8 m Zodiac™ Mark V HD, equipped with twin 30 HP 4-stroke outboard motors. All critical survey positioning was determined with a Hemisphere™ VS 111 DGPS.

2.2 Bathymetric Survey

The bathymetric survey was conducted within the Primary Survey Area during 4 July using a Syqwest™ Hydrobox data logging, single beam depth sounder in combination with the Hemisphere™ GPS unit indicated 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%. The final bathymetric depth data were processed and corrected for tidal elevation and referenced to chart datum using tide tables for Fermeuse. Tidal corrections were applied based on changes in 5-minute time intervals.

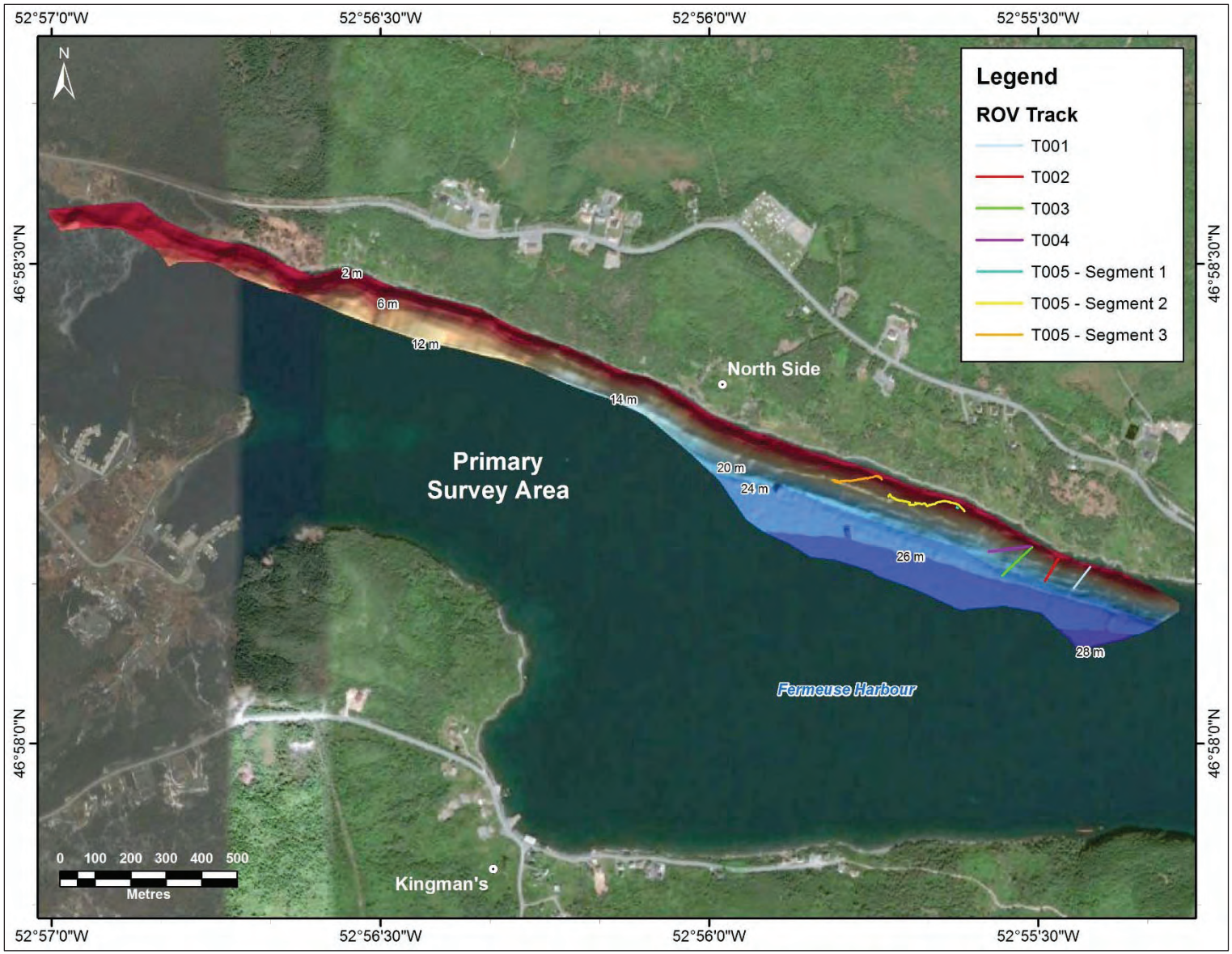

Figure 2.1. Primary Survey Area, Fermeuse Harbour, NL, July 2018.

2.3 ROV Survey – Biota and Substrate

The marine fish habitat survey was conducted during 14 July 2018 using a JW Fisher Sealion™ Remote Operated Vehicle (ROV) in combination with the Hemisphere™ GPS unit. The ROV-mediated underwater video footage was monitored and recorded from on board the survey vessel using a Sony GV HD700 recording deck. ROV surveys consisted of four transect sequences (T001–T004) along weighted lines placed on the seabed marked in 5-m increments, and three segments providing additional coverage within the Primary Survey Area (T005 – Segments 001, 002, 003). Prior to video analysis, the video files were edited by Narwhal Environmental to remove unnecessary footage (e.g., recording while the ROV was deployed and retrieved). The ROV 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):

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 3.0.4) program.

2.4 Shoreline Photography

High-resolution (12 MP; FX format), GPS-referenced photographs of the shoreline were acquired from the survey vessel within the survey area using a Nikon D700 digital SLR camera in combination with a Garmin™ Montana 600 GPS.

3.0 SURVEY RESULTS

3.1 Bathymetric Survey

Depths in the Primary Survey Area ranged from 2–28 m (see Figure 2.1). Within this area, bottom depth is ≤20 m within ~50 m from the shoreline, beyond which depth abruptly changes to 24–26 m, increasing up to 28 m at the furthest extent from shore surveyed.

3.2 ROV Survey - Biota and Substrate

A total of 1.3 hours of video footage, equivalent to about 708 m of survey track line was collected within the Primary Survey Area. Approximate transect length was ~50 m each for T001 and T002, ~80 m for T003, ~60 m for T004, and ~8 m, 270 m and 190 m for Segments 001, 002 and 003 of T005, respectively (see Appendix A). The empirical data for observed biota and surficial sediment type are included in Appendix A, and the survey videos (and accompanying files) are in Appendix B (see accompanying USB flash drive).

Observed biota and surficial substrate types are summarized in Table 3.1. Representative biota and substrate images captured from the ROV video footage are presented in Figures 3.1–3.10. The observed biota, typical for coastal Newfoundland, included various types of algae, sea urchins, sea anemones, sea stars and sea cucumbers, toad and rock crabs, periwinkles, and finfishes. The surficial substrate along the shorelines in the study area ranged from medium to medium/fine and coarse/medium/fine, typically consisting of gravel, rubble/boulders and sand. Several large boulders with approximate heights above the seabed of at least ~1 m was observed along transects T002, T003 and T005 (Segment 002).

Various debris types were observed on the seabed, including a red-coloured rod in T001; glass bottles, an unidentified yellow item and possible portion of a metal pipe in T002; glass bottles, a drink can, an unidentified cylindrical object, possible portion of a metal pipe and a car tire in T003; glass bottles, a rectangular wooden board or sheet of metal and car tires in T004; and a drink can in T005 (Segment 002).

3.3 Shoreline Photography

A total of 247 high-resolution still images of the shorelines in the Primary Survey Area were taken from the survey vessel. All photographs and their associated detailed date, time, and GPS position data are included in Appendix C (see accompanying USB flash drive).

Table 3.1. Summary of marine biota and surficial substrate classes and types observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.

Video File ID	Depth Range (m)	Biota	Substrate Class and Type
Fermeuse T001 50 m	2 to <22	Flora Sea colander (*Agarum cribosum*) Sour weed (*Desmarestia* sp.) Coralline algae Brown filamentous algae (Phaeophyceae) Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Toad crab (*Hyas* sp.) Cunner (*Tautogolabrus adspersus*)	Medium *Predominant:* Gravel *Other:* Sand Rubble Cobble
Fermeuse T002 50 m	2 to <22	Flora Sea colander (*Agarum cribosum*) Sour weed (*Desmarestia* sp.) Coralline algae Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Cunner (*Tautogolabrus adspersus*) Comb jelly	Coarse/Medium/Fine *Predominant:* Gravel Boulder Sand *Other:* Rubble Cobble
Fermeuse T003 70 M	2 to <26	Flora Sea colander (*Agarum cribosum*) Sour weed (*Desmarestia* sp.) Laminarian kelp (*Laminaria* sp.) Irish moss (*Chondrus crispus*) Red tube weed (*Ptilota* sp.) Coralline algae Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Spiny sunstar (*Crossaster papposus*) Toad crab (*Hyas* sp.)	Coarse/Medium/Fine *Predominant:* Rubble Gravel Sand *Other:* Cobble Boulder

Video File ID	Depth Range (m)	Biota	Substrate Class and Type
		Rock crab (*Cancer irroratus*) Stalked jellyfish (*Lucernaria quadricornis* or *Haliclystus* sp.) Comb jelly	
Fermeuse T004 70 M	2 to <22	Flora Sea colander (*Agarum cribosum*) Sour weed (*Desmarestia* sp.) Laminarian kelp (*Laminaria* sp.) Coralline algae (rhodolith; *Lithothamnion glaciale*) Coralline algae Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Toad crab (*Hyas* sp.) Cunner (*Tautogolabrus adspersus*) Sea gooseberry (*Pleurobrachia* sp.) Comb jelly	Coarse/Medium *Predominant:* Gravel Rubble *Other:* Sand Rubble Boulder
Fermeuse T005 Segments 1 2 and 3 (Segment 001)	<6	Flora Sour weed (*Desmarestia* sp.) Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Periwinkle (*Littorina* sp.)	Medium/Fine *Predominant:* Gravel Sand
Fermeuse T005 Segments 1 2 and 3 (Segment 002)	2 to ~10	Flora Sea colander (*Agarum cribosum*) Sour weed (*Desmarestia* sp.) Smooth chord weed (*Chorda filum*) Coralline algae Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Orange-footed sea cucumber (*Cucumaria frondosa*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Toad crab (*Hyas* sp.) Periwinkle (*Littorina* sp.) Cunner (*Tautogolabrus adspersus*) Flounder Comb jelly	Medium/Fine *Predominant:* Gravel Sand *Other:* Boulder Rubble Cobble Shell

Video File ID	Depth Range (m)	Biota	Substrate Class and Type
Fermeuse T005 Segments 1 2 and 3 (Segment 003)	2 to ~10	Flora Sour weed (*Desmarestia* sp.) Smooth chord weed (*Chorda filum*) Laminarian kelp (*Laminaria* sp.) Coralline algae Unidentified brown algae Fauna Green sea urchin (*Strongylocentrotus droebachiensis*) Sea anemone (likely *Metridium senile*) Northern sea star (*Asterias vulgaris*) Blood star (*Henricia* sp.) Rock crab (*Cancer irroratus*) Periwinkle (*Littorina* sp.) Cunner (*Tautogolabrus adspersus*) Sculpin	Medium *Predominant:* Gravel *Other:* Cobble Rubble Sand Shell Boulder

Figure 3.1. Sea colander, sour weed and smooth chord weed species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.

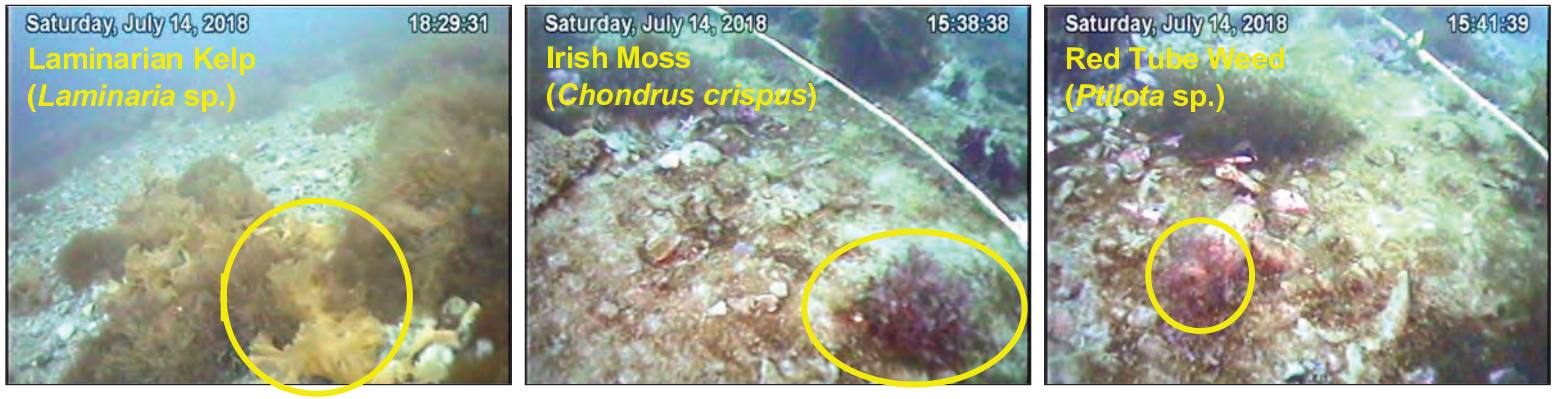

Figure 3.2. **Laminarian kelp, Irish moss and red tube weed species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

Figure 3.3. **Coralline algae (rhodolith) and coralline algae species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

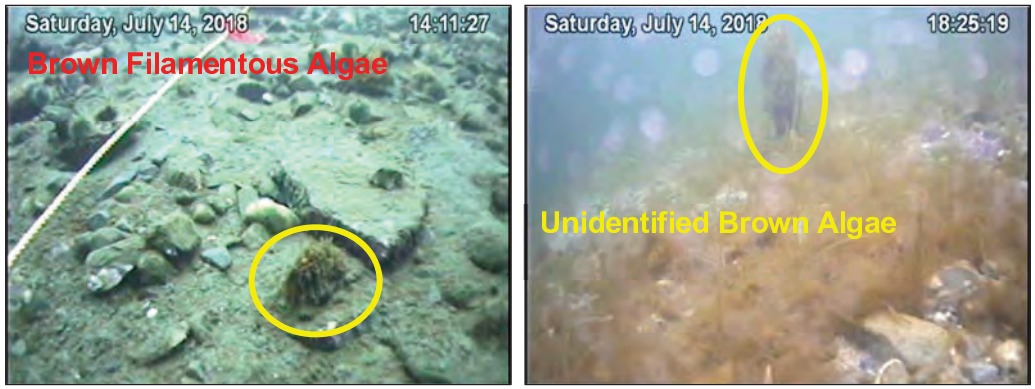

Figure 3.4. **Brown filamentous algae and unidentified brown algae species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

Figure 3.5. **Sea urchin, sea anemone and sea cucumber species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

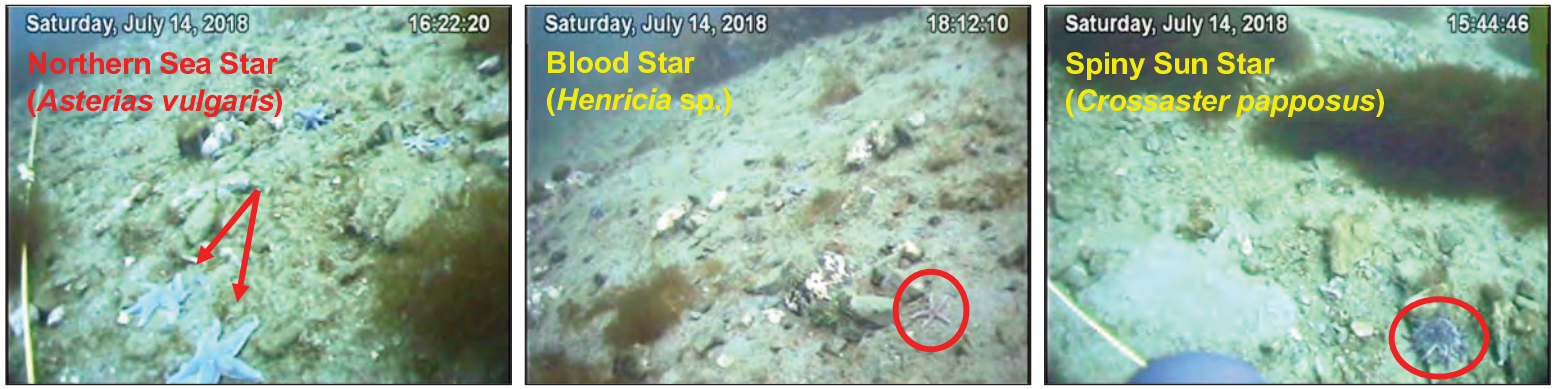

Figure 3.6. **Northern sea star, blood star and spiny sunstar species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

Figure 3.7. **Toad crab, rock crab and periwinkle species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

Figure 3.8. Cunner, flounder and sculpin species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.

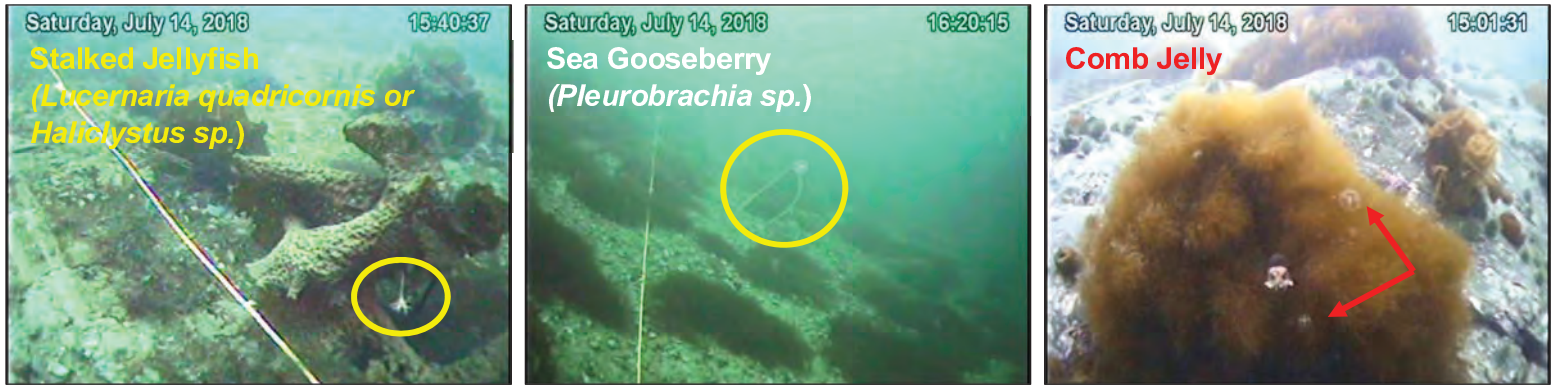

Figure 3.9. Stalked jellyfish, sea gooseberry and comb jelly species observed during the Primary Survey Area ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.

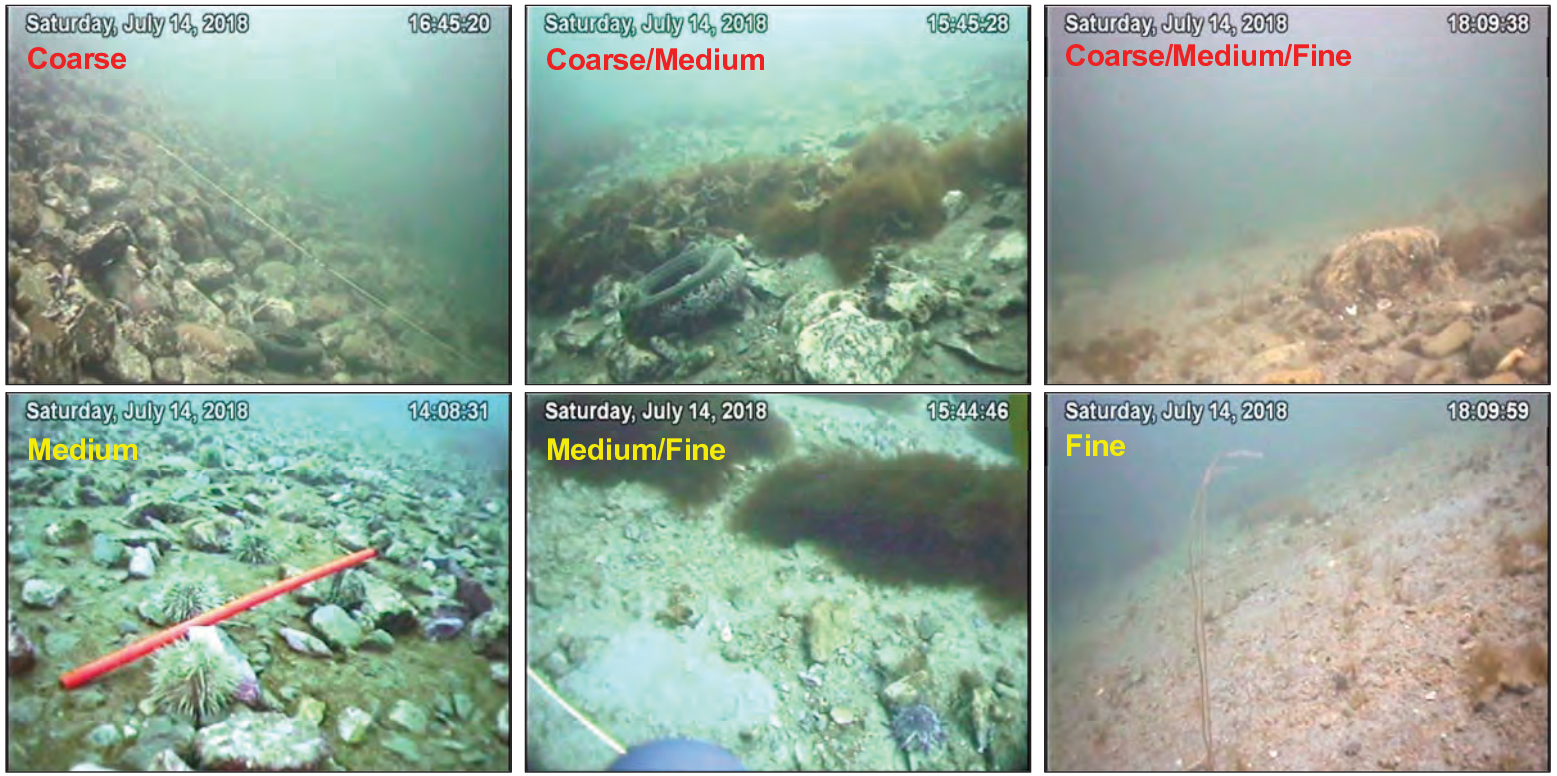

Figure 3.10. **Typical surficial substrates observed in the Primary Survey Area during the ROV video survey for Fermeuse Enterprises Limited in Fermeuse Harbour, NL, 14 July 2018.**

4.0 SUMMARY

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

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

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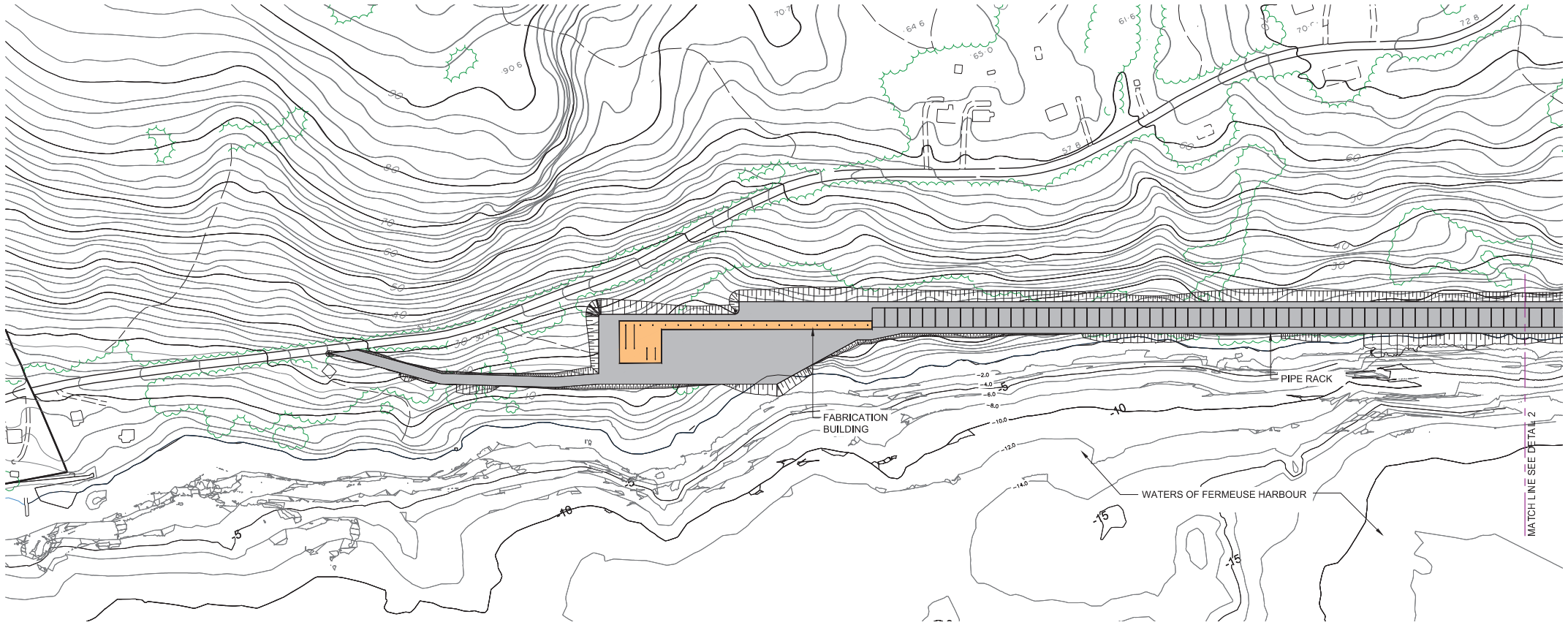
Robbins, C.R., G.C. Ray, and J. Douglass. 1986. Atlantic coast fishes. Peterson Field Guides. Houghton Mifflin Company, Boston, NY.

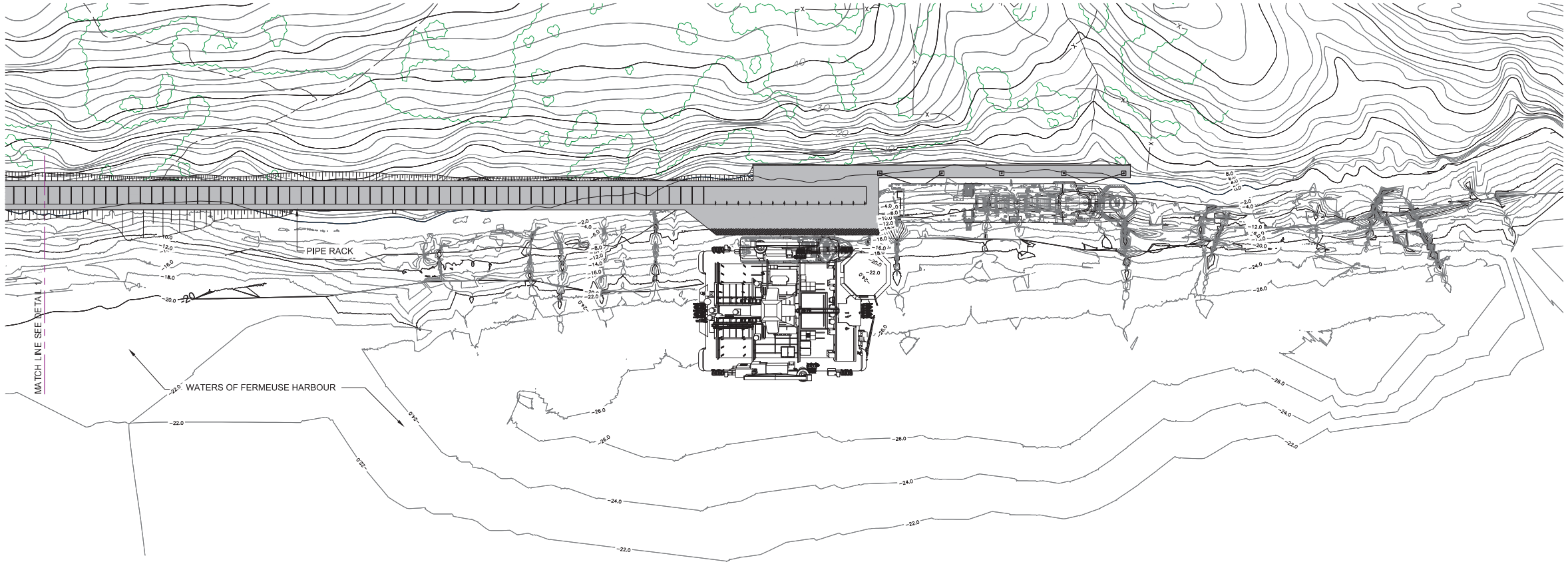
APPENDIX B: CONCEPT SITE PLAN



SPOOL BASE - PARTIAL PLAN - WEST

0 50 100m
Scale 1:2000

1
001 003



SPOOL BASE - PARTIAL PLAN - EAST

0 50 100m
Scale 1:2000

1
2 003

- LAYDOWN AREA
- CURRENT PHASE WHARF CONSTRUCTION
- PERIMETER FENCE
- LOW NORMAL TIDE (LNT)
- FXLED 300 Flood 4 Array Tilt: 50
- FXLED 300 Flood 3 way Tilt: 50
- FXLED 300 Flood 3-90 Tilt: 50
- FXLED 300 Flood 2-120 Tilt: 50
- DSX2 LED 30000 40K T4M Tilt: 0
- DSX2 LED 100C 1000 40K T3M MV Tilt: 0
- FXLED 300 Flood Tilt: 50

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2019/04/12

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B01	ISSUED FOR REVIEW			2019/05/28

NORTH

PROFESSIONAL STAMP

PERMIT HOLDER STAMP

SNC·LAVALIN
1090 TOPSAIL RD., MOUNT PEARL, NL, A1N 5E7
TEL: (709) 368-0118 FAX: (709) 368-3541

CLIENT
FERMEUSE ENTERPRISES LIMITED

PROJECT
FERMEUSE HARBOUR DEVELOPMENT

TITLE
SPOOL BASE ENLARGED PLAN

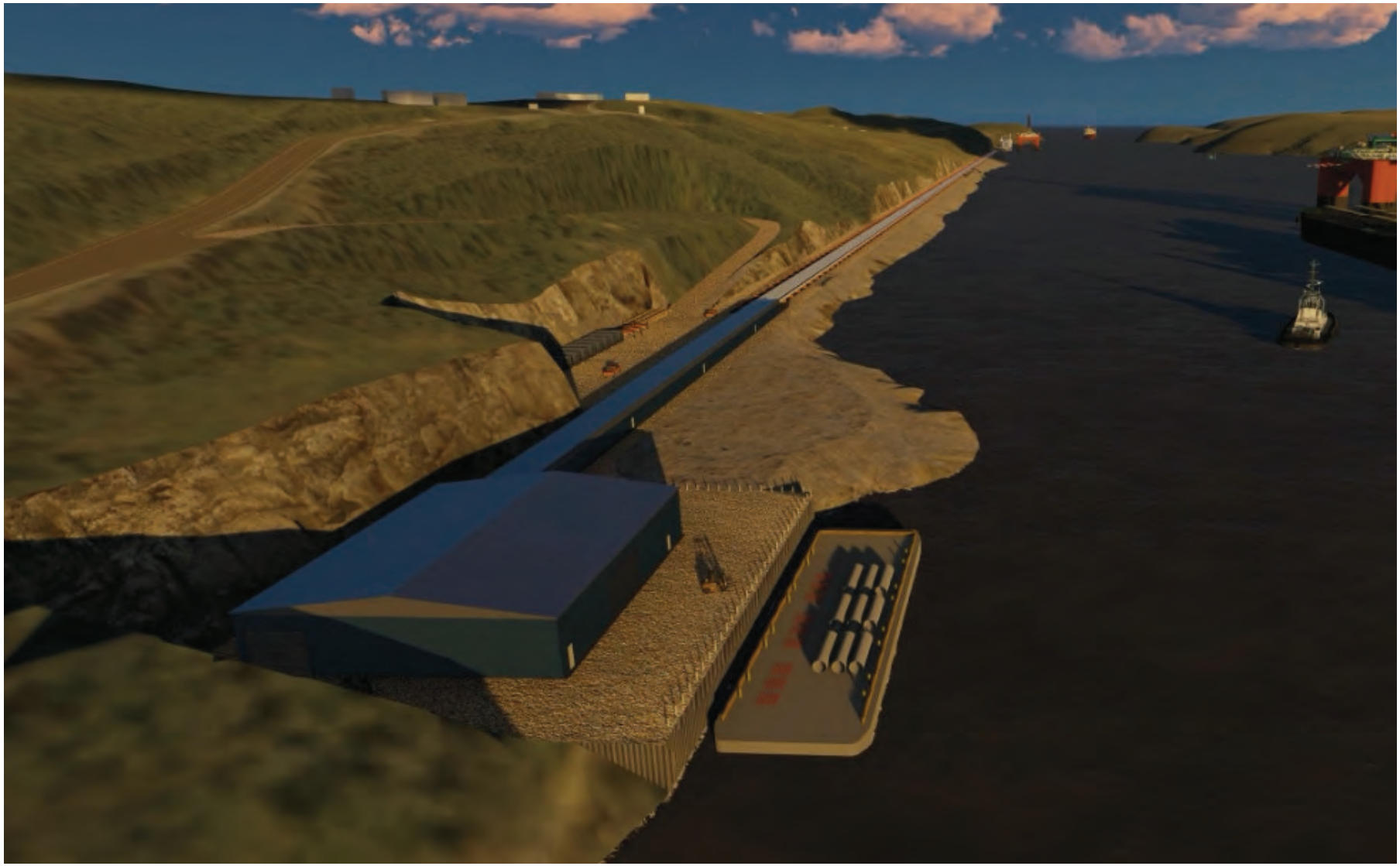
DESIGNED BY C.F.	CHECKED BY C.F.	DATE 2018/05/28	
DRAWN BY J.V.	APPROVED BY C.F.	DATE 2018/05/28	
SCALE AS SHOWN	SNC-LAVALIN PROJ. No. 656193		
	CLIENT PROJ. No.		

DRAWING No. DW1 – 01 – MA – 01 – 003 REV. B01

656193-0001-D-4P-DWG-000-0003-01

REFERENCE FILES

APPENDIX C: VISUAL RENDERINGS



APPENDIX D: LETTERS

FERMEUSE NL
BUILT ON THE STRENGTH OF THE SEA
Incorporated in 1967

The Town Council of Fermeuse

526 Main Hwy

Fermeuse, NL A0A2G0
Ph: (709) 363-2400 Fax: (709) 363-2308
townoffermeuse@gmail.com

April 25, 2019

Honourable Graham Letto
Minister of Municipal Affairs and Environment
PO Box 8700
St. John's, NL
A1B 4J6

Re: Planned Environmental Registration – Fermeuse Spool Base Project

Dear Minister Letto,

The Town of Fermeuse is well aware that Fermeuse Enterprises Limited (FEL) is proposing development of a Spool Base on the Northside of Fermeuse Harbour. We know that FEL is ready to submit their Spool Base Environmental Assessment documents in the very near future.

The Spool Base development is a significant additional element of the overall marine service base model proposed for Fermeuse Harbour by FEL. In January 2017, the development of a marine service base on the south side of Fermeuse Harbour gained Environmental approval through your Department.

These are major opportunities for the revitalization of Fermeuse, Port Kirwan, and all communities along this shore as well as the Southern Avalon. We are pleased that the project proponents believe in this area and that they have made significant private investments in development planning over the last number of years. We are also pleased that they have engaged both the Town and our residents throughout the development process.

In fact, as a direct result of FEL's efforts, the Town Council of Fermeuse commenced development of a formal Municipal Plan in 2014. This plan was undertaken to accommodate future industrial growth and to ensure effective municipal management of anticipated growth. Formal approval of the Municipal Plan and "Fermeuse Municipal Planning Area" was achieved on March 12, 2015 under the Urban and Rural Planning Act, 2000.

However, when our Municipal Plan was developed/approved in 2014/2015, the Spool Base opportunity had not been identified. As a result, a small percentage of the land proposed for use as a Spool Base falls within a 'Rural' designation that does not clearly cover industrial development.

The Council has reviewed the location for the Spool Base and believes it is an entirely suitable location for the proposed use. As a matter of fact, most of the Spool Base falls within an area zoned as Mixed Development and as such is an allowable use under the Town's Municipal Plan. A small portion of the proposed development falls within a Rural zoning designation and the Town of Fermeuse will seek an amendment to the Town Plan for this area from Rural to either Mixed Development or Marine Industrial to clarify the planning use intentions of the Town.

The Town Council has reviewed this issue and plans to amend the Municipal Plan as quickly as possible to remove any doubts. If the Spool Base project had been recognized in 2015, the Town could have – and most certainly would have – drafted the land use language to more clearly accommodate.

We urge you and your officials to accept that the Municipal Plan will be amended to affirm our support. Furthermore, we urge you and your officials to allow FEL's request for Environmental Assessment to proceed immediately and concurrently with the Town's planned amendment to its Municipal Plan (which, after all, was developed and intended to support development of new industry in our Town).

We look forward to your favourble decision on this very important matter to our Town as well as the Southern Avalon and province. We anxiously await your reply.

Sincerely,

Marsha Kenny

for Mayor Jerome Kenny
Town of Fermeuse

cc: Joanne Sweeney, Director
Fermeuse Enterprises Limited

Town Of Port Kirwan

P.O. Box 50, Site 2
Port Kirwan, NL
A0A 2G0

June 11, 2019

Honourable Lisa Dempster
Minister of Municipal Affairs and Environment
PO Box 8700
St. John's, NL
A1B 4J6

Re: Planned Environmental Registration – Fermeuse Spool Base Project

Dear Minister Dempster:

The Town of Port Kirwan strongly supports the proposed development of a Spool Base on the Northside of Fermeuse Harbour by Fermeuse Enterprises Limited (FEL) is proposing. This will be a very important project for our Town and we understand that you will be reviewing the environmental assessment aspects of the project soon.

This project is a major opportunity to help revitalize all communities along this shore, especially Port Kirwan. Council has reviewed the location for the Spool Base and fully understand that a significant portion of the planned facility falls within the municipal boundaries of the Town of Port Kirwan. While the Town of Port Kirwan does not have a formal Municipal Plan, we believe the proposed location is entirely suitable for the planned use and we are not aware of any significant issues or concerns arising out of the development (environmental or otherwise).

We are very pleased that the project proponents believe in this area and that they have made significant private investments in development planning over the last number of years. We are also pleased that they have engaged both the Town and our residents throughout the development process.

We urge you and your officials to look favorably on the registration documents for the Spool Base development.

Sincerely,

Mayor Eugene Brothers
Town of Port Kirwan

cc: Joanne Sweeney, Director
Fermeuse Enterprises Limited