

Harbour Improvements La Scie, La Scie Harbour, NL

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ABSTRACT

The community of La Scie is located at the head of the Baie Verte Peninsula, between White Bay and Notre Dame Bay on the northeast coast of Newfoundland. The approximate population of La Scie is 1240 residents. The history of La Scie dates back to as early as 1857 when the first settlers were recorded. However, the fishing history of La Scie dates back to as early as the 1760's where it was used by the French as a fishing station. Currently, the total number of fishermen in La Scie is around 281. These fishermen have a total number of 141 boats, from small speed boats for inshore fishermen to longliners for offshore fishing purposes.

Due to the increasing numbers of fishing vessels at the public wharf in La Scie, it was proposed to enhance the current DFO Small Crafts Harbour (SCH) facilities. This project was to involve the installation of a 40 m rubblemound breakwater, 20 m extension to an existing finger pier wharf, and construction of a 6.1 m by 60.6 m marginal wharf structure. These harbour improvements were proposed in order to increase the berthage capacity of fishing vessels and offer additional protection for various boats moored in the harbour, upgrade the existing facilities, and provide an estimated useful life of at least thirty (30) years. The proposed project complies with DFO SCH's mandate to keep harbours critical to the fishing industry open and in good repair.

1 INTRODUCTION

The small outpost community of La Scie is located at the head of the Baie Verte Peninsula, between White Bay and Notre Dame Bay on the northeast coast of Newfoundland. Travelling to La Scie from St. John's is approximately 651km. The roads in and around La Scie consist of approximately 10km of paved road and 10km of gravel road. See *Figure 1: Map of Newfoundland Displaying Location of La Scie* below for a more precise location.

The history of this small outpost dates back to as early as 1857, at which point the first settlement was recorded. Typical of most outpost communities in Newfoundland, fishing was and is still the main source of employment. Therefore, with the fishing history of La Scie included the actual history of La Scie dates back as far as the 1760's.



Figure 1: Map of Newfoundland Displaying Location of La Scie
(Source: <http://maps.google.ca>)

Nowadays, the total number of fisherpeople in La Scie is approximately 281. These fisherpeople have a total of 141 boats, from small speed boats for inshore fishing, to longliners for fishing further offshore. Catch that is brought in on these boats is sold to various fish plants such as the National Sea, which is located in La Scie itself.



Figure 2: La Scie Harbour
(Source: <http://newfoundland.hilwin.nl/PHP/en/lascie.php>)

The town has a public wharf as well as 12 private wharves. Most of these facilities were not in operation to their complete potential since the closure of the cod fishery and some minor disrepair. Other species did not represent a high percentage of the total catch for this area, and as a result of the restrictions placed on cod; it was not feasible for the plant to remain open. The cod moratorium (1991) has had drastic effects on the town of La Scie, with the decline in employment opportunities.

2 PROJECT DESCRIPTION

The objective of the project was to enhance the current La Scie harbour facilities in order to help boost the fishing industry in La Scie and surrounding communities. Providing the community with adequate facilities would help promote fishing as a viable employment opportunity.

The proposal was for a three component harbour improvement project which would involve enhancing the existing Department of Fisheries and Oceans (DFO), Small Crafts and Harbours (SCH) facilities at La Scie as well as construction of new marine structures. More specifically the improvements were to include the installation of a breakwater, extension to an existing finger pier wharf and construction of a new marginal wharf. The site is located along the north shoreline of La Scie harbour which can be accessed by municipal roads off Provincial Route 414. See *Figure 3: Photo with Overlay of Proposed Changes* below to view site access and project specifics.

The project was proposed to be constructed in at least two phases. Phase one included the installation of a new breakwater. The remaining phases were determined at a later date and were dependent on DFO priorities and funding at that particular point in time. See *Figure 3* and *4* below for location and specific tasks to be involved in each of the phases.

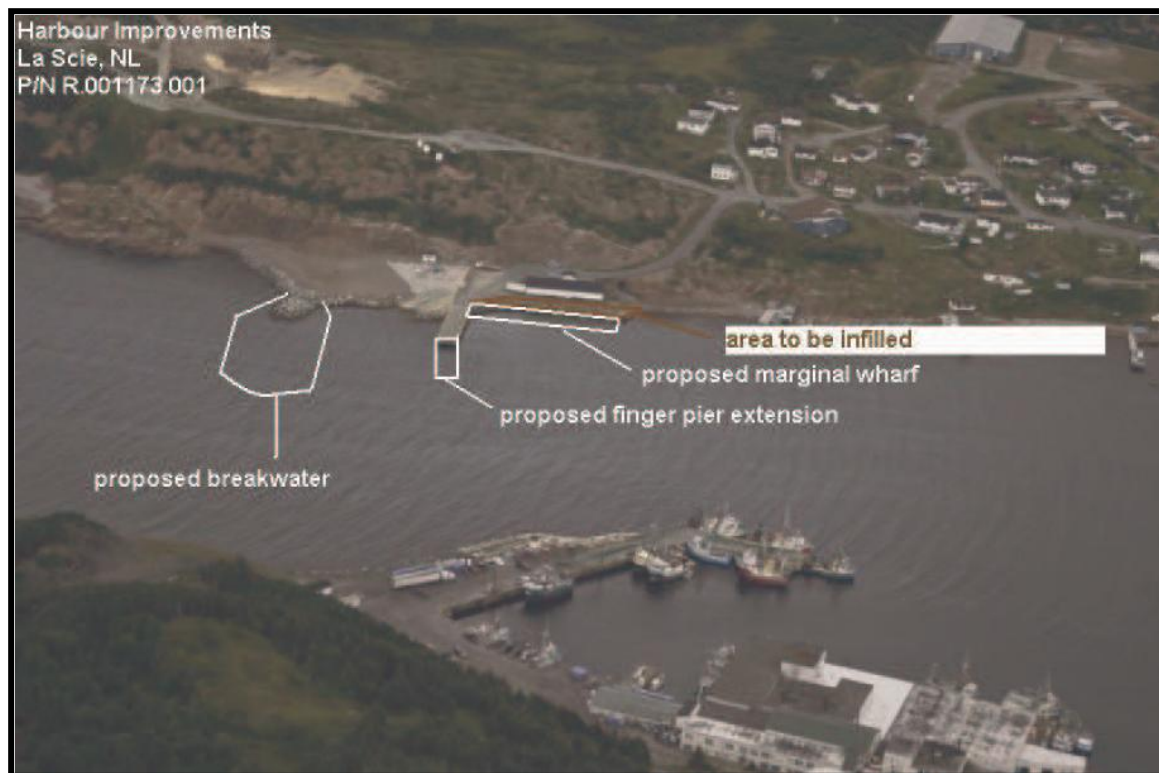


Figure 3: Photo with Overlay of Proposed Changes
(Source: Public Works and Government Services Canada)

The new construction component of this project was to cover the construction of an extension to the existing finger pier as well as the construction of a new marginal wharf structure. This new construction was to increase the berthing capacity to allow for additional fishing vessels in the harbour. Furthermore, these upgrades to the existing facility would increase the useful life of the facilities by at least 30 years, therefore, meeting current operational requirements of the facility users.

The marginal wharf component covers the construction of a new treated timber cribwork finger pier extension to the existing DFO SCH breakwater wharf. Most of the wharf construction was to be carried out using manual labor and conventional power tools assisted by an excavator.

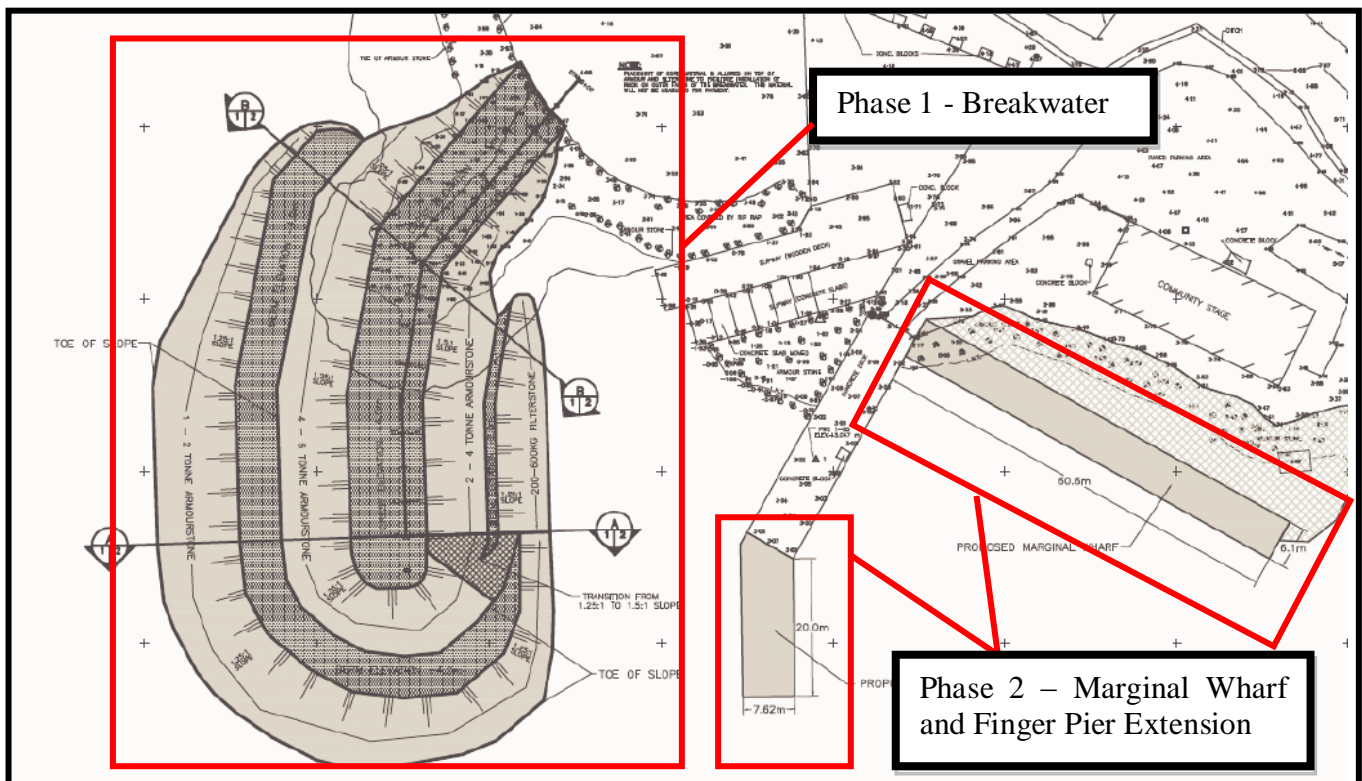


Figure 4: Site Plan with Propose Improvements
(Source: Public Works and Government Services Canada)

Pennecon Heavy Civil Limited was the successful bidder of the La Scie harbour improvements and was responsible for both phases of the project. CBCL Limited Consulting Engineers was responsible for the design of the marine structures to be constructed in phases I and II of this project (i.e. finger pier extension and marginal wharf structures). CBCL Ltd also provided an alternate means of access to the site during the construction of the harbour improvements so as to decrease the impact on regular fishing and other harbour activities during the construction stages.

2.1 Design and Construction of Breakwater Extension

Phase one of this project was the extension of an existing breakwater by approximately 40 meters. The final structure measured approximately 60 meters wide by 100 meters long. The construction of the breakwater involved the placement of roughly 4000 cubic meters of 1-2 tonne armorstone, 1350 cubic meters of 204 tonne armorstone, 3400 cubic meters of 4-6 tonne armorstone, 3600 cubic meters of 200-600 kg filter stone, and 11,300 cubic meters of 0.1-200 kg core

stone. The armourstone required was trucked to the site where it was placed using an excavator(s) working in dry conditions from atop the existing breakwater structure. The successful contractor, Pennecon Heavy Civil Limited, was not specified in the tender documents and was left up to the contractor to determine the source for the armourstone to be used during construction.

Design criteria for the La Scie breakwater project included the following:

- Provide wave protection for vessels berthed at the facility
- Limit the reflected wave height
- Provide for future opportunities for upgrading to a berthing pier
- Furnish a breakwater at a cost that was within DFO-SCH's funding limitations
- Provide a structure that would be environmentally acceptable

The harbour in La Scie is natural, not manmade; therefore, the installation of the new breakwater helped to enhance the existing protection that was already being provided by the natural contours of the land. *Figure 5 – Topographic Map of La Scie* below shows the natural harbour and land contours. Since La Scie is a relatively small community, a rubble mound breakwater was the most cost efficient form of a breakwater when compared to other options such as a caisson breakwater. The basis behind a rubblemound breakwater is that the structural voids help to dissipate the wave energy while the armourstone outside of the structure absorb most of the energy, and the smaller gravel and sand particles prevent the wave energy from continuing through the breakwater core itself. This allows for the vessels tied up within the harbour to be protected from storm conditions that may occur.

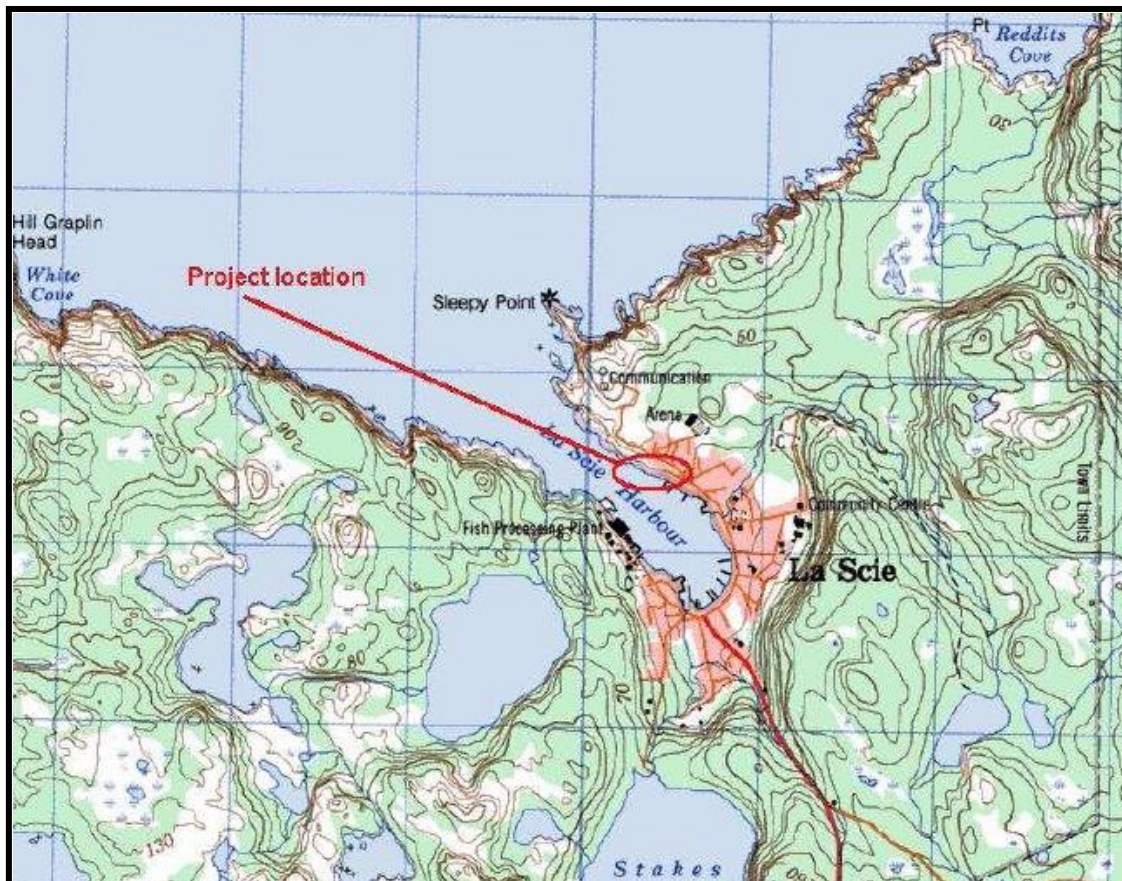


Figure 5: Topographic Map of La Scie
(Source: Public Works and Government Services Canada)

2.2 Design and Construction of Finger Pier Extension and Marginal Wharf

The second phase of the project consisted of the implementation of a new 20 m long by 7.62 m wide treated timber cribwork extension to the existing finger pier wharf with an additional 380 cubic meters of scour protection. Also to be implemented during phase two were repairs to the existing marginal wharf structure. The work on the marginal wharf included demolition and removal of the existing reinforced concrete decks and adjacent parking areas to allow for the new marginal wharf construction. Once demolition and removal was completed, the construction of the new treated timber crib marginal wharf measuring approximately 6.1 meters by 60.6 meters long. This new wharf is located adjacent to the community stage and required infilling of approximately 400 square meters. The associated cribbing was designed to be seated at a depth of three meters below the surface. All infill materials that were used through phase two of this project was site fill but was subject to regulatory approval to ensure consistency of material. Site re-grading, installation of new coping, reinforced concrete decks, new cleats, wheelguards, relocation of a jib crane/light poles and asphalt paving were also installed through the course of this phase of the project. With regards to the new finger pier extension, the construction was complete with a new rock mattress foundation, scour protection, fender system, reinforced concrete deck, cleats, wheelguards and electrical conduits for future electrical equipment.



Figure 6: Marginal Wharf Construction
(Source: CBCL Limited Consulting Engineers)

3 PROJECT RATIONALE

The current marine facilities that existed at the harbour in La Scie were not adequate for the current and projected boat storage and general daily usage requirements. Also, the outside of the finger pier at the site was not, at that point, usable for berthage in most weather conditions which created an increase in the lack of adequate boat storage for the facilities in La Scie.

The overall project rationale was to alleviate the issue of overcrowding, to provide the fishermen with a safe facility to offload their catch at the end of the day and to provide safe berthage for vessels, shielded from harsh weather conditions. The proposed improvements to add on to the existing finger pier and to make improvements to the existing marginal wharf would help reduce the overcrowding issue and the breakwater would increase the protection of the harbour facilities and of boats tied up within the harbour itself.

Through these proposed changes it would allow the fishing community of La Scie to grow and further the fishing industry as the fishing community of La Scie plays a large role in the overall fishing history of Newfoundland. The breakwater will also provide additional protection to the coastal residents in the case of major storms where large waves may jeopardize local homes and business as well as the fishing vessels moored in the harbour.

With the decline of employment options in La Scie, harbour infrastructure was in desperate need of improvements to ensure there existed adequate facilities to support and maintain the fishing industry in and around the community of La Scie. The improvements suggested would promote fishing as a viable employment opportunity for the residents of La Scie and the surrounding areas. Overall, these proposed improvements would help the La Scie harbour facilities become more efficient and spacious.

4 PROJECT CHALLENGES

In general, an active seasonal fishery was executed from the project/construction area. The duration of the construction phases was likely to extend into the fishing season. As a result, minor disruptions to harbour and nearby fish plant operations were anticipated throughout the duration of the project. In addition to minor disruptions to daily harbour activities some water and soil disruptions were also highly probable during the course of the project which are discussed in the subsections below.

4.1 Marine Water Quality

Marine water quality was considered to be a concern with respect to environmental challenges since the construction of the breakwater and placement of the materials had the potential to conflict with the marine habitat through the introduction of suspended sediments into the surrounding water column.

Mitigation of these possible concerns was to have a floating silt curtain available on site for immediate deployment, for the case of the suspended sediments becoming a concern. However, it was highly likely that any suspended sediment would only be a short term issue and would dissipate quickly. However, since there was a slight probability of occurrence, proper measures were put in place to remediate the issue should it have occurred at any point during construction of either of the phases.

4.2 Water/Soil Pollutants

The most probable source of potential pollutants on site was related to the use of heavy equipment during construction of both the breakwater and the wharf/finger pier construction.

Accidental spills of cement, heavy equipment fuel, engine oil, and hydraulic fluids were considered possible pollutants throughout the course of the construction on the various elements of the project. Also, excavation of benthic material was considered a possible contaminant as it may have resulted in sedimentation and the release of toxic elements into the overlying water column should it be released into the surrounding soil or water.

Mitigation of these possible environmental concerns was to check all machinery for leakage of lubricants and/or fuel and the machinery to be in good operating condition prior to usage. Any required refueling of equipment had to be done at least 30m from water.

5 PROJECT TIMELINE AND OCCUPATIONS REQUIRED

The first phase of the project commenced on July 15, 2009 and was completed over a three (3) month period during the summer of 2009. There were no records to state at which point Phase II of this project began and was to be completed by, however, construction of the entire project is now 100 percent complete. Both phases of this project were awarded as one project to Pennecon Heavy Civil Ltd. for a total of \$1,912,726.14.

The following list outlines occupations which were employed during the design and construction period. Please note that this list represents only an approximation of the number and type of occupations that may have been produced as a result of the discussed project. Annual occupations created as a result of the proposed project were ultimately determined by the contractor. Occupations are expected to be comparable to those created for similar breakwater/wharf construction projects throughout the province.

- 4 – Professional Engineers
- 2 – Engineering Technicians
- 2 – Surveyors
- 1 – Rod and Chainmen
- 1 – Construction Inspector
- 1 – Draftsperson
- 6 – Laborers
- 2 – Heavy Equipment Operators
- 5 – Truck Drivers
- 2 – Flag People
- 1 – Construction Foremen/Superintendents

6 CONCLUSIONS

In conclusion, to help promote the Newfoundland fishery in outport communities, it is essential to evaluate the current state of the harbour facilities. Upgrading the existing facilities promotes job opportunities in and around those communities, both during and after construction/renovations. The deficiencies of the existing facility in La Scie included lack of appropriate berthage and protection for vessels against storm conditions; therefore, it is important to evaluate the needs and requirements of the facility in question prior to proceeding with a proposal or project. It is also important to evaluate potential environmental constraints or concerns that may need to be dealt with throughout the course of a marine project, such as the above discussed case, as any disruptions to marine life could be fatal.

REFERENCES

- [1] Edwin Neeleman. (2003). *Welcome to Newfoundland*. [Online]. Available: <http://newfoundland.hilwin.nl/PHP/en/lascie.php>
- [2] Newfoundland Labrador Canada. (2012, August 2). *La Scie Harbour Improvements*. [Online]. Available: http://www.env.gov.nl.ca/env/env_assessment/projects/Y2009/1434/index.html
- [3] H.E. Chandler. (1978). *The How To Write What Book*. [Online]. Available: <http://www.civeng.carleton.ca/ECL/cwrtng.html>
- [4] Canadian Environmental Assessment Agency. (2012, Dec. 5). *Harbour Improvements (P/N R.001173.001) La Scie Harbour Improvement*. [Online]. Available: <http://www.ceaa.gc.ca/052/details-eng.cfm?pid=46788>
- [5] MERX (2013). *Harbour Improvements – La Scie, N*. [Online]. Available: http://www.merx.com/English/supplier_menu.asp?WCE=Show&TAB=1&PORTAL=MERX&State=7&id=PW%24PWD0064462&FED_ONLY=0&hcode=Cp45kWecrjbM6p0YN%2FQxDQ%3D%3D
- [6] CBCL Limited (2013). *Marine - Project Gallery*. [Online]. Available: http://www.cbcl.ca/marine/marine_gallery.html