Newfoundland Power Inc.

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DELIVERED BY HAND

December 9, 2013

Board of Commissioners
of Public Utilities
P.O. Box 21040
120 Torbay Road
St. John's, NL A1A 5B2

Attention: G. Cheryl Blundon
Director of Corporate Services
and Board Secretary

Ladies & Gentlemen:

Re: Application for approval of capital expenditures supplemental to Newfoundland Power Inc.'s (the "Company") 2014 Capital Budget

Please find enclosed the original and 8 copies of an application for approval of capital expenditures supplemental to the Company's approved 2014 capital budget (the "Application"). The proposed 2014 capital expenditure of $14,520,000 is necessary to replace the submarine cable system that supplies electricity to Bell Island.

Background

On January 9th, 2012, an unplanned outage on distribution feeder BCV-02 was found to have resulted from a failure of one of four of the submarine cables providing the electricity supply to Newfoundland Power's customers on Bell Island. On April 6th, 2012, before the first cable failure could be repaired, a second failure occurred on one of three remaining in-service cables. By Saturday, April 21st, 2012, the repair of both cables had been completed and the Bell Island submarine cable system had been returned to normal operation.

Following the successive cable failures experienced in 2012, Newfoundland Power engaged submarine power cable experts Orton Consulting Engineers International Ltd. to assess the condition of the submarine cables. The experts' condition assessment confirmed the submarine cables are at the end of their service life.

Following that assessment, Newfoundland Power considered whether replacing the existing submarine cable system was the least cost option for supplying electricity to Bell Island. The Company's analysis, submitted with the Application, showed that the proposed replacement of the submarine cable system is the least cost alternative, and is materially less costly over the long term than supplying Bell Island using local generation.

Accordingly, Newfoundland Power has determined that the continued least cost delivery of electricity to its customers on Bell Island requires that the existing Bell Island submarine cable system be replaced.

To ensure the replacement of the submarine cable system is completed at the lowest cost consistent with reliable service as required by the *Electrical Power Control Act, 1994*, Newfoundland Power engaged SNC-Lavalin, an engineering firm with expertise in the design and installation of submarine power cable systems, to assist in the evaluation of design alternatives and the development of detailed technical specifications for a replacement cable system.

Once the detailed technical specifications for the project had been developed, Newfoundland Power initiated a competitive procurement process. As a result of that competitive process, which was completed in November 2013, Newfoundland Power selected a supplier to manufacture and install the replacement submarine cable system. The Company is currently engaged in detailed contract negotiations with the prospective supplier. The pricing obtained in the competitive procurement process is valid until January 17th, 2014, pending the Board's approval of the Application. That pricing forms the basis of the capital expenditure estimates in the Application.

The Application and Filing

The Application proposes 2014 capital expenditures of $14,520,000 to replace the three-phase submarine cable system that provides electricity supply to customers on Bell Island from Newfoundland Power's Broad Cove substation.

For convenience, the Application and supporting materials (collectively, the "Filing") are provided in a single bound volume on three-hole punched paper. The Filing includes the following supporting materials:

1. The Application
2. Schedule A – *Bell Island Submarine Cable System Replacement, December 2013*
3. Schedule B – Project Description
4. Condition Assessment
    a. *Bell Island Submarine Cable Condition Assessment*, Orton Consulting Engineers International Ltd.
    b. *Letter of Opinion, September 30, 2013*, Mark Fenger, Kinectrics Inc.
5. *Design and Installation of a New Bell Island Submarine Power Cable System*, SNC-Lavalin
6. Request for Proposals dated October 28, 2013 (including Addendum #1 dated November 1, 2013)

Telephone: (709) 737-5609 *Email: ghayes@newfoundlandpower.com* *Fax: (709) 737-2974*

Process Matters

This project was not included in the Company's 2014 Capital Budget Application because the necessary engineering design work and the procurement process for the project had yet to be completed. The project cannot be delayed until the 2015 Capital Budget Application process due to the risks associated with the condition of the existing submarine cable system. Timely approval by the Board will facilitate the completion of the proposed submarine cable system replacement in 2014.

The Application is submitted in accordance with the provisions respecting supplemental capital expenditures in the Capital Budget Application Guidelines dated October 2007.

A draft of the Order requested is enclosed for the Board's convenience. If there are any questions in relation to this matter, please contact the undersigned at the direct number noted below.

Yours very truly,

Gerard M. Hayes
Senior Counsel

Enclosure

c.	Geoffrey Young Newfoundland and Labrador Hydro	Thomas Johnson O'Dea Earle Law Offices

Telephone: (709) 737-5609 *Email: ghayes@newfoundlandpower.com* *Fax: (709) 737-2974*

IN THE MATTER OF the *Public Utilities Act,* (the "Act"); and

IN THE MATTER OF an Application by Newfoundland Power Inc. ("Newfoundland Power") for approval to proceed with the construction and purchase of certain improvements and additions to its property pursuant to Section 41(3) of the Act,

TO: The Board of Commissioners of Public Utilities (the "Board")

THE APPLICATION OF Newfoundland Power **SAYS THAT:**

1. Newfoundland Power is a corporation duly organized and existing under the laws of the Province of Newfoundland and Labrador, is a public utility within the meaning of the Act, and is subject to the provisions of the *Electrical Power Control Act, 1994.*

2. Newfoundland Power's Broad Cove Substation (the "Substation") is a 12.5 kV distribution substation located on the south shore of Conception Bay.

3. The Substation's BCV-02 feeder serves approximately 1,550 customers on Bell Island. The three-phase electricity supply to Bell Island consists of a 5-kilometre long submarine cable system consisting of 4 separate single-phase cables. Three of the cables carry load, and the fourth is an energized spare cable which provides contingency in the event of the failure of one of the other cables.

4. During 2012, successive failures occurred on two of the single-phase submarine cables serving Bell Island. Each failure resulted in the interruption of electricity service on the BCV-02 feeder. The first failure occurred on January 9, 2012. The second failure occurred on April 6, 2012.

5. Following the first cable failure, Newfoundland Power applied to the Board for approval of a capital expenditure of $510,000 for the replacement of the damaged section of the failed submarine cable. In Order No. P.U. 8 (2012), the Board approved the expenditure.

6. Before the repair work had commenced on the first failed cable, a failure occurred on another of the submarine cables serving Bell Island. Newfoundland Power undertook immediately to repair the second damaged cable under authority of the Allowance for Unforeseen Items included in its approved 2012 capital budget. The second repair was carried out using the equipment and personnel that were then being mobilized in connection with the initial cable failure.

7. Following completion of the repairs of the two failed submarine cables, Newfoundland Power engaged Orton Consulting Engineers International Ltd. ("Orton"), an engineering consultant with expertise in power cable systems, to assess the condition of the submarine

cables serving Bell Island. Orton concluded that the submarine cables are at the end of their useful life and recommended that the cables be replaced.

8. After receiving Orton's recommendation that the cables be replaced, Newfoundland Power sought the advice of Kinectrics ("Kinectrics"), another engineering consultant with expertise in power cable systems, to review Orton's findings. Kinectrics concurred in Orton's conclusion that the cables are at the end of their useful life and further indicated that the achieved lifespan of the submarine cables is consistent with what would reasonably be expected for cables of their type and vintage.

9. In early 2013, Newfoundland Power engaged consulting engineers BAE-Newplan, a subsidiary of SNC-Lavalin Inc., to assist it in evaluating options and developing a technical specification and preliminary cost estimates for the replacement of the Bell Island submarine cable system.

10. In order to determine whether replacing the cable system was the least cost option for supplying Bell Island with electricity, Newfoundland Power also evaluated other options and determined, on the basis of a net present value analysis of revenue requirements, that replacing the Bell Island submarine cable system was the least cost alternative.

11. Following completion of the technical specification and identification of suppliers, Newfoundland Power issued a competitive tender for bids for the supply and installation of a new submarine cable system.

12. When Newfoundland Power judged none of the bids received in response to its tender to be acceptable, it subsequently issued a request for proposals seeking alternative proposals for the supply and installation of the new submarine cable system.

13. The request for proposals closed on November 18, 2013 and a successful bidder has been chosen. The awarding of a contract to supply and install the new Bell Island submarine cable system is contingent upon the Board's approval of this Application.

14. To effect the replacement of the Bell Island submarine cable system, Newfoundland Power proposes estimated 2014 capital expenditures totalling $14,520,000. Schedule "A" to this Application is a report entitled *Bell Island Submarine Cable System Replacement* which provides a detailed explanation of the necessary capital expenditures.

15. Schedule B to this Application is a formal explanation of the proposed capital project.

16. The proposed expenditures referred to in paragraph 14 are necessary to ensure the continued provision of a safe, reliable electricity supply to Newfoundland Power's customers on Bell Island. Newfoundland Power proposes to carry out the proposed project commencing in early 2014, with final commissioning of the new Bell Island submarine cable system scheduled for November 2014.

17. Newfoundland Power submits that the replacement of the Bell Island submarine cable system with a new submarine cable system as proposed in this Application will provide

for delivery of power to Bell Island customers at the lowest possible cost consistent with reliable service as required pursuant to the *Electrical Power Control Act, 1994*.

18. Newfoundland Power submits that the proposed 2014 expenditures referred to in paragraph 14 are necessary to provide service and facilities which are reasonably safe and adequate and just and reasonable, all as required pursuant to Section 37 of the Act.

19. Communications with respect to this Application should be sent to Gerard Hayes, Counsel for Newfoundland Power.

20. **NEWFOUNDLAND POWER REQUESTS** that the Board approve, pursuant to Section 41 (3) of the Act, the proposed 2014 capital expenditures of $14,520,000 as set out in this Application.

DATED at St. John's, Newfoundland and Labrador, this 9th day of December, 2013.

NEWFOUNDLAND POWER INC.

Gerard M. Hayes
Counsel for the Applicant
Newfoundland Power Inc.
P.O. Box 8910
55 Kenmount Road
St. John's, NL A1B 3P6

Telephone: (709) 737-5609
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IN THE MATTER OF the *Public Utilities Act,* (the "Act"); and

IN THE MATTER OF an Application by Newfoundland Power Inc. ("Newfoundland Power") for approval to proceed with the construction and purchase of certain improvements and additions to its property pursuant to Section 41(3) of the Act,

AFFIDAVIT

I, Gary J. Smith of St. John's in the Province of Newfoundland and Labrador, Professional Engineer, make oath and say as follows:

1. That I am Vice-President, Engineering and Operations of Newfoundland Power Inc.

2. To the best of my knowledge, information and belief, all matters, facts and things set out in this Application are true.

SWORN to before me at St. John's
in the Province of Newfoundland and
Labrador this 9th day of December, 2013.

Barrister

Gary J. Smith

Newfoundland Power Inc.
2014 Capital Budget Supplemental Application
Bell Island Submarine Cable Replacement
Filing Contents

Bell Island Submarine Cable System Replacement

December 2013

Prepared by:

James Mullins, P. Eng.

REGISTERED PROFESSIONAL ENGINEER
PEG Newfoundland and Labrador
JAMES MULLINS
SIGNATURE
2013-12-09
DATE
NEWFOUNDLAND & LABRADOR

NEWFOUNDLAND POWER
A FORTIS COMPANY

Table of Contents

1.0 Introduction

Newfoundland Power Inc. ("Newfoundland Power") supplies electricity to customers on Bell Island by means of a 5.2 kilometre long, three-phase submarine cable system. The submarine cable system consists of four single conductor cables energized at 12.5 kV. Electricity is supplied from Newfoundland Power's Broad Cove substation via distribution feeder BCV-02 to serve approximately 1,550 customers on Bell Island. Submarine cables are the lowest cost means of providing a long term reliable electricity supply to Bell Island.

The existing Bell Island cable system has experienced three recent failures. One failure occurred in 2008, and there were two separate failures in 2012. After each of these failures, the damaged cable sections were repaired and placed back into service.

Following the 2012 cable failures, Newfoundland Power engaged submarine power cable experts Orton Consulting Engineers International Ltd. ("Orton"), of Vancouver, to complete an assessment of the physical condition of the damaged cables. Orton's report concluded that "...all of the cables are at the end of their useful life and should be replaced."[1] Newfoundland Power also sought the advice of a second engineering firm with power cable expertise, Kinectrics Inc. ("Kinectrics"), of Toronto, who confirmed Orton's findings.[2]

To assist in evaluating design options and developing detailed technical specifications for a replacement cable system, Newfoundland Power engaged consulting engineers SNC-Lavalin Inc. SNC-Lavalin also provided preliminary cost estimates.[3]

In order to determine whether replacing the submarine cable system was the least cost option for supplying electricity to Bell Island, Newfoundland Power compared the associated costs, on a net present value basis over the life of a new cable system, to the costs associated with supplying Bell Island customers using local generation. The net present value analysis indicated that replacing the Bell Island submarine cable system is the least cost alternative.

Newfoundland Power subsequently issued a competitive tender for the supply and installation of a replacement submarine cable system. When no acceptable bids were received in response to the tender, a request for proposals ("RFP") was issued. As a result of the RFP process, which concluded in November 2013, Newfoundland Power identified a proposal to replace the Bell Island submarine cable system that meets the requirement for a least cost, reliable supply of electricity to customers on Bell Island.

Newfoundland Power proposes to replace the Bell Island submarine cable system as soon as possible, with project completion scheduled for November 2014. The long project duration is principally due to the lead time associated with procurement of the cable.

The total estimated project cost is approximately $14.5 million.

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1 See *Bell Island Submarine Cable Condition Assessment*, Orton Consulting Engineers International Ltd., page 9.

2 See *Letter of Opinion, September 30, 2013*, Mark Fenger, Kinectrics Inc. Kinectrics Inc. is a private testing, inspection, certification and consulting firm that originated as Ontario Hydro Research Division.

3 See *Design and Installation of a New Bell Island Submarine Power Cable System*, SNC-Lavalin.

2.0 Background

2.1 Customers Served

Bell Island is located in Conception Bay, approximately 5 kilometres from the nearest point on the island of Newfoundland. Newfoundland Power supplies electricity to approximately 1,550 customers on Bell Island, 92% of which are residential customers.[4]

During 2012, electricity sales to customers on Bell Island were approximately 28 GWh with a peak demand of approximately 8.3 MW.[5] From 2007 to 2012, the load on Bell Island increased by approximately 0.4% per year.[6] Load growth on Bell Island has been lower than the average load growth on the Northeast Avalon Peninsula, which averaged 2.3% per year in this period.

2.2 Existing Power Supply

Electrical power is supplied to Bell Island via a 5.2 kilometre long submarine cable system. The submarine cable system is part of the BCV-02 distribution feeder that originates at Newfoundland Power's Broad Cove Substation in Portugal Cove - St. Phillips. The submarine cable system constitutes the sole supply of electrical power to domestic and commercial electricity users on Bell Island.

The submarine cable system consists of four individual cables that were installed in 1988 and 1990 at an original cost of approximately $3.5 million. The four-cable system consists of three cables carrying load and one spare.

2.3 Cable System Failures

In 2008, a fault occurred in one of the cables at the foot of the land-based termination structure at the Broad Cove end of the cable. The cause of this failure was mechanical stress at the point where the cable transitions from vertical to horizontal as it exits the structure. Newfoundland Power transferred the load to the spare cable, and customers experienced a power interruption of approximately three hours. To repair the faulted cable, a section of new cable was installed to replace the damaged section. The repaired cable was placed back in service in approximately one week.

In early 2012, two of the submarine cables failed in successive incidents. In the first incident, on January 9th, a fault occurred about 300 metres from shore in about 6 metres of water at the Broad Cove end of the cables.[7] Load was transferred to the spare cable, and customers experienced a power interruption of just over 2 hours. Anticipating that the necessary repairs might take several months to complete, Newfoundland Power established a contingency plan to prepare for the possibility of another cable failure prior to the repair being completed.

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4 Feeder BCV-02 provides service to a very small number of customers in Broad Cove (approximately 14). The remaining customers served by the feeder are on Bell Island.

5 Weather-adjusted figures.

6 Further details are provided in Appendix B.

7 Newfoundland Power used a time-domain reflectometer ("TDR") to determine the approximate location of the cable fault. The TDR transmits a high frequency pulse into the cable and measures the time for the pulses to be reflected back to the source to calculate the approximate location of the fault.

The second fault occurred on April 6th, 2012, in a segment of cable buried in sand beyond the low water mark on the Bell Island side. Because this happened before the January 9th cable had been repaired, no spare cable was available. As a result, electrical service to Bell Island was interrupted for a longer period. The contingency plan that had been put in place following the January incident enabled restoration of power to customers within 10 hours.

Service was restored to all customers requiring single-phase power by transferring the load to the two remaining single-phase cables; service was restored to customers requiring three-phase power by means of a "Scott" transformer connection.[8]

These contingency measures enabled service to customers to be maintained while the submarine cables were being repaired. However, maintaining the Bell Island electricity distribution system in this configuration over an extended period risks damaging customers' electrical equipment. Further, the winter load on Bell Island cannot be served if the submarine cable system is not fully operational.

By mid-April, a marine contractor and equipment had already been mobilized to repair the January 6th cable damage. It was fortunate that the cable failure on April 6th had also occurred in shallow water. This allowed the equipment mobilized to repair the January failure to also be used for the second repair.[9] As a result, the repair of both damaged cables was completed by April 21st, 2012.

The total cost of both repairs in 2012 was approximately $903,000.[10]

Appendix A provides photographs taken during the April 2012 cable repair project.

3.0 Cable System Condition Assessment

Once repairs of the two cables had been completed in April 2012, Newfoundland Power engaged Orton to assess the condition of the submarine cable system. The objective of Orton's laboratory investigation was to determine the root cause of the cable failures and assess the likelihood of a recurrence.

Orton completed a forensic analysis of one sample of faulted cable and two samples of spare cable, utilizing the laboratory services of Powertech Labs, also of Vancouver.[11] The cable

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8 A "Scott" connection uses four single-phase transformers to supply three-phase loads from two phases of a power system. This configuration can damage customer equipment if maintained over an extended period.

9 The equipment included a marine work platform that consisted of a barge fitted with legs, or spuds, used to secure the barge in position by effectively standing the platform on the sea bottom. This approach is only practical in relatively shallow water.

10 For additional detail, see the reports *Bell Island Submarine Cable, Replace Cable Section* and *Bell Island Submarine Cable, Allowance for Unforeseen Items, Final Report* filed with the Board of Commissioners of Public Utilities (the "Board") on March 16th, 2012 and July 13th, 2012, respectively.

11 Newfoundland Power has maintained two reels of spare cable for the Bell Island cable system in its central storage facility at Duffy Place since the current system was installed in 1988.

samples were systematically tested to assess the comparative condition of the sample from the faulted cable and the samples of spare cable.

The laboratory investigation determined that the copper tape inside the failed cable sample was badly corroded. As a result, it could no longer carry the capacitive current, which ultimately caused the cable failure. Over time, the aging polyethylene jacket of the cables allowed small amounts of salt water into the cable, accelerating the corrosion of the copper and increasing the likelihood of failure.[12]

The laboratory observations were corroborated by the results of electrical resistance tests conducted on the cable samples. The copper tape resistance per unit length of the failed cable was found to be significantly higher than that of the samples of spare cable. This finding confirmed that the copper tape in the failed cable can no longer carry the capacitive current it was designed to carry. As a result, capacitive current is forced to travel through parts of the cable that were not designed to carry it.[13]

Based on these findings, Orton concluded that the cables in the Bell Island submarine cable system are at the end of their useful life, and recommended they should be replaced.[14]

After reviewing Orton's recommendation, Newfoundland Power sought the advice of Kinectrics, another engineering consulting firm with expertise in power cable systems, to review Orton's findings. Kinectrics was asked to consider whether additional testing of the in-service submarine cables might be warranted to confirm the results of Orton's condition assessment.

Kinectrics advised that electrical field testing of the cables could be destructive and would not, in any event, be expected to result in different findings than Orton's. Kinectrics concurred with Orton's conclusion that the cables are at the end of their useful life and further indicated that the achieved lifespan of the submarine cables is consistent with what would be reasonably expected for cables of that type and vintage.[15]

Based on Orton's findings, and the confirmation of those findings by Kinectrics, Newfoundland Power has determined that maintaining a reliable power supply to its customers on Bell Island requires the replacement of the Bell Island submarine cable system.

4.0 Replacement System Considerations

The decision to replace the Bell Island submarine cable system required Newfoundland Power to address certain basic engineering and cost considerations.

[12] See *Bell Island Submarine Cable Condition Assessment*, at pages 8 and 9.
[13] Ibid., Sections 4.2 and 5.1.
[14] Ibid., Section 6.0.
[15] *Letter of Opinion, September 30, 2013*, Mark Fenger, Kinectrics Inc.

For detailed technical assistance on engineering matters, Newfoundland Power engaged SNC-Lavalin, a large engineering consulting firm with experience in the design and installation of submarine power cable projects.

It was also necessary to determine whether replacing the submarine cable system would be the least cost option to supply customers on Bell Island. In that regard, Newfoundland Power performed a net present value ("NPV") analysis of revenue requirement impacts, comparing the alternatives of (1) replacing the cable system and (2) supplying Bell Island with local generation.[16]

4.1 Principal Engineering Design Parameters

The following principal engineering design requirements were determined with consideration for long term reliability and costs.

Availability/Reliability

From a reliability perspective, the submarine cable system must provide a level of redundancy that will minimize risk of customer outages due to failure of a single cable.[17]

Two cable system design configurations were considered for the replacement system. These were: (1) installing four single conductor cables; and (2) installing two three-conductor cables.

The existing system consists of four single-conductor cables. The system operates with three cables energized and carrying load (one for each phase). The fourth cable is a spare that is energized but is not carrying load. The spare can be used to carry load when there is trouble with one of the other phases, or to permit maintenance on a cable without disrupting service to customers.[18] The spare cable is rotated annually to avoid having any single cable carry no load for an extended period.[19]

A three-conductor cable system consists of two separate cables, each of which contains three conductors. Three-conductor cables were utilized for the Bell Island power supply prior to the installation of the existing system in 1988.[20]

From a reliability perspective, the contingency configurations provided by either cable system would satisfy maintenance and power restoration requirements on Bell Island. SNC-Lavalin's analysis contains detailed technical assessments of the two configurations.[21] The detailed

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16 In Order No. P.U. 6 (1991), the Board ordered Newfoundland Power to evaluate any capital expenditure of a material amount using an NPV methodology. This requirement is also reflected in the *Capital Budget Application Guidelines*.

17 Without the contingency of a spare cable, mobile generation would be required to supply electricity to customers in the event of a cable failure. This is not practical, given the length of time that might be needed to repair or replace a submarine cable. Furthermore, Newfoundland Power's existing mobile generation does not have sufficient capacity to carry the Bell Island load for an extended period.

18 Submarine cables are typically taken out of service when the mechanical protection at the shore ends requires repair or replacement.

19 Leaving a submarine cable "cold" for extended periods may tend to shorten its service life.

20 Three submarine cables were installed in 1932. These were supplemented by a cable installed in 1955. The 1955 cable was still operational when the existing cables were installed, but it failed a short time later.

21 See *Design and Installation of a New Bell Island Submarine Power Cable System*, pages 22 to 24.

assessment does not indicate any constraints that would prefer one configuration over the other. SNC-Lavalin recommended that the final decision between two three-conductor cables and four single-phase cables be made on the basis of bid evaluation.[22]

Mitigation of Corrosion

Water ingress leading to corrosion of the copper tape that carries capacitive current was identified by Orton as the root cause of the 2012 cable failures. It was therefore a requirement of Newfoundland Power that the new cable be designed to eliminate the possibility of copper tape corrosion.

SNC-Lavalin's assessment was that either Ethylene Propylene Rubber (EPR) or Tree Retardant Cross-Linked Polyethylene (TR-XLPE) are suitable insulation materials for the Bell Island cable system. The technical specification therefore allowed suppliers to propose either cable insulation type.

Cable designs utilizing EPR and TR-XLPE insulation systems each address the ingress of moisture in different ways. Suppliers were therefore required to specify a method to eliminate corrosion of the copper tapes.

TR-XLPE cables can incorporate a lead sheath to prevent the ingress of moisture, protecting the insulation itself from degradation. In addition to acting as a water barrier, the lead sheath also serves to carry the capacitive current, thereby eliminating the need for copper tapes. EPR insulation, on the other hand, is not affected by ingress of moisture. Accordingly, EPR cables do not typically incorporate a lead sheath, in which case corrosion of the copper tapes must be addressed by other elements of the design.

Forecast Load

Newfoundland Power's technical requirements for a replacement submarine cable system included a design life of 40 years.[23] Accordingly, the capacity requirement for a replacement cable system was based on a 40-year load forecast for Bell Island.

Based on recent growth, Newfoundland Power estimates future annual growth in energy sales on Bell Island at 0.3%. In addition to normal load growth, the potential exists for some existing commercial and institutional customers on Bell Island to convert their heating loads to electricity from other energy sources. Based on these considerations, Newfoundland Power's specification for the replacement cable system was based on a design load of 10.4 MVA.

Further detail on the load forecast for Bell Island is provided in Appendix B.

Operating Voltage

Given the uncertainty inherent in a 40-year forecast, Newfoundland Power specified that the cable design provide for operating voltage flexibility. This is consistent with the approach taken when the existing cable system was installed, and provides a contingency to allow

[22] Ibid., page 28

[23] A TR-XLPE submarine power cable with a lead sheath has an expected service life of 40 years. The existing Bell Island submarine cables do not include a lead sheath.

Newfoundland Power to respond to the development of additional unforeseen load on Bell Island during the service life of the submarine cable system.

The existing cable system operates at 12.5 kV; however, the submarine cables were designed to be capable of operating at 25 kV. The higher design voltage allows for the contingency that load growth may exceed forecast.[24]

The incremental cost associated with providing a cable that can operate at the higher voltage is minimal.[25] Newfoundland Power believes it is prudent to incur the extra cost now to avoid having to incur greater costs if load growth on Bell Island exceeds the forecast during the service life of the cable.

Short-Circuit Tolerance
A short circuit occurs when current flows along an electrical conductor as a result of damage to, or other interference with, components of an electrical circuit. For example, a short circuit can occur if an energized conductor contacts a neutral wire during severe weather. Such incidents are not uncommon on electricity distribution systems, and electrical system components must be designed to withstand short circuit current.

If a short circuit occurs on the Bell Island distribution system, the submarine cable will be exposed to the resulting current until protection equipment can open the circuit. If the current exceeds the design capacity of the submarine cable, it could damage the cable.

Newfoundland Power has calculated the short circuit current levels that could accompany an electric system short circuit on Bell Island. Accordingly, the RFP specified that the replacement Bell Island submarine cables must be capable of withstanding a short circuit current of approximately 11.5 kA for up to 0.5 seconds.

Cable Markings
The new cables are required to be marked in such a way that each cable is easily identifiable under water. The marking of the cables will allow utility personnel to readily determine which cable is associated with each overhead conductor. This will contribute to the safe and efficient maintenance of the submarine cable system.

4.2 Alternatives to Cable Replacement
To determine whether replacing the Bell Island submarine cable system was the least cost supply option, Newfoundland Power compared the costs with the alternative of supplying the customer load using local generation on Bell Island. In the local generation scenario, the Bell Island electrical distribution system would be isolated from the Island Interconnected System.

The Company's analysis compared the alternative of continuing to supply customers from the Island Interconnected System through a new submarine cable system with the alternative of

[24] Conversion from 12.5 kV to 25kV would double the load carrying capacity of the cable.
[25] The cost difference is primarily a result of the insulation layer being slightly thicker. This increases the material cost of the cable by approximately 5%. The cost of providing the increased capacity for the Bell Island cable is approximately $250,000.

supplying customers using local diesel generation on Bell Island.[26] The analysis compared the revenue requirements of each alternative on a net present value basis over the system life of 40 years.

On a net present value basis, the cost of supplying electricity to Bell Island customers using local generation is approximately $173 million. This compares to approximately $120 million for a new submarine cable system assuming no Labrador interconnection, or $75 million with a Labrador interconnection.

On the basis of the net present value comparison of these alternatives, Newfoundland Power has concluded that the least cost option for continuing to supply Bell Island customers with electricity is the replacement of the submarine cable system.

Details of the net present value analysis are provided in Appendix C.

5.0 Project Description

5.1 Project Review

Prior to seeking proposals from submarine cable suppliers and installers, Newfoundland Power asked SNC-Lavalin to evaluate options for the replacement of the Bell Island submarine cable system and to assist in the development of detailed technical specifications.

Based on the principal design parameters described in 4.1 above, SNC-Lavalin developed preliminary technical specifications and preliminary cost estimates for the project.

The preliminary cost estimate of approximately $13.4 million included the cost of (1) SNC-Lavalin's engineering services, (2) Newfoundland Power's estimate for managing the project and completing the installation of the termination structures and related work, and (3) the supply and installation of the submarine cables, including spare equipment, the marine survey, shore end protection, and turnkey contract management.[27]

5.2 Scope of Work

This project involves the installation of a new submarine cable system between Broad Cove, Conception Bay to the area of the Dominion Pier on Bell Island. This will involve further engineering design work, acquisition of government permits and approvals, construction of new termination structures and necessary modifications to overhead distribution lines, installation of shore protection for the cables, and the supply and installation of the new cables. It will also include a survey of the ocean bottom to determine the precise cable route, and testing and commissioning of the completed cable system.

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[26] Newfoundland Power determined that diesel generation was a lower cost alternative for Bell Island than generation based on either gas turbines or renewable energy.

[27] SNC-Lavalin, op. cit., page 27.

While Newfoundland Power will provide oversight of the cable installation, the supply and installation will be carried out pursuant to a "turnkey" contract. A turnkey arrangement provides for the manufacture and installation of the cables by a single contractor.

Newfoundland Power has engaged SNC-Lavalin to provide expert support during the testing and review of all technical aspects of the cable manufacture and installation.

The construction of the termination structures and associated equipment will be completed by Newfoundland Power separately from the cable supply and installation contract.

5.3 Procurement Process

To facilitate approval of the associated capital expenditures by the Board, Newfoundland Power proceeded in 2013 with the engineering work, and the permitting, approvals and contract pricing processes necessary to develop an accurate estimate of the project costs.

On September 20th, 2013, Newfoundland Power issued a tender for competitive bids for the supply and installation of the new submarine cable system. The tender closed on October 18th, 2013. However, the pricing in the bids received in response to the tender was significantly higher than expected. After careful consideration of the matter, Newfoundland Power chose not to accept any of the bids and to proceed as soon as possible with an amended procurement process.

On October 28th, 2013, Newfoundland Power issued a Request for Proposals (the "RFP") seeking proposals from submarine power cable suppliers for the supply and installation of the new submarine cable system. A request for proposals process allows prospective suppliers more flexibility in addressing project requirements, including the ability to suggest alternatives.

The RFP was directed to all of the pre-qualified suppliers that had received the initial tender package, including some who had chosen not to participate in the initial tender. The RFP was supplemented with direct communications with prospective suppliers, advising that pricing obtained as a result of the initial tender was much higher than expected, and that reasonable measures to achieve lower pricing would be considered in the RFP process.

The date set for receipt of proposals under the RFP was November 18th, 2013. On that date, Newfoundland Power received 5 proposals.

Table 1 provides a comparison of the results of the initial competitive tender and the subsequent RFP.[28]

Table 1
Comparison of Procurement Pricing

	Number of Proposals Received	**Total Project Cost Estimate** Based on High Bid	**Total Project Cost Estimate** Based on Low Bid
Tender - October 2013	4	$27.1 M	$20.4 M
RFP - November 2013	5	$25.6 M	$14.5 M

As Table 1 shows, the total project cost based on the lowest bid received in response to the initial tender was significantly higher than SNC-Lavalin's preliminary project cost estimate of approximately $13.4 million. On the other hand, the total project cost based on the lowest price submitted in response to the subsequent RFP is considerably closer to the preliminary estimate.

Following detailed evaluation of the results of the RFP, the supplier that submitted the lowest priced proposal was selected to supply and install the new Bell Island submarine cables.

5.4 Successful Proposal

The successful proposal was submitted by Hellenic Cables S.A., a submarine cable manufacturer based in Greece ("Hellenic"). Hellenic and its predecessor companies have been in the cable manufacturing business since 1957, and have been manufacturing submarine power cables since 1972.[29] Hellenic has extensive international experience in the manufacture and installation of submarine power cables, primarily through turnkey contracts.[30] Hellenic's submarine cable manufacturing plant in Fulgor, near Corinth, Greece, produces both low and medium-voltage power cables and fibre optic cables.

In accordance with the terms of the RFP, the pricing submitted in Hellenic's proposal will be valid for 60 days after the RFP response deadline.[31] The 60-day period was established to allow time for approval of the project by the Board and for negotiation of final contract terms.[32]

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28 To protect commercially-sensitive information, project cost information is based on the range of bids. The responses to the tender and RFP were not ever intended to be public and may contain information that is commercially sensitive to bidders. Furthermore, final contract terms for this project are not settled, and the disclosure of bid details could be detrimental to Newfoundland Power's negotiation of final contract terms.

29 Hellenic was formerly known as Fulgor. Fulgor had been among the suppliers selected by SNC-Lavalin to provide preliminary cost information for its technical evaluation of the proposed cable replacement project. (See SNC-Lavalin, op. cit., page 10.)

30 Hellenic has manufactured and installed submarine power cables for electric utilities in Greece, Scotland, Norway, Italy, the Bahamas, Egypt, Malaysia and Malta.

31 The 60-day period expires on January 17th, 2014.

The proposal provides for the manufacture and installation of two 25 kV three-conductor TR-XLPE cables. To provide maximum operating flexibility, Newfoundland Power will operate the two cables in parallel. Both cables will be energized and carrying load at all times. When maintenance is required to be performed on one cable, or if a problem is encountered, all of the customer load on the Bell Island can immediately be switched to the other cable.[33]

The proposal provides for installation of the cables using Canadian marine vessels with state-of-the-art dynamic positioning capability. The cables will be laid slightly to the east of the existing submarine cables within an established no-anchorage zone.

Hellenic's proposal meets all of the essential requirements of the RFP, including the principal design parameters as described in section 4.1 above and detailed in the technical specification.[34]

5.5 Project Cost

The estimated cost to complete all work required to replace the Bell Island submarine cable system is approximately $14.5 million. Table 2 is a summary of the projected costs.

Table 2
Projected Expenditures
(000s)

Cost Category	Estimated Cost
Material	$11,900
Labour - Internal	241
Labor - Contract	570
Engineering	1,060[35]
Other	749[36]
Total	**$14,520**

5.6 Project Schedule

The estimated lead time for cable delivery is approximately 8 months. Due to seasonal weather conditions, it is preferable to complete the cable installation portion of the project by early fall.

32 Definitive contract language will be finalized during the 60-day period, and contract execution will follow issuance of an order of the Board.

33 This configuration also avoids leaving any single submarine cable "cold" for an extended period.

34 Notably, the lead sheath incorporated in the design of the TR-XLPE cables to be used in the new Bell Island system eliminates the need for copper tapes, and eliminates the risk of corrosion inside the cable. This is the principal contributor to the expected service life of 40 years.

35 Includes costs of Newfoundland Power engineering and consulting engineers' fees.

36 Interest during construction (IDC) is the largest component of this cost.

Table 3 shows the principal milestones in the project schedule.

Table 3
Project Schedule

Milestone	Date
Finalization of Contract	January 2014
Material Procurement by Supplier	April 2014
Marine Survey	April 2014
Onshore Construction	July 2014
Cable Manufacture Complete	August 2014
Cable Factory Acceptance Testing	August 2014
Delivery of Cable to Eastern Canadian Port	September 2014
Submarine Cable Installation	September 2014
Completion of Shoreline Work	October 2014
Cable System Testing and Commissioning	November 15, 2014

6.0 Concluding

Electricity is supplied to customers on Bell Island by means of a 5.2 kilometre long, three-phase submarine cable system energized at 12.5 kV. A submarine cable system is the most cost-effective means of providing Bell Island customers with a reliable supply of electricity.
A condition assessment of the existing submarine cable system supplying electricity to Bell Island was carried out after two cable failures were experienced in 2012. Based on the results of the condition assessment, Newfoundland Power has determined that the existing cable system must be replaced.

A net present value analysis of alternatives shows a replacement submarine cable system is the lowest cost option for supplying electricity to Newfoundland Power's customers on Bell Island.

The proposed capital project involves the manufacture and installation of two three-conductor TR-XLPE cables. The project includes construction of new termination structures at both Bell Island and Broad Cove, which will allow the existing system to remain operational while the new system is being constructed, installed and commissioned.

The project schedule anticipates that the testing and commissioning of the new submarine cable system will be completed on or before November 15th, 2014. The estimated total cost of replacing the Bell Island submarine cable system is approximately $14.5 million.

In order to ensure the completion of the Bell Island submarine cable system replacement project prior to the 2014-2015 winter season, Newfoundland Power has submitted a supplemental application to the Board for approval of the associated capital expenditures.

Replacement of the Bell Island submarine cable system without delay is necessary to ensure the continued supply of electricity to Bell Island at the lowest cost consistent with safe, reliable service.

Appendix A
PHOTOGRAPHS

2012 Cable Failures

Appendix A
Photographs

Photograph 1 – Cable repair vessels.

Photograph 2 – Diver leaving marine work platform.

Appendix A
Photographs

Photograph 3 – Cable retrieval to marine work platform.

Photograph 4 – Perforations and corrosion of copper tape on faulted cable.

Appendix A
Photographs

Photograph 5 – Completed submarine cable splice.

Photograph 6 – Placement of repaired cable onto sea bottom.

Appendix A
Photographs

Photograph 7 – Shore approach excavation and trenching work at Bell Island.

Photograph 8 – Divers installing cable protection (cast iron necklaces).

Appendix B
40 Year Feeder Load Forecast – BCV-02 (Bell Island)

Appendix B
40 Year Feeder Load Forecast – BCV-02 (Bell Island)

Newfoundland Power prepared a 40-year forecast of customer load on Bell Island to support planning of appropriate least cost, reliable power supply. This forecast took into consideration factors such as historical trends in customer and sales growth, forecasts of economic activity, and energy use trends, particularly for space heating.

Customers on Bell Island are presently supplied from a single distribution feeder ("BCV-02") that originates at Newfoundland Power's Broad Cove Substation in the community of Portugal Cove-St. Phillips.[1] At the end of 2012, there were 1,550 customers supplied through BCV-02.[2] The total load was approximately 28 GWh with a peak demand of 8.3 MW.[3]

Table 1 shows a breakdown of the 2012 load on BCV-02 by customer class.

Table 1
Bell Island (BCV-02)
2012 Customer Load Breakdown

Customer Class	Number of Customers[4]	Sales (GWh)
Domestic	1428	22.1
General Service	122	5.9
Street and Area Lighting	n/a[5]	0.2
Total	1550	28.2

Residential customers comprise 92% of the customers on Bell Island, and 78% of energy sales.

In the 10 years from 2002 to 2012, the number of customers served on Bell Island has increased at an average annual rate of 0.1% while energy sales have increased by 0.3%. In the 5 years from 2007 to 2012, the number of customers served and energy sales have increased by 0.4% annually, on average. This is materially lower than customer and energy sales growth in the surrounding Northeast Avalon area of 2.2% and 2.3% annually, respectively, over the past 5 years.

1 A small number of the customers supplied by BCV-02 are located in Broad Cove (approximately 14). The remaining 1536 customers are located on Bell Island.

2 2012 is used as the base year for forecasting, since it is the most recent full year for which data is available. At time of filing, there were 1,553 customers served by the BCV-02 feeder, which reflects an increase of 0.2% in 2013.

3 The total load is based on adjusting actual sales and peak demand for normal weather conditions.

4 This is the total number of customer accounts.

5 The number of street light accounts is not reflective of the number of customers or fixtures, since all area lighting is typically provided to customers who otherwise have accounts and the number of fixtures per account varies.

Appendix B
40 Year Feeder Load Forecast – BCV-02 (Bell Island)

Forecasts of economic growth and housing starts for the province and the Northeast Avalon area show slower growth in the longer term compared to recent experience. This indicates continued limited load growth on Bell Island.

The Company also considered the impact of possible future conversions to electric space heating from other fuels. As a result, the long term forecast of capacity requirements were increased by approximately 1 MW. This reflects Bell Island customers' current heating energy use, fuel price trends and recent experience regarding heating system conversions.

Forecast growth in energy sales for customers on Bell Island is approximately 0.3 % per year, based on recent trends. Forecast load growth of 0.3% annually for 40 years would increase the estimated peak demand from 8.3 MW to 9.4 MW. Allowing an additional 1 MW for possible future heating load brings the total 40 year forecast load to 10.4 MW.

Appendix C
Analysis of Bell Island Supply Alternatives

Appendix C
Analysis of Bell Island Supply Alternatives

General

To determine the least cost approach to replacement of the Bell Island submarine cable system, Newfoundland Power conducted a comparative analysis of alternatives. This analysis assessed the costs, in terms of the net present value of revenue requirement impacts over 40 years, as well as the technical feasibility of each alternative.[1]

The assessment which follows compares two alternatives for supply of power to customers on Bell Island:

1. Island Interconnected System Supply: continuing to supply customers through a submarine cable system from the Island Interconnected System; and

2. Bell Island Isolated Supply: supplying customers using local generation on Bell Island.

Alternative 1: Island Interconnected System Supply

Under this alternative, Newfoundland Power would replace the Bell Island submarine cable system and continue to supply customers from the Island Interconnected System. The estimated cost of this alternative includes costs related to constructing and maintaining the new submarine cable system, as well as the incremental costs to supply the customer load on Bell Island from the Island Interconnected System. Supply cost estimates were considered with marginal costs calculated based on two scenarios. The first scenario assumes no interconnection between Labrador and the island of Newfoundland; the second assumes a Labrador in-feed.[2]

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[1] The cost estimates for each alternative include capital and operating costs over a system life of 40 years. The estimated life of the replacement cable system is 40 years. See *Section 4.1 Principal Engineering Design Parameters, Mitigation of Corrosion*, at page 6 of this report.

[2] The marginal costs used in the economic evaluation were taken from the response to Request for Information CA-NLH-033 filed in the 2013 NLH General Rate Application. There is uncertainty as to marginal costs under a Labrador Interconnection. See response to Request for Information NP-NLH-110 from the 2013 NLH General Rate Application.

Appendix C
Analysis of Bell Island Supply Alternatives

Table 1 outlines the principal cost assumptions used in the economic evaluation of Alternative 1, and shows the net present value of the revenue requirement impact.

Table 1
Net Present Value
Alternative 1: Island Interconnected System Supply

Cost Assumptions	
Submarine Cable System Replacement Cost	$14,520,000
Annual Inspections and Maintenance Cost	$5,000
Periodic Testing (10 year cycle)[3]	$30,000
Energy Losses to Hydro's Supply Point	1.07%
Losses at Peak to Hydro's Supply Point	1.72%
Net Present Value	
Marginal Supply Cost (No Labrador Interconnection)	$120 million
Marginal Supply Cost (Labrador Interconnection)	$75 million

The net present value of the revenue requirement for Alternative 1 is $120 million, based on no Labrador in-feed, and $75 million assuming interconnection between the island and Labrador. The net present value calculations for Alternative 1 under both marginal supply assumptions are provided in Figures 1 and 2, on pages C-6 and C-7, respectively.

Alternative 2: Bell Island Isolated Supply

Under this alternative, Newfoundland Power would install generation facilities on Bell Island to supply the local customer load isolated from the Island Interconnected System. Local generation on Bell Island could potentially involve diesel generation, gas turbine generation or renewable energy-based generation.

Diesel generation technology is used by Hydro to supply their isolated systems and is the technology often used in small isolated systems in Northern Canada. The largest of Hydro's isolated systems is the L'Anse au Loup System in southern Labrador, with a capacity of 4.1 MW.[4] The forecast capacity requirement for a Bell Island isolated system is 10.4 MW.[5]

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[3] This is a preliminary estimate. The form and necessity of a periodic testing program has not yet been assessed.

[4] See 2013 NLH General Rate Application, page 2.39. The L'Anse au Loup system is interconnected with the Lac Roberson Hydro system in Quebec which supplies electricity to Hydro's customers in this area when available. The L'Anse Au Loup diesel system has 6 diesel generation units varying in size from 600 kW to 1825 kW. It has a firm capacity of 4,100 kW.

[5] See Appendix B: 40 Year Feeder Load Forecast – BCV-02 (Bell Island) for details.

Gas turbine generation technology could also be used for local generation. However, the efficiency of gas turbine generation is materially lower than that of diesel generation.[6] Due to the lower operating efficiency, gas turbine technology is not an economically viable alternative to diesel generation in this instance.

Renewable energy technologies such as wind and solar are also potential sources of local generation for Bell Island. Electricity generation using these technologies is limited by weather conditions and availability of wind or sunshine. To provide reliable supply to an isolated customer load, these technologies must be supported by energy storage and/or dispatchable supply resources such as diesel generation. This requirement would materially impact the cost of such an isolated supply system. Hydro is currently assessing the integration of wind and diesel generation through a pilot project.[7] Until this technology is proven, its costs cannot be assessed.

Newfoundland Power's review of generation technologies has determined that diesel generation is the most viable option for the isolated supply of Bell Island customers. The Company evaluated a diesel generation facility designed to supply a peak demand of 10 MW with a single redundant generation unit to ensure reliability.[8] The facility evaluated included five 2.9 MW diesel units, as well as fuel storage, a wharf for delivery of fuel, buildings to house the generators, office and storage space, and necessary electrical equipment.

[6] Gas turbine generation units typically have production efficiency of approximately 3 kWh/litre (12,000 BTU/kWh). See *Technology Characterization: Gas Turbines*, Energy and Environmental Analysis (an ICF Company), page 6. Diesel units typically have higher production efficiencies of approximately 4 kWh/litre. See *Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Electric Company*, Intergroup Consultants Ltd., page 3.

[7] Hydro has a pilot project at Ramea involving wind generation and hydrogen storage to supplement the diesel generation for that remote community.

[8] The diesel generation units were sized based on a load factor of 32%.

Table 2 outlines the principal cost assumptions used in the economic evaluation of Alternative 2, and shows the net present value of the revenue requirement impact.

Table 2
Net Present Value
Alternative 2: Bell Island Isolated Supply

Cost Assumptions	
Site Acquisition, Preparation & Foundations	$1,020,000
Generating Units & Exhaust Equipment	11,500,000
Fuel Handling Facilities, Buildings & Generating Unit enclosures	3,300,000
Electrical (Substation, Generating Unit Controls & Automation)	1,575,000
EPCM, Installation and Commissioning	2,150,000
Owner's Cost (Engineering and IDC)	1,100,000
Sub-total	20,645,000
Contingency (10%)	2,065,000
Total Initial Capital Cost[9]	$22,710,000
Refurbishment - 2039	$16,124,000
Fuel Cost	0.95¢/litre[10]
Fuel Efficiency	3.9 kWh/litre
Operating and Maintenance (lube oil, consumables, parts and labour)	3.5¢/kWh
Net Present Value	$173 million

The net present value of the revenue requirement impact for Alternative 2 is $173 million. The net present value calculations for Alternative 2 are provided in Figure 3 on page C-8.

9 Initial cost estimate, excluding owner costs was provided by Kaehne Consulting Ltd., an electrical engineering and project management firm based in Vancouver.

10 Based on Newfoundland Power's price to purchase diesel fuel in August 2013, escalated based on changes in Hydro's price projection for #6 fuel oil.

Appendix C
Analysis of Bell Island Supply Alternatives

Summary and Conclusion

Table 3 compares the present value of revenue requirement impacts for the two alternatives considered for supplying electricity to customers on Bell Island.

Table 3
Present Value of Revenue Requirement for
Supply of Electricity to Customers on Bell Island

Alternative	Present Value of Costs
1. Island Interconnected System Supply	
(a) Marginal Supply Cost (No Labrador Interconnection)	$120 million
(b) Marginal Supply Cost (Labrador Interconnection)	$75 million
2. Bell Island Isolated Supply	$173 million

On the basis of this net present value analysis, Newfoundland Power has concluded that the least cost approach to supply customers on Bell Island is from the Island Interconnected System by means of a submarine cable system.

Appendix C
Analysis of Bell Island Supply Alternatives

Figure 1 - Alternative 1A: New Cable with Island Interconnected System Supply (Based on no Labrador Interconnection)
Calculation of the Present Value of Revenue Requirement[1]

Discount Rate 6.85%

	Electricity Supply Requirements						Cable Costs		No Labrador Interconnection Marginal Supply Costs[4]		Revenue Requirement			
Year	**Energy Supply Requirements** GWh	**Energy Losses to Supply Point[2]** GWh	**Total Energy Requirements** GWh	**Marginal Capacity Requirements** MW	**Losses to Supply Point at Peak Demand[3]** MW	**Total Capacity Requirements** MW	**Capital Cost** ($000)	**Operating Cost** ($000)	**Energy Costs** ($000)	**Capacity Costs[5]** ($000)	**Capital Related[6]** ($000)	**Operating Costs** ($000)	**Energy Costs** ($000)	**Total** ($000)
2014	28.3	0.3	28.6	8.3	0.1	8.5	14,520	5	4,660	1,487	2,885	5	4,660	7,550
2015	28.4	0.3	28.7	8.3	0.1	8.5	-	5	4,444	2,293	3,836	5	4,444	8,286
2016	28.5	0.3	28.8	8.4	0.1	8.5	-	5	4,601	1,406	2,900	5	4,601	7,507
2017	28.5	0.3	28.8	8.4	0.1	8.5	-	5	4,731	1,854	3,303	5	4,731	8,039
2018	28.6	0.3	28.9	8.4	0.1	8.6	-	5	4,832	780	2,185	5	4,832	7,022
2019	28.7	0.3	29.0	8.5	0.1	8.6	-	6	4,962	782	2,145	6	4,962	7,112
2020	28.8	0.3	29.1	8.5	0.1	8.6	-	6	5,123	552	1,873	6	5,123	7,002
2021	28.9	0.3	29.2	8.5	0.1	8.6	-	6	5,430	458	1,741	6	5,430	7,176
2022	29.0	0.3	29.3	8.5	0.1	8.7	-	6	5,651	512	1,756	6	5,651	7,414
2023	29.1	0.3	29.4	8.6	0.1	8.7	-	6	5,781	524	1,732	6	5,781	7,519
2024	29.1	0.3	29.5	8.6	0.1	8.7	-	43	5,915	536	1,709	43	5,915	7,666
2025	29.2	0.3	29.5	8.6	0.1	8.8	-	6	6,051	548	1,687	6	6,051	7,744
2026	29.3	0.3	29.6	8.6	0.1	8.8	-	6	6,191	561	1,666	6	6,191	7,863
2027	29.4	0.3	29.7	8.7	0.1	8.8	-	6	6,333	574	1,647	6	6,333	7,987
2028	29.5	0.3	29.8	8.7	0.1	8.8	-	7	6,480	587	1,628	7	6,480	8,115
2029	29.6	0.3	29.9	8.7	0.1	8.9	-	7	6,629	600	1,611	7	6,629	8,247
2030	29.7	0.3	30.0	8.7	0.2	8.9	-	7	6,782	614	1,595	7	6,782	8,384
2031	29.8	0.3	30.1	8.8	0.2	8.9	-	7	6,938	628	1,580	7	6,938	8,525
2032	29.9	0.3	30.2	8.8	0.2	8.9	-	7	7,098	643	1,566	7	7,098	8,671
2033	29.9	0.3	30.3	8.8	0.2	9.0	-	7	7,262	658	1,552	7	7,262	8,821
2034	30.0	0.3	30.4	8.8	0.2	9.0	-	52	7,429	673	1,540	52	7,429	9,021
2035	30.1	0.3	30.4	8.9	0.2	9.0	-	8	7,601	688	1,528	8	7,601	9,136
2036	30.2	0.3	30.5	8.9	0.2	9.0	-	8	7,776	704	1,517	8	7,776	9,301
2037	30.3	0.3	30.6	8.9	0.2	9.1	-	8	7,955	720	1,507	8	7,955	9,470
2038	30.4	0.3	30.7	8.9	0.2	9.1	-	8	8,139	737	1,497	8	8,139	9,644
2039	30.5	0.3	30.8	9.0	0.2	9.1	-	8	8,326	754	1,489	8	8,326	9,823
2040	30.6	0.3	30.9	9.0	0.2	9.2	-	8	8,518	771	1,481	8	8,518	10,008
2041	30.7	0.3	31.0	9.0	0.2	9.2	-	9	8,715	789	1,473	9	8,715	10,197
2042	30.8	0.3	31.1	9.1	0.2	9.2	-	9	8,916	807	1,467	9	8,916	10,391
2043	30.9	0.3	31.2	9.1	0.2	9.2	-	9	9,121	826	1,461	9	9,121	10,591
2044	30.9	0.3	31.3	9.1	0.2	9.3	-	63	9,332	845	1,456	63	9,332	10,851
2045	31.0	0.3	31.4	9.1	0.2	9.3	-	9	9,547	865	1,451	9	9,547	11,007
2046	31.1	0.3	31.5	9.2	0.2	9.3	-	9	9,767	884	1,447	9	9,767	11,223
2047	31.2	0.3	31.6	9.2	0.2	9.3	-	10	9,992	905	1,443	10	9,992	11,445
2048	31.3	0.3	31.7	9.2	0.2	9.4	-	10	10,223	926	1,441	10	10,223	11,673
2049	31.4	0.3	31.7	9.2	0.2	9.4	-	10	10,458	947	1,438	10	10,458	11,907
2050	31.5	0.3	31.8	9.3	0.2	9.4	-	10	10,700	969	1,437	10	10,700	12,147
2051	31.6	0.3	31.9	9.3	0.2	9.5	-	10	10,946	991	1,436	10	10,946	12,393
2052	31.7	0.3	32.0	9.3	0.2	9.5	-	11	11,199	1,014	1,436	11	11,199	12,645
2053	31.8	0.3	32.1	9.4	0.2	9.5	-	11	11,457	1,037	1,697	11	11,457	13,165

Present Value of Revenue Requirement **119,902**

NOTES

[1] Some columns may not add due to rounding.

[2] This is the transmission energy losses incurred to transmit energy from the Company's supply point to its distribution system. Losses are calculated based on Newfoundland Power's estimated average % transmission energy (1.07%).

[3] This is the transmission losses at peak demand. The losses are calculated based on Newfoundland Power's estimated average % transmission losses at time of system peak (1.72%).

[4] Marginal cost are the Marginal costs provided in Response to CA-NLH-033 from 2013 NLH General Rate Application times the Energy and Total Peak Demand Requirements

[5] The capacity costs are economic carrying charges, not revenue requirements. An economic carrying charge is the present value cost of advancing the cost of a marginal unit of production one year.

[6] This is the marginal capacity costs plus the revenue requirements associated with the capital cost.

Appendix C
Analysis of Bell Island Supply Alternatives

Figure 2 - Alternative 1B: New Cable with Island Interconnected System Supply (Based on a Labrador Interconnected Scenario)
Calculation of the Present Value of Revenue Requirement[1]

Discount Rate 6.85%

	Electricity Supply Requirements						Cable Costs		Labrador Interconnection Marginal Supply Costs[4]		Revenue Requirement			
Year	Energy Supply Requirements GWh	Energy Losses to Supply Point[2] GWh	Total Energy Requirements GWh	Marginal Capacity Requirements MW	Losses to Supply Point at Peak Demand[3] MW	Total Capacity Requirements MW	Capital Cost ($000)	Operating Cost ($000)	Energy Costs ($000)	Capacity Costs[5] ($000)	Capital Related[6] ($000)	Operating Costs ($000)	Energy Costs ($000)	Total ($000)
2014	28.3	0.3	28.6	8.3	0.1	8.5	14,520	5	4,660	1,487	2,885	5	4,660	7,550
2015	28.4	0.3	28.7	8.3	0.1	8.5	-	5	4,444	2,293	3,836	5	4,444	8,286
2016	28.5	0.3	28.8	8.4	0.1	8.5	-	5	4,601	1,406	2,900	5	4,601	7,507
2017	28.5	0.3	28.8	8.4	0.1	8.5	-	5	4,731	1,854	3,303	5	4,731	8,039
2018	28.6	0.3	28.9	8.4	0.1	8.6	-	5	1,562	459	1,864	5	1,562	3,432
2019	28.7	0.3	29.0	8.5	0.1	8.6	-	6	1,712	503	1,866	6	1,712	3,583
2020	28.8	0.3	29.1	8.5	0.1	8.6	-	6	1,921	551	1,873	6	1,921	3,799
2021	28.9	0.3	29.2	8.5	0.1	8.6	-	6	2,014	585	1,868	6	2,014	3,888
2022	29.0	0.3	29.3	8.5	0.1	8.7	-	6	2,108	621	1,866	6	2,108	3,980
2023	29.1	0.3	29.4	8.6	0.1	8.7	-	6	2,157	635	1,843	6	2,157	4,006
2024	29.1	0.3	29.5	8.6	0.1	8.7	-	43	2,207	650	1,823	43	2,207	4,072
2025	29.2	0.3	29.5	8.6	0.1	8.8	-	6	2,257	665	1,804	6	2,257	4,067
2026	29.3	0.3	29.6	8.6	0.1	8.8	-	6	2,309	680	1,786	6	2,309	4,101
2027	29.4	0.3	29.7	8.7	0.1	8.8	-	6	2,363	696	1,769	6	2,363	4,138
2028	29.5	0.3	29.8	8.7	0.1	8.8	-	7	2,417	712	1,754	7	2,417	4,177
2029	29.6	0.3	29.9	8.7	0.1	8.9	-	7	2,473	728	1,739	7	2,473	4,219
2030	29.7	0.3	30.0	8.7	0.2	8.9	-	7	2,530	745	1,726	7	2,530	4,263
2031	29.8	0.3	30.1	8.8	0.2	8.9	-	7	2,588	762	1,714	7	2,588	4,309
2032	29.9	0.3	30.2	8.8	0.2	8.9	-	7	2,648	780	1,703	7	2,648	4,358
2033	29.9	0.3	30.3	8.8	0.2	9.0	-	7	2,709	798	1,692	7	2,709	4,409
2034	30.0	0.3	30.4	8.8	0.2	9.0	-	52	2,772	816	1,683	52	2,772	4,507
2035	30.1	0.3	30.4	8.9	0.2	9.0	-	8	2,835	835	1,675	8	2,835	4,518
2036	30.2	0.3	30.5	8.9	0.2	9.0	-	8	2,901	854	1,667	8	2,901	4,576
2037	30.3	0.3	30.6	8.9	0.2	9.1	-	8	2,968	874	1,661	8	2,968	4,636
2038	30.4	0.3	30.7	8.9	0.2	9.1	-	8	3,036	894	1,655	8	3,036	4,699
2039	30.5	0.3	30.8	9.0	0.2	9.1	-	8	3,106	915	1,650	8	3,106	4,764
2040	30.6	0.3	30.9	9.0	0.2	9.2	-	8	3,178	936	1,645	8	3,178	4,832
2041	30.7	0.3	31.0	9.0	0.2	9.2	-	9	3,251	958	1,642	9	3,251	4,902
2042	30.8	0.3	31.1	9.1	0.2	9.2	-	9	3,326	980	1,639	9	3,326	4,974
2043	30.9	0.3	31.2	9.1	0.2	9.2	-	9	3,403	1,002	1,637	9	3,403	5,049
2044	30.9	0.3	31.3	9.1	0.2	9.3	-	63	3,481	1,025	1,636	63	3,481	5,181
2045	31.0	0.3	31.4	9.1	0.2	9.3	-	9	3,562	1,049	1,635	9	3,562	5,206
2046	31.1	0.3	31.5	9.2	0.2	9.3	-	9	3,644	1,073	1,636	9	3,644	5,289
2047	31.2	0.3	31.6	9.2	0.2	9.3	-	10	3,728	1,098	1,636	10	3,728	5,374
2048	31.3	0.3	31.7	9.2	0.2	9.4	-	10	3,814	1,123	1,638	10	3,814	5,462
2049	31.4	0.3	31.7	9.2	0.2	9.4	-	10	3,902	1,149	1,641	10	3,902	5,552
2050	31.5	0.3	31.8	9.3	0.2	9.4	-	10	3,992	1,176	1,644	10	3,992	5,645
2051	31.6	0.3	31.9	9.3	0.2	9.5	-	10	4,084	1,203	1,648	10	4,084	5,742
2052	31.7	0.3	32.0	9.3	0.2	9.5	-	11	4,178	1,230	1,652	11	4,178	5,841
2053	31.8	0.3	32.1	9.4	0.2	9.5	-	11	4,274	1,259	1,918	11	4,274	6,203

Present Value of Revenue Requirement **74,700**

NOTES

[1] Some columns may not add due to rounding.

[2] This is the transmission energy losses incurred to transmit energy from the Company's supply point to its distribution system. Losses are calculated based on Newfoundland Power's estimated average % transmission energy (1.07%).

[3] This is the transmission losses at peak demand. The losses are calculated based on Newfoundland Power's estimated average % transmission losses at time of system peak (1.72%).

[4] Marginal cost are the Marginal costs provided in Response to CA-NLH-033 from 2013 NLH General Rate Application times the Energy and Total Peak Demand Requirements

[5] The capacity costs are economic carrying charges, not revenue requirements. An economic carrying charge is the present value cost of advancing the cost of a marginal unit of production one year.

[6] This is the marginal capacity costs plus the revenue requirements associated with the capital cost.

Appendix C
Analysis of Bell Island Supply Alternatives

Figure 3 - Alternative 2: Bell Island Isolated Supply Option
Calculation of the Present Value of Revenue Requirement[1]

Discount Rate 6.85%

	Electricity Supply Requirements			Diesel Plant Costs			Revenue Requirement			
Year	Load Requirements GWh	Losses to Supply Point[2] GWh	Total GWh	Capital Cost ($000)	Operating Cost ($000)	Fuel Costs ($000)	Capital Related ($000)	Operating Costs ($000)	Fuel Costs ($000)	Total ($000)
2014	28.3	-	28.3	22,710	990	6,381	2,251	990	6,381	9,622
2015	28.4	-	28.4		1,013	6,086	2,537	1,013	6,086	9,636
2016	28.5	-	28.5		1,036	6,301	2,454	1,036	6,301	9,791
2017	28.5	-	28.5		1,060	6,478	2,374	1,060	6,478	9,912
2018	28.6	-	28.6		1,084	6,616	2,297	1,084	6,616	9,998
2019	28.7	-	28.7		1,109	6,795	2,223	1,109	6,795	10,128
2020	28.8	-	28.8		1,135	7,015	2,152	1,135	7,015	10,301
2021	28.9	-	28.9		1,161	7,436	2,082	1,161	7,436	10,679
2022	29.0	-	29.0		1,188	7,739	2,015	1,188	7,739	10,942
2023	29.1	-	29.1		1,215	7,917	1,950	1,215	7,917	11,083
2024	29.1	-	29.1		1,243	8,100	1,887	1,243	8,100	11,230
2025	29.2	-	29.2		1,272	8,286	1,826	1,272	8,286	11,384
2026	29.3	-	29.3		1,301	8,477	1,766	1,301	8,477	11,545
2027	29.4	-	29.4		1,331	8,673	1,707	1,331	8,673	11,712
2028	29.5	-	29.5		1,362	8,873	1,650	1,362	8,873	11,885
2029	29.6	-	29.6		1,394	9,078	1,594	1,394	9,078	12,065
2030	29.7	-	29.7		1,426	9,287	1,539	1,426	9,287	12,252
2031	29.8	-	29.8		1,459	9,501	1,485	1,459	9,501	12,445
2032	29.9	-	29.9		1,492	9,720	1,432	1,492	9,720	12,645
2033	29.9	-	29.9		1,527	9,944	1,380	1,527	9,944	12,851
2034	30.0	-	30.0		1,562	10,174	1,329	1,562	10,174	13,065
2035	30.1	-	30.1		1,598	10,408	1,279	1,598	10,408	13,285
2036	30.2	-	30.2		1,635	10,648	1,229	1,635	10,648	13,512
2037	30.3	-	30.3		1,672	10,894	1,180	1,672	10,894	13,746
2038	30.4	-	30.4		1,711	11,145	1,482	1,711	11,145	14,338
2039	30.5	-	30.5	20,261	1,750	11,402	2,803	1,750	11,402	15,955
2040	30.6	-	30.6		1,791	11,665	3,118	1,791	11,665	16,574
2041	30.7	-	30.7		1,832	11,934	3,008	1,832	11,934	16,774
2042	30.8	-	30.8		1,874	12,209	2,902	1,874	12,209	16,986
2043	30.9	-	30.9		1,918	12,491	2,799	1,918	12,491	17,207
2044	30.9	-	30.9		1,962	12,779	2,698	1,962	12,779	17,439
2045	31.0	-	31.0		2,007	13,073	2,600	2,007	13,073	17,680
2046	31.1	-	31.1		2,053	13,375	2,504	2,053	13,375	17,932
2047	31.2	-	31.2		2,101	13,683	2,410	2,101	13,683	18,194
2048	31.3	-	31.3		2,149	13,999	2,319	2,149	13,999	18,466
2049	31.4	-	31.4		2,199	14,322	2,229	2,199	14,322	18,749
2050	31.5	-	31.5		2,249	14,652	2,140	2,249	14,652	19,041
2051	31.6	-	31.6		2,301	14,990	2,053	2,301	14,990	19,344
2052	31.7	-	31.7		2,354	15,335	1,968	2,354	15,335	19,657
2053	31.8	-	31.8		2,409	15,689	2,133	2,409	15,689	20,230
End Effects							9,592	-	-	9,592
Present Value of Revenue Requirement										**172,516**

NOTES

[1] Some columns may not add due to rounding.

[2] There are no losses included in the analysis since the generation will be supplied directly into the distribution system avoiding any transmission losses which will occur in Options 1A or 1B.

DISTRIBUTION

Project Title: **Bell Island Submarine Cable Replacement**

Project Cost: **$14,520,000**

Project Description

Newfoundland Power supplies electricity to customers on Bell Island by means of a 5-kilometre long, three-phase submarine cable system originating at Broad Cove, Conception Bay. The submarine cable system consists of four cables, one of which is designated as a spare. Electricity is supplied from the Company's Broad Cove substation via distribution feeder BCV-02.

In separate incidents in January 2012 and April 2012, two of the four submarine cables providing electricity to Bell Island experienced faults resulting in the loss of supply to customers. In late April 2012, these cables were repaired from a marine barge positioned over the cables in Conception Bay.

A sample of the faulted cable and samples of spare cable were examined by Orton Consulting Engineers International Ltd. The condition assessment showed that the cable failed due to corrosion of the copper tape shield as a result of the ingress of sea water through the cable jacket. The assessment further determined that this condition may be prevalent along much of the length of the cable and that the in-service reliability of the cables has been compromised. The Company had a second engineering firm, Kinectrics Inc., review the results of the Orton assessment, and they confirmed the validity of the first assessment that the submarine cable system is at the end of its service life.

The proposed capital expenditures are associated with the installation of a new submarine power cable system to replace the existing cables which are at the end of their useful lives. The report titled *Bell Island Submarine Cable Project Cable System Replacement* included as Schedule A provides detailed information on the project.

Justification

Newfoundland Power is obligated to provide electricity to customers in a least cost manner consistent with reliable service. To ensure continued least cost, reliable service to customers on Bell Island it is necessary to replace the submarine cable system, which is at the end of its useful life.

Condition assessment of the cables completed by experts in submarine cable systems has confirmed the need to replace the existing cables. As a result, the Company with the assistance of SNC-Lavalin, completed the necessary engineering work to prepare detailed specifications for the supply and installation of a new cable system in a least cost manner. The Company solicited proposals from qualified vendors and has obtained an acceptable proposal for the supply and installation of a new submarine cable system.

Newfoundland Power compared the costs of replacing the submarine cable system, on a net present value basis over the life of a new cable system, to the costs associated with supplying Bell Island using local generation. The net present value analysis indicated that replacing the Bell Island submarine cable system is the least cost alternative.

The Company is seeking approval of the project as a supplemental expenditure to its approved 2014 capital budget. The project was not included in the 2014 Capital Budget Application submitted by the Company on June 28, 2013, as the necessary engineering and project budget had not been completed. The project cannot be delayed for submission in the Company's 2015 Capital Budget Application due to the risk associated with experiencing future cable faults in light of the condition assessment completed by qualified experts in submarine cable systems.

Projected Expenditures

Table 1 provides a breakdown of the proposed expenditures for 2014 and a projection of expenditures through 2018.

Table 1
Project Cost
(000s)

Cost Category	2014	2015	2016 - 2018	Total
Material	$11,900	-	-	$11,900
Labour – Internal	241	-	-	241
Labour – Contract	570	-	-	570
Engineering	1,060	-	-	1,060
Other	749	-	-	749
Total	**$14,520**	**$0**	**$0**	**$14,520**

Costing Methodology

The budget estimate for this project has been determined primarily through competitive bidding to ensure the work is completed in a least cost manner consistent with reliable service.

Future Commitments

This is not a multi-year project.

ORTON CONSULTING ENGINEERS INTERNATIONAL LTD.

NEWFOUNDLAND POWER

BELL ISLAND SUBMARINE CABLE CONDITION ASSESSMENT

Harry Orton (OCEI) and Dr Avaral Rao (Powertech)

4/20/2013

Abstract: Two failures occurred on the submarine cables to Bell Island in Conception Bay, so an investigation was initiated to determine why and if the cables need to be replaced. The laboratory investigation at Powertech Labs in Vancouver concluded that the copper tape inside the failed cable sample was badly cracked and corroded, and as a result, that it could no longer carry the design capacitive current, thus leading to cable failure. In addition, the aging PE jacket is allowing increasing amounts of salt water into the cable, thus accelerating the situation. Therefore, it is recommended to replace all of the cables to Bell Island.

1.0 Table of Contents

2.0 Introduction

A system of four 250 kcmil 25 kV cross-linked polyethylene (XLPE) insulated submarine cables are used to supply power to customers on Bell Island. Two of these four cables were installed in 1988, and the other two were installed in 1990. Together, three of these cables provide power to Bell Island with the fourth cable acting as a spare. The cables were made by Canada Wire and consist of a 36 wire compact copper conductor with successive layers of the conductor shield, XLPE insulation, semiconducting insulation shield, copper tape, medium density polyethylene (MDPE) jacket, copper armor wire and hessian cloth serving. The cross section of the cables is shown in Figure 1.

The initial Bell Island submarine cable failure was first noted by a recloser trip (BCV-01) and lockout at 5:43 am on January 9, 2012. Eventually, the fault location was determined to be 300 metres offshore and in 6 metres of water. As a part of the cable repair effort, a section of the faulted cable was removed and sent to Powertech Labs in Vancouver, British Columbia for a cable failure investigation. A second fault occurred on one of the other installed cables of the same design and vintage on April 6, 2012 at 12:15 pm. A section of this cable was not removed for analysis, as it was not recoverable.

Initially, two sections of the Bell Island cable were removed from two spare cable lengths and sent to Powertech Labs for analysis. Two sections of the failed cable section were sent at a later date.

The samples are identified as follows:

- Spare cable Sample #1 – Taken from Reel # ADG 1065 (Manufactured by Canada Wire in 1990).
- Spare cable Sample #2– Taken from Reel# ADG 1331 (Manufactured by Canada Wire in 1990).
- Failed cable section (Manufactured by Canada Wire in 1988).

3.0 Condition Assessment of Spare Cable Samples (Samples #1 and #2)

3.1 Visual Inspection

Visual examination of the cable samples is the first step to determine if the cable was made according to specification and if there are any major manufacturing defects or in-service damage that could result in cable failure.

The cable samples as-received are shown in Figure 2. The hessian cloth serving of the samples was removed and a visual examination was conducted to assess the condition of the armor wires of the cables. The armor wires did not show any damage or breakage. Subsequently, the armor wires of the samples were removed to prepare the sample for further inspection (Figure 3).

The PE jacket was then removed to expose the copper tape. Details of the long cracks found in the copper tape in the samples from Reel # ADG 1065 are shown in Figures 4 and 5. As seen in Figure 5, a deep indentation was formed on the semi-conducting insulation shield. Also the copper tape shown in Figure 6 did not contain any cracks. However, the copper tape had many wrinkles at the overlapping edges (Figure 7). Visual examination suggested that the copper tape was cracked or wrinkled during fabrication of the submarine cable.

The thickness of the copper tape was measured using a spherical face micrometer. The average thickness of the copper tape is 0.07 mm (0.0027 "). This thickness matches the value provided in the cable specification given in Figure 1.

4.0 Bell Island Submarine Cable Failure Investigation

4.1 Visual Examination

The two sections of the failed cable were examined for arc damage. The undamaged section adjacent to the faulted region of the cable is shown in Figures 8 and 9. A closer view of the faulted region is shown in Figure 10. The sample armour wires were removed to expose the PE jacket (Figure 11). As the armor wires were being removed, fine powder came away from Sample #2 (Figures 11 and 12). The fine powder contained mostly fine particles of the PE jacket as well as corroded copper granules. Arc damage of the armor wires was seen on Sample #2 (Figure 13) close to the fault.

When the PE jacket was carefully removed from the undamaged section of Sample #1 to expose the copper tape, a thin layer of moisture was observed on the internal surface of the PE jacket. Analysis identified the moisture as sea water. This suggests that the sea water had penetrated the PE jacket of the failed cable or had traveled along the cable from the failure site after the cable had failed.

Figures 14 to 16 show the condition of copper tape at various locations along Sample #1. As seen from these figures, the copper tape had experienced a significant amount of corrosive damage. Cracks and perforations were noticed in the copper tape (Figures 14 to 16). It is believed that some of these cracks originated during cable fabrication. However, the tape perforations (Figure 15) and transverse cracks are due to corrosion that occurred while the cable was in service. It is noted that cracks occurred on the wrinkled areas of the copper tape (Figure 16).

The observed corroded and cracked copper tape shown in Figures 14 to 16 clearly suggests that the copper tape had experienced significant corrosion in sea water. Normally high or medium density PE jackets will slow water penetration and protect the components underneath. However in this case, it is believed that the PE jacket may have lost its properties after more than 24 years of in-service life due to ageing, or, to pin holes that developed in the material, thus allowing greater amounts of sea water to enter the cable. Consequently, sea water penetrated the aged jacket and remained in contact with the copper tape. This sea water remained stagnant inside the cable causing crevice corrosion of the thin copper tape. It is believed that 0.07 mm thick copper tape would corrode by crevice corrosion under the influence of stagnant sea water.

4.2 Copper Tape Electrical Resistance

The second sample of failed cable and the sample from the spare Reel # ADG 1331 were used for electrical resistance experiments of the copper tape. The first series of measurements were taken in an ambient environment at room temperature. The second series of measurements were taken in a sea water environment at room temperature (Figure 17). The resistance of the copper tape was measured using a four point resistance measurement technique. By passing a current through two outer probes and measuring the voltage across two inner probes allows for an accurate measurement of the copper tape resistance.

It can be observed from the resistance measurement results in Table 1 that the copper tape resistance per unit length of the failed cable is higher than that of the spare cable. This observation was true for both the ambient atmosphere as well as in the sea water environment. The differences in resistance are due to corrosion at the copper tape over laps that increased the contact resistance between laps. In addition, the copper tape cross-section has been reduced by the corrosive action. For more details on the importance of these measurements, see the discussion in Section 5, Item 3 below.

Table 1: Resistance per unit length of copper tape. Samples in air and salt water.

Sample Identification	Sample in Air (Corrected to 20°C)					
	cm	mΩ	mΩ/cm	cm	mΩ	mΩ/cm
Cable from Reel #ADG 1331	11.75	1.419	**0.121**	30.48	3.13	**0.103**
Failed Cable	11.75	22.917	**1.950**	25.40	26.88	**1.058**

Sample Identification	Sample in Salt Water (Corrected to 20°C)					
	cm	mΩ	mΩ/cm	cm	mΩ	mΩ/cm
Cable from Reel #ADG 1331	11.75	0.556	**0.047**	30.48	1.40	**0.046**
Failed Cable	9.80	7.499	**0.765**	23.50	17.32	**0.737**

4.3 XLPE Insulation Assessment

Assessment of the XLPE insulation was carried out by slicing thin discs/wafers from the insulation after removing the cable conductor, and looking for the presence of water trees. Water trees are diffuse, cloud like structures that grow in an insulating material such as XLPE with an appearance resembling a bush or tree. Water trees will grow from contaminants or voids in the insulation under the influence of an electric field and in the presence of water. It is generally accepted that water trees reduce the dielectric breakdown strength of an insulating material, which in this application, could lead to cable failure.

The location of each specimen removed for the examination is shown in the layout of Figure 18. Figures 19 and 20 are micro-photographs of the XLPE insulation slices removed from the failed submarine cable section. Methylene blue dye was used to make a permanent record of any water trees, hence the blue colour of the XLPE insulation in the figures.

Examination of both Figures 19 and 20 indicate a complete absence of water treeing in the XLPE insulation. Water treeing is typically the normal failure mode of XLPE insulated cables. Therefore, other failure modes need to be addressed as discussed below in Section 5.

5.0 Discussion, Observations and Conclusions

5.1 Discussion and Observations

1. Underground and submarine power cables are designed with an overlapping copper tape that makes contact at each overlap, thus forming a low impedance conductive tube for transport of normal leakage or capacitive current, as well as zero sequence or fault currents. However, if copper tape corrosion occurs at the overlap contact surfaces, the conductive tube now becomes a higher impedance coil, as evidenced by the results discussed in Section 4.2. Add cracks to the copper tapes and the current path within the copper tape is reduced, as the tapes are now open-circuited. The leakage current will seek another path and the only one available is the semiconductive shield which is not designed for this function. For this particular cable design, the other possible alternative path is the copper armor wire, but there is an insulating PE jacket in-between, so the current must travel along the semiconductive insulation shield. Eventually the current flowing through the semiconductive shield will lead to material degradation and the cable will ultimately fail.
2. The copper tape in the failed cable and one of the spare cable samples contained many cracks and wrinkles. The copper tape crack edges penetrated the insulation shield, but did not penetrate into the insulation. In addition, wrinkles were observed on the overlapping edges of the tapes. Since cracks were observed in the spare cable sample, they appear to have occurred during manufacture, not during installation or operation during service life.
3. The cable sample from the second spare did not contain any cracks in the copper tape, but severe wrinkles were noted on the overlapping edges of copper tape.
4. The failed cable copper tape just under the PE jacket had a thin layer of sea water suggesting that the cable jacket was allowing salt water to penetrate the cable, thus leading to crevice corrosion of the copper tape under a stagnant salt water environment. Pin holes or cracks in the jacket will allow greater than normal water penetration.
5. The copper tape resistance in the corroded condition is higher than that of the spare cable in ambient and sea water environments, suggesting that corrosion has changed the conductive path along the copper tape, as evidenced by the results discussed in Section 4.2.
6. One of the most prevalent causes of Medium Voltage (MV) polymer cable failures is water treeing. To ensure that the investigation was complete, wafers of XLPE insulation adjacent to the failure site were examined for water tree content. No water trees were found, suggesting that other mechanisms were involved in the failure.
7. Sea water permeated through the aged PE jacket and contacted the copper tape of the cable. Crevice corrosion of the copper tape occurred due to stagnant seawater between the tape and PE jacket. The degree of corrosion observed suggested that the sea water had been present during much of the in-service life of the cable.
8. It is believed that the cable failure was caused by extensive corrosion damage in combination with cracks in the copper tape. The copper tape was corroded by the stagnant sea water between the tape and PE jacket. Based upon these laboratory results, it is likely that this

corrosion is prevalent along the entire submerged lengths of the in-service cables. Since cracks in the copper tape were found in the spare cable as well as the in-service cable samples, it is believed that cracking of the copper tapes is extensive and extends for some distance, possibly sporadically, along the in-service cable. This fact, in conjunction with the copper tape corrosion, leads to the assessment that the in-service cable reliability has been compromised.

5.2 Conclusions

Based on the comprehensive failure investigation of the submarine cable to Bell Island, the following conclusions can be drawn:

1. Cable failure was due to corrosion and cracking of the copper tape shield, forcing the capacitive leakage current to flow through the semi-conductive shield that was not designed for this function. Deterioration of the insulation shield occurred and cable failures resulted. This situation may be prevalent along much of the cable length.
2. Crevice corrosion and perforations occurred on the surface of copper tape. Extensive corrosion damage was caused by stagnant sea water that permeated though the PE jacket.
3. The PE jacket is no longer limiting salt water penetration.
4. Based upon the findings outlined above, the in-service reliability of the cables has been compromised.

6.0 Recommendations

Based upon the above Discussion, Observations and Conclusions, it has been determined that all of the cables are at the end of their useful life and should be replaced.

7.0 Appendix A – Analytical Figures

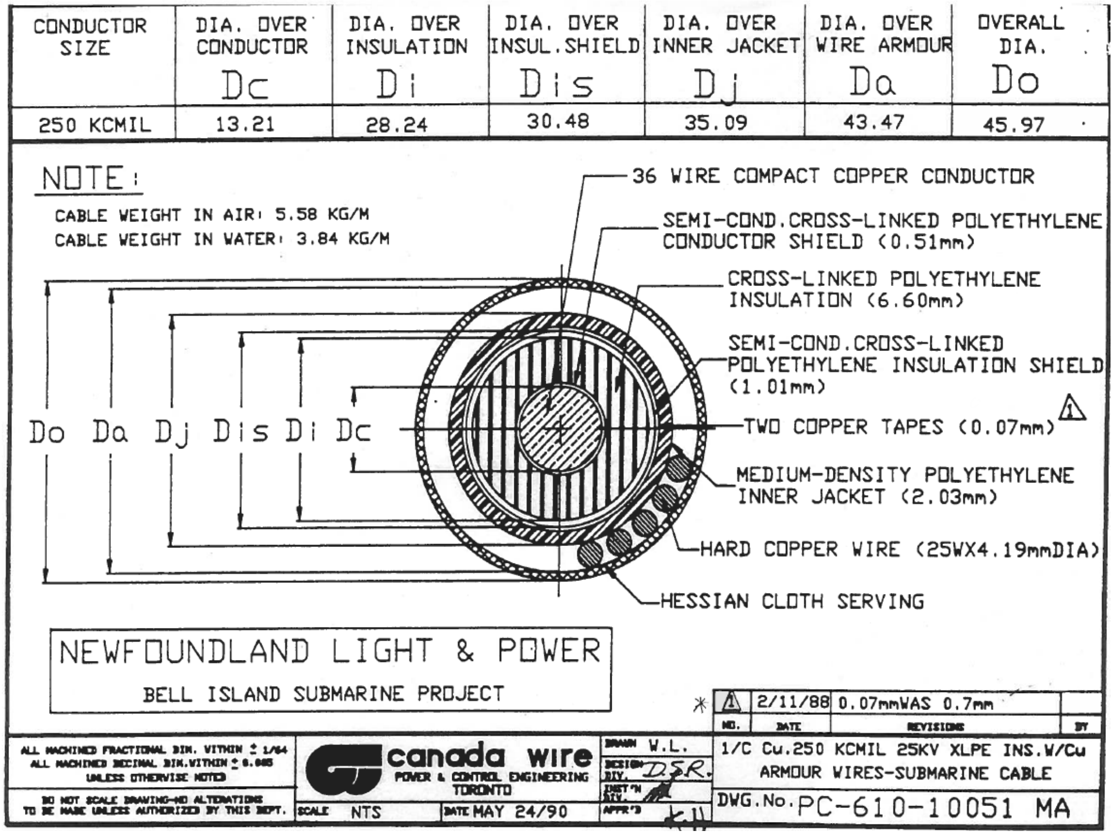

Figure 1: Cross-section of the submarine cable used for Bell Island Submarine Project.

Figure 2: Spare cable Samples #1 and #2 as received.

Figure 3: Cable sample after the removal of copper armor wires.

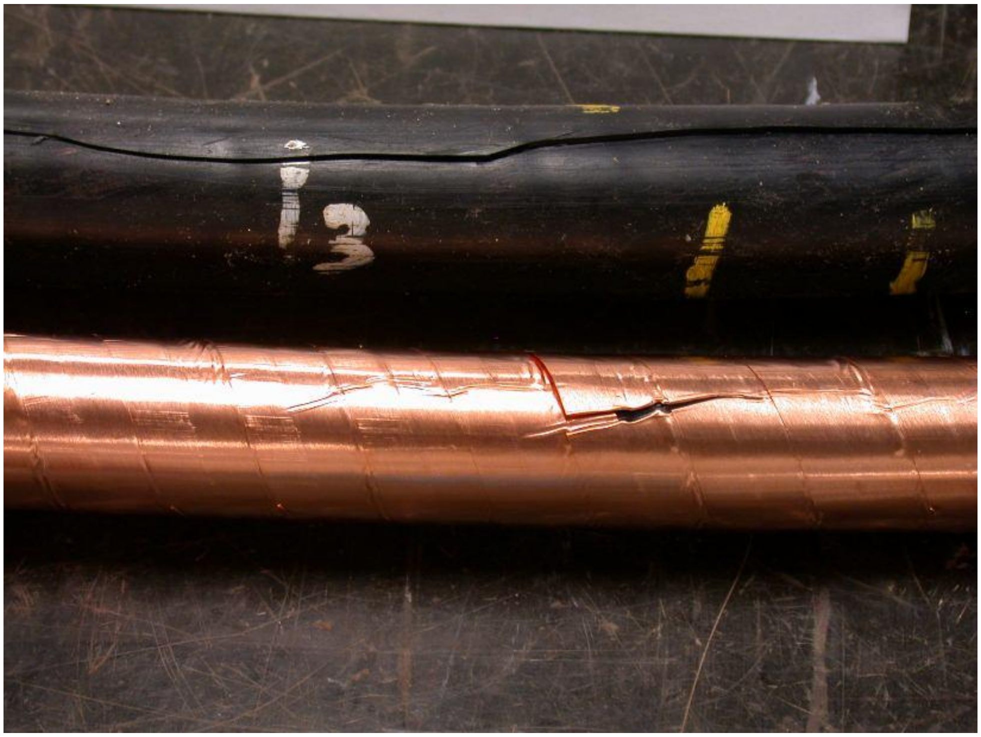

Figure 4: Cracks in the copper tape of spare cable Reel # ADG 1065.

Figure 5: Cracks in the copper tape of spare cable Reel # ADG 1065.

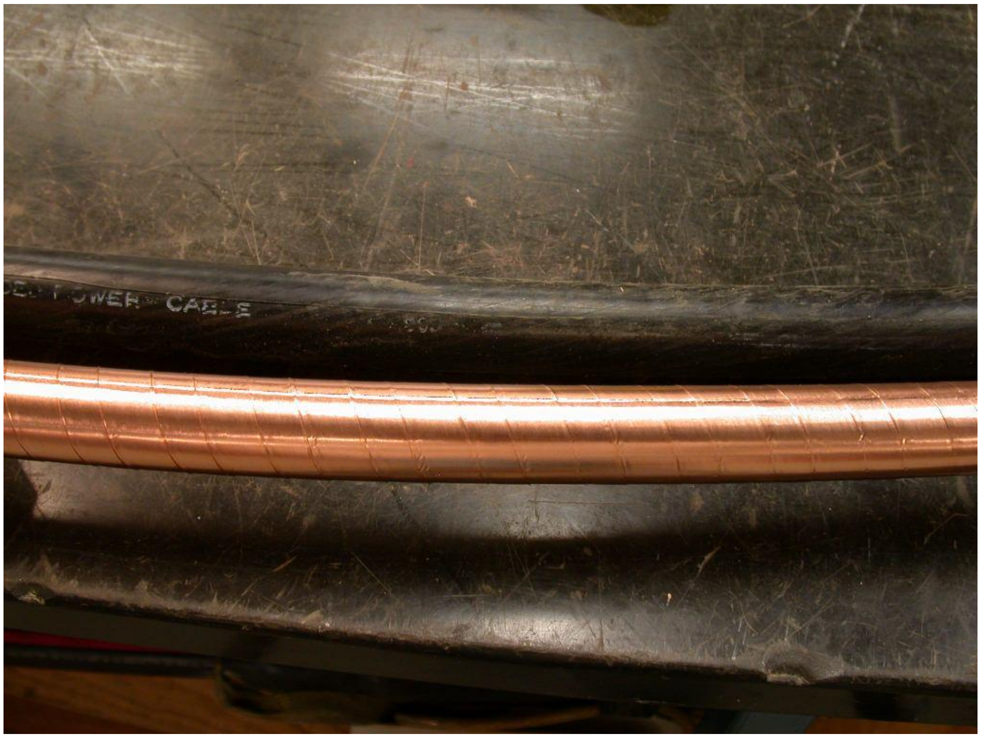

Figure 6: Examination of copper tape of sample from Reel# ADG 1331.

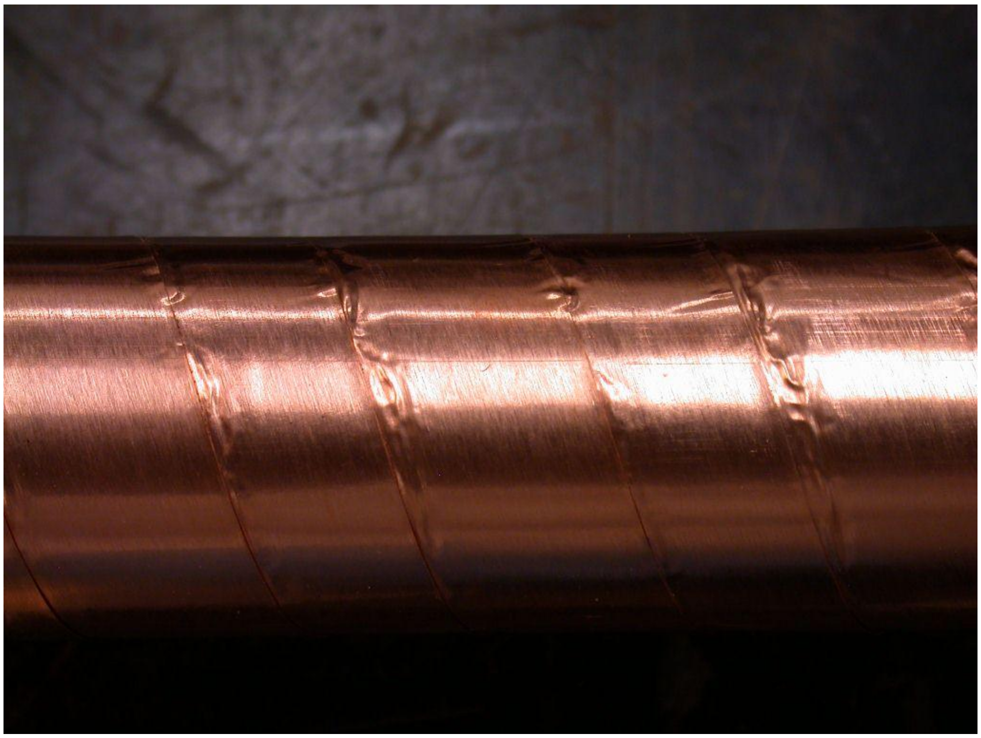

Figure 7: Wrinkles on the copper tape of sample from Reel #1331

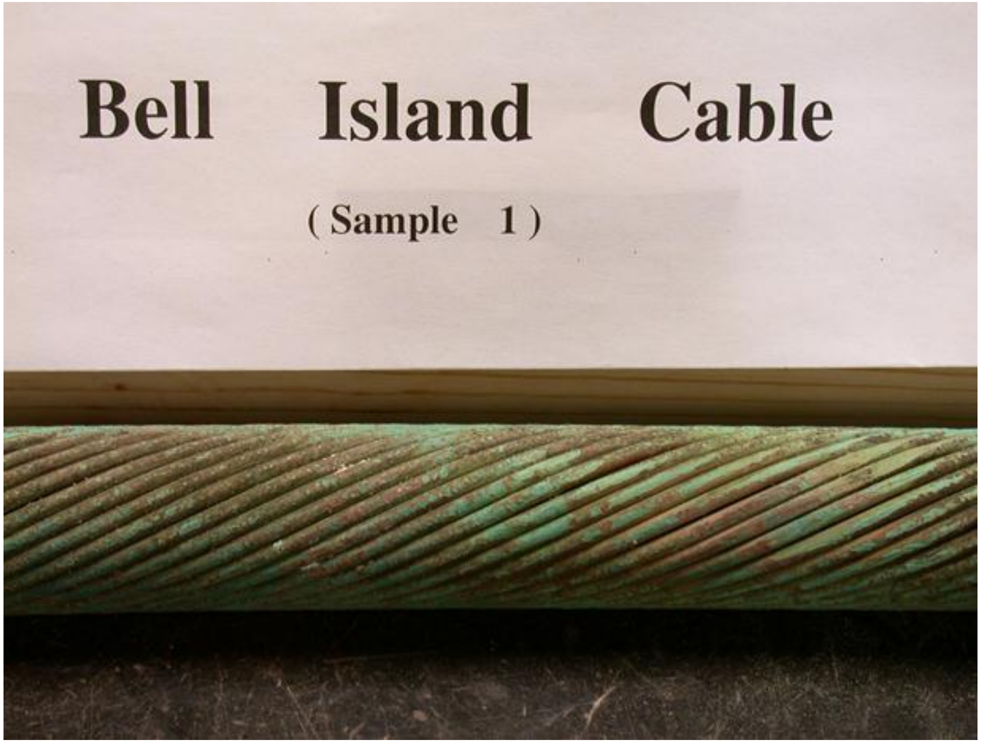

Figure 8: Undamaged section of the failed submarine cable.

Figure 9: Faulted section of the failed submarine cable.

:

Figure 10: Closer view of the faulted location.

Figure 11: Condition of the failed cable after the partial removal of armor wires.

Figure 12: Failed cable after the removal of armor wires showing corrosion powder.

Figure 13: Arc damage on the copper armor wires close to the fault of the failed cable.

Figure 14: Cracks and corrosion damage on the copper tape of Sample #1 of the failed cable.

Figure 15: Perforations on the copper tape of Sample #1 of the failed cable.

Figure 16: Cracks on the wrinkled area of the copper tape of Sample #1 of the failed cable.

Figure 17: Copper tape electrical resistance measurement.

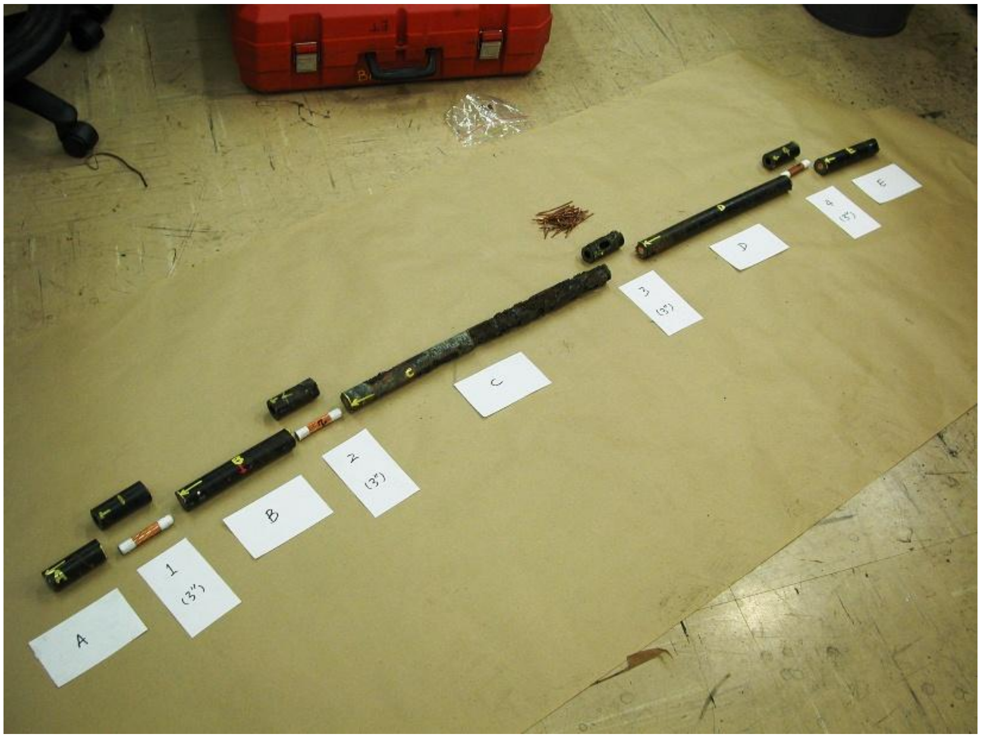

Figure 18: Lay out of the specimens removed from the failed cable sample.

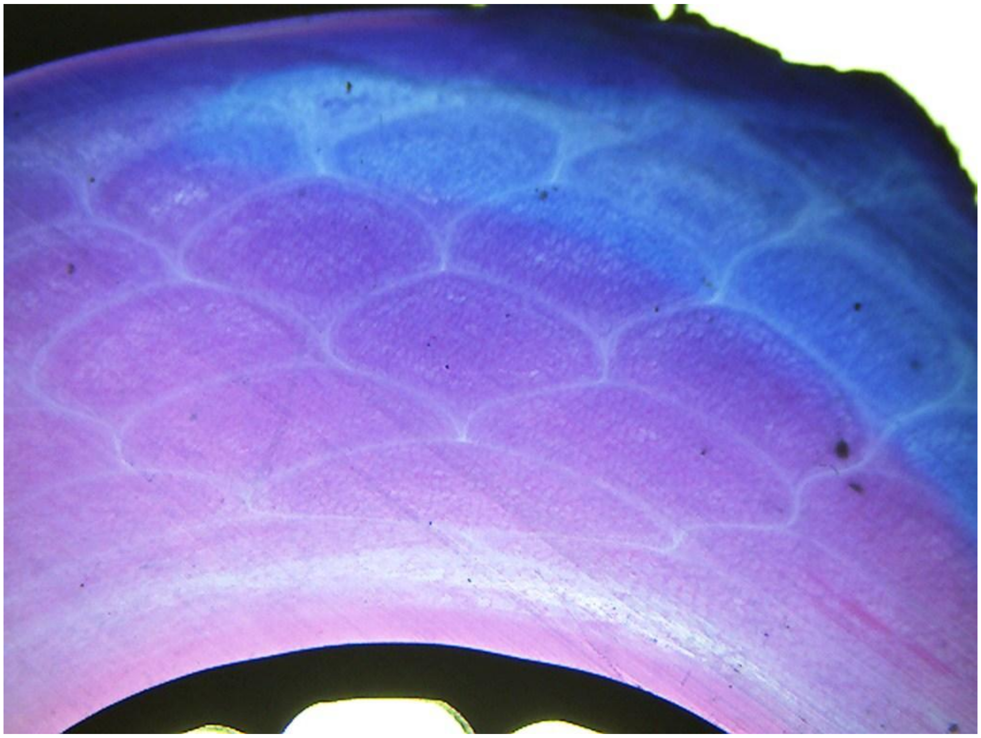

Figure 19: Photograph of an XLPE wafer at Location 1.

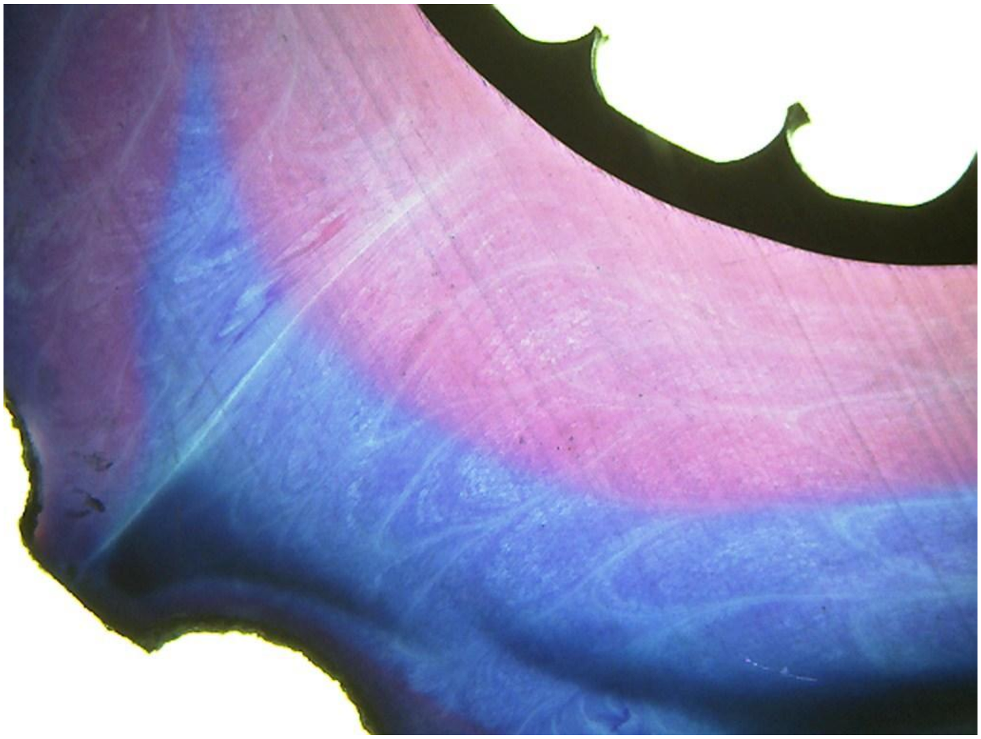

Figure 20: Photograph of an XLPE wafer at Location 3 adjacent to the fault.

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KINECTRICS

LETTER OF OPINION

Mark Fenger,
Principal Engineer & Service Line Lead Cables & GIS
Transmission & Distribution Technologies Department
Kinectrics Inc.

September 30, 2013

INTRODUCTION

This letter of opinion is in response to a request from Newfoundland Power Inc. for Kinectrics Inc. to review the findings of "Bell Island Submarine Cable Condition Assessment" by Orton Consulting Engineers International Ltd. with the objective of considering potential electrical field tests which may further aid in assessing the condition of the Bell Island Cable System.

The Bell Island cable system consists of four phases of 250 kcmil, 25 kV XLPE insulated submarine cables. Two phases were installed in 1988 and two phases were installed in 1990. The cables were manufactured by Canada Wire.

ASSESSMENT

Kinectrics Inc. agrees with the essential findings outlined in the report titled "*Bell Island Submarine Cable Condition Assessment*" dated April 20, 2013 by Orton Consulting Engineers International Ltd (OCEI). The condition assessment performed shows the cable system to be near its end of life. Based on the type of cable, its application and its vintage, the deterioration/aging observed in the OCEI report is common and expected for cables this design and age.

For these types of cables, assessing the condition of the main insulation system and its components would involve one or more of the following electrical field tests:

- On-Line PD Measurements
- Time Domain Reflectrometry (TDR) measurements
- Dielectric spectroscopy measurements (Tan δ)
- Off-line AC withstand and partial discharge measurements

With respect to On-Line PD Tests: Given these cable systems consists of submarine cables on-line PD measurements can only be performed at the cable termination ends. Given that signals related to partial discharge activity propagating through sections of solid dielectric cable are subjected to significant attenuation, on-line PD measurements would be limited to assessing the condition of the open air terminations and would not yield any diagnostic information on the condition of the submarine cable sections. Thus, on-line PD measurements would not usefully contribute to further condition assessment of these cables.

With respect to Time Domain Reflectrometry (TDR) Measurements: TDR measurements have proven to be effective in detecting significant corrosion of the outer metallic sheath. However, this test methodology would require a TDR trace obtained on each phase of the cable system when the cable system was new, healthy and defect free. As well, while this test provides information on the condition of the outer metallic sheath it does not provide information on the condition of the main insulation of a cable system. As no TDR measurements were performed on these cables when they were newly laid and as a TDR test does not yield information on the condition of the main insulation of the cable system a TDR test/measurement will not yield any useful information on the condition of these cables.

With respect to Dielectric Spectroscopy Tests: Dielectric spectroscopy (Tan δ) testing involves an assessment of historical trending with reference to baseline values. It would be of no value in this case, since Tan δ measurements have not been carried out previously on the cables in question, and there is no historical data available for comparison.

With respect to Off-Line AC Withstand and PD Tests: Given the findings of OCEI and given the type and vintage of these cables it is highly likely that off-line AC withstand and Partial Discharge testing is likely to be destructive and result in an insulation failure. Furthermore, it is Kinectrics opinion that, in this case, off-line AC Withstand and PD measurements will not result in findings different from those outlined in OCEI's report.

CONCLUSIONS

Kinectrics has reviewed the OCEI report dated April 20,2013, and agrees with its conclusion that the cables in the Bell Island submarine cable system are at the end of their useful life. The achieved lifespan of the cables is consistent with what would be reasonably expected for cables of this type and vintage.

For the reasons noted above, further electrical field testing of the cables could be destructive of the cables and would not, in any event, be expected to result in findings different from those outlined in OCEI's report

Mark Fenger, Sep 30-13

Mark Fenger,
Principal Engineer & Service Line Leader – Cables & GIS systems
September 30, 2013

SNC·LAVALIN

DESIGN AND INSTALLATION OF A NEW BELL ISLAND SUBMARINE POWER CABLE SYSTEM

Phase 1 Report
Cable System Options Evaluation & Concept Selection

Newfoundland Power Inc.

POWER

05 | 08 | 2013

REPORT > Client ref. 12-074 > ORIGINAL
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Phase I Report
Cable System Options Evaluation & Concept Selection

Prepared for:
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Document No.
512233-40ER-001-04

Date
August 5, 2013

SNC • LAVALIN

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APPENDICES:

EXECUTIVE SUMMARY

SNC-Lavalin Inc. was contracted by Newfoundland Power in April, 2013 to evaluate options and provide assistance in the development of a technical specification for replacing the submarine cable power system serving Bell Island. The existing system comprises four single phase cables running from Broad Cove on the Avalon Peninsula of Newfoundland to an area known as the Old Dominion Pier on Bell Island.

Cable system failures were experienced in 2012. After extensive review of the cause of the failures and laboratory testing by a third party expert, it was recommended that the cable system be replaced in its entirety.

Availability and economics, including supply, installation and repair costs, the need for spares, and the type of shoreline and mechanical protection needed, were the key factors considered in developing a least-cost project scope and associated cost estimate. Other factors considered in the comparison were the operating characteristics of the system and the corridor width required for the installation.

A review was conducted of available cable insulation types and Ethylene Propylene Rubber (EPR) and Cross-Linked Polyethylene (XLPE) were selected as the most suitable for the new installation. Both types have been successfully used for medium voltage submarine cables. EPR is not susceptible to water treeing and thus can be used in submarine applications without a "water barrier". However, EPR is a softer material than XLPE and requires more care during installation. XLPE insulated cables, on the other hand, are more common and generally easier to install, but must have a water barrier such as lead sheathing in order to ensure the absence of humidity in the insulation. The vast majority of new submarine cables rated 15 kV to 35kV are XLPE insulated cables. Single and three-conductor cables are available for each type. The three-conductor submarine cables are produced by assembling three insulated single conductors together with fillers to obtain the round shape.

In terms of cable protection, iceberg scour is not a significant issue. The cable corridor is protected to the west by a number of smaller islands and shallower depths, and to the north by Bell Island itself. Deeper draft icebergs can only approach the cable corridor from the east through a narrow channel. The two previous cable installations did not experience damage to the cables from iceberg activity or bottom conditions in over sixty continuous years of operation.

It is recommended, therefore, that the new cables be laid in the existing corridor, immediately to the east of the presently operating cables, with no additional protection in the offshore sections beyond the designated cable armouring.

A number of options were considered for protection of the cables in the foreshore areas. Based on cost and logistical considerations it is recommended that the cables be installed in trenches from the termination structure out to the lowest low water mark, with mechanical protection, in the form of ductile iron necklaces, against the action of sea ice and wave action, installed on the cables from the high water mark out to the 10m depth.

Information on bathymetry and bottom conditions in the crossing area exists from previous work by the Bedford Institute and McElhanney Offshore Surveys. However, the bottom information is limited to the routes of the currently operating cables. Based on the accuracy of the available information, it is recommended that a marine survey be completed during the execution phase of the Project, inclusive of a side scan survey, to gather information on the proposed new cable routes as well as to more accurately confirm the positions of the existing cables.

Schedule

The lead time from the date of placing an order to the delivery of the cable to a port in eastern Canada (Halifax or St. John’s) is estimated to be in the order of 8 months. An extra month will be required for clearing Canadian customs and the transfer of the cables to the installation barge / vessel.

One turn-key contract is recommended for the supply and installation of the cables in order to minimize the need for co-ordination between two or more contractors and to keep the liability for the installation with one supplier. It is estimated that the actual installation and mechanical protection of the cable system would require 3-4 weeks.

Appendix I contains a preliminary Project Schedule for the Design and Installation of the New Bell Island Submarine Cable Power System. It is estimated that the cable installation and commissioning can be completed during the fourth quarter of 2014.

Cost Estimate

As detailed in Section 8, the total least-cost project estimate of the cable system replacement project is in the order of $13,352,460.

Conclusions and Recommendations

The study generally concludes that current cable system technology and manufacturing processes will allow for the provision of a reliable power supply to Bell Island for the next 40 years.

Accordingly it is recommended that:

- A "TURN KEY" contract be awarded to a cable manufacturer for the supply and installation of the cables as well as the terminations (potheads) and the mechanical and shore zone protection of the cables;
- A final decision to install two three-conductor submarine cables or four single-conductor cables be made after the turn-key bids are evaluated; based on price and technical criteria at that time;
- A survey of the proposed new cable routes be carried out by the successful cable supplier, prior to the execution stage of the project, in order to establish the bottom conditions along the routes, the location of old abandoned cables, and other features that may have to be considered in the final design and installation of the new cables. The program should comprise bathymetric, sub-bottom, side scan sonar and diver surveys as set out in Appendix E – Recommended Marine Survey program;
- The successful cable supplier be requested to certify the results of the marine survey with respect to their accuracy and compatibility with the state-of-the-art in submarine cable installations;
- A 500 meter length of submarine cable, together with two flexible submarine cable joints and four cable termination kits be purchased and stored for use in case of an emergency repair following the rare occasion of a failure; and

- Newfoundland Power should maintain a list of qualified marine contractors that could be called upon to facilitate cable repairs / splicing if required in the future.

1 INTRODUCTION

Newfoundland Power Inc. (Newfoundland Power) provides electrical power to Bell Island by means of four submarine cables which run from Broad Cove on the mainland of the province to an area known as the Old Dominion Pier on Bell Island. Two of the cables were installed in 1988 and two were installed in 1990. The four cables comprise the three phase submarine cable system providing electrical power to Bell Island.

Cable system failures were experienced in January and April of 2012. Newfoundland Power engaged a third party expert to investigate and report on the cause of the failures. After extensive laboratory testing, the expert recommended that the cable system be replaced, citing reliability of the present system as the key driver.[1]

BAE-Newplan Group Limited (BNG), a wholly owned subsidiary of SNC-Lavalin Inc., was contracted by Newfoundland Power to prepare a report to evaluate options for replacement of the submarine cable system. This report summarizes the findings, including a technical specification, and provides a qualitative cable system replacement project scope and associated least-cost project estimate.

[1] Bell Island Submarine Cable Condition Assessment, Harry Orton (OCEI) and Dr. Avaral Rao (Power Tech Cables), April, 2013.

2 SCOPE

The scope of the work required to complete this study included;

- Site investigation,
- Assessment of existing bathymetric information,
- Assessment of cable system specifications,
- Development of cable system specifications,
- Preliminary design and cost estimation (cable system procurement, installation cost and delivery lead time), and
- A report summarizing the findings.

The scope of work is limited to the actual submarine cable system from a proposed new terminal point at Broad Cove to a new terminal point at Bell Island.

3 OBJECTIVES

The main objective of the Phase 1 report is to evaluate options and develop a preliminary concept and associated cost estimate for the installation of a new submarine power cable system which will provide reliable electricity to the community of Bell Island from the Newfoundland Power substation at Broad Cove.

The report will also form the basis for the detailed design of the cable system, including cable specifications, installation, and shoreline protection once the final concept has been adopted.

The specific Phase1 objectives included:

- ❑ Assess existing bathymetric and geophysical information and determine what new surveys, if any, will be required to install the new submarine cable system;
- ❑ In consultation with Newfoundland Power, identify the main types of submarine cable that would be acceptable for the reliable supply of electricity to Bell Island;
- ❑ Identify possible cable suppliers and contractors specialized in the manufacture and installation of submarine power cables;
- ❑ Prepare preliminary technical specifications for the cables;
- ❑ Evaluate the two main options for the new submarine cable system; namely, installing four single-conductor insulated submarine power cables or installing two three-conductor cables of the same capacity;
- ❑ Prepare a list of Pros and Cons of the two cable types;
- ❑ Evaluate the two methodologies for the execution of the project, i.e., a turn-key supply and install contract versus separate supply and install contracts;
- ❑ Prepare preliminary budgetary estimates for the supply and installation of the cables; and

- Recommend the least cost cable system capable of supplying reliable power to Bell Island for a period of 40 years.

4 BACKGROUND AND FACT FINDING

4.1 MEETING WITH NEWFOUNDLAND POWER

Meetings were held on March 28, 2013 and April 2, 2013 at the Newfoundland Power offices with representatives of the study team and Newfoundland Power in attendance to review available information on the existing cable system, the study objectives and schedule, Newfoundland Power's basic design guidelines for the new submarine cable system, and to explore prospective options for the new cable system.

Newfoundland Power directed that the new cable system must be reliable as it is the only economic means of providing power to the community of Bell Island in the quantity required to meet the demand. To provide the necessary reliability, the new cable system shall consist of a minimum of four single-phase cables to provide three phase power, if single phase cables are chosen, or, a minimum of two cables, if three phase cables are chosen. The existing cable system must remain operational while the new system is being installed.

Newfoundland Power provided their design guiding principles for the new submarine cable system and, after a discussion of problems experienced with the present system, fault current considerations, and load and operational considerations, the following design criteria were adopted.

- ❑ Cables shall be supplied and installed in a continuous length (approx. 5375 metres) and factory splices will not be permitted;
- ❑ Copper tape corrosion was identified as the root cause of the in-service cable faults. The new design will be required to mitigate this problem;
- ❑ Cable specification shall allow for operating voltage versatility to account for load growth as relevant;
- ❑ The required transmission capacity is 10.4 MVA based on the long term projected growth of electricity consumption on Bell Island;

- The worst-case short circuit current is approximately 11.5 KA and the duration is 0.5 seconds; and

- The new cables shall be marked in such a way that each cable is easily identifiable under water.

Newfoundland Power provided plans showing the approximate locations of the four in-service single phase submarine cables, as well as the locations of a number of old abandoned single and three phase cables. Following a review of the plans, and given the operational considerations during installation, it was apparent that the best location to install the new submarine cables would be slightly to the east of the existing in-service cables where a number of old abandoned cables are located. To locate the new cables to the east of the abandoned cables would probably place the cables outside of the established no-anchor zone for the cables. Going outside of the no-anchor zone may not be a problem technically, but it would require an updating of navigation charts. As well, the space to the east is limited by the Bell Island ferry route and the need to stay as far away from the zone of vessel travel as possible. The old abandoned cables to the east of the in-service system should not be an issue for installing the new cables as the new cables will have identification markers to distinguish them from the old cables.

Newfoundland Power had made previous contact with a number of submarine cable suppliers. Based on the responses received by Newfoundland Power, the knowledge of the study team, the experience of each company, and their willingness to provide a bid for the supply and installation of the new submarine cable system, the following companies were selected to provide preliminary budget information on the cost of supplying and installing the new system.

- Nexans (Norway)
- NSW (part of the General Cables group in Germany)
- Prysmian (USA and Italy)
- J-Power (Japan)
- Viscas (Japan)
- Fulgor (Greece)
- LS Cable (Korea)

- Okonite (USA)

International companies were selected, as there are no Canadian companies that can supply the type of submarine cables required in a continuous length.

In addition, IT International was added to the contact list for budgetary information on the cost of installing the cables.

4.2 SITE VISIT

A site visit was carried out on April 3, 2013, during which time the key members of the study team and Newfoundland Power representatives met at Bell Island and Broad Cove and inspected the shoreline features and termination structure for the existing in-service submarine cable system at each location. The locations of the old abandoned three-phase cable termination structures were also noted.

It was observed during the visit that an abandoned three-phase cable installed in 1955 is exposed on the beach on Bell Island in the tidal zone. The cast iron necklaces installed on the cable have deteriorated, but their condition is relatively good given their age. The existing in-service single phase cables also have cast iron necklaces for mechanical protection.

A discussion took place to determine the location of the termination structures for the new cable system. The exact locations will be decided by Newfoundland Power and provided for the final design. A duct bank was installed on Bell Island in 2012 with four 6” spare ducts in anticipation of future cable replacement. Newfoundland Power will consider installing a similar duct bank at Broad Cove.

Preliminary discussions were also held to determine the location of the new submarine cable system. Based on the fact that the existing cables must remain in service until the new system is ready to be energized, the likely location for the new termination structures, and the known bathymetry of the Bell Island Tickle, it was confirmed that the new submarine cable system would be installed in the existing no anchor zone to the east of the current in-service cable system as shown on Drawing No. 0003 in Appendix A.

4.3 EXISTING CONDITIONS

The existing in-service cable system is referred to as BCV-02 (the Broad Cove 02 Distribution Feeder) and consists of four submarine cables which comprise the three-phase submarine cable system providing electricity to Bell Island. Two of these cables were installed in 1988, and two more installed in 1990, at a total cost of $3.5 Million. A third cable was installed in 1988 but was deemed inoperable because of problems experienced with a factory splice in the cable. The cable was subsequently abandoned and replaced with a new cable in 1990. The cables were manufactured by Canada Wire in 1988 and 1990, and have been in service since their installation.

In 2008, a failure occurred in one of the cables at the base of the termination structure at Broad Cove. The root cause of this failure was excessive mechanical stress at the point where the cable transitioned from vertical to horizontal as it exited the termination structure. The cable was repaired and placed back in service.

Cable system failures were experienced in January and April of 2012 and, after extensive laboratory testing, it was recommended by an independent third-party expert that the cable system be replaced, citing reliability as the key driver. In addition to the operating cables, there are as many as five (5) power cables present along the right-of-way which have been abandoned and are no longer in service. These include the cable installed in 1988 but never used (cable with factory splice), a three-phase cable installed in 1955, which was abandoned in 1990 due to a cable fault, and three (3) additional three-phase cables installed in 1932. The on-shore infrastructure is comprised of Newfoundland Power’s standard distribution structures. The modification of these structures is not within the scope of this study.

The cable approach at the shoreline of Broad Cove (mainland side of the cable crossing) traverses bedrock with sand and gravel deposits. The cable approach at the shoreline on the Bell Island side of the cable crossing traverses alternating patches of sand, silt, and gravel. All of the existing operating cables are individually protected inside cable “necklaces” from each shore to a distance approximately 90 m from shore. On the Bell Island side, the cables are all routed to onshore structures through a common trench, while on the Broad Cove side the cables are routed through individual trenches. The cable length from shoreline to shoreline is approximately 5200 m, with a maximum water depth of approximately 120 m.

The distribution voltage across to Bell Island is 12.47 kV, which provides service to a current load of 8.3 MVA. The forty-year forecasted load for Bell Island is 10.4 MVA. The approximate locations of the existing cables are shown on Drawing No. 0001 in Appendix A.

4.4 ENVIRONMENTAL CONSIDERATIONS

Environmental matters on projects are generally considered in two phases. The first phase is the environmental assessment process wherein environmental impacts are considered in a broad context. The second phase is the obtaining of permits and approvals from various agencies. This phase normally follows the successful completion of the environmental assessment phase.

The environmental assessment of projects is regulated by both the federal and provincial governments. With regard to the federal government the process is governed by the *Canadian Environmental Assessment Act* and the *Regulations Designating Physical Activities* promulgated under that Act. With regard to the provincial government, the environmental assessment process is governed by the *Environmental Protection Act* and the *Environmental Assessment Regulations* promulgated under that Act.

Contact was made with the Canadian Environmental Assessment Agency and the Environmental Assessment Division of the Department of Environment and Conservation and both have advised that, due to the nature of this project, it does not require registration under the federal or provincial processes. Copies of correspondence from both the federal and provincial authorities in this regard are contained in Appendix F. Both agencies indicated that other federal and provincial agencies may have an interest in the project and may require approvals or authorizations to be put in place prior to construction. These agencies are:

- Fisheries and Oceans Canada
- Transport Canada (Navigable Waters Branch)
- Environment Canada

- Water Resources Division, Department of Environment and Conservation

Initial contact was made with these agencies to determine what their permitting / approval requirements may be. These requirements will be dealt with further during the detailed design phase (Phase 2) of the project.

As certain portions of the project may lie within the boundaries of the Towns of Portugal Cove-St. Philip's and Wabana, the Towns may require development or construction permits to be issued for the work. Contact will be made with the Towns during Phase 2 to determine what their requirements are in this regard.

5 ASSESSMENT OF CABLE SYSTEMS

5.1 GENERAL

In order to gather data relevant to new cable system configurations, a number of major submarine cable manufacturers (see Section 4.1) were contacted in order to confirm their interest in the project, as well as to obtain up-to-date budgetary estimates and expected lead times for the supply of the required cables.

In addition, International Telecom (IT) of Halifax, Nova Scotia, a major enterprise specializing in the installation of submarine cables was requested to provide information related to the laying and protection of the cables.

P. F. Collins International Trade Solutions provided information on shipping costs and customs duties related to cable to be shipped from international locations.

The desired reliability and availability of the cable system can be obtained with either of the configuration options. In the remote case of a fault occurring on one of the two three-conductor cables (option two), or one of the single-conductor cables (option one), transfer of power to the reserve cable can easily be carried out in a short period of time.

The three-conductor cables would be more costly to repair because of their size, but the probability of an outage, due to physical conditions, on the heavier three-conductor cable would be much less[2]. It is recognized in the submarine cable industry that three-conductor cables are more robust than single-conductor cables. This is due to the heavier weight and increased diameter. They usually have steel wire armour that would resist abrasion and corrosion more than copper wire armour, which is usually applied to single-conductor cables.

Cable suppliers were requested to provide their prices based on a 40 year service life for the cables. In order to meet the 40 year service life any cable class has to be “Pre-Qualified” through a rigorous program of testing.

[2] Submarine Power Cables: design, Installation, Repair, Environmental Aspects, Thomas Worzyk, Springer–Verlag Berlin Heidelberg, 2009

This consists of heat cycle testing (heating for 8 hours, and cooling for 16 hours), to simulate the thermo-mechanical stresses that the cables and accessories will have to endure. This is a one year, accelerated test, which is supposed to be equal to 40 years of service life. At the end of the heat cycle tests, a Basic Impulse Level (BIL) test is usually performed. This test is done by manufacturers on a regular basis, especially for higher voltage cables to ensure the consistency of their product. The testing is very expensive and takes a year to complete. The tests are not performed for every project and can be substituted with “Type Tests”, which are much shorter and project-specific.

Type Tests include: insulation tests, bending tests, long-term voltage tests, lightning impulse tests, partial discharge tests, oil and water immersion tests on sheath, and aging tests.

The voltage level in the pre-qualification tests is the main factor used to produce an electrical stress higher than that under normal operating voltage. There is a mathematical formula that relates the life expectancy (40 Years) with the test voltage level and the breakdown strength of the insulating material.

The following table summarizes the responses received from suppliers concerning the supply and installation of the two cable alternatives.

Table 5.1: Cable Manufacturer Responses

Manufacturer	Country	Interest	Status	Notes
Fulgor	Greece	Yes	Submitted pricing and will bid	XLPE, 1&3/C
J-Power	Japan	Yes	Submitted pricing and will bid	XLPE, 1&3/C
LS cables	Korea	Yes	Submitted pricing and will bid	XLPE, 1&3/C
Nexans	Norway	Declined	N/A	N/A
NSW	Germany	Yes	Submitted pricing and will bid	XLPE, 3/C
Okonite	USA	Yes	Submitted pricing and will bid	EPR, 1&3/C
Prysmian	Italy	Yes	Will bid, no price submitted	EPR, 1&3/C
Viscas	Japan	Declined	N/A	N/A

Table 5.2: Installation Contractor Response

Installer	Country	Interest	Status	Notes
IT International Telecom Inc.	Canada (Nova Scotia)	Yes	Budgetary estimates provided for Cable installation	XLPE, EPR, 1&3/C

5.2 CABLE ROUTING AND PROTECTION

A primary objective of the site visit carried out at Broad Cove and Bell Island on April 3, 2013 was to investigate the coastline and select the most probable route for laying the new submarine cable system. The route for the new submarine cable system will be influenced by the locations of the existing in-service cables and their termination structures, probable locations for the new termination structures, ice conditions, bottom conditions, presence of boulders, ocean currents, bathymetry, and the fact that the existing in-service cables must remain energized while the new system is being installed.

In some years, first year arctic ice brought south by the Labrador Current does find its way into Conception Bay and the Bell Island Tickle. Although the prevailing winds in the area of the Tickle are from the southwest, there are occasions when northerly winds exert a pressure on the north side of the ice edge. This can produce rafting of the ice along the shorelines. Because of the sheltering influence of Bell Island itself, rafting is not a severe problem in the Tickle; however, the cables must be protected from ice action in the foreshore areas. Indications are that the cables, which were installed in 1955 and abandoned in 1990, were not protected in the foreshore areas at the time they were installed, other than with the normal cable armouring. Problems were experienced with the cables within a few years and protection was added in the form of cast iron necklaces.

Icebergs may find their way into the cable corridor, but the potential for iceberg scour is limited. The cable corridor is protected to the west by a number of smaller islands and shallower depths, and to the north by Bell Island itself (Drawing No. 0002 - Hydrographic Chart - Conception Bay in Appendix A). Deeper draft icebergs can only approach the cable corridor from the east through a narrow channel. The two previous cable installations did not experience damage to the cables from iceberg activity or bottom conditions in over sixty continuous years of operation. Based on this information, no additional protection is recommended in the offshore sections other than the cable armour. However, care must be taken during the installation to avoid laying the cables on top of boulders as movement of the cables on the boulders, caused by ocean currents, can lead to abrasive action on the cable and cable failure. Currents in the tickle are not severe and there are no indications of problems of this nature with the existing system; however, boulders are present in the area and should be avoided.

A number of options are available for protection of the cables in the foreshore areas. Horizontal Directional Drilling (HDD) has been ruled out due to the configuration of the cliffs on the Bell Island side and the encroachment of the road and private property on the Broad Cove side. These factors make HDD prohibitively expensive.

On the Bell Island side it is recommended to install the cables buried in trenches with mechanical protection against the action of sea ice from the high water mark to a depth of approximately 10.0 metres at low tide. On the Broad Cove side the trenching can end at the low tide mark, but the mechanical protection should extend to a depth of approximately 10.0 metres at low tide. This is based on the fact that the present in-service cables have mechanical protection in the form of cast iron necklaces out to a depth of approximately 10 metres and the cables have not experienced any physical damage in the protected zone. A review of submarine cables at other east and south coast locations has confirmed that cables protected to a depth of 10 metres have not been subjected to damage. One such location was at Fogo and Change Islands where shore fast and arctic ice conditions tend to be more severe than the conditions in Bell Island Tickle.

A number of options are available for mechanical protection of the cables in the foreshore areas; namely, installing concrete necklaces, concrete mattresses, cast iron necklaces, or an articulated ductile iron pipe system.

Concrete necklaces are not recommended due to the quality control required to produce high strength concrete in very thin sections. Also, while the sections could be produced utilizing fibreglass reinforcement instead of steel, the durability and life expectancy of the concrete would be questionable in the harsh marine environment.

Concrete mattresses have widespread use in the protection of marine pipelines and submarine cables. The mattresses can be constructed in varying lengths. However, because of their weight, a heavy lift crane, deployed on a barge, is required to place the mattresses. This makes the use of mattresses expensive. Mattresses are also very effective in preventing scour caused by storms and ocean currents in areas where the seafloor materials are susceptible to scour. There is no evidence of scouring around the existing in-service or abandoned cables. For this reason, and because of the high cost, concrete mattresses are not recommended.

The cast iron necklaces on the existing cables are bolted together with stainless steel nuts and bolts. The cast iron necklaces have performed well and cast iron could be used again on the new cable system. However, ductile iron clip-together articulated pipe systems are now available to provide shallow water abrasion and impact protection. The clip-together system has a number of advantages over bolted systems. This feature allows quick real time application during installation of the cables and a much simplified diver installation onto installed cables. Ductile iron, like cast iron, is resistant to corrosion but it is much stronger and is less brittle. The ease of installation makes the ductile iron articulated pipe systems the most cost effective. The mechanical protection would be installed starting in the shore zone trenches from the high water mark out to the 10 meter depth. Ductile iron articulated pipe is available from a number of suppliers. The exact design of the articulated pipe system varies between suppliers as some have their own patented protected system. Appendix B contains an example of one Ductile Iron Articulated Pipe Protection System, known as Protector Shell Articulated Pipe.

Based on the likely location for the new termination structures, the fact the existing cables must remain energized during installation of the new submarine cable system, the performance of existing cables, and the apparent suitability of the bathymetry, it is recommended that the new submarine cable system be installed immediately to the east of the existing in-service cables. The recommended location is shown on Drawing No. 0003 in Appendix A. The fact that the new cables will be installed in the same corridor as the old abandoned cables installed in 1955 should not be a problem. The locations of the existing in-service cables shown on the drawing are approximate and the exact location should be determined and marked with buoys prior to the installation of the new cables.

5.3 BATHYMETRY AND SEAFLOOR CONDITIONS

Contact was made with the Bedford Institute to determine the most up to date hydrographic information available for the Bell Island Tickle. The Institute provided digitized files of the area which were prepared in 1990. The digitized files were created from sounding surveys carried out by the Canadian Hydrographic Services in 1950. The benefit of the digitized information is that contour mapping of the seafloor can be created at any contour interval utilizing software developed for that purpose. The report drawings contained herein show contours of the Bell Island Tickle created at 1.0 metre intervals. The soundings, which were digitized and used to produce these contours, were taken on a grid of approximately 70.0 m. The software interpolates the data to create an elevation at any point. Assuming the original soundings were accurate, the centerline profiles of the new submarine cable system developed from the digitized files should be accurate enough for the purposes of tendering the project, especially given the type of turn-key contract being recommended. The successful contractor will have to warrant that the installation is free from defects, and installed as per the manufacturer's recommendations. He will also be required to confirm the bottom conditions along the cable route.

In 1988, Newfoundland Power engaged McElhanney Offshore Surveys Ltd. to do a sounding survey for the planned installation of the existing in-service cables. The information available from this survey only covers the actual footprint of the cables as shown on Newfoundland Power Drawing, No. 1-1150-34-2 (Appendix C). The contours on the drawing were compared with the contours created from the digitized files and there doesn't appear to be any significant difference in the information.

During the 1988 survey, McElhanney also carried out a sediments survey of the seafloor in the corridor planned for the cables and determined the position of the three-phase cable (28L) using side scan sonar. This information is also contained on Newfoundland Power Drawing, No. 1-1150-34-2. There is no indication that the sediments survey extended beyond the planned footprint of the cables. Based on the contour configuration, it is likely that the same geological classifications of the bottom sediments will extend some distance to the east and can be expected to be similar for the location of the new cables. The information would be provided to bidders.

It is important that the locations of the in-service cables be established before the new cables are installed. The successful contractor will be required to carry out bottom, sub-bottom and/or side scan sonar surveys as part of the turn-key installation contract, in order to confirm information on the bottom characteristics along the cable routes. The survey should also include offset survey lines (side scan only) in the areas of the existing cables to confirm their locations. This survey could also be used to establish the presence of boulders along the cable routes prior to beginning the cable laying program.

6 CABLE SYSTEM DESIGN

6.1 GENERAL

Following the investigation of the faults that occurred on the existing cables in 2012, it was recommended that the entire cable system be replaced by a new cable system taking into consideration the ultimate projected load of 12.7 MVA. The two possible scenarios to be considered were four single-conductor submarine cables or, alternatively, two three-conductor submarine cables.

The design of these cables and the technology available for their manufacture are discussed in the next two sections.

6.2 SINGLE CONDUCTOR CABLES

Three main insulating materials are commonly used in medium voltage submarine cables; namely, oil impregnated paper, Ethylene Propylene Rubber (EPR), and Cross Linked Polyethylene (XLPE). Although paper insulated cables offered long life and good reliability, they are now avoided due to the very specialized skills required for their repair; particularly jointing and terminations.

Two polymeric insulating materials, EPR and XLPE, have been successfully used for medium voltage submarine cables. EPR is not susceptible to water treeing and thus can be used in submarine applications without a "water barrier". However, EPR is a softer material than XLPE and requires much more care during installation. On the other hand, XLPE insulated cable must have a water barrier such as lead sheathing in order to ensure the absence of humidity in the insulation.

Many water barrier materials, such as laminated layers of copper or aluminum, could be used to ensure the impermeability of the insulation. Lead (particularly ½ C alloy) has been adopted for many submarine cable projects, as it offers the highest reliability due to its flexibility and fatigue resistant properties[3].

[3] Ibid

Tree retardant XLPE materials, known as TR-XLPE, are also available and are often recommended for submarine applications. The vast majority of new submarine cables rated 15 kV to 35kV are XLPE insulated cables[4].

Two typical design specifications for single conductor submarine cables (No. SMC-1-25-EPR and SMC-1-25-XLPE)) have been developed and are included in Appendix D.

It is important to mention that some cable suppliers cannot offer XLPE insulated submarine cables due to the lack of equipment, mainly the lead extruder.

All single conductor submarine cables are armoured using copper wires (non ferrous materials).

6.3 THREE-CONDUCTOR CABLES

Three-conductor submarine cables are produced by assembling three insulated single-conductor cables and fillers to obtain the round shape and are armoured using galvanized steel wires as there is no problem with magnetic induction.

Two typical design specifications for three conductor submarine cables (No. SMC-3-25-EPR and SMC-3-25-XLPE)) have been developed and are included in Appendix D.

6.4 COMPARISON BETWEEN FOUR SINGLE-CONDUCTOR CABLES AND TWO THREE-CONDUCTOR CABLES

One of the main objectives of this report is to provide Newfoundland Power with a clear comparison between the two possible alternatives considered for the replacement of the existing submarine cable system.

Availability and economics are among the most important factors in the comparison. It is therefore imperative to consider the installation of four single-conductor submarine cables to ensure the same level of availability as that offered by two three-conductor cables.

[4] Ibid

The main pros and cons of the two available alternatives for replacing the submarine cables (namely four single-conductor and two three-conductor submarine cables) are given in Tables 6.1 and 6.2 below:

Table 6.1: PROS

Single-Conductor Cables	Remarks
Less costly per length of cable	Need three cables for 3 phases
Light weight	
Smaller diameter	Cables have a much smaller X-section
Longer length without factory or field joints	
Higher Current rating	
Improved availability with the 4th cable	
Reduced repair cost and spares	
Three-Conductor Cables	**Remarks**
More robust cable design	
Lower losses and sheath circulating current	
Narrower corridor required for installation	Only two, versus four cables required
Depending on length and size of cable, may have lower installation cost	Two 3/C cables would have to be installed for similar availability

Table 6.2: CONS

Single conductor cables	Remarks
Depending on length and size of cable, may be greater installation cost for four cables	Four separate crossings by barge, however, a smaller barge would be required for the installation of 1/C cables)
Need for wider trenches at shore ends	
Increased mechanical protection cost for four cables	
Wider corridor required for four submarine cables	
Three conductor cables	**Remarks**
More costly per unit length	However, two less cables required
Lower current rating (requiring larger conductor)	
Heavier and stiffer than a single conductor cable	Needs heavier handling equipment and a larger barge for installation
Large diameter	
Security of cable system decreased	Two 3/C cables would have to be installed for similar availability
All three phases may have to be repaired after a fault;	Longer and more expensive repair for 3/C cables

7 PRELIMINARY SUPPLY AND INSTALLATION SCHEDULE

7.1 GENERAL

Following the analysis of replies received from the cable suppliers, the lead time from the date of placing an order to the delivery of the cable to a port in eastern Canada (Halifax or St. John's) is estimated to be in the order of 8 months. An extra month will be required for clearing Canadian customs and the transfer of the cables to the installation barge / vessel.

It is estimated that the actual installation and mechanical protection of the two three-conductor cables would require some 3-4 weeks.

Appendix G contains a preliminary Project Schedule for the Design and Installation of the New Bell Island Submarine Cable Power System. The key milestones associated with this schedule which is based on a turn-key supply and install contract are:

Milestone	Date
❑ Issue Tender for Cable Supply and Installation	August, 2013
❑ Award Contract for Cable Supply and Installation	October, 2013
❑ Start Construction of Onshore Structures	May, 2014
❑ Delivery of Cable to Eastern Canadian Port	June, 2014
❑ Commence Cable Installation on the Tickle	July, 2014
❑ Completion of Onshore Structures	July, 2014
❑ Complete Cable Installation and Commissioning	August, 2014

Prior to awarding the contract for cable supply and installation, approval will be required from the Newfoundland and Labrador Board of Commissioners of Public Utilities (PUB).

7.2 CONTRACTING STRATEGY

The project could be executed by issuing two separate contracts, i.e., one contract for the supply of the cable, and a separate contract for the installation. With issuing separate contracts, the cable manufacturer would have to conclude an agreement with the installation contractor in order to coordinate their activities. The cable manufacturer would have to provide a list of equipment required for safe and efficient operation in water, as well as on land. In the interest of minimizing the need for coordination between two contracts, and to have the liability for the installation with one supplier, it is recommended that a turn-key contract for the supply and installation of the cable be issued.

8 PRELIMINARY COST ESTIMATE

The following is the least cost budgetary estimate for the submarine cable system:

Two Three - Conductor Cables

	$Can	**$Can**
Cable Supply	7,000,000	
Spares	530,000	
Cable Installation	2,530,000	
Turn Key Contract Management	550,000	
Trenching and Near Shore Protection	463,000	
Terminations	495,000	
Sub-total – Cable Supply & Installation		11,568,000
Marine survey	165,000	
Engineering & Management	676,000	
Owner's Cost incl. IDC	944,000	
Sub-total - Engineering and Owner's Costs		1,785,000
Total Cost		**13,353,000**

Notes:

- The submitted prices do not include GST.
- Spares include 500 m of spare cable plus two splice and four termination kits.

At the present time, the world market for submarine cables is very busy and there are many factors, such as cable design criteria, plant manufacturing capacity, raw material costs, shipping costs from foreign locations, installation fleet availability, delivery time, etc., that could affect this cost estimate at the time of final bidding. The final decision as to the project schedule, system configuration and cable type would then be made at the time of tender evaluation when firm information has been received from suppliers.

9 CONCLUSIONS AND RECOMMENDATIONS

Following the examination of the compiled data, it is concluded that for a similar level of reliability, both system configuration options are comparable in cost (less than a 10% cost differential between the two) and can deliver the required level of service.

Thus, it is recommended to:

- Award a "TURN KEY" contract to a cable manufacturer. It would include the supply and installation of all the cables as well as the terminations (potheads), lighting arrestors, and the final mechanical protection of the cables.
- Make the final decision to install two three-conductor submarine cables or four single-conductor cables after the turn-key bids are evaluated; based on price and technical criteria at that time.
- Require the successful cable supplier to carry out a marine survey of the proposed new cable routes prior to the execution stage of the project in order to establish the bottom conditions along the routes, the location of old abandoned cables, and other features that may have to be considered in the design and installation of the new cables. The program should comprise bathymetric, sub-bottom, side scan sonar and diver surveys as set out in Appendix E – Recommended Marine Survey program.
- Request the successful cable supplier to certify the results of the marine survey with respect to their accuracy and compatibility with the state-of-the-art in submarine cable installations.
- Purchase a short length (500m) of submarine cable, together with two splice kits and four termination kits, to be stored and used as "spare" to be used in case of an emergency repair following the rare occasion of a failure.
- Newfoundland Power should maintain a list of qualified marine contractors that can be called upon to facilitate cable repairs / splicing if required in the future.

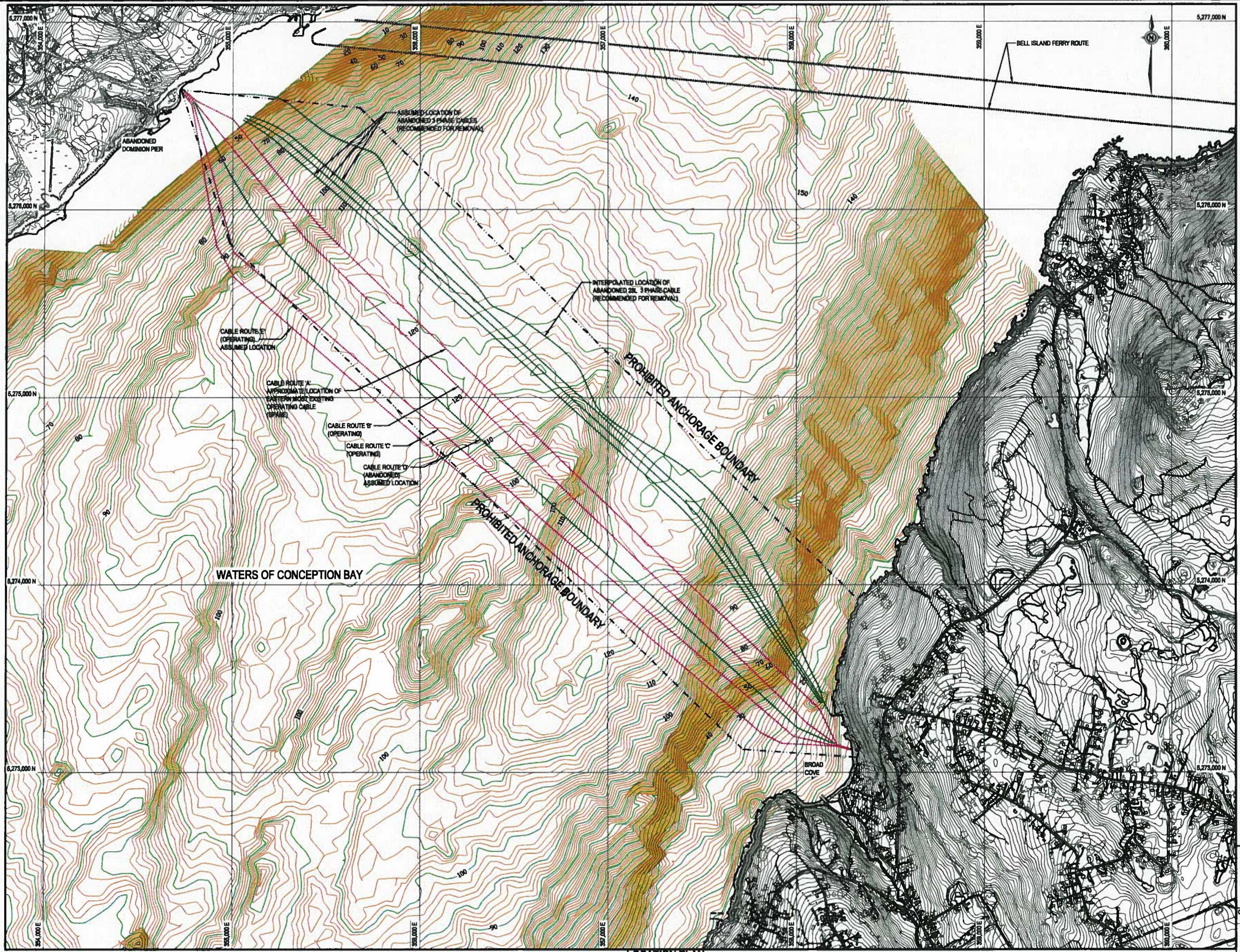
APPENDIX A

Drawing No. 0001 – New Bell Island Submarine Power Cable System – Location Plan – Existing Cable System

Drawing No. 0002– New Bell Island Submarine Power Cable System – Hydrographic Chart – Conception Bay

Drawing No. 0003 – New Bell Island Submarine Power Cable System – Plan and Profile – New Cable System

Drawing No. 0004 – New Bell Island Submarine Power Cable System – Plan – Shore Approaches



LOCATION PLAN

0 100 300 500m

NOTES:

1. CONTOUR LINES FROM CANADIAN HYDROGRAPHIC FIELD SHEET NO. 2192NE, NW, SE & SW.
2. SOUNDINGS ARE IN METRES.

LEGEND:

EXISTING OPERATING CABLES

ABANDONED CABLES

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NEW BELL ISLAND SUBMARINE POWER CABLE SYSTEM LOCATION PLAN - EXISTING CABLE SYSTEM

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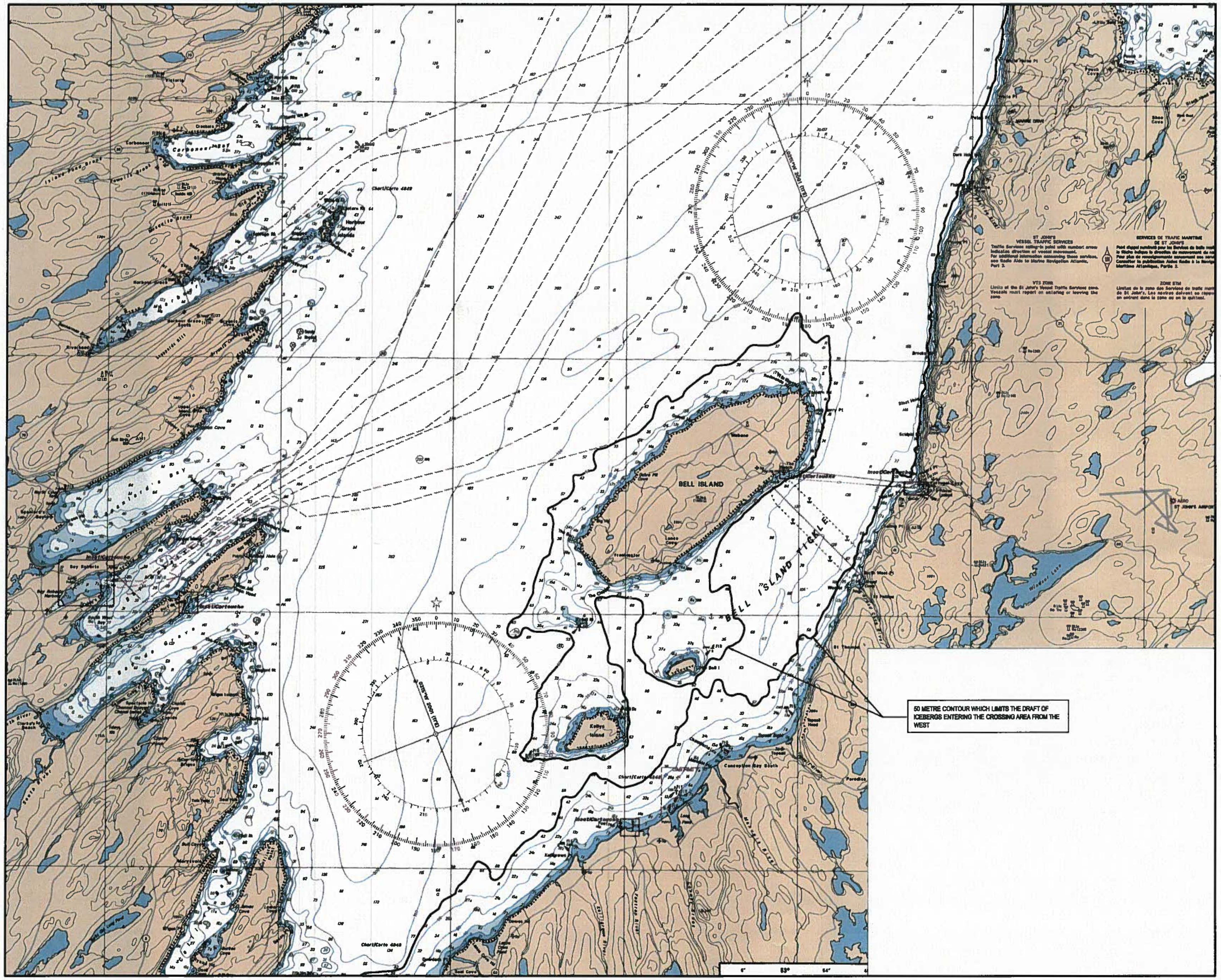

0 100 300 500m

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CABLE SYSTEM
HYDROGRAPHIC CHART - CONCEPTION BAY

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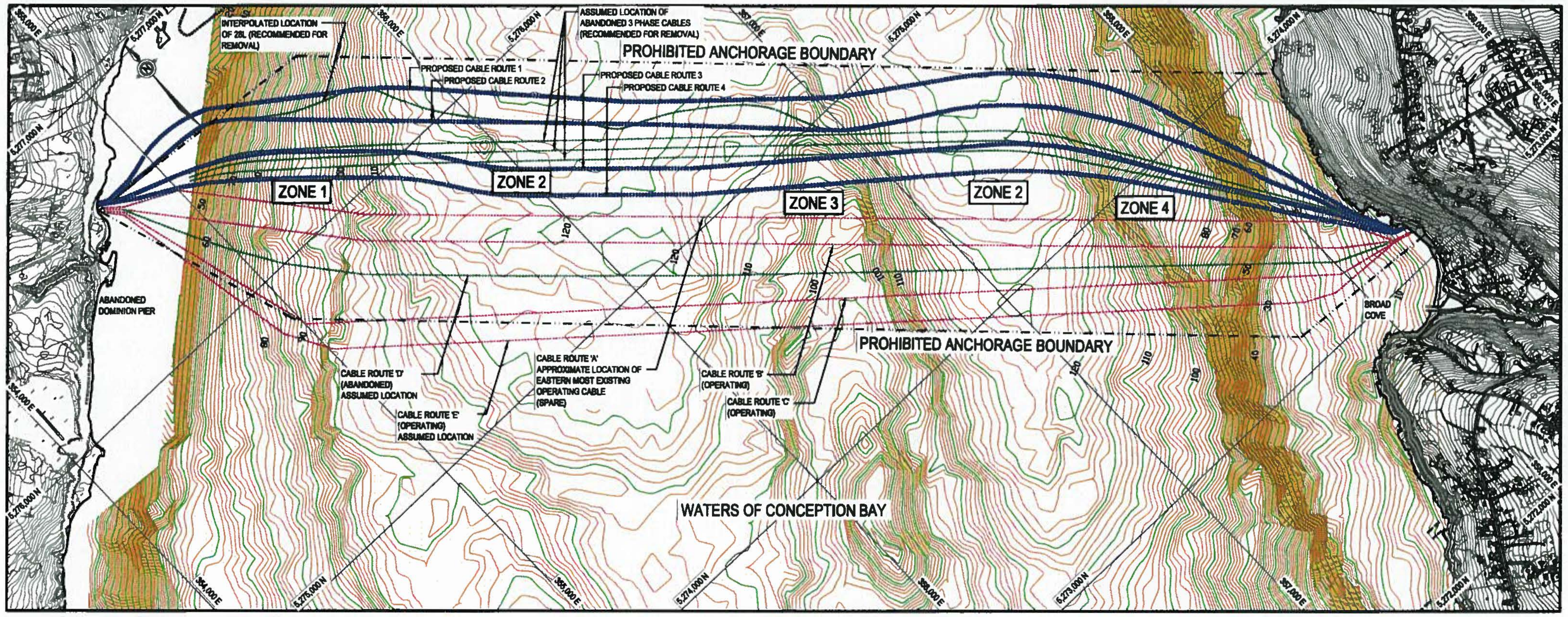

LOCATION PLAN

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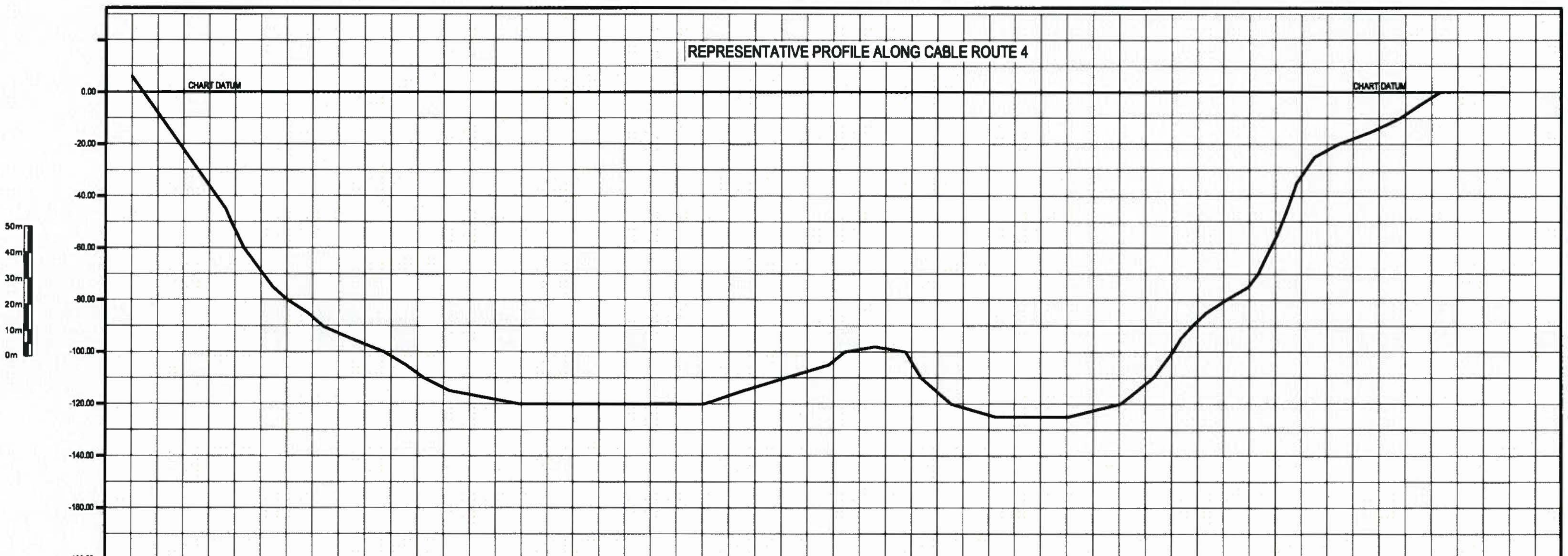

PROFILE

0 100 300 500m

GEOLOGICAL CLASSIFICATION:

GEOLOGICAL CLASSIFICATION OF SURVEY CORRIDOR AS DETERMINED BY INTERPRETATION OF SIDE SCAN SONAR DATA.

ZONE 1: ALTERNATE PATCHES OF SAND, SILT AND GRAVEL.

ZONE 2: PREDOMINATELY SAND AND SILT WITH LESSER GRAVEL PATCHES.

ZONE 3: BEDROCK WITH SAND AND GRAVEL VENEER. SOME BOLDER SIZE GRAVEL.

ZONE 4: BEDROCK WITH SAND AND GRAVEL DEPOSITS.

NOTE: ZONE BOUNDARY BETWEEN ZONE 1 AND ZONE 2 IS GRADATIONAL WHERE AS ALL OTHERS ARE ABRUPT.

LEGEND:

- PROPOSED CABLES
- EXISTING OPERATING CABLES
- ABANDONED CABLES

NOTES:

ROUTES 1 TO 4 WOULD BE UTILIZED FOR OPTION 1 - 4 SINGLE CONDUCTOR CABLES.

ROUTES 2 AND 3 WOULD BE UTILIZED FOR OPTION 2 - 2 THREE CONDUCTOR CABLES.

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PLAN AND PROFILE - NEW CABLE SYSTEM

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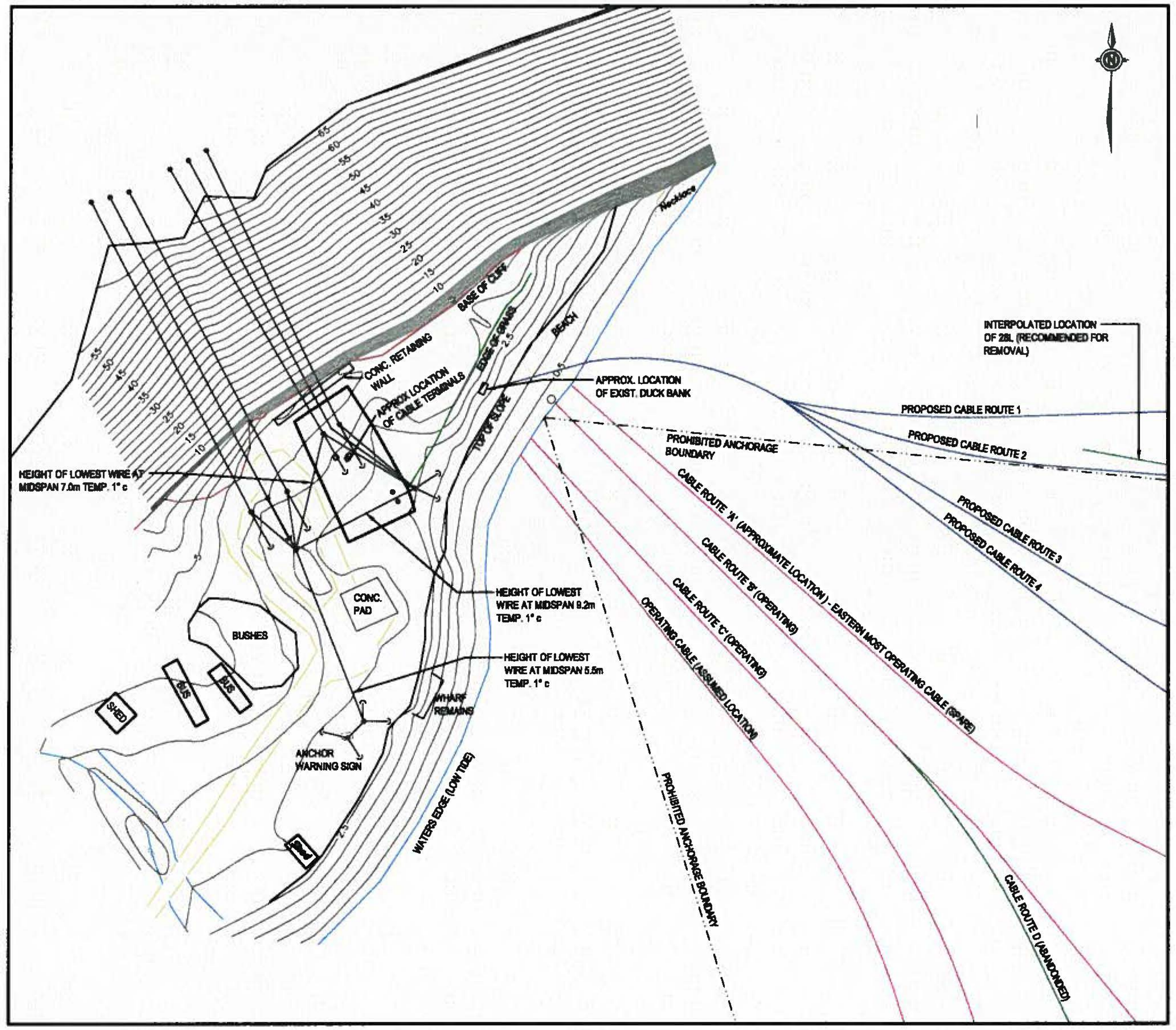
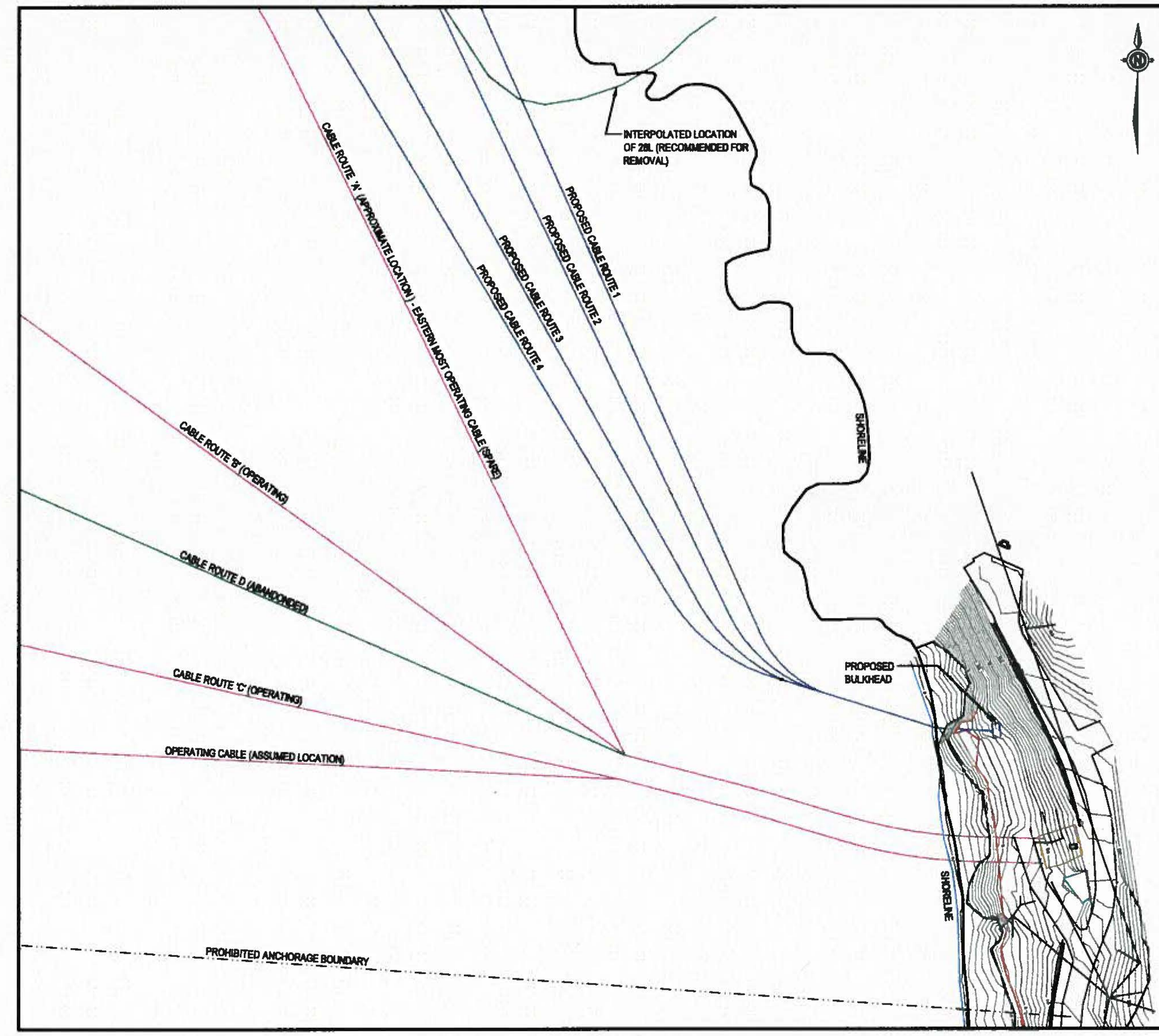


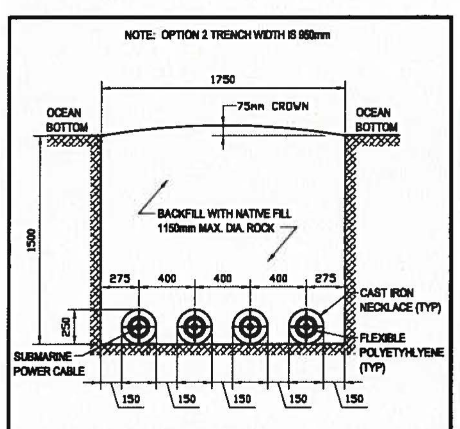
PLAN - BELL ISLAND SHORE APPROACH

0 5 15 25m
Scale 1:500



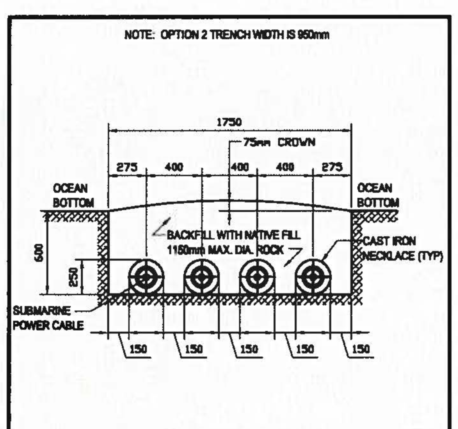
PLAN - ST. PHILLIPS SHORE APPROACH

0 20 40m
Scale 1:750



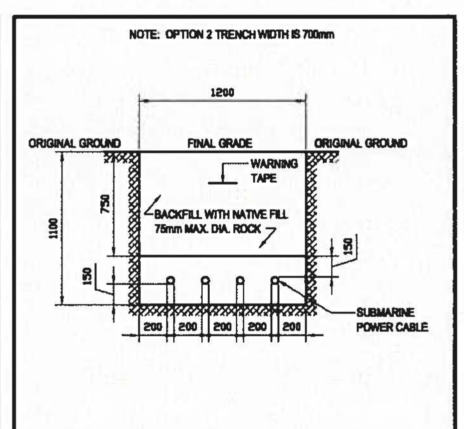
TYPICAL SUBMARINE TRENCH DETAIL (OPTION 1) BELL ISLAND SIDE (IN OVERBURDEN)

0 0.5 1.0m
Scale 1:25



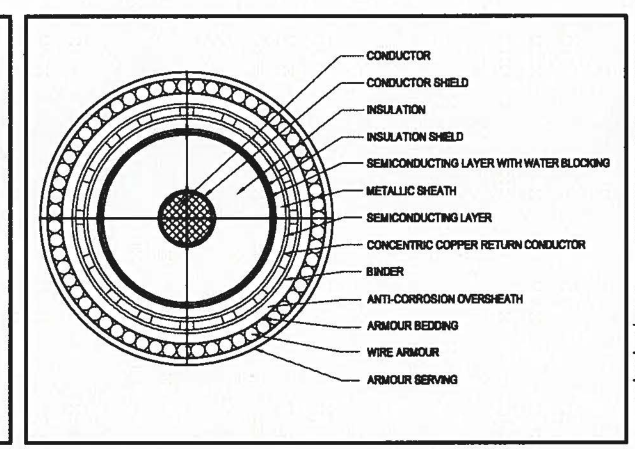
TYPICAL SUBMARINE TRENCH DETAIL (OPTION 1) ST. PHILLIPS SIDE (IN ROCK)

0 0.5 1.0m
Scale 1:25



TYPICAL LAND TRENCH DETAIL (OPTION 1) BELL ISLAND AND ST. PHILLIPS

0 0.5 1.0m
Scale 1:25



SINGLE-CORE SUBMARINE XLPE POWER CABLE - CROSS SECTION (OPTION 1)

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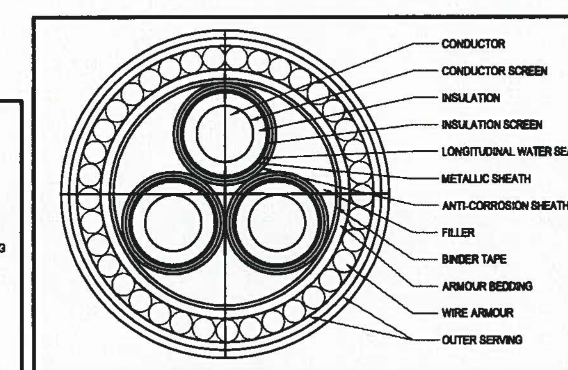

THREE-CORE SUBMARINE POWER CABLE - CROSS SECTION (OPTION 2)

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TITLE:
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SUBMARINE POWER
CABLE SYSTEM
PLAN - SHORE APPROACHES

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APPENDIX B

Ductile Iron Articulated Pipe Protection

Protectorshell Home

Product Specifications

Accessories

Design

Development

Installation

INNOVATION AND VALUE IN PRODUCTS AND SERVICES FOR THE SUBMARINE CABLE INDUSTRY

Protectorshell is a clip together articulated pipe system developed to provide shallow water abrasion and impact protection for submarine cables. By avoiding the nuts and bolts of alternative products, this clip together feature allows quick real time application during laying, and a much simplified diver installation onto prelaid cables.

Protectorshell is manufactured from Ductile Iron to ISO 1083 - 400/12. This material retains the corrosion resistance of traditional cast iron but is far stronger.

Protectorshell is suitable for installation and recovery in water depths in excess of 40m. Protectorshell has been used on various submarine cable shore-ends, cable pipeline crossings and post installation cable protection. The strength and simplicity of Protectorshell make it a viable solution to a wide range of cable and flowline protection problems, both on land and at sea.

Protectorshell is available in four sizes with internal diameters of 55mm, 76mm, 120mm and 160mm and in wall thickness of 9 and 12mm.

A wide range of adaptors, attachments and accessories are available for use with PROTECTORSHELL Articulated Pipe. These accessories allow the reversal of application direction and interfacing with flanged pipes or even concrete abutments.

.

MSD SERVICES

Protectorshell™ Articulated Pipe

Cable Services

PROTECTORSHELL ACCESSORIES

A wide range of adaptors, attachments and accessories are available for use with PROTECTORSHELL Articulated Pipe. These accessories allow the reversal of application direction and interfacing with flanged pipes or even concrete abutments.

Special sizes and specifications are available on request.

Flange adaptor

Allows the seamless interface of Protectorshell to flanges and concrete structures.

Dogbone clamp *(Tension clamp)*

Serves as a secure starting point for Protectorshell Application. Also allows the application to proceed in two directions along a cable.

Saddle clamp

Where Protectorshell needs to be secured to the underlying surface, the protectorshell saddle clamp addresses the issue of dissimilar metals and fit.

Female joint *(Repair shroud)*

Allows the seamless connection of two converging streams of Protectorshell along the same cable. In the unlikely event of breakage, allows the simple repair of a single section of Protectorshell Articulated pipe.

Protectorshell™
Articulated Pipe

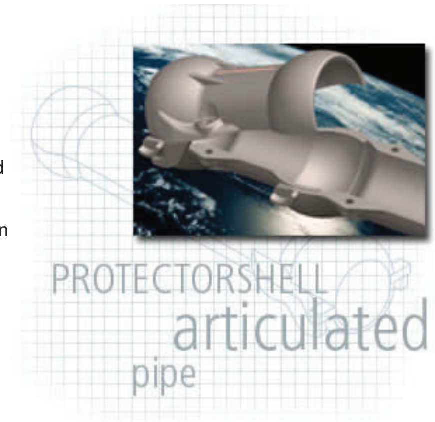
Cable Services

MSD SERVICES

| ABOUT US | CONTACT US | LINKS | HOME |

Protectorshell Home
Product Specifications
Accessories
Design
Development
Installation

INNOVATION AND VALUE IN PRODUCTS AND SERVICES FOR THE SUBMARINE CABLE INDUSTRY



Protectorshell is a clip together articulated pipe system developed to provide shallow water abrasion and impact protection for submarine cables. By avoiding the nuts and bolts of alternative products, this clip together feature allows quick real time application during laying, and a much simplified diver installation onto prelaid cables.

Protectorshell is manufactured from Ductile Iron to ISO 1083 - 400/12. This material retains the corrosion resistance of traditional cast iron but is far stronger.

Protectorshell is suitable for installation and recovery in water depths in excess of 40m. Protectorshell has been used on various submarine cable shore-ends, cable pipeline crossings and post installation cable protection. The strength and simplicity of Protectorshell make it a viable solution to a wide range of cable and flowline protection problems, both on land and at sea.

Protectorshell is available in four sizes with internal diameters of 55mm, 76mm, 120mm and 160mm and in wall thickness of 9 and 12mm.

A wide range of adaptors, attachments and accessories are available for use with PROTECTORSHELL Articulated Pipe. These accessories allow the reversal of application direction and interfacing with flanged pipes or even concrete abutments.

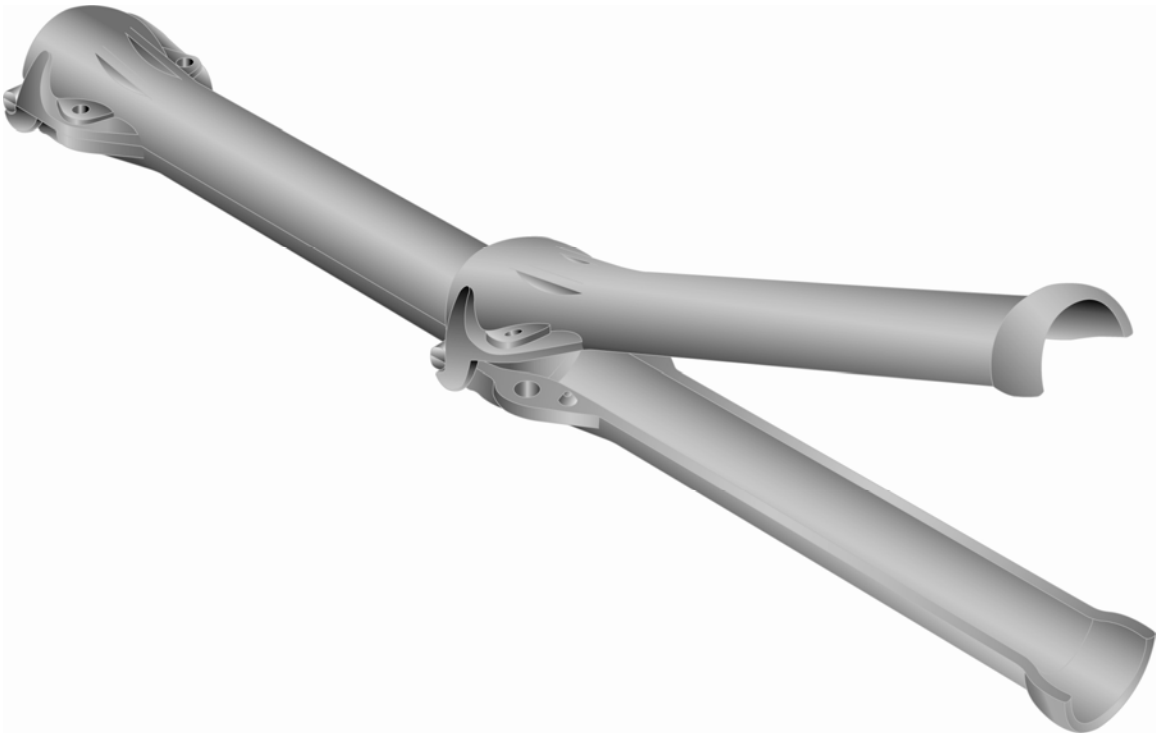
.

Protectorshell Articulated Pipe has been developed to provide shallow water abrasion and impact protection for submarine cables.

Protectorshell is unique in that it clips together, avoiding the nuts and bolts of traditional articulated pipe. This clip together feature allows quick real time application during laying and a much simplified diver installation onto pre-laid cables.

The **Protectorshell** system comprises two different cast segments which are identified as uppers and lowers. Each successive pair of segments clips over and retains the end of the preceding pair.

A wide range of adaptors and attachments are available for use with **Protectorshell** Articulated Pipe. These adaptors and attachments allow the reversal of application direction and interfacing with other cable protection measures such as directionally drilled pipes, pipe flanges and concrete abutments.



PS076/475/09

Specifications	
Segment Length - Overall	535mm
Effective Installed Length/segment pair	475mm
Minimum Internal Diameter	76mm - for cables up to 66mm diameter
Maximum External Diameter	168mm
Wall Thickness	9mm
Material	Ductile Iron to ISO 1083
Tensile Strength / Elongation	400MPa / 15% elongation
Impact Resistance	12m Drop test or 26kg
Minimum Bend Diameter	4.0m
Weight per Segment	11.1kg
Weight per installed metre (air)	23.3kg
Weight per installed metre (water)	20.4kg

APPENDIX C

Existing Information Supplied by Newfoundland Power

Appendix C

Table of Contents

Figure 1 – Current Bell Island Submarine Cable Installation Corridor

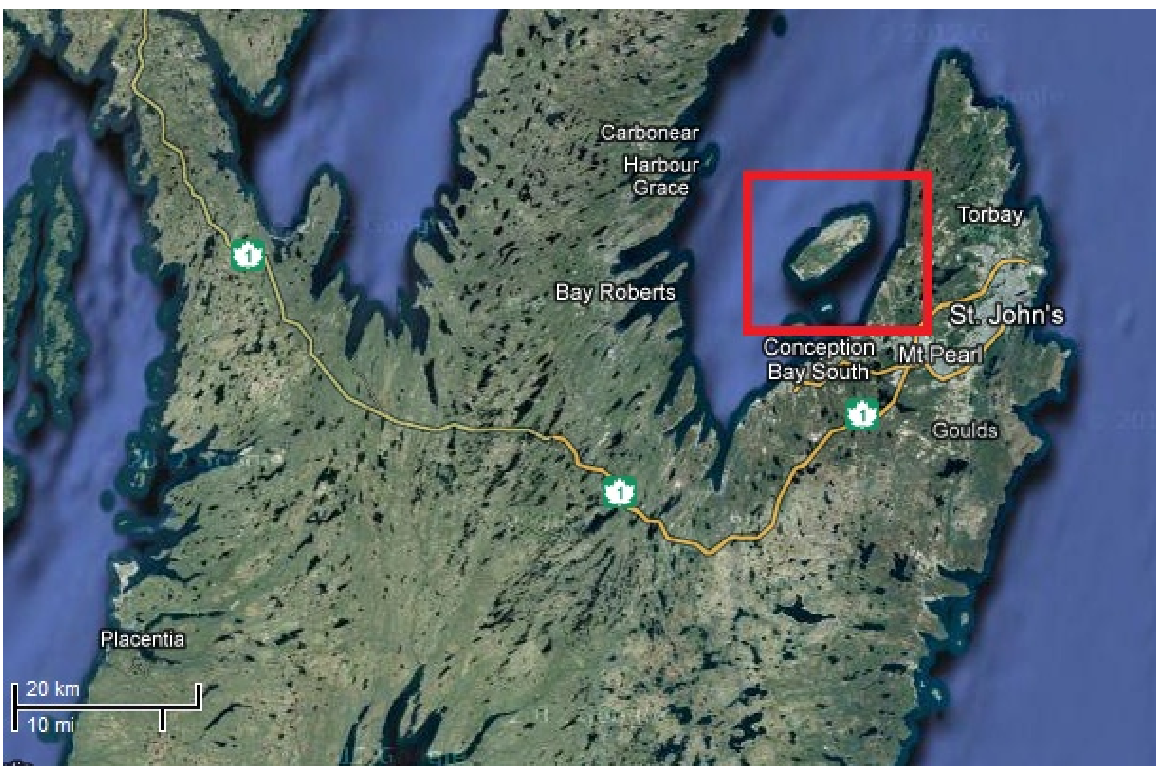


Figure 2 – Bell Island Location Relative to Main Island of Newfoundland

Figure 3 – Bell Island Onshore Termination and Distribution Structures

Figure 4 – View From Shore of Bell Island Across to Broad Cove Substation (Main Island of Newfoundland)

Figure 5 – View of Broad Cove Shoreline Termination Structure

Newfoundland Power Inc. - Bell Island Submarine Power Cable System

Design Guiding Principles

1. Continuous cable lengths – no factory splices, no compromises (~5200m shore to shore). The actual length of the new cables may be more or less than 5200m depending upon route selection.

2. Copper tape corrosion has been identified as the root cause of our in-service cable fault. Mitigation of this flawed design characteristic is required.

3. Fault Current Considerations (Amps):

   - 2 Identical Transformers (see single line diagram 1-903)
   - 2 Identical Transmission Lines
   - Maximum Available Generation

LLL	LLG	LL	LG
12734	11859	11028	10151

4. Load Considerations

   Current Load = 8.3 MVA.
   40 year forecast load = 10.4 MVA rating (590 A).
   Cold load pickup capacity is important.
   Operating voltage flexibility (currently system is 25kV cable energized at 12.5kV).

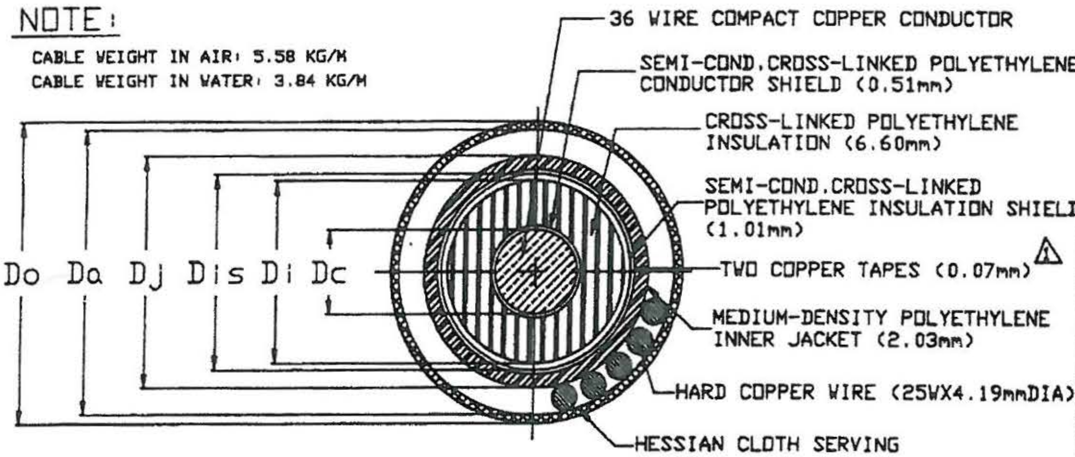
5. Operational considerations:
   a. Cable phase identification tags/markers underwater and onshore.
   b. Methods of submarine cable protection and immobilization.
   c. Shore approaches and cable routing.
   d. Three phase cable vs. single phase cable (cost-benefit).
   e. Establishment/expansion of no anchor zone.
   i. Flashing beacons either side of cable approaches (Maritime electric PEI – NB).

In-Service Cable Specifications

CONDUCTOR SIZE	DIA. OVER CONDUCTOR Dc	DIA. OVER INSULATION Di	DIA. OVER INSUL. SHIELD Dis	DIA. OVER INNER JACKET Dj	DIA. OVER WIRE ARMOUR Da	OVERALL DIA. Do
250 KCMIL	13.21	28.24	30.48	35.09	43.47	45.97

NOTE:

CABLE WEIGHT IN AIR: 5.58 KG/M
CABLE WEIGHT IN WATER: 3.84 KG/M



NEWFOUNDLAND LIGHT & POWER

BELL ISLAND SUBMARINE PROJECT

NO.	DATE	REVISIONS	BY
* 1	2/11/88	0.07mm WAS 0.7mm	

ALL MACHINED FRACTIONAL DIM. WITHIN ± 1/64
ALL MACHINED DECIMAL DIM. WITHIN ± [illegible]
UNLESS OTHERWISE NOTED

DO NOT SCALE DRAWING—NO ALTERATIONS TO BE MADE UNLESS AUTHORIZED BY THIS DEPT.

canada wire
POWER & CONTROL ENGINEERING
TORONTO

SCALE NTS | DATE MAY 24/90

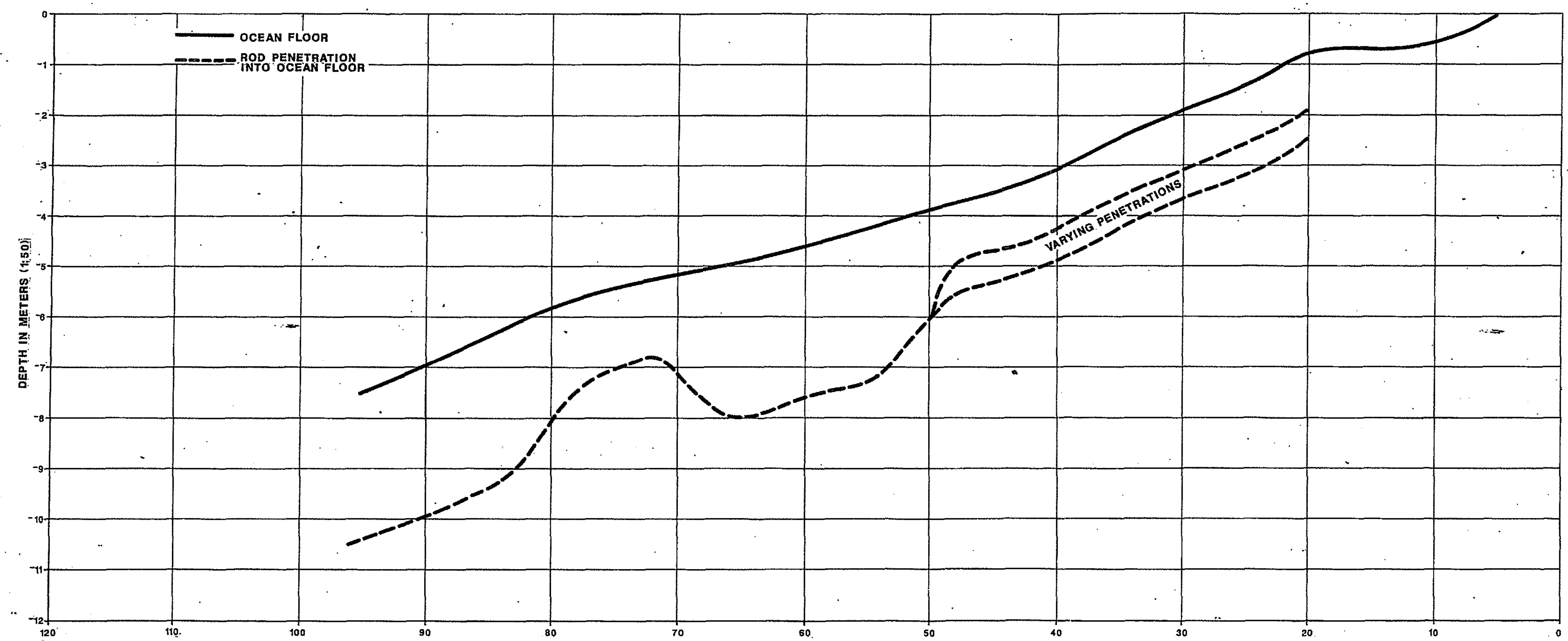
DRAWN W.L.
DESIGN DIV. DSR.
APPR'D

1/C Cu. 250 KCMIL 25KV XLPE INS. W/Cu ARMOUR WIRES-SUBMARINE CABLE

DWG. No. PC-610-10051 MA

B1 - BELL ISLAND

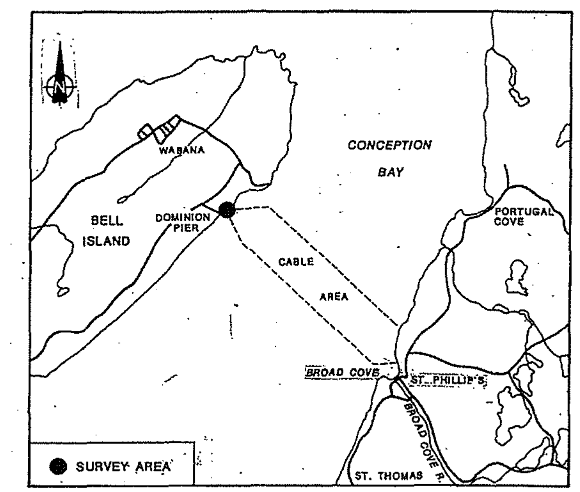
CENTER OF PROPOSED TRENCH SHOWING
ROD PENETRATION DEPTHS



NOTES

- THE SOUNDING SURVEY WAS CONDUCTED ON JULY 7 AND 8, 1988 BY McELHANNEY OFFSHORE SURVEYS LTD.
- SOUNDINGS WERE POSITIONED USING RANGE MARKERS ON SHORE FOR LINE KEEPING IN CONJUNCTION WITH MICROFIX EDM EQUIPMENT.
- DEPTHS WERE MEASURED WITH A RAYTHEON DE719 SURVEY FATHOMETER CALIBRATED USING A BAR CHECKING DEVICE LOWERED TO A MAXIMUM DEPTH OF 30m.
- ALL DEPTHS ARE REDUCED TO CHART DATUM BASED ON PREDICTED TIDES FOR THE SURVEY AREA AND ARE SHOWN IN METERS.
- HORIZONTAL CONTROL WAS ESTABLISHED FROM EXISTING CHS AND CROWN LANDS CONTROL.
- ALL DISTANCES SHOWN ON PROFILES WERE MEASURED FROM PRE-ESTABLISHED POINTS ON THE FORESHORE THAT CORRESPOND TO HIGHER HIGH WATER.

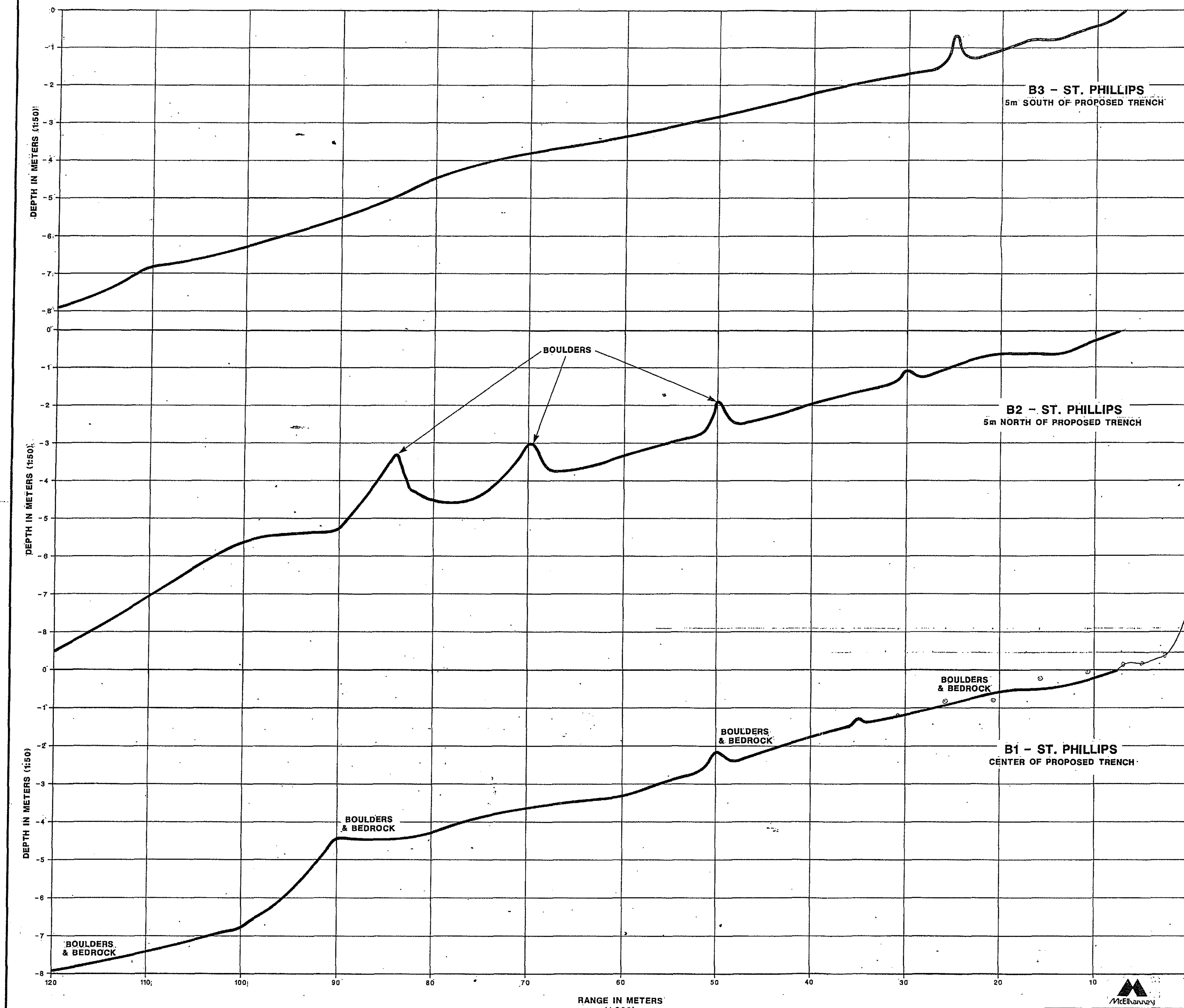
KEY PLAN



McElhanney

McELHANNEY OFFSHORE SURVEYS LTD.
20600279

NEWFOUNDLAND LIGHT & POWER CO. LIMITED	
DESIGNED:	Project: BELL ISLAND/ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN: D. BURRY	Title: CENTRAL PROFILE OF PROPOSED TRENCH SHOWING ROD PENETRATION DEPTHS INTO THE SEABED, BELL ISLAND, NF.
CHECKED: B. RYAN	
APPROVED:	Scale: 1:200 (RANGE) 1:50 (DEPTH) — DWG. NO.
PASSED:	Date: JULY 12/88 — 1-788-I-4

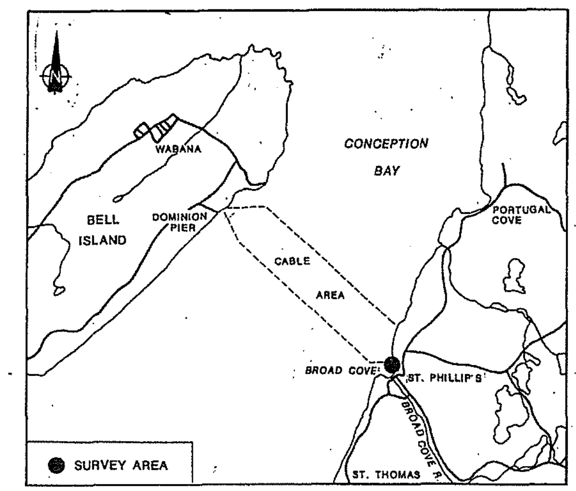


McELHANNEY OFFSHORE SURVEYS LTD.
20600279

NOTES

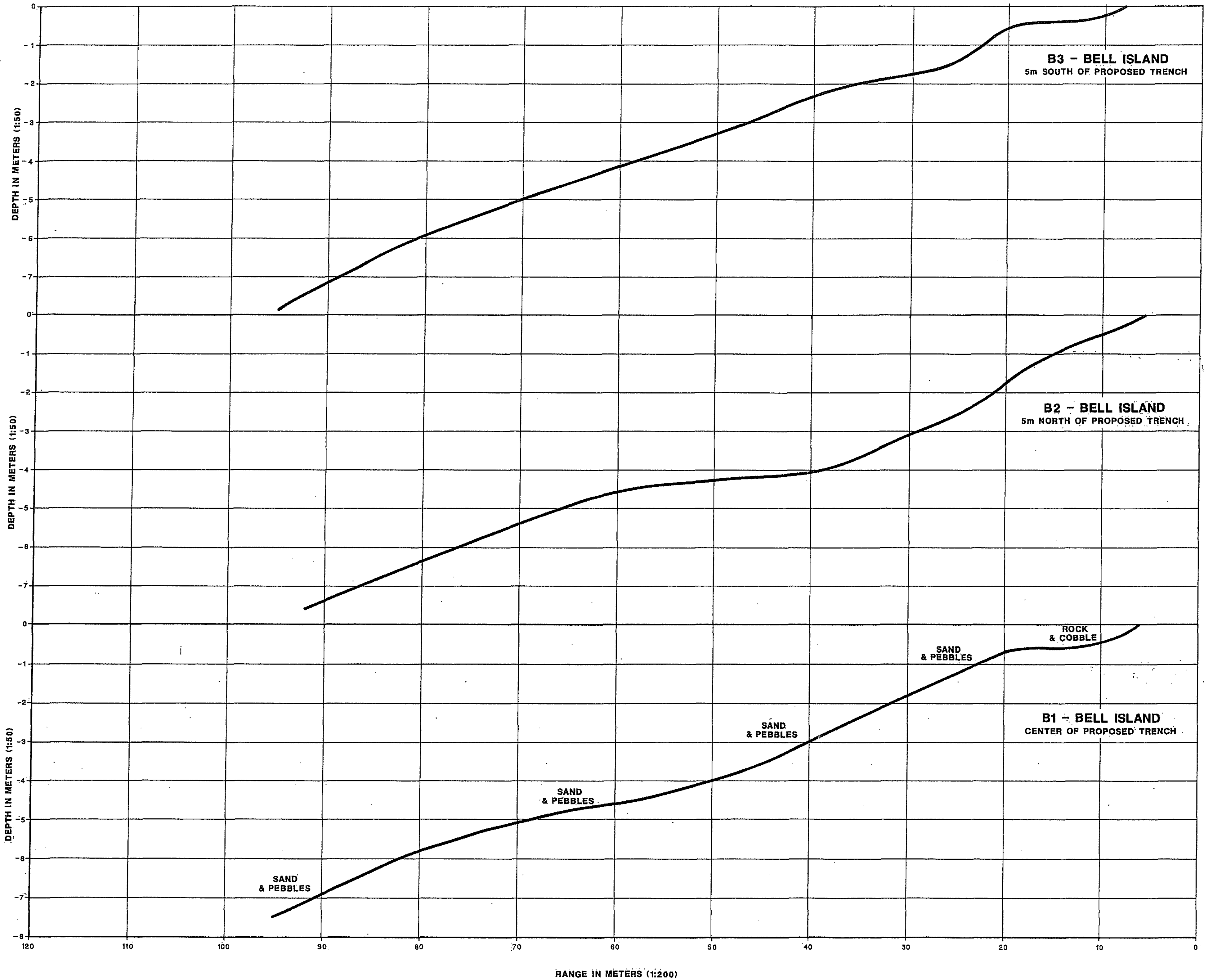
- THE SOUNDING SURVEY WAS CONDUCTED ON JULY 7 AND 8, 1988 BY McELHANNEY OFFSHORE SURVEYS LTD.
- SOUNDINGS WERE POSITIONED USING RANGE MARKERS ON SHORE FOR LINE KEEPING IN CONJUNCTION WITH MICROFIX EDM EQUIPMENT.
- DEPTHS WERE MEASURED WITH A RAYTHEON DE719 SURVEY FATHOMETER CALIBRATED USING A BAR CHECKING DEVICE LOWERED TO A MAXIMUM DEPTH OF 30m.
- ALL DEPTHS ARE REDUCED TO CHART DATUM BASED ON PREDICTED TIDES FOR THE SURVEY AREA AND ARE SHOWN IN METERS.
- HORIZONTAL CONTROL WAS ESTABLISHED FROM EXISTING CHS AND CROWN LANDS CONTROL.
- ALL DISTANCES SHOWN ON PROFILES WERE MEASURED FROM PRE-ESTABLISHED POINTS ON THE FORESHORE THAT CORRESPOND TO HIGHER HIGH WATER.
- DUE TO THE ROCKY NATURE OF THE SEABED, NO PENETRATION TESTS WERE CONDUCTED.

KEY PLAN



NEWFOUNDLAND LIGHT & POWER CO. LIMITED

DESIGNED	Project: BELL ISLAND/ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN D. BURRY	Title: BATHYMETRIC PROFILES OF PROPOSED TRENCHING AREA FOR CABLE LANDING SITE, ST. PHILLIPS, NF.
CHECKED: B. RYAN	
APPROVED:	Scale: 1:200 (RANGE) 1:50 (DEPTH) — DWG. NO. 1-788-1-5
PASSED:	Date: JULY 12/88 — SHEET 1 OF 2



NOTES

- THE SOUNDING SURVEY WAS CONDUCTED ON JULY 7 AND 8, 1988 BY McELHANNEY OFFSHORE SURVEYS LTD.
- SOUNDINGS WERE POSITIONED USING RANGE MARKERS ON SHORE FOR LINE KEEPING IN CONJUNCTION WITH MICROFIX EDM EQUIPMENT.
- DEPTHS WERE MEASURED WITH A RAYTHEON DE719 SURVEY FATHOMETER CALIBRATED USING A BAR CHECKING DEVICE LOWERED TO A MAXIMUM DEPTH OF 30m.
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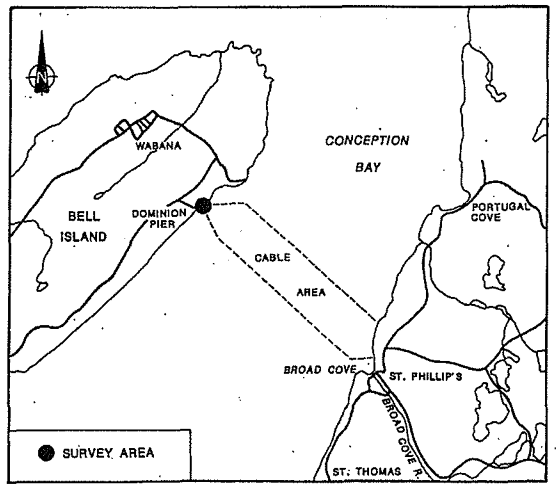
- ALL DISTANCES SHOWN ON PROFILES WERE MEASURED FROM PRE-ESTABLISHED POINTS ON THE FORESHORE THAT CORRESPOND TO HIGHER HIGH WATER.

KEY PLAN



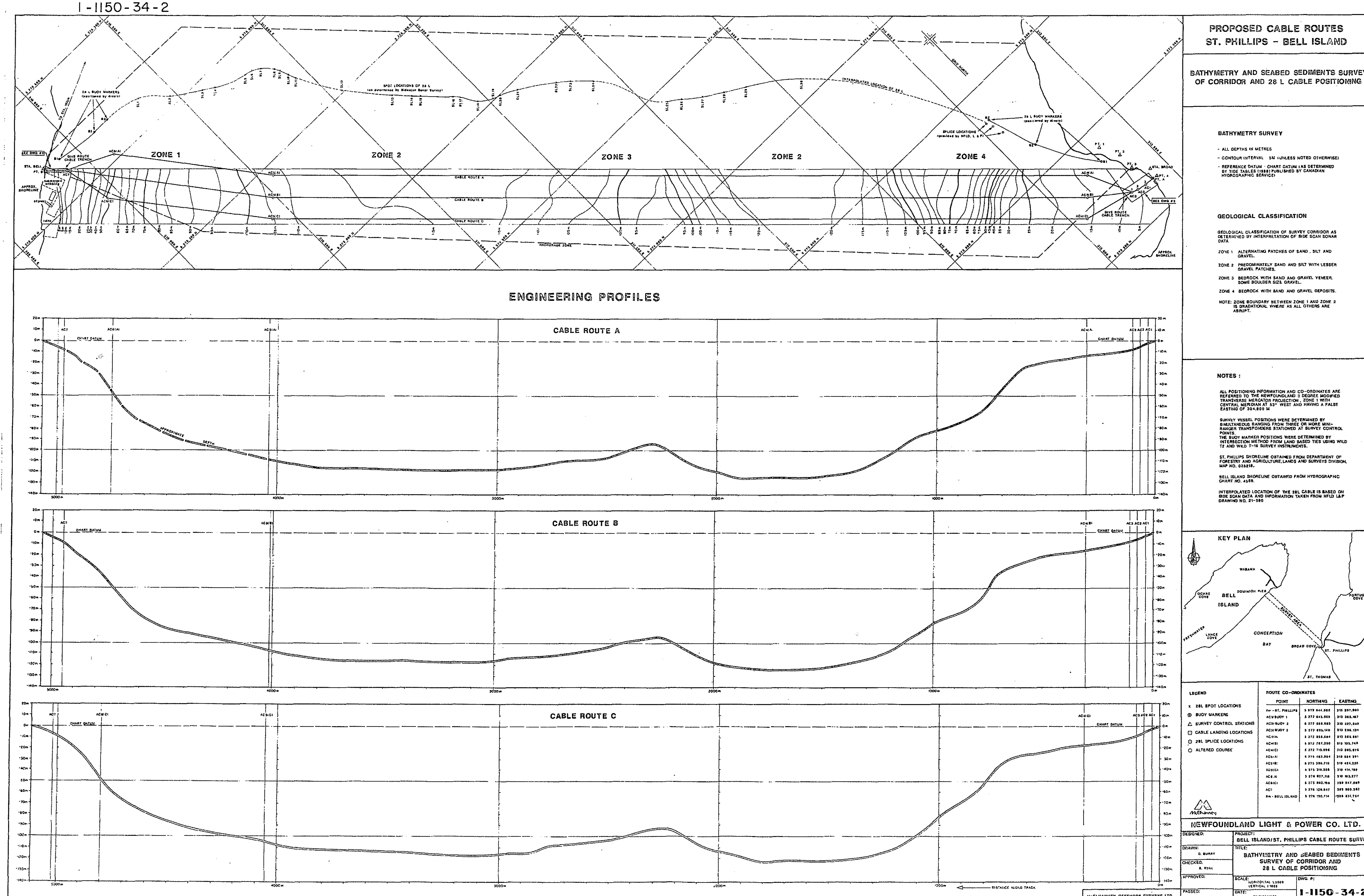
McElhanney

McELHANNEY OFFSHORE SURVEYS LTD.
20600279

NEWFOUNDLAND LIGHT & POWER CO. LIMITED

DESIGNED:	Project: BELL ISLAND/ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN: D. BURRY	Title: BATHYMETRIC PROFILES OF PROPOSED TRENCHING AREA FOR CABLE LANDING SITE, BELL ISLAND, NF.
CHECKED: B. RYAN	
APPROVED:	Scale: 1:200 (RANGE) 1:50 (DEPTH) — DWG. NO. I-788-I-5
PASSED:	Date: JULY 12/88 — SHEET 2 OF 2

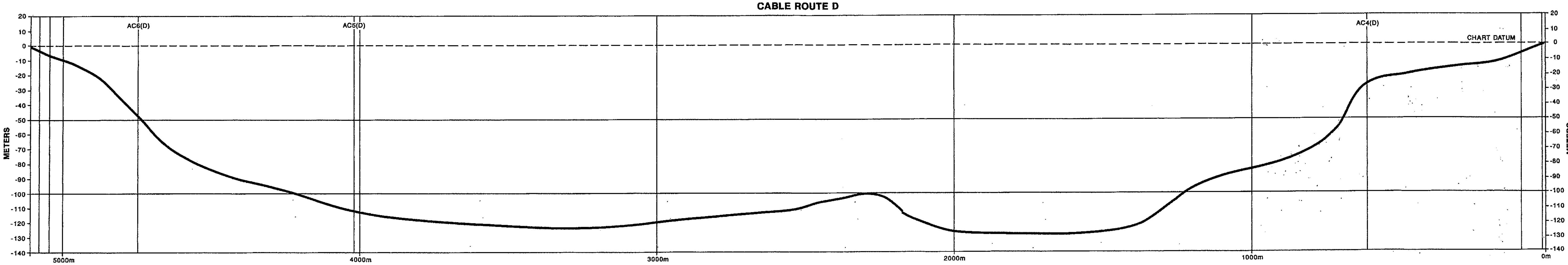
1-1150-34-2


PROPOSED CABLE ROUTES
ST. PHILLIPS - BELL ISLAND
BATHYMETRY AND SEABED SEDIMENTS SURVEY OF CORRIDOR AND 28 L CABLE POSITIONING
ZONE 1
ZONE 2
ZONE 3
ZONE 2
ZONE 4
CABLE ROUTE A
CABLE ROUTE B
CABLE ROUTE C
ANCHORAGE ZONE
INTERPOLATED LOCATION OF 28 L
SPLICE LOCATIONS
DIVE ROUTE CABLE TRENCH
APPROX. SHORELINE
ENGINEERING PROFILES
CABLE ROUTE A
CABLE ROUTE B
CABLE ROUTE C
CHART DATUM
APPROXIMATE DEPTH
DISTANCE ALONG TRACK
McELHANNEY OFFSHORE SURVEYS LTD.
BATHYMETRY SURVEY
- ALL DEPTHS IN METRES
- CONTOUR INTERVAL 5M (UNLESS NOTED OTHERWISE)
- REFERENCE DATUM - CHART DATUM (AS DETERMINED BY TIDE TABLES (1988) PUBLISHED BY CANADIAN HYDROGRAPHIC SERVICE)
GEOLOGICAL CLASSIFICATION
GEOLOGICAL CLASSIFICATION OF SURVEY CORRIDOR AS DETERMINED BY INTERPRETATION OF SIDE SCAN SONAR DATA
ZONE 1 ALTERNATING PATCHES OF SAND, SILT AND GRAVEL.
ZONE 2 PREDOMINATELY SAND AND SILT WITH LESSER GRAVEL PATCHES.
ZONE 3 BEDROCK WITH SAND AND GRAVEL VENEER. SOME BOULDER SIZE GRAVEL.
ZONE 4 BEDROCK WITH SAND AND GRAVEL DEPOSITS.
NOTE: ZONE BOUNDARY BETWEEN ZONE 1 AND ZONE 2 IS GRADATIONAL WHERE AS ALL OTHERS ARE ABRUPT.
NOTES :
ALL POSITIONING INFORMATION AND CO-ORDINATES ARE REFERRED TO THE NEWFOUNDLAND 3 DEGREE MODIFIED TRANSVERSE MERCATOR PROJECTION, ZONE 1 WITH CENTRAL MERIDIAN AT 53° WEST AND HAVING A FALSE EASTING OF 304,800 M
SURVEY VESSEL POSITIONS WERE DETERMINED BY SIMULTANEOUS RANGING FROM THREE OR MORE MINI-RANGER TRANSPONDERS STATIONED AT SURVEY CONTROL POINTS.
THE BUOY MARKER POSITIONS WERE DETERMINED BY INTERSECTION METHOD FROM LAND BASED TIES USING WILD T2 AND WILD T-16 SURVEY INSTRUMENTS.
ST. PHILLIPS SHORELINE OBTAINED FROM DEPARTMENT OF FORESTRY AND AGRICULTURE, LANDS AND SURVEYS DIVISION, MAP NO. 025216.
BELL ISLAND SHORELINE OBTAINED FROM HYDROGRAPHIC CHART NO. 4566.
INTERPOLATED LOCATION OF THE 28L CABLE IS BASED ON SIDE SCAN DATA AND INFORMATION TAKEN FROM NFLD L&P DRAWING NO. 21-580
KEY PLAN
BELL ISLAND
WABANA
DOMINION PIER
CONCEPTION BAY
LANCE COVE
BROAD COVE
ST. PHILLIPS
ST. THOMAS
PORTUGAL COVE
LEGEND
x 28L SPOT LOCATIONS
BUOY MARKERS
SURVEY CONTROL STATIONS
CABLE LANDING LOCATIONS
28L SPLICE LOCATIONS
ALTERED COURSE
ROUTE CO-ORDINATES
POINT NORTHING EASTING
NEWFOUNDLAND LIGHT & POWER CO. LTD.
DESIGNED:
PROJECT: BELL ISLAND/ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN: D. BURRY
TITLE: BATHYMETRY AND SEABED SEDIMENTS SURVEY OF CORRIDOR AND 28 L CABLE POSITIONING
CHECKED: B. RYAN
APPROVED:
SCALE: HORIZONTAL 1:5000 VERTICAL 1:1000
DWG. #: 1-1150-34-2
PASSED:
DATE: JULY/23/1989
NFLD LIGHT & POWER (BELL ISLAND)

1-1150-34-3

ENGINEERING PROFILES

CABLE ROUTE D



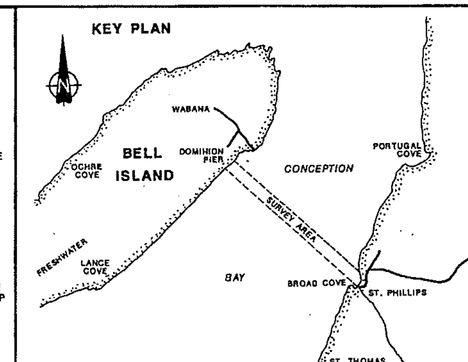
BATHYMETRY SURVEY

- ALL DEPTHS IN METERS
- CONTOUR INTERVAL = 5 m (UNLESS NOTED OTHERWISE)
- REFERENCE DATUM - CHART DATUM (AS DETERMINED BY TIDE TABLES (1988) PUBLISHED BY CANADIAN HYDROGRAPHIC SERVICE)

NOTES

- ALL POSITIONING INFORMATION AND CO-ORDINATES ARE REFERRED TO THE NEWFOUNDLAND 3 DEGREE MODIFIED TRANSVERSE MERCATOR PROJECTION, ZONE 1 WITH CENTRAL MERIDIAN AT 53° WEST AND HAVING A FALSE EASTING OF 304,800 m.
- SURVEY VESSEL POSITIONS WERE DETERMINED BY SIMULTANEOUS RANGING FROM THREE OR MORE DEL NORTE TRANSPONDERS STATIONED AT SURVEY CONTROL POINTS.
- ST. PHILLIPS SHORELINE OBTAINED FROM DEPARTMENT OF FORESTRY AND AGRICULTURE, LANDS AND SURVEYS DIVISION, MAP NO. 025216.
- BELL ISLAND SHORELINE OBTAINED FROM HYDROGRAPHIC CHART NO. 4566.
- INTERPOLATED LOCATION OF THE 28L CABLE IS BASED ON SIDE SCAN DATA AND INFORMATION TAKEN FROM NFLD. L&P DRAWING NO. 21-580.
- APPEND TO, BATHYMETRY AND SEABED SEDIMENTS SURVEY OF CORRIDOR AND 28L CABLE POSITIONING, DRAWING No. 1. DATED JULY /25/1988

KEY PLAN



LEGEND

- PROPOSED CABLE ROUTES
- AS LAID CABLE ROUTES
- 28L SPOT LOCATIONS
- BUOY MARKERS
- SURVEY CONTROL STATIONS
- CABLE LANDING LOCATIONS
- 28L SPLICE LOCATIONS
- ALTERED COURSE
- CABLE POSITION LAID BY DIVERS

PROPOSED ROUTE CO-ORDINATES

POINT	NORTHING	EASTING
0m-ST.PHILLIPS	5 272 644.002	313 397.903
AC1/BUOY 1	5 272 645.085	313 365.197
AC2/BUOY 2	5 272 656.883	313 327.049
AC3/BUOY 3	5 272 665.140	313 296.134
AC4(A)	5 272 858.604	313 205.801
AC4(B)	5 272 787.250	313 135.740
AC4(C)	5 272 715.896	313 065.676
AC4(D)	5 273 150.851	313 051.096
AC5(A)	5 275 462.064	310 554.291
AC5(B)	5 275 390.710	310 484.230
AC5(C)	5 275 319.356	310 414.168
AC5(D)	5 275 533.418	310 624.352
AC6(A)	5 276 027.118	310 103.277
AC6(C)	5 275 902.198	309 947.089
AC6(D)	5 276 089.501	310 181.433
AC7	5 276 120.847	309 900.282
0m-BELL ISLAND	5 276 190.714	309 831.754
P1	5 272 664.093	313 341.917
P2	5 272 986.816	313 075.223

REVISIONS

No.	DESCRIPTION	DATE	BY
6			
5			
4			
3			
2			
1	REVISED PROFILE	13/07/90	G.B.C.

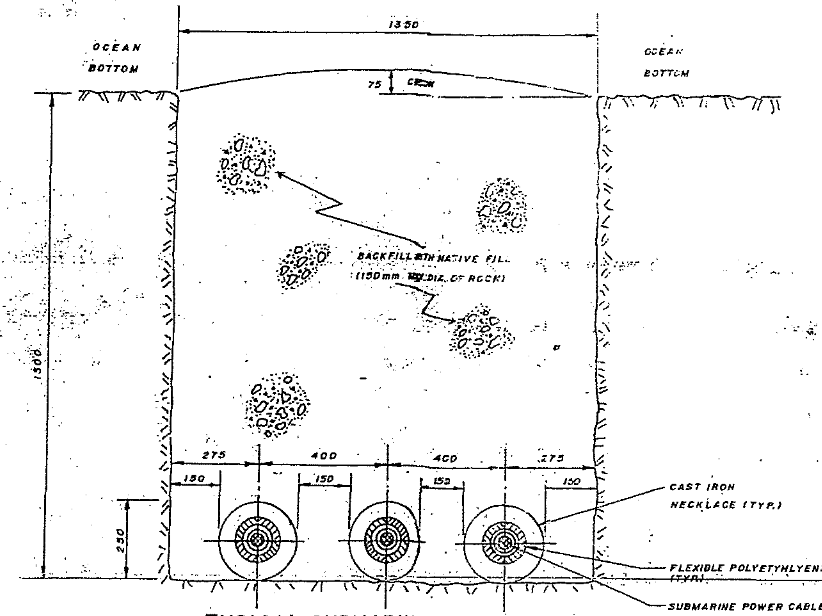
PROPOSED CABLE ROUTE ST. PHILLIPS - BELL ISLAND

McElhanney

COMSTOCK INTERNATIONAL LTD.

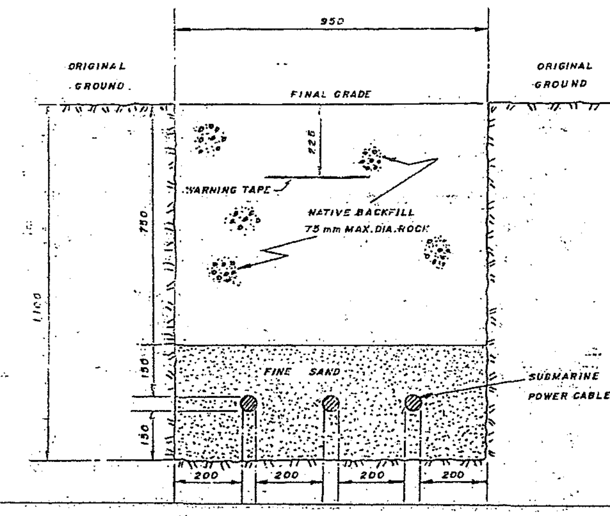
DESIGNED :	PROJECT : BELL ISLAND / ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN : T. BROWN	TITLE : PROPOSED CABLE ROUTE ST. PHILLIPS-BELL ISLAND
CHECKED : M. COLE	
APPROVED :	SCALE : HORIZONTAL 1 : 5000
PASSED :	DATE : JUNE / 1990
DWG. No. :	1-1150-34-3

1-1150-34-4



TYPICAL SUBMARINE TRENCH DETAIL

BELL ISLAND SIDE

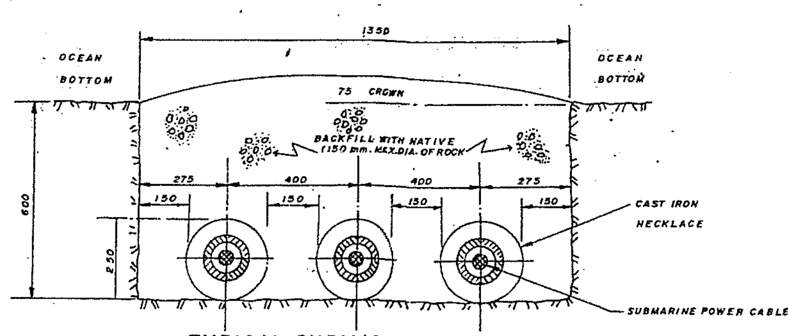


TYPICAL LAND TRENCH

BELL ISLAND AND ST.PHILLIPS

NOTES :

1. Trenches Shall Be Free Of Any Projecting Stones, Ridges Or Sharp Changes In Grade Which Could Cause Damage To Cables.
2. Approximate Length Of Land Trench For St. Phillips Side = 45 M.
3. Approximate Length Of Submarine Trench For St. Phillips Side = 15 M.
4. Approximate Length Of Land Trench For Bell Island Side = 35 M.
5. Approximate Length Of Submarine Trench For Bell Island Side = 80 M.
6. Total Number Of Cast Iron Necklace Sets To Be Installed = 1700.
7. Some Land Trench Areas Will Use Cast Iron Necklace Protection Instead Of Directly Buried Cable.



TYPICAL SUBMARINE TRENCH

ST. PHILLIPS SIDE

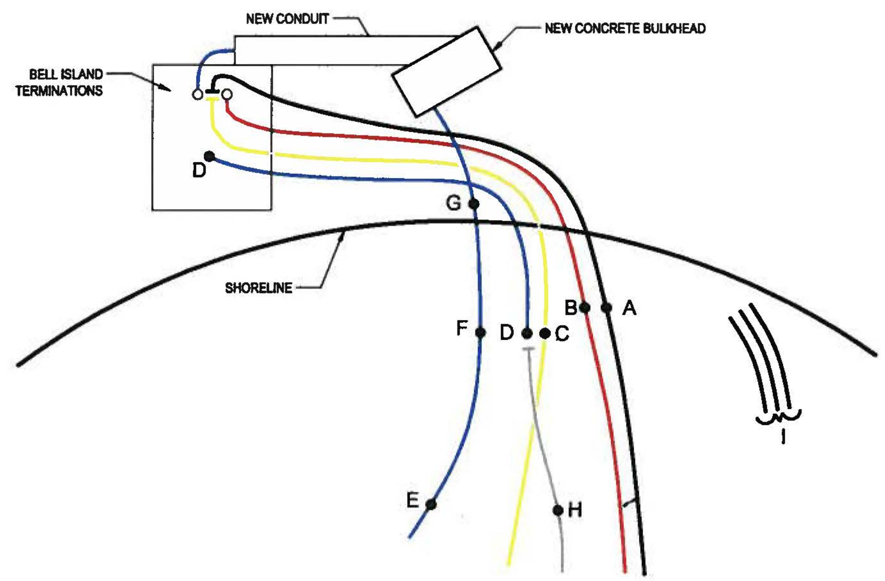
REV.	DATE	DESCRIPTION	DRAWN BY	MADE BY	APP. BY	MICROFILM NO.

REVISIONS

NEWFOUNDLAND LIGHT & POWER CO. LIMITED

DESIGNED M.J.	PROJECT SUBMARINE CABLE ST. PHILLIPS-BELL ISLAND
DRAWN G.P	TITLE TYPICAL TRENCH DETAILS (1988)
CHECKED	
APPROVED	SCALE: 1:10
PASSED	DATE: 88-07-14

DWG. NO. 1-1150-34-4



3 BELL ISLAND CABLE ARRANGEMENT

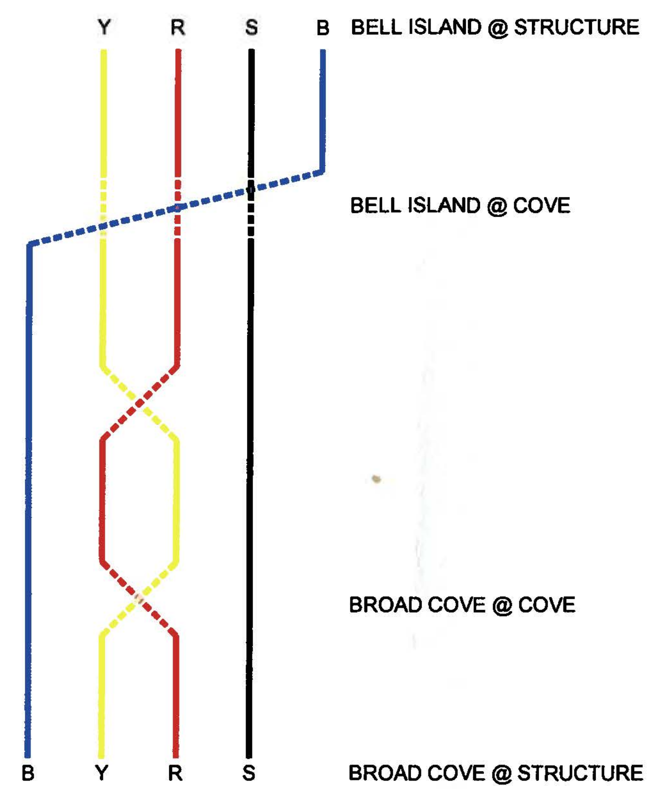
Scale: N.T.S

BELL ISLAND SIDE LEGEND: (1988 - BLUE, YELLOW & "AA" / 1990 - RED, SPARE)

- A - SPARE
- B - RED
- C - YELLOW (MARKED YELLOW)
- D - BLUE, CUT AT THIS LOCATION & ABANDONED.
- E - BLUE
- F - BLUE JOINED & FOLLOWS NEW ROUTE INTO CONDUIT. (MARKED BLUE ON JOINT)
- G - NEW BLUE CABLE SECTION CROSSES FIVE ORIGINAL CABLES 20' IN FRONT OF CONCRETE BULKHEAD. ALL CABLES IN NECKLACES.
- H - ABANDONED 1988 CABLE (MARKED "AA"). CUT OFF AT STRUCTURE.
- I - THREE OLD ABANDONED 3 PHASE CABLES IDENTIFIED BY DIVE TEAM.

COORDINATES (WGS84):

A, B:	47.62646 N, -52.93110 W
C, D:	47.62635 N, -52.93139 W
E:	47.62597 N, -52.93109 W
F:	47.62632 N, -52.93131 W

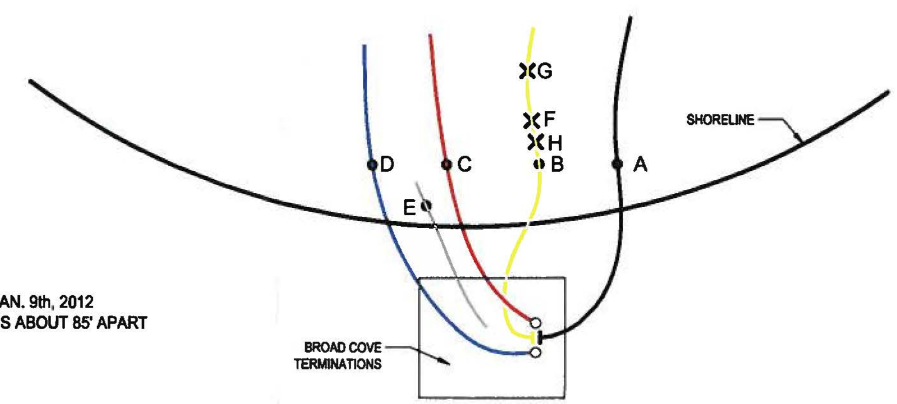


2 PHYSICAL / ELECTRICAL CABLE ARRANGEMENT

Scale: N.T.S.

BROAD COVE SIDE LEGEND:

- A - SPARE
- B - YELLOW
- C - RED
- D - BLUE
- E - ABANDONED
- F - FAULT AT 200m, ON JAN. 9th, 2012
- G & H - JOINT LOCATIONS ABOUT 85' APART



1 BROAD COVE CABLE ARRANGEMENT

Scale: N.T.S.

NOTES:

DWG #	TITLE

REFERENCE DRAWINGS

REV	DATE	DESCRIPTION	APPROVED

REVISION HISTORY

NEWFOUNDLAND POWER
A FORTIS COMPANY

PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by APEGN D0134
which is valid for the year 2012

SITE: BELL ISLAND SUBMARINE CABLES

PROJECT:

PROJECT #

TITLE: BELL ISLAND SUBMARINE CABLE LAYOUT

REV DESCRIPTION: ORIGINAL ISSUE

DESIGNED: D. MANNING	CHECKED: D. JACKMAN
DRAWN: S. HOBBS	APPROVED:

SCALE:	DRAWING NUMBER 1-1150-34-14	REVISION A
DATE: 2012/07/06	OF	

APPENDIX D

Typical Submarine Cable Specifications

APPENDIX D1

Specification # SMC-1-25

Single Conductor 25 kV, Cross-Linked Polyethylene (XLPE) Insulated Submarine Cable

SPECIFICATION NO. SMC-1-25-XLPE

SINGLE CONDUCTOR 25 KV , CROSS-LINKED POLYETHYLENE (XLPE) INSULATED SUBMARINE CABLE

1.0 SCOPE

This specification covers single conductor, 25 kV, Cross-Linked Polyethylene (XLPE) insulated, shielded, lead covered and copper wire armoured Submarine cable for use on three-phase, 60 Hz nominal 25 kV system with grounded neutral.

2.0 GENERAL

2.1 The cable shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

2.2 The nominal system voltage will be 25 kV phase-to-phase on a grounded neutral system. The minimum continuous phase-to-phase voltage shall be 27.5 kV. The basic impulse level (BIL) shall be 150 kV.

3.2 The cable shall be designed to operate satisfactorily for a maximum conductor temperature of 90°C, a maximum emergency conductor temperature of 105°C, and short circuit conductor temperature of 250°C.

2.3 The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

3.0 CABLE DETAILS

3.1 CONDUCTOR

The conductor shall be stranded copper filled with a compound to prevent moisture propagation. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.2 CONDUCTOR SCREEN

Conductor screen shall be an extruded layer of semi-conducting Polyethylene compatible with the insulation material.

3.3 INSULATION

The insulation shall be "Tree-Retardant" Cross-Linked Polyethylene (TR-XLPE).

3.4 INSULATION SHIELD

Insulation shield shall be a smooth extruded layer of semi-conducting Polyethylene compatible with the insulation material. It should adhere firmly to the insulation.

3.5 SWELLING TAPES

A layer of water absorbing swelling tapes shall be applied over the insulation shield.

3.6 LEAD SHEATH

A lead sheath of suitable thickness shall be extruded over the cable. The lead to be used shall be fatigue resistant ½C alloy.

3.7 POLYETHYLENE JACKET (SHEATH)

An outer Medium or High Density Polyethylene jacket shall be extruded over the cable metallic sheath. A flooding compound could be applied between the lead sheath and the outer jacket.

3.8 COPPER WIRE ARMOUR

Hard drawn copper wires shall be applied as armour. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the armour wires to provide a cushion between them and the underlying cable core.

The copper armour wires will also act as grounding, and thus they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.9 SERVING

Serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; clause 3.10.

3.10 PHASE IDENTIFICATION

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables, respectively. The reserve cable shall have a stripe of a different color. ORANGE or RED could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimeter intervals.

4.0 TESTING

4.1 The cables shall be tested in accordance with the reference standards specified in section 6.0 below.

Certified test reports shall be submitted for acceptance prior to any shipment of cables.

4.2 Witnessing the Tests

Newfoundland Power and its agents reserve the right to witness any of the above mentioned tests. A prior notice will be given.

5.0 PACKAGING

Each completed submarine cable shall be shipped to site either on a steel reel or in a steel basket to be transferred to the installation ship or barge.

The following information shall be posted on each reel or basket:

- Name of the supplier
- Size of conductor (KCM or mm2)
- Rated operating voltage (kV)
- Total length of the cable in meters
- The gross weight of the reel or the basket
- The year of manufacture
- Newfoundland Power Order Number

6.0 REFERENCE SPECIFICATIONS

AEIC CS8-07; SPECIFICATION FOR EXTRUDED DIELECTRIC, SHIELDED POWER CABLES RATED 5 THROUGH 46 KV.

ICEA P-32-382; SHORT CIRCUIT CHARACTERISTICS OF INSULATED CABLES

7.0 TECHNICAL QUESTIONNAIRE

The attached technical questionnaire should be completed at the time of bidding. Alternative cable designs would be considered; however, any exceptions from the specification should be explicitly mentioned.

APPENDIX D2

Specification # SMC-3-25

Three Conductor 25 kV, Cross-Linked Polyethylene (XLPE) Insulated Submarine Cable

SPECIFICATION NO. SMC-3-25-XLPE

THREE CONDUCTOR 25 KV, CROSS-LINKED POLYETHYLENE (XLPE) INSULATED SUBMARINE CABLE

1.0 SCOPE

This specification covers three conductor, 25 kV, Cross-Linked Polyethylene (XLPE) insulated, shielded, lead covered and copper wire armoured Submarine cable for use on three-phase, 60 Hz nominal 25 kV system with grounded neutral.

2.0 GENERAL

2.1 The cable shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

2.2 The nominal system voltage will be 25 kV phase-to-phase on a grounded neutral system. The minimum continuous phase-to-phase voltage shall be 27.5 kV. The basic impulse level (BIL) shall be 150 kV.

2.3 The cable shall be designed to operate satisfactorily for a maximum conductor temperature of 90°C, a maximum emergency conductor temperature of 105°C, and short circuit conductor temperature of 250°C.

2.4 The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

3.0 CABLE DETAILS

The three conductor cable shall be made by assembling three single conductor XLPE insulated and lead sheathed cables as specified in Specification no. SMC-1-25-XLPE.

The assembly should include non-hydroscopic fillers and, if necessary, a bare copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled cables. A band of yellow Polypropylene yarn should be in the outer serving.

4.0 TESTING

The cables shall be tested in accordance with the reference standards specified in section 6.0 below. Certified test reports shall be submitted for acceptance prior to any shipment of cables.

4.1 WITNESSING THE TESTS

Newfoundland Power and its agents reserve the right to witness any of the above mentioned tests. A prior notice will be given.

5.0 PACKAGING

Each completed submarine cable shall be shipped to site either on a steel reel or in a steel basket to be transferred to the installation ship or barge.

The following information shall be posted on each reel or basket:

- Name of the supplier
- Size of conductor (KCM or mm2)
- Rated operating voltage (kV)
- Total length of the cable in meters
- The gross weight of the reel or the basket
- The year of manufacture
- Newfoundland Power Order Number

6.0 REFERENCE SPECIFICATIONS

AEIC CS8-07; SPECIFICATION FOR EXTRUDED DIELECTRIC; SHIELDED POWER CABLES RATED 5 THROUGH 46 KV.

ICEA P-32-382; SHORT CIRCUIT CHARACTERISTICS OF INSULATED CABLES

7.0 TECHNICAL QUESTIONNAIRE

The attached technical questionnaire should be completed at the time of bidding. Alternative cable designs would be considered; however, any exceptions from the specification should be explicitly mentioned.

APPENDIX D3

Specification # SMC-1-25-EPR

Single Conductor 25 kV, Ethylene Polyethylene Rubber (EPR) Insulated Submarine Cable

SPECIFICATION NO. SMC-1-25-EPR

SINGLE CONDUCTOR 25 KV, ETHYLENE PROPYLENE RUBBER (EPR) INSULATED SUBMARINE CABLE

1.0 SCOPE

This specification covers single conductor, 25 kV, Ethylene Propylene Rubber (EPR) Insulate**d**, shielded, Submarine cable with hard drawn copper wire armour for use on three-phase, 60 Hz nominal 25 kV system with grounded neutral.

2.0 GENERAL

2.1 The cable shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

2.2 The nominal system voltage will be 25 kV phase-to-phase on a grounded neutral system. The minimum continuous phase-to-phase voltage shall be 27.5 kV. The basic impulse level (BIL) shall be 150 kV.

2.3 The cable shall be designed to operate satisfactorily for a maximum conductor temperature of 90°C, a maximum emergency conductor temperature of 105°C, and short circuit conductor temperature of 250°C.

2.4 The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

3.0 CABLE DETAILS

3.1 CONDUCTOR

The conductor shall be stranded tinned copper wires. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.2 CONDUCTOR SCREEN

Conductor screen shall be an extruded layer of semi-conducting thermosetting material compatible with the insulation material.

3.3 INSULATION

The insulation shall be an extruded layer of Ethylene Propylene Rubber (EPR).

3.4 INSULATION NON-METALLIC SHIELD

The insulation shield shall be a smooth extruded layer of semi-conducting thermosetting material compatible with the EPR insulation material. It should adhere firmly to the insulation.

3.5 INSULATION METALLIC SHIELD

The insulation metallic shield shall consist of a corrosion resistant material. The owner's in-service cables are single conductor with copper tape shield. The copper tapes are corroding due to water ingress. The new cable design must address this problem.

A layer of cushioning material shall be applied over the insulation shield prior to the application of the armour wires.

3.6 COPPER WIRE ARMOUR

Hard drawn copper wires shall be applied as armour. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the armour wires to provide a cushion between them and the underlying cable core as mentioned in 3.5 above. The copper armour wires will also act as "grounding" and thus, they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.7 SERVING

The serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; clause 3.8.

3.8 PHASE IDENTIFICATION

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables respectively. The reserve cable shall have a stripe of a different color. ORANGE or RED could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimeter intervals.

4.0 TESTING

4.1 The cables shall be tested in accordance with the reference standards specified in section 6.0 below.

Certified test reports shall be submitted for acceptance prior to any shipment of cables.

4.2 Witnessing the tests

Newfoundland Power and its agents reserve the right to witness any of the above mentioned tests. A prior notice will be given.

5.0 PACKAGING

Each completed submarine cable shall be shipped to site either on a steel reel or in a steel basket to be transferred to the installation ship or barge.

The following information shall be posted on each reel or basket:

- Name of the supplier
- Size of conductor (KCM or mm2)
- Rated operating voltage (kV)
- Total length of the cable in meters
- The gross weight of the reel or the basket
- The year of manufacture
- Newfoundland Power Order Number

6.0 REFERENCE SPECIFICATIONS

AEIC CS8-07; SPECIFICATION FOR EXTRUDED DIELECTRIC; SHIELDED POWER CABLES RATED 5 THROUGH 46 KV.

ICEA P-32-382; SHORT CIRCUIT CHARACTERISTICS OF INSULATED CABLES

7.0 TECHNICAL QUESTIONNAIRE

The attached technical questionnaire should be completed at the time of bidding. Alternative cable designs would be considered; however, any exceptions from the specification should be explicitly mentioned.

APPENDIX D4

Specification # SMC-3-25-EPR

Three Conductor 25 kV, Ethylene Propylene Rubber (EPR) Insulated Submarine Cable

SPECIFICATION NO. SMC-3-25-EPR

THREE CONDUCTOR 25 KV, ETHYLENE PROPYLENE RUBBER (EPR) INSULATED SUBMARINE CABLE

1.0 SCOPE

This specification covers three conductor, 25 kV, Ethylene Propylene Rubber (EPR) insulated, shielded and armoured Submarine cable for use on three-phase, 60 Hz nominal 25 kV system with grounded neutral.

2.0 GENERAL

2.1 The cable shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

2.2 The nominal system voltage will be 25 kV phase-to-phase on a grounded neutral system. The minimum continuous phase-to-phase voltage shall be 27.5 kV. The basic impulse level (BIL) shall be 150 kV.

2.3 The cable shall be designed to operate satisfactorily for a maximum conductor temperature of 90°C, a maximum emergency conductor temperature of 105°C, and short circuit conductor temperature of 250°C.

2.4 The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

3.0 CABLE DETAILS

The three conductor cable shall be made by assembling three single conductor EPR insulated cables as specified in Specification no. SMC-1-25-EPR.

The assembly should include non-hydroscopic fillers and if necessary, a bare tinned copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled insulated cables.

4.0 TESTING

The cables shall be tested in accordance with the reference standards specified in section 6.0. Certified test reports shall be submitted for acceptance prior to any shipment of cables.

4.1 WITNESSING THE TESTS

Newfoundland Power and its agents reserve the right to witness any of the above mentioned tests. A prior notice will be given.

5.0 PACKAGING

Each completed submarine cable shall be shipped to site either on a steel reel or in a steel basket to be transferred to the installation ship or barge.

The following information shall be posted on each reel or basket:

- Name of the supplier
- Size of conductors (KCM or mm2)
- Rated operating voltage (kV)
- Total length of the cable in meters
- The gross weight of the reel or the basket
- The year of manufacture
- Newfoundland Power Order Number

6.0 REFERENCE SPECIFICATIONS

AEIC CS8-07; SPECIFICATION FOR EXTRUDED DIELECTRIC; SHIELDED POWER CABLES RATED 5 THROUGH 46 KV.

ICEA P-32-382; SHORT CIRCUIT CHARACTERISTICS OF INSULATED CABLES

7.0 TECHNICAL QUESTIONNAIRE

The attached technical questionnaire should be completed at the time of bidding. Alternative cable designs would be considered. However, any exceptions from the specification should be explicitly mentioned.

APPENDIX E

Recommended Marine Survey Program

APPENDIX E – Recommended Marine Survey Program

It is recommended that bathymetric, seismic and side scan sonar surveys be conducted along each of the proposed cable routes. The following information shall be gathered:

1) Bottom Profiles – along each of the proposed cable routes as located on Drawing 0003. The routes, four in total, are approximately 100 metres apart. The profiles shall be tied into the co-ordinate system using a suitable GPS positioning system.

2) Side-scan sonar - along each of the four proposed crossing routes. The primary function of the side-scan sonar will be to identify bottom features and determine the locations of a number of old abandoned cables in the crossing area. At four locations to be selected along the corridor, side-scan sonar shall be run perpendicular to the routing of the existing cables for a distance of approximately 500 metres. The purpose of this will be to identify the locations of the existing operating cables.

3) Sub-bottom Profiles – along each of the four proposed cable routes.

4) Visual diving survey – complete with colour still and video photography at each of the proposed landing sites. The purpose of the diving survey of the proposed landfall sites will be to identify any characteristics of the terrain which may offer advantages for the protection of the cables in the foreshore areas.

The bottom and sub-bottom profiles and side scan sonar shall be gathered simultaneously, where appropriate, and shall be plotted by reference to a suitable GPS system. All data will be interpreted and provided in a format ready for immediate use by the engineering team.

Although it is intended that only the information outlined above be collected, sufficient time shall be available to supplement that data if further information is required.

It is proposed that the following will be supplied as a minimum by the underwater survey contractor:

Equipment

1) Vessel – 42 foot Cape Island Type vessel or equivalent
2) Survey Fathometer
3) Side-Scan Sonar Array
4) Sub-bottom Profiler
5) GPS Positioning System
6) Surface Air diving Spread – bottles, umbilicals, hats, compressor, etc.
7) U/W TV System – camera, light cable, monitor, video recorder.

Personnel

1) Vessel Captain
2) Safety Supervisor
3) Electronics Technician/Operator
4) Four Man Diving Team
5) Survey Assistant

APPENDIX F

Federal/Provincial Environmental Responses

From: McDonald,Derek [CEAA] [Derek.McDonald@ceaa-acee.gc.ca]
Sent: May 3, 2013 2:44 PM
To: Peach, Andrew
subject: RE: NL Power Bell Island Project

Hello Andrew,

The Agency has reviewed the information you provided with respect to the NL Power Bell Island
Project. The information was reviewed in light of the schedule to the Regulations Designating Physical
Activities under the canadian Environmental Assessment Act, 2012 (CEAA 2012). The schedule
describes activities that constitute a "designated project" as defined in CEAA 2012.

Based on the information provided, the Agency has concluded that the proposed activity is not a
designated project. consequently, there is no requirement to submit a project description pursuant to
CEAA 2012.

In your project summary, you noted the potential need for regulatory approvals from Fisheries and
oceans canada and Transport canada. If these are required, your project may be subject to CEAA 2012
requirements specified in sections 66 to 72 of the Act. Those sections apply to physical activities that
are not designated projects, but take place on federal lands and require a federal authority to exercise
a power, duty or function in order to proceed. You will need to consult with relevant federal
authorities to determine if these provisions will apply to the NL Bell Island Project; the Agency has no
role in the application of that portion of CEAA 2012. I also recommend that you contact Environment
canada to discuss the potential need for a Disposal at sea Permit under the canadian Environmental
Protection Act, 1999, as may be associated with various techniques for cable burial.

I trust this is helpful. Please contact me if you have further questions.

Derek

Derek McDonald, P.Eng.
Project Manager | Gestionnaire de projets
canadian Environmental Assessment Agency- Atlantic Region Agence canadienne d'evaluation
environnementale- region de l'Atlantique
suite 200, 1801 Hollis Street | 1801, rue Hollis, bureau 200 Halifax, NS | Halifax, N-E B3N 3J4
derek.mcdonald@ceaa-acee.gc.ca
902.426.9458

Newf<;n/ridland
Labrador

Government of Newfoundland and Labrador
Department of Environment and Conservation

File Ref No. *200.18.0099:0151*
Your File No. 512233

May 15, 2013

Mr. Albert Peach
SNC-Lavalin
1133 Topsail Road
Mount Pearl, NL
A1N 5G2

For: Submarine Power Cable Replacement
At: Broad Cove to Bell Island
From: Newfoundland Power

Dear Mr. Peach :

This application was referred to the Environmental Assessment Division and it has been determined that registration is NOT required under Section 47 of the Environmental Protection Act, SNL 2002, cE-14.2.

Registration is not required to upgrade and replace the submarine power cable sytem (Broad Cove 02 Distribution Feeder) along the existing right-of-way/cable installation corridor for Bell Island.

Please be aware that this Department must be notified of any significant changes to the undertaking. All proponents are required to comply with all relevant legislation including permits and approvals from this Department and any other municipal, provincial or federal regulatory authorities.

If you have any questions regarding this matter please contact Paul Carter at (709) 729-0188, toll free at 1-800-563-6181 or email pcarter@gov.nl.ca.

Sincerely,

Bas Cleary
Director
Environmental Assessment Division

APPENDIX G

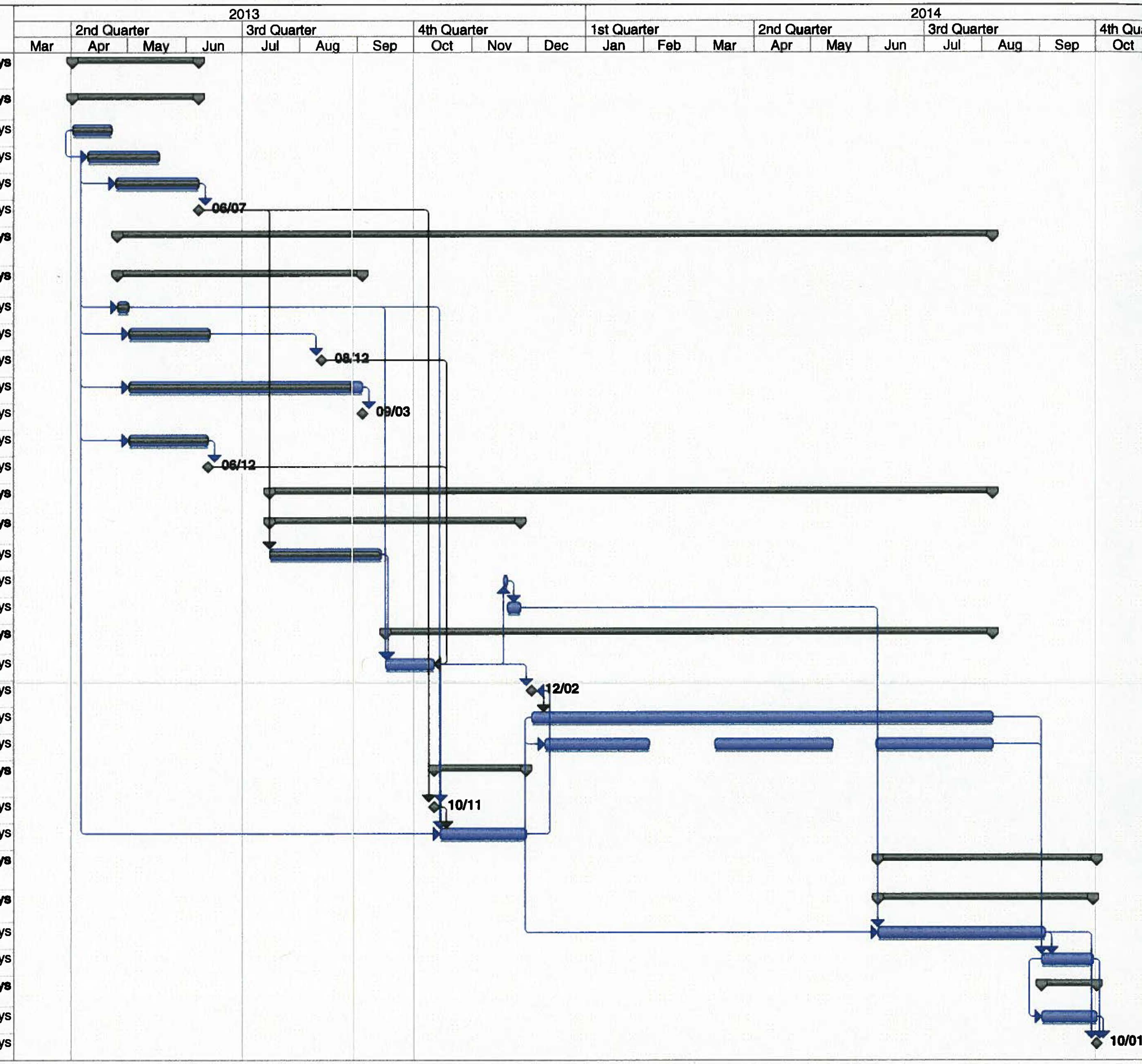
Preliminary Project Schedule

SNC·LAVALIN
BAE-Newplan

Newfoundland Power Inc
Bell Island Submarine Cable System

512233
Aug 2013 Update
Rev 2

ID	Task Name	Start	Finish	Duration
1	***Phase 1 - Preliminary Studies***	**'13 Apr 02**	**'13 Jun 07**	**49 days**
2	**Phase I - Cable System Option Evaluation & Selection**	**'13 Apr 02**	**'13 Jun 07**	**49 days**
3	Preliminary Cable Design	'13 Apr 02	'13 Apr 22	15 days
4	Prep Cable System Project Costs inc Cable Procur Costs & Lead Times	'13 Apr 10	'13 May 17	28 days
5	Prepare Report on System Options	'13 Apr 25	'13 Jun 07	32 days
6	Complete Preliminary Engineering Design Work	'13 Jun 07	'13 Jun 07	0 days
7	***Phase 2***	**'13 Apr 26**	**'14 Aug 06**	**334 days**
8	**Major Permits & Approvals**	**'13 Apr 26**	**'13 Sep 03**	**93 days**
9	Prepare & Submit Project Description for EA Registration Clarification	'13 Apr 26	'13 May 01	4 days
10	DFO - Request for Project Review	'13 May 02	'13 Jun 13	31 days
11	DFO - Letter of Advice Issued	'13 Aug 12	'13 Aug 12	0 days
12	Transport Canada - Nav Waters Request for Work Approval	'13 May 02	'13 Sep 03	89 days
13	Transport Canada - Approval Received	'13 Sep 03	'13 Sep 03	0 days
14	DOEC - Alteration to a Body of Water - Schedule H	'13 May 02	'13 Jun 12	30 days
15	DOEC - Approval Received	'13 Jun 12	'13 Jun 12	0 days
16	***Design Package***	**'13 Jul 16**	**'14 Aug 06**	**277 days**
17	**Detailed Design & Technical Direction in Cable Procur**	**'13 Jul 16**	**'13 Nov 26**	**96 days**
18	Finalize Cable Specs, Detail Design Drawings & Tender Documents	'13 Jul 16	'13 Sep 13	44 days
19	Risk Assessment Workshop	'13 Nov 18	'13 Nov 19	2 days
20	Prepare Risk Report	'13 Nov 20	'13 Nov 26	5 days
21	***Cable Procurement***	**'13 Sep 16**	**'14 Aug 06**	**233 days**
22	Cable Supply & Install Tender & Evaluation	'13 Sep 16	'13 Oct 11	20 days
23	Tender Award	'13 Dec 02	'13 Dec 02	0 days
24	Cable Fabrication & Delivery	'13 Dec 03	'14 Aug 06	177 days
25	Cable Fabrication QC Surveillance	'13 Dec 10	'14 Aug 06	130 days
26	***Regulatory Approvals***	**'13 Oct 11**	**'13 Nov 29**	**35 days**
27	Application to NL Public Utilites Commission	'13 Oct 11	'13 Oct 11	0 days
28	NL Public Utilities Commission Review & Approval	'13 Oct 15	'13 Nov 29	34 days
29	***Phase 3***	**'14 Jun 06**	**'14 Oct 01**	**84 days**
30	***Installation***	**'14 Jun 06**	**'14 Sep 29**	**82 days**
31	Construct / Enhancement of Onshore Structures	'14 Jun 06	'14 Sep 03	64 days
32	Install New Cable & Commissioning	'14 Sep 02	'14 Sep 29	20 days
33	**Installation & Commissioning Support**	**'14 Sep 02**	**'14 Oct 01**	**22 days**
34	Technical Direction During On-Site Installation & Commissioning	'14 Sep 02	'14 Oct 01	22 days
35	Project Complete	'14 Oct 01	'14 Oct 01	0 days



Project: 512233 Bell Island Submarine
Date: '13 Aug 29

Task	Split	Milestone	Project Summary
Baseline	Progress	Summary	External Tasks
External Milestone	Deadline		


SNC·LAVALIN
1133 Topsail Road
Mount Pearl, NL A1N 5G2
709-368-0118 - 709-368-5410

NEWFOUNDLAND POWER
A FORTIS COMPANY

55 Kenmount Road
P.O. Box 8910
St. John's, NL
A1B 3P6
Business: (709) 737-5600
Facsimile: (709) 737-5817
www.newfoundlandpower.com

2013/10/28

Request for Proposal (RFP): Supply and Installation of Bell Island Submarine Cable System
RFP Number: 13-059

Dear Proponent:

As follow up to the termination of Tender #13-047 for the above noted Project we are now reissuing this Project as a Request For Proposal (RFP) for your consideration. Please review the document in detail prior to submitting a response.

As part of issuing this Request for Proposal (RFP) we have initiated changes to the Scope of Work and the provision of additional information which we have summarized below:

Summary of Changes

1. See General Technical Requirement of the Technical Specifications, Section 3.1.
2. Changes to length of submarine trenching and supply and installation of articulated pipe protection – See Schedule of Prices.
3. Changes to Installation Requirements – See Technical Specifications, Section 2.10.
4. Clarification to permitting – See Technical Specifications, Section 1.3 and Section 5.

To support the cable installation, a list of local subcontractors is as follows:

- CIVIL CONTRACTORS:
  - Pennecon Energy Ltd. (www.pennecon.com)
  - Modern Paving Ltd. (www.modernpaving.ca)
  - Newfound Construction Ltd. (www.newfound.ca)
  - Trident Construction Ltd. (www.tridentconstruction.ca)

- ELECTRICAL CONTRACTORS:
  - Pennecon Energy Ltd. (www.pennecon.com)
  - Black & McDonald Ltd. (www.blackandmcdonald.com)
  - G.J. Cahill and Company (1979) Ltd. (www.gjcahill.com)
  - JSM Electrical Ltd. (www.jsmelectrical.ca)

- SUBMARINE SURVEY CONTRACTORS:
  - DOF Subsea. (www.dof.no)
  - Fugro GeoServices Ltd. (www.fugro.ca)

- DIVING CONTRACTORS:
  - SeaForce Diving Ltd. (www.seaforcediving.com)
  - Afonso Diving Ltd. (www.afonsogroup.com/diving.php)

- MARINE CONTRACTORS:
  - Davis Shipping Ltd. (www.davisshippinglimited.com)
  - McKeil Marine Ltd. (www.mckeil.com)
  - Miller Shipping Ltd. (www.millershipping.ca)
  - Atlantic Towing Ltd. (www.atlantictowing.com)

Newfoundland Power encourages Contractors and Suppliers to submit alternate solutions that would be advantageous to our Company to be presented as an alternate Proposal.

Yours very truly,

Brenda Hynes

Brenda Hynes
Contract Specialist

Request For Proposal (RFP) 13-059

Newfoundland Power Inc.

Supply and Installation of Bell Island Submarine Cable System

Safety is our priority.
Make it yours too!

NEWFOUNDLAND POWER
A FORTIS COMPANY

Newfoundland Power Inc.

Supply and Installation
of
Bell Island Submarine Cable System

Request For Proposal Contents

INSTRUCTIONS TO PROPONENTS

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1. General Nature and Location of the Work

Newfoundland Power Inc. (herein called the "Owner") requests proposals ("Proposals") for the purpose of awarding a **Turn-Key** Contract for the design, manufacture, inspection, delivery, installation and commissioning of a 25kV submarine cable system to service Bell Island, in the Province of Newfoundland and Labrador, Canada. The system will cover a distance of approximately 5.375 kilometres between Broad Cove and Bell Island.

The cable shall be a 25 kV insulated submarine cable system comprised of four (4) single conductor cables OR two (2) three-conductor cables, either of which may be constructed using Tree-Retardant Cross-Linked Polyethylene (TR-XLPE) or Ethylene Propylene Rubber (EPR) insulation. In order to determine exact cable system lengths, a submarine survey will be required prior to the start of cable manufacturing.

The cable system will be installed within the same corridor as the existing in-service cable system. Shoreline and submarine trenching activities will be required, as the cables will be placed inside a common trench at both shores, and protected with an articulated pipe system. Terminating hardware and lightning arrestors will be required to complete the cable installation up to the Owner-supplied termination structures.

The successful completion of the RFP evaluation process will lead to the negotiation of a Contract for the Supply and Installation of Bell Island Submarine Cable System.

2. Submission of Proposals

Proposals will be received up to **2:00:00 p.m. Newfoundland Standard Time** on **November 18, 2013** (Request For Proposal (RFP) Close) and may be submitted electronically or in printed form as follows:

(a) Electronic submissions in Portable Document Format (PDF) shall be submitted by email with the RFP number and name in the subject line, to the following email address:

tenders@newfoundlandpower.com

The Owner cannot guarantee its ability to receive email at all times up to the RFP Close. Proponents submitting Proposals electronically do so at their own risk.

(b) Hardcopy submissions shall be by mail or by courier contained in a sealed envelope clearly marked with the RFP number and name, followed by the name and address of the Proponent, to one of the following addresses:

Mail:

Newfoundland Power Inc.
P.O. Box 8910
St. John's, NL A1B 3P6
Attention: Procurement

Courier:

Newfoundland Power Inc.
50 Duffy Place (Receptionist)
St. John's, NL A1B 4M5
Attention: Procurement

The submission of a Proposal by a recipient of this RFP ("Proponent") shall constitute an agreement by such Proponent to be bound by all of the terms and conditions of this RFP.

Proposals shall be open to acceptance for a period of sixty (60) days following the RFP Close.

Proponents shall be responsible for all costs incurred during the preparation of Proposals and otherwise incurred by the Proponents relating to this RFP and any contract award.

3. RFP Document

This RFP consists of the following ("RFP Document"):

(a) Instructions to Proponents
(b) Proposal Form (including Commercial and General Returnable Schedules)
(c) Agreement
(d) Definitions
(e) General Conditions
(f) Supplementary Conditions
(g) Certificate of Insurance
(h) Drawings
(i) Specifications
(j) Any Addenda to the above

4. Contract Document

Subject to Section 14 – Contract Award of these Instructions to Proponents, the Contract that is entered into between the Owner and the successful Proponent(s) shall consist of the following sections of the RFP Document

(a) Agreement
(b) Definitions
(c) General Conditions
(d) Supplementary Conditions
(e) Certificate of Insurance
(f) Drawings
(g) Specifications
(h) Schedule A- Commercial and General Returnable Schedules and;
(i) Any Addenda to the above

The Agreement included in the RFP Document is for the information of Proponents and should not be completed at the time of Proposal submission.

5. Completion of Proposal Form

Proponents shall submit Proposals in the format set out in the Proposal Form and completed as follows:

(a) Proponents should note that there are thirteen (13) Commercial and General Returnable Schedules attached to the Proposal Form that are considered part of the Proposal Form.

(b) The Proposal Form must be completed in its entirety and all information provided shall be typed or printed so as to be clearly legible.

(c) In completing the Schedule of Prices:

- A price shall be entered against each item listed unless the price of that item has been included in the price of another item listed.
- All prices shall be quoted in Canadian Dollars. Harmonized Sales Tax (HST) shall be quoted separately. (if applicable)

(d) Proponents may submit Proposals for either Option 1 or Option 2, or for both Options. In addition to submitting Proposals for either or both of the specified Options, the Proponent may also submit an alternate Proposal providing an equivalent solution.

(e) Proponents shall provide any other information they feel is pertinent to this RFP.

(f) Where spaces are provided on the Proposal Form for the Proponent's signature, the Proposal Form shall be signed by a duly authorized representative of the Proponent.

6. Requests for Clarification of RFP

Proponents shall submit requests for clarification regarding this RFP in writing by **3:00 p.m. Newfoundland Standard Time on November 12, 2013**. Requests for clarification shall be submitted to the email address indicated in Section 2 – Submission of Proposals of these Instructions to Proponents. (tenders@newfoundlandpower.com) The Owner reserves the right not to respond to requests for clarification submitted after the deadline indicated above.

The Owner shall determine the appropriateness of supplying a response to a request for clarification given to one Proponent, to other Proponents.

7. Familiarity with the Work and Work Site

Before submitting a Proposal, Proponents **are advised to** carefully examine the RFP Document and fully inform themselves of any existing conditions and limitations of the Work Site.

A Site visit can be scheduled upon request.

8. Amendments to the RFP

The Owner may amend the RFP Document by issuing an Addendum. Where an Addendum is issued less than three (3) days before the RFP Close, the RFP Close shall be extended to provide a minimum of three (3) days between the issuance of the Addendum and the RFP Close.

9. Amendment of Proposals

Proponents may submit a revised Proposal up to the RFP Close by following the instructions outlined in Clause 2, Submission of Proposals.

10. Evaluation of Proposals

The Owner will evaluate Proposals based on a number of criteria including but not limited to price, delivery, warranty, methodology, proposed personnel and subcontractors, compliance with specifications, and Proponents demonstrated ability to perform the Work.

11. Requests for Clarification of Proposals

The Owner reserves the right to request clarification of any Proposal submitted in response to this RFP. Proponents shall reply to any such requests within forty-eight (48) hours of their receipt. All replies shall be submitted in writing in electronic or printed from at the applicable address indicated in Section 2 – Submission of Proposals of these Instructions to Proponents. The Owner may refuse to consider replies received more than forty eight (48) hours after the receipt of requests for clarification or not received in writing.

12. Preparation, Acceptance and Rejection of Proposals

Proponents are requested to note the following:

(a) The Owner reserves the right to withdraw or modify this RFP at any time or terminate this RFP process and negotiate directly with any one or more Proponents or other parties;

(b) Any costs incurred by Proponents in preparing a Proposal, and all work and/or travel expenses, presentations, demonstrations, communications, and materials provided by Proponents to the Owner related to this RFP, are the sole responsibility of the Proponents and shall be at no cost to the Owner;

(c) All Proposals and supporting material submitted in response to this RFP shall become the property of the Owner;

(d) The lowest Proposal will not necessarily be accepted.

(e) The Owner reserves the right to accept any Proposal, in whole or in part and to accept any Proposal it considers advantageous.

(f) The Owner reserves the right to reject any and all Proposals;

(g) The successful Proponent will be notified in writing of the acceptance of their Proposal;

(h) The Owner reserves the right to use any or all concepts presented in any Proposal, whether the Proposal is accepted or rejected;

13. Project Approval

The Project is contingent upon the regulatory approval of the Board of Commissioners of Public Utilities. The Owner will apply for regulatory approval of the Project as soon as practicable following the RFP Close. The purpose of the sixty (60) day RFP validity period is to facilitate the required regulatory approval process.

14. Questions and Inquiries

Questions and inquiries regarding this RFP shall be communicated to the Owner one week prior to the RFP Close in writing at one of the addresses indicated in Clause 2, Submission of Proposals.

The Owner will determine the appropriateness of supplying a response given to one Proponent, to other Proponents.

15. Contract Award

The successful Proponent will be notified in writing of the acceptance of his Proposal and will be required to execute the Contract within seven (7) days of written request of the Owner.

16. Confidentiality of Information

Proprietary information identified as such by Proponents will be reasonably safeguarded from copy. However, the Owner accepts no responsibility for exposure of proprietary information.

This RFP is a confidential document and will remain the property of the Owner while in the hands of Proponents.

The contents of this RFP are to be used only by Proponent's personnel or third party Subcontractor(s) working on the development of the Proposal. The contents of this document are not to be disclosed to any other third parties.

17. Limitation of Liability

By submitting a Proposal in response to this RFP, the Proponent agrees that it will not claim damages, costs, or expenses, for whatever reason, relating in any way whatsoever to this RFP and any resulting process, and waives any and all claims against the Owner whatsoever, whether for costs, damages or expenses incurred by the Proponent in preparing a Proposal or participating in the RFP.

18. Governing Law

This RFP shall be governed by, subject to and interpreted in accordance with the laws of the Province of Newfoundland and Labrador and the laws of Canada applicable therein.

PROPOSAL FORM

NEWFOUNDLAND POWER INC.

PROPOSAL FORM

RFP Name: Supply and Installation of Bell Island Submarine Cable System

RFP Number: 13-059

Submitted by:

Proponent's Legal Name	
Address	
City, Province	
Postal Code	
Contact Name	
Phone Number	
Email Address	

NEWFOUNDLAND POWER
A FORTIS COMPANY

1. After careful consideration of the RFP Document, the Proponent hereby presents its Proposal to perform the Work specified in the RFP Document and the Schedule of Prices of this Proposal for:

   (a) **Option 1 – Four - Single Conductor Cable System**

   Total Estimated Contract Price (including HST)
   of $________________ (Canadian Dollars) (in words__________________________
   ____

   (b) Option 2 – Two - Three Conductor Cable System

   Total Estimated Contract Price (including HST)
   of $________________ (Canadian Dollars) (in words__________________________

2. The Proponent acknowledges receipt of the following addenda:

   Addendum No.______________________________

3. The Proponent agrees that this Proposal is open for consideration for sixty (60) days following the date set as the deadline for receipt of Proposals. If within that time this RFP is accepted by the Owner, the Proponent shall within (7) days of written request by the Owner:

   (a) execute an Agreement, and

   (b) furnish the security requirements as identified in Clause GC22 – Bonds.

4. If a Proponent's Proposal is accepted, in whole or in part, then the Proponent will be required to sign a Contract and comply with the terms and conditions stated within.

   The proposed Contract with the Owner may include but not be limited to a requirement for the following documentation:

   - An Insurance Certificate (preferably the Newfoundland Power Inc. Insurance Certificate included with this RFP Document) - completed by the Proponent's insurance broker or a letter from the Proponents insurance broker stating that the Proponent is eligible to obtain the required insurance coverage.

5. The Proponent acknowledges that this Proposal has been submitted without any connection, comparison, or arrangements with or knowledge of any other person or persons Proposal on this RFP and has been prepared, in all aspects, without collusion.

Signed by or on behalf of the Proponent at ____________________ in the ______________of _________________,____________ this ________ day of ________________, 2013 by:

Signatory Please Print	Witness Please Print
Signature	Signature
Signatory Please Print	Witness Please Print
Signature	Signature

COMMERCIAL AND GENERAL

RETURNABLE SCHEDULES

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1. SCHEDULE OF PRICES (Pages 1 to 7 inclusive)

<u>Explanatory Notes:</u>

1. It is the intention to use the Schedule of Prices contained herein, in the adjudication of the Proposals. Failure to submit this schedule in full during the RFP stage may disqualify this Proposal.

2. The Schedule of Prices will be used to assist both parties in administering and agreeing any changes/variation, which may arise during the course of the Contract.

3. The Schedule of Prices will be used to calculate the value of work completed during the evaluation of interim/final payments.

4. It remains the Contractor's responsibility to include in the Schedule of Prices for the full value of work as required by the specifications. Should any work that the Contractor deems to form part of this RFP not be detailed in the Schedule of Prices provided, then the value of the work must be separately defined and priced in the Proponent's Proposal.

Part A - Cable Manufacture and Delivery to Site

Item 1: Cable Manufacture Mobilization

Mobilization for cable manufacture shall be defined as the loading, transportation, unloading, and complete set-up of all plant, materials and equipment necessary to complete the work associated with the manufacture of the cables.

The price for this item shall not exceed 25% of the total price for Item 2 of the Schedule of Prices, "Manufacture of Conductor Cables".

The Contractor is advised that payment for 50% of the price for this item will be made within 30 days of execution of Contract and payment for the remaining 50% will be made at the start of manufacture of the cables.

Payment at the lump sum price shall be compensation in full for all labour, supplies, materials and equipment required to mobilize for the cable manufacture.

Item 2: Manufacture of Conductor Cables

Manufacture of the conductor cables shall be defined as all labour, materials, plant and equipment required to manufacture the cables and the completion of all testing defined in the Specifications Section of this RFP for the work.

Measurement for payment shall be based upon the actual metres of cable installed as determined by the Marine Survey and agreed upon by the Owner. The actual length of cable is subject to the final agreed to spacing and location for the cable installation.

The contractor is advised that payment for 80% of the price for this item shall be made after the manufacture of the cables is complete and after successful completion of all testing. The remaining 20% payment for this item will be made after delivery of the cables to an eastern Canadian port subject to the cables being free of any damages caused by the transport and off-loading of the cables.

Payment at the unit price shall be compensation in full for all labour, materials, plant and equipment required to manufacture the cables, including all testing defined in the specifications for the work.

Item 3: Delivery of Cables to Canadian Port

Delivery of Cables to Canadian Port shall be defined as all labour, materials and equipment use required to transport the cables from the suppliers plant to an eastern Canadian port, including all freight and import duties and off- loading onto the vessel to be deployed for the installation of the cables.

The Contractor is advised that payment for this item shall be made after the cables are loaded onto the vessel to be deployed for the installation of the cables.

Payment at the lump sum price shall be compensation in full for all labour materials and equipment use required to deliver the cables to an eastern Canadian port including all freight charges and import duties.

Item 4: Supply Spare Cable

Supply spare cable shall be defined as the manufacture, transport, freight and import duties associated with the delivery of 500 metres of spare cable, identical to the installed cable, on a reel suitable for the purpose. The spare cable shall be delivered to Newfoundland Power's premises at 50 Duffy Place, St. John's, NL A1B 4M5 Canada

The Contractor is advised payment for this item will be made after the cable has been delivered in good condition and accepted at Newfoundland Power's premises.

Payment at the unit price shall be compensation in full for the manufacture, testing, transport, freight and import duties associated with the delivery of the cable to Newfoundland Power's premises.

Items 5 & 6: Supply Spare Termination Kits and Spare Splice Kits

Supply spare Termination Kits and spare Splice Kits shall be defined as the supply and delivery of the kits to Newfoundland Power's premises at 50 Duffy Place, St. John's, NL A1B 4M5 Canada. The Termination kits shall be identical to the termination kits to be installed on the cables and the splice kits shall be suitable for splicing of the cable, if it becomes necessary at some future point.

Part B - Cable System installation

Item 1: Mobilization/Demobilization

Mobilization for cable installation shall be defined as the loading, transportation, unloading, and complete set-up of all plant, materials and equipment necessary to complete the installation of the cable system

Demobilization shall be defined as the removal of all plant, materials and equipment deployed to complete the installation of the cable system.

The price for this item shall not exceed 25% of the total price for Item 3 of the Schedule of Prices, “Cable Installation”.

The contractor is advised that 60% of the price for this item shall be paid as Mobilization when the installation vessel is dispatched to site and the remaining 40% will be paid as Demobilization when the installation of the cable system is completed.

Payment at the lump sum price shall be compensation in full for all labour, supplies, materials and equipment required to mobilize for the cable installation and demobilize from site.

Item 2: Marine Survey

The marine survey shall be defined as the supply of all labour, materials, plant and equipment, necessary to complete the marine survey and provide Newfoundland Power with the data and drawings as detailed in the technical specifications.

The Contractor is advised payment for this item will be made after the marine survey is completed and the data and drawings are delivered and acceptable to Newfoundland Power.

Payment at the lump sum price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to complete the marine survey.

Item 3: Cable Installation

Cable installation shall be defined as the complete installation and commissioning of the cable system and includes all labour, materials, plant and equipment necessary for the installation and commissioning of the cables.

The Contractor is advised payment for this item will be made after the cable system is installed, commissioned and accepted by Newfoundland Power.

Payment at the lump sum price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to complete the installation and commissioning of the cable system, including submission of all installation records such as as-built drawings and video record. Payment will not be made until the cables are backfilled as per Part B. Item 4 and Item 5.

Item 4: Shoreline Trenching and Backfilling

Shoreline trenching and backfilling shall be defined as the trenching, backfilling and restoration work required, to install the cable system from the new termination structures to the low low-water mark at each terminus of the cables and includes all labour, materials, plant and equipment necessary for the trenching and backfilling of the cables.

The Contractor is advised payment for this item shall be for the actual lineal metres of trenching and will be made after the trenching, backfilling and restoration work is completed to the satisfaction of Newfoundland Power.

Payment at the unit price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to complete the trenching, backfilling and restoration.

Item 5: Submarine Trenching and Backfilling (Bell Island)

Submarine trenching and backfilling shall be defined as the trenching, backfilling and restoration work required, to install the cable system from the low low-water mark on Bell Island to a depth of 10 metres (at low tide) and includes all labour, materials, plant and equipment necessary for the trenching and backfilling of the cables.

The Contractor is advised payment for this item shall be for the actual lineal metres of trenching and will be made after the trenching, backfilling and restoration work is completed to the satisfaction of Newfoundland Power.

Payment at the unit price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to complete the trenching, backfilling and restoration.

Item 6: Supply and Install Termination Kits (including Lightning Arrestors)

Supply and install termination kits shall be defined as the supply and installation of terminations, lightning arrestors and any associated accessories necessary to connect the cable system to Newfoundland Power’s overhead cable at the termination structures and includes all labour, materials, plant and equipment necessary to install the terminations.

The Contractor is advised payment for this item shall be for each termination and will be made after the cable system is completed and accepted by Newfoundland Power.

Payment at the unit price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to supply and install the terminations and associated accessories

Item 7: Supply and Install Articulated Pipe Protection

Supply and Install Articulated Pipe Protection shall be defined as the supply and installation of ductile iron articulated pipe and accessories, as protection for the cables, from the high high-water mark out to a depth of approximately 10 metres and includes all labour, materials, plant and equipment necessary to supply and install the articulated pipe and associated accessories.

The Contractor is advised payment for this item shall be for the actual lineal metres of articulated pipe supplied and installed and will be made after the installation is complete.

Payment at the unit price for this item shall be compensation in full for all labour, materials, plant and equipment necessary to supply and install the articulated pipe and associated accessories.

Schedule of Prices
OPTION 1
Bell Island - Submarine Cable System
Single - Conductor Cables

Item No.	Description	Unit	Quantity	Unit Price	Total
Part A - Cable Manufacture and Delivery to Site					
1	Cable Manufacture Mobilization	L.S.	1		
2	Manufacture of Four (4) Single Conductor Cables	lm	21500		
3	Delivery of Cables to Canadian Port	L.S.	1		
4	Supply Spare Cable	lm	500		
5	Supply Spare Terminations Kits	Each	4		
6	Supply Spare Splice Kits	Each	4		
Part B - Cable System Installation					
1	Mobilization/Demobilization	L.S.	1		
2	Marine Survey	L.S.	1		
3	Cable Installation	L.S.	1		
4	Shoreline Trenching/Backfilling	lm	70		
5	Submarine Trenching/Backfilling (Bell Island)	lm	125		
6	Supply and Install Termination Kits (including Lightning Arrestors)	Each	8		
7	Supply and Install Articulated Pipe Protection	lm	1000		
				Subtotal	
				H.S.T. (13% of Contract Price)	
				Total Estimated Contract Price	

Schedule of Prices
OPTION 2
Bell Island - Submarine Cable System
Three - Conductor Cables

Item No.	Description	Unit	Quantity	Unit Price	Total
Part A - Cable Manufacture and Delivery to Site					
1	Cable Manufacture Moblization	L.S.	1		
2	Manufacture of Two (2) Three - Conductor Cables	lm	10750		
3	Delivery of Cables to Canadian Port	L.S.	1		
4	Supply Spare Cable	lm	500		
5	Supply Spare Terminations Kits	Each	6		
6	Supply Spare Splice Kits	Each	4		
Part B - Cable System Installation					
1	Mobilization/Demobilization	L.S.	1		
2	Marine Survey	L.S.	1		
3	Cable Installation	L.S.	1		
4	Shoreline Trenching/Backfilling	lm	70		
5	Submarine Trenching/Backfilling (Bell Island)	lm	125		
6	Supply and Install Termination Kits (including Lightning Arrestors)	Each	12		
7	Supply and Install Articulated Pipe Protection	lm	500		
				Subtotal	
				H.S.T. (13% of Contract Price)	
				Total Estimated Contract Price	

Schedule of Prices (Option 1 and Option 2)

Notes:

1. On a monthly basis, the Owner shall be invoiced in accordance with the Schedule of Prices for Work completed by the Contractor.

2. The unit and lump sum prices in the Schedule of Prices shall be for the Work complete in every respect and must include all incidental or contingent expenses and risks of every kind necessary to complete the Work in accordance with the Contract.

3. The Owner, at its discretion, will inspect the Work completed and confirm field measurements prior to payment of any invoice. Payment for Work may be withheld if defects in materials or workmanship are discovered on inspection. Payment will be made when the Contractor remedies the defects.

4. The quantities listed are to be considered as approximate only and not to be taken as the actual quantities to complete the Work.

6. The Contractor agrees that the quantities shown in the Schedule of Prices are estimates only and that payments will be made for the actual quantities as measured in the completed Work at the unit and lump sum prices proposed by the Contractor in the Schedule of Prices.

7. All prices are to be quoted in Canadian Dollars.

8. Harmonized Sales Tax 13% (HST) shall be quoted separately (if applicable). For tax details refer to the following link:
   http://www.cra-arc.gc.ca/tx/bsnss/tpcs/gst-tps/menu-eng.html

2. SCHEDULE OF LABOUR RATES FOR EXTRA WORK

The Contractor has detailed below all categories of labour he proposes to use in the execution of Extra Work and their respective hourly rates. These rates may be used in the case of extra work which falls outside the current scope of the contract subject to the provision set out in GC11 and GC12 of the General Conditions section of the Contract. The rates shall be the total cost to Newfoundland Power in respect of the extra work carried out by the Contractor and shall include for all Contractor's profits, overheads, establishments, supervision, wages, accommodation, travelling, subsistence and other costs relative to the employment by the Contractor of the categories of labour detailed, and for hand and small tools such as cutting and welding torches, angle grinders, drilling machines, etc., and consumables normal to the trade or labour category.

Category	**Normal Time** CAD($)	**Overtime for hours exceeding ____ hrs / week** CAD($)	**Sunday & Public Holidays** CAD($)	**Standing Time** CAD($)

These rates are fixed and not subject to escalation.

3. SCHEDULE OF CONTRACTOR'S EQUIPMENT FOR EXTRA WORK

Operating Rates

The Contractor has detailed below Contractors' Equipment he proposes to use in the execution of Extra Work and their respective hourly rates. These rates may be used in the case of extra work which falls outside the current scope of the contract. The rates shall be the total cost to Newfoundland Power in respect of extra work carried out by the Contractor and shall include for all the Contractor's overheads, profits, transport to site, establishment on site, removal from site, supervision, hire rates, fuel, oil, maintenance and servicing, associated items such as slings, moille points, etc., test certificates, operator cost (including overtime and Sunday time), accommodation, travelling, subsistence, and other costs relative to the employment by the Contractor of the personnel.

Standing Time Rates

The rates for standing time shall be the all inclusive rates and shall be deemed to cover all costs or charges for overheads, profits, maintenance, consumables, etc., but excluding operators costs which shall be in the event of suspension of the work be paid for at the rates to be inserted in Schedule 2

Description	**Capacity**	**Operating** CAD($)	**Standing** CAD($)

These rates are fixed and not subject to escalation.

4. SCHEDULE OF ESCALATING INDICES

The Contract Price is fixed and not subject to Escalation.

5. CONTRACTOR'S ORGANIZATION

The Contractor's proposed Organization for its Company's Head Office and Site based Supervisory Personnel, who would be involved in the execution of this Contract, is listed as follows.

Please provide resumes of proposed personnel for project execution.

6. CONTRACTOR'S CASH FLOW PREDICTIONS

The Contractor's estimated Cash Flow Predictions (CAD$) are as follows:

Payment Category	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Total Value
Totals									

* Extend no of months as required to match duration of Contractor's Proposal Program

7. SCHEDULE OF CONTRACTOR’S PROPOSED SUBCONTRACTORS AND MAJOR SUPPLIERS

The Contractor is to list the names of Subcontractor’s and / or Major Suppliers proposed to be used on the project.

DESCRIPTION OF WORK	SUBCONTRACTOR OR SUPPLIER	CAD($)	APPROXIMATE VALUE

8. REQUEST FOR PROPOSAL (RFP) PROGRAM

The Owner requires the completion of the cable system not later than November 14, 2014. The Proponent shall plan and schedule his activities to facilitate this date.

Accordingly, the attached schedule provides general information on the Project requirements regarding the planning of the works.

The Proponent must provide a summary of his proposed program in Microsoft Project or equivalent with his Proposal.

The successful Proponent shall submit a detailed Schedule to the Owner's Representative within ten (10) working days after the Contract has been signed.

The program must include as a minimum all the critical requirements, such as long lead items, design engineering, fabrication duration, installation duration, commissioning duration, milestone dates, access requirements, site establishment dates, delivery dates, etc.

9. ALTERATIONS BY PROPONENT

Should the Proponent desire to make any deviations, modifications or alterations to the Conditions of Contract, Specifications, Provisional Bill of Quantities / Schedule of Prices, Drawings etc, or to qualify its Proposal in anyway, it shall be clearly stated hereunder. Alternatively the items can be addressed in the covering letter attached to the Proposal.

No deviations, modifications or alterations to the Conditions of Contract shall be considered unless detailed in this form.

If no deviations, modification or alterations are desired, the Schedule hereunder is to be marked NIL.

Page/Reference/ Clause / Item	**Clause or Item description to be modified**	**Clause or Item Modified or Altered as follows**	**Reason for Modification**

10. INFORMATION QUESTIONNAIRE

The purpose of this Information Questionnaire is to have contractors describe their abilities, experience and competence.

Any additional information may be included in an annex and attached to the Questionnaire.

The Questionnaire must be duly filled out to allow for a complete evaluation of the Proposal.

All information is strictly confidential.

1.0	**GENERAL**

1.1 Name of Company: ______________________________

Street Address: ______________________________

Mailing Address: ______________________________

City: ____________ Prov. /State: ________ Postal/Zip Code: ______

Telephone No.: ______________ Fax No.: ______________

E-mail: ________________ Company website: ____________

1.2 Publicly or privately owned company: ______________________

1.3 If a Corporation:

Year Incorporated: ______________________________

Country: ______________________________

Provincial/State: ______________________________

1.4 If registered:

Provinces/States: ______________________________

1.5 If a Company:

Date of establishment: ______________________________

1.6 If Company is owned by an Individual:

Date of establishment: ______________________________

1.7 Name, titles and addresses of company officers; members; owner:

____

____

____

____

1.8 Branch/Affiliated Offices

Indicate street and mailing addresses, telephone numbers and facsimile number of each office and/or affiliate. Please "X" in a functional description of each office in the appropriate boxes below. Attach additional sheets if necessary.

Complete Legal Name: ______________

____

Address: ______________________

____

City and Province: ______________

Postal Code: ______________

Contacts/Positions: ______________

____

Telephone Number: ______________

Facsimile Number: ______________

Detailed Design: ☐

Fabrication: ☐

Purchasing: ☐

Inspection: ☐

Construction: ☐

Other (*specify*): ☐

E-mail: Company website:

1.9 Organization Chart of the Company

(Please attach the organizational chart of the company).

1.10 Number of Employees

- Engineers ______________
- Draftspersons ______________
- Estimators ______________
- Project Managers ______________
- Site Supervisors ______________
- Others (*specify*) ______________

1.11 State for which provinces valid contractors licenses are held. Provide license numbers and dates of issue. State what type of work you are licensed for.

Also state registration particulars, as applicable, to show compliance with any other legislation or regulations pertaining to work sites in the provinces listed above.

1.12 Describe the scope of services available through your company.

1.13 Does your company employ its shop and site workers under the terms of any union agreements with trade unions?

Yes ☐ No ☐

If yes, list those trade unions (and related provinces/countries) with whom your company has executed a voluntary collective agreement.

Also list those trade unions (and related provinces) which have been certified under provincial government legislation/decree, as bargaining agent for certain of your employees.

List those collective employment agreements, in provinces where you do business, between trade unions and registered employers organizations by which your company is bound.

2.0	**FINANCIAL**

2.1 Approximate annual value of construction work carried out in the last five years:

20____ $__________ 20____ $__________ 20____ $______

20____ $__________ 20____ $__________

2.2 Bank references:

Bank: ____

____

____

____

Name and title of person to contact: ____

Telephone Number: ____

2.3 Is your parent company, if any, willing to provide a letter of guarantee of financial responsibility for any work awarded to your company?

2.4 Bonds

Have you ever received bonds: (Performance/Payment bonds) Yes ☐ $______________________

No ☐

If yes, name of the bond company: ____

____

Telephone No.: ____

Name and title of person to contact: ____

2.5 Financial Statement

- Enclosed: Yes ☐ No ☐
- Available upon request: Yes ☐ No ☐

2.6 Insurance

a) We are currently insured for an amount of:

____

covering wrap up comprehensive general liability insurance, and site "All risk" insurance.

b) We are currently insured for an amount of:

____

covering automobile liability.

c) Other details for insurance:

____

2.7

- Has your company ever cancelled a contract before completion of the work?

  Yes ☐ No ☐

- Have you ever declared bankruptcy or restructured the company to avoid bankruptcy?

  Yes ☐ No ☐

- Do you have any judgements, claims, or lawsuits pending?

  Yes ☐ No ☐

If yes, provide details:

3.0	**EXPERIENCE**

3.1 Draw up a list of revelant construction contracts completed in the last five years:

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Start & completion Dates ______________________________

Owner: ______________________________

Contact: ________________ Tel. No.: __________

Eng./Arch.: ______________________________

Contact: ________________ Tel. No.: __________

* * * *

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

** if subcontractor, provide name of contractor*

Contractor or Subcontractor:* ______________________________

Date of completion of work: ______________________________

Owner: ______________________________

Contact: ____________________ Tel. No.: ____________

Eng./Arch.: ______________________________

Contact: ____________________ Tel. No.: ____________

* * * *

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Start & completion dates: ______________________________

Owner: ______________________________

Contact: ____________________ Tel. No.: ____________

Eng./Arch.: ______________________________

Contact: ____________________ Tel. No.: ____________

** if subcontractor, provide name of contractor*

3.2 Draw up a list of construction contracts in progress

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Start & completion dates: ______________________________

Owner: ______________________________

Contact: ______________________ Tel. No.: ____________

Eng./Arch.: ______________________________

Contact: ______________________ Tel. No.: ____________

* * * *

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Date of completion of work: ______________________________

** if subcontractor, provide name of contractor*

Owner: ______________________________

Contact: ______________ Tel. No.: ________

Eng./Arch.: ______________________________

Contact: ______________ Tel. No.: ________

* * * *

Project: ______________________________

____

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Start & completion dates: ______________________________

Owner: ______________________________

Contact: ______________ Tel. No.: ________

Eng./Arch.: ______________________________

Contact: ______________ Tel. No.: ________

* * * *

Project: ______________________________

____

** if subcontractor, provide name of contractor*

Type of Work: ______________________________

____

Value $ M: ______________________________

Contractor or Subcontractor:* ______________________________

Start & completion dates: ______________________________

Owner: ______________________________

Contact: ______________________ Tel. No.: ____________

Eng./Arch.:

Contact: ______________________ Tel. No.: ____________

* *if subcontractor, provide name of contractor*

Note: Complete on additional sheets as necessary

3.3 On the average, what percentage of contracts are awarded to subcontractors? _______%

4.0 CONTRACTOR'S EQUIPMENT

List of Contractor's equipment which can be used for the proposed work:

Qty	Description including capacity	Model	Model Year

5.0	**HEALTH AND SAFETY**

5.1	Does your Company have Occupational Health & Safety program?	Yes ☐	No ☐
5.2	Does your organization have a Corporate health and safety policy, describing the philosophy of healthy and safe work environment; and, expressing management commitment to provide safe and healthy work environment; documented comprehensive safe work procedures/ practices?	Yes ☐	No ☐
5.3	Can you provide the Company's organization chart showing the position of personnel responsible for Health and Safety?	Yes ☐	No ☐
5.4	Can you supply a copy of your Company Health and Safety Management System manuals, plans and procedures?	Yes ☐	No ☐
5.5	Do you conduct jobsites Safety inspections, audits?'	Yes ☐	No ☐
5.6	Can you attach a copy of the current certificate(s) of conformity for your Company Health and Safety Management System?	Yes ☐	No ☐
5.7	Does your Company have a formal risk assessment process that identifies Health and Safety risks and hazards for each job description or type of operation performed by its employees?	Yes ☐	No ☐
5.8	Does your Company have a structured organization and system to identify and provide appropriate training for all personnel?	Yes ☐	No ☐
5.9	Does your Company perform an evaluation of employees after completion of their health and safety training programs?	Yes ☐	No ☐
5.10	Does your Company maintain records for its health and safety training programs for employees?	Yes ☐	No ☐
5.12	Please give the following data for the past three years:		

	20__	20__	20_
Number of lost workday cases:			
Number of restricted workday cases:			
Number of cases with medical attention only:			
Number of fatalities:			
Total employee hours worked last year (*do not include any non-work time, even though paid*)	____________		
	20__	20__	20_
Frequency = Number of Lost Time Accidents* x 1 000 000 / Number of Hours Worked			
Severity = Number of Days Lost x 1 000 000 / Number of Hours Worked			

** Note: Lost time means an absence from the job site for more than 24 hours due to job accident*

6.0	**OTHER INFORMATION**
	Provide additional pertinent information for contractor's prequalification.

7.0	**RISK MANAGEMENT**

7.1	Does your Company have a Risk Management system/ program and process?	Yes ☐	No ☐
7.2	Does your Company Risk Management process meet the requirements of ISO 31000 Risk Management Principles and Guidelines?	Yes ☐	No ☐
7.3	Does your Company Risk Management process apply to all your projects?	Yes ☐	No ☐
7.4	Does your Company Risk Management process apply to all your Suppliers and Sub-Suppliers?	Yes ☐	No ☐
7.5	Is your Company Risk Management process register available for review?	Yes ☐	No ☐
7.6	Can you supply a copy of your Company Risk Management system and process policies, procedures and practices?	Yes ☐	No ☐
7.7	Does your Company have a Loss Control program?	Yes ☐	No ☐
7.8	Does your Company Loss Control program include a detailed contingency plan for completing its orders on best time possible in case of property damage, production delays, product losses, etc. ?	Yes ☐	No ☐
7.9	Can you supply a copy of your Company detailed contingency plan for completing its orders on best time possible in case of property damage, production delays, product losses, etc. ?	Yes ☐	No ☐
7.10	Does your Company have a preventative maintenance system and program?	Yes ☐	No ☐

8.0	**ENVIRONMENTAL PROTECTION**		
8.1	Do you have an Environmental Management System/ Program?	Yes ☐	No ☐
8.2	Can you supply a copy of your Company Environmental Management System manuals, plans, specifications and procedures?	Yes ☐	No ☐
8.3	Can you attach a copy of the current certificate(s) of conformity for your Company Environmental Management System?	Yes ☐	No ☐
8.4	Can you supply a copy of the First party, Second party and Third party auditing reports of your Company Environmental Management System/ program?	Yes ☐	No ☐
8.5	Has your Company had any environmental violation notices / convictions over the past 3 years?	Yes ☐	No ☐
8.6	Does your Company Environmental Management System address your Company suppliers and sub-suppliers Environmental Management Systems?	Yes ☐	No ☐
8.7	Can you supply a copy of your Company suppliers and sub-suppliers Environmental Management System manuals, plans, specifications, procedures and audit reports?	Yes ☐	No ☐
8.8	Name of Manager Responsible	______________________________	

9.0	**I hereby declare that this information is, to the best of my knowledge, true.**

Name:	______________________________	Title:	__________
Signature:	______________________________	Date:	__________

11. Schedule of Technical Particulars

At the time of installation, the submarine cable is expected to convey a peak winter load of 8.6 MVA at a nominal voltage of 12.47 kV. The cable is to be designed to service a 40 year forecast peak load of 10.4 MVA at an operating voltage of 12.47 kV. In the event that load growth exceeds 10.4 MVA at 12.47 kV, an operating voltage conversion to 25 kV will be required. The cable is to be designed to operate at 25 kV with a capacity of 20.8 MVA.

25 KV POWER CABLES		Unit	Data	
			Required	**Offered**
1	**GENERAL**			
1.1	Name of manufacturer			
1.2	Place of manufacture			
1.3	Manufacturers type or drawing reference #			
1.4	Circuit rating required:			
	- at 12.47 kV Operating Voltage	MVA	10.4	
	- at 25 kV Operating Voltage	MVA	20.8	
1.5	Constructional and testing standards to which cable applies			
1.6	General description of cable:			
	- Voltage designation Uo/U(Um)	kV		
	- Number of cores		One or three	
	- Conductor size	mm^2		
	- Conductor material		Copper	
	- Type of insulation:		TR-XLPE or EPR	
	- Type of metal sheath (XLPE Cables)		Lead	
	- Type of metallic shield (EPR cables)			
	- Type of armor		---	
	- Single conductor cables		Copper	
	- Three conductor cables		Galvanized steel	
	- Type of Jacket (XLPE cables)		MDPE or HDPE	
	- Type of Jacket (EPR cables)			
1.7	Year of first commercial operation of cable type			
1.8	Installation Vessel Accuracy	m		

25 KV POWER CABLES		Unit	Data	
			Required	Offered
2	**DATA DESIGN**			
2.1	Conductor			
	- Material		Copper	
	- Nominal cross-section	mm^2		
	- Overall diameter	mm		
	- Waterblocking method			
	- Semiconducting binder tape	yes/no		
2.2	Conductor screen:			
	- Type of material		Extruded semi conductive layer compatible with insulation type	
	- Nominal thickness	mm		
2.3	Insulation:			
	- Insulation level	%	110%	
	- Material type		TR-XLPE or EPR	
	- Minimum average thickness	mm		
	- Minimum thickness at a point	mm		
	- Nominal overall diameter	mm		
2.4	Insulation shield:			
	- Type of material		Extruded semi conductive layer compatible with insulation type	
	- Nominal thickness	mm		
	- Insulation metallic shield (EPR cables)	mm		
2.5	Sheath (XLPE cables)	mm	Lead	
2.6	Manufacturing method:			
	- XLPE cables			
	- EPR cables			
2.7	Bedding type and material (If applicable)			
2.8	Filler type and materials (Three conductor Cables)			
2.9	Armor:			
	- Single conductor cables		Copper	
	- Three conductor cables		Galvanized steel	
	- Shape of armor wires			
	- Diameter of armor wires	mm		
	- Number of armor wires, (approx.)			
	- Number of layers			
2.10	Soil Thermal Resistivity	C^o cm/W	100	

25 KV POWER CABLES		Unit	Data	
			Required	Offered
2.11	Serving:			
	- Type and material			
2.12	Phase identification single conductor cables:			
	- Cable 1			
	- Cable 2			
	- Cable 3			
	- Cable 4 (Reserve cable)			
2.13	Nominal overall cable diameter	mm		
2.14	Weight of completed cable	kg/m		
3	**ELECTRICAL DATA**			
3.1	Frequency	Hz	60	
3.2	Current rating (continuous)	A		
3.3	Maximum permissible conductor temperature	C		
3.4	Short circuit current:			
	Permissible short circuit current for 1 second			
	- In the conductor	kA		
	- In the lead sheath (XLPE cables)	kA		
	- In the metallic sheath (EPR cables)	kA		
	- Maximum Permissible Emergency Current Rating for One (1) Hour (As % of Nominal Current Rating – Item 3.2)	%		
3.5	Rated voltage:			
	- Rated RMS system voltage (U)	kV		
	- Rated RMS system voltage between conductor and screen (Uo)	kV		
3.6	Highest continuous RMS system voltage (Um)	kV		
3.7	Conductor resistance:			
	- Maximum DC resistance at 20ºC	Ω/km		
	- AC resistance at 90ºC	Ω/km		
3.8	Capacitance between conductor and screen	Ω/km		
3.9	Cable impedence @ 10.4 MVA, 12.47 kV	Ω/km		
3.10	Charging current @ 10.4 MVA, 12.47 kV	A/Km		
3.11	Cable impedence @ 20.8 MVA, 25 kV	Ω/km		
3.12	Charging current @ 20.8 MVA, 25 kV	A/Km		
3.13	Power Factor		0.875	

25 KV POWER CABLES		Unit	Data	
			Required	**Offered**
3.14	Losses at 12.47kV, 10.4 MVA and 25kV, 20.8 MVA:		12.47kV, 10.4 MVA	25kV, 20.8 MVA
	- Conductor losses	W/m		
	- Dielectric losses	W/m		
	- Sheath losses	W/m		
	- Armour loss	W/m		
	Total losses per cable			
3.15	Voltage drop at 12.47 kV, 10.4 MVA	%		
3.16	Voltage drop at 25 kV, 20.8 MVA	%		
4	**MECHANICAL DATA**			
4.1	Minimum cable radius when laid	m		
	Minimum permissible bending radius during laying	m		
4.2	Maximum permissible pulling tension during laying	kN		
4.3	Maximum permissible pulling tension during recovery	kN		
4.4	Factory Splices	Yes/No	---	
4.5	Quantity of Splices per Cable	#/Cable		
4.6	Continuous Armor Wire	Yes/No		
5	**COLD LOAD PICKUP CONSIDERATIONS**			
5.1	Duration at 1.5 times nominal current rating (Item 3.2)	hours		
5.2	Duration at 2 times nominal current rating (Item 3.2)	hours		
5.3	Provide a Load Duration Curve			
6	**DESIGN LIFE**			
6.1	Cable System Design Life	Years	40	

12. QA Program

Contractor’s Quality Assurance Program Certificate to be submitted with Proposal and QA Program to be submitted within thirty (30) days of contract award.

13. Inspection and Test Plan (ITP)

The Owner requires Proponents to submit a cable system Inspection and Test Plan (ITP) as further described in the below noted Section 4.3.3 taken from the Technical Specifications.

Technical Specifications

4.3.3 Contractors shall include an Inspection and Test Plan (ITP) in their Proposal documents. The ITP shall list all inspections and tests proposed for the cable system by the Contractor, between the date of ordering and the date of delivery. The plan shall also include a list of the type tests for which the Contractor proposes to provide documentation of previous testing on cables of identical design.

The Contractor shall be responsible for the planning and execution of all inspections and tests, but Newfoundland Power's representative shall have the right to witness any or all of the manufacturing, inspection or tests.

Newfoundland Power and the Contractor shall sign off the final version of the ITP, which, thereafter, shall form part of the contract documents.

The Contractor shall notify Newfoundland Power, at least two weeks in advance, of the date on which any of the inspections or tests nominated as Hold or Witness points on the ITP are due to be carried out.

Certificates of Test shall be provided for the cable system to prove it has been satisfactorily tested to meet all requirements of its appropriate manufacturing standards, whether or not witnessed by Newfoundland Power.

Where appropriate, test certificates shall state values for all test results. Tests for which the results are indicated as pass or fail shall be qualified by the relevant acceptance criteria.

AGREEMENT

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THIS AGREEMENT made on the day of , 2013

BETWEEN: **NEWFOUNDLAND POWER INC.**
(the "Owner")

AND:
(the "Contractor")

WITNESSETH THAT THE PARTIES AGREE AS FOLLOWS:

1. The Work

The Contractor shall:

(a) perform the Work required by the Contract Document;

(b) do and fulfill everything indicated by this Agreement; and,

(c) commence the Work by the _____day of ____________,_______and attain Total Performance of the Work as certified by the Owner or the Owner's Representative, on or before the 14^{th} day of November, 2014.

2. Contract Document

The following is an exact list of the components of the Contract Document referred to in Clause 1 of this Agreement and as defined in Definitions - Clause 3. This list is subject to subsequent amendments in accordance with the provisions of the Contract and agreed upon between the parties. Terms used in the Contract Document which are defined in the attached Definitions shall have the meanings designated in those Definitions.

(a) Agreement
(b) Definitions
(c) General Conditions
(d) Supplementary Conditions
(e) Certificate of Insurance
(f) Drawings
(g) Specifications
(h) Schedules
(i) Any Addenda to the above.

The following schedules are attached to this Agreement and are to be read into and form part hereof:

Commercial and General Returnable Schedules (13 Schedules).

3. Contract Price

(a) The quantities shown in the Schedule of Prices are estimated. The Contract price shall be the final sum of the products of the actual quantities that are incorporated in, or made necessary by the Work, as confirmed by survey, count and measurement, and the appropriate Contract prices, together with any adjustments that are made in accordance with the provisions of the Contract Document.

(b) The Total Estimated Contract Price shall be the sum of the products of the estimated quantities and the appropriate Contract prices in the Schedule of Prices.

(c) The Total Estimated Contract Price (Option “ “) is _____________ dollars in Canadian funds including HST (13 %). (if applicable)

4. Payment

(a) The Owner shall pay the Contractor in Canadian funds for the performance of the Contract, the amounts being determined by actual measured quantities of the individual Work items contained in the Schedule of Prices of this Contract Document, and measured in accordance with the methods of measurement given in the Specifications.

(b) Subject to applicable legislation and the provisions of the Contract Document, and in accordance with legislation and statutory regulations respecting holdback percentages and, where such legislation or regulations do not exist or apply, subject to a holdback of ten percent (10%), the Owner shall:

(j) make monthly payments to the Contractor on account of the Work performed as certified by the Owner’s Representative;

(ii) upon Substantial Performance of the Work as certified by the Owner’s Representative, pay to the Contractor the unpaid balance of holdback monies then due; and,

(iii) upon Total Performance of the Work as certified by the Owner’s Representative, pay to the Contractor the unpaid balance of monies then due.

5. Rights and Remedies

(a) The duties and obligations imposed by the Contract Document and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

(b) No action or failure to act by the Owner, Owner's Representative or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

6. Receipt and Addresses for Notices

(a) Communications in writing between the parties will be addressed to the recipient at the address set out below. The delivery of communications in writing shall be by hand, by courier, by prepaid first class mail, or by facsimile or other form of electronic communication during the transmission of which no indication of failure of receipt is communicated to the sender.

(b) A communication in writing will be deemed to have been received by the other party on the date of delivery if delivered by hand or courier, or if sent by mail it shall be deemed to have been received five (5) calendar days after the date on which it was mailed, provided that if either such day is not a working day, then it shall be deemed to have been received on the working day next following such day.

(c) A communication in writing sent by facsimile or other form of electronic communication shall be deemed to have been received on the date of its transmission provided that if such day is not a working day, or if it is received after the end of normal business hours on the date of its transmission at the place of receipt, then it shall be deemed to have been received at the opening of business at the place of receipt on the first working day next following the transmission thereof.

(d) An address for a party may be changed by notice in writing to the other party setting out the new address in accordance with this Clause.

(e) If it is intended that the notice must be received by a specific individual, then that individual's name shall be indicated.

The Owner at:

Newfoundland Power Inc.
55 Kenmount Road
P.O. Box 8910
St. John's, NL A1B 3P6

Email Address: jamullins@newfoundlandpower.com
Phone Number: (709) 737-5820
Attention: James Mullins

The Contractor at:

Name of Contractor:
Address

Email Address:
Facsimile Number:
Attention:

7. Law of the Contract

This Agreement is governed by the laws of the Province of Newfoundland and Labrador and the federal laws of Canada applicable therein. The parties agree to submit to the exclusive jurisdiction of the courts of Newfoundland and Labrador.

8. Succession

The Schedule of Prices attached hereto, and the other items that are stated herein to constitute the Contract Document, are to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties, and subject to law and the provisions of the Contract Document shall enure to the benefit of, and be binding upon the parties hereto, their respective heirs, legal representatives, successors and assigns.

9. Owner's Policies, Procedures and Training Documents

Unless otherwise described, all Work shall be done in accordance with the Owner's current policies, procedures, and training material. The Contractor shall at all times keep himself and his personnel informed of the Owner's current policies, procedures, and training material including but not limited to the documents posted at https://workingwith.newfoundlandpower.com.

10. Privacy Consent

The Contractor consents and agrees to the Owner's collection, use and maintenance of the Contractor's personal information as defined in applicable privacy legislation for the purpose of facilitating the acquisition and payment of products and services, to evaluate the Contractor's qualifications and to monitor the Contractor's performance.

11. Business Ethics Policy

(a) The Contractor shall at all times comply with the Owner's Business Ethics Policy as amended from time to time. This obligation includes, but is not limited to, ensuring that its applicable employees, agents, and subcontractors have read and are complying with the Business Ethics Policy and any related training materials that may be provided to the Contractor by the Owner from time to time.

(b) Prior to the commencement of the Work and at the discretion of the Owner, the Contractor shall sign a Business Ethics Acknowledgement letter provided by the Owner which indicates the training described in 11(a) has been successfully completed.

(c) Failure on the part of the Contractor to comply with the Owner's Business Ethics Policy shall be grounds for immediate termination of this Agreement by the Owner without cause and for indemnity by the Contractor to the Owner for any damages suffered or losses incurred as a result of the failure or breach of the Business Ethics Policy.

IN WITNESS WHEREOF the parties hereto have executed this Agreement as of the day and year first above written.

EXECUTED by the Contractor
in the presence of:

Witness Please Print	Signatory Please Print
Position/Title Please Print	Position/Title Please Print
Signature	Signature

EXECUTED by Newfoundland Power Inc.
in the presence of:

Witness Please Print	Signatory Please Print
Position/Title Please Print	Position/Title Please Print
Signature	Signature
Witness Please Print	Signatory Please Print
Position/Title Please Print	Position/Title Please Print
Signature	Signature

DEFINITIONS

The following definitions shall apply to the Contract Document:

1. Changes in the Work

Changes in the Work means the deletion, extension, increase, decrease, or alteration of lines, grades, dimensions, methods, drawings, or materials of the Work or part thereof, within the scope of the Work contemplated by the Contract Document.

2. Contract

The Contract is the undertaking by the parties to perform their respective duties, responsibilities, and obligations as prescribed in the Contract Document and represents the entire Agreement between the parties. The Contract supersedes all prior negotiations, representations, or agreements, either written or oral, including the Tender Document. The Contract may be amended only as provided in the General Conditions of the Contract.

3. Contract Document

The Contract Document consists of the executed Agreement between the Owner and Contractor, Definitions, the General Conditions of the Contract, Supplementary Conditions, Certificate of Insurance, Drawings, Specifications, and such other documents as are listed in the Agreement, including amendments thereto incorporated before the execution of the Contract and subsequent amendments thereto made pursuant to the provisions of the Contract and agreed upon between the parties.

4. Contract Time

(a) The Contract Time is the time stipulated in the Contract Document for substantial performance of the Work.

(b) The date of Substantial Performance of the Work is the date certified as such by the Owner’s Representative.

(c) Day means the calendar day.

(d) Working day means days other than Saturdays, Sundays and holidays which are observed by the construction industry in the area of the place of the Work.

5. Contractor

The Contractor is the person, firm, or corporation identified as such in the Agreement. The term Contractor means the Contractor or his authorized representative as designated to the Owner in writing.

6. Drawings

The Drawings are the graphic and pictorial portions of the Contract Document, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, and diagrams.

7. Extra Work

Extra work means any work or service, the performance of which is beyond the scope of the Work contemplated by the Contract Document.

8. Newfoundland Power

Newfoundland Power means the Owner, Newfoundland Power Inc.

9. Other Contractor

Other Contractor means a person, firm, or corporation employed by or having a separate contract directly or indirectly with the Owner for work other than that required by the Contract Document.

10. Owner

The Owner is Newfoundland Power Inc. The term Owner means the Owner or his authorized agent or representative as designated to the Contractor in writing.

11. Owner's Representative

The Owner's Representative is the person(s) or firm(s) designated by the Owner to act on behalf of the Owner and is the contact for coordination of field reviews, specification inquiries, pre-job coordination, and safety meetings, coordination of the issuance of Work and is the final interpreter of the requirements of the Contract Document.

12. Place of the Work

The Place of the Work is the designated site or location of the Project of which the Work may be the whole or a part.

13. Products

Products mean material, machinery, equipment, and fixtures forming the Work but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work and normally referred to as construction, machinery, and equipment.

14. Project

Project means the total construction contemplated, of which the Work might be the whole or a part.

15. Project Site

Project Site means Place of the Work.

16. Shop Drawings

The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data that are to be provided by the Contractor to illustrate details of a portion of the Work.

17. Site

Site means Place of the Work.

18. Specifications

The Specifications are that portion of the Contract Document, wherever located and whenever issued, consisting of the written requirements and standards for Products, systems, workmanship, quality, and the services necessary for the performance of the Work.

19. Subcontractor(s)

A Subcontractor is a person, firm, or corporation having a direct contract with the Contractor to perform a part or parts of the Work, or to supply products worked to a special design according to the Contract Document, but does not include one who merely supplies products not so worked.

20. Substantial Performance of the Work

Substantial Performance of the Work is as defined in the lien legislation applicable to the place of the Work. If such legislation is not in force or does not contain such definition, Substantial Performance of the Work shall have been reached when the Work is ready for use or is being used for the purpose intended and is so certified by the Owner's Representative.

21. Temporary Work

Temporary Work means temporary supports, structures, facilities, services, and other temporary items, excluding construction equipment, required for the execution of the Work but not incorporated into the Work.

22. Total Performance of the Work

Total Performance of the Work means when the entire Work, except those items arising from the provisions of GC23 - Warranty, has been performed to the requirements of the Contract Document and is so certified by the Owner's Representative.

23. Work

The Work means the total construction and related services required by the Contract Document.

GENERAL CONDITIONS

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1. GC1 Contract Document

1.1 The Contract Document shall be signed in triplicate by the Owner and the Contractor.

1.2 The Contract Document is complementary, and what is required by any one part thereof shall be as binding as if required by all.

1.3 The intent of the Contract Document is to include the labour, products, and services necessary for the performance of the Work in accordance with this Document. It is not intended, however, that the Contractor shall supply products or perform Work not consistent with, covered by or properly inferable from the Contract Document.

1.4 Words and abbreviations which have well known technical or trade meanings are used in the Contract Document in accordance with such recognized meanings.

1.5 References to the masculine or the singular shall be considered to include the feminine and the plural as the context requires.

1.6 In the event of conflict in the Contract Document, the following shall apply:

(a) figured dimensions shown on a Drawing shall govern even though they may differ from dimensions scaled on the same Drawing;

(b) Drawings of larger scale shall govern over those of smaller scale of the same date;

(c) Specifications shall govern over Drawings;

(d) the General Conditions shall govern over Specifications;

(e) the Supplementary Conditions shall govern over the General Conditions; and,

(f) the executed Agreement between the Owner and Contractor shall govern over all documents.

Notwithstanding the foregoing, documents of later date shall always govern.

1.7 The Contractor shall be provided without charge with as many copies of the Contract Document or parts thereof as are necessary for the performance of the Work.

1.8 The Contractor shall keep one copy of the current Contract Document and Shop Drawings at the Place of the Work, in good order and available to the Owner's Representative and his representatives. This requirement shall not be considered to include the executed set of Contract Document.

1.9 Drawings, Specifications, models, and copies thereof furnished by the Owner are and shall remain the property of the Owner with the exception of the signed Contract sets belonging to each party to this Contract. Such Documents and models are to be used only with respect to the Work and are not to be used on other work. Such Documents and models are not to be copied or revised in any manner without the written authorization of the Owner.

1.10 Models furnished by the Contractor at the Owner's expense are the property of the Owner.

2. GC2 Additional Instructions

2.1 During the progress of the Work, the Owner’s Representative will furnish to the Contractor such additional instructions to supplement the Contract Document as may be necessary for the performance of the Work. Such instructions shall be consistent with the intent of the Contract Document.

2.2 Additional instructions may be in the form of Specifications, Drawings, samples, models, or other written instructions.

2.3 Additional instructions will be issued by the Owner’s Representative with reasonable promptness and in accordance with a schedule agreed upon for such instructions.

3. GC3 Owner’s Representative

3.1 The Owner’s Representative will provide administration of this Contract as described in the Contract Document.

3.2 The Owner’s Representative will be the Owner’s Representative during construction and until completion of any correction of defects under the provisions of GC23 - Warranty, Paragraph 23.2, or until the issuance of the certificate of Total Performance of the Work, whichever is later. The Owner's instructions to the Contractor shall be forwarded through the Owner’s Representative.

3.3 The Owner’s Representative will not be responsible for the acts or omissions of the Contractor, his Subcontractors or their agents, employees, or other persons performing any of the Work.

3.4 Based on the Owner’s Representative’s observations and his evaluation of the Contractor's applications for payment, the Owner’s Representative will determine the amounts owing to the Contractor under the Contract and will issue certificates for payment in such amounts, as provided in the Agreement - Payment and GC14 - Certificates and Payments.

3.5 The Owner's Representative will be, in the first instance, the interpreter of the requirements of the Contract Document and the judge of the performance thereunder by the Contractor. Interpretations and decisions of the Owner's Representative shall be consistent with the intent of the Contract Document.

3.6 Claims, disputes, and other matters in question relating to the performance of the Work or the interpretation of the Contract Document shall be referred to the Owner's Representative.

3.7 The Owner's Representative will have authority to reject Work which, in his opinion, does not conform to the requirements of the Contract Document. Whenever he considers it necessary or advisable, the Owner's Representative will have authority to require special inspection or testing of Work whether or not such Work be then fabricated, installed, or completed.

3.8 The Owner's Representative will review and take appropriate action upon the Contractor's submittals such as Shop Drawings, product data, and samples in accordance with the requirements of the Contract Document.

3.9 The Owner's Representative will prepare change orders in accordance with the requirements of GC11 - Changes in the Work and Extra Work.

3.10 The Owner's Representative will conduct inspections to determine the date of Substantial Performance of the Work and Total Performance of the Work in accordance with the requirements of GC14 - Certificates and Payments. The Owner's Representative will receive and review written warranties and related documents required by the Contract and provided by the Contractor and will forward such warranties and documents to the Owner for his acceptance.

4. GC4 Delays

4.1 If the Contractor is delayed in the performance of the Work by an act or omission of the Owner, Owner's Representative or anyone employed or engaged by them directly or indirectly, that is contrary to the provisions of the Contract Document, then the Contract Time shall be extended for such reasonable time as the Owner may decide in consultation with the Contractor. The Contractor shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as a result of such delay.

4.2 If the Contractor is delayed in the performance of the Work by a stop work order issued by a court or other public authority and providing that such order was not issued as the result of an act or fault of the Contractor or anyone employed or engaged by him directly or indirectly, then the Contract Time shall be extended for such reasonable time as the Owner may decide in consultation with the Contractor. The Contractor shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as the result of such delay.

4.3 If the Contractor is delayed in the performance of the Work by labour disputes, strikes, lockouts (including lockouts decreed or recommended for its members by a recognized contractors' association, of which the Contractor is a member or to which the Contractor is otherwise bound), fire, unusual delay by common carriers or unavoidable casualties, or without limit to any of the foregoing by a cause beyond the Contractor's control other than a delay due to weather conditions, then the Contract Time shall be extended for such reasonable time as the Owner may decide in consultation with the Contractor, but in no case shall the extension of time be less than the time lost as the result of the event causing the delay, unless such shorter extension be agreed to by the Contractor. The Contractor shall not be entitled to payment for costs incurred as the result of such delays unless such delays are the result of actions by the Owner. The Contractor shall not be entitled to payment for costs incurred as the result of a delay due to weather conditions.

4.4 No extension shall be made for delay unless written notice of claim is given to the Owner’s Representative not later than fourteen (14) days after the commencement of delay, providing however, that in the case of a continuing cause of delay, only one notice of claim shall be necessary.

4.5 If no schedule is made under GC2 - Additional Instructions, no claim for delay shall be allowed because of failure to furnish instructions until fourteen (14) days after a demand for such instructions has been made and not then unless such claim is reasonable.

4.6 The Owner’s Representative will not, except by written notice to the Contractor, stop or delay the Work pending instructions or proposed Changes in the Work.

5. GC5 Owner's Right to Perform Work or Stop the Work or Terminate Contract

5.1 If the Contractor should be adjudged bankrupt, or makes a general assignment for the benefit of creditors because of his insolvency or if a receiver is appointed because of the Contractor’s insolvency, the Owner may, without prejudice to any other right or remedy he may have, by giving the Contractor or receiver or trustee in bankruptcy written notice, terminate the Contract.

5.2 If the Contractor should neglect to prosecute the Work properly or otherwise fails to comply with the requirements of the Contract to a substantial degree, the Owner may notify the Contractor in writing that he is in default of his contractual obligations and instruct him to correct the default in the five (5) working days immediately following the receipt of such notice.

5.3 If the correction of the default cannot be completed in the five (5) working days specified, the Contractor shall be in compliance with the Owner's instructions if he:

(a) commences the correction of the default within the specified time;

(b) provides the Owner with an acceptable schedule for such correction; and,

(c) completes the correction in accordance with such schedule.

5.4 If the Contractor fails to correct the default in the time specified or subsequently agreed upon, the Owner, without prejudice to any other right or remedy he may have, may:

(a) correct such default and deduct the cost thereof from any payment then or thereafter due the Contractor; or

(b) terminate the Contractor's right to continue with the Work in whole or in part and terminate the Contract.

5.5 If the Owner terminates the Contractor's right to continue with the Work under the conditions set out in this General Condition, he shall:

(a) be entitled to take possession of the premises and products and utilize the construction machinery and equipment, subject to the rights of third parties, and finish the Work by whatever method he may consider expedient but without undue delay or expense;

(b) withhold further payments to the Contractor until the Work is finished;

(c) upon Total Performance of the Work, charge the Contractor the amount by which the full cost of finishing the Work, including compensation to cover the cost of corrections to Work performed by the Contractor that may be required under GC23 - Warranty exceeds the unpaid balance of the saContract Price; however, if such cost of finishing the Work is less than the unpaid balance of the Contract Price, he shall pay the Contractor the difference; and,

(d) on expiry of the warranty period, charge the Contractor the amount by which the cost of corrections to his Work under GC23 - Warranty exceeds the allowance provided for such corrections, or if the cost of such corrections is less than the allowance, pay the Contractor the difference.

5.6 If a Performance Bond has been provided by the Contractor, the provisions of this General Condition shall be exercised in accordance with the conditions of such Performance Bond.

5.7 The Contractor's obligation under the Contract as to quality, correction and warranty of the Work performed by him, up to the time of termination, shall continue in force after such termination.

5.8 The Owner may terminate the Contract should the Contractor breach the requirements of the Owner’s Contractor Safety Responsibilities and the Owner’s Contractor Environmental Responsibilities.

6. GC6 Contractor's Right to Stop the Work or Terminate Contract

6.1 If the Owner should be adjudged bankrupt or makes a general assignment for the benefit of creditors because of his insolvency or if a receiver is appointed because of his insolvency, the Contractor may, without prejudice to any other right or remedy he may have, by giving the Owner or receiver or trustee in bankruptcy written notice, terminate the Contract.

6.2 If the Work should be stopped or otherwise delayed for a period of thirty (30) days or more under an order of a court or other public authority and providing that such order was not issued as the result of an act or fault of the Contractor or of anyone directly or indirectly employed or engaged by him, the Contractor may, without prejudice to any other right or remedy he may have, by giving the Owner written notice, terminate the Contract.

6.3 The Contractor may notify the Owner in writing that the Owner is in default of his contractual obligations if:

(a) the Owner or Owner's Representative fails to issue a certificate in accordance with the provisions of GC14 - Certificates and Payments;

(b) the Owner fails to pay the Contractor when due the amounts certified by the Owner's Representative or awarded by arbitration or a court; or

(c) the Owner violates the requirements of the Contract to a substantial degree.

The Contractor's written notice to the Owner shall advise that if the default is not corrected in the five (5) working days immediately following the receipt of the written notice, the Contractor may, without prejudice to any other right or remedy he may have, stop the Work or terminate the Contract.

6.4 If the Contractor terminates the Contract under the conditions set out above, he shall be entitled to be paid for all Work performed in accordance with the Schedule of Prices and for loss sustained upon products and construction machinery and equipment and such other damages as the Contractor may have sustained as a result of the termination of the Contract.

7. GC7 Disputes

7.1 Differences between the parties to the Contract as to the interpretation, application, or administration of the Contract, or any failure to agree where agreement between the parties is called for, which remain unresolved in the first instance by decision of the Owner's Representative pursuant to the provisions of GC3 – Owner's Representative, herein called a "dispute", shall be settled in accordance with the requirements of this General Condition.

7.2 The claimant shall give written notice of such dispute to the other party no later than fourteen (14) days after the receipt of the Owner's Representative's decision given under GC3 - Owner's Representative. Such notice shall set forth particulars of the matters in dispute, the probable extent and value of the damage and the relevant provisions of the Contract Document. The other party shall reply to such notice no later than fourteen (14) days after he receives or is deemed to have received it, setting out in such reply his grounds and other relevant provisions of the Contract Document.

7.3 If the matter in dispute is not resolved promptly, the Owner's Representative will give such instructions as, in his opinion, are necessary for the proper performance of the Work and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by so doing neither party will jeopardize any claim they may have. If it is subsequently determined that such instructions were in error or at variance with the Contract Document, the Owner shall pay the Contractor costs incurred by the Contractor in carrying out such instructions which he was required to do beyond what the Contract Document correctly understood and interpreted would have required him to do, including costs resulting from interruption of the Work.

7.4 It is agreed that no act by either party shall be construed as a renunciation or waiver of any of his rights or recourse, provided he has given the notices in accordance with Paragraph 7.2 and has carried out the instructions as provided in Paragraph 7.3.

7.5 In recognition of the obligation of the Contractor to perform the disputed Work as provided in Paragraph 7.3, it is agreed that settlement of dispute proceedings may be commenced immediately following the dispute in accordance with the foregoing settlement of dispute procedures.

7.6 In the event that a dispute arises with respect to the Contract Document that cannot be resolved as provided in the above paragraphs and cannot be negotiated between the parties, then in such event, the parties agree to use the services of a mediator to attempt to resolve their disputes.

7.7 In the event that mediation does not result in a resolution of the dispute and the parties agree that they do not wish to terminate the Agreement, then in such an event, any unresolved issues may be referred to arbitration. Should arbitration be agreed upon, the arbitration will be conducted in accordance with the Arbitration Act of Newfoundland and Labrador before a single arbitrator chosen by the Contractor from a list of three (3) qualified arbitrators provided by the Owner.

8. GC8 Assignment

Neither party to the Contract shall assign the Contract or a portion thereof without the written consent of the other, which consent shall not be unreasonably withheld.

9. GC9 Other Contractors

9.1 The Owner reserves the right to award separate contracts in connection with the Project of which the Work is a part, or do certain Work by his own forces.

9.2 When separate contracts are awarded for different parts of the Project, or Work is performed by the Owner's own forces, the Owner shall:

(a) provide for the coordination of the Work of his own forces and of each separate Contract with the Work of this Contract; and,

(b) ensure that insurance coverage is provided to the same requirements as are called for in GC19 - Insurance. Such insurance shall be coordinated with the insurance coverage of this Contractor as it affects the Work of this Contract.

9.3 The Contractor shall coordinate the Work of this Contract with the work of Other Contractors and connect as specified or shown in the Contract Document. If there is a change in the scope of the Work required for the planning and performance of this coordination and connection, the changes shall be authorized in accordance with GC11 - Changes in the Work and Extra Work, and the value of the changes shall be determined in accordance with GC12 - Valuation and Certification of Changes in the Work.

9.4 The Contractor shall report to the Owner's Representative any apparent deficiencies in Other Contractors' work which would affect the Work of this Contract immediately as they come to his attention and shall confirm such report in writing. Failure by the Contractor to so report shall invalidate any claims against the Owner by reason of the deficiencies of Other Contractors' work except as to those of which he was not reasonably aware.

9.5 The Owner shall take all reasonable precautions to avoid labour disputes or other disputes on the Project arising from the work of Other Contractors.

10. GC10 Subcontractors

10.1 The Contractor agrees to preserve and protect the rights of the parties under the Contract with respect to Work to be performed under subcontract and to:

(a) enter into contracts or written agreements with his Subcontractors to require them to perform their Work in accordance with and subject to the terms and conditions of the Contract Document; and

(b) be as fully responsible to the Owner for acts and omissions of his Subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by him. The Contractor, therefore, agrees that he will incorporate the terms and conditions of the Contract Document into all subcontract agreements he enters into with his Subcontractors.

10.2 The Contractor agrees to employ those Subcontractors proposed by him in writing and accepted by the Owner at the signing of the Contract.

10.3 The Owner may, for reasonable cause, object to the use of a proposed Subcontractor and require the Contractor to employ one of the other subcontract bidders.

10.4 In the event that the Owner requires a change from a proposed Subcontractor, the Contract Price shall be adjusted by the difference in cost and markup occasioned by such required change.

10.5 The Owner’s Representative shall not be required to employ as a Subcontractor a person or firm to whom he may reasonably object.

10.6 The Owner’s Representative may, upon reasonable request and at his discretion, provide to a Subcontractor information as to the percentage or quantity of the Subcontractor's work which has been certified for payment.

10.7 Nothing contained in the Contract Document shall create a contractual relationship between a Subcontractor and the Owner.

11. GC11 Changes in the Work and Extra Work

11.1 Changes in the Work:

Except as provided in GC12 - Valuation and Certification of Changes in the Work:

(a) the Owner, through the Owner’s Representative, without invalidating the Contract, may make Changes in the Work with the Contract Price and Contract Time being adjusted accordingly by written order; and,

(b) no Changes in the Work shall proceed without a written order signed by the Owner and no claim for a change in the Contract Price or change in the Contract Time shall be valid unless so ordered and at the same time valued or agreed to be valued as provided in GC12 - Valuation and Certification of Changes in the Work.

11.2 Extra Work

The Owner may offer the Contractor Extra Work. If the terms and conditions for the performance of the Extra Work are agreed upon, the Owner shall issue a written change order amending the Contract Price and Contract Time as appropriate, or a written order to proceed until a price and change in time are agreed upon by the parties and a change order can be issued.

12. GC12 Valuation and Certification of Changes in the Work

12.1 If the type of Work involved in a Change in the Work is included in the items contained in the Schedule of Prices and in the Agreement Section 3 - Contract Price, Paragraph (c), it shall be performed on the same payment basis as the original Work except as described in Paragraphs 12.7 and 12.8, and the Contract Time shall be extended for such time as the Owner's Representative may decide in consultation with the Contractor.

12.2 If the type of Work involved in a Change in the Work is not included in the items contained in the Schedule of Prices and in the Agreement Section 3 - Contract Price, Paragraph (c), or is such as to alter the nature or intent of the Work included in an item in the Schedule of Prices, the value of such change shall be determined by one or more of the following methods:

(a) by estimate and acceptance in a lump sum;

(b) by unit prices agreed upon;

(c) by cost and a fixed or percentage fee; and,

(d) by variation of the Contract Unit Prices.

12.3 When a Change in the Work covered by Paragraph 12.2 is proposed or required, the Contractor shall present to the Owner's Representative for approval his claim for a change in the Contract Price and change in Contract Time with appropriate documentation in a form acceptable to the Owner's Representative. The Owner's Representative will satisfy himself as to the correctness of such claim and a change order shall be issued to the Contractor amending the Contract Price and Contract Time as appropriate. The value of Work performed in the change shall be included for payment with the regular certificates for payment.

12.4 In the case of Changes in the Work to be paid for under methods (b) and (c) of Paragraph 12.2, the form of presentation of costs and methods of measurement shall be agreed to by the Owner's Representative and Contractor before proceeding with the change. The Contractor shall keep accurate records, as agreed upon, of quantities or costs and present an account of the cost of the Change in the Work, together with vouchers where applicable.

12.5 If the method of valuation, measurement, change in Contract Price, and change in Contract Time cannot be promptly agreed upon, and the change is required to be proceeded with, then the Owner's Representative in the first instance will determine the method of valuation, measurement and the change in Contract Price and Contract Time subject to final determination in the manner set out in GC7 - Disputes. In this case, the Owner's Representative will, with the consent of the Owner, issue a written authorization for the change setting out the method of valuation and if by lump sum, his valuation of the change in Contract Price and Contract Time.

12.6 In the case of a dispute in the valuation of a change authorized in the Work and pending final determination of such value, the Owner's Representative will certify the value of Work performed in accordance with his own evaluation of the change and include the amount with the regular certificate for payment. The Contractor shall keep accurate records of quantities and cost of such Work.

12.7 Should the actual quantity of an item in the Schedule of Prices in the Agreement Section - Contract Price, Paragraph (c), vary by more than twenty percent (20%) of the estimated quantity, either the Owner or the Contractor may request a revision to the Contract Price contained in the Schedule. Such a request for a revision in a Contract Price shall be given as soon as reasonably possible after the party concerned becomes aware of the circumstances.

12.8 If a revision to a Contract Price is negotiated, then:

(a) the revised price in the case of a decrease of more than twenty percent (20%) of the estimated quantity will apply to the actual Work performed for that item; or

(b) the revised price in the case of an increase of more than twenty percent (20%) of the estimated quantity will apply to the excess quantity of Work for that item only.

12.9 If either party requests renegotiation of the Contract Price, both parties agree to act promptly in order to arrive at an equitable revision of the Contract Price prior to proceeding with the Work so affected. If agreement on such renegotiation can not be reached, the Contractor shall proceed with the Work and the matter shall be subject to final determination in the manner set out in GC7 - Disputes. Pending such settlement, payment for the Work performed shall be made on the regular certificate for payment on the basis of the Contract Price.

12.10 The Owner reserves the right to audit the Contractor concerning any and all Changes in the Work.

12.11 It is intended in all matters referred to above that the Owner, the Owner's Representative and Contractor shall act promptly.

13. GC13 Applications for Payment

13.1 Applications for payment on account may be made monthly as the Work progresses.

13.2 Applications for payment shall be dated the last day of the agreed monthly payment period and the amount claimed shall be for the value of Work performed and products delivered to the Place of the Work at that date.

13.3 Applications for payment for products delivered to the Place of the Work, but not yet incorporated into the Work, shall be supported by such evidence as the Owner's Representative may reasonably require to establish the value and delivery of the products.

13.4 Applications for release of holdback monies following Substantial Performance of the Work and the application for final payment shall be made at the time and in the manner set forth in GC14 - Certificates and Payments.

14. GC14 Certificates and Payments

14.1 The Owner's Representative will, no later than ten (10) days after the receipt of an application for payment from the Contractor submitted in accordance with GC13 - Applications for Payment, issue a certificate for payment in the amount applied for or in such other amount as he determines to be properly due. If the Owner's Representative amends the application, he will promptly notify the Contractor in writing giving his reasons for the amendment.

14.2 The Owner shall make payment to the Contractor on account in accordance with the provisions in the Agreement Section - Payment no later than thirty (30) days after the issuance of a certificate for payment by the Owner's Representative.

14.3 The Owner's Representative will, no later than ten (10) days after the receipt of an application from the Contractor for a certificate of Substantial Performance of the Work, make an inspection and assessment of the Work to verify the validity of the application. The Owner's Representative will, no later than seven (7) days after his inspection, notify the Contractor of his approval or the reasons for his disapproval of the application. When the Owner's Representative finds that Substantial Performance of the Work has been reached, he will issue such a certificate. The date of Substantial Performance of the Work shall be as stated in this certificate. Immediately following the issuance of the certificate of Substantial Performance of the Work, the Owner's Representative, in consultation with the Contractor, will establish a reasonable date for the Total Performance of the Work.

14.4 Immediately following the issuance of the certificate of Substantial Performance of the Work, the Owner's Representative will issue a certificate for payment of holdback monies. The holdback monies authorized by this certificate shall become due and payable on the day following the expiration of the statutory limitation period stipulated in the lien legislation applicable to the Place of the Work or, where such legislation does not exist or apply, in accordance with such other legislation, industry practice, or such other provisions which may be agreed to between the parties, provided that the Owner may retain out of such holdback monies any sums required by law to satisfy any liens against the Work or other monetary claims against the Contractor and enforceable against the Owner, and also provided that the Contractor has submitted to the Owner a sworn statement that all accounts for labour, subcontracts, products, construction machinery, and equipment and other indebtedness which may have been incurred by the Contractor in the Substantial Performance of the Work and for which the Owner might in any way be held responsible have been paid in full except holdback monies properly retained.

14.5 Where legislation permits and where, upon application by the Contractor, the Owner's Representative has certified that the Work of a Subcontractor has been totally performed to his satisfaction prior to the Substantial Performance of the Work, the Owner shall pay the Contractor the holdback retained for such Subcontractor on the day following the expiration of the statutory limitation period for such Subcontractor stipulated in the lien legislation applicable to the Place of the Work.

14.6 Notwithstanding the provisions of Paragraph 14.5 and notwithstanding the wording of such certificates, the Contractor shall ensure that such Work is protected pending the Total Performance of the Work and be responsible for the correction of defects in it regardless of whether or not they were apparent when such certificates were issued.

14.7 The Owner's Representative will, no later than ten (10) days after the receipt of an application from the Contractor for payment upon Total Performance of the Work, make an inspection and assessment of the Work to verify the validity of the application. The Owner's Representative will, no later than seven (7) days after his inspection, notify the Contractor of his approval or the reasons for his disapproval of the application. When the Owner's Representative finds that Total Performance of the Work has been reached, he will issue a certificate of Total Performance of the Work and certify for payment the remaining monies due to the Contractor under the Contract, less holdback monies which are required to be retained. The date of Total Performance of the Work shall be as stated in this certificate. Subject to the provisions of GC17 - Workplace, Health, Safety and Compensation Commission Insurance, Paragraph 17.1, the Owner shall, no later than fifteen (15) days after the issuance of such certificate, make payment to the Contractor in accordance with the provisions of the Agreement Section - Payment.

14.8 The release of the remaining holdback monies shall become due and payable on the day following the expiration of the statutory limitation period stipulated in the lien legislation applicable to the Place of the Work, or where such legislation does not exist or apply in accordance with such other legislation, industry practice or such other provisions which may be agreed to between the parties, provided that the Owner may retain out of such holdback monies any sums required by law to satisfy any liens against the Work or other monetary claims against the Contractor and enforceable against the Owner, and provided that the Contractor has submitted to the Owner a sworn statement that all accounts for labour, subcontracts, products, construction machinery and equipment and other indebtedness which may have been incurred by the Contractor in the Total Performance of the Work and for which the Owner might in any way be held responsible have been paid in full except holdback monies properly retained.

14.9 No payment made by the Owner under this Contract or partial or entire use or occupancy of the Work by the Owner shall constitute an acceptance of Work or products which are not in accordance with the requirements of the Contract Document.

14.10 All certificates issued by the Owner's Representative shall be to the best of his knowledge, information, and belief. By issuing any certificate, the Owner's Representative does not guarantee the correctness or completeness of the Work.

14.11 As of the date of Total Performance of the Work, as set out in the certificate of Total Performance of the Work, the Owner expressly waives and releases the Contractor from all claims against the Contractor including, without limitation, those that might arise from the negligence or breach of contract by the Contractor, except one or more of the following:

(a) those made in writing prior to the date of Total Performance of the Work and still unsettled;

(b) those arising from the provisions of GC18 - Indemnification or GC23 - Warranty; and

(c) those made in writing within a period of six (6) years from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, or within such shorter period as may be prescribed by any limitation statute of the province or territory of the Place of the Work and arising from any liability of the Contractor for damages resulting from his performance of the Contract with respect to substantial defects or deficiencies in the Work for which the Contractor is proven responsible.

As used herein, "substantial defects or deficiencies" means those defects or deficiencies in the Work which affect the Work to such an extent or in such a manner that a significant part or the whole of the Work is unfit for the purpose intended by the Contract Document.

14.12 As of the date of Total Performance of the Work, as set out in the certificate of Total Performance of the Work, the Contractor expressly waives and releases the Owner from all claims against the Owner including, without limitation, those that might arise from the negligence or breach of contract by the Owner except those made in writing prior to the Contractor's application for payment upon Total Performance of the Work and still unsettled.

14.13 Notwithstanding GC1 - Contract Document, Paragraph 1.6, in the event of conflict between the provisions of this General Condition and the Agreement Section - Rights and Remedies, Paragraph (a) or GC21 - Damages and Mutual Responsibility, the provisions of this General Condition shall govern.

15. GC15 Taxes and Duties

15.1 Unless otherwise stated in the General Conditions, the Contractor shall pay the government sales taxes, customs duties, and excise taxes with respect to the Contract.

15.2 Where an exemption or recovery of government sales taxes, customs duties, or excise taxes is applicable to the Contract, the procedure shall be as established in the General Conditions.

15.3 Any increase or decrease in costs to the Contractor due to any government legislated changes in such taxes and duties after the date of the Tender, shall increase or decrease the Contract Price accordingly.

16. GC16 Laws, Notices, Permits and Fees

16.1 The laws of Newfoundland and Labrador and the federal laws of Canada applicable therein shall govern the Work. The parties agree to submit to the exclusive jurisdiction of the courts of Newfoundland and Labrador.

16.2 The Contractor shall obtain the permits, licenses, and certificates and pay the fees required for the performance of the Work which are in force at the date of Tender closing, but this shall not include the obtaining of permanent easements or rights of servitude.

16.3 The Contractor shall give the required notices and comply with the laws, ordinances, rules, regulations, codes, and orders of the authorities having jurisdiction which are or become in force during the performance of the Work and which relate to the Work, to the preservation of the public health, and to construction safety.

16.4 The Contractor shall not be responsible for verifying that the Contract Document is in compliance with the applicable laws, ordinances, rules, regulations, and codes relating to the Work. If the Contract Document is at variance therewith, or changes which require modification to the Contract Document are made to the laws, ordinances, rules, regulations, or codes by the authorities having jurisdiction subsequent to the date of the Tender closing, the Contractor shall notify the Owner's Representative in writing requesting direction immediately such variance or change becomes known to him. The Owner's Representative will make the changes required to the Contract Document in accordance with GC11 - Changes in the Work and Extra Work and the value of the changes shall be determined in accordance with GC12 - Valuation and Certification of Changes in the Work.

16.5 If the Contractor fails to notify the Owner's Representative in writing and obtain his direction as required in Paragraph 16.4 and performs Work knowing it to be contrary to any laws, ordinances, rules, regulations, codes, or orders of the authorities having jurisdiction, the Contractor shall be responsible for and shall correct the violations thereof and shall bear the costs, expense, and damages attributable to his failure to comply with the provisions of such laws, ordinances, rules, regulations, codes, or orders.

17. GC17 Workplace, Health, Safety and Compensation Commission Insurance

17.1 Prior to commencing the Work and prior to receiving payment on Substantial and Total Performance of the Work, the Contractor shall provide evidence of compliance with the requirements of the Workplace and Health, Safety and Compensation Act.

17.2 At any time during the term of the Contract, when requested by the Owner, the Contractor shall provide such evidence of compliance by himself and his Subcontractors.

18. GC18 Indemnification

18.1 The Contractor shall indemnify and hold harmless and defend the Owner and the Owner's Representative, their agents, and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings by third parties that arise out of, or are attributed to, the Contractor's performance of the Contract (hereinafter called "claims"), provided such claims are:

(a) attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property;

(b) caused by negligent acts or omissions of the Contractor or anyone for whose acts he may be liable; and,

(c) made in writing within a period of six (6) years from the date of Substantial Performance of the Work as set out in the certificate of Substantial Performance of the Work, or within such shorter period as may be prescribed by any limitation statute of the province or territory of the place of the Work.

The Owner expressly waives the right to indemnity for claims other than those stated above.

18.2 The Owner shall indemnify and hold harmless the Contractor, his agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the Contractor's performance of the Contract which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the Place of the Work.

18.3 Notwithstanding GC1 - Contract Document, Paragraph 1.6, in the event of conflict between the provisions of this General Condition and the Agreement Section - Rights and Remedies, Paragraph (a) or GC21 - Damages and Mutual Responsibility, the provisions of this General Condition shall govern.

19. GC19 Insurance

Without restricting the generality of GC18 - Indemnification, the Contractor shall provide, maintain and pay for a minimum level of insurance as outlined below:

(a) Commercial General Liability Insurance

The Contractor shall provide and maintain at his expense, a Comprehensive General Liability Insurance with a minimum limit of five million dollars ($5,000,000) inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof with a property damage deductible of $25,000 per occurrence which includes, without limitation, the following extensions:

(i) All premises and operations liability.
(ii) Products and completed operations liability.
(iii) Blanket contractual liability.
(iv) Cross liability.
(v) Personal injury liability.
(vi) Contingent employers' liability.
(vii) Nonowned automobile.
(viii) Owner's and Contractor's protective liability.
(ix) Occurrence based property damage.
(x) Broad form property damage, including completed operations.
(xi) Broad form automobile.
(xiii) Use of explosives for blasting (on a required basis).

(xiv) Medical payments with a limit of $25,000.00 per occurrence.
(xv) Employees as additional insured.

(b) Automobile Third Party Liability Insurance

The Contractor shall provide and maintain at his expense, Automobile Third Party Public Liability Insurance for a minimum limit of $2,000,000 in respect of all automobiles owned, leased, or operated.

(c) Marine Liability (Protection & Indemnity)

The Contractor shall provide and maintain at his expense, a Marine Liability Insurance with a minimum limit of five million dollars ($5,000,000) in respect of all owned, leased and chartered vessels. Coverage should include pollution as well as crew liability (including transportation, wages, maintenance and cure), third party bodily injury, wreckage and debris removal and property damage liability. It should also provide for Collision/Towers liability as well as contractual liability. The policy should also be endorsed for “special operations” for cable laying.

(d) Hull and Machinery Insurance

The Contractor shall provide and maintain at his expense, a Hull and Machinery Liability Insurance for a minimum limit equal to full market value of all owned, leased and chartered vessels.

(e) Cargo Insurance

The Contractor shall provide and maintain at his expense, an all risk Cargo Insurance for the full value of the submarine cable and other cargo to be shipped including the cost of freight and insurance, including war risk, while waterbourne.

(f) The Contractor shall provide, maintain and pay for, during the entire Term of this Agreement, all insurance coverage as required by the terms of the attached “Appendix A, Certificate of Insurance” to this Agreement. Proof of the required insurance shall be provided to the Owner, prior to the commencement of the Work, by a original Certificate of Insurance in the form provided in “Appendix A, Certificate of Insurance”, signed by the Contractor’s Insurance Broker.

19.1 The Contractor shall provide proof of any renewed insurance to the Owner, by a Certificate of Insurance in the form provided in Appendix A, and signed by the Contractor’s insurance broker within two weeks of renewal. Should the Contractor change insurance brokers during the term of the Contract, the Contractor shall notify the Owner in writing within seven days.

19.2 If the Contractor fails to provide or maintain insurance as required in this General Condition or elsewhere in the Contract Document, then the Owner shall have the right to provide and maintain such insurance and give evidence thereof to the Contractor and the Owner's Representative. The cost thereof shall be payable by the Contractor to the Owner on demand or the Owner may deduct the costs thereof from monies which are due or may become due to the Contractor.

19.3 The Contractor shall be responsible for any deductible amounts under the insurance policy.

19.4 All insurance policies maintained by the Contractor must state that it will be the primary insurance.

19.5 The Owner shall individually be named as an additional insured on the Contractor's Comprehensive General Liability and Marine Liability (Protection & Indemnity) policies. The Owner shall also be individually named as an additional insured under the Hull and Machinery policy in the event coverage for collision liability is provided under this policy.

19.6 The Contractor waives all rights against the Owner for damages caused by any peril to the extent covered by insurance provided under the insurance requirements of this Agreement. The Contractor shall require similar waivers by Subcontractors and Sub-Subcontractors. All insurance policies required hereunder shall permit and recognize such waivers of subrogation.

19.7 All insurance policies must be placed with insurance companies that meet with the approval of the Owner, which approval shall not unreasonably be withheld.

19.8 All insurance policies shall be endorsed to provide the Owner with at least thirty (30) days notice of cancellation, or any other material reduction of coverage, scope or limits.

19.9 The Owner shall have the right to request from the Contractor's insurance broker, an updated Certificate of Insurance at any time during the term of the Contract.

20. GC20 Protection of Work and Property

20.1 The Contractor shall protect the Work and the Owner's property and property adjacent to the Place of the Work from damage and shall be responsible for damage which may arise as the result of his operations under the Contract except damage which occurs as the result of:

(a) errors in the Contract Document; or

(b) acts or omissions by the Owner, the Owner's Representative, Other Contractors, their agents and employees.

20.2 Before commencing any work, the Contractor shall determine the location of all underground utilities and structures indicated in the Contract Document or that are reasonably apparent in an inspection of the Place of the Work.

20.3 Should the Contractor in the performance of this Contract damage the Work, the Owner's property or property adjacent to the Place of the Work, the Contractor shall be responsible for the making good of such damage at his expense.

20.4 Should damage occur to the Work or Owner's property for which the Contractor is not responsible as provided in Paragraph 20.1, he shall make good such damage to the Work, and if the Owner so directs to the Owner's property, and the Contract Price and Contract Time shall be adjusted in accordance with GC11 -Changes in the Work and Extra Work, and the value of the changes shall be determined in accordance with GC12 - Valuation and Certification of Changes in the Work.

21. GC21 Damages and Mutual Responsibility

21.1 If either party to this Contract should suffer damage in any manner because of any wrongful act or neglect of the other party or of anyone for whom he is responsible in law, then he shall be reimbursed by the other party for such damage. The party reimbursing the other party shall be subrogated to the rights of the other party in respect of such wrongful act or neglect if it be that of a third party.

21.2 Claims under this General Condition shall be made in writing to the party liable within a reasonable time after the first observance of such damage and may be adjusted by agreement or in the manner set out in GC7 - Disputes.

21.3 If the Contractor has caused damage to another contractor on the Work, the Contractor agrees upon due notice to settle with such Other Contractor by agreement or arbitration, if he will so settle. If such Other Contractor sues the Owner on account of damage alleged to have been so sustained, the Owner shall notify the Contractor and may require the Contractor to defend the action at the Contractor's expense. If a final order or judgement against the Owner arises therefrom, the Contractor shall pay or satisfy it and pay the costs incurred by the Owner.

21.4 If the Contractor becomes liable to pay or satisfy a final order, judgement, or award against the Owner, then the Contractor, upon undertaking to indemnify the Owner against any and all liability for costs, shall have the right to appeal in the name of the Owner such final order or judgement to any and all courts of competent jurisdiction.

22. GC22 Bonds

22.1 The Owner will require the Contractor to provide and maintain a Performance Bond in the amount of one hundred percent (100%) of the Total Estimated Contract Price. The Performance Bond must be received prior to execution of the Agreement.

22.2 The Owner will require the Contractor to provide a Labour and Materials Bond in the amount of fifty percent (50%) of the Total Estimated Contract Price. The Labour and Materials Bond must be received prior to the execution of the Agreement.

22.3 All bonds shall be issued by a duly licensed surety company authorized to transact a business of suretyship in the Province of Newfoundland and Labrador.

22.4 The costs of obtaining the required bonds are to be borne by the Contractor.

22.5 The Contractor shall promptly provide to the Owner any bonds that are required.

23. GC23 Warranty

23.1 The Contractor shall be responsible for the proper performance of the Work only to the extent that the design and Specifications permit such performance.

23.2 Subject to Paragraph 23.1, the Contractor agrees to correct promptly, at his own expense, defects, or deficiencies in the Work which appear prior to and during the period of three (3) years from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, or such longer periods as may be specified for certain products or Work.

23.3 During the period provided in GC3 - Owner's Representative, Paragraph 3.2, the Owner's Representative shall promptly give the Contractor written notice of observed defects and deficiencies.

23.4 The Contractor agrees to correct or pay for damage resulting from correction made under the requirements of Paragraph 23.2.

24. GC24 Contractor's Responsibilities and Control of the Work

24.1 The Contractor shall have complete control of the Work and shall effectively direct and supervise the Work so as to ensure conformance with the Contract Document. He shall be solely responsible for construction means, methods, techniques, sequences and procedures and for coordinating the various parts of the Work under the Contract.

24.2 The Contractor shall be solely responsible for construction safety at the Place of the Work and for compliance with the rules, regulations, and practices required by the applicable construction safety legislation.

24.3 The Contractor shall have the sole responsibility for the design, erection, operation, maintenance, and removal of Temporary Work and the design and execution of construction methods required in their use. The Contractor shall engage and pay for registered professional engineering personnel, skilled in the appropriate disciplines to perform these functions where required by law or by the Contract Document, and in all cases where such Temporary Work and their method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

24.4 Notwithstanding the provisions of Paragraphs 24.1 and 24.3, or provisions to the contrary elsewhere in the Contract Document where such Contract Document includes designs for Temporary Work or specify a method of construction in whole or in part, such facilities and methods shall be considered to be part of the design of the Work and the Contractor shall not be held responsible for that part of the design or the specified method of construction. The Contractor shall, however, be responsible for the execution of such design or specified method of construction in the same manner that he is responsible for the execution of the Work.

24.5 The Contractor shall review the Contract Document and shall promptly report to the Owner's Representative any error, inconsistency or omission he may discover. Such review by the Contractor shall be to the best of his knowledge, information, and belief and in making such review the Contractor does not assume any responsibility to the Owner or the Owner's Representative for the accuracy of the review. The Contractor shall not be liable for damage or costs resulting from such errors, inconsistencies or omissions in the Contract Document that he did not discover. If the Contractor does discover any error, inconsistency or omission in the Contract Document, he shall not proceed with the Work affected until he has received corrected or missing information from the Owner's Representative.

24.6 The Contractor shall prepare and update, as required, a construction schedule indicating the timing of the major activities of the Work. The schedule shall be designed to ensure conformance with the required Contract Time. The schedule shall be submitted to the Owner and the Owner's Representative for their information within a reasonable time from the date of Contract award. The Contractor shall monitor the progress of the Work relative to the schedule and advise the Owner's Representative of any revisions required as the result of delays as provided in GC4 - Delays, indicating the results expected from the resultant change in schedule.

25. <u>GC25 Superintendence</u>

25.1 The Contractor shall employ a competent supervisor and necessary assistants who shall be in attendance at the Place of the Work while Work is being performed.

25.2 The supervisor shall be satisfactory to the Owner's Representative and shall not be changed except for good reason and only then after consultation with the Owner's Representative.

25.3 The supervisor shall represent the Contractor at the Place of the Work and instructions given to him by the Owner's Representative shall be held to have been given to the Contractor. Important instructions shall be confirmed to the Contractor in writing; other instructions shall be so confirmed if requested.

26. GC26 Labour and Products

26.1 Unless otherwise stipulated elsewhere in the Contract Document, the Contractor shall provide and pay for labour, products, tools, construction machinery, and equipment, water, heat, light, power, transportation and other facilities and services necessary for the Performance of the Work in accordance with the Contract.

26.2 Products provided shall be new unless otherwise specified in the Contract Document. Products that are not specified shall be of a quality best suited to the purpose required and their use subject to the approval of the Owner's Representative.

26.3 The Contractor shall maintain good order and discipline among his employees engaged on the Work and shall not employ on the Work anyone not skilled in the task assigned to him.

27. GC27 Subsurface Conditions

27.1 The Contractor shall promptly notify the Owner's Representative in writing, if in his opinion, the subsurface conditions at the Place of the Work differ materially from those indicated in the Contract Document, or a reasonable assumption of probable conditions based thereon.

27.2 After prompt investigation, should the Owner's Representative determine that conditions do differ materially, he will issue appropriate instructions for Changes in the Work in accordance with GC11 - Changes in the Work and Extra Work, and the value of the changes shall be determined in accordance with GC12 - Valuation and Certification of Changes in the Work.

28. GC28 Use of the Work

28.1 The Contractor shall confine his apparatus, the storage of products, and the operations of his employees to limits indicated by laws, ordinances, permits, or the Contract Document and shall not unreasonably encumber the premises with his products.

28.2 The Contractor shall not load or permit to be loaded any part of the Work with a weight or force that will endanger the safety of the Work.

29. <u>GC29 Cleanup and Final Cleaning of the Work</u>

29.1 The Contractor shall maintain the Work in a tidy condition and free from the accumulation of waste products and debris, other than that caused by the Owner, Other Contractors or their employees.

29.2 Upon attaining Substantial Performance of the Work, the Contractor shall remove his surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work. He shall also remove waste products and debris other than that caused by the Owner, Other Contractors, or their employees and leave the Work clean and suitable for occupancy by the Owner unless otherwise specified.

29.3 Total Performance of the Work shall not be attained until the Contractor has removed his surplus products, tools, construction machinery, and equipment. He shall also have removed waste products and debris, other than that caused by the Owner, Other Contractors, or their employees.

30. <u>GC30 Cutting and Remedial Work</u>

30.1 The Contractor shall do the cutting and remedial Work required to make the several parts of the Work come together properly.

30.2 The Contractor shall coordinate the Work to ensure that this requirement is kept to a minimum.

30.3 Should the Owner, the Owner's Representative, Other Contractors or anyone employed by them be responsible for ill-timed Work necessitating cutting or remedial Work to be performed, the cost of such cutting or remedial Work shall be valued as provided in GC12 - Valuation and Certification of Changes in the Work.

30.4 Cutting and remedial Work shall be performed by specialists familiar with the materials affected and shall be performed in a manner to neither damage nor endanger the Work.

31. <u>GC31 Inspection of the Work</u>

31.1 The Owner and the Owner's Representative or their authorized agents or representatives shall at all times have access to the Work. If parts of the Work are in preparation at locations other than the Place of the Work, the Owner and the Owner's Representative or their authorized agents or representatives shall be given access to such Work whenever it is in progress.

31.2 If Work is designated for special tests, inspections, or approvals in the Contract Document, by the Owner's Representative's instructions, or the laws or ordinances of the Place of the Work, the Contractor shall give the Owner's Representative timely notice requesting inspection. Inspection by the Owner's Representative shall be made promptly. The Contractor shall arrange for inspections by other authorities and shall give the Owner's Representative timely notice of the date and time.

31.3 If the Contractor covers, or permits to be covered, Work that has been designated for special tests, inspections, or approvals before such special tests, inspections, or approvals are made, given or completed, he shall, if so directed, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work at his own expense.

31.4 The Owner's Representative may order any part or parts of the Work to be specially examined should he believe that such Work is not in accordance with the requirements of the Contract Document. If, upon examination such Work be found not in accordance with the requirements of the Contract Document, the Contractor shall correct such Work and pay the cost of examination and correction. If such Work be found in accordance with the requirements of the Contract Document, the Owner shall pay the cost of examination and replacement.

31.5 The Contractor shall furnish promptly to the Owner's Representative, two (2) copies of certificates and inspection reports relating to the Work.

31.6 The Contractor shall pay the cost of making any test or inspection, including the cost of samples required for such test or inspection, if such test or inspection is designated in the Contract Document to be performed by the Contractor or is designated by the laws or ordinances applicable to the Place of the Work.

31.7 The Contractor shall pay the cost of samples required for any test or inspection to be performed by the Owner's Representative if such test or inspection is designated in the Contract Document.

32. <u>GC32 Rejected Work</u>

32.1 Defective Work, whether the result of poor workmanship, use of defective products, or damage through carelessness or other act or omission of the Contractor, and whether incorporated in the Work or not, which has been rejected by the Owner's Representative as failing to conform to the Contract Document, shall be removed promptly from the Place of the Work by the Contractor and replaced or re-executed promptly in accordance with the Contract Document at the Contractor's expense.

32.2 Other Contractors' work destroyed or damaged by such removals or replacements shall be made good promptly at the Contractor's expense.

32.3 If in the opinion of the Owner's Representative it is not expedient to correct defective Work or Work not performed in accordance with the Contract Document, the Owner may deduct from the monies otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract Document, the amount of which will be determined in the first instance by the Owner's Representative.

33. GC33 Shop Drawings

33.1 The Contractor shall arrange for the preparation of clearly identified Shop Drawings as called for by the Contract Document or as the Owner's Representative may reasonably request.

33.2 Prior to submission to the Owner's Representative, the Contractor shall review all Shop Drawings. By this review, the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers, and similar data or will do so and that he has checked and coordinated each Shop Drawing with the requirements of the Work and of the Contract Document. The Contractor's review of each Shop Drawing shall be indicated by stamp, date, and signature of a responsible person.

33.3 The Contractor shall submit Shop Drawings to the Owner's Representative for his review with reasonable promptness and in orderly sequence so as to cause no delay in the Work or in the Work of Other Contractors. If either the Contractor or the Owner's Representative so requests, they shall jointly prepare a schedule fixing the dates for submission and return of Shop Drawings. Shop Drawings shall be submitted in the form of reproducible transparencies or prints as the Owner's Representative may direct. At the time of submission, the Contractor shall notify the Owner's Representative in writing of any deviations in the Shop Drawings from the requirements of the Contract Document.

33.4 The Owner's Representative will review and return Shop Drawings in accordance with any schedule agreed upon, or otherwise with reasonable promptness so as to cause no delay. The Owner's Representative's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or of responsibility for meeting all requirements of the Contract Document unless a deviation on the Shop Drawings has been approved in writing by the Owner's Representative.

33.5 The Contractor shall make any changes in Shop Drawings which the Owner's Representative may require consistent with the Contract Document and resubmit unless otherwise directed by the Owner's Representative. When resubmitting, the Contractor shall notify the Owner's Representative, in writing, of any revisions other than those requested by the Owner's Representative.

34. GC34 Environment

34.1 The Contractor shall ensure that its employees, Subcontractors, and their employees, and the Work, comply with:

(a) all applicable environmental legislation, rules, regulations and requirements of all authorities having jurisdiction which are in force or come into force during the performance of the Work by the Contractor during this Agreement;

(b) the Owner's "Contractor Environmental Responsibilities" as amended from time to time;

(c) all environmental procedures developed and used by the Owner of which the Contractor is made aware; and

(d) such other rules and regulations as the Owner may establish.

34.2 The Owner shall obtain environmental approvals for the commencement of the Work from the appropriate federal, provincial, and municipal authorities. Any conditions required by such authorities shall be submitted to the Contractor for incorporation in the Contract. The Contractor shall then be responsible for obtaining all other necessary permits and approvals required for compliance with government laws and regulations.

34.3 Prior to the commencement of the Work and at the discretion of the Owner, the Contractor or the Contractor's designee shall attend a two-hour Environmental Competency Training course offered by the Owner. Upon successful completion of this training and prior to the commencement of the Work the Contractor shall ensure that:

(a) the Environmental Competency Training course prescribed in Paragraph 34.3 is delivered by the Contractor or the Contractor's designee to every employee of the Contractor, its Subcontractors and their employees who will be engaged in the performance of the Work;

(b) each person to whom the course is delivered completes a quiz provided by the Owner with a minimum 70% grade mark. A copy of the quiz shall be provided to the Owner as evidence of successful completion of the training; and

(c) no worker will be permitted to be engaged in the performance of the Work unless they have attended the training and successfully completed the quiz prescribed by Paragraph 34.3 (b).

34.4 Notwithstanding the Contractor’s Environmental Responsibilities, in the event of any spill of petroleum product or hazardous substance by the Contractor or anyone acting on behalf of the Contractor or under the Contractor’s direction, including subcontractors, the Owner may in its sole discretion initiate emergency spill response, including initial containment and any and all mitigation measures deemed by the Owner to be appropriate in the circumstances, whether required by law or not. Initiation by the Owner of spill response in accordance with this clause shall not relieve the Contractor of any responsibility associated with the spill, legal or otherwise, and the Contractor shall be responsible for all of the costs reasonably incurred in connection therewith. The Owner may deduct the cost of the spill response from any payment then or thereafter due the Contractor by the Owner.

35. <u>GC35 Safety</u>

35.1 The Contractor shall ensure that its employees, Subcontractors and their employees, and the Work, comply with:

(a) all applicable safety legislation, rules, regulations and requirements of all authorities having jurisdiction which are in force or come into force during the performance of the Work by the Contractor during this Agreement;

(b) the Occupational Health and Safety Act;

(c) the Owner’s Contractor Safety Responsibilities as amended from time to time;

(d) the Owner’s Operations Manual, any additional regulations as attached, and with all specified health and safety standards, policies and procedures established for and used by the Owner, and,

(e) such other rules and regulations as the Owner may establish.

35.2 Prior to the initial commencement of Work under this Contract, a pre-job meeting between the Owner and the Contractor shall be conducted to communicate and clarify the Owner's expectations with respect to health and safety requirements.

35.3 Prior to the commencement of Work the Contractor shall provide a letter of good standing from the Newfoundland and Labrador Construction Safety Association (NLCSA) to demonstrate they have achieved Certificate of Recognition (COR) status. In lieu of the Certificate of Recognition, an equivalent safety standard as specified in the Owner’s Contractor Safety Responsibilities may be accepted by the Owner. The Contractor shall:

(a) remain in good standing with the Newfoundland and Labrador Construction Safety Association with respect to the Certificate of Recognition status for the duration of the Contract;

(b) be responsible to ensure that all Subcontractors hired by the Contractor for this Contract have achieved Certificate of Recognition (COR) status and remain in good standing with the Newfoundland and Labrador Construction Safety Association with respect to the Certificate of Recognition status for the duration of the Contract; and

(c) prior to the commencement of the Work and at any time thereafter upon request from the Owner, provide a copy of the Contractor's or Subcontractor's Certificate of Recognition status from the Newfoundland and Labrador Construction Safety Association for the duration of the Contract.

35.4 Prior to the commencement of the Work and at the discretion of the Owner, the Contractor or the Contractor's designee shall attend a two-hour health and safety training course offered by the Owner. Upon successful completion of this training and prior to the commencement of the Work the Contractor shall ensure that:

(a) the health and safety training course prescribed in Paragraph 35.4 is delivered by the Contractor or the Contractor's designee to every employee of the Contractor, its Subcontractors and their employees who will be engaged in the performance of the Work;

(b) each person to whom the course is delivered completes a quiz provided by the Owner with a minimum 70% grade mark. A copy of the quiz shall be forwarded to the Owner as evidence of successful completion of the training; and

(c) no worker will be permitted to be engaged in the performance of the Work unless they have attended the two-hour health and safety training course and successfully completed the quiz prescribed by Paragraph 35.4 (b).

35.5 Prior to the commencement of the Work, the Contractor shall sign a competency letter provided by the Owner, which indicates that the Contractor's employees, Subcontractors and their employees are competent to perform the Work assigned to them in a safe, healthy and environmentally responsible manner. These claims shall be supported with appropriate documentation as detailed in the Contract Document and as requested by the Owner. No Work shall commence until the competency letter has been provided to the Owner

36. GC36 Toxic and Hazardous Substances

36.1 For the purposes of applicable legislation related to toxic and hazardous substances, the Owner shall be deemed to have control and management of the Place of the Work with respect to existing conditions.

36.2 Prior to the Contractor commencing the Work, the Owner shall:

(a) take all reasonable steps to determine whether any toxic or hazardous substances are present at the Place of the Work, and

(b) provide the Owner’s Representative and the Contractor with a written list of any such substances that are known to exist and their locations.

36.3 The Owner shall take all reasonable steps to ensure that no person’s exposure to any toxic or hazardous substances exceeds the time weighted levels prescribed by applicable legislation at the Place of the Work and that no property is damaged or destroyed as a result of exposure to, or the presence of, toxic or hazardous substances which were at the Place of the Work prior to the Contractor commencing the Work.

36.4 Unless the Contract expressly provides otherwise, the Owner shall be responsible for taking all necessary steps, in accordance with applicable legislation in force at the Place of the Work, to dispose of, store or otherwise render harmless toxic or hazardous substances which were present at the Place of the Work prior to the Contractor commencing the Work.

36.5 If the Contractor encounters toxic or hazardous substances at the Place of the Work, or has reasonable grounds to believe that toxic or hazardous substances are present at the Place of the Work, which were not brought to the Place of the Work by the Contractor or anyone for whom the Contractor is responsible and which were not disclosed by the Owner or which were disclosed but have not been dealt with as required under Paragraph 36.4, the Contractor shall:

(a) take all reasonable steps, including stopping the Work, to ensure that no person’s exposure to any toxic or hazardous substances exceeds any applicable time weighted levels prescribed by applicable legislation at the Place of the Work, and

(b) immediately report the circumstances to the Owner’s Representative in writing.

36.6 If the Owner and Contractor do not agree on the existence, significance of, or whether the toxic or hazardous substances were brought onto the Place of the Work by the Contractor or anyone for whom the Contractor is responsible, the Owner shall retain and pay for an independent qualified expert to investigate and determine such matters. The expert’s report shall be delivered to the Owner and the Contractor.

36.7 If the Owner and Contractor agree or if the expert referred to in Paragraph 36.6 determines that the toxic or hazardous substances were not brought onto the Place of the Work by the Contractor or anyone for whom the Contractor is responsible, the Owner shall promptly at the Owner’s own expense:

(a) take all steps as required under Paragraph 36.4;

(b) reimburse the Contractor for the costs of all steps taken pursuant to Paragraph 36.5;

(c) extend the Contract time for such reasonable time as the Owner's Representative may recommend in consultation with the Contractor and the expert referred to in Paragraph 36.6 and reimburse the Contractor for reasonable costs incurred as a result of the delay; and

(d) indemnify the Contractor as required by GC18- Indemnification.

36.8 If the Owner and Contractor agree or if the expert referred to in Paragraph 36.6 determines that the toxic or hazardous substances were brought onto the Place of the Work by the Contractor or anyone for whom the Contractor is responsible, the Contractor shall promptly at the Contractor's own expense:

(a) take all necessary steps, in accordance with applicable legislation in force at the Place of the Work, to safely remove and dispose the toxic or hazardous substance;

(b) make good any damage to the Work, the Owner's property or property adjacent to the Place of the Work as provided in Paragraph 20.3 of GC20 – Protection of Work and Property;

(c) reimburse the Owner for reasonable costs incurred under Paragraph 36.6; and

(d) indemnify the Owner as required by GC18 - Indemnification.

36.9 If either party does not accept the expert's findings under Paragraph 36.6, the disagreement shall be settled in accordance with GC7 - Disputes. If such disagreement is not resolved promptly, the parties shall act immediately in accordance with the expert's determination and take the steps required by Paragraph 36.7 or 36.8 it being understood that by so doing, neither party will jeopardize any claim that party may have to be reimbursed as provided by GC36 – Toxic and Hazardous Substances.

37. GC37 Mould

37.1 If the Contractor or Owner observes or reasonably suspects the presence of mould at the Place of the Work, the remediation of which is not expressly part of the Work,

(a) the observing party shall promptly report the circumstances to the other party in writing, and

(b) the Contractor shall promptly take all reasonable steps, including stopping the Work if necessary, to ensure that no person suffers injury, sickness or death and that no property is damaged as a result of exposure to or the presence of the mould, and

(c) if the Owner and Contractor do not agree on the existence, significance or cause of the mould or as to what steps need be taken to deal with it, the Owner shall retain and pay for an independent qualified expert to investigate and determine such matters. The expert's report shall be delivered to the Owner and Contractor.

37.2 If the Owner and Contractor agree, or if the expert referred to in Paragraph 37.1 (c) determines that the presence of mould was caused by the Contractor's operations under the Contract, the Contractor shall promptly, at the Contractor's own expense:

(a) take all reasonable and necessary steps to safely remediate or dispose of the mould, and

(b) make good any damage to the Work, the Owner's property or property adjacent to the Place of the Work as provided in Paragraph 20.3 of GC 20 – Protection of Work and Property, and

(c) reimburse the Owner for reasonable costs incurred under Paragraph 37.1 (c), and

(d) indemnify the Owner as required by GC18 – Indemnification.

37.3 If the Owner and Contractor agree, or if the expert referred to in Paragraph 37.1 (c) determines that the presence of mould was not caused by the Contractor's operations under the Contract, the Owner shall promptly, at the Owner's own expense:

(a) take all reasonable and necessary steps to safely remediate or dispose of the mould, and

(b) reimburse the Contractor for the cost of taking the steps under Paragraph 37.1 (b) and making good any damage to the Work as provided in Paragraph 20.4 of GC20 – Protection of Work and Property, and

(c) extend the Contract Time for such reasonable time as the Owner's Representative may recommend in consultation with the Contractor and the expert referred to in Paragraph 37.1 (c) and reimburse the Contractor for reasonable costs incurred as a result of the delay, and

(d) indemnify the Contractor as required by GC18 – Indemnification.

37.4 If either party does not accept the expert's finding under Paragraph 37.1 (c), the disagreement shall be settled in accordance with GC7 - Disputes. If such disagreement is not resolved promptly, the parties shall act immediately in accordance with the expert's determination and take the steps required by Paragraphs 37.2 or 37.3, it being understood that by so doing neither party will jeopardize any claim the party may have to be reimbursed as provided by GC37- Mould.

38. GC38 Artifacts and Fossils

38.1 Fossils, coins, articles of value or antiquity, structures and other remains or things of scientific or historic interest discovered at the Place or Work shall, as between the Owner and the Contractor, be deemed to be the absolute property of the Owner.

38.2 The Contractor shall take all reasonable precautions to prevent removal or damage to discoveries as identified in Paragraph 38.1, and shall advise the Owner's Representative upon discovery of such items.

38.3 The Owner's Representative will investigate the impact on the Work of the discoveries identified in Paragraph 38.1. If conditions are found that would cause an increase or decrease in the Contractor's cost or time to perform the Work, the Owner's Representative will issue appropriate instructions for a change in the Work as provided in GC11 - Changes in the Work and Extra Work.

SUPPLEMENTARY CONDITIONS

[Intentionally left blank.]

APPENDIX A

CERTIFICATE OF INSURANCE

CERTIFICATE OF INSURANCE

NEWFOUNDLAND POWER
A FORTIS COMPANY

Attn: Insurance Representative, please complete this Certificate of Insurance.

13-059 Supply and Installation of Bell Island Submarine Cable System

Contract Number **Contract Name**

Broker Name **Address**

Contractor's Company Legal Name **Address**

Newfoundland Power Inc. P. O. Box 8910, St. John's, Newfoundland, A1B 3P6

Individual Named as Additional Insured for: **Address**

(Comprehensive General Liability, Marine Liability and Hull & Machinery Insurance)

This document certifies that the following policies of insurance and indicated coverage are at present in force subject to the terms, conditions and exclusions as contained therein covering the operations of the insured in connection with the above noted Contract made between the Contractor and Newfoundland Power Inc.

Policy Type	Required	Limits of Liability	Insurer & Policy Number	Inception Date D/M/Y	Expiry Date D/M/Y
Comprehensive General Liability including:	X	Minimum limit $5,000,000 per occurrence & maximum deductible $25,000 property damage			
• *Cross Liability*	X	As per policy limit			
• *Non-owned auto*	X	As per policy limit			
• *Forest fire fighting expenses*		As per policy limit			
• *Use of explosives for blasting*		Minimum limit $500,000			
• *Collapse & Underpinning*		As per policy limit			
Automobile Third Party Liability including:	X	Minimum limit $2,000,000			
• *Off-road vehicles (snowmobiles, ATVs, etc) liability coverage*		As per policy limit			
Marine Liability (Protection & Indemnity)	X	Minimum limit $5,000,000			
Non-owned watercraft		Minimum limit $2,000,000			
Environment Impairment Liability		Minimum limit $2,000,000 & maximum deductible $5,000			
Hull & Machinery Insurance	X	Minimum limit equal to full market value of the Vessel(s)			
Fidelity Bond		Minimum limit of $250,000 & maximum deductible of $1,000			
Hook/Riggers Liability					
Cargo Insurance	X	Minimum limit equal to value of cargo being shipped			
Professional Liability		Minimum limit $1,000,000			

The Insurer will endeavor to notify Newfoundland Power Inc., in writing, 30 days prior to cancellation or material change of any policy, except in the event of nonpayment, where policy conditions dealing with termination will apply. Name of Insurer's Officer or Authorized

Insurance Representative: (**Please Print**)______________________________

Insurance Representative: Signature: ______________________ **Date:**____________

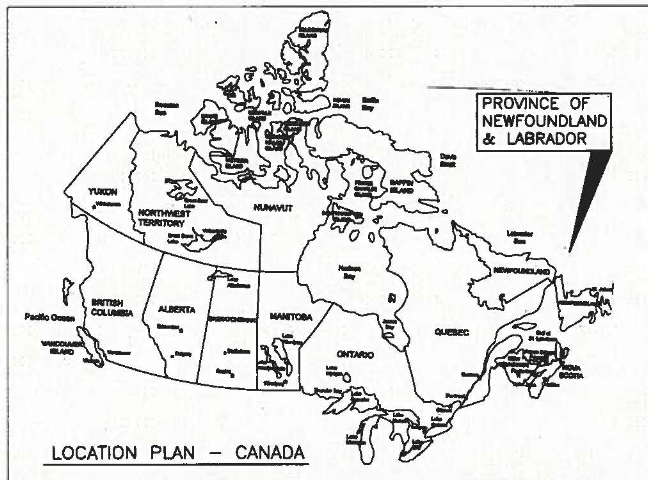
Phone #: ______________________ **Email Address:** ______________________________

DRAWINGS

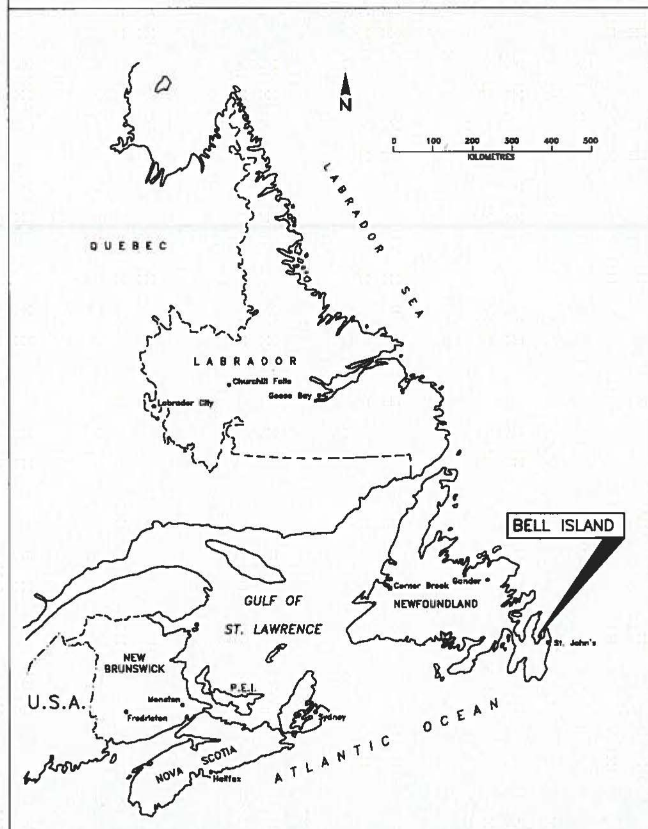
List of Drawings

Drawing No.	Drawing Revision #	Drawing Title
0001	PA	Bell Island Submarine Power Cable System – Location Plan
0002	PA	Bell Island Submarine Power Cable System – Site Plan
0003	Rev 1	Bell Island Submarine Power Cable System Plan & Profile of Proposed Cable Route No. 1
0004	Rev 1	Bell Island Submarine Power Cable System Plan & Profile of Proposed Cable Route No. 2
0005	Rev 1	Bell Island Submarine Power Cable System Plan & Profile of Proposed Cable Route No. 3
0006	Rev 1	Bell Island Submarine Power Cable System Plan & Profile of Proposed Cable Route No. 4
0007	PA	Bell Island Submarine Power Cable System – Shore Approaches
0008	Rev 1	Bell Island Submarine Power Cable System Trench & Cable Details
1-1150-34-2		Bathymetry and Seabed Sediments Survey of Corridor and 28L Cable Positioning
Figure 1		Approximate Bell Island Submarine Cable Installation Corridor
Figure 2		Bell Island Location Relative to Main Island of Newfoundland
Figure 3		Bell Island Onshore Termination and Distribution Structures
Figure 4		Broad Cove Shoreline Termination Structure

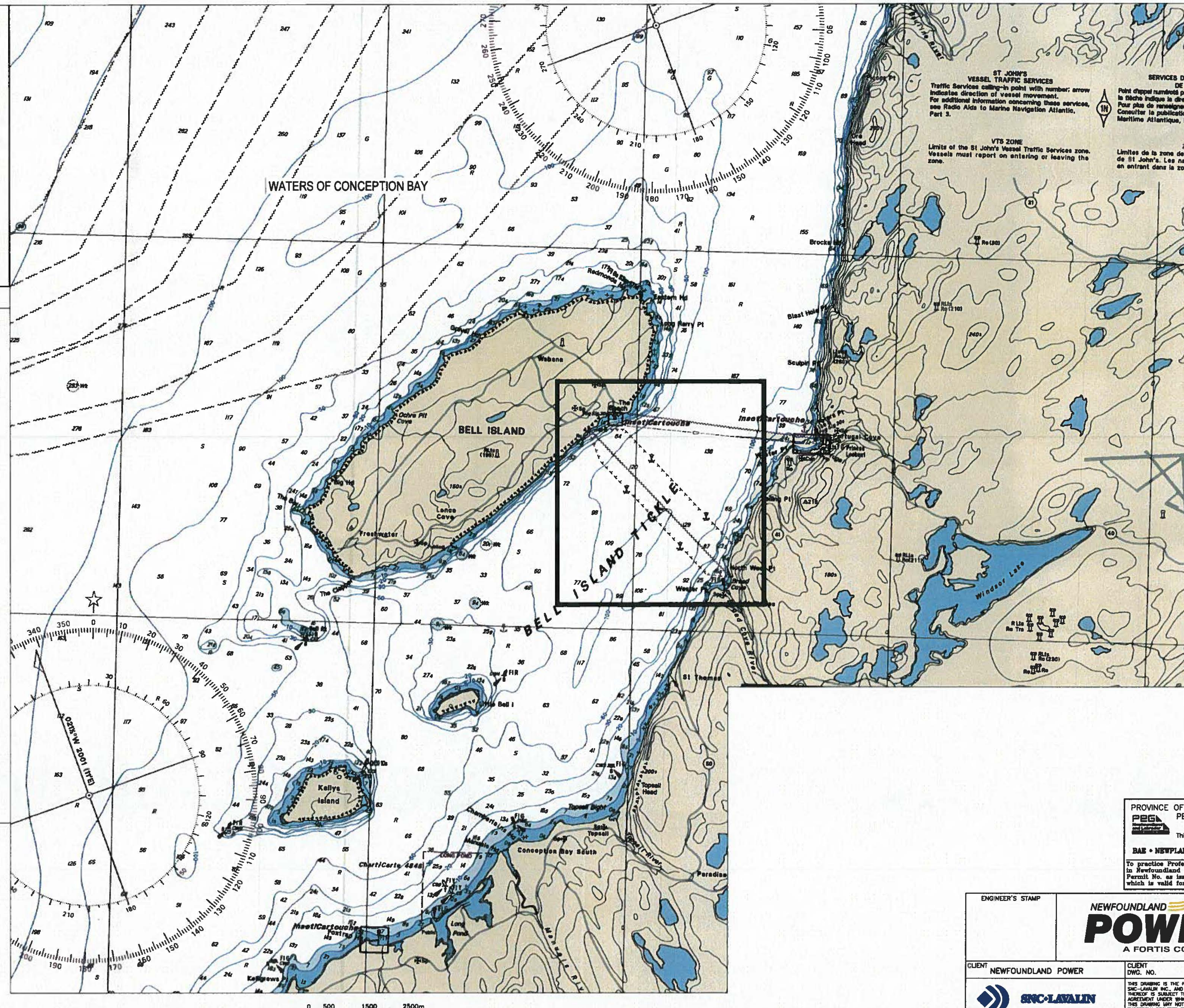
The Contractor acknowledges receipt of the following Drawings in Portable Document Format (PDF).



LOCATION PLAN – CANADA



KEY PLAN – NEWFOUNDLAND



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CLIENT NEWFOUNDLAND POWER

CLIENT DWG. NO.

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APPROVED PROJ. MAN.	Albert Peach		13 / 08 / 28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			

NO.	DATE	REVISIONS	BY	CHK	LEAD DISCPL.	ENG. MAN.	PROJ. MAN.	CLIENT ENG.	CLIENT AREA
PA	13 / 08 / 28	ISSUED FOR CLIENT REVIEW							

DWG. NO.	REFERENCES

TITLE

BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
LOCATION PLAN

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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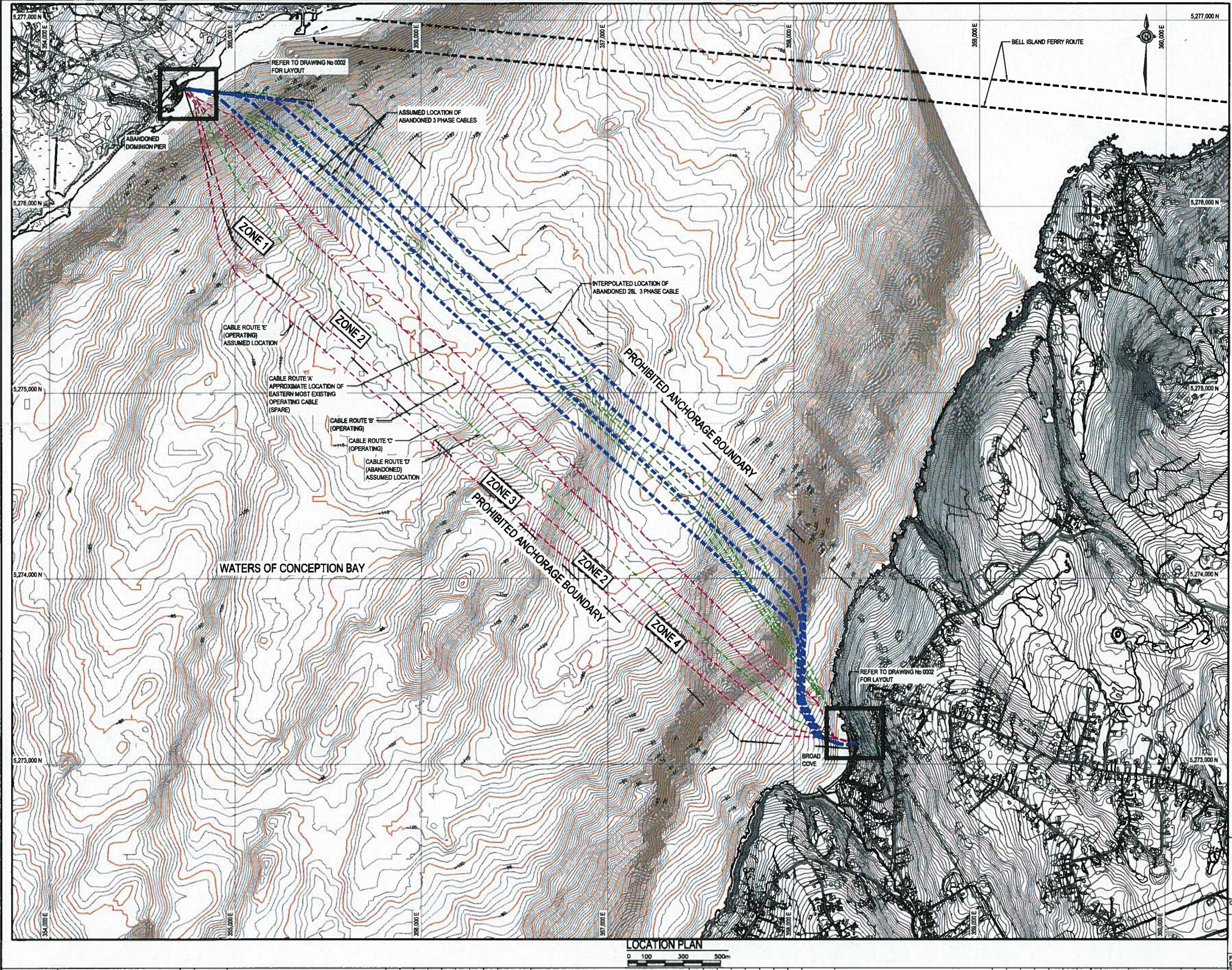

NOTES:

1. CONTOUR LINES FROM CANADIAN HYDROGRAPHIC FIELD SHEET NO. 2192NE, NW, SE & SW.
2. SOUNDINGS ARE IN METRES.
3. COORDINATES SHOWN ARE IN ACCORDANCE WITH UTM ZONE 22, NAD 83.

LEGEND:

- EXISTING OPERATING CABLES
- ABANDONED CABLES
- PROPOSED NEW CABLES

GEOLOGICAL CLASSIFICATION:

GEOLOGICAL CLASSIFICATION OF SURVEY CORRIDOR AS DETERMINED BY INTERPRETATION OF SIDE SCAN SONAR DATA.

ZONE 1: ALTERNATE PATCHES OF SAND, SILT AND GRAVEL.

ZONE 2: PREDOMINATELY SAND AND SILT WITH LESSER GRAVEL PATCHES.

ZONE 3: BEDROCK WITH SAND AND GRAVEL VENEER. SOME BOLDER SIZE GRAVEL

ZONE 4: BEDROCK WITH SAND AND GRAVEL DEPOSITS.

NOTE: ZONE BOUNDARY BETWEEN ZONE 1 AND ZONE 2 IS GRADATIONAL WHERE AS ALL OTHERS ARE ABRUPT.

THIS INFORMATION WAS TAKEN FROM NEWFOUNDLAND POWER DRAWING NO. 1-1150-34-2.

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APPROVED PROJ. ENG.	Ray Awad		13 / 08 / 28
APPROVED PROJ. MAN.	Albert Peach		13 / 08 / 28
CLIENT: APPROVED ENG. COORD.			
CLIENT: APPROVED AREA MAN.			

TITLE

BELL ISLAND SUBMARINE POWER CABLE SYSTEM SITE PLAN

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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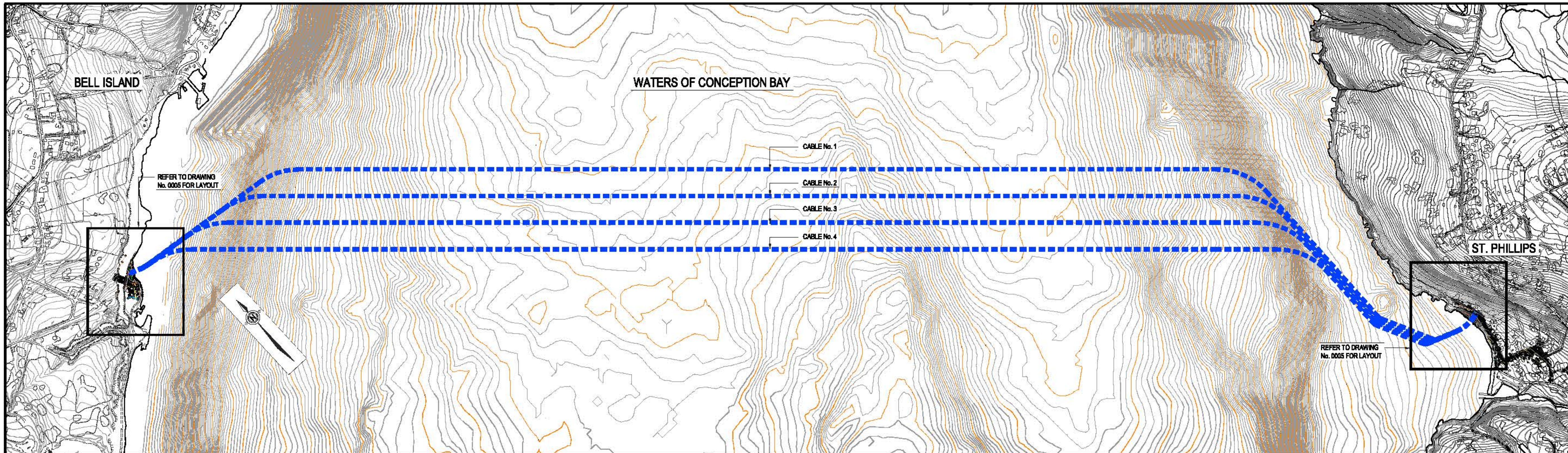
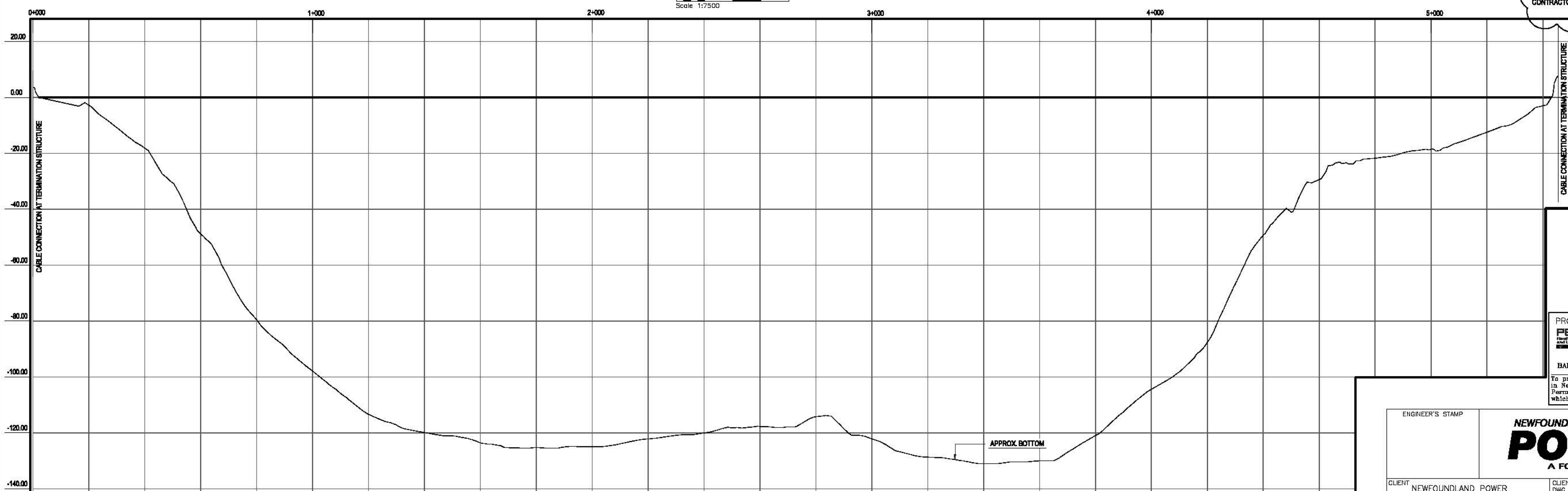


PLAN OF CABLES

0 200 400m
Scale 1:7500

NOTE:

1. TYPICAL SPACING BETWEEN CABLES IN DEEPER WATER WOULD BE 50 TO 100 METRES. CONTRACTOR TO RECOMMEND ACTUAL SPACING.



PROFILE OF CABLE No. 1

0 200 400m
Scale 1:7500

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PROFESSIONAL ENGINEER | NAME | NO.

NO.	DATE	REVISIONS
01	13/09/10	ISSUED FOR ADDENDUM NO. 1
00	13/09/06	ISSUED FOR TENDER

SNC-LAVALIN INC.	NAME (PRINT)	INIT.	DATE
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APPROVED PROJ. ENG.	Ray Awad		13/08/28
APPROVED PROJ. MAN.	Albert Peach		13/08/28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			

DWG. NO. | REFERENCES | NO. | DATE | REVISIONS | BY | CHK | LEAD DISCPL. | ENG. MAN. | PROJ. MAN. | CLIENT ENG. | AREA | SCALE

TITLE
BELL ISLAND SUBMARINE POWER CABLE SYSTEM PLAN & PROFILE OF PROPOSED CABLE ROUTE No.1

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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Format: A1 594mm × 841mm

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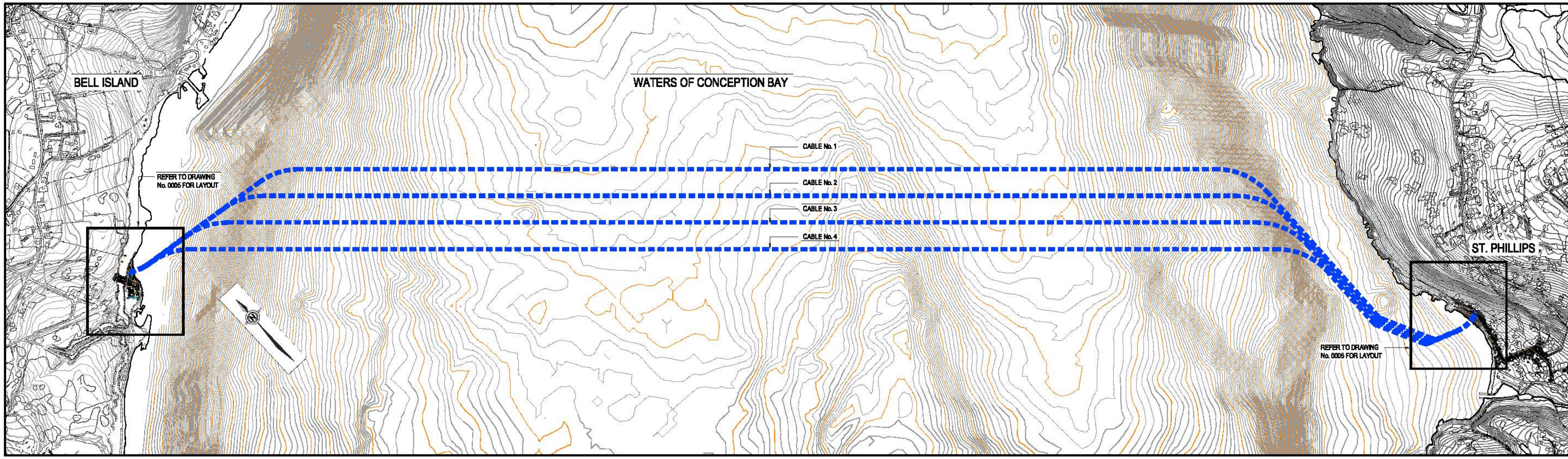
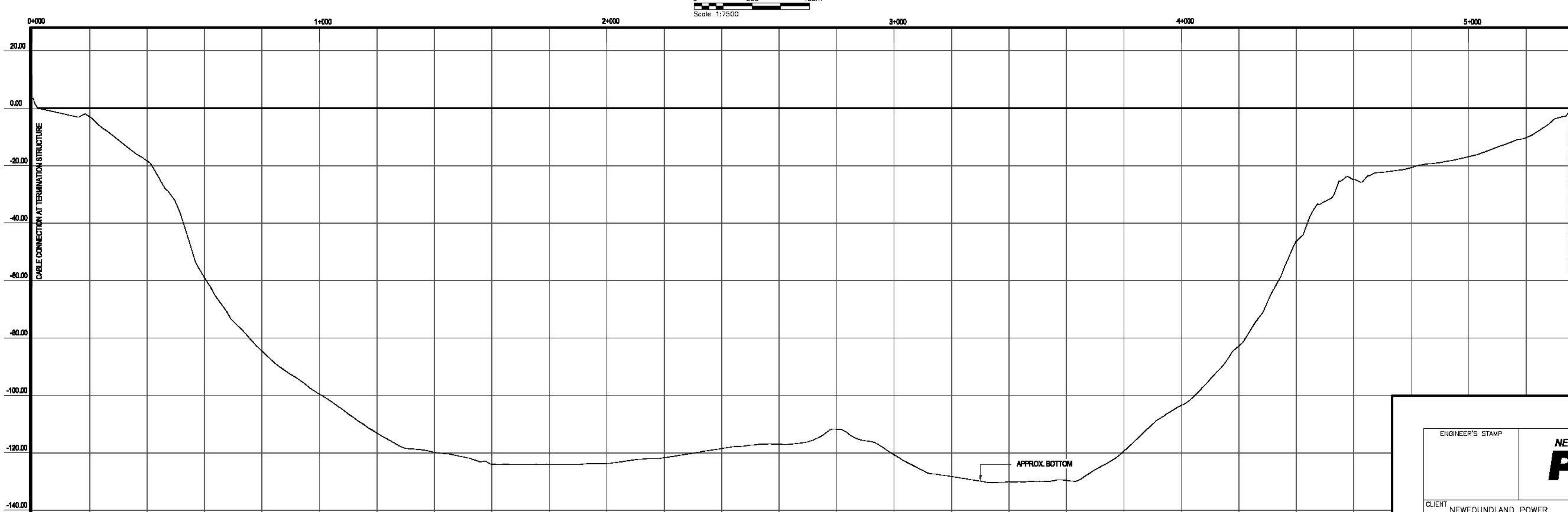


PLAN OF CABLES

0 200 400m
Scale 1:7500



NOTE:

1. TYPICAL SPACING BETWEEN CABLES IN DEEPER WATER WOULD BE 50 TO 100 METRES. CONTRACTOR TO RECOMMEND ACTUAL SPACING.

01

PROFILE OF CABLE No. 2

0 200 400m
Scale 1:7500

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01	13/09/10	ISSUED FOR ADDENDUM NO. 1
00	13/09/06	ISSUED FOR TENDER

DWG. NO. | REFERENCES | NO. | DATE | REVISIONS | BY | CHK | LEAD DISCPL. | ENG. MAN. | PROJ. MAN. | CLIENT ENG. | CLIENT AREA

SNC-LAVALIN INC.	NAME (PRINT)	INIT.	DATE
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APPROVED PROJ. ENG.	Rey Awad		13/08/28
APPROVED PROJ. MAN.	Albert Peach		13/08/28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			
SCALE			

CLIENT NEWFOUNDLAND POWER

CLIENT DWG. NO.

SNC·LAVALIN

PROFESSIONAL ENGINEER | NAME | NO.

TITLE

BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
PLAN & PROFILE OF PROPOSED CABLE
ROUTE No.2

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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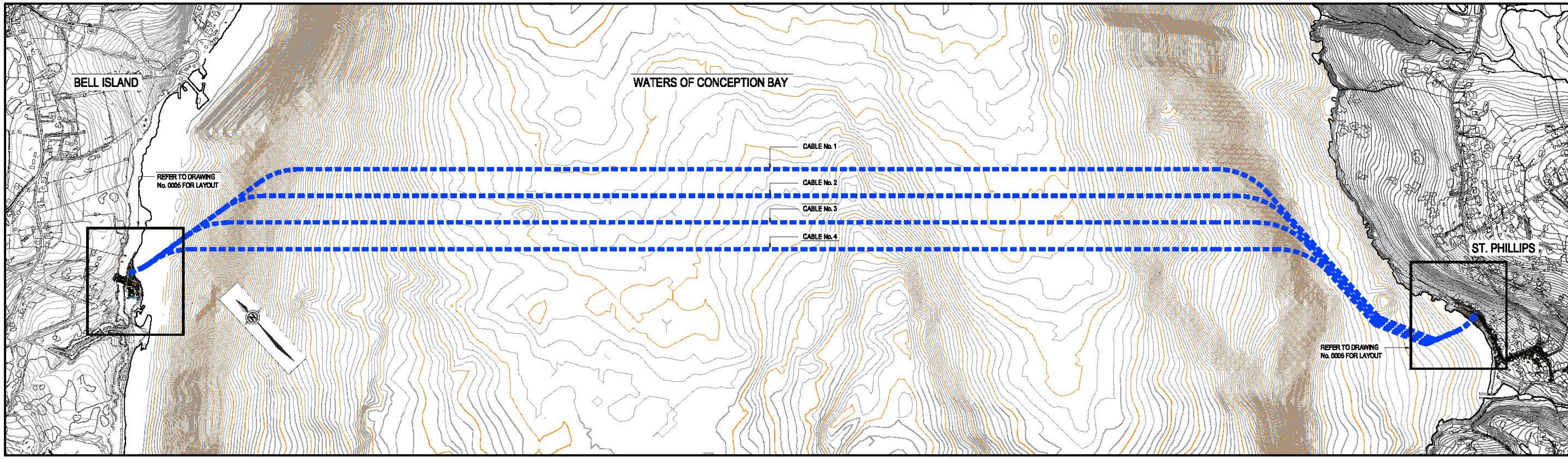

PLAN OF CABLES

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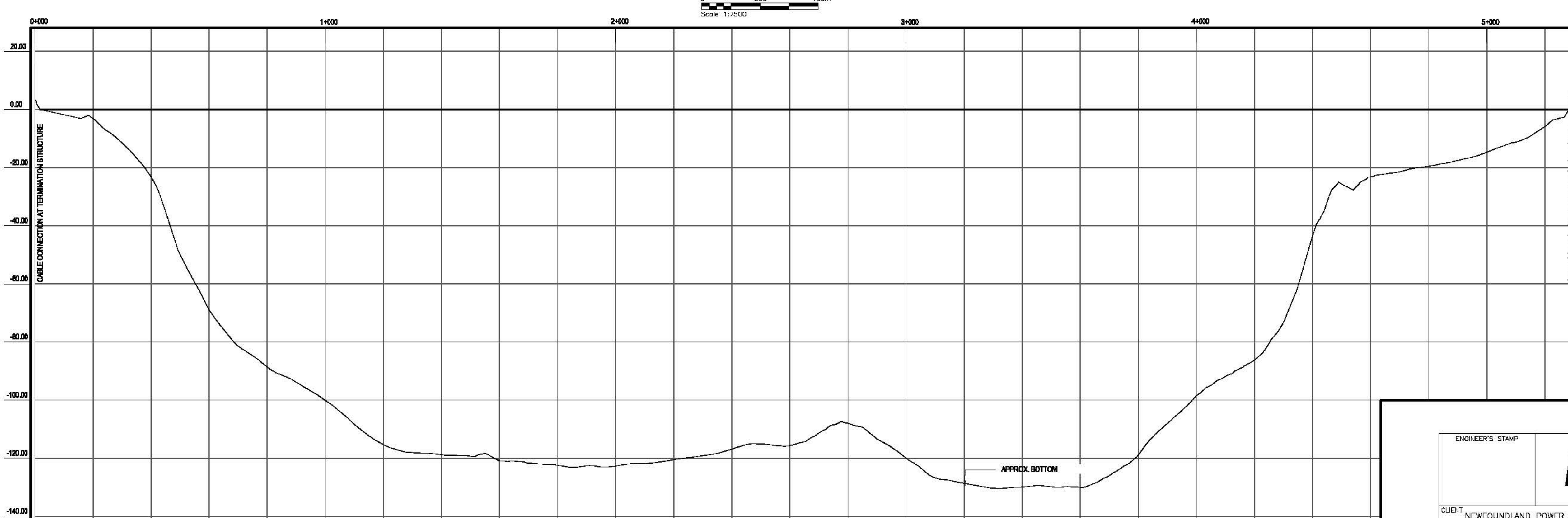
Scale 1:7500



NOTE:

1. TYPICAL SPACING BETWEEN CABLES IN DEEPER WATER WOULD BE 50 TO 100 METRES. CONTRACTOR TO RECOMMEND ACTUAL SPACING.

01

PROFILE OF CABLE No. 3

0 200 400m
Scale 1:7500

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APPROVED PROJ. ENG.	Ray Awad		13 / 08 / 28
APPROVED PROJ. MAN.	Albert Peach		13 / 08 / 28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			
SCALE			

TITLE

BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
PLAN & PROFILE OF PROPOSED CABLE
ROUTE No.3

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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NO.	DATE	REVISIONS
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00	13 / 09 / 06	ISSUED FOR TENDER

DWG. NO.	REFERENCES	NO.	DATE	REVISIONS	BY	CHK	LEAD DISCPL.	ENG. MAN.	PROJ. MAN.	CLIENT ENG.	CLIENT AREA

Format: A1 594mm x 841mm

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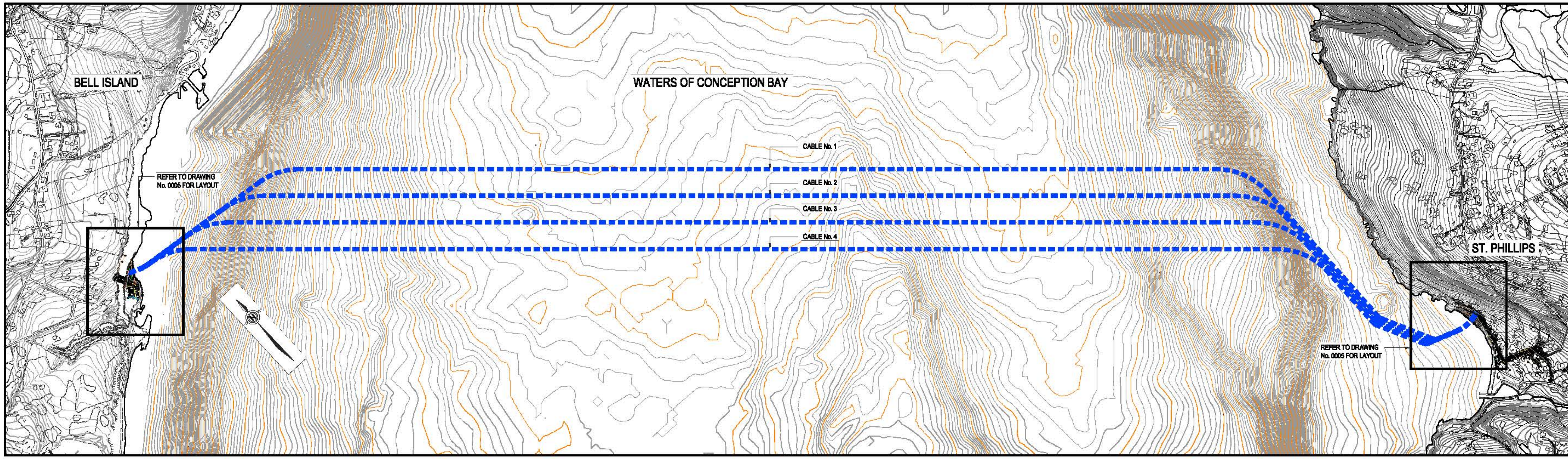

PLAN OF CABLES

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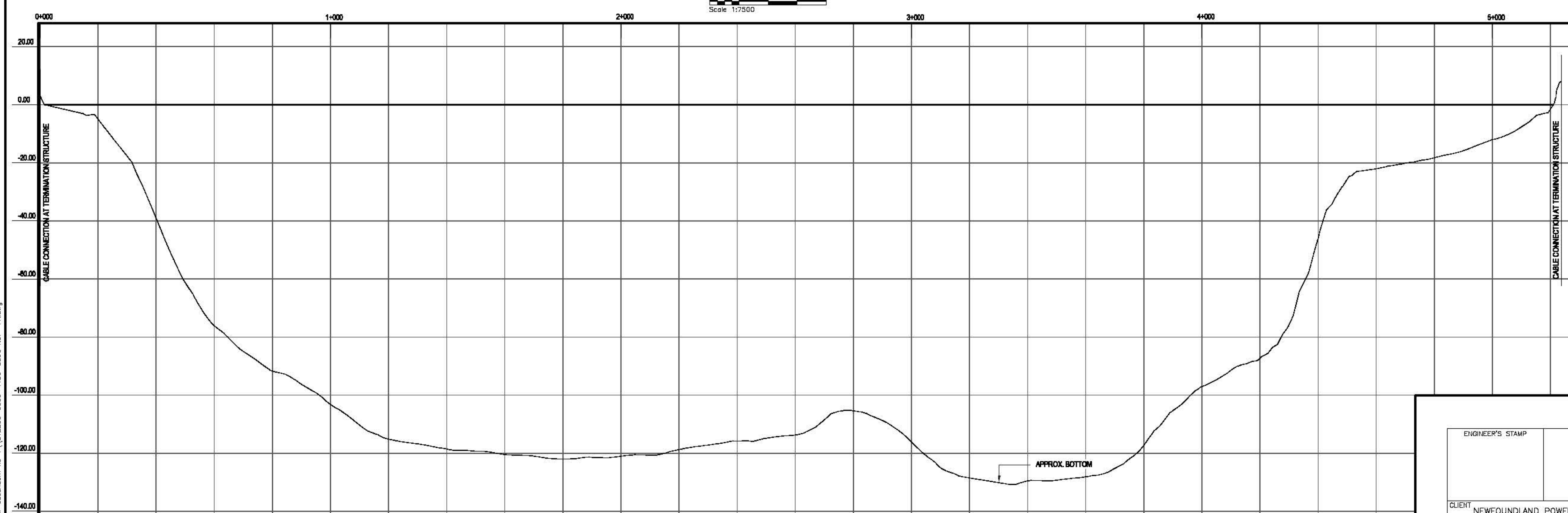
Scale 1:7500



PROFILE OF CABLE No. 4

0 200 400m
Scale 1:7500

NOTE:

1. TYPICAL SPACING BETWEEN CABLES IN DEEPER WATER WOULD BE 50 TO 100 METRES. CONTRACTOR TO RECOMMEND ACTUAL SPACING.

01

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CLIENT NEWFOUNDLAND POWER

CLIENT DWG. NO.

SNC·LAVALIN

PROFESSIONAL ENGINEER | NAME | NO.

NO.	DATE	REVISIONS
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00	13/09/06	ISSUED FOR TENDER

SNC-LAVALIN INC.	NAME (PRINT)	INIT.	DATE
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APPROVED PROJ. ENG.	Rey Awad		13/08/28
APPROVED PROJ. MAN.	Albert Peach		13/08/28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			

TITLE

BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
PLAN & PROFILE OF PROPOSED CABLE
ROUTE No.4

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
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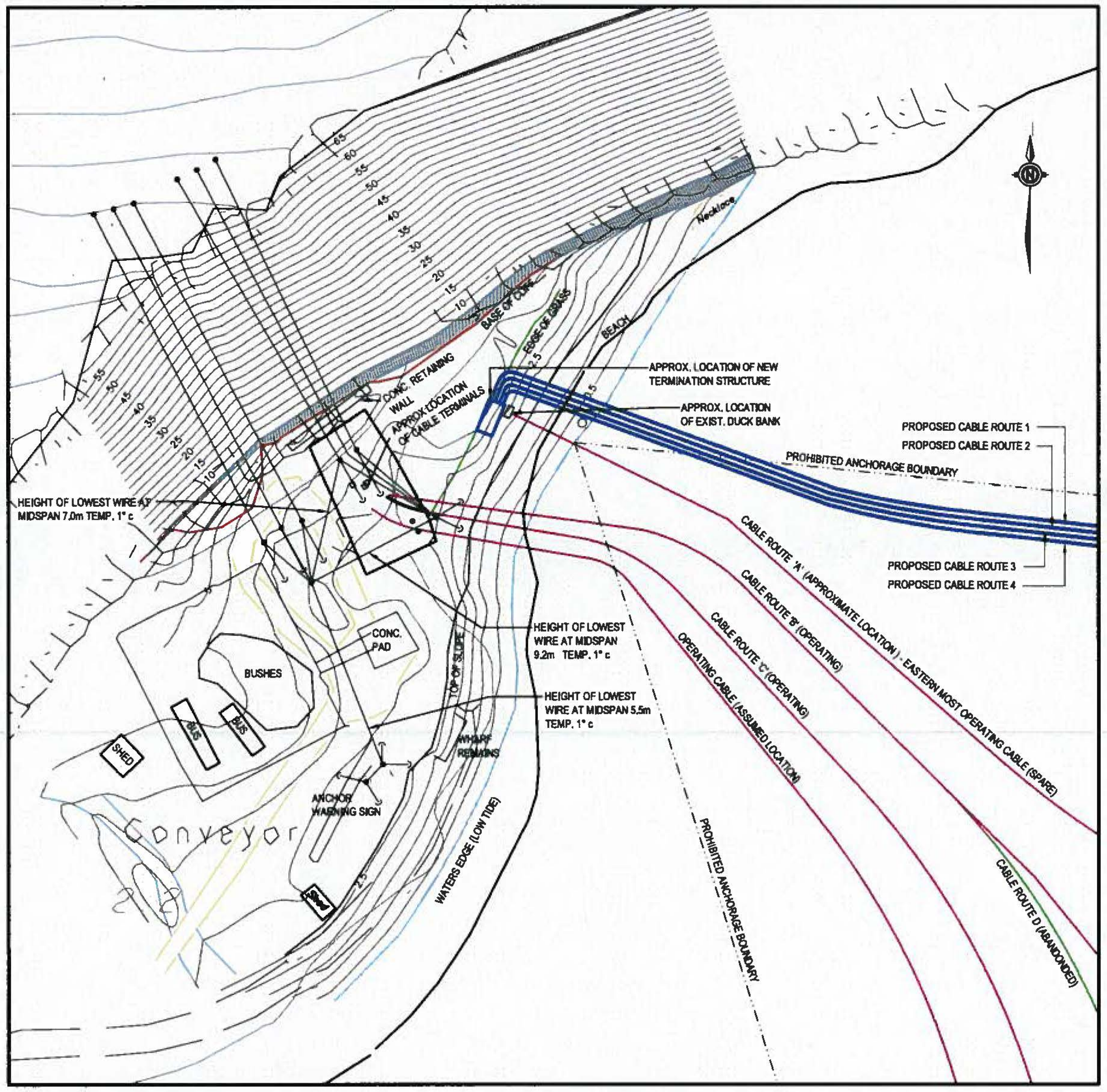
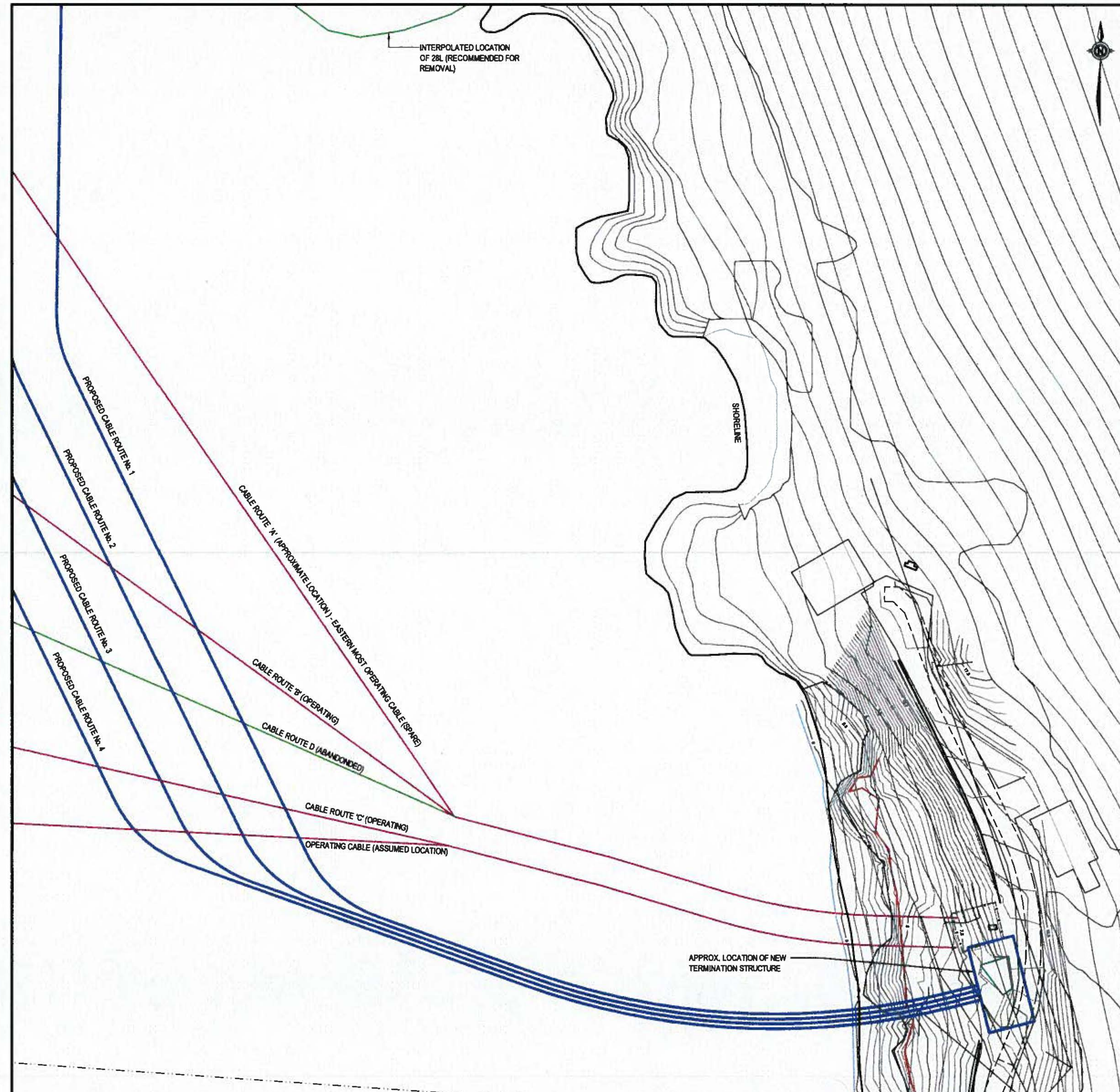


PLAN - BELL ISLAND SHORE APPROACH

0 5 15 25m

Scale 1:500



PLAN - ST. PHILLIPS SHORE APPROACH

0 20 40m

Scale 1:750

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APPROVED PROJ. MAN.	Albert Peach		13 / 08 / 28
CLIENT APPROVED ENG. COORD.			
CLIENT APPROVED AREA MAN.			

TITLE

BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
PLAN - SHORE APPROACHES

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
512233	0000	41	DD	0007	01	PA

Format: A1 594mm x 841mm

DWG. NO.	REFERENCES	NO.	DATE	REVISIONS	BY	CHK	LEAD DISCPL.	ENG. MAN.	PROJ. MAN.	CLIENT ENG.	CLIENT AREA	NO.	DATE	REVISIONS	BY	CHK	LEAD DISCPL.	ENG. MAN.	PROJ. MAN.	CLIENT ENG.	CLIENT AREA
												PA	13 / 08 / 28	ISSUED FOR CLIENT REVIEW							

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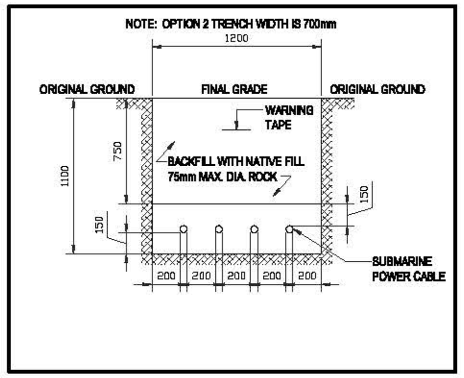
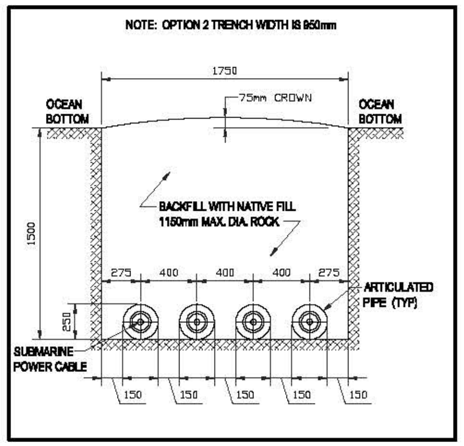
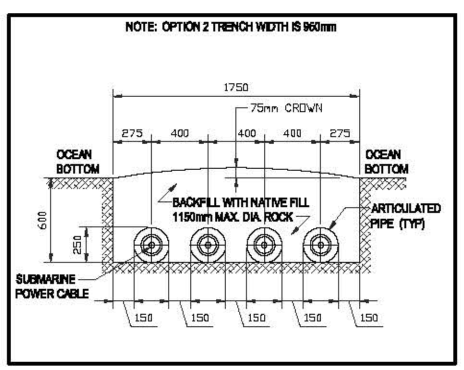


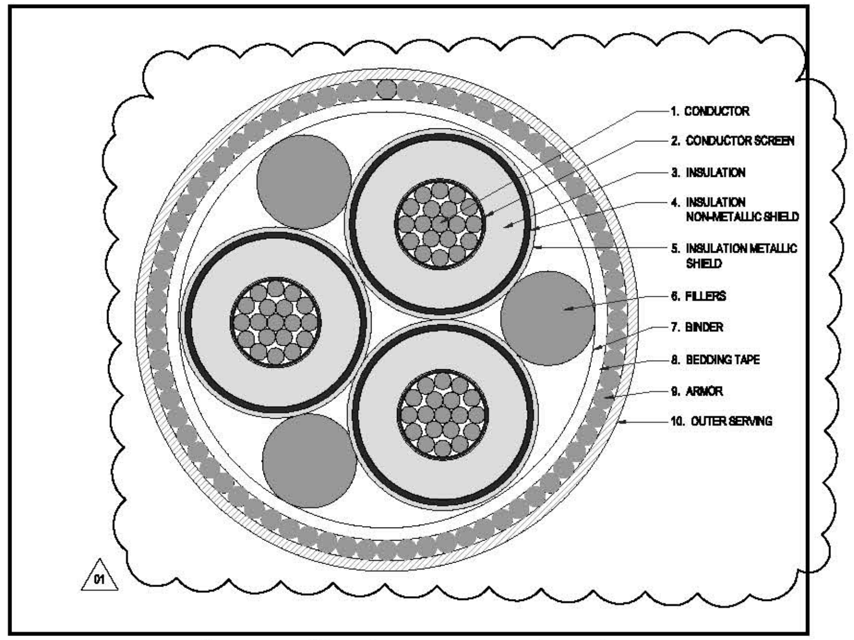
TYPICAL LAND TRENCH DETAIL (OPTION 1)
BELL ISLAND AND BROAD COVE
0 0.5 1.0m
Scale 1:25



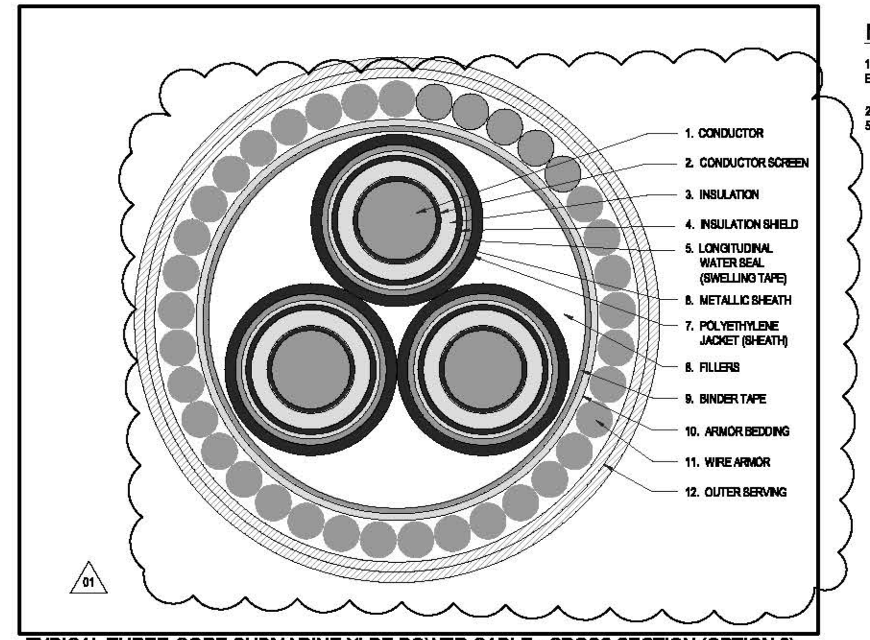
TYPICAL SUBMARINE TRENCH DETAIL (OPTION 1)
BELL ISLAND SIDE (IN OVERBURDEN)
0 0.5 1.0m
Scale 1:25



TYPICAL SUBMARINE TRENCH DETAIL (OPTION 1)
BROAD COVE SIDE (IN ROCK)
0 0.5 1.0m
Scale 1:25



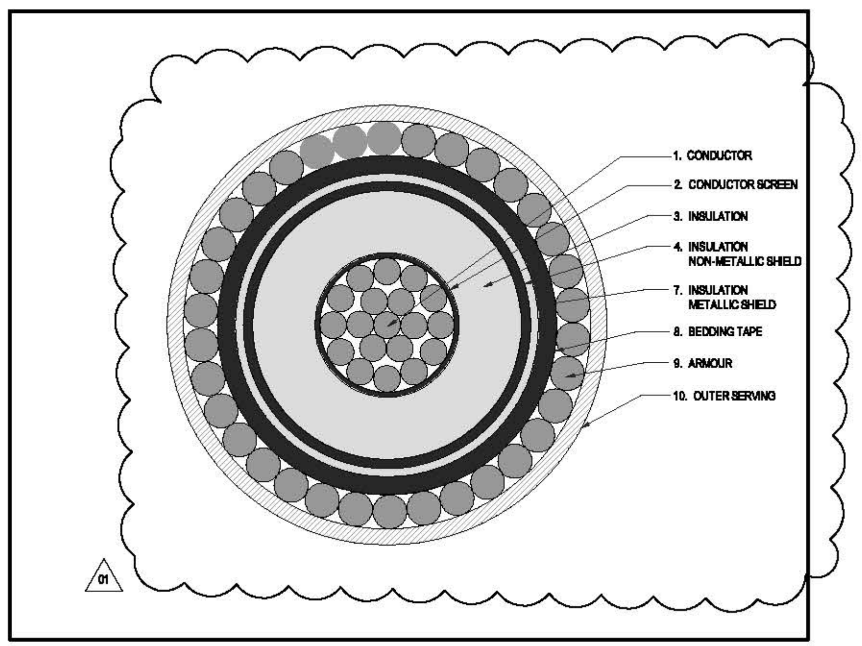
TYPICAL THREE-CORE SUBMARINE EPR POWER CABLE - CROSS SECTION (OPTION 2)
N.T.S.



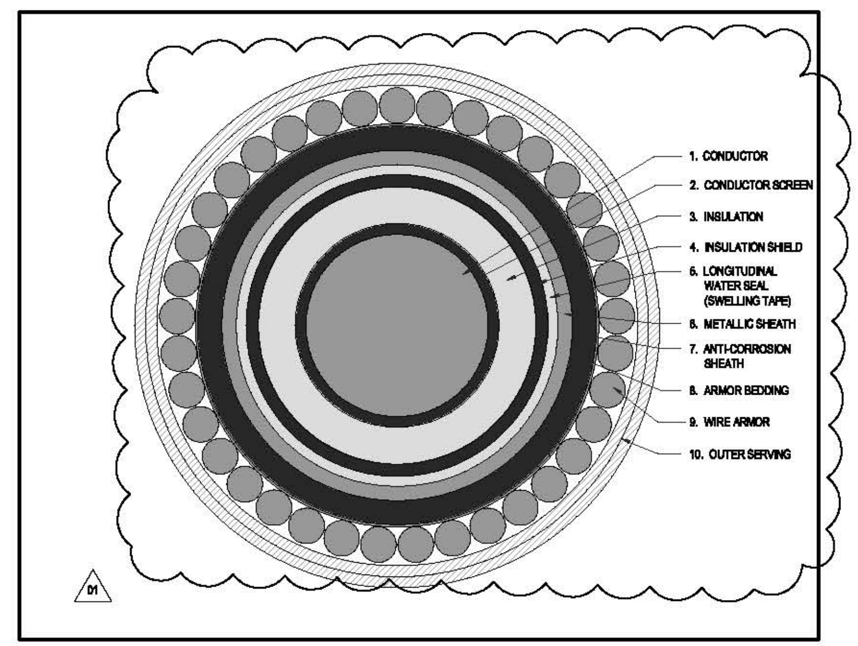
TYPICAL THREE-CORE SUBMARINE XLPE POWER CABLE - CROSS SECTION (OPTION 2)
N.T.S.

NOTES:

1. THE TRENCH ON THE BROAD COVE SIDE OF THE CROSSING WILL REQUIRE EROSION MITIGATION (RIP RAP) AT THE SHORELINE.
2. TYPICAL SPACING BETWEEN CABLES IN DEEPER WATER WOULD BE 50 TO 100 METRES. CONTRACTOR TO RECOMMEND ACTUAL SPACING.



TYPICAL SINGLE-CORE SUBMARINE EPR POWER CABLE - CROSS SECTION (OPTION 1)
N.T.S.



TYPICAL SINGLE-CORE SUBMARINE XLPE POWER CABLE - CROSS SECTION (OPTION 1)
N.T.S.

PROVINCE OF NEWFOUNDLAND
PEG
PERMIT HOLDER CLASS "A"
This Permit Allows
BAE • NEWPLAN GROUP LIMITED
To practice Professional Engineering in Newfoundland and Labrador Permit No. as issued by PEGNL D0049 which is valid for the year 2013.

ENGINEER'S STAMP

NEWFOUNDLAND POWER
A FORTIS COMPANY

CLIENT NEWFOUNDLAND POWER
CLIENT DWG. NO.

SNC-LAVALIN

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PROFESSIONAL ENGINEER | NAME | NO.

SNC-LAVALIN INC.	NAME (PRINT)	INIT.	DATE
DESIGNED	Terry McCarthy		13/08/28
DRAWN	Brian Murray		13/08/28
CHECKED	Gene Laing		13/08/28
APPROVED LEAD ENG.	Terry McCarthy		13/08/28
APPROVED PROJ. ENG.	Ray Awad		13/08/28
APPROVED PROJ. MAN.	Albert Peach		13/08/28
CLIENT APPROVED ENG. COORD.			
APPROVED AREA MAN.			

TITLE
BELL ISLAND
SUBMARINE POWER CABLE SYSTEM
TRENCH & CABLE DETAILS

PROJECT NO.	AREA	DISCPL.	DOC.	DRAWING NUMBER	LOC.	REVISION NUMBER
512233	0000	41	DD	0008	01	01

NO.	DATE	REVISIONS	BY	CHK	LEAD DISCPL.	ENG. MAN.	PROJ. MAN.	CLIENT ENG.	CLIENT AREA
01	13/09/10	ISSUED FOR ADDENDUM NO. 1							
00	13/09/05	ISSUED FOR TENDER							

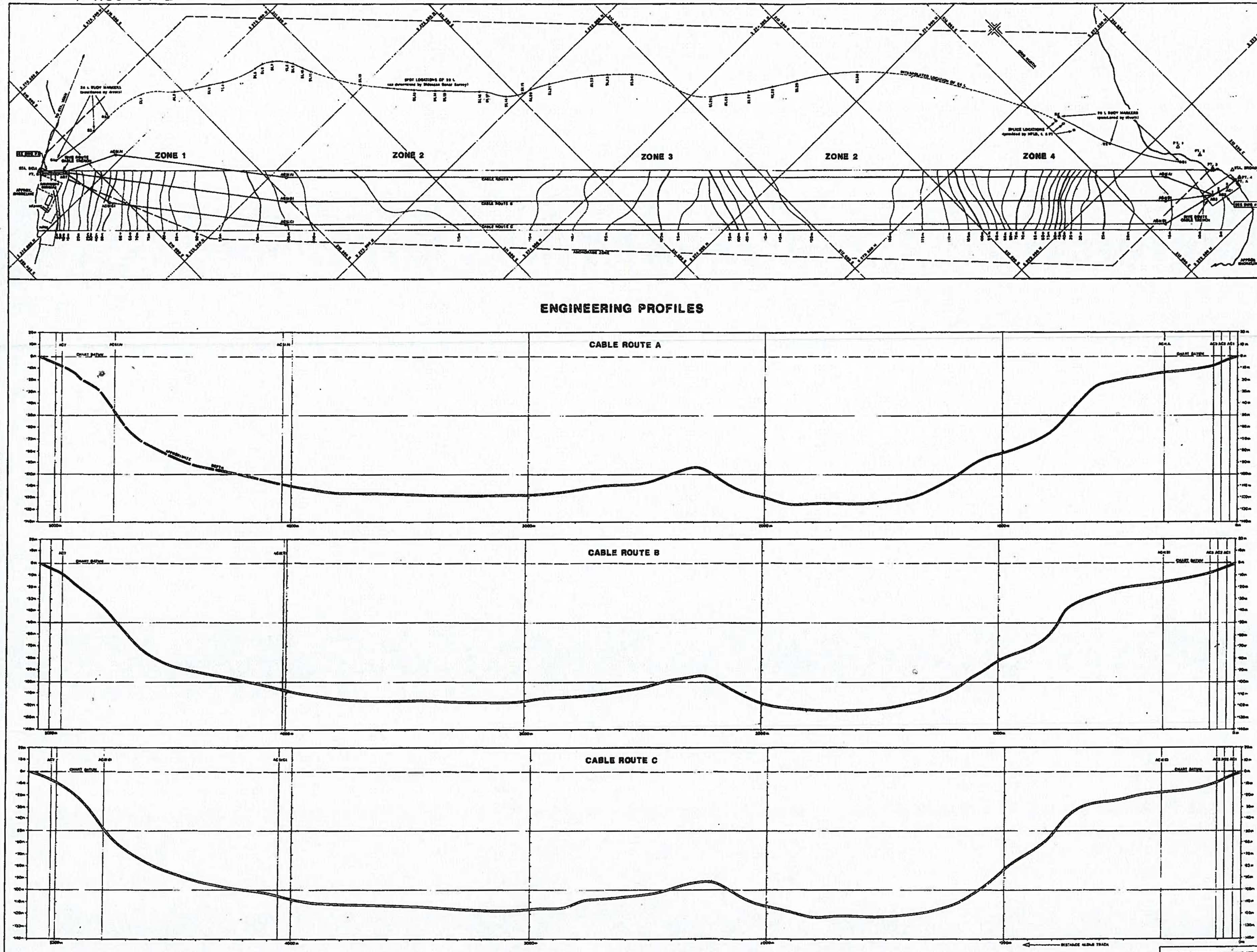
DWG. NO. | REFERENCES

Format: A1 594mm x 841mm

DATE: 2013/09/10 — 3:05pm
PATH: G:\512233\Drawings\Marine\Bound Reissued for addendum no 1\512233-0000-4100-0008 Rev PA.dwg

NFLD LIGHT & POWER (BELL ISLAND)

1-1150-34-2



PROPOSED CABLE ROUTES
ST. PHILLIPS - BELL ISLAND

BATHYMETRY AND SEABED SEDIMENTS SURVEY OF CORRIDOR AND 28 L CABLE POSITIONING

BATHYMETRY SURVEY

- ALL DEPTHS IN METRES
- CONTOUR INTERVAL 5M (UNLESS NOTED OTHERWISE)
- REFERENCE DATUM - CHART DATUM (AS DETERMINED BY TIDE TABLES (1988) PUBLISHED BY CANADIAN HYDROGRAPHIC SERVICE)

GEOLOGICAL CLASSIFICATION

GEOLOGICAL CLASSIFICATION OF SURVEY CORRIDOR AS DETERMINED BY INTERPRETATION OF SIDE SCAN SONAR DATA

ZONE 1 ALTERNATING PATCHES OF SAND, SILT AND GRAVEL.

ZONE 2 PREDOMINATELY SAND AND SILT WITH LESSER GRAVEL PATCHES.

ZONE 3 BEDROCK WITH SAND AND GRAVEL VENEER. SOME BOULDER SIZE GRAVEL.

ZONE 4 BEDROCK WITH SAND AND GRAVEL DEPOSITS.

NOTE: ZONE BOUNDARY BETWEEN ZONE 1 AND ZONE 2 IS GRADATIONAL WHERE AS ALL OTHERS ARE ABRUPT.

NOTES :

ALL POSITIONING INFORMATION AND CO-ORDINATES ARE REFERRED TO THE NEWFOUNDLAND 3 DEGREE MODIFIED TRANSVERSE MERCATOR PROJECTION, ZONE 1 WITH CENTRAL MERIDIAN AT 53° WEST AND HAVING A FALSE EASTING OF 304,800 M

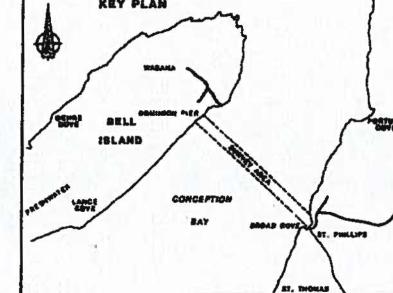
SURVEY VESSEL POSITIONS WERE DETERMINED BY SIMULTANEOUS RANGING FROM THREE OR MORE MINI-RANGER TRANSPONDERS STATIONED AT SURVEY CONTROL POINTS.
THE BUOY MARKER POSITIONS WERE DETERMINED BY INTERSECTION METHOD FROM LAND BASED TIES USING WILD T2 AND WILD T-16 SURVEY INSTRUMENTS.

ST. PHILLIPS SHORELINE OBTAINED FROM DEPARTMENT OF FORESTRY AND AGRICULTURE, LANDS AND SURVEYS DIVISION, MAP NO. 025216.

BELL ISLAND SHORELINE OBTAINED FROM HYDROGRAPHIC CHART NO. 4568.

INTERPOLATED LOCATION OF THE 28L CABLE IS BASED ON SIDE SCAN DATA AND INFORMATION TAKEN FROM NFLD L&P DRAWING NO. 21-580

KEY PLAN



LEGEND

- X 28L SPOT LOCATIONS
- BUOY MARKERS
- △ SURVEY CONTROL STATIONS
- CABLE LANDING LOCATIONS
- 28L SPLICE LOCATIONS
- ○ ALTERED COURSE

ROUTE CO-ORDINATES

POINT	NORTHING	EASTING
0m - ST. PHILLIPS	5 273 044.362	313 537.063
AC1/BUOY 1	5 273 040.000	313 303.197
AC2/BUOY 2	5 273 050.063	313 027.049
AC3/BUOY 3	5 272 023.140	313 396.134
AC4(A)	5 272 450.444	313 096.001
AC4(B)	5 273 787.254	310 123.740
AC4(C)	5 273 710.695	313 063.476
AC5(A)	5 274 463.064	310 584 291
AC5(B)	5 275 200.719	310 451.230
AC5(C)	5 275 210.305	310 414.100
AC6(A)	5 276 027.06	310 103.277
AC6(C)	5 275 902.104	309 947.066
AC7	5 276 129.047	309 906.263
0m - BELL ISLAND	5 276 190.714	309 031.764

McElhanney

MCELHANNEY OFFSHORE SURVEYS LTD.

NEWFOUNDLAND LIGHT & POWER CO. LTD.

DESIGNED:	PROJECT: BELL ISLAND/ST. PHILLIPS CABLE ROUTE SURVEY
DRAWN: B. SURRY	TITLE: BATHYMETRY AND SEABED SEDIMENTS SURVEY OF CORRIDOR AND 28 L CABLE POSITIONING
CHECKED: A. RYAN	
APPROVED:	SCALE: HORIZONTAL 1:5000 VERTICAL 1:1000
PASSED:	DATE: [illegible]
	DWG. #: 1-1150-34-2

Figure 1 – Approximate Bell Island Submarine Cable Installation Corridor

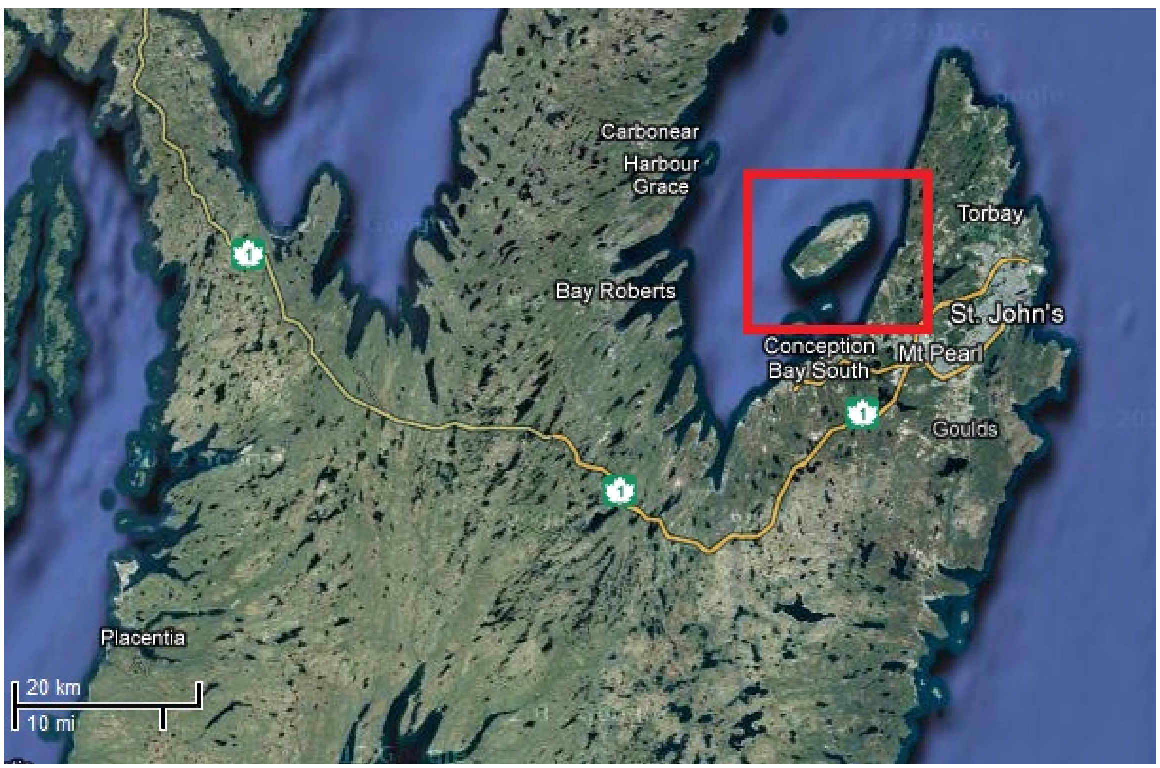


Figure 2 – Bell Island Location Relative to Main Island of Newfoundland

Figure 3 – Bell Island Onshore Termination and Distribution Structures
(arrow indicating proposed location of new structure)

Figure 4 – Broad Cove Shoreline Termination Structure
(arrow indicating proposed location of new structure)

SPECIFICATIONS

Supply and Installation
of
Bell Island Submarine Cable System

Technical Specification

Technical Specification – 25kV Submarine Insulated Cable (By SNC-Lavalin)

PART 1 GENERAL

1.1 Description of Work

.1 The included Technical Specification – 25kV Submarine Insulated Cable (By SNC-Lavalin), defines the minimum requirements for the design, manufacture, inspection, factory and field testing, supply, installation and commissioning of a medium voltage, submarine power cable system to service Bell Island, located in the Province of Newfoundland and Labrador, Canada.

.2 The Contractor shall carry out all fabrication and construction activities necessary to complete the installation of the submarine power cable system described in the Technical Specification and the listed drawings.

.3 The Contractor must provide adequate means to protect the Work that is exposed to any risk of contamination or damage during completion of the Work.

1.2 Location and Layout

.1 Bell Island Installation Corridor

 .1 Bell Island is situated in close proximity to the Avalon Peninsula on the east coast of the island of Newfoundland.

 .2 At present, Bell Island is provided with electricity by means of four single-conductor submarine cables terminated at Broad Cove on the Avalon Peninsula of Newfoundland which run to terminations at an area known as the Old Dominion Pier on Bell Island.

.2 Work will be required at both shore approaches and termination locations in relative close proximity to cables energized at voltages of 12.5kV.

1.3 Site Access

.1 The Broad Cove termination station is located adjacent to Thorpe's Road in the Community of Portugal Cove-St. Phillips, NL.

.2 The Bell Island termination station is located in an area known as the Old Dominion Pier. Bell Island is only accessible via Ferry service which runs on a regular schedule from Portugal Cove-St. Phillips, NL.

1.4 Scope and Sequence of Work

.1 The scope and sequence of work to be performed shall consist of, but not necessarily be limited to, all items described in the Technical Specification – 25kV Submarine Insulated Cable (SNC-Lavalin).

.2 The cable system installation Work shall be conducted in a manner to accommodate the Owner's continued use of the existing energized submarine cable system, including the existing on-shore infrastructure.

1.5 Construction Schedule

.1 The Contractor shall submit a detailed construction schedule, indicating anticipated progress stages during cable fabrication and cable installation.

.2 The Contractor shall employ appropriate levels of staffing and resources required to maintain the schedule.

1.6 Materials and Equipment Supplied by the Owner

.1 The Owner shall supply termination structures complete with mounted switches.

1.7 Materials and Equipment Supplied by the Contractor

.1 The Contractor shall supply all materials and equipment required to complete the Work in accordance with these Specifications and drawings, except as supplied by Owner.

.2 The Contractor shall remove and dispose of all excess and scrap materials and equipment as directed by the Owner's Representative.

.3 The Contractor shall be responsible for loading, transporting and unloading of contractor furnished items required for the work.

1.8 Security of Materials

.1 The Contractor will be responsible for the safe and secure storage of all tools, materials, equipment and machinery required by the Contractor to perform the Work, including tools, materials, equipment and machinery belonging to Owner and the Contractor.

.2 The Owner will not be responsible for any loss or damage of tools, materials, equipment and machinery that are belonging to or have been turned over to the Contractor.

1.9 Drawings

.1 Work shall be carried out in accordance with drawing(s) listed and any additional drawing(s) issued by the Owner, or issued by the Contractor and approved by the Owner.

.2 Project drawings will be “Approved for Construction” and will be sufficiently complete to indicate clearly construction details of permanent Work.

.3 “Approved for Construction” drawings may be revised from time to time, only with the Owner’s Approval, to adapt Works to the final designs and to suit actual physical conditions encountered during progress of the Work.

1.10 Identification of Work

.1 The Contractor is responsible for completing all work as described in the Tender Package.

.2 Where there are discrepancies among the Specifications and/or drawings, the Contractor shall consult with the Owner’s Representative for direction.

.3 Should any dispute arise regarding the true intent and meaning of the Specifications and/or drawings, or should any portion of the same be obscure or capable of more than one interpretation, the same shall be decided by the Owner’s Representative, whose direction shall be final.

1.11 Setting Out of Work

.1 The Contractor shall assume full responsibility for and execute complete layout of Work to keep within alignment and grade restraints set out in the Contract, paying particular attention to the No Anchorage Zone.

.2 The Contractor shall inform the Owner’s Representative of impending Work and obtain Owner’s approval for actual location.

.3 Stakes, buoys, and other survey markers required for laying out Work shall be supplied by the Contractor.

1.12 Codes and Standards

.1 Materials and workmanship must conform to or exceed applicable standards of Newfoundland Power, Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other related referenced organizations.

.2 Conform to latest revision of dated referenced standards, as reaffirmed or revised to date of specification. Standards or codes not dated shall be deemed edition in force on date of specification.

1.13 Changes in the Work

.1 If the Contractor determines that changes are required to the Work indicated on the drawings or specifications, the Contractor must contact Owner's Representative prior to commencing such Work.

.2 When a concern is raised that something may need to be corrected or changed, Owner's Representative will review the circumstances, if the change is not an imminent requirement for successful completion of the Work. If it is agreed that a change is necessary, then an Engineering Change Notice (ECN) form will be created. This form will be an official notification to the Contractor regarding changes to engineering, and will specifically outline what action is required and when. The form will have to be signed by Owner's Representative and the Contractor prior to the change being made in the field. The ECN process will ensure that all design and engineering changes are reviewed and approved before being issued to the field.

.3 No additional Work shall be performed unless and until Owner's Representative has approved, in writing, the changes and any additional costs involved.

1.14 Measurement for Payment

.1 Notify Owner's Representative sufficiently in advance of operations to permit required measurements for payment.

.2 The Owner, at its discretion, will inspect the Work completed and confirm field measurements prior to payment of any invoice.

.3 Work not specifically listed in the Schedule of Prices, but specified herein, indicated on drawings, or required for a complete and proper installation, shall be deemed to have their prices included in the items which are listed in the Schedule of Prices.

.4 In the event of a disagreement between Owner's Representative and the Contractor regarding the field measurements of Work complete, the decision of Owner's Representative will be final.

1.15 Inspection of Work

.1 The Owner, at its discretion, will inspect the Work completed prior to the payment of any invoice.

.2 The Contractor will be notified by Owner, in writing, of any corrective action required. Any and all corrective action shall be completed in a timely manner as agreed to by the Contractor and Owner's Representative. The Contractor shall notify Owner, in writing, when the corrective action is completed.

.3 Payment will be made when the Contractor remedies the defects as verified by Owner's Representative. Payment may be made by Owner on part of an invoice. In such cases, an amended copy of the invoice will be sent to the Contractor outlining the rejected items and the reasons for rejection.

1.16 Warranty

.1 The Contractor warrants the installed submarine cable system to be free of defects in material and/or workmanship for a period of three (3) years from the date of substantial completion. If any defects in material and/or workmanship are discovered, the Contractor shall remedy the defects and cover any associated cost to Owner.

1.17 Closing Down Work

.1 Should the Work be closed down for any cause, the Contractor must assume all responsibility for its proper protection during such period. The Contractor must provide protection for any and all Work liable to be damaged.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals

1.2 Administrative

.1 Project meetings to be held at times and locations as determined by the Owner's Representative and agreed upon by the Contractor.

.2 The Owner's Representative will arrange project meetings and record and distribute minutes.

.3 The Owner's Representative will preside at meetings.

.4 Representatives of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 Mandatory Meetings

.1 Project Manager, Contractor, major Subcontractors, and supervisors will be in attendance.

.2 Contract Award Meeting

- .1 The meeting will be held at the Owner's Office at 55 Kenmount Road in St. John's, Newfoundland and Labrador, Canada.
- .2 The Owner's Representative and the Contractor will agree to the date and time of the meeting after award of the Contract. In event of a conflict in schedules, the Owner's Representative shall establish the date for the meeting. The meeting shall be to review the Contract, and Technical Specifications.
- .3 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work including, but not limited to, specific milestones for cable design, cable manufacture, cable shipment, and cable installation.

.3 Schedule of submission of cable system design package, shop drawings, and associated samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.
.5 Delivery schedule of specified equipment.
.6 Proposed changes, change orders, procedures, approvals required, and administrative requirements.
.7 Owner provided products.
.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
.9 Maintenance manuals (where applicable) in accordance with Section 01 78 00 - Closeout Submittals.
.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
.11 Appointment of inspection and testing agencies or firms.
.12 Contract Requirements.
.13 Health and Safety Requirements.
.14 Environmental Requirements.

1.4 Progress Meetings

.1 Monthly during the course of cable fabrication (video conferencing where possible) and daily during installation.

.2 The Contractor and major Subcontractors involved are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule (as applicable).

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

1.5 Risk Assessment

.1 Prior to the start of work on the installation of the cable system the Contractor shall have key personnel responsible for the installation of the cables and the persons assigned responsibility for safety on the project together with representatives of Newfoundland Power attend a risk assessment workshop in St. John’s. The purpose of the workshop is to document hazards associated with the execution of the work and to put mitigation plans in place to reduce the risk associated with the hazards.

PART2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 77 00 - Closeout Procedures.

1.2 Schedules Required

.1 Submit schedules as follows:

- .1 Construction Progress Schedule.
- .2 Submittal Schedule for Shop Drawings and Product Data.
- .3 Submittal Schedule for Samples.
- .4 Product Delivery Schedule.

1.3 Format

.1 Prepare schedule in form of a horizontal bar chart.

.2 Provide a separate bar for each major item of work, trade or operation.

.3 Split horizontally for projected and actual performance.

.4 Provide horizontal time scale identifying first work day of each week.

.5 Format for listings: chronological order of start of each item of work.

1.4 Submission

.1 Submit initial format of schedules within 15 working days after award of Contract.

.2 Submit schedules in electronic format (MS Project).

.3 Owner's Representative will review schedule and return review copy within 10 days after receipt.

.4 Resubmit finalized schedule within 7 days after return of review copy.

.5 Submit revised progress schedule with each application for payment.

.6 Distribute copies of revised schedule to:

- .1 Job site office.
- .2 Subcontractors.
- .3 Other concerned parties.

.7 Instruct recipients to report to Contractor within 10 days, any problems anticipated by timetable shown in schedule.

1.5 Critical Path Scheduling

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each major element of construction.

.3 Show projected percentage of completion of each item as of first day of month.

.4 Indicate progress of each activity to date of submission schedule.

.5 Show changes occurring since previous submission of schedule:

- .1 Major changes in scope.
- .2 Activities modified since previous submission.
- .3 Revised projections of progress and completion.
- .4 Other identifiable changes.

.6 Provide a narrative report to define:

- .1 Problem areas, anticipated delays, and impact on schedule.
- .2 Corrective action recommended and its effect.
- .3 Effect of changes on schedules of other prime contractors.

1.6 Submittals Schedule

.1 Include schedule for submitting shop drawings, product data, and samples.

.2 Indicate dates for submitting, review time, resubmission time, last date for meeting fabrication schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 Sections Include

.1 Shop drawings and product data.

1.2 Related Sections

.1 Section 01 32 00 – Construction Progress Documentation.

.2 Section 01 78 00 – Closeout Submittals

1.3 Administrative

.1 This section specifies general requirements and procedures for contractor’s submissions. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work until relevant submissions are reviewed by Owner’s Representative.

.3 Present submittals in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Notify Owner’s Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work are coordinated.

.7 Contractor’s responsibility for errors and omissions in submission is not relieved by Owner’s Representative’s review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Owner’s Representative review of submission, unless Owner’s Representative gives written acceptance of specific deviations.

.9 Make any changes in submissions which Owner’s Representative may require consistent with Contract Documents and resubmit as directed by Owner’s Representative. When resubmitting, notify Owner’s Representative in writing of revisions other than those requested.

.10 Notify Owner’s Representative, in writing, when resubmitting, of any revisions other than those requested by Owner’s Representative.

.11 Keep one reviewed copy of each submission on site.

1.4 Submittals

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Coordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.3 Allow 10 days for Owner’s Representative review of each submission.

.4 Adjustments made on shop drawings by Owner’s Representative are not intended to change contract price. If adjustments affect value of Work, state such in writing to Owner’s Representative immediately after receipt of approval of shop drawings. If value of Work is to change a change order must be issued prior to proceeding with Work.

.5 After Owner’s Representative review, distribute copies.

.6 Submit electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Owner’s Representative may reasonably request.

.7 Submit three copies and electronic copy in PDF format of Operations and Maintenance Data for requirements requested in Specification Sections and as requested by Owner’s Representative

.8 Delete information not applicable to Project.

.9 Supplement standard information to provide details applicable to Project.

.10 Cross-reference product data information to applicable portions of Contract Documents.

.11 If upon review by Owner’s Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of work may proceed.

1.5 Shop Drawings Review

.1 The review of shop drawings by Owner’s Representative is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that Owner’s Representative approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the Work, for information that pertains to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 Construction Safety Measures

.1 The Contractor shall ensure that its employees, Subcontractor employees, and the Work comply with all applicable regulations, legislation, rules, and requirements of all authorities having jurisdiction which are in force or come into force during the performance of the Work by the Contractor. These include, but may not be limited to, items listed below. Where conflicts arise among these requirements, the most stringent shall apply.

- .1 National Building Code
- .2 Canadian Construction Safety Code
- .3 Newfoundland & Labrador Occupational Health and Safety Act & Regulations
- .4 Workplace Health, Safety and Compensation Commission
- .5 Newfoundland and Labrador Construction Safety Association
- .6 Maritime Occupational Health and Safety Regulations (made pursuant to the Canada Labour Code).
- .7 Canada Shipping Act, 2001
- .8 Owner’s Operations Manual
- .9 Owner’s Contractor Safety and Environmental Responsibilities as amended from time to time
- .10 Any additional regulations as attached, and with all specified health and safety standards, policies and procedures established for and used by Owner
- .11 Canadian Standards Association and American Society for Testing and Materials
- .12 Other federal, provincial and municipal regulations, statutes and authorities.

.2 Prior to the initial commencement of Work under this Contract, a pre-job meeting between Owner’s Representative and the Contractor shall be conducted to communicate and clarify Owner’s expectations with respect to health and safety requirements.

.3 Unless otherwise described, all Work shall be done in accordance with Owner's current policies, procedures, and training material. The Contractor shall at all times keep himself and his personnel informed of Owner's current policies, procedures, and training material including but not limited to the documents posted at:

https://workingwith.newfoundlandpower.com

1.2 Working in Proximity to Energized Equipment

.1 Where a Contractor is required to work in proximity to energized equipment the Contractor shall:

.1 Provide a list of all Contractor and Subcontractor personnel who will be on the Site to Owner’s Representative. This list shall be maintained and updated whenever personnel not on the original list are used at the Site.

.2 Where applicable, include the specified minimum approach distances in all tailboard safety meetings and the Project Health and Safety Plan.

.3 Have access to control buildings and/or control rooms only when the Work requires such access, and with the permission of Owner’s Representative.

.4 Park vehicles on Site only if it is necessary for the performance of work. The vehicles must also be connected to the ground grid (where applicable) while inside the substation with appropriate portable 2/0 AWG copper insulated cable as per clause 2.4 Grounding Equipment. If vehicles are working (not just parked) within 2.5 meters of the fence, outside the substation yard, the vehicle shall be connected to the fence grid. In such cases consideration must be given to touch potential hazards between the vehicle and the ground.

.2 Upon request of Owner, provide continuous supervision acceptable to Owner’s Representative. Circumstances may dictate that the Site Supervisor be a non-working Site Supervisor.

.1 The Contractor must appoint a Site Supervisor in charge of the Work. The name of the Site Supervisor must be communicated to Owner in writing.

.2 The Site Supervisor will be responsible for all crews and will remain on the Work Site at all times when Work is being carried out by the Contractor.

.3 If the Contractor changes the Site Supervisor, Owner must be notified in writing and the Site Supervisor must be acceptable to Owner's Representative.

.4 The Site Supervisor shall demonstrate knowledge and competence regarding the Contract specifications and all relevant safety requirements. The Owner reserves the right to refuse Site Supervisor status to any person. Should Owner refuse a Supervisor, the Contractor would be required to appoint a replacement Site Supervisor that is acceptable to both parties.

1.3 Minimum Approach Distances

The Contractor must ensure they are familiar with Owner's Minimum Approach Distances to Energized Equipment as per OPR106.07. The purpose of this procedure is to establish safe working distances for work carried out in proximity to energized apparatus in an effort to minimize or eliminate the hazard of electric shock to which workers may be exposed.

1.4 Worker Protection Code Requirements

.1 Where it becomes necessary to de-energize apparatus greater than 750V in order to perform the Contractor's activities safely, the Contractor shall not proceed until confirmation is provided by Owner's Representative that a Protection Guarantee, in accordance with Owner's Worker Protection Code, has been established and the Contractor is in possession of Form #543a (Request to Provide Worker Protection for Outside Party).

1.5 Security & Public Safety

.1 The Contractor shall take action to ensure public safety and security of the Site with respect to actions and activities the Contractor undertakes.

1.6 Rigging

.1 All rigging and use of hoisting equipment such as chains, slings, and shackles must be in compliance with the Newfoundland and Labrador Occupational Health and Safety Regulations.

1.7 Overloading

.1 Ensure no part of the Work is subjected to any load which will reduce safety limits or will cause permanent deformation.

1.8 Aerial Device Use

.1 It is recognized that there is a possibility that an emergency could arise anytime a worker goes aloft in an aerial device. Consideration should be given to the abnormal conditions which could arise while working aloft, such as mechanical failure, vehicle accident, illness or accidental injury. This shall be discussed during the risk management / job planning process and during the tailboard meetings each day prior to the use of an aerial device.

.2 Contractors shall have a procedure to recognize and respond to emergencies associated with the use of aerial devices. As a minimum, this procedure must include plans for bucket evacuation (for a worker who is aloft in an aerial device when the device becomes inoperable) and bucket rescue (for a worker who becomes injured or disabled and is unable to operate the controls while aloft in an aerial device). Upon request, this procedure shall be submitted to Newfoundland Power for review.

1.9 Project Health and Safety Plan

.1 Upon request of Owner, the Contractor will be required to develop a written site-specific Project Health and Safety Plan prior to commencement of work. The Plan shall be submitted to Owner's Representative for review before contract execution. The Project Health and Safety Plan will involve a Site hazard assessment based on review of all work and the Work Site. The Contractor shall identify all known and potential health risks and safety hazards.

.2 Based on the Site hazard assessment, the Project Health and Safety Plan, if required, shall include but not be limited to the following:

- .1 Summary of health risks and safety hazards resulting from analysis of hazard assessment.
- .2 List of critical tasks and operations which must be performed as part of the Work.
- .3 List of hazardous materials to be brought on Site as required by the Work complete with associated material safety data sheets.

.4 Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.

.5 Identify personal protective equipment to be used by workers as required to manage hazards that cannot be reasonably or practically managed by engineering and administrative controls.

.6 State the Contractor’s Safety Policy. Provide confirmation that the Contractor and subcontractors currently have in place Standard Operating Procedures (SOP) and Safe Work Practices (SWP), representative of the work type to be undertaken. Maintain a copy of all SOP and SWP on Site at all times for own use and provide for inspection when requested by Owner’s Representative.

.7 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e.: names/telephone numbers) of:

.1 Designated personnel from own company;
.2 Owner’s representatives;
.3 Local emergency resources;
.4 Regulatory agencies.

.8 All control measures, protective devices, work practices and procedures indicated in the Plan shall comply with applicable Federal and Provincial Safety Regulations.

.9 Develop the Project Health and Safety Plan in collaboration with all subcontractors. Ensure that all work and activities of subcontractors are included in the hazard assessment and are reflected in the Plan.

.10 Implement, maintain and enforce compliance with requirements of the Project Health and Safety Plan until final completion of the Work and demobilization from Site.

.11 Post a legibly typed copy of the Project Health and Safety Plan in a common visible area at the Work Site. Ensure that all workers and other authorized persons allowed access to the construction area(s) are aware of and abide by the rules and regulations indicated in the Plan.

.12 Post all versions of the Project Health and Safety Plan and submit an updated copy to Owner’s Representative in all instances.

.13 Submission of the Project Health and Safety Plan, and any revised version, to Owner's Representative is for information and reference purpose only. It shall not be construed to imply approval by Owner's Representative, be interpreted as a warranty of being complete, accurate and legislative compliant and shall not relieve the Contractor and Subcontractor of legal obligation for the provision of Health and Safety on the Project.

1.10 Site Safety Meetings

.1 In conjunction with Owner's Representative, the Contractor shall conduct a Pre-Job Safety Meeting with all intended Site workers including those of proposed Subcontractors, prior to commencing any work on Site. This meeting shall be used to communicate the Project Health and Safety Plan and to provide awareness to all workers of personal protective equipment and other safety requirements.

.2 The Contractor shall also provide the Pre-Job Safety Meeting information to all new workers before they enter the Site.

.3 The Contractor will maintain on the Site an accurate listing showing the date workers attended the Pre-Job Safety Meeting.

.4 All workers on Site shall start each shift with a tailboard safety meeting. These meetings will be used to review pertinent sections of the Project Health & Safety Plan, keep workers apprised of changing conditions and hazards on a day to day basis and address any issues or concerns that may arise.

.5 Additional tailboard safety meetings shall be held whenever conditions and hazards occur that were not included in the daily tailboard meeting.

.6 For Projects in excess of one month, the Contractor shall conduct monthly safety meetings. Minutes of all safety meetings shall be recorded and copies kept on Site at all times. Minutes shall be made available to Owner's Representatives at any time for the purpose of audit and/or review.

.7 A record of daily tailboard meetings shall be kept on Site and provided to Owner's Representatives upon request.

PART 2 TOOLS AND EQUIPMENT

2.1 Personal Protective Equipment

.1 The Contractor must follow all rules pertaining to worker personal protective equipment as per Owner's Operations Manual, OPR104.01, Personal Protective Equipment and other relevant OPR's.

.2 Clothing should minimize danger from live electrical equipment or lines, unguarded moving machinery, hot or injurious substances, open flames, etc. Linepersons must wear long sleeved shirts with the sleeves rolled down while working on a pole or from an aerial device.

.3 All affected workers of the crew shall wear:

.1 Hard hats (CSA Class E, Type II). The hard hats shall be maintained in good condition with no cracks, dents or penetrations. The suspension shall have no torn or broken threads and the foam liner shall be properly installed and in good condition.
.2 Safety footwear (CSA Grade 1). These shall be marked with a green triangle and orange omega (Ω) symbol, be puncture resistant and electric shock resistant (ESR) and a minimum of six to eight inches high.
.3 Eye protection (CSA approved).
.4 Traffic safety vests (CSA approved) shall be worn when working on or adjacent to public roads or when workers may be exposed to the hazard of mobile equipment.
.5 Hearing protection when employees are using any gas powered equipment, jack hammer, compressor, chain saw, or other such equipment, as per Owner's Operations Manual, OPR104.01.
.6 Approved CSA or ULC chain saw clothing (pants/leggings) and approved chain saw safety footwear shall be worn by any worker operating a chain saw as per OPR 103.08.
.7 Approved Flame Resistant (FR) clothing as deemed necessary by Owner's Operations Manual OPR104.02 and CAN/ULC-5801.
.8 A Transport Canada approved Personal Floatation Device while conducting work from the cable installation vessel or while in relative close proximity to the shore approach area (during trenching operations).

2.2 Test Equipment

.1 The Contractor must follow all rules pertaining to test equipment as per Owner’s Operations Manual, OPR103.04, Working with Test Equipment. All test equipment shall be CSA certified or equivalent. Test equipment shall be used only by qualified personnel that have received proper training in the use of the equipment.

2.3 Climbing Equipment / Fall Arrest

.1 All Work performed at elevations greater than 10 ft must be performed on a suitable staging or platform and workers must be tethered with harnesses/lanyards as per the Newfoundland and Labrador Occupational Health and Safety Regulations.

.2 All climbing equipment, including fall arrest harnesses and lanyards shall be CSA approved, inspected and maintained in good condition as per the Occupational Health and Safety Regulations and Owner’s OPR104.04. Proof of CSA certification shall be evident on the equipment.

.3 Lanyards must be no longer than 6 ft and limit free fall to 4 ft.

.4 100% fall protection (i.e. tethered at all times) is required when climbing poles and structures this includes:

  .1 Body harness and climbing belt combination
  .2 Pole choker
  .3 Secondary lanyard

2.4 Grounding Equipment

.1 The Contractor shall supply all required grounds, of sufficient quantity and length for their own use under this Contract.

.2 Temporary Protective Grounds (including vehicle grounds) must meet ASTM F855 - 04 “Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment”.

.3 Working grounds and vehicle grounds shall be marked with a valid and legible re-test date (testing is required annually), shall be maintained in good condition, and shall be replaced when damaged or deteriorated.

2.5 Miscellaneous Tools & Equipment

.1 Hoisting Equipment such as ropes, slings, shackles, and chains shall be maintained in good condition with a visible and legible load rating. Hoisting equipment shall have the correct load rating for the task being performed.

.2 All rigging and use of hoisting equipment such as chains, slings, and shackles must be in compliance with the Newfoundland and Labrador Occupational Health and Safety Regulations.

.3 Hoists and grips shall be maintained in good condition with no evidence of wear and tear.

.4 Ladders shall meet CSA standard and shall be non-conductive if used inside a substation or near energized equipment. Ladders shall be maintained and used in accordance with Occupational Health and Safety Regulations.

2.6 Vehicles, Heavy Equipment, Off-Road Equipment, and Trailers

.1 The Contractor shall ensure all marine vessels, vehicles, heavy equipment, and trailers, used for the Work, including, but not limited to, trucks, radial boom derricks, aerial devices, backhoes, excavators, etc., are inspected and maintained in accordance with applicable legislation and with all Owner’s requirements, policies, procedures, and standards.

.2 The Contractor’s equipment must be maintained in a condition acceptable to Owner’s Representative.

.3 The Contractor or Subcontractor shall replace, at the request of Owner, any equipment that Owner deems to be in an unsatisfactory condition, and the equipment deemed to be unsatisfactory shall be considered unserviceable in terms of the Contract unless and until it has been restored to a condition that meets Owner’s requirements. Any necessary replacement of equipment, for any reason, shall be at the Contractor’s expense.

2.7 Heavy Equipment

.1 Heavy equipment is defined as any Cab & Chassis (Truck) with a gross vehicle weight of 4500 kg (10,000 lbs) or greater. During the term of the Contract, all heavy equipment used for the Work in this Contract shall be maintained to the standards required by the Government of Newfoundland and Labrador, Department of Government Services and Lands, Motor Registration Division, and to all Owner requirements.

.2 All heavy equipment shall have a valid, annual, Motor Vehicle Inspection Certificate from a recognized truck and trailer heavy equipment repair facility licensed under the Government of Newfoundland and Labrador, Department of Government Services and Lands, Motor Registration Division. All inspection stickers shall be placed in the windshield of the heavy equipment inspected and all Vehicle Inspection Certificates shall be made available to Owner upon request.

.3 The Contractor shall inspect, maintain, service, repair and overhaul all heavy equipment in accordance with the approved maintenance schedule and manufacturer’s maintenance and overhaul procedures; and comply with all manufacturers’ recommendations, mandatory service bulletins and recall notices.

.4 This should be done at least twice a year and all records must be kept in a file showing the inspection form for the chassis and aerial device, the work performed and a list of parts & labour.

.5 The Contractor shall maintain complete and accurate maintenance records for all heavy equipment, and the records shall be made available upon request from Owner and/or any governmental authorities or agencies having jurisdiction.

.6 The Contractor will be responsible to ensure that all heavy equipment to be used by Subcontractors hired by the Contractor for this Contract is maintained to the standards outlined herein. The Owner shall have the right to request from the Contractor a copy of the Subcontractor’s equipment inspection certificates and maintenance records at any time during the term of the Contract.

.7 Contractors and Subcontractors must comply with the Commercial Vehicles Hours of Service Regulations under the Highway Traffic Act and maintain log books and their driving time accordingly.

.8 All Contractors and Subcontractors must be familiar with the Compliance Review Facility Audit Safety Package available through the Government of Newfoundland and Labrador, Department of Government Services and Lands, Motor Registration Division, Transportation Regulation Enforcement Section. All heavy equipment used for the Work in this Contract shall have the following and this information shall be submitted to Owner upon request from the Contractor:

.1 A Preventive Maintenance Program including annual Motor Vehicle Inspections (MVI) on the chassis and an annual boom inspection as per the manufacturer's recommendations;

.2 A file on each truck showing the historical maintenance carried out on each truck or piece of equipment. Records must show dates, year, make, model, VIN number, odometer and work performed. In addition to maintenance, it shall contain daily pre-trip inspections/circle checks to be kept for two years after the vehicle is sold;

.3 A file on each individual driver that will contain proof of classification of license, endorsements, convictions, driving under influences of drugs & alcohol, driver's abstracts, log books/hours of service (time sheets), operator training & experience (T.D.G., First Aid, etc), driver improvement courses, housekeeping, load security, etc;

.4 Proof of valid insurance and proper type of insurance;

.5 Emergency supplies such as environmental spill kits, first-aid kits and fire extinguishers as outlined herein;

.6 All Subcontractors hired by the Contractor to perform any section of the Work under this Contract shall be required to submit inspections as outlined above to the Contractor. The Contractor will be required to have copies of the Subcontractor's equipment inspections.

.9 For each Aerial Device (bucket truck), to be used for the Work under this Contract, Owner's "*Articulated Aerial Device Annual Maintenance and Inspection*" form must be completed by a licensed mechanic and submitted to Owner upon request. The form will be issued to the Contractor by Owner as required.

.10 Two (2) wheel chocks designed for a 44" diameter tire must be deployed on each parked vehicle. – Similar to the ZICO SAC 44, complying to the SAEJ348 standards or the NFPA 1901-96 standards.

.11 For those aerial devices with controls below rotation, located at the right rear corner, an operator's platform is provided. Because of a touch potential hazard, the Operator must stand on this platform when working in close proximity to energized lines for their own protection. Access steps to and from the deck of the truck and to and from the bucket must be in place for ergonomic and safety reasons.

.12 All loose hardware must be removed from the deck & placed in the lockers before travelling to and from a jobsite. Barriers or gates must be installed across the side access step and the rear of the deck to ensure nothing is able to fall off the deck while travelling.

.13 The Contractor shall have a winch line inspection and replacement program. The winch line must be appropriately rated and properly maintained. It shall be replaced when worn.

.14 Load rating charts and boom angle indicators must be present, legible, and in a location visible to the operator, regardless of boom position.

.15 Holding valves must be tested daily and confirmed to be in good working order.

2.8 Trailers

.1 Trailers that are 4500 kg (10,000 lbs) or greater used for the Work in this Contract shall be maintained to the standards required by the Government of Newfoundland and Labrador, Department of Work Services and Transportation - Motor Vehicle Registration Division. These shall have a Valid Motor Vehicle Inspection Certificate from a recognized truck and trailer heavy equipment repair facility licensed under the Government of Newfoundland and Labrador, Department of Government Services and Lands, Motor Registration Division. All inspection stickers shall be affixed to the chassis of the trailer and all Vehicle Inspection Certificates shall be made available to Owner upon request.

.2 The Contractor shall maintain, repair and overhaul all trailers in accordance with the approved maintenance schedule and manufacturer's maintenance and overhaul procedures; and comply with all manufacturers' mandatory service bulletins or recall notices. The Contractor shall maintain complete and accurate maintenance records for all heavy equipment, and the records shall be made available upon request from Owner and/or any governmental authorities or agencies having jurisdiction.

.3 The Contractor will be responsible to ensure that all trailers used by Subcontractors hired by the Contractor for this Contract is maintained to the standards outlined above. Owner shall have the right to request from the Contractor a copy of the Subcontractor's equipment inspection certificates and maintenance records at any time during the term of the Contract.

.4 The Contractor or Subcontractor shall forthwith replace at the request of the Owner any equipment that Owner deems to be in an unsatisfactory condition, and the equipment deemed to be unsatisfactory shall be considered unserviceable in terms of the Contract unless and until it has been restored to a condition that meets Owner's requirements. Any necessary replacement of equipment, for any reason, shall be at the Contractor's expense.

.5 Safety chains shall be of a suitable length and capacity (minimum of 3/8" chain). The safety hook must be complete with safety catch and be in good condition.

PART 3 EXECUTION

3.1 Not Used

END OF SECTION

PART 1 GENERAL

1.1 General

.1 Ensure that all requirements, specified herein, as well as those of the authorities having jurisdiction, are strictly enforced and executed.

.2 The Contractor shall at all times keep himself and his personnel informed of the Owner's current policies, procedures and training material including, but not limited to, Owner's Contractor Environmental Responsibilities, Environmental Procedures contained in the Owner's Operation Manual, and the documents posted at:

https://workingwith.newfoundlandpower.com

PART 2 PRODUCTS

2.1 No products required in this Section.

PART 3 EXECUTION

3.1 Fires

.1 Fires and burning of rubbish on Site are not permitted.

3.2 Disposal of Waste

.1 The Contractor shall be responsible for the removal and proper disposal of all waste material form the site.

.2 Burying of rubbish and waste materials on Site is not permitted.

.3 Disposal of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers is prohibited.

.4 Scrap materials that cannot be recycled or salvaged must be disposed of only at an approved landfill site.

3.3 Provincial Environmental Approvals

.1 Approval has been obtained from the Department of Environment and Conservation, Government of Newfoundland and Labrador, to install the new submarine cable system. The approval stipulates that the General Terms and Conditions which apply to alterations to a body of water must be followed during the execution of the work. The General Terms and Conditions are;

- .1 All work must take place within the legal boundaries of the proponent or with the approval of the land owner. The constructed works must comply with all other items and conditions provided in the Crown Lands grant, lease or license for occupancy;
- .2 Any work that must be performed below the high water mark must be carried out during a period of low water levels;
- .3 Water pumped from excavation for work areas, or any runoff or effluent directed out of work sites, must have silt and turbidity removed by settling ponds, filtration, or other suitable treatment before discharging to a body of water. Effluent discharged into receiving waters must comply with the Environmental Water Control Water and Sewage Regulations, 2003;
- .4 All operations must be carried out in a manner that prevents damage to land, vegetation, and watercourses, and which prevents pollution of bodies of water;
- .5 The use of heavy equipment in streams or bodies of water is not permitted. The operation of heavy equipment must be confined to dry stable areas;
- .6 All vehicles and equipment must be clean and in good repair, free of mud and oil, or other harmful substances that could impair water quality;
- .7 During the construction of concrete components, formwork must be properly constructed to prevent any fresh concrete from entering a body of water. Dumping of concrete or washing of tools and equipment in any body of water is prohibited;
- .8 Wood preservatives such as penta, CCA or other such chemicals must not be applied to timber near a body of water. All treated wood or timber must be thoroughly dry before being brought to any work site and installed;
- .9 The use of creosote treated wood is strictly prohibited within 15 metres of all bodies of fresh water in the province;

.10 Any areas adversely affected by this project must be restored to a state that resembles local natural conditions. Further remedial measures to mitigate environmental impacts on water resources can and will be specified, if considered necessary in the opinion of the Department of Environment and Conservation;

.11 The bed, banks and floodplains of watercourses, or any other vulnerable areas affected by this project, must be adequately protected from erosion by seeding, sodding or placing of rip-rap;

.12 All waste materials resulting from this project must be disposed of at a site approved by the regional Government Service Center of the Department of Government Services. The Department of Government Services may require samples to be submitted for testing and analysis;

.13 Periodic maintenance such as painting, resurfacing, clearing of debris, or minor repairs, must be carried out without causing any physical disruption of any watercourse. Care must be taken to prevent spillage of pollutants into the water;

.14 The owners of structures are responsible for any environmental damage resulting from dislodgement caused by the wind, wave, ice action, or structural failure;

.15 Sediment and erosion control measures must be installed before starting work. All control measures must be inspected regularly and any necessary repairs made if damage is discovered;

.16 Fill or ballast material must be of good quality, free of fines or other substances including metals, organics or chemicals that may be harmful to the receiving waters, and

.17 The proposed use of any facility and site will not involve any storage of pollutants such as fuels, chemicals, pesticides, etc.

.2 Bidders are advised any remedial works required by the Department of Environment and Conservation over and above the normal reinstatement of the existing shoreline features after trenching and backfilling that are deemed not to have been caused by any negligence or fault of the Contractor will be negotiated with the Contractor.

3.4 Federal Environmental Approvals

.1 Approval has been obtained from the Environmental Protection Operations Directorate, Atlantic Region, of Environment Canada, to install the new submarine cable system. The use of trenched material within the tidal zone is considered a placement rather than a disposal activity under the regulatory requirements of the Disposal at Sea provisions of the Canadian Environmental Protection Act, 1999. The Directorate concluded the placement activity would not be contrary to Disposal at Sea legislation provided the Contractor executes the work in a manner that complies with all other federal and provincial requirements designed to protect the marine environment.

.2 Newfoundland Power is in the process of obtaining approval to install the new cable system from Fisheries and Oceans Canada. The terms and conditions contained in their approval will be conveyed to the Contractor. It is likely Fisheries and Oceans will restrict work in the shoreline areas prior to June 20, 2014 due to the presence of a lobster fishery near shore and fish (caplin), using the beaches for spawning purposes. The contractor shall plan his work activity to commence after the referenced date. A condition of the pending permit is that the existing in-service cables and the older abandoned cables shall be left in place.

.3 Newfoundland Power is also in the process of obtaining approval from Transport Canada under the Navigable Waters Protection Act to install the new cable system in the no-anchor zone designated on the navigation charts for the area. The terms and conditions contained in their approval will be conveyed to the contractor. In general their approval will deal with minimizing interference with navigation through the Bell Island Tickle during installation of the cables.

3.5 Contractor Permits

.1 The Owner has obtained the approvals as detailed in Sections 3.3.1 and 3.4.1. The Owner in the process of obtaining the approvals detailed in Sections 3.4.2 and 3.4.3.

.2 The Contractor is responsible for obtaining all other required permits and approvals.

3.6 Hazardous Material

.1 WHMIS – Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.

.2 Deliver copies of WHMIS data sheets to Owner's Representative at least three weeks prior to delivery of hazardous substances to the Site.

.3 The Contractor shall keep on Site at all times, copies of the materials safety data sheets (MSDS).

3.7 Contractor Compliance

.1 The Contractor shall ensure that its employees, Subcontractors and their employees, and the Work, comply with:

  .1 All applicable environmental legislation, rules, regulations, and requirements of all authorities having jurisdiction which are in force or come into force during the performance of the Work by the Contractor.

  .2 All environmental procedures developed and used by Owner of which the Contractor is made aware.

  .3 Owner's Operations Manual and Contractor Environmental Responsibilities as amended from time to time.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 Provide all construction facilities not incorporated into the Work but required to execute the Work.

.2 Remove from Site all such facilities after use.

1.2 Storage

.1 Provide and maintain suitable weather tight temporary storage facilities for storage of materials and equipment which are subject to damage by weather.

.2 Provide heated facilities for storage of materials and equipment requiring heat.

1.3 Sanitary Facilities

.1 Contractor shall provide suitable washroom facilities for all personnel on Site. Facilities shall consist of a minimum of toilet and hand washing area with suitable supply of clean water.

.2 Contractor must maintain these facilities in a clean condition with a sufficient supply of paper, soap and disinfectant. Waste material including water shall be disposed of on a regular schedule acceptable to the Owner's Representative.

1.4 Power

.1 120/240V, single phase power is not available on Site. Contractor shall provide suitable mobile generators, fuel, and extension cords for his own use. All electrical tools & equipment shall be protected by ground fault circuit interrupters.

1.5 Project Cleanliness

.1 Maintain the Work in tidy condition, free from the accumulation of waste products and debris.

.2 Remove waste material and debris from the Site or deposit in approved spoil areas. Leave the Site in original condition after Project is completed.

1.6 Removal of Temporary Facilities

.1 Remove temporary facilities from Site when Project is completed.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

1.2 Final Inspection and Declaration Procedures

.1 Contractor's Inspection: The Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects; repair as required. Notify the Owner's Representative in writing of satisfactory completion of the Contractor's Inspection and that corrections have been made. Request an Owner's Representative's Inspection.

.2 Owner's Representative's Inspection: Owner's Representative and the Contractor will perform an inspection of the Work to identify any defects or deficiencies. The Contractor shall correct Work accordingly.

.3 Completion: The Contractor shall submit written certificate that the following have been performed:

- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Equipment and systems have been tested and are fully operational.
- .4 Certificates required have been submitted.
- .5 Operation of systems have been demonstrated to Owner's personnel.
- .6 Work is complete and ready for Final Inspection.

.4 Final Inspection: When items noted above are completed, request final inspection of Work by the Owner's Representative, Consultant and the Contractor. If Work is deemed incomplete by the Owner's Representative, complete outstanding items and request a re-inspection.

.5 Declaration of Total Performance: When the Owner's Representative considers final deficiencies and defects have been corrected and it appears requirements of the Contract have been totally performed, provide Statutory Declaration of Total Performance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Emergency repair guidelines and best practices.

.6 Spare parts, special tools and maintenance materials.

.7 Warranties.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 77 00 - Closeout Procedures.

1.3 Submission

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Owner's Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 One week prior to Substantial Performance of the Work, submit to the Owner's Representative, three final copies of operating and maintenance manuals.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

1.4 Format

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide CAD files in DWG format on USB drive. Also provide electronic files in PDF format.

1.5 Contents - Each Volume

.1 Table of Contents: provide title of project; names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties; schedule of products and systems, indexed to content of volume.

.2 For each product or system:

- .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .2 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.3 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.6 As-Builts and Samples

.1 Maintain at the site for Owner’s Representative one record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Owner’s Representative.

1.7 Recording Actual Site Conditions

.1 The As-Built Drawings shall provide a record of all changes. It is the Contractor’s responsibility to ensure that the changes are recorded as they occur; they are to be indicated by use of coloured lines and suitable notations on one complete set of drawings set aside exclusively for this purpose in the office of the Contractor.

.2 The provision of GPS data to the Owner in an agreed upon format reflecting vessel positioning during cable laying operations is the responsibility of the Contractor. Also provide actual cable tension data log for the installation of each cable.

.3 The Contractor shall provide a video record of each cable showing its final location on the ocean floor to ensure that there are no incidents of kinking, looping, spanning or other visual damage.

.4 The Contractor shall turn over to the Owner each drawing completely marked up as above, so that the master drawing can be revised to suit. If “electronic” copies of the drawings were accepted, then a suitably annotated revised drawing file shall be submitted with the marked up print.

.5 These drawings shall be clearly identified with the notation “Revised As-Built” imprinted adjacent to the title block.

.6 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.7 Legibly mark each item to record actual construction, including:

- .1 Field changes of dimension and detail.
- .2 Changes made by change orders.
- .3 Details not on original Contract Drawings.
- .4 References to related shop drawings and modifications.

.8 Specifications: legibly mark each item to record actual construction, including:

- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Addenda and change orders.

.9 Other Documents: submit manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.10 At completion of project provide all recorded information on print drawings or alternatively transfer to CAD files in DWG format. Submit DWG files, also with electronic files in PDF format as part of the Closeout Submittals.

1.8 Spare Parts

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Owner’s Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 Special Tools

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to project site place and store.

.4 Receive and catalogue all items. Submit inventory listing to Owner’s Representative. Include approved listings in Maintenance Manual.

1.10 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Owner’s Representative.

1.11 Warranties

.1 Develop warranty binder to contain information relevant to Warranties.

.2 Warranty binder to include required actions and documents to assure that Owner receives warranties to which it is entitled.

.3 Assemble approved information in binder and submit upon acceptance of Work. Organize binder as follows:

 .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of Work.

.4 Retain warranties and bonds until time specified for submittal.

.4 Include information contained in warranty binder as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Starting point and duration of warranty period.

.7 Summary of maintenance procedures required to continue warranty in force.

.8 Organization, names and phone numbers of persons to call for warranty service.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DESIGN, SUPPLY, AND INSTALLATION OF A NEW BELL ISLAND SUBMARINE POWER CABLE SYSTEM

PROVINCE OF NEWFOUNDLAND AND LABRADOR

PEG Newfoundland and Labrador PROFESSIONAL ENGINEERS AND GEOSCIENTISTS

PERMIT HOLDER
This Permit Allows

BAE ◆ NEWPLAN GROUP LIMITED

To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEG D0049
which is valid for the year 2013

REVISION INDEX						
N°	**Original**	**Reviewed by**	**Approved by**	**Date**	**Revision Details**	**Submission**
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00	**T. McCarthy**	**R. Awad**	**A. Peach**	**09-03-2013**	**Clarifying Details**	**Issued for Bid**

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1 INTRODUCTION

1.1 General

This specification defines the minimum requirements for the design, manufacture, inspection, factory and field testing, supply, installation and commissioning of a medium voltage, submarine power cable system to service Bell Island, located in the Province of Newfoundland and Labrador, Canada. Bell Island is situated in Conception Bay, in close proximity to the Avalon Peninsula, on the east coast of the Island of Newfoundland. At the present time Bell Island is serviced with electricity by means of four single-conductor submarine cables running from Broad Cove on the Avalon Peninsula of Newfoundland to an area known as the Old Dominion Pier on Bell Island.

Technical specifications are included for single conductor and three conductor, 25 kV, Tree-Retardant Cross-Linked Polyethylene (TR-XLPE) insulated, shielded, lead covered and copper or galvanized steel wire armoured submarine cables for use on a three-phase, 60 Hz nominal multi-grounded Y system. Also included are specifications for single conductor and three-conductor 25 kV, Ethylene Propylene Rubber (EPR) insulated submarine cables. To provide the necessary reliability, the new system shall consist of a minimum of four single-conductor cables to provide three phase power, if single phase cables are chosen, or a minimum of two cables (**each capable of carrying the full load)**, if three phase cables are chosen for the system. The existing cable will operate in parallel with the new system. It is planned to install the new cables just to the east of the existing in-service cables within the No-Anchor zone designated on the navigational charts for the area. A number of old abandoned cables are located in this area, as well as the currently energized cables. The new cable system will be required to cross over the existing in-service cables during the installation effort. Based on project limitations, documentation and surveys provided, the successful Contractor may adjust the planned route and spacing of the cables, within the No-Anchor zone, subject to the prior approval of Newfoundland Power.

New termination structures will be constructed by Newfoundland Power prior to the installation of the cables. The approximate locations of the new structures are shown on the drawings and photographs provided. They are located in close proximity to the existing termination structures. The details and exact location of the new termination structures will be provided to the successful bidder.

At the time of installation, the submarine cables are expected to convey a peak winter load of 8.6 MVA at a nominal voltage of 12.47 kV. The cable system is to be designed to service a 40 year forecast peak winter load of 10.4 MVA at an operating voltage of 12.47 kV. The cable will be designed for future conversion to 25kV at peak load of 20.8 MVA.

The submarine cable segment consists of approximately 5.375 km (circuit length) of insulated cable crossing a 120 m deep body of ocean. The actual circuit length of each cable will vary depending on the actual installed location as determine by marine survey and spacing of the cables.

This document shall be read in conjunction with other applicable documents, Project Data Sheets and Project Drawings.

1.1.1 Existing Conditions

The existing in-service cable system is referred to as BCV-02 (the Broad Cove 02 Distribution Feeder) and consists of four submarine cables which comprise the three-phase submarine cable system providing electricity to Bell Island. Two of these cables were installed in 1988, and two more were installed in 1990. A third cable was installed in 1988 but was deemed inoperable because of problems experienced with a factory splice in the cable. The cable was subsequently abandoned and replaced with a new cable in 1990.

In addition to the operating cables, there are as many as five (5) power cables present within the right-of-way which have been abandoned and are no longer in service. These include the cable installed in 1988 but never used (cable with factory splice), a three-phase cable installed in 1955, (28L), which was abandoned in 1990 due to a cable fault, and three (3) additional three-phase cables installed in 1932. The on-shore infrastructure is comprised of Newfoundland Power's standard distribution structures. The modification of these structures is not within the scope of this contract.

The cable approach at the shoreline of Broad Cove (mainland side of the cable crossing) traverses bedrock with sand and gravel deposits. The cable approach at the shoreline on the Bell Island side of the cable crossing traverses alternating patches of sand, silt, and gravel. All of the existing operating cables are individually protected inside cast iron cable "necklaces" from each shore to a distance approximately 90 m from shore. On the Bell Island side, the cables are all routed to onshore structures through a common trench, while on the Broad Cove side the cables are routed through individual trenches. The distribution voltage across to Bell Island is 12.47 kV, which provides service to a current load of 8.6 MVA. The forty (40) year forecasted peak winter load for Bell Island is 10.4 MVA. The approximate locations of the existing cables are shown on the provided drawings.

1.1.2 Bathymetry and Subsea Conditions

The bathymetry of the Bell Island Tickle shown on the drawings is the most recent information available. It was created from digitized files of the area which were prepared by the Bedford Institute in 1990. The digitized files were created from sounding surveys carried out by the Canadian Hydrographic Services in 1950. The soundings, which were digitized and used to produce these contours, were taken on a grid of approximately 70.0 m.

In 1988, Newfoundland Power engaged McElhanney Offshore Surveys Ltd. to do a sounding survey for the planned installation of the existing in-service cables. The information available from this survey only covers the actual footprint of the cables as shown on Newfoundland Power Drawing, No. 1-1150-34-2 (Part F).

During the 1988 survey, McElhanney also carried out a sediments survey of the seafloor in the corridor planned for the cables and determined the position of the three-phase cable (28L) using side scan sonar. This information is also contained on Newfoundland Power Drawing, No. 1-1150-34-2. There is no indication that the sediments survey extended beyond the planned footprint of the cables. Based on the contour configuration, it is likely that the same geological classifications of the bottom sediments will extend some distance to the east and can be expected to be similar for the location of the new cables.

The existing information on the bathymetry and subsea conditions is provided for information purposes, but is not to be relied on for installation of the new cables. The Contractor is required to carry out a marine survey to establish the locations of the in-service cables and determine subsea conditions before the new cables are installed. The marine survey shall consist of bathymetric, seismic and side scan sonar surveys along each of the proposed cable routes. The following information shall be gathered:

a. Bottom profiles along each of the cable routes. The profiles shall be tied into the co-ordinate system using a suitable GPS positioning system;

b. Side scan sonar data along each of the cable routes to identify bottom features and determine the locations of old abandoned cables. Side scan sonar shall also be run perpendicular to the proposed routing of the new cables, approximately every 500 m to determine the locations of the existing in-service cables;

c. Sub-bottom profiles along each of the proposed cable routes; and

d. A visual diving survey, complete with colour still and video photography at each of the proposed landing sites, to identify any characteristics of the terrain which may offer advantages for protection of the cables in the foreshore area.

All survey information gathered shall be referenced to a suitable GPS system and a copy provided to Newfoundland Power in a format ready for use by the engineering team. The contractor shall determine if the information gathered is sufficient to warrant the installation of the cable system and if not the successful contractor will be responsible to carry out any additional surveys he deems necessary to warrant the installation.

1.1.3 Climatic Condition

1.1.3.1 Installation Considerations

The climate in Conception Bay is comparable to the rest of northeast Newfoundland. Historical weather data recorded over the last five years at a marine weather station in Holyrood, located less than ten kilometres from the proposed work corridor, gives good insight towards typical conditions that can be expected during the months of July to September. On average, the temperature is between 15°C and 20°C. Prevailing wind direction is in a south-southwest to south-southeast direction. Hurricane season in Atlantic Canada officially starts on June 1st of every year, and extends into the fall months, according to Environment Canada. Although hurricanes and tropical storms have taken place sporadically in the area during late summer in the past, they are not a common occurrence, and it is usually only the tail end of these types of storms that may reach Newfoundland. The Owner will not accept any claims for delays due to the weather for the installation portion of the Work.

1.1.3.2 Ice Considerations

In some years, first year arctic ice brought south by the Labrador Current, does find its way into Conception Bay and the Bell Island Tickle. Although the prevailing winds in the area of the Tickle are from the southwest, there are occasions when northerly winds exert a pressure on the north side of the ice edge. This can produce rafting of the ice along the shorelines. Because of the sheltering influence of Bell Island itself, rafting is not a severe problem in the Tickle; however, the cables must be protected from ice action in the foreshore areas.

1.1.3.3 Cable Operating Environment Considerations

Comprehensive environmental data for the region of installation is available from the following sources:

- Environment Canada. (2013, July 10). *Weather Data*. Retrieved August 1, 2013, from Environment Canada: http://climate.weather.gc.ca/data_index_e.html

- Robichaud, B. (2012, June 8). *Canadian Hurricane Centre*. Retrieved August 1, 2013, from Environment Canada: http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=F548786D-DAEE-4176-BCF8-57F9EA3E250D

1.2 Scope of Work

The Contractor will be responsible for, but not necessarily limited to, the turn-key design, supply, and installation of a new submarine power cable system as follows:

1.2.1 Design and Supply of the 25kV Submarine Cable System

Including:

a. Cables;
b. Cable terminations and associated accessories, including lightning arrestors;

c. Packaging and marking for transport;
d. Inspection and Testing;
e. Documentation, drawings and certification;
f. Supply 500 m of spare cable and
g. Supply of spare splice kits
h. Supply of spare termination kits

1.2.2 Installation, Protection and Commissioning of the Cable System

The contractor shall:

a. Install and commission the cable system from the termination structure at Broad Cove to the termination structure near the Old Dominion Pier on Bell Island. The cable system shall be installed east of the existing in-service cables, in the area of the old abandoned cables and within the No-Anchor zone designated on the navigational charts.

b. Supply and install mechanical protection for the cables in the form of ductile iron articulated pipe sections or approved equivalent, from the high water mark out to a water depth of approximately 10 metres at both Broad Cove and Bell Island.

c. Complete trenching and backfilling of the cables:

    a. On the Broad Cove side, the Contractor shall trench from the termination structure to just beyond the low low-water mark, install the cable in the trench and backfill. The length of trench is approximately 40 metres. The trench shall be taken out to a distance beyond the low water mark which is easily accessible by a standard excavator operating at the lowest low water mark.

    b. On the Bell Island side the Contractor shall trench from the termination structure out into the ocean to a point at a water depth of approximately 10 metres and install the cable in the trench and backfill. The total length of the trench is approximately 150 metres. The submarine portion of the trench (125 metres) may be created after the cables have been laid by removing the native material underneath the cables (by jetting or equivalent means) and then backfilling the trench with native material. This work may require barge supported excavation, dredging, or jetting equipment.

d. Supply and install termination kits and lightning arrestors to terminate the cables at the shore termination structures.

e. Complete cable system testing and commissioning.

1.2.3 Engineering, Coordination, Construction, Documentation

The Contractor shall:

a. Survey, as required, and confirm the final cable route, the layout of the installation, and the required cable length.

b. Supply and install the cable system necessary to meet the various parameters and requirements of these specifications.

c. Provide the equipment and marine fleet for delivering and installing the submarine cables.

d. Design the cable trench and cable configurations for the approaches to the land terminations.

e. Provide all technical installation supervision, skilled trades' people, labourers, equipment, vessels, materials and other facilities required to complete the installation of the cables to Newfoundland Power's satisfaction.

f. Conduct field testing to ensure the integrity of the installation.

g. Provide training for designated personnel on the repair, replacement and maintenance of various components of the cable system.

h. Provide all factory and field test documentation, drawings, instruction manuals, etc., in both hard copy and electronic format.

i. Ensure all necessary coordination between the component suppliers to guarantee a successful installation of the submarine power cable system.

j. Complete the excavation and backfilling of the trenches and return the area to the preconstruction condition with provision for erosion mitigation (rip rap) along the shoreline, including all areas used to access the cable routes, with equipment and machinery to a condition satisfactory to Newfoundland Power.

1.3 Work by Newfoundland Power

The following work will be provided by Newfoundland Power:

a. Termination structures.

b. Acquisition of the following permits:

   i. Department of Fisheries and Oceans.

   ii. Government of Newfoundland and Labrador: Department of Environment.

   iii. Environment Canada.

iv. Navigable Waters.

1.4 Newfoundland Power/ Contractor Interfaces

The new cable installation shall be required to fall within the termination points defined for the Project. These termination points will comprise two 46 kV Termination Structures to be installed by Newfoundland Power on either side of the Tickle at the points of connection to the cable.

1.5 Definitions, Acronyms and Abbreviations

1.5.1 General Definitions

PROJECT	Bell Island Submarine Cable System Project
CONTRACT	The formal agreement between Newfoundland Power and CONTRACTOR
CONTRACTOR	The Contractor performing the WORK described under the CONTRACT with Newfoundland Power, including all designated suppliers and installation sub-contractors
WORK	Any and all works and/or services and/or materials to be provided by the CONTRACTOR under the CONTRACT with Newfoundland Power
SHALL AND MUST	Indicates mandatory requirements.
SHOULD	Indicates that a provision is not mandatory, but recommended as good practice

1.5.2 Specific Terms, Definitions, Acronyms and Abbreviations

Term / Acronym / Abbreviation	Explanation / Definition
AC	Alternating Current
CTA	Copper Tape Armoured
EMC	Electromagnetic Compatibility
ETP	Engineering Technical Particulars
FR	Fire Resistant
HSE	Health Safety & Environment
HV	High Voltage
IEC	International Electrotechnical Commission
ITP	Inspection and Test Plan
kV	Kilovolts
EPR	Ethylene Propylene Rubber
XLPE	Cross Linked Polyethylene

TR-XLPE	Tree Retardant Cross Linked Polyethylene

1.6 Reference Standards

Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments / supplements / revisions thereto.

1.6.1 Statutory Regulations, Codes and Standards

The Contractor shall comply with applicable codes, regulations, ordinances, and rules.

It shall be the Contractor’s responsibility to identify and comply with the requirements of any statutory international and national codes, laws, rules, regulations and standards for materials, design, fabrication, import, installation, operation, and testing of the equipment.

In particular, the standards and rules for connection and integration to the distribution network of Newfoundland Power shall apply.

1.6.1.1 Standards

The cable system shall be designed, manufactured and tested in accordance with standards AEIC CS-8-07 “Specification for Extruded Dielectric, Shielded Power Cables Rated 5 Through 46 KV” and ICEA S-94-649-2010 “Standard for Concentric Neutral Cables Rated 5 Through 46KV”. For short circuit calculations, ICEA P-32-382 should be used.

All documents referenced in this specification shall be of the latest issue at the time of bid. If any two standards differ in test methods and requirements the one with the most stringent methods shall be used and approved by Newfoundland Power.

1.6.1.2 International Organization for Standardisation (ISO)

The Contractor shall apply a quality assurance system accredited to ISO 9001 for the design, manufacture, and supply of the cables.

2 GENERAL REQUIREMENTS

2.1 Materials

2.1.1 General

The materials of construction and equipment shall be as specified in this specification. When materials are not specified, the materials proposed in the offer shall be suitable for the operating and design conditions.

All materials, equipment or supplies furnished under this specification shall be the product of a manufacturer who is experienced in the design and construction of such materials, equipment, or supplies, and who has furnished similar materials, equipment, or supplies that have been in satisfactory operation for a minimum of three years, preferably in similar environmental conditions, to establish their reliability.

Alternate materials to those described in this specification may be offered; however any such alternatives shall be clearly indicated in the bid, along with any cost adjustments and technical data supporting the alternative. Alternative materials shall be subject to Newfoundland Power’s written approval.

All materials shall be new, free of defects and be identifiable against their certification.

Asbestos products shall not be used.

2.2 Operation and Design Life

The 25kV cables and accessories shall be designed for minimum life duration of 40 years in the environment and for the duty specified herein.

2.3 Service Conditions

2.3.1 Voltage

At the time of installation, the nominal system voltage will be 12.47 kV phase-to-phase on a multi-grounded-Y system. The maximum continuous phase-to-phase voltage shall be 13.4kV. The basic impulse level (BIL) shall be150kV.

In the circumstance where future load growth were to exceed modelled predictions, an operating voltage conversion to 25kV will be required. Thus, the Contractor is required to ensure the cable is designed to operate at both 12.47 kV and 25 kV.

2.3.2 Operating Temperature

The cable shall be designed to operate satisfactorily for a maximum continuous conductor temperature of 90^0C, a maximum emergency conductor temperature of 105^0C and short circuit conductor temperature of 250^0C, under short circuit conditions for 5 seconds.

2.3.3 Ambient Conditions

In addition to any requirement stated in this specification and related documents, appropriate operating conditions shall be used in the design and construction of this equipment, for the parts installed under water, or underground or in the air and exposed to the sun and the weather.

2.4 Proven Equipment Criteria

Only equipment of proven reliability in similar service conditions shall be included in the Contractor's bid proposal. Prototypes shall not be offered. The Contractor shall provide the related necessary evidence (reference lists with installation dates and run hours accumulated by date, etc.). The reference units shall have equivalent design features to the units proposed.

2.5 Language

All documentation and communications shall be in the English language.

2.6 Units of Measurement

The units of measurement shall be in the metric system.

2.7 EMC Requirements

All equipment shall comply with the requirements for EMC as defined in IEC 61000, in order to ensure:

- Conducted emissions in both the power supply input and outputs are controlled within acceptable limits;
- Any electromagnetic disturbances generated by the equipment and its individual components do not exceed a level which would affect the correct operation of both radio and telecommunications equipment;
- The equipment has an adequate level of intrinsic immunity to external electromagnetic and conducted disturbance to enable it to operate as intended; and
- The design of the equipment should be of an adequate standard to maintain performance during its operational life in its installed environment.

2.8 Deviations, Concessions and Change Control

Contractor shall refer to the bid documents for the procedure for raising deviations or concession requests to the technical content of this specification.

Newfoundland Power will consider all deviations and concession requests and approval may be granted at the discretion of Newfoundland Power. No deviation or concession shall be implemented prior to approval being granted. Any deviations or concession implemented prior to approval shall be subject to rejection.

2.9 Design Requirements

2.9.1 Quality System

The Contractor shall apply a quality assurance system accredited to ISO 9001 for the manufacture and supply of the cables.

Materials shall be chosen with due regard to this specification and be fit for the duty described.

2.9.2 General Design Requirements

The cables shall be suitable for installation in the environment conditions appropriate for the location and installation.

Cables shall be constructed with suitable sheathing materials which shall withstand exposure to the environment, with specific attention given to the following:

- The insulation and sheath materials shall be resistant to oil, acid and alkali and shall be tough enough to withstand mechanical stresses during handling;
- Cables shall be suitable for installation in the ocean and as the location requires, outdoors exposed to direct sunlight, with resistance to ultraviolet radiation from the sun. All cables shall be insect and rodent proof;
- All environmental and safety guidelines are to be ensured while selecting the raw materials to be used in manufacturing of cables.

The cables offered shall, preferably, be standard types in regular production by the manufacturer. All cables shall be type tested and certified by an independent testing authority.

2.10 Installation Requirements

The Contractor shall be responsible for the installation of the complete cable system; including the submarine and the land cables, as well as the terminations and lightning arrestors. Care shall be taken to avoid damage to the cable when coiling or bending it onto drums, or as loose coils in the hold of a vessel, for transport and later for installation and laying. The contractor shall exercise the necessary due diligence in all phases of the cable installation to ensure a safe, efficient and future maintenance-free installation.

The contractor shall develop an installation program which includes trans-boarding the cables from the freight ship to the installation vessel.

While ensuring provisions for a safe and effective installation program, the contractor shall provide ample consideration of installation methodology which is well-suited to the proposed cable system. It is recognized that due to the physical characteristics of the two cable system configurations (three-conductor or single-conductor), installation methods may vary. Based upon the final cable system design, it is anticipated that the installation vessel and associated equipment requirements may be different for a single-conductor vs. a three-conductor cable.

The contractor shall provide the following main equipment:

- A suitably certified installation vessel;
- Tug support, anchors and anchor handling equipment;
- ROV and/or diving support.

The cable shall be controlled and protected to prevent damage during transport and installation. The cable shall be laid with continuous control of the direction and speed of the cable-laying vessel to ensure the cable is laid within the planned cable route. The cable will be laid with continuous control of the cable laying tension to ensure the cable is laid within the design tension limits and bending radius and that the cable is laid on the ocean bottom with no kinks, loops, or suspensions off the bottom. The contractor shall also ensure that the cable is located on the bottom so as to avoid rock outcrops, boulders or other areas which have the potential to cause damage to the cable as a result of spanning or chafing.

The vessel systems shall include the necessary braking, winching and stinger/cable deployment equipment to prevent bending, kinking, looping or spanning of the cable during the cable laying operations.

Installation of the cable shore ends shall be achieved utilizing the necessary floatation and pulling equipment to avoid any damage to the cable. The cables shall be placed in the onshore trenches and final connections shall be made to the Newfoundland Power termination structures. Adequate cable clamping shall be provided for the vertical sections on the termination structures.

2.10.1 Rules and Regulations

The Contractor shall respect all governing provincial and federal laws and regulations relative to marine work. The contractor shall notify the Coast Guard, and other authorities as required, about the detailed submarine cable laying operations and schedule.

2.10.2 Access

The Contractor shall provide Newfoundland Power engineers and their representatives with access to the installation vessel during the installation of the submarine cables.

3 25 KV INSULATED CABLES TECHNICAL SPECIFICATIONS

3.1 General Technical Requirements

The Contractor shall design the cable system using Tree-Retardant Cross-Linked Polyethylene (TR-XLPE) Insulated Submarine Cables or Ethylene Propylene Rubber (EPR) Insulated submarine Cables.

The cables shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

At the time of installation, the nominal system voltage will be 12.47 kV phase-to-phase on a multi-grounded Y system. The maximum continuous phase-to-phase voltage shall be 13.4 kV. The basic impulse level (BIL) shall be150 kV.

At the time of installation, the submarine cables are expected to convey a peak winter load of 8.6 MVA at a nominal voltage of 12.47 kV. The cable system is to be designed to service a 40 year forecast peak winter load of 10.4 MVA at an operating voltage of 12.47 kV. The cable will be designed for future conversion to 25 kV at a peak load of 20.8 MVA.

The cable shall be designed to operate satisfactorily for a maximum continuous conductor temperature of 90ºC, a maximum emergency conductor temperature of 105ºC, and short circuit conductor temperature of 250ºC.

The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

For standard cable cross sections, refer to Drawing 0008.

Field splices will not be permitted.

3.2 Single Conductor XLPE Cable

The conductor shall be stranded copper filled with a compound to prevent moisture propagation. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.2.1 Conductor Screen

Conductor screen shall be an extruded layer of semi-conducting Polyethylene compatible with the insulation material.

3.2.2 Insulation

The insulation shall be "Tree-Retardant" Cross-Linked Polyethylene (TR-XLPE).

3.2.3 Insulation Shield

Insulation shield shall be a smooth extruded layer of semi-conducting Polyethylene compatible with the insulation material. It should adhere firmly to the insulation.

3.2.4 Swelling Tapes

A layer of water absorbing swelling tapes shall be applied over the insulation shield.

3.2.5 Lead Sheath

A lead sheath of suitable thickness shall be extruded over the cable. The lead to be used shall be fatigue resistant ½C alloy.

3.2.6 Polyethylene Jacket (Sheath)

An outer Medium or High Density Polyethylene jacket shall be extruded over the cable metallic sheath. A flooding compound could be applied between the lead sheath and the outer jacket.

3.2.7 Copper Wire Armour

Hard drawn copper wires shall be applied as armour. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the Armour wires to provide a cushion between them and the underlying cable core. The copper armour wires will also act as grounding and thus, they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.2.8 Serving

Serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; Clause 3.2.9.

3.2.9 Phase Identification

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables, respectively. The reserve cable shall have a stripe of a different color. “ORANGE” or “RED” could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimetre intervals.

3.3 Three Conductor XLPE Cable

The three conductor cable shall be made by assembling three single conductor XLPE insulated and lead sheathed cables as specified in section 3.2. Each conductor shall be individually marked.

The assembly should include non-hygroscopic fillers and, if necessary, a bare copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled cables. A band of yellow Polypropylene yarn should be in the outer serving.

3.4 Single Conductor EPR Cable

The conductor shall be stranded tinned copper wires. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.4.1 Conductor Screen

Conductor screen shall be an extruded layer of semi-conducting thermosetting material compatible with the insulation material.

3.4.2 Insulation

The insulation shall be an extruded layer of Ethylene Propylene Rubber (EPR).

3.4.3 Insulation Non Metallic Shield

The insulation shield shall be a smooth extruded layer of semi-conducting thermosetting material compatible with the EPR insulation material. It should adhere firmly to the insulation.

3.4.4 Insulation Metallic Shield

The insulation metallic shield shall consist of a corrosion resistant material. The Owner's in-service cables are single conductor with copper tape shield. The copper tapes are corroding due to water ingress. The new cable design must address this problem.

A layer of cushioning material shall be applied over the insulation shield prior to the application of the armour wires.

3.4.5 Copper Wire Armour

Hard drawn copper wires shall be applied as armor. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the armour wires to provide a cushion between them and the underlying cable core as mentioned in 3.4.4 above. The copper armour wires will also act as grounding and thus, they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.4.6 Serving

The serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; clause 3.4.7.

3.4.7 Phase Identification

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables, respectively. The reserve cable shall have a stripe of a different color. “ORANGE” or “RED” could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimetre intervals.

3.5 Three Conductor EPR Cable

The three conductor cable shall be made by assembling three single conductor EPR insulated cables as specified in Specification 3.4

The assembly should include non-hydroscopic fillers and if necessary, a bare tinned copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled insulated cables.

3.6 Terminations and Accessories

The Contractor shall design and provide 46 KV cable terminations, lightning arrestors, and associated accessories to protect the submarine cable for a minimum life of 40 years and the voltage rating shall be compatible with the cable system described herein. Normal brands of lightning arrestors that the Owner typically uses include Ohio Brass DynaVar OR Cooper VariSTAR.

The termination will be installed outdoors and shall be capable of operating continuously under the environmental conditions existing in the Bell Island area. Historic weather information is available from the Environment Canada website referenced in Section 1.1.3.

At the Broad Cove side, the lightning arrestors are to be connected to the feeder system neutral by 4/0 AWG copper conductor. At the Bell Island side the lightning arrestors are to be connected to the station ground grid by 4/0 AWG copper conductor.

3.7 Articulated Pipe

The submarine cable system shall be protected with ductile iron articulated pipe sections, or approved equal, from the high water mark out to a water depth of approximately 10 m. Material for production of the sections shall be ductile cast iron 65-45-12 (ASTM 536) or approved equivalent international standard. The design, supply and installation of the articulated pipe sections includes all adaptors and attachments associated with installing the sections.

Consideration shall also be given to prevent any galvanic corrosion between the articulated pipes and cable armor wire.

3.8 Documentation

Contractor shall include with his bid the technical data in accordance with the Schedule of Technical Particulars.

Contractor shall provide a construction drawing or diagram for the type of cable supplied. This drawing shall show, as a minimum, the following information:

- The strand diameter and number of strands per conductor;
- The conductor diameter;
- The diameter over the insulation;
- The number and orientation of cores;
- The direction of lay;
- The diameter over the bedding;
- The armouring tape details;
- The diameter over the armouring;
- The overall diameter over the sheath;
- The weight of cable (in kg/m);
- The materials of manufacture for each component;
- The colour of each component;
- The method of core identification;
- The minimum bending radius;
- Cable current ratings;
- Maximum conductor temperatures for load and fault conditions.

Where production tolerances allow a range of diameters, the drawing shall indicate maximum and minimum dimensions.

The information may be provided in tabular format for each cable type.

Manufacturing of the cables shall not commence until Newfoundland Power has reviewed and approved calculations, drawings and any other design documentation.

4 QUALITY ASSURANCE INSPECTION AND TESTING

4.1 Quality Assurance

The Contractor shall have a quality system in accordance with an internationally recognized standard. The effectiveness of the quality system and the Contractor's compliance with it shall be subject to monitoring by Newfoundland Power and in addition, may be audited following an agreed period of notice.

The Contractor shall submit a quality control program for Newfoundland Power’s review with his tender. The Contractor shall provide facilities for, and cooperate with, Newfoundland Power and its inspectors during manufacturing, assembly and testing.

4.2 Inspection

Newfoundland Power or their authorized representatives shall be permitted at all times free access to all parts of the Contractor’s work sites that concern the construction and testing of the cable system.

Inspection and certification requirements for the cables shall be per approved inspection and test plan, third party inspection and certification requirements.

4.3 Testing

The cables shall be tested in accordance with the reference standards, AEIC CS-8-07, Specification For Extruded Dielectric; Shielded Power Cables Rated 5 Through 46 KV, ICEA P-32-382; Short Circuit Characteristics of Insulated Cables, and ICEA S-94-649-2010 “Standard for Concentric Neutral Cables Rated 5 Through 46KV.”

Certified test reports shall be submitted by The Contractor for acceptance by The Owner prior to any shipment of cables.

All testing shall be carried out at the cable manufacturer’s test facility. Test equipment shall be supplied by the manufacturer and shall be calibrated within six months prior to the test date.

4.3.1 Type Tests

Type Tests shall be carried out with supervision and certification by a recognized testing authority. All tests may be witnessed by an Inspection Agency and/or Newfoundland Power’s representative.

On completion of tests and before dispatch of the 25kV cables from the Contractor’s works, the Contractor shall supply a full set of test documents to Newfoundland Power for approval. The equipment shall be dispatched only after the test documents are approved by Newfoundland Power. The test documents shall include, but not be limited to, all of the test data for the following Type Tests:

- Insulation test;
- Bending tests;
- Tan δ tests
- Long-time voltage tests;
- Lightning impulse test;
- Partial discharge test;
- Oil and water immersion test on sheath;
- Aging test.

Where recent type testing has been completed on cables of identical design, type test documentation may be submitted in lieu of performing each of the listed type tests, upon receipt of approval from Newfoundland Power.

4.3.2 Routine Tests

Prior to delivery, the 25kV cables shall undergo the following routine tests and checks. Tests shall comply with the requirements of IEC Standards referenced in this document and shall include those listed below. All tests may be witnessed by an inspection agency and/or Newfoundland Power's representative. Full written test reports shall be submitted to Newfoundland Power on completion of the tests. The cables shall be dispatched only after the test documents are approved by Newfoundland Power.

a. Continuity and resistance test for conductors and screens;
b. Capacitance measurement;
c. Partial discharge test;
d. Voltage test between conductor and screen;
e. Visual check on general appearance and finish;
f. Metal sheath integrity test;
g. Polyethylene jacket integrity test;
h. Measure the overall diameter of the cable sheath;
i. Check for correct colour and markings;
j. Check for correct markings on drums.

4.3.3 Inspection and Test Plan (ITP)

Contractors shall include an Inspection and Test Plan (ITP) in their tender documents. The ITP shall list all inspections and tests proposed for the cable system by the Contractor, between the date of ordering and the date of delivery. The plan shall also include a list of the type tests for which the Contractor proposes to provide documentation of previous testing on cables of identical design.

The Contractor shall be responsible for the planning and execution of all inspections and tests, but Newfoundland Power's representative shall have the right to witness any or all of the manufacturing, inspection or tests.

Newfoundland Power and the Contractor shall sign off the final version of the ITP, which, thereafter, shall form part of the contract documents.

The Contractor shall notify Newfoundland Power, at least two weeks in advance, of the date on which any of the inspections or tests nominated as Hold or Witness points on the ITP are due to be carried out.

Certificates of Test shall be provided for the cable system to prove it has been satisfactorily tested to meet all requirements of its appropriate manufacturing standards, whether or not witnessed by Newfoundland Power.

Where appropriate, test certificates shall state values for all test results. Tests for which the results are indicated as pass or fail shall be qualified by the relevant acceptance criteria.

4.4 Cable Supplier Support

Contractors, in their bid, shall provide details of their after sales support capability. Bidders shall advise their service representative and facility nearest to the project location.

4.5 Packaging, Shipping and Storage

Preparation for shipment and storage, as well as handling of the cables shall be in accordance with the Contractor's standard procedures, which shall be subject to approval. However, the following are the minimum requirements.

Each shipping container shall be clearly identified with the contents, purchase order number and item number.

The cables shall be preserved and protected to withstand transit to and storage at the job site prior to installation. The cables shall be protected to safeguard against all adverse environment conditions that may be encountered during shipment, storage and installation.

Cables shall have been fully tested and inspected prior to packaging. No packaging activities shall commence without the prior consent of the Newfoundland Power. Newfoundland Power shall be notified of the dates of packaging with sufficient notice to allow attendance for completion of inspection and release certificates without affecting the required delivery schedule.

No equipment shall be allowed to leave the Cable Supplier's premises without such certificate being signed, or a written waiver issued.

5 PERMITTING AND INSTALLATION

Newfoundland Power is obtaining approval permits for the right of way and installation of the new cable system as detailed below. The contractor's installation methods should comply with all the conditions of the attached permits. If all these conditions are met the Owner does not anticipate any further requirements for environmental permitting for the Project.

Newfoundland Power has received environmental approval from the Government of Newfoundland and Labrador, Department of Environment and Conservation. As detailed in the respective letter date June 19, 2013, the Department of Environment and Conservation confirms that based upon the information provided, no provincial government approval/permit is required to Alter a Body of Water under Section 48 of the Water Resources Act. However, it does outline General Terms and Conditions that must be met by the Contractor. This letter is available in Section 9 – Permits.

Newfoundland Power has also received confirmation from Environment Canada of the permitting requirements that must be met by the Contractor. This letter, dated July 4, 2013, is available in Section 9.

Newfoundland Power has received confirmation of a project review from the Canadian Department of Fisheries and Oceans which has determined that this project is not likely to result in impacts to fish and fish habitat provided that additional mitigation measures are applied. This letter, dated September 13, 2013, is available in Section 9.

As a minimum, a floating silt curtain must be used and maintained during all trenching activities. The Canadian Department of Fisheries and Oceans (DFO) may have other restrictions as well.

As for the handling of excavated soils, no permit is required to reuse the native material as backfill provided that it is used for a legitimate purpose (i.e., backfill in the trenches). If material is side cast and not reused, then an application for a Disposal at Sea permit will need to be filed with DFO. Part of this permitting process will trigger a response/feedback from DFO. This could result in a harmful alteration, disruption, or destruction (HADD) of fish habitat process as per Section 35 of the Fisheries Act.

PERMITS

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Environment and Conservation
Office of the Assistant Deputy Minister
Environment

File Reference #
535-26

June 19, 2013

Ken Dominie, P. Eng.
Senior Consultant
BAE Newplan Group Limited
1133 Topsail Road
Mount Pearl NL A1N 5G2

Dear Mr. Dominie:

Re: NL Power – Bell Island Cable Replacement Project Description

Thank you for your letter dated May 28, 2013 on the above noted topic. Upon review of the information provided I confirm that no permit will be required to Alter a Body of Water under Section 48 of the Water Resources Act for the work described in your submission. We request that you follow the attached General Terms and Conditions while completing this work. If there is any requirement for usage of water during the horizontal directional drilling process please contact Dr. Abdel-Razek at 729-4795 regarding a Water Use License.

Thank you for providing this information to the Department of Environment and Conservation and good luck with your project.

Sincerely yours;

Clyde McLean, P.Eng.
Manager Water Investigation Section

cc. Dr. Abdel-Razek

RECEIVED
JUN 25 2013

General Terms and Conditions

General Alterations

1. All work must take place within the legal boundaries of the proponent or with the approved of the land owner. The constructed works must comply with all other terms and conditions provided in the Crown Lands grant, lease or license for occupancy.

2. Any work that must be performed below the high water mark must be carried out during a period of low water levels.

3. Water pumped from excavations for work areas, or any runoff or effluent directed out of work sites, must have silt and turbidity removed by settling ponds, filtration, or other suitable treatment before discharging to a body of water. Effluent discharged into receiving waters must comply with the *Environmental Control Water and Sewage Regulations, 2003*.

4. All operations must be carried out in a manner that prevents damage to land, vegetation, and watercourses, and which prevents pollution of bodies of water.

5. The use of heavy equipment in streams or bodies of water is not permitted. The operation of heavy equipment must be confined to dry stable areas.

6. All vehicles and equipment must be clean and in good repair, free of mud and oil, or other harmful substances that could impair water quality.

7. During the construction of concrete components, formwork must be properly constructed to prevent any fresh concrete from entering a body of water. Dumping of concrete or washing of tools and equipment in any body of water is prohibited.

8. Wood preservatives such as penta, CCA or other such chemicals must not be applied to timber near a body of water. All treated wood or timber must be thoroughly dry before being brought to any work site and installed.

9. The use of creosote treated wood is strictly prohibited within 15 metres of all bodies of fresh water in the province.

10. Any areas adversely affected by this project must be restored to a state that resembles local natural conditions. Further remedial measures to mitigate environmental impacts on water resources can and will be specified, if considered necessary in the opinion of the Department of Environment and Conservation.

11. The bed, banks and floodplains of watercourses, or other vulnerable areas affected by this project, must be adequately protected from erosion by seeding, sodding or placing of rip-rap.

12. All waste materials resulting from this project must be disposed of at a site approved by the regional Government Service Center of the Department of Government Services. The

Department of Government Services may require samples to be submitted for testing and analysis.

13. Periodic maintenance such as painting, resurfacing, clearing of debris, or minor repairs, must be carried out without causing any physical disruption of any watercourse. Care must be taken to prevent spillage of pollutants into the water.

14. The owners of structures are responsible for any environmental damage resulting from dislodgement caused by the wind, wave, ice action, or structural failure.

15. Sediment and erosion control measures must be installed before starting work. All control measures must be inspected regularly and any necessary repairs made if damage is discovered.

16. Fill or ballast material must be of good quality, free of fines or other substances including metals, organics or chemicals that may be harmful to the receiving waters.

17. The proposed use of any facility and site will not involve any storage of pollutants such as fuels, chemicals, pesticides, etc.

P.O. Box 8700, St. John's, NL, Canada A1B 4J6 t 709.729.2572 f 709.729.0112

Environment Canada Environnement Canada

Environmental Protection Operations Directorate, Atlantic Region
15th Floor, Queen Square
45 Alderney Drive
Dartmouth, NS B2Y 2N6

File no. 4540-1

July 4, 2013

Mr. Ken Dominie, P.Eng., MBA
Senior Consultant
BAE-NewPlan Group Limited
1133 Topsail Road
Mount Pearl, NL A1N 5G2

Dear Sir:

Re: NL Power - Bell Island Cable Replacement Project Description, Job Number: 512233

Thank you for your letter of May 28, 2013 relating to the above project and the acquisition of required regulatory approvals and permits. I have reviewed the information provided with a focus on the regulatory requirements of the Disposal at Sea provisions of the *Canadian Environmental Protection Act, 1999*, particularly sub-section 122(1), which defines at-sea disposal. Excavation or trenching in the tidal zone or foreshore are the only activities identified that could result in the at-sea disposal of a substance (seabed materials). At-sea disposal must be authorized by an Environment Canada Disposal at Sea permit except if the activity is captured by one of the exemptions provided in the legislation.

CEPA paragraph 122(1)(i), one of the exemptions referenced above, removes the requirement for a Disposal at Sea permit provided that the material to be disposed of is placed for a legitimate purpose and if the placement is not contrary to the purposes of the Disposal at Sea legislation. Use of trenched materials for backfilling purposes, as described in your June 28, 2103 email, would be considered a placement rather than a disposal activity. In addition, EC has concluded that the placement activity would not be contrary to Disposal at Sea legislation provided it is conducted in a manner that complies with all other federal and provincial requirements designed to protect the marine environment. Based on this understanding, no Disposal at Sea permit is required.

As part of your efforts to acquire regulatory approvals and permits, appropriate consideration should be given to the federal *Species at Risk Act* and the *Fisheries Act* prohibition against the deposit of a deleterious substance in waters frequented by fish (Section 36). Finally, I refer you to Canadian Wildlife Service Avoidance Guidelines, intended to reduce harm to migratory birds, their nests and eggs and available at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1.

Yours truly,

Adrian MacDonald
Marine Disposal Coordinator
Environmental Assessment and Marine Programs

P.O. Box 5667
St John's, Newfoundland & Labrador
A1C 5X1

Your file *Votre référence*

September 13, 2013

Our file *Notre référence*
13-HNFL-NA1-00137

J.T. Mullin, P.Eng., B.Eng.
Engineer, Substations
Newfoundland Power
P.O. Box 8910
55 Kenmount Rd
St. John's, NL A1B 3P6

Dear Mr. Mullins:

Subject: NL Power, Belle Island Cable Replacement Project - *Proposal not likely to result in impacts to fish and fish habitat provided that additional mitigation measures are applied.*

Fisheries and Oceans Canada – Fisheries Protection Program (DFO) received your proposal on May 31st, 2013. Please refer to the file number and title below:

DFO File No.:	13-HNFL-NA1-00137
Title:	NL Power, Bell Island Cable Replacement Project - SNC Lavalin

You may be aware of changes to the *Fisheries Act*, however, these have not affected the review of your project at this time. For more information on current changes to the *Fisheries Act* please refer to the DFO website at www.dfo-mpo.gc.ca/media/infocus-alaune/2012/habitat-eng.htm.

Your proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

- Project Description Document entitled, *NL Power Belle Island Cable Replacement Project Description*, received May 31st, 2013.
- Meeting between Roger Johnson, NL Hydro and SNC Lavalin representatives on June 12, 2013.
- Field investigation report entitled, *New Bell Island Submarine Power Cable System – Beach Investigation*, dated September 10, 2013.

We understand that NL Power proposes to:

Upgrade and replace the submarine power cable system which currently provides electricity to the community of Belle Island from the substation at Broad Cove, Portugal Cove – St. Phillips. Options for cable design include four single phase or two triple phase cables installed within or in close proximity to the existing cable corridor. Foreshore protection will include trenching by jetting or excavation and steel collars.

To reduce potential impacts to fish and fish habitat we are recommending the following mitigation measures be included in the proposed plans.

a. *Please refer to applicable FACTSHEETS at the following link for suggested mitigation techniques: http://www.nfl.dfo-mpo.gc.ca/e0005361*

b. *Efforts should be made to limit silt arising as a result of any trenching in the work area. Work should be completed at low (or falling) tide. A floating silt curtain must be used and maintained during all trenching activities.*

c. *There should be no silt and/or sediment, concrete, or any other substance deleterious to fish or fish habitat released to watercourses and/or water bodies as a result of these works. This could be accomplished as per the mitigations outlined in FACTSHEETS referenced above or by other means as appropriate to the site conditions.*

d. *Shoreline disturbance should be restricted to the immediate work area.*

e. *The use of heavy equipment in bodies of water is not permitted. The operation of such equipment (if required) must be confined to dry stable areas.*

f. *Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks. All vehicles and equipment must be clean and in good repair, free of mud and oil, or other harmful substances that could impair water quality.*

g. *Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.*

h. *No blasting in or near water bodies/watercourses.*

Provided that the additional mitigation measures described above are incorporated into proposed plans, DFO has concluded the proposal is not likely to result in impacts to fish or fish habitat.

A copy of this letter should be kept at the work site while work is in progress.

You will not need to obtain a formal approval from DFO in order to proceed with your proposal. It remains your responsibility, however, to meet requirements of any other federal, provincial and municipal agencies.

If the plans have changed or if the description of your proposal is incomplete you should contact this office to determine if the advice in this letter still applies.

Please be advised that any unauthorized impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement. In addition, under the *Fisheries Act*, there is a requirement to notify DFO of any harmful alteration or disruption, or any destruction of fish habitat that has not been authorized. Such notifications should be directed to the undersigned.

If you have any questions please contact the undersigned at (709) 772-3296, by fax at (709) 772-5562, or by email at roger.johnson@dfo-mpo.gc.ca.

Roger Johnson
Sr. Biologist - Hydro, Flows & Linear Development
Fisheries Protection Program
Dept. of Fisheries and Oceans
Telephone: (709)772-3296
E-mail: Roger.Johnson@dfo-mpo.gc.ca

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca

ADDENDUM #1

November 01, 2013

RFP Number: **13-059**
RFP Title: **Supply and Installation of Bell Island Submarine Cable System**

Addendum #1 is required for the following:

1. Provision of Videos and Drawings

The following link **https://ftp.nfpower.nf.ca** will provide access to video inspections of the existing cables at the shoreline area and the project drawings in AutoCad format.

The Username and Password to access this link is as follows:
Username: **BellIslandSub**
Password: **RFP13059**

Videos

Five videos are provided to demonstrate the seabed conditions at the Broad Cove and Bell Island landing points.

Video 1 – Broad Cove Splice (2012). This video shows the seabed conditions in the area of the cable splice that was completed at Broad Cove in 2012. The first splice is located about 200 metres from the termination structure at Broad Cove. The water depth in the area is about 11 metres and the length of cable between the two splices is approximately 25 metres.

Video 2 – Broad Cove Ductile Iron Necklace Inspection (2010). This video is an inspection of the necklaces from the low water mark at Broad Cove to where the necklaces end at a water depth of about 10 metres. As can be seen in the video the necklaces start at the low water mark and are not buried. The cable and necklaces rest on the ocean floor and the new cables should be installed in the same manner at the Broad Cove side.

Videos 3, 4 & 5 – Bell Island Shore Approach Inspection (2013). These videos are an inspection of the Bell Island shore approach bottom characteristics.

Drawings

The eight drawings previously provided as PDF documents with the RFP package are now provide here in Autocad (.DWG) format.

2. Clarifications

Clarification #1

Proponents must include the use of ductile iron articulated pipes in their Proposal. If Proponents want to propose an alternate they can do so by providing details of an alternate product in the Proposal Form – Schedule 9 – Alterations by Proponents. Proposals must include all technical data for the alternate product and proposed change to the proposed price, if any.

Clarification #2

Information regarding the subsea conditions from when the current in-service cables were installed indicates that the **existing** cables are in 1100 mm wide trenches on land with 900 mm of cover on the cable at both the Broad Cove and Bell Island side.

On the Bell Island side the cables were buried in the subsea stratum out to a water depth of 10 metres. At the Broad Cove side the cables were not buried. The cables are contained in ductile iron necklaces and lay on the ocean floor.

The videos provided as part of this Addendum show the subsea conditions of the existing cables in the near shore area. Table 1 below shows the depth of overburden on the Bell Island side along the cable routes for the cables that were installed in 1988. The rod penetrations test survey was prior to the cables being installed in 1988 and completed by air injection lance. The lance was made from ½ inch schedule 40 pipe tapered at one end and fitted with a valve at the other end. The lance was eleven (11) feet long and the work was completed by a diver. **The data in the table may not be indicative of conditions to be encountered along the route of the new proposed cables.**

Table 1 - ROD PENETRATION DEPTHS

Distance from low normal tide level (M)	Approximate Penetration Depth (M)	Bottom Type
0	0.0	Beach rock, cobble
6	0.0	Beach rock, cobble
12	0.0	Rock, 76 - 305mm
18	1.2 to 1.8	Rock 51 – 152mm and sand
24	1.2 to 1.8	Sand and small rock
30	1.2 to 1.8	Sand and small rock
36	1.2 to 1.8	Sand and small rock
42	1.2 to 1.8	Sand and small rock
48	1.2 to 1.8	Sand and small rock
54	3.0	Sand
60	3.0	Sand and pebble
66	3.0	Sand and pebble
72	1.5	Pebble and sand
78	1.8	Pebble and sand
84	3.0	Pebble and sand
90	3.0	Pebble and sand
96	3.0	Pebble and sand
102	1.5	Pebble and sand

The sea temperatures at the surface and near shore in Conception Bay will typically vary from -1 or -2 degrees C in the winter and to 12 degrees C in the late summer and fall.

Clarification #3

There are three existing abandoned cables that could be in the new route at the Bell Island shore approach. One cable is made of butyl rubber and the other two are PILC. The contractor may either cut out a section of the old cables or relocate them in the near shore area (in shallow water and onshore) where they cross the new cable route, if deemed necessary. The contractor will be required to obtain any necessary permits. Some items that would need to be addressed with this work include:

- If the old cables are buried in the subsea material and require removal or relocation then turbidity/silt mitigation measures may be required.
- The PILC cable end may require a cap to prevent any leakage of oil.
- Prior to moving any section of the old cable the contractor must confirm they are not buried in close proximity to the energized cables.

Clarification #4

Newfoundland Power has received approval from Transport Canada; Navigable Waters Protection Program. Attached is the respective approval letter dated October 28, 2013.

Transport Canada / Transports Canada

Navigable Waters Protection Program
PO Box/C.P. 1013
Dartmouth N.S. B2Y 4K2

Your file Votre référence

Our file Notre référence
8200-1097

OCT 2 8 2013

VIA COURIER

Newfoundland Power Inc.
PO Box 8910
St. John's, NL A1B 3P6

Attention: Jamie Mullins

RE: Application under the *Navigable Waters Protection Act* for Approval of a Submarine Cable, located at Bell Island Tickle, Conception Bay, in the Province of Newfoundland and Labrador.

Enclosed please find an Approval for the above-noted work signed on behalf of the Minister of Transport, Infrastructure and Communities pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act* (NWPA).

Ensure to review your Approval in its entirety and acknowledge receipt via the contact information provided below. In particular, note that your Approval carries a validity period and therefore it will be necessary to seek Re-Approval prior to the expiry date.

Please note that you must comply with any terms and conditions in the attached Approval document as well as any other requirements under the NWPA, its regulations and other relevant legislation.

No person shall permit any tools, equipment, vehicles, temporary structures or parts thereof used or maintained for the purpose of building or placing a work in a navigable water to remain in such water after the completion of the project.

As the proposed work will be completely or partially submerged in a navigable water, you are required, once the construction of the work is completed, to provide a Statutory Declaration that the work was built and placed in conformity with the approved plan(s) and site pursuant to the *Navigable Waters Protection Act*, its regulations and the terms and conditions in the Approval. Therefore, please complete and return the attached Statutory Declaration to the attention of the undersigned.

Where a work or a portion of a work that is being constructed or maintained in a navigable water causes debris or other material to accumulate on the bed or on the surface of such water, the owner of that work or portion of that work shall cause the debris or other material to be removed to the satisfaction of the Minister.

Vessels utilized in the operation to be marked in accordance with the Collision Regulations.

Please note that the attached document relates only to the effect of your work on navigation under the NWPA. Other Federal and/or Provincial Acts and Regulations may apply. It is your responsibility to comply with any applicable legislation/regulation.

.../2

Canada

Should you have any questions, please do not hesitate to contact our office in Dartmouth by phone at (902) 426-2726, by fax at (902) 426-7585 or by e-mail at nwpdar@tc.gc.ca.

Respectfully,

William Bennett
Officer, Navigable Waters Protection Program
Marine Safety and Security
Transport Canada
Atlantic Region

Enclosure(s)

Transport Canada   Transports Canada

NAVIGABLE WATERS PROTECTION ACT (R.S.C. 1985, c. N-22) as amended by Part 7 of the *Budget Implementation Act*, 2009, S.C. 2009, c. 2 (*Navigable Waters Protection Act*), PART I
Subsections 5(1) and (3) – Other Than Substantial Interference

8200-1097

Approval

APPLICANT:	Newfoundland Power Inc. PO Box 8910 St. John's, NL A1B 3P6
WORK:	**Submarine Cable**
SITE LOCATION:	Located at Approximately 47° 36' 53.00" N x 052° 54' 13.00" W, Bell Island Tickle, Conception Bay, in the Province of Newfoundland and Labrador.
IMPORTANT NOTICE:	This document approves the work in terms of its effect on marine navigation pursuant to the *Navigable Waters Protection Act*. In accordance with the *Navigable Waters Protection Act*, the work must be built, placed, maintained, operated, used and removed as per this Approval including the Terms and Conditions listed below and attached plans as well as regulations made pursuant to the *Navigable Waters Protection Act*. It is the applicant's responsibility to obtain any other forms of approval, including building permits, under any applicable laws.

WHEREAS the above-named applicant has made application to the Minister of Transport, Infrastructure and Communities under the *Navigable Waters Protection Act* for approval of the above-referenced work at the above-described site in accordance with the attached plan(s);

WHEREAS it is considered advisable to approve the said work at the said site and plan(s) thereof for a period of 30 years pursuant to the Schedule referred to in subsection 3(1) of *the Navigable Waters Works Regulations*.

THEREFORE, the Minister of Transport, Infrastructure and Communities, pursuant to subsections 5(1) and (3) of the *Navigable Waters Protection Act*, hereby approves the said work at the said site and plan(s) thereof in accordance with the following terms and conditions:

1. A notice to shipping is to be issued prior to commencement to advise mariners of the location, activities and duration of cable laying operations. Notice to shipping may be issued by contacting the Canadian Coast Guard Port aux Basques Marine Communications and Traffic Services at Telephone: 709-695-2168 Facsimile: 709-695-3833 Email: notshippax@dfo-mpo.gc.ca
2. The work is to be constructed in accordance with the approved plans and operational description.
3. The zone of cable laying operation is to be continually monitored to alert vessels approaching the area as to the cable laying operation.
4. Cables floating on the surface of the water are to be clearly delineated by use of cautionary buoys.
5. Standard No Anchorage signs are to be placed and maintained where the cable transitions from the waterway on to the shorelines.
6. Barges and equipment used in the operation must be visible at all times and be marked in accordance with the Collision Regulations of the Canada Shipping Act.
7. The proponent is responsible to provide Transport Canada (NWPA) and Canadian Hydrographic Services with as laid survey plans denoting the exact location of the laid cable.

SIGNED in two copies on OCT 2 8 2013 **in St. John's, NL**

William Bennett
Officer, Navigable Waters Protection Program
Marine Safety and Security
Transport Canada
Atlantic Region

for the Minister of Transport

Canada

DESIGN AND INSTALLATION OF A NEW BELL ISLAND SUBMARINE POWER CABLE SYSTEM

Phase I Report
Cable System Options Evaluation & Concept Selection

Prepared for:
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Document No.
512233-40ER-001-04

Date
August 5, 2013

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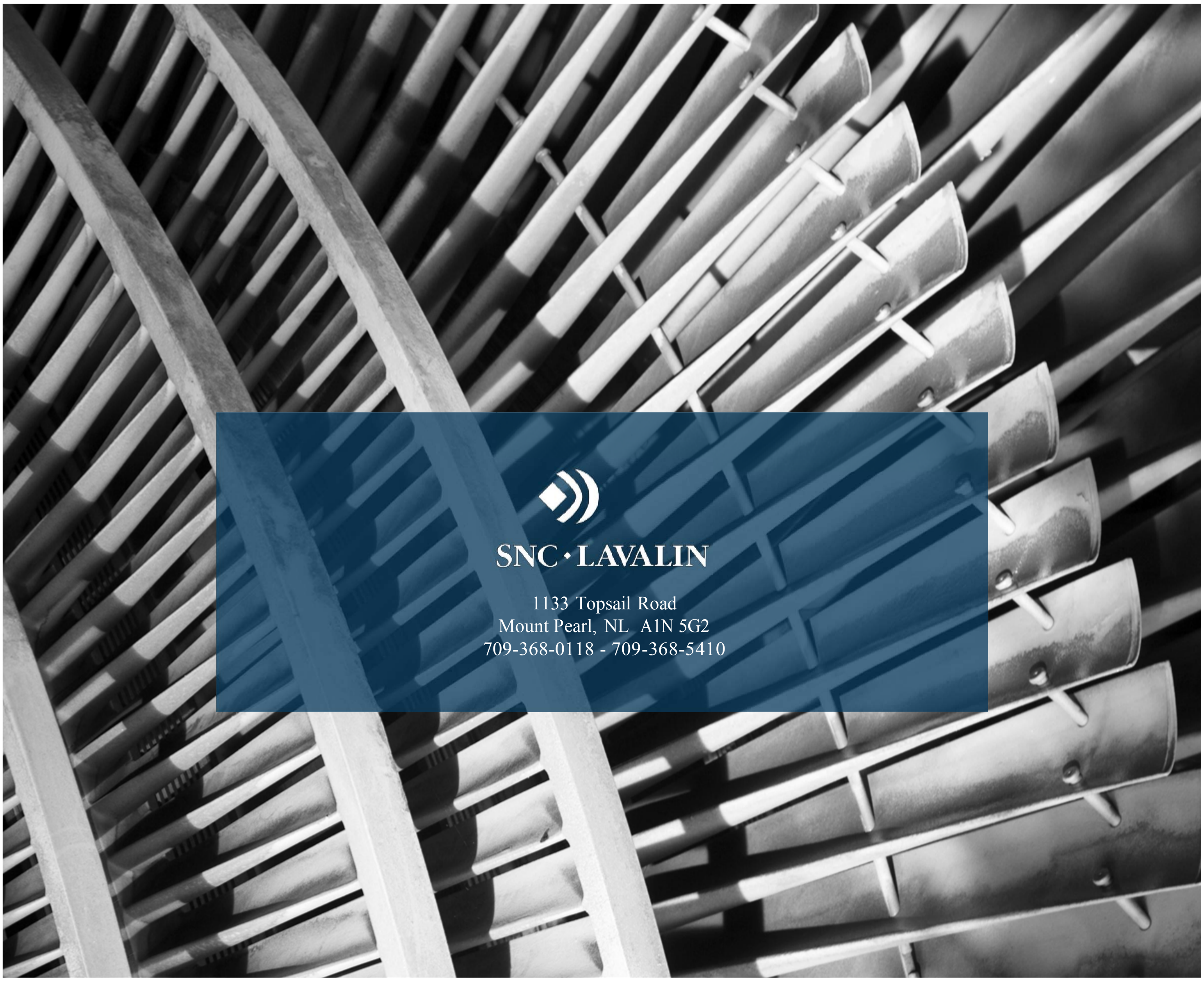
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DESIGN, SUPPLY, AND INSTALLATION OF A NEW BELL ISLAND SUBMARINE POWER CABLE SYSTEM

PROVINCE OF NEWFOUNDLAND AND LABRADOR

PEG Newfoundland and Labrador PROFESSIONAL ENGINEERS AND GEOSCIENTISTS

PERMIT HOLDER
This Permit Allows

BAE ◆ NEWPLAN GROUP LIMITED

To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEG D0049
which is valid for the year 2013

REVISION INDEX						
N°	**Original**	**Reviewed by**	**Approved by**	**Date**	**Revision Details**	**Submission**
PA	**T. McCarthy**	**R. Awad**	**A. Peach**	**08-16-2013**	**First Issue**	**For Review**
00	**T. McCarthy**	**R. Awad**	**A. Peach**	**09-03-2013**	**Clarifying Details**	**Issued for Bid**

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1 INTRODUCTION

1.1 General

This specification defines the minimum requirements for the design, manufacture, inspection, factory and field testing, supply, installation and commissioning of a medium voltage, submarine power cable system to service Bell Island, located in the Province of Newfoundland and Labrador, Canada. Bell Island is situated in Conception Bay, in close proximity to the Avalon Peninsula, on the east coast of the Island of Newfoundland. At the present time Bell Island is serviced with electricity by means of four single-conductor submarine cables running from Broad Cove on the Avalon Peninsula of Newfoundland to an area known as the Old Dominion Pier on Bell Island.

Technical specifications are included for single conductor and three conductor, 25 kV, Tree-Retardant Cross-Linked Polyethylene (TR-XLPE) insulated, shielded, lead covered and copper or galvanized steel wire armoured submarine cables for use on a three-phase, 60 Hz nominal multi-grounded Y system. Also included are specifications for single conductor and three-conductor 25 kV, Ethylene Propylene Rubber (EPR) insulated submarine cables. To provide the necessary reliability, the new system shall consist of a minimum of four single-conductor cables to provide three phase power, if single phase cables are chosen, or a minimum of two cables (**each capable of carrying the full load)**, if three phase cables are chosen for the system. The existing cable will operate in parallel with the new system. It is planned to install the new cables just to the east of the existing in-service cables within the No-Anchor zone designated on the navigational charts for the area. A number of old abandoned cables are located in this area, as well as the currently energized cables. The new cable system will be required to cross over the existing in-service cables during the installation effort. Based on project limitations, documentation and surveys provided, the successful Contractor may adjust the planned route and spacing of the cables, within the No-Anchor zone, subject to the prior approval of Newfoundland Power.

New termination structures will be constructed by Newfoundland Power prior to the installation of the cables. The approximate locations of the new structures are shown on the drawings and photographs provided. They are located in close proximity to the existing termination structures. The details and exact location of the new termination structures will be provided to the successful bidder.

At the time of installation, the submarine cables are expected to convey a peak winter load of 8.6 MVA at a nominal voltage of 12.47 kV. The cable system is to be designed to service a 40 year forecast peak winter load of 10.4 MVA at an operating voltage of 12.47 kV. The cable will be designed for future conversion to 25kV at peak load of 20.8 MVA.

The submarine cable segment consists of approximately 5.375 km (circuit length) of insulated cable crossing a 120 m deep body of ocean. The actual circuit length of each cable will vary depending on the actual installed location as determine by marine survey and spacing of the cables.

This document shall be read in conjunction with other applicable documents, Project Data Sheets and Project Drawings.

1.1.1 Existing Conditions

The existing in-service cable system is referred to as BCV-02 (the Broad Cove 02 Distribution Feeder) and consists of four submarine cables which comprise the three-phase submarine cable system providing electricity to Bell Island. Two of these cables were installed in 1988, and two more were installed in 1990. A third cable was installed in 1988 but was deemed inoperable because of problems experienced with a factory splice in the cable. The cable was subsequently abandoned and replaced with a new cable in 1990.

In addition to the operating cables, there are as many as five (5) power cables present within the right-of-way which have been abandoned and are no longer in service. These include the cable installed in 1988 but never used (cable with factory splice), a three-phase cable installed in 1955, (28L), which was abandoned in 1990 due to a cable fault, and three (3) additional three-phase cables installed in 1932. The on-shore infrastructure is comprised of Newfoundland Power's standard distribution structures. The modification of these structures is not within the scope of this contract.

The cable approach at the shoreline of Broad Cove (mainland side of the cable crossing) traverses bedrock with sand and gravel deposits. The cable approach at the shoreline on the Bell Island side of the cable crossing traverses alternating patches of sand, silt, and gravel. All of the existing operating cables are individually protected inside cast iron cable "necklaces" from each shore to a distance approximately 90 m from shore. On the Bell Island side, the cables are all routed to onshore structures through a common trench, while on the Broad Cove side the cables are routed through individual trenches. The distribution voltage across to Bell Island is 12.47 kV, which provides service to a current load of 8.6 MVA. The forty (40) year forecasted peak winter load for Bell Island is 10.4 MVA. The approximate locations of the existing cables are shown on the provided drawings.

1.1.2 Bathymetry and Subsea Conditions

The bathymetry of the Bell Island Tickle shown on the drawings is the most recent information available. It was created from digitized files of the area which were prepared by the Bedford Institute in 1990. The digitized files were created from sounding surveys carried out by the Canadian Hydrographic Services in 1950. The soundings, which were digitized and used to produce these contours, were taken on a grid of approximately 70.0 m.

In 1988, Newfoundland Power engaged McElhanney Offshore Surveys Ltd. to do a sounding survey for the planned installation of the existing in-service cables. The information available from this survey only covers the actual footprint of the cables as shown on Newfoundland Power Drawing, No. 1-1150-34-2 (Part F).

During the 1988 survey, McElhanney also carried out a sediments survey of the seafloor in the corridor planned for the cables and determined the position of the three-phase cable (28L) using side scan sonar. This information is also contained on Newfoundland Power Drawing, No. 1-1150-34-2. There is no indication that the sediments survey extended beyond the planned footprint of the cables. Based on the contour configuration, it is likely that the same geological classifications of the bottom sediments will extend some distance to the east and can be expected to be similar for the location of the new cables.

The existing information on the bathymetry and subsea conditions is provided for information purposes, but is not to be relied on for installation of the new cables. The Contractor is required to carry out a marine survey to establish the locations of the in-service cables and determine subsea conditions before the new cables are installed. The marine survey shall consist of bathymetric, seismic and side scan sonar surveys along each of the proposed cable routes. The following information shall be gathered:

a. Bottom profiles along each of the cable routes. The profiles shall be tied into the co-ordinate system using a suitable GPS positioning system;

b. Side scan sonar data along each of the cable routes to identify bottom features and determine the locations of old abandoned cables. Side scan sonar shall also be run perpendicular to the proposed routing of the new cables, approximately every 500 m to determine the locations of the existing in-service cables;

c. Sub-bottom profiles along each of the proposed cable routes; and

d. A visual diving survey, complete with colour still and video photography at each of the proposed landing sites, to identify any characteristics of the terrain which may offer advantages for protection of the cables in the foreshore area.

All survey information gathered shall be referenced to a suitable GPS system and a copy provided to Newfoundland Power in a format ready for use by the engineering team. The contractor shall determine if the information gathered is sufficient to warrant the installation of the cable system and if not the successful contractor will be responsible to carry out any additional surveys he deems necessary to warrant the installation.

1.1.3 Climatic Condition

1.1.3.1 Installation Considerations

The climate in Conception Bay is comparable to the rest of northeast Newfoundland. Historical weather data recorded over the last five years at a marine weather station in Holyrood, located less than ten kilometres from the proposed work corridor, gives good insight towards typical conditions that can be expected during the months of July to September. On average, the temperature is between 15°C and 20°C. Prevailing wind direction is in a south-southwest to south-southeast direction. Hurricane season in Atlantic Canada officially starts on June 1st of every year, and extends into the fall months, according to Environment Canada. Although hurricanes and tropical storms have taken place sporadically in the area during late summer in the past, they are not a common occurrence, and it is usually only the tail end of these types of storms that may reach Newfoundland. The Owner will not accept any claims for delays due to the weather for the installation portion of the Work.

1.1.3.2 Ice Considerations

In some years, first year arctic ice brought south by the Labrador Current, does find its way into Conception Bay and the Bell Island Tickle. Although the prevailing winds in the area of the Tickle are from the southwest, there are occasions when northerly winds exert a pressure on the north side of the ice edge. This can produce rafting of the ice along the shorelines. Because of the sheltering influence of Bell Island itself, rafting is not a severe problem in the Tickle; however, the cables must be protected from ice action in the foreshore areas.

1.1.3.3 Cable Operating Environment Considerations

Comprehensive environmental data for the region of installation is available from the following sources:

- Environment Canada. (2013, July 10). *Weather Data*. Retrieved August 1, 2013, from Environment Canada: http://climate.weather.gc.ca/data_index_e.html

- Robichaud, B. (2012, June 8). *Canadian Hurricane Centre*. Retrieved August 1, 2013, from Environment Canada: http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=F548786D-DAEE-4176-BCF8-57F9EA3E250D

1.2 Scope of Work

The Contractor will be responsible for, but not necessarily limited to, the turn-key design, supply, and installation of a new submarine power cable system as follows:

1.2.1 Design and Supply of the 25kV Submarine Cable System

Including:

a. Cables;
b. Cable terminations and associated accessories, including lightning arrestors;

c. Packaging and marking for transport;
d. Inspection and Testing;
e. Documentation, drawings and certification;
f. Supply 500 m of spare cable and
g. Supply of spare splice kits
h. Supply of spare termination kits

1.2.2 Installation, Protection and Commissioning of the Cable System

The contractor shall:

a. Install and commission the cable system from the termination structure at Broad Cove to the termination structure near the Old Dominion Pier on Bell Island. The cable system shall be installed east of the existing in-service cables, in the area of the old abandoned cables and within the No-Anchor zone designated on the navigational charts.

b. Supply and install mechanical protection for the cables in the form of ductile iron articulated pipe sections or approved equivalent, from the high water mark out to a water depth of approximately 10 metres at both Broad Cove and Bell Island.

c. Complete trenching and backfilling of the cables:

    a. On the Broad Cove side, the Contractor shall trench from the termination structure to just beyond the low low-water mark, install the cable in the trench and backfill. The length of trench is approximately 40 metres. The trench shall be taken out to a distance beyond the low water mark which is easily accessible by a standard excavator operating at the lowest low water mark.

    b. On the Bell Island side the Contractor shall trench from the termination structure out into the ocean to a point at a water depth of approximately 10 metres and install the cable in the trench and backfill. The total length of the trench is approximately 150 metres. The submarine portion of the trench (125 metres) may be created after the cables have been laid by removing the native material underneath the cables (by jetting or equivalent means) and then backfilling the trench with native material. This work may require barge supported excavation, dredging, or jetting equipment.

d. Supply and install termination kits and lightning arrestors to terminate the cables at the shore termination structures.

e. Complete cable system testing and commissioning.

1.2.3 Engineering, Coordination, Construction, Documentation

The Contractor shall:

a. Survey, as required, and confirm the final cable route, the layout of the installation, and the required cable length.

b. Supply and install the cable system necessary to meet the various parameters and requirements of these specifications.

c. Provide the equipment and marine fleet for delivering and installing the submarine cables.

d. Design the cable trench and cable configurations for the approaches to the land terminations.

e. Provide all technical installation supervision, skilled trades' people, labourers, equipment, vessels, materials and other facilities required to complete the installation of the cables to Newfoundland Power's satisfaction.

f. Conduct field testing to ensure the integrity of the installation.

g. Provide training for designated personnel on the repair, replacement and maintenance of various components of the cable system.

h. Provide all factory and field test documentation, drawings, instruction manuals, etc., in both hard copy and electronic format.

i. Ensure all necessary coordination between the component suppliers to guarantee a successful installation of the submarine power cable system.

j. Complete the excavation and backfilling of the trenches and return the area to the preconstruction condition with provision for erosion mitigation (rip rap) along the shoreline, including all areas used to access the cable routes, with equipment and machinery to a condition satisfactory to Newfoundland Power.

1.3 Work by Newfoundland Power

The following work will be provided by Newfoundland Power:

a. Termination structures.

b. Acquisition of the following permits:

   i. Department of Fisheries and Oceans.

   ii. Government of Newfoundland and Labrador: Department of Environment.

   iii. Environment Canada.

iv. Navigable Waters.

1.4 Newfoundland Power/ Contractor Interfaces

The new cable installation shall be required to fall within the termination points defined for the Project. These termination points will comprise two 46 kV Termination Structures to be installed by Newfoundland Power on either side of the Tickle at the points of connection to the cable.

1.5 Definitions, Acronyms and Abbreviations

1.5.1 General Definitions

PROJECT	Bell Island Submarine Cable System Project
CONTRACT	The formal agreement between Newfoundland Power and CONTRACTOR
CONTRACTOR	The Contractor performing the WORK described under the CONTRACT with Newfoundland Power, including all designated suppliers and installation sub-contractors
WORK	Any and all works and/or services and/or materials to be provided by the CONTRACTOR under the CONTRACT with Newfoundland Power
SHALL AND MUST	Indicates mandatory requirements.
SHOULD	Indicates that a provision is not mandatory, but recommended as good practice

1.5.2 Specific Terms, Definitions, Acronyms and Abbreviations

Term / Acronym / Abbreviation	Explanation / Definition
AC	Alternating Current
CTA	Copper Tape Armoured
EMC	Electromagnetic Compatibility
ETP	Engineering Technical Particulars
FR	Fire Resistant
HSE	Health Safety & Environment
HV	High Voltage
IEC	International Electrotechnical Commission
ITP	Inspection and Test Plan
kV	Kilovolts
EPR	Ethylene Propylene Rubber
XLPE	Cross Linked Polyethylene

TR-XLPE	Tree Retardant Cross Linked Polyethylene

1.6 Reference Standards

Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments / supplements / revisions thereto.

1.6.1 Statutory Regulations, Codes and Standards

The Contractor shall comply with applicable codes, regulations, ordinances, and rules.

It shall be the Contractor's responsibility to identify and comply with the requirements of any statutory international and national codes, laws, rules, regulations and standards for materials, design, fabrication, import, installation, operation, and testing of the equipment.

In particular, the standards and rules for connection and integration to the distribution network of Newfoundland Power shall apply.

1.6.1.1 Standards

The cable system shall be designed, manufactured and tested in accordance with standards AEIC CS-8-07 "Specification for Extruded Dielectric, Shielded Power Cables Rated 5 Through 46 KV" and ICEA S-94-649-2010 "Standard for Concentric Neutral Cables Rated 5 Through 46KV". For short circuit calculations, ICEA P-32-382 should be used.

All documents referenced in this specification shall be of the latest issue at the time of bid. If any two standards differ in test methods and requirements the one with the most stringent methods shall be used and approved by Newfoundland Power.

1.6.1.2 International Organization for Standardisation (ISO)

The Contractor shall apply a quality assurance system accredited to ISO 9001 for the design, manufacture, and supply of the cables.

2 GENERAL REQUIREMENTS

2.1 Materials

2.1.1 General

The materials of construction and equipment shall be as specified in this specification. When materials are not specified, the materials proposed in the offer shall be suitable for the operating and design conditions.

All materials, equipment or supplies furnished under this specification shall be the product of a manufacturer who is experienced in the design and construction of such materials, equipment, or supplies, and who has furnished similar materials, equipment, or supplies that have been in satisfactory operation for a minimum of three years, preferably in similar environmental conditions, to establish their reliability.

Alternate materials to those described in this specification may be offered; however any such alternatives shall be clearly indicated in the bid, along with any cost adjustments and technical data supporting the alternative. Alternative materials shall be subject to Newfoundland Power’s written approval.

All materials shall be new, free of defects and be identifiable against their certification.

Asbestos products shall not be used.

2.2 Operation and Design Life

The 25kV cables and accessories shall be designed for minimum life duration of 40 years in the environment and for the duty specified herein.

2.3 Service Conditions

2.3.1 Voltage

At the time of installation, the nominal system voltage will be 12.47 kV phase-to-phase on a multi-grounded-Y system. The maximum continuous phase-to-phase voltage shall be 13.4kV. The basic impulse level (BIL) shall be150kV.

In the circumstance where future load growth were to exceed modelled predictions, an operating voltage conversion to 25kV will be required. Thus, the Contractor is required to ensure the cable is designed to operate at both 12.47 kV and 25 kV.

2.3.2 Operating Temperature

The cable shall be designed to operate satisfactorily for a maximum continuous conductor temperature of 90^{0}C, a maximum emergency conductor temperature of 105^{0}C and short circuit conductor temperature of 250^{0}C, under short circuit conditions for 5 seconds.

2.3.3 Ambient Conditions

In addition to any requirement stated in this specification and related documents, appropriate operating conditions shall be used in the design and construction of this equipment, for the parts installed under water, or underground or in the air and exposed to the sun and the weather.

2.4 Proven Equipment Criteria

Only equipment of proven reliability in similar service conditions shall be included in the Contractor's bid proposal. Prototypes shall not be offered. The Contractor shall provide the related necessary evidence (reference lists with installation dates and run hours accumulated by date, etc.). The reference units shall have equivalent design features to the units proposed.

2.5 Language

All documentation and communications shall be in the English language.

2.6 Units of Measurement

The units of measurement shall be in the metric system.

2.7 EMC Requirements

All equipment shall comply with the requirements for EMC as defined in IEC 61000, in order to ensure:

- Conducted emissions in both the power supply input and outputs are controlled within acceptable limits;
- Any electromagnetic disturbances generated by the equipment and its individual components do not exceed a level which would affect the correct operation of both radio and telecommunications equipment;
- The equipment has an adequate level of intrinsic immunity to external electromagnetic and conducted disturbance to enable it to operate as intended; and
- The design of the equipment should be of an adequate standard to maintain performance during its operational life in its installed environment.

2.8 Deviations, Concessions and Change Control

Contractor shall refer to the bid documents for the procedure for raising deviations or concession requests to the technical content of this specification.

Newfoundland Power will consider all deviations and concession requests and approval may be granted at the discretion of Newfoundland Power. No deviation or concession shall be implemented prior to approval being granted. Any deviations or concession implemented prior to approval shall be subject to rejection.

2.9 Design Requirements

2.9.1 Quality System

The Contractor shall apply a quality assurance system accredited to ISO 9001 for the manufacture and supply of the cables.

Materials shall be chosen with due regard to this specification and be fit for the duty described.

2.9.2 General Design Requirements

The cables shall be suitable for installation in the environment conditions appropriate for the location and installation.

Cables shall be constructed with suitable sheathing materials which shall withstand exposure to the environment, with specific attention given to the following:

- The insulation and sheath materials shall be resistant to oil, acid and alkali and shall be tough enough to withstand mechanical stresses during handling;
- Cables shall be suitable for installation in the ocean and as the location requires, outdoors exposed to direct sunlight, with resistance to ultraviolet radiation from the sun. All cables shall be insect and rodent proof;
- All environmental and safety guidelines are to be ensured while selecting the raw materials to be used in manufacturing of cables.

The cables offered shall, preferably, be standard types in regular production by the manufacturer. All cables shall be type tested and certified by an independent testing authority.

2.10 Installation Requirements

The Contractor shall be responsible for the installation of the complete cable system; including the submarine and the land cables, as well as the terminations and lightning arrestors. Care shall be taken to avoid damage to the cable when coiling or bending it onto drums, or as loose coils in the hold of a vessel, for transport and later for installation and laying. The contractor shall exercise the necessary due diligence in all phases of the cable installation to ensure a safe, efficient and future maintenance-free installation.

The contractor shall develop an installation program which includes trans-boarding the cables from the freight ship to the installation vessel.

While ensuring provisions for a safe and effective installation program, the contractor shall provide ample consideration of installation methodology which is well-suited to the proposed cable system. It is recognized that due to the physical characteristics of the two cable system configurations (three-conductor or single-conductor), installation methods may vary. Based upon the final cable system design, it is anticipated that the installation vessel and associated equipment requirements may be different for a single-conductor vs. a three-conductor cable.

The contractor shall provide the following main equipment:

- A suitably certified installation vessel;
- Tug support, anchors and anchor handling equipment;
- ROV and/or diving support.

The cable shall be controlled and protected to prevent damage during transport and installation. The cable shall be laid with continuous control of the direction and speed of the cable-laying vessel to ensure the cable is laid within the planned cable route. The cable will be laid with continuous control of the cable laying tension to ensure the cable is laid within the design tension limits and bending radius and that the cable is laid on the ocean bottom with no kinks, loops, or suspensions off the bottom. The contractor shall also ensure that the cable is located on the bottom so as to avoid rock outcrops, boulders or other areas which have the potential to cause damage to the cable as a result of spanning or chafing.

The vessel systems shall include the necessary braking, winching and stinger/cable deployment equipment to prevent bending, kinking, looping or spanning of the cable during the cable laying operations.

Installation of the cable shore ends shall be achieved utilizing the necessary floatation and pulling equipment to avoid any damage to the cable. The cables shall be placed in the onshore trenches and final connections shall be made to the Newfoundland Power termination structures. Adequate cable clamping shall be provided for the vertical sections on the termination structures.

2.10.1 Rules and Regulations

The Contractor shall respect all governing provincial and federal laws and regulations relative to marine work. The contractor shall notify the Coast Guard, and other authorities as required, about the detailed submarine cable laying operations and schedule.

2.10.2 Access

The Contractor shall provide Newfoundland Power engineers and their representatives with access to the installation vessel during the installation of the submarine cables.

3 25 KV INSULATED CABLES TECHNICAL SPECIFICATIONS

3.1 General Technical Requirements

The Contractor shall design the cable system using Tree-Retardant Cross-Linked Polyethylene (TR-XLPE) Insulated Submarine Cables or Ethylene Propylene Rubber (EPR) Insulated submarine Cables.

The cables shall be designed, manufactured and tested in accordance with AEIC CS8-07 and ICEA P-32-382. All documents referenced in this specification shall be of the latest issue at the time of the bid. If any two standards differ in test methods and requirements, the one with the most stringent method shall be used and approved by Newfoundland Power.

At the time of installation, the nominal system voltage will be 12.47 kV phase-to-phase on a multi-grounded Y system. The maximum continuous phase-to-phase voltage shall be 13.4 kV. The basic impulse level (BIL) shall be150 kV.

At the time of installation, the submarine cables are expected to convey a peak winter load of 8.6 MVA at a nominal voltage of 12.47 kV. The cable system is to be designed to service a 40 year forecast peak winter load of 10.4 MVA at an operating voltage of 12.47 kV. The cable will be designed for future conversion to 25 kV at a peak load of 20.8 MVA.

The cable shall be designed to operate satisfactorily for a maximum continuous conductor temperature of 90ºC, a maximum emergency conductor temperature of 105ºC, and short circuit conductor temperature of 250ºC.

The cable shall be manufactured using true triple extrusion head and dry curing and cooling.

For standard cable cross sections, refer to Drawing 0008.

Field splices will not be permitted.

3.2 Single Conductor XLPE Cable

The conductor shall be stranded copper filled with a compound to prevent moisture propagation. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.2.1 Conductor Screen

Conductor screen shall be an extruded layer of semi-conducting Polyethylene compatible with the insulation material.

3.2.2 Insulation

The insulation shall be "Tree-Retardant" Cross-Linked Polyethylene (TR-XLPE).

3.2.3 Insulation Shield

Insulation shield shall be a smooth extruded layer of semi-conducting Polyethylene compatible with the insulation material. It should adhere firmly to the insulation.

3.2.4 Swelling Tapes

A layer of water absorbing swelling tapes shall be applied over the insulation shield.

3.2.5 Lead Sheath

A lead sheath of suitable thickness shall be extruded over the cable. The lead to be used shall be fatigue resistant ½C alloy.

3.2.6 Polyethylene Jacket (Sheath)

An outer Medium or High Density Polyethylene jacket shall be extruded over the cable metallic sheath. A flooding compound could be applied between the lead sheath and the outer jacket.

3.2.7 Copper Wire Armour

Hard drawn copper wires shall be applied as armour. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the Armour wires to provide a cushion between them and the underlying cable core. The copper armour wires will also act as grounding and thus, they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.2.8 Serving

Serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; Clause 3.2.9.

3.2.9 Phase Identification

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables, respectively. The reserve cable shall have a stripe of a different color. “ORANGE” or “RED” could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimetre intervals.

3.3 Three Conductor XLPE Cable

The three conductor cable shall be made by assembling three single conductor XLPE insulated and lead sheathed cables as specified in section 3.2. Each conductor shall be individually marked.

The assembly should include non-hygroscopic fillers and, if necessary, a bare copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled cables. A band of yellow Polypropylene yarn should be in the outer serving.

3.4 Single Conductor EPR Cable

The conductor shall be stranded tinned copper wires. The size of the conductor shall be determined by calculations based on the required load and the environmental conditions specified in the tender documents.

3.4.1 Conductor Screen

Conductor screen shall be an extruded layer of semi-conducting thermosetting material compatible with the insulation material.

3.4.2 Insulation

The insulation shall be an extruded layer of Ethylene Propylene Rubber (EPR).

3.4.3 Insulation Non Metallic Shield

The insulation shield shall be a smooth extruded layer of semi-conducting thermosetting material compatible with the EPR insulation material. It should adhere firmly to the insulation.

3.4.4 Insulation Metallic Shield

The insulation metallic shield shall consist of a corrosion resistant material. The Owner's in-service cables are single conductor with copper tape shield. The copper tapes are corroding due to water ingress. The new cable design must address this problem.

A layer of cushioning material shall be applied over the insulation shield prior to the application of the armour wires.

3.4.5 Copper Wire Armour

Hard drawn copper wires shall be applied as armor. The mechanical capacity of the armour must exceed the tension required during the submarine cable laying and possible future retrieval for repair. A bedding layer shall be installed under the armour wires to provide a cushion between them and the underlying cable core as mentioned in 3.4.4 above. The copper armour wires will also act as grounding and thus, they should be able to withstand, without damage, the short circuit current specified in the technical specification.

3.4.6 Serving

The serving shall be a non-hygroscopic material applied helically over the completed cable. Special phase identification shall be included in the serving as described below; clause 3.4.7.

3.4.7 Phase Identification

In order to facilitate the identification of the phases, it is required to include "YELLOW" bands of the non-hygroscopic material in the outer serving. One, two and three stripes shall be applied on the three different cables, respectively. The reserve cable shall have a stripe of a different color. “ORANGE” or “RED” could be used. The yellow stripes shall be repeated and visible at a maximum of 30 centimetre intervals.

3.5 Three Conductor EPR Cable

The three conductor cable shall be made by assembling three single conductor EPR insulated cables as specified in Specification 3.4

The assembly should include non-hydroscopic fillers and if necessary, a bare tinned copper conductor in order to meet the short circuit requirements of the system. A bedding layer of Galvanized Steel Wire armour and Polypropylene yarn serving shall be applied over the assembled insulated cables.

3.6 Terminations and Accessories

The Contractor shall design and provide 46 KV cable terminations, lightning arrestors, and associated accessories to protect the submarine cable for a minimum life of 40 years and the voltage rating shall be compatible with the cable system described herein. Normal brands of lightning arrestors that the Owner typically uses include Ohio Brass DynaVar OR Cooper VariSTAR.

The termination will be installed outdoors and shall be capable of operating continuously under the environmental conditions existing in the Bell Island area. Historic weather information is available from the Environment Canada website referenced in Section 1.1.3.

At the Broad Cove side, the lightning arrestors are to be connected to the feeder system neutral by 4/0 AWG copper conductor. At the Bell Island side the lightning arrestors are to be connected to the station ground grid by 4/0 AWG copper conductor.

3.7 Articulated Pipe

The submarine cable system shall be protected with ductile iron articulated pipe sections, or approved equal, from the high water mark out to a water depth of approximately 10 m. Material for production of the sections shall be ductile cast iron 65-45-12 (ASTM 536) or approved equivalent international standard. The design, supply and installation of the articulated pipe sections includes all adaptors and attachments associated with installing the sections.

Consideration shall also be given to prevent any galvanic corrosion between the articulated pipes and cable armor wire.

3.8 Documentation

Contractor shall include with his bid the technical data in accordance with the Schedule of Technical Particulars.

Contractor shall provide a construction drawing or diagram for the type of cable supplied. This drawing shall show, as a minimum, the following information:

- The strand diameter and number of strands per conductor;
- The conductor diameter;
- The diameter over the insulation;
- The number and orientation of cores;
- The direction of lay;
- The diameter over the bedding;
- The armouring tape details;
- The diameter over the armouring;
- The overall diameter over the sheath;
- The weight of cable (in kg/m);
- The materials of manufacture for each component;
- The colour of each component;
- The method of core identification;
- The minimum bending radius;
- Cable current ratings;
- Maximum conductor temperatures for load and fault conditions.

Where production tolerances allow a range of diameters, the drawing shall indicate maximum and minimum dimensions.

The information may be provided in tabular format for each cable type.

Manufacturing of the cables shall not commence until Newfoundland Power has reviewed and approved calculations, drawings and any other design documentation.

4 QUALITY ASSURANCE INSPECTION AND TESTING

4.1 Quality Assurance

The Contractor shall have a quality system in accordance with an internationally recognized standard. The effectiveness of the quality system and the Contractor's compliance with it shall be subject to monitoring by Newfoundland Power and in addition, may be audited following an agreed period of notice.

The Contractor shall submit a quality control program for Newfoundland Power's review with his tender. The Contractor shall provide facilities for, and cooperate with, Newfoundland Power and its inspectors during manufacturing, assembly and testing.

4.2 Inspection

Newfoundland Power or their authorized representatives shall be permitted at all times free access to all parts of the Contractor's work sites that concern the construction and testing of the cable system.

Inspection and certification requirements for the cables shall be per approved inspection and test plan, third party inspection and certification requirements.

4.3 Testing

The cables shall be tested in accordance with the reference standards, AEIC CS-8-07, Specification For Extruded Dielectric; Shielded Power Cables Rated 5 Through 46 KV, ICEA P-32-382; Short Circuit Characteristics of Insulated Cables, and ICEA S-94-649-2010 "Standard for Concentric Neutral Cables Rated 5 Through 46KV."

Certified test reports shall be submitted by The Contractor for acceptance by The Owner prior to any shipment of cables.

All testing shall be carried out at the cable manufacturer's test facility. Test equipment shall be supplied by the manufacturer and shall be calibrated within six months prior to the test date.

4.3.1 Type Tests

Type Tests shall be carried out with supervision and certification by a recognized testing authority. All tests may be witnessed by an Inspection Agency and/or Newfoundland Power's representative.

On completion of tests and before dispatch of the 25kV cables from the Contractor's works, the Contractor shall supply a full set of test documents to Newfoundland Power for approval. The equipment shall be dispatched only after the test documents are approved by Newfoundland Power. The test documents shall include, but not be limited to, all of the test data for the following Type Tests:

- Insulation test;
- Bending tests;
- Tan δ tests
- Long-time voltage tests;
- Lightning impulse test;
- Partial discharge test;
- Oil and water immersion test on sheath;
- Aging test.

Where recent type testing has been completed on cables of identical design, type test documentation may be submitted in lieu of performing each of the listed type tests, upon receipt of approval from Newfoundland Power.

4.3.2 Routine Tests

Prior to delivery, the 25kV cables shall undergo the following routine tests and checks. Tests shall comply with the requirements of IEC Standards referenced in this document and shall include those listed below. All tests may be witnessed by an inspection agency and/or Newfoundland Power's representative. Full written test reports shall be submitted to Newfoundland Power on completion of the tests. The cables shall be dispatched only after the test documents are approved by Newfoundland Power.

a. Continuity and resistance test for conductors and screens;
b. Capacitance measurement;
c. Partial discharge test;
d. Voltage test between conductor and screen;
e. Visual check on general appearance and finish;
f. Metal sheath integrity test;
g. Polyethylene jacket integrity test;
h. Measure the overall diameter of the cable sheath;
i. Check for correct colour and markings;
j. Check for correct markings on drums.

4.3.3 Inspection and Test Plan (ITP)

Contractors shall include an Inspection and Test Plan (ITP) in their tender documents. The ITP shall list all inspections and tests proposed for the cable system by the Contractor, between the date of ordering and the date of delivery. The plan shall also include a list of the type tests for which the Contractor proposes to provide documentation of previous testing on cables of identical design.

The Contractor shall be responsible for the planning and execution of all inspections and tests, but Newfoundland Power's representative shall have the right to witness any or all of the manufacturing, inspection or tests.

Newfoundland Power and the Contractor shall sign off the final version of the ITP, which, thereafter, shall form part of the contract documents.

The Contractor shall notify Newfoundland Power, at least two weeks in advance, of the date on which any of the inspections or tests nominated as Hold or Witness points on the ITP are due to be carried out.

Certificates of Test shall be provided for the cable system to prove it has been satisfactorily tested to meet all requirements of its appropriate manufacturing standards, whether or not witnessed by Newfoundland Power.

Where appropriate, test certificates shall state values for all test results. Tests for which the results are indicated as pass or fail shall be qualified by the relevant acceptance criteria.

4.4 Cable Supplier Support

Contractors, in their bid, shall provide details of their after sales support capability. Bidders shall advise their service representative and facility nearest to the project location.

4.5 Packaging, Shipping and Storage

Preparation for shipment and storage, as well as handling of the cables shall be in accordance with the Contractor's standard procedures, which shall be subject to approval. However, the following are the minimum requirements.

Each shipping container shall be clearly identified with the contents, purchase order number and item number.

The cables shall be preserved and protected to withstand transit to and storage at the job site prior to installation. The cables shall be protected to safeguard against all adverse environment conditions that may be encountered during shipment, storage and installation.

Cables shall have been fully tested and inspected prior to packaging. No packaging activities shall commence without the prior consent of the Newfoundland Power. Newfoundland Power shall be notified of the dates of packaging with sufficient notice to allow attendance for completion of inspection and release certificates without affecting the required delivery schedule.

No equipment shall be allowed to leave the Cable Supplier's premises without such certificate being signed, or a written waiver issued.

5 PERMITTING AND INSTALLATION

Newfoundland Power is obtaining approval permits for the right of way and installation of the new cable system as detailed below. The contractor's installation methods should comply with all the conditions of the attached permits. If all these conditions are met the Owner does not anticipate any further requirements for environmental permitting for the Project.

Newfoundland Power has received environmental approval from the Government of Newfoundland and Labrador, Department of Environment and Conservation. As detailed in the respective letter date June 19, 2013, the Department of Environment and Conservation confirms that based upon the information provided, no provincial government approval/permit is required to Alter a Body of Water under Section 48 of the Water Resources Act. However, it does outline General Terms and Conditions that must be met by the Contractor. This letter is available in Section 9 – Permits.

Newfoundland Power has also received confirmation from Environment Canada of the permitting requirements that must be met by the Contractor. This letter, dated July 4, 2013, is available in Section 9.

Newfoundland Power has received confirmation of a project review from the Canadian Department of Fisheries and Oceans which has determined that this project is not likely to result in impacts to fish and fish habitat provided that additional mitigation measures are applied. This letter, dated September 13, 2013, is available in Section 9.

As a minimum, a floating silt curtain must be used and maintained during all trenching activities. The Canadian Department of Fisheries and Oceans (DFO) may have other restrictions as well.

As for the handling of excavated soils, no permit is required to reuse the native material as backfill provided that it is used for a legitimate purpose (i.e., backfill in the trenches). If material is side cast and not reused, then an application for a Disposal at Sea permit will need to be filed with DFO. Part of this permitting process will trigger a response/feedback from DFO. This could result in a harmful alteration, disruption, or destruction (HADD) of fish habitat process as per Section 35 of the Fisheries Act.