

Project Description

2.0 PROJECT DESCRIPTION

This section describes the Project based on conceptual design information currently available at the time of writing the EIA report. Further detailed engineering design will be completed as the Project progresses, and therefore this information is subject to change as other aspects of planning proceeds. The EIA report evaluates what is interpreted as worst case scenario for the construction of the cables, based on the current conceptual design and previous experience with other similar projects.

This section describes: the Project components as they are currently conceived, phases and activities required for the Project execution, the anticipated Project schedule, alternatives to the Project, Project-related emissions and wastes, as well as Project planning and management strategies.

2.1 PROJECT LOCATION

The Project consists of the installation and operation of two new submarine electrical cables (one from Deer Island to Campobello Island, and one from Campobello Island to Grand Manan Island) and the future decommissioning of the existing cables (see Figure 1.1). The Project components include two segments of 69 kiloVolt (kV) submarine cables and the modification of four land-based overhead-to-underground cable riser stations. There are four land-based cable riser stations: one on Deer Island, two on Campobello Island, and one on Grand Manan Island.

Three assessment areas are used to facilitate the assessment process, as follows.

- The Project Development Area (PDA; Figure 1.1) is the immediate area of physical disturbance associated with construction, operation, and decommissioning of the Project. See Figures 2.1 and 2.2 for the two proposed and the two existing submarine cable routes: Head Harbour Passage (Deer Island to Campobello Island) and Grand Manan Channel (Campobello Island to Grand Manan Island).
- The Local Assessment Area (LAA) is defined as the maximum area where Project-specific environmental effects can be predicted and measured with a reasonable degree of accuracy and confidence.
- The Regional Assessment Area (RAA) is defined as the area within which Project-related environmental effects may overlap or accumulate with the environmental effects of other projects or activities that have been or will be carried out.

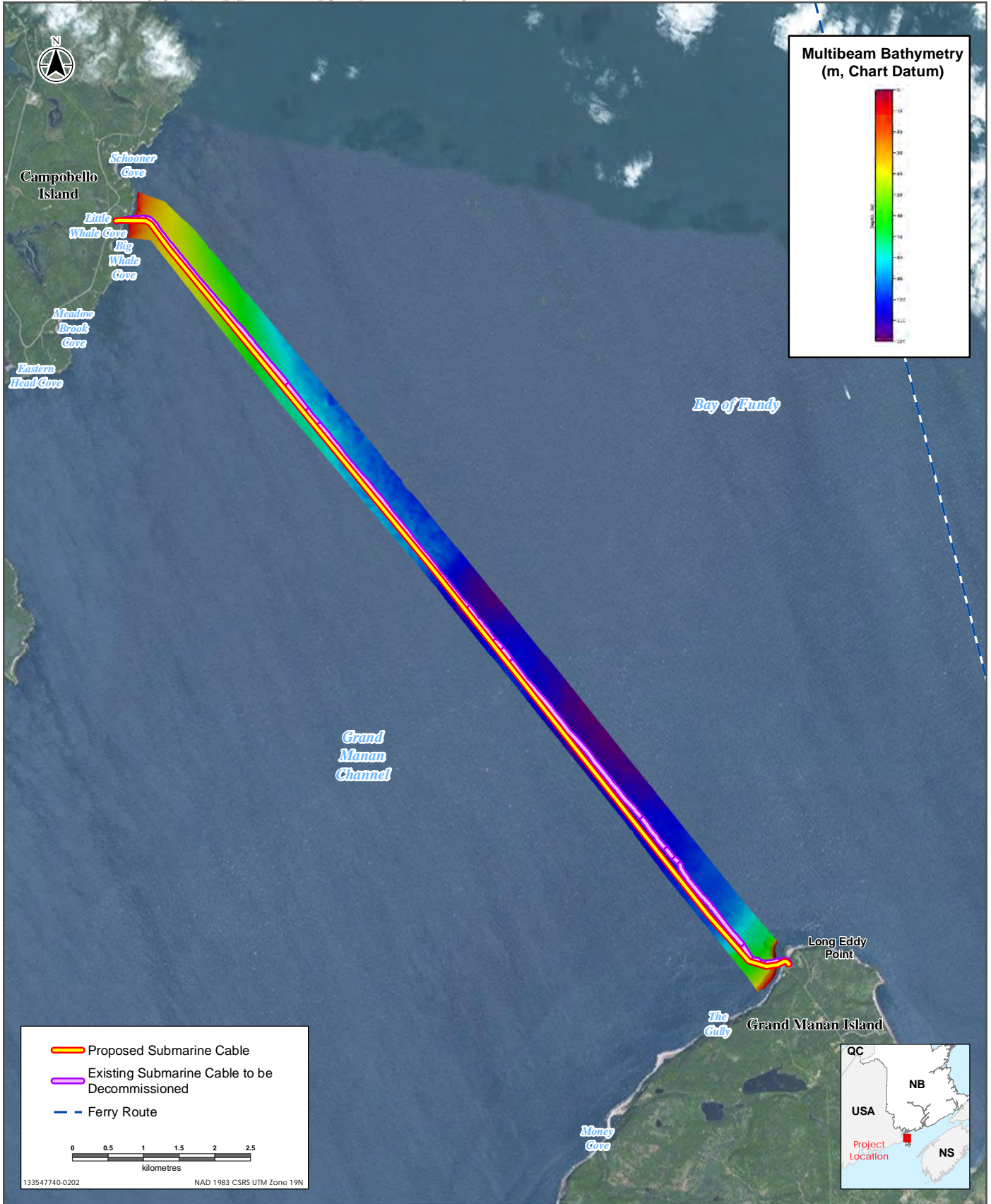
The PDA for the Project is 36.16 ha in area and includes:

- the four proposed cable riser station expansions at Chocolate Cove, Wilsons Beach, Little Whale Cove, and Long Eddy Point;
- two 10 m wide corridors extending approximately 3.4 km from each cable riser station (Chocolate Cove and Wilsons Beach), across Head Harbour Passage; one corridor each for the proposed and existing cables; and
- two 10 m wide corridors extending approximately 14.5 km from each cable riser station (Little Whale Cove and Long Eddy Point), across Grand Manan Channel; one corridor each for the proposed and existing cables.



Sources: Government of New Brunswick, Canadian Seabed Research Ltd (CSR). Multibeam bathymetry acquired by CSR in 2016 adjusted to Chart Datum.

Submarine Cable from Deer Island to Campobello Island



Sources: Government of New Brunswick, Canadian Seabed Research Ltd (CSR). Multibeam bathymetry acquired by CSR in 2017 adjusted to Chart Datum.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Submarine Cable from Campobello Island to Grand Manan Island

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The PDA for both the existing and proposed cables are 10 m wide corridors to be consistent in the assessment process for both land and marine installation, and decommissioning. The actual footprint of disturbance for the removal of the existing cables in the Passage and the Channel would be 4 m wide within the 10 m corridor below low water only and the areas of disturbance for the placement of the proposed cable in the Passage would be 2 m wide within the 10 m corridor below low water only.

The specific spatial extents of the LAA and RAA are specific to the valued components (VCs) being assessed, and will be described in each respective section of the EIA report.

2.2 DESCRIPTION OF PROJECT COMPONENTS

The Project involves the construction and operation of two segments of a high voltage alternating current (AC) submarine transmission system, one across Head Harbour Passage, and the other across Grand Manan Channel. The Project also involves the eventual decommissioning of the existing submarine cables.

The cable system would transmit 50 megaWatts (MW) of AC power at 69 kV. The Project would require the installation of the submarine cables, cable landfall sites, and modifications to the existing cable riser stations at Chocolate Cove, Wilsons Beach, Little Whale Cove, and Long Eddy Point. The new cables would be rated higher than the existing cables to allow for potential addition of future renewable energy projects and to accommodate possible future load growth on the islands. The source of electrical power for these cables would be through an existing overhead transmission line from mainland New Brunswick to Deer Island, which does not require replacement and is thus not part of the Project. No new land-based transmission lines, outside of those elements required for the new cable riser stations, are required for this Project.

Further details on the Project elements are provided below.

2.2.1 Cable Riser Stations

Modifications to the existing cable riser stations at Chocolate Cove on Deer Island, Wilsons Beach and Little Whale Cove on Campobello Island, and Long Eddy Point on Grand Manan Island would be required to accommodate the new cables. These modifications would include upgrades to the existing access roads, which would include grading, ditching for storm water management, and minor access relocation at Chocolate Cove and Wilsons Beach to allow Project vehicle access into the expanded cable riser stations. Modifications would also include the installation of transmission line termination and cable riser structures, which would require a minimal footprint of disturbance. Cable Landfall Sites

For the purpose of this Project, a cable landfall site is defined as the area from the cable riser station to 3 m water depth. The submarine cable would make landfall at four locations (Chocolate Cove, Wilsons Beach, Little Whale Cove, and Long Eddy Point), adjacent to the existing cables.

Cable landfall site expansions may require new easements and/or land purchases at all four landfall sites. Water lot revisions and a second cable riser structure would be added and modifications to the existing

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69 kV line would be made at each site. The perimeter fences at Wilsons Beach, Little Whale Cove, and Long Eddy Point would require upgrades.

NB power would acquire easements and land purchases as required to facilitate the construction of the new infrastructure and modifications of existing infrastructure.

Chocolate Cove

The new submarine cable would approach the Chocolate Cove landfall site running on the south side of the existing cable, as shown in Figure 2.3. The new cable would not cross the existing cable in this area.

Wilsons Beach

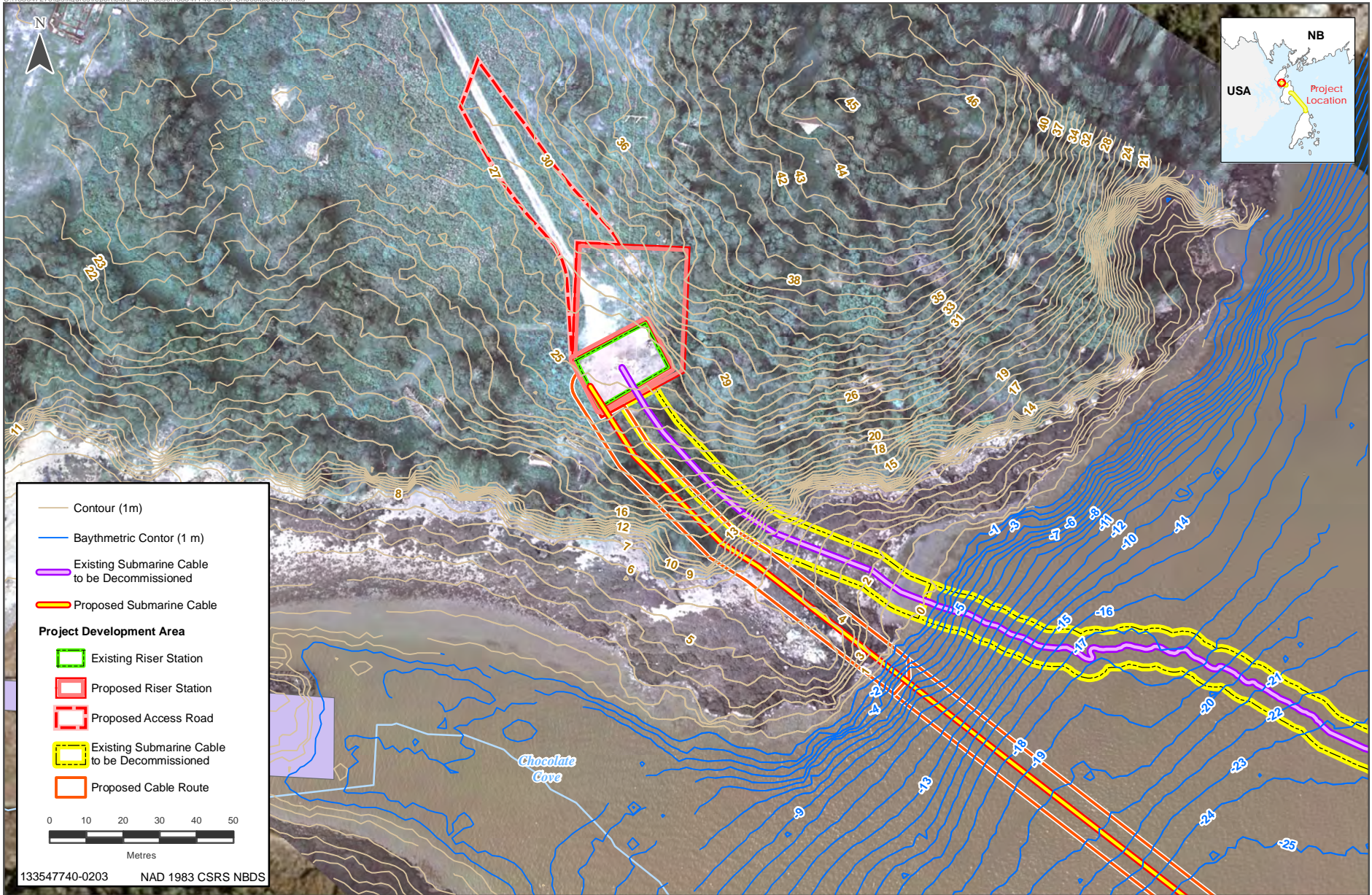
The new submarine cable would approach the Wilsons Beach landfall site running north of the existing cable as shown in Figure 2.4 and cross the existing cable in the intertidal area and run on the south side of the existing cable to the cable riser station.

Little Whale Cove

The new submarine cable would approach the Little Whale Cove landfall site running on the north of the existing cable, as shown in Figure 2.5. The new cable would not cross the existing cable in this area.

Long Eddy Point

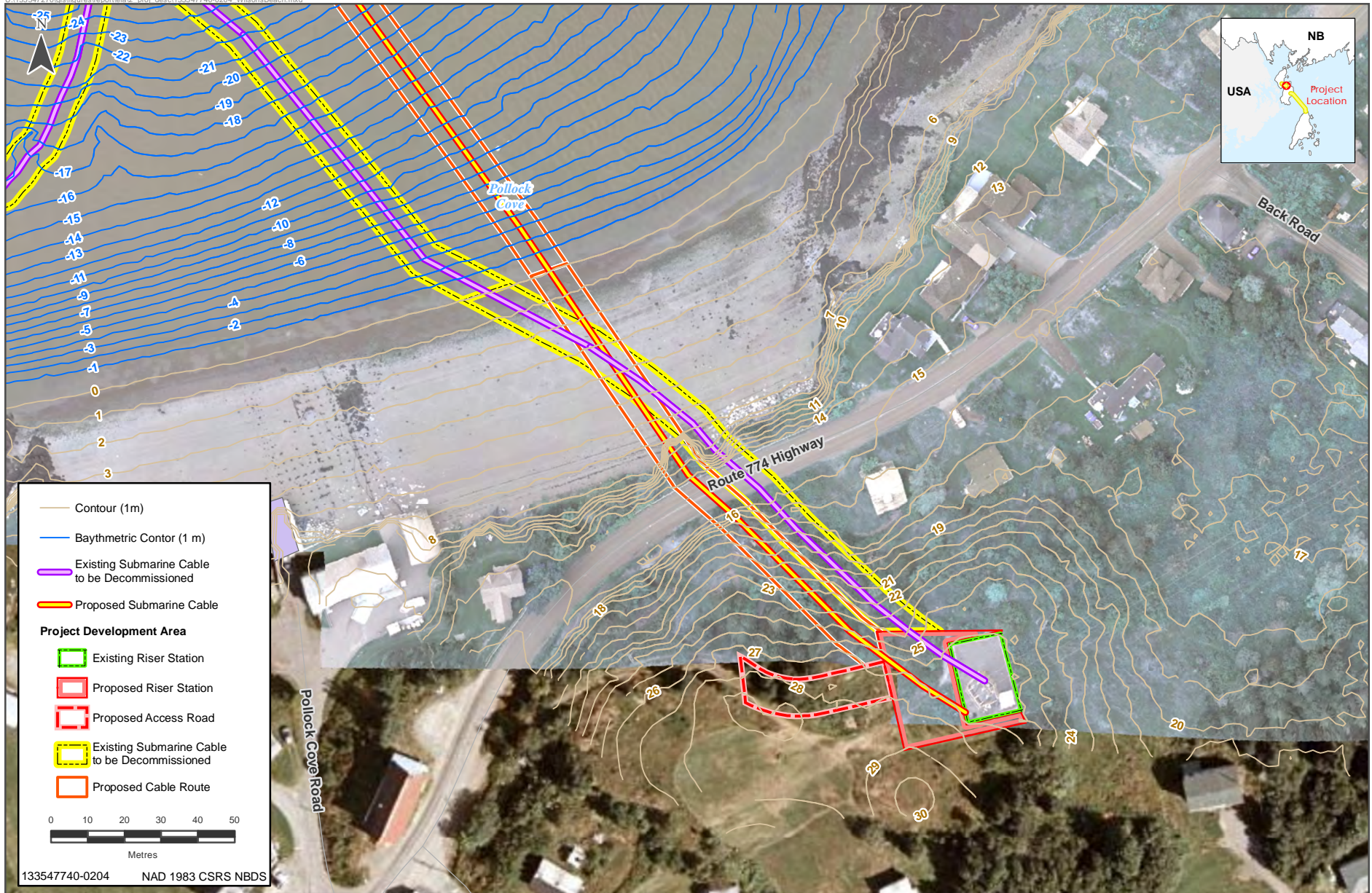
The Canadian Seabed Research Ltd. (CSR) survey found evidence of slope failures at the base of the embankment offshore at Long Eddy Point, which indicate a potential hazard to the existing cable. The new submarine cable would approach the Long Eddy Point landfall site from the south of the existing cable as shown in Figure 2.6. The new cable would not cross the existing cable in this area.



Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010). Archaeological data provided by the Government of New Brunswick, Archaeological Services.

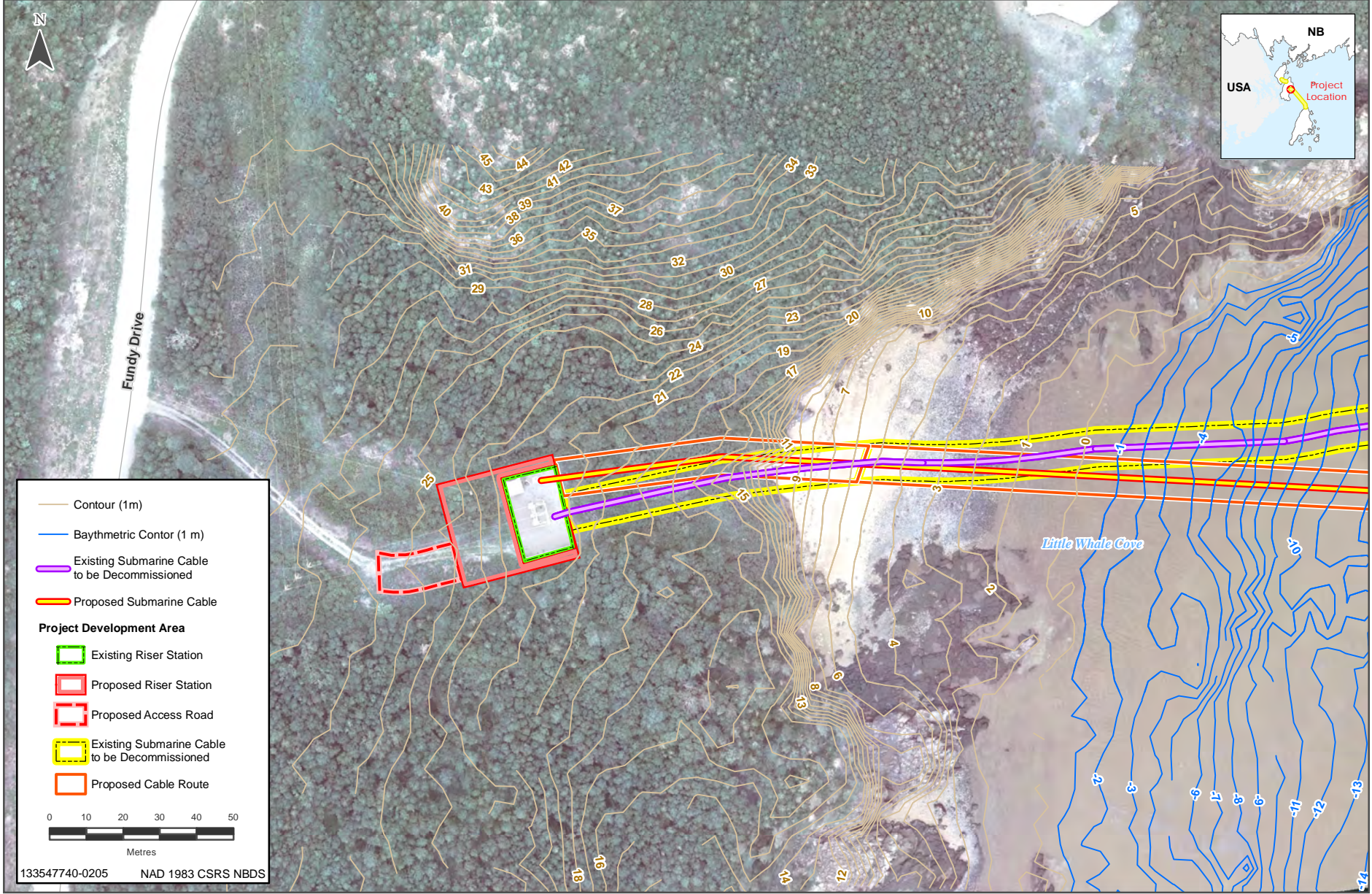
Chocolate Cove Landfall Site





Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010). Archaeological data provided by the Government of New Brunswick, Archaeological Services.

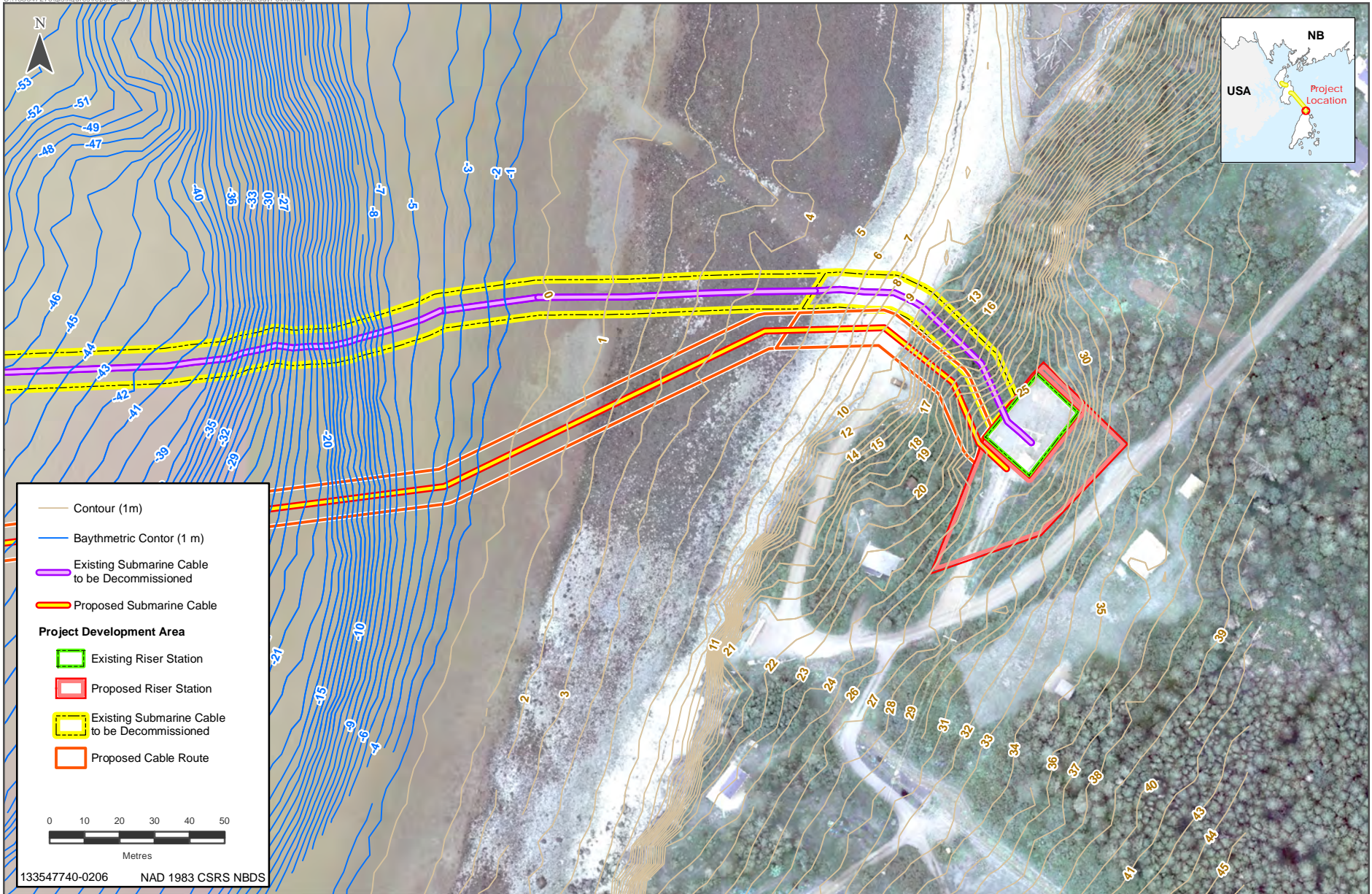
Wilsons Beach Landfall Site



Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010). Archaeological data provided by the Government of New Brunswick, Archaeological Services.

Little Whale Cove Landfall Site





Source Data: Base data provided by Service New Brunswick. Imagery provided by GeoNB Enhanced Imagery (2010). Archaeological data provided by the Government of New Brunswick, Archaeological Services.

Long Eddy Point Landfall Site

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2.2.3 Submarine Cables

Submarine cables transmitting 50 MW at 69 kV would be installed crossing the Head Harbour Passage (Figure 2.1) and Grand Manan Channel (Figure 2.2). The three-core cables would be manufactured from cross-linked polyethylene (XLPE), which is made from high density polyethylene and contains cross-linked bonds in the polymer structure, creating a highly durable material. The cables are entirely solid-state and do not contain any gaseous or liquid insulating medium. Preliminary investigations suggest that a 240 square millimetre (mm²) conductor size would meet the 50 MW capacity at 69 kV. A typical three-core submarine cable with XLPE insulation is shown in Figure 2.7.



Figure 2.7 Typical Three-core Submarine Cable (ABB 2010)

2.2.4 Cable Protection

Since their original installation, the existing submarine cables have been exposed above the shorelines due to soil erosion. Substantial corrosion has been noted and repaired on the protective collars used to protect the cables in these areas.

Two methods of construction have been considered for cable burial at the landfall sites: horizontal directional drilling (HDD), and open-cut trenching (OCT). Cable burial is required to protect the new submarine cables in the intertidal zones and on land. Both HDD and OCT are described further in Section 2.3.1.1 below. While HDD is the preferred method for constructing the cable landfalls at this time,

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OCT is being carried as an option in the event that HDD becomes not feasible (e.g., unsuitable geotechnical characteristics).

The use of the HDD method at landfall sites to 3 m below the lower low water large tide (LLWLT) is recommended to avoid past problems experienced with the existing cables due to shoreline erosion.

In the Grand Manan Channel, numerous ship anchors have hooked onto the existing cables, and there are many marks from scallop drags and reports from fishers of multiple interactions with the cable. However, there has not been any faults to the existing cables and the probability of a ship dropping or dragging an anchor on either crossing that would cause a fault is considered low.

Despite the outcomes of the risk assessment, given that there remains a potential danger to both cables as a result of the techniques of lobster and scallop fishing, cable protection from lobster and scallop fisheries is recommended for both crossings utilizing a double helical armour.

The double helical armour protection would consist of one layer of galvanized steel wires or flat straps. High tensile strength steel armour wires or straps would be used to provide higher abrasion resistance. Each armour wire or strap would be evenly coated with bitumen.

The cable would be buried to a depth of approximately 0.6 m below the seafloor on a “best efforts” basis for the Grand Manan Channel crossing. A marine plow would create a trench and a cable laying vessel would place the cable in the trench. Where cable burial is not possible, the cables would be laid on the seabed, and not buried. Based on the hard material at the surface of the seabed within the Head Harbour Passage, the cable would only be laid on the seabed surface for this crossing.

2.3 DESCRIPTION OF PROJECT ACTIVITIES AND PHASES

The phases and activities associated with the Project are described below. The sequencing and methods used for the activities would be confirmed through detailed engineering design, constructability review, and site-specific conditions.

2.3.1 Construction

Construction activities would begin immediately following approval of the EIA, the fulfilment of any pre-construction Conditions of Approval, and the receipt of all necessary permits and authorizations. The following is a brief description of construction activities that are typical for construction of submarine cables. These activities would be managed by NB Power in accordance with a Project-Specific Environmental Management Plan (PSEMP), to be developed prior to construction.

2.3.1.1 Cable Burial Methods

Current construction methods for cable burial at the landfall sites include horizontal directional drilling (HDD) and open-cut trenching (OCT) to protect the new submarine cables in the intertidal zones and on land. While HDD is the preferred method for constructing the cable landfalls at this time, OCT is being carried as an option in the event that HDD becomes not feasible (e.g., unsuitable geotechnical characteristics). Both options are assessed in this EIA report.

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Figure 2.8 shows the proposed submarine cable burial cross-section for the HDD burial method. This method would be used:

- where bedrock is encountered;
- where soil erosion is a concern;
- down steep bedrock shore banks;
- across roadways to meet Canadian Standards Association (CSA) C22.3, No. 7 (*Canadian Electric Code, Part III* 2015);
- under intertidal zones; or
- into the water to a location 3 m below the LLWLT.

A high-density polyethylene (HDPE) conduit would be pulled through the boreholes in areas where HDD is carried out. The new submarine cables would be pulled into this conduit. HDD is the preferred method of cable installation at the landfall sites.

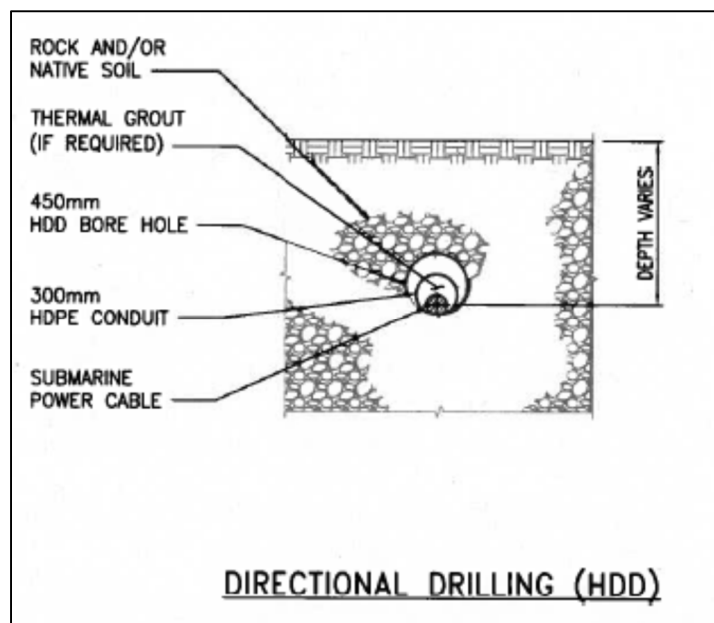


Figure 2.8 Typical Underground Cable Installation Cross-section of Horizontal Directional Drilling

Figure 2.9 shows the proposed submarine cable burial cross-section for the OCT burial method. This method is more easily carried out in areas where bedrock is not encountered, and where soil erosion is not an issue. OCT would be carried out in areas where HDD is not feasible. Sediment control would be required in the intertidal zones. An HDPE conduit would be inserted in the trench in the intertidal zone and the excavation would be backfilled immediately. This would minimize the effect the tides may have on an open excavation while waiting for the new submarine cable delivery and installation. The conduit would be buried at a depth of approximately 1 to 3 m below grade (where conditions permit). The new submarine cable would then be pulled into this conduit. Articulated mechanical protectors would be used

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to protect the cable from the exit point of the HDPE conduit below the low tide area, where the cable may be laid directly on the seabed to a depth of 3 m below LLWLT. A bell-end would need to be fitted to the end of the HDPE conduit to ensure that minimum cable bending radius limits are not exceeded at this point.

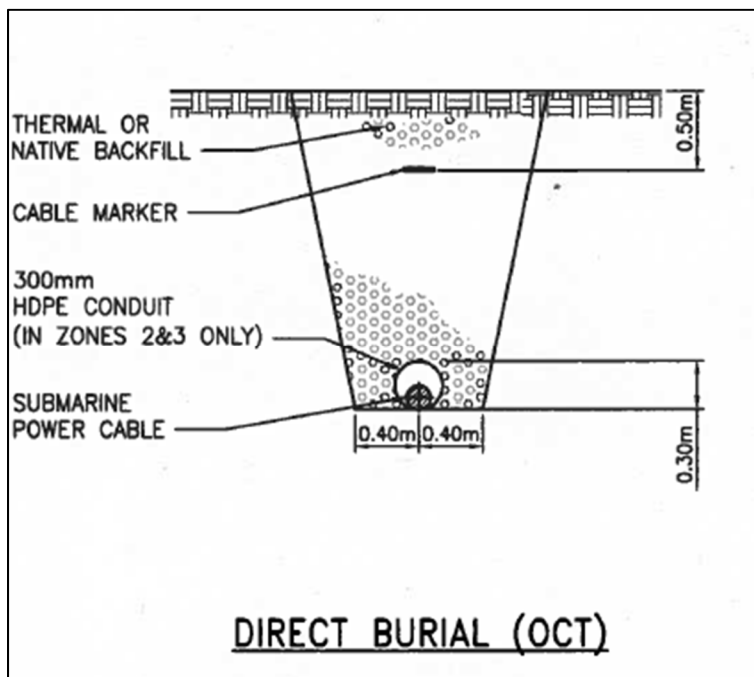


Figure 2.9 Typical Underground Cable Installation Cross-section for Open-cut Trenching

Geotechnical studies were conducted for each of the four landfall sites and for underground cable runs to the landfall sites. The studies indicated that the four landfall sites appear to have suitable material for HDD. If the HDD option is confirmed, there would still be a need for a short length of open trench from the exit/entry point of the HDD to the cable riser station.

If the OCT option is confirmed, it would involve excavating a trench using rock hammers to approximately 1 to 2 m deep, where possible, from the cable riser station to 3 m water depth.

2.3.1.2 Land-based Construction

Landfall Construction

The submarine cable would make landfall at Chocolate Cove, Wilsons Beach, Little Whale Cove, and Long Eddy Point at existing NB Power landfall sites. Current construction methods for cable burial at landfall sites include both HDD (preferentially) and OCT (where HDD is not feasible) to protect the new submarine cables in the intertidal zones and on land. The HDD method was recommended for cable burial at all four landfall sites, to the fullest extent that it can be implemented at these locations. However, in areas where HDD is not possible and where the OCT method is used instead, it would involve

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excavating a trench using rock hammers to approximately 1 to 2 m deep, where possible, from the cable riser station to 3 m water depth.

At each landfall site, for the area between the HDD exit/entry point to the cable riser station, the cable would be installed in a single trench. The trench would be partially filled with thermal sand and plastic boards would be installed above the cable. The plastic boards serve as indication that a power cable is present below if excavation is required in the area. The route of the cable would be delineated with marker posts every 50 m to the high water point with warnings indicating the presence of a high voltage underground cable.

Modification to Cable Riser Stations

Modifications to the existing cable riser stations at Chocolate Cove, Wilsons Beach, Little Whale Cove, and Long Eddy Point, would be required to accommodate for the new cables.

The modifications to the cable riser stations would include the installation of transmission line termination and cable riser structures, perimeter fencing, minor upgrades to the existing access roads, and extensions/tap-offs to the existing 69 kV overhead line.

Clean-Up and Revegetation

In areas where soil disturbance due to construction may cause erosion, measures would be taken to stabilize the affected area. Such measures may include trimming and back blading, mulching, seeding, and fabric placement. Erosion control used during construction would be maintained until such time as the disturbed ground has been adequately stabilized.

Land-Based Transportation

Construction and trucking activities would vary during the Project, depending on what components are being installed and the stage of construction. Road traffic generated during construction would be comprised of:

- trucks (transportation of construction equipment and materials, and various services)
- passenger vehicles (construction workers' automobiles, SUVs, vans, and pick-ups)

2.3.1.3 Marine-based Construction

Cable Installation in Head Harbour Passage and Grand Manan Channel

For the marine-based construction, the cable would be buried to a depth of approximately 0.6 m on a "best efforts" basis within the Grand Manan Channel. The cable installation would be completed with a dedicated cable laying vessel, barge or offshore supply vessel equipped with redundant dynamic positioning capabilities, as well as several axillary support vessels. A marine plow, or a similar piece of equipment, would be dragged on the bottom of the seabed across the Grand Manan Channel to create a trench that is approximately 1 m deep and 2 to 3 m wide at the top. The plowed material would be mounded on either side of the trench, similar to a snow plow. The cable would then be placed within the trench. The cable landings on land would be completed by floating the appropriate amount of cable

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parallel to the shore and then pulling the cable through the HDD conduit or OCT (if required) to the cable riser station. Once the cable has been confirmed that it is in the trench, the cable would be back filled via another type of marine plow or left to back fill naturally.

Cable installation for Head Harbour Passage would be similar to that of the Grand Manan Channel with the exception of the trenching and backfilling. Throughout this process, the equipment is required to maintain a certain tension on the cable and would ensure that the cable does not exceed the maximum bending radius.

Double helical armour has been recommended for the cable for the whole length of the crossing.

Marine Transportation

The Project area of the Bay of Fundy is predominantly used by commercial fishers with additional uses including coastal recreation, marine transportation, submarine power and communication cables. Project-related vessels would transit Head Harbour Passage and Grand Manan Channel and would abide by the guidance from the Fundy Marine Traffic.

2.3.1.4 General Project Construction

Inspection and Energizing the Project

Following the installation of all Project components, cable inspections and commissioning testing would be conducted by NB Power staff or equivalent contractor prior to energization to ensure the cables are ready for service. Any deficiencies discovered during these inspections would be corrected prior to energizing (commissioning) the cables.

Once inspection is complete, the cables would be energized, beginning the operation phase of the Project (described further below).

Employment and Expenditure

The land-based construction workforce would be accommodated in nearby lodgings within Fundy Isles, project camps would not be constructed for the Project. The majority of the marine-based construction workforce is expected to be accommodated on board the cable vessels, likely to be self-contained, for the duration of the Project.

A variety of management, accounting and payroll, engineering, and construction personnel would be required during construction. It is expected that the Project would generate direct employment for up to approximately 75 to 100 workers at the peak of construction activity. These workers may be employed by New Brunswick-based construction or engineering firms. Additionally, specialists from within Canada or abroad may be employed to advise or construct unique aspects of the Project.

2.3.2 Operation

During the operation of the Project, certain routine activities would be performed in order to ensure reliability of the network. Activities expected during operation include vegetation management on land,

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infrastructure inspection, maintenance and repair, access road maintenance, transportation of people or materials, and electricity transmission. These activities have the potential to produce emissions, solid waste, transportation, and employment and expenditures. These activities and derivatives are described in the following sections.

2.3.2.1 Vegetation Management

NB Power would be responsible for maintaining suitable access to the cable riser stations during emergencies, and for regularly scheduled inspections and maintenance. Routine inspections would be conducted to facilitate the safe and reliable operation of all Project infrastructure.

To avoid interruptions to electrical service caused by overgrown or fallen vegetation at landfall sites, NB Power would restrict the growth of trees and brush along the landfall sites in accordance with their vegetation management program. The clearances were developed from the Canadian Electrical Code for safe and reliable operation of high-voltage lines. Manual, mechanical, and chemical methods would be used to control vegetation at the landfall sites. The frequency of vegetation management depends upon the growth rate, but is normally carried out every five to seven years.

2.3.2.2 Access Road Maintenance

Access to the landfall sites would use existing adjacent road access to the landfall sites, to the extent feasible. General access road maintenance activities would be carried out by third parties during the summer months, with the assistance of NB Power. Detailed maintenance procedures would be developed during later planning stages; however, maintenance of the roads may include:

- bridge or culvert maintenance;
- litter pick-up;
- road repairs;
- snow removal and ice control;
- traffic sign installation and repairs;
- traffic signal maintenance; and
- vegetation control.

Periodic summer maintenance of roadway drainage systems may be required, including the replacement or repair of culverts and re-establishment of the drainage ditches. Repairs would be conducted as necessary and may involve occasional excavation or removal of the existing cover and subgrade, leveling, grading, and gravelling.

Winter operation activities would involve snow removal and ice control to reduce traffic disruptions and safety hazards. Snow removal would be accomplished by plow. Road ice would be managed through the application of sand to icy or snow-packed road surfaces, to provide traction.

2.3.2.3 Energy Transmission

Following construction, the new submarine cables would be energized and would begin transmitting electricity, while the existing cables remain in standby service until decommissioning.

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The submarine cables would be operated continually for the life of the Project. Routine inspections and maintenance will ensure minimal interruptions to this activity.

2.3.2.4 Infrastructure Inspection, Maintenance, and Repair

Maintenance inspections will be completed to check for the deterioration of hardware and insulators, and identify maintenance requirements. These inspections will also assist in identifying any potential for weakened support structures and foundations, as well as changes in terrain that may affect structure stability.

Inspections may be carried out in the event of an emergency (e.g., ships anchor or wind storm). Inspection results would be provided to NB Power operational personnel who are responsible for planning and scheduling maintenance work.

2.3.2.5 Employment and Expenditure

The maintenance workforce would be accommodated in nearby lodgings within the Fundy Isles. A variety of management, accounting and payroll, engineering and construction personnel maybe required during maintenance operations. These workers may be employed by NB-based construction or engineering firms. Specialists from within Canada or abroad may be employed to advise or construct unique aspects of the Project.

2.3.2.6 Land-Based Transportation

Once commissioning activities are completed, the traffic generated during operation of the Project would be low and fairly uniform, mainly during periodic inspection and maintenance activities.

Road traffic generated during the operation phase of the Project would be comprised of:

- passenger vehicles (NB Power pick-ups); and
- support vehicles for transport of equipment, and various services for landfall site inspection, maintenance and repair, and vegetation management.

2.3.3 Decommissioning

2.3.3.1 Decommissioning of Existing Cables

Once the new cables are in service, the decommissioning of the existing cables would be conducted at some time in the future, when the cables have reached the end of their service life. The following three options are being assessed for the eventual decommissioning of the existing cables:

- leave in place and remove gas;
- remove gas and remove only the marine cable portion of the Project; and
- remove gas and take out both terrestrial and marine cable sections of the Project.

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While decommissioning of the existing cables is assessed in this EIA report, NB Power anticipates that any EIA approval for this Project would require the submission of a Decommissioning Plan for the existing cables to be submitted for review by NBDELG prior to initiating cable decommissioning activities.

2.3.3.2 Eventual Decommissioning of Proposed Cables

Decommissioning activities of the proposed cables are not expected to occur until the end of life of the Project, which is expected to be at least 40 years from the start of the operation phase. It is not possible to determine with any certainty the potential environmental effects of future decommissioning activities, nor the regulations and policies that might apply, at that time. Therefore, neither the decommissioning phase for the new cables, nor potential activities to be conducted as a part of it, are assessed in detail as part of this EIA; it is expected that they would be assessed in accordance with regulations in place at the time of their future decommissioning.

2.3.3.3 Reclamation

Reclamation would involve the restoration of the Project site to as near natural conditions as feasible. In general, disturbed areas of the site would be graded and shaped. Slopes would be graded to merge naturally into adjacent undisturbed areas. Grading may include decommissioning ditches and other water management structures that are no longer needed, or enhancing them to provide natural swales for channeling surface water into nearby watercourses. Former laydown areas would be capped with overburden and stabilized.

2.3.3.4 Employment and Expenditure

Employment and expenditure during decommissioning would be modest and would vary depending on the activity being carried out at the time. Decommissioning would require limited contractor and Project personnel to dismantle all equipment and facilities associated with the Project. Reclamation would see limited contractor and Project personnel to restore areas of the site to near pre-Project conditions. Expenditure associated with these activities would be similar to or less than during the construction phase.

2.3.3.5 Land-Based Transportation

Transportation needs during decommissioning would be modest and would vary depending on the activity being carried out at the time. Although specific details of the decommissioning phase and associated transportation requirements are not fully defined at this time, it is expected that the Project activities and requirements during this phase would be similar to or less than those during the construction phase.

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2.3.3.6 Marine Transportation

Marine transportation needs during decommissioning would vary depending on the activity being carried out at the time. Although specific details of the decommissioning phase and associated marine transportation requirements are not fully defined at this time, it is expected that the Project activities and requirements during this phase would be similar to or less than those during the construction phase.

2.4 EMISSIONS AND WASTES

2.4.1 Air Contaminants

Releases of air contaminants to the atmosphere would consist mainly of combustion gases from the operation of on-site construction equipment and large trucks used to deliver equipment. There may also be some fugitive dust generated as a result of land-based excavation activities. The predominant source of greenhouse gases (GHGs) would be from fuel combustion in heavy equipment, marine vessels, and trucks. Nominal quantities of GHGs would be released from vegetation clearing, as vegetation acts as a carbon sink. During construction, air contaminants may be released from the following activities:

- fuel combustion from heavy equipment during clearing and site preparation (e.g., excavators, dozers);
- fuel combustion from passenger vehicles moving to and from the site, as well as on-site;
- fuel combustion from trucks and marine vessels transporting equipment and material;
- dust from site preparation activities (e.g., land clearing, trenching, HDD);
- dust from vehicle and equipment movement on unpaved roads;
- dust from loading and unloading of overburden and topsoil; and
- dust from stockpiling of overburden and topsoil.

Topsoil and overburden stockpiled during construction would be seeded and revegetated periodically. The generation of airborne dust from these sources is considered to be nominal. Topsoil and overburden are transferred by trucks to stockpiles. While material handling may generate dust, it is assumed that most material would be wet and that minimal dust would be generated.

Project-related releases of air contaminants would include small amounts of combustion gases from the operation of marine construction equipment required to install the two submarine cables. This installation would require the use of vessels and barges to support cable installation activities across the Head Harbour Passage and the Grand Manan Channel and potential excavation of trenches near the landfall sites. The emissions would remain largely confined to the project development area (PDA) and immediately adjacent areas, and would be of short duration.

During operation, modest amounts of air contaminants may be released from the following sources, mainly during periodic inspection and maintenance activities associated with the new cables:

- fuel combustion from mobile equipment;
- fuel combustion from passenger vehicles/inspection vessels to and from the site, as well as on-site; and
- dust from the movement of vehicles and equipment on unpaved roads.

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During routine operation, vehicle/vessel support would be required during inspection, maintenance, and repair of the existing infrastructure, access road maintenance and vegetation management. The emissions would remain largely confined to the LAA and the immediately adjacent areas and would be of short duration.

Emissions during future decommissioning activities are expected to be similar to, but of a shorter duration than, those during construction.

2.4.2 Noise and Vibration Emissions

Noise and vibration emissions during construction are generally associated with the operation of construction equipment, rock hammers, and HDD. Construction noise and vibration would be localized and intermittent, as equipment is operated on an as-needed basis, and mostly during daytime hours (7:00 am to 7:00 pm) where possible. Noise sources would be mitigated through the use of mufflers, and noise barriers. Vibration levels would be periodically monitored during peak construction to ensure they meet the *Blasting Code Approval Regulation* under the *Municipalities Act*.

Blasting will not be required for the construction of this Project.

During operation, modest noise emissions and vibration would result from the operation of heavy equipment and from transportation vehicles on Project access roads, mainly during periodic inspection and maintenance activities. Similar to air contaminants, noise and vibration would remain largely confined to the corridor and the immediately adjacent areas, and would be short-term and transient.

Given the limited extent of activities during the decommissioning phase, few concerns exist with respect to noise and vibration. Noise and vibration levels would be similar to, but of a shorter duration than, those during construction.

2.4.3 Surface Runoff

Surface runoff during construction would be carefully managed. Surface runoff mitigation measures (e.g., erosion and sedimentation control measures) would be employed during construction, and ground disturbance would be held to a minimum outside the required construction zones. Management of site runoff would employ best practices such as containment ditches and silt fences to avoid or mitigate potential adverse environmental effects to watercourses.

There are no features during operation that would be expected to result in significant amounts of surface runoff to be managed.

Surface runoff during future decommissioning activities is expected to be similar to, but of a shorter duration than, that during construction.

2.4.4 Electromagnetic Fields

During operation, the submarine cables have the potential to produce electromagnetic fields (EMFs) during electricity transmission. The strength of the EMF is dependent on the distance from the source and

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the amount of power being transferred through the cable. Within North America, EMF is generally measured in units of Gauss (G). Natural sources of EMF include the earth's geomagnetic field, this field ranges from 300 to 700 milliGauss (mG) (Normandeau et al. 2011). The amount of EMF released from similarly sized cables buried 1 m below the seabed ranges from 78.5 mG directly above the seabed to 2.2 mG, at a distance of 10 horizontal metres from the cable, respectively (Normandeau et al. 2011).

EMF would not be emitted during the construction or decommissioning phases.

2.4.5 Waste Disposal

During the construction and decommissioning phases, there would be disposal of some general construction wastes such as wood, steel, cardboard or other packaging, and other construction debris. These materials would be disposed of at approved construction and demolition disposal sites. All merchantable timber from site clearing would be removed by the contractor, and remaining brush would be stockpiled. No burning of waste would be carried out during construction. Soil and overburden would be stockpiled for future use in reclamation activities. NB Power, or its contractors, would reuse or recycle waste materials where possible, and dispose of other wastes at approved facilities. Any liquid hazardous materials (e.g., waste oils and lubricants) generated by contractors on-site would be collected and disposed of using approved hazardous materials collectors.

During operation, there would be disposal of some general operational wastes such as wood, steel, and cardboard. These materials would be disposed of at approved disposal sites. No burning of waste would be carried out during operation. NB Power, or its contractors, would reuse or recycle waste materials where possible, and dispose of other wastes at approved facilities. Any liquid hazardous materials (e.g., waste oils and lubricants) used during inspection, maintenance, and repair of the existing infrastructure by contractors on-site would be collected and disposed of using approved hazardous materials collectors.

2.5 ALTERNATIVES TO THE PROJECT

As the Project involves the spanning of two bodies of water for several kilometres with no opportunity for installing an overhead cable, there are no alternative means of power transmission considered outside of the selected Project option of using submarine transmission cables. On-island generation, alternative routes, and alternative burial methods are potential alternatives to the Project. These are discussed in the following subsections.

2.5.1 On-island Generation

The generation of power within the Fundy Islands was considered as an alternative to importing electricity from the mainland. While there is a small backup generating station on Grand Manan for providing emergency power in the event of an interruption in electrical transmission to that island, it is not able to provide a continuous source of power without modification and refurbishment. Construction of new large-scale power generation facilities within the islands, either on each of the Deer/Campobello/Grand Manan Islands or one facility to serve all three islands is not considered economically feasible when compared to the cost of importing electricity from mainland New Brunswick. Also, due to the low population density within the islands, it would not be technically feasible to develop new thermal power sources for the

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islands. There are no feasible watersheds on the islands within which to develop hydroelectric facilities. Finally, the use of solar and wind power is not considered technically feasible, as this type of power generation would not provide a continuous supply of electricity to the islands (i.e., they would provide electricity only when the sun is shining or the wind is blowing). Therefore, due to the technical and economic limitations of on-island generation, these options were determined to not be technically or economically feasible alternatives to the Project.

2.5.2 Alternative Routes

Several alternative routes have been considered for the proposed transmission cables between both crossings (Head Harbour Passage and Grand Manan Channel).

Factors influencing the route selection include year-round accessibility for repair, lower capital cost by transmission capacity, lower operating cost, lower risk of physical damage by external factors, and feedback from public consultation.

Upon choosing a submerged cable design, several alternative options were considered, as discussed below. The routes were reviewed by CSR prior to commencing marine surveys, and are described below.

2.5.2.1 Head Harbour Passage

Early investigations initially proposed using the same landfall sites as currently but instead of a straight line, the centerline of the cables was moved approximately 400 m to the south. This would take the cable out of the existing NB Power easement, but was chosen to avoid the very rugged marine bottom profile inside the existing easement.

During the summer of 2016, CSR carried out surveys of the initially proposed route. After conducting the surveys, the route recommended by CSR follows the initially proposed route for approximately the first 2,400 m, with some variations to avoid exposed bedrock. At that point, the route outlined by CSR veers to the north away from the initially proposed route and crosses the existing cable. This was chosen to avoid rough terrain on the approach to Campobello Island. At 3,000 m from Deer Island, where the existing cable crosses a very steep and irregular cliff, with slopes exceeding 30 degrees, the CSR route is more than 150 m to the north. The slope in that area is relatively constant at just over 10 degrees. On approaching the shore, the CSR route once again crosses the existing cable, in the intertidal zone in order to land the cable on NB Power property. The route recommended by CSR has six lengths of bedrock totaling approximately 800 m, or 25% of the crossing. Of the remaining 2,400 m, all but 200 m is described as cobbles with gravel and boulders.

The route outlined by CSR for the Head Harbour Passage crossing was not recommended by local fishers during consultation meetings. Feedback from local fishers requested that the proposed cable follow a route closer to the existing cables as to reduce the area of disturbance to fishing grounds. A new route was proposed along the center of the Passage that would follow closer to the existing cables.

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2.5.2.2 Grand Manan Channel

Early investigations initially proposed using the same landfall sites as the existing cable, but moving 750 m northeast and then parallel to the existing cable. This was based on information from fishers that the existing cable was at the northern end of their fishing area and that the seabed would be more conducive to burial. The survey of this route during Phase 1 indicated the route avoided bedrock.

CSR surveyed the proposed route with the only significant change being on the approach to Long Eddy Point on Grand Manan Island. The existing cable was located and it does not approach the shore through the water lot. Instead, it veers to the south and approaches from the southwest, not crossing into the water lot until just below the high water line to avoid a very steep embankment within 200 m of shore. The survey found evidence of slope failures at the base of the embankment, which indicate a hazard to the existing cable. The approach recommended by CSR crosses the existing cable and moves farther to the south, approaching the shore where the slope is less severe.

CSR suggested a shorter and more cost-effective concept route running from the same shore ends, but 250 m south of the existing cable. The concept route would be over 500 m shorter and there would be no crossing of the existing cable required. The shorter route was not accepted, however, due to i) scallop landings, ii) surficial geology of the seabed, iii) the cost savings of the shorter route would be offset by the cost of the additional geophysical surveys required for the CSR concept route, and iv) Project delay due to the requirement of additional geophysical surveys of the CSR concept route, that may still result in the selection of the northern route.

The initially proposed route, 750 m north of the existing cable, with the revised approach to Long Eddy Point proposed by CSR, was initially recommended for the Grand Manan Channel crossing. After consulting with local fishers, it was requested that the proposed cable follow a route closer to the existing cables as to reduce the area of disturbance to fishing grounds. A new route was proposed along the Channel that would travel south and closer to the existing cables. In September 2017, CSR conducted an additional survey focusing on the area near the existing cables.

Alternate landfall site locations were considered; however, ruled out by NB Power due to the efficiencies of using the existing infrastructure at the land-based landfall sites.

2.5.3 Alternative Cable Burial Methods

The HDD and OCT methods were the two cable burial methods considered for cable burial at landfall sites for this Project.

The HDD method would:

- avoid issues that NB Power has experienced in the past with the existing cables due to shore erosion;
- expedite the cable landing process, and cable routing under roadways or vehicular areas; and
- potentially reduce the construction footprint associated with OCT.

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The OCT method could:

- result in a larger construction footprint due to the footprint of the trench;
- have the potential to release hydraulic fluid or diesel fluid into the marine environment in the event of trenching equipment failure;
- result in large amounts of sediment being release into the marine environment as the rising and falling tides interact with soil removal during trenching operations; and
- be problematic in areas where bedrock is encountered.

Taking into consideration the above listed factors, the use of the HDD method is recommended, wherever possible. It must be noted that while preferred, the HDD method may not be technically feasible in some of the landfall sites. If not, OCT would be implemented. For the purposes of this EIA report, both methods are considered and assessed.

2.6 SCHEDULE

The required in-service date for the new cable interconnection is late 2019. Following the receipt of all necessary permits and authorizations, and the completion of detailed engineering design. The marine activities associated with cable installation and land-based construction activities are assumed to start in summer 2018, with complete installation and commissioning of the new cables in mid to late 2019.

The proposed schedule is provided in Table 2.1.

Table 2.1 Proposed Project Schedule

Project Activity	Timeline
EIA Submission	January 2018
EIA Determination (assumed)	Spring-Summer 2018
Cable Manufacture	2018-2019 (6-8 months)
Land Based Work - Landfall sites	2018-2019
Cable Installation	Summer 2019
Cable Terminations	Fall 2019
In-Service Date	Fall 2019

The schedule provides adequate flexibility to avoid work during sensitive periods (i.e., migration, local avian breeding/nesting periods, fishing seasons, peak marine mammal activity) and to allow for weather-related delays. As part of NB Power's Public Consultation and Engagement Program, information on time sensitive periods for the installation of the cables would be sought from local stakeholders and First Nations Rights Holder.