



Interim Report Offshore Infrastructure - NS and PEI (BC and UK)

**Association of Canada Lands Surveyors
Offshore Committee
Offshore Infrastructure Surveys – Task Force**

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Offshore Infrastructure Surveys – Initial Research into Practices

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1. Abstract

The research was carried out to support the Association of Canada Lands Surveyors (ACLS) Offshore Committee's interests in offshore infrastructure surveys (OIS) within and without Canada's twelve (12) nautical mile limit. The research focused particularly on the practices with regard to offshore pipelines, flowlines, umbilicals, subsea structures, and communication and power cables. In addition, the report examined how such spatial information is gathered, managed and shared. Currently, this information is generally held by the offshore infrastructure owners and only shared if required. In addition, the standard of the surveys carried out were not uniform, as they are mostly driven by client specific issues. The presentation will cover OIS in Nova Scotia and Prince Edward Island with some references to practices in British Columbia and the UK.

2. Introduction

For centuries maps and nautical charts have played a crucial role in shaping human civilization but ever since Google Earth opened our eyes to what maps could do, things have never been the same. Disruptive technologies are taking hold of the spatial industry where Geographical Information Systems (GIS) itself is becoming disruptive technology. Location has become an integral feature of most information, whether used in logistics, health, agriculture or whatever else someone sees on their smart phone. To meet the multidisciplinary implementation of the customers' needs, the surveying and mapping of Canada's offshore infrastructure needs to be improved to meet the needs of Canada and Canadians.¹

The Association of Canada Lands Surveyors (ACLS) has been aware of growing concerns resulting from the lack of a comprehensive property rights system in offshore Canada Lands, otherwise known as a marine cadastre. If no registry is created, Canadians will miss the full economic potential that the offshore areas offer. The increasing human activities in the ocean space (species protection; marine protected areas; conservation areas; vessel navigation and management; oil and gas pipelines, flowlines, umbilicals and subsea structures; communication and power cables; aquaculture and fishing; renewable energy projects; subsea mining, etc.) requires an integrated approach to balance competing demands. Further the potential for financial and environmental liability is huge, hence the necessity for the creation of a Canadian marine cadastre.²

Current discussions with respect to underground infrastructure and easement requirements³ are very similar to a marine cadastre. Underground infrastructure cannot be seen and could reasonable be found anywhere between two known points where the utilities enter and exit the ground.

¹ With thanks to Anusuy Datta and Meenal Dhande, "The Great Disruption", *Geospatial World*, September to October 2017, pages 16 to 23.

² ACLS, "Honouring Our Past and Surveying Our Future: Surveying for the Benefit of All Canadians", unpublished media handout prepared for The Hill Times on 12 May 2017.

³ Bill S-229, "An Act Respecting Underground Infrastructure Safety" currently being sponsored by the Honourable Senator Mitchell online at <http://www.parl.ca/DocumentViewer/en/42-1/bill/S-229/first-reading> (last accessed: 16 March 2018).

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3. OIS and Location

As of 16 March 2018, there was no Canadian federal legislation that has mandated the need for offshore infrastructure surveys within or beyond the 12 nautical mile limit. Rather, all such offshore infrastructure data was held by the offshore operator with no central repository or uniform standard for surveys.⁴

There are two (2) roles specifically related to cadastral surveys for the Surveyor General Branch (SGB) which are as follows: regulatory which requires mandatory intervention, and contract management which is optional at the request of an administering minister or commissioner. There is an additional role related to Canada's geodetic infrastructure where authority flows from section 2 of the *Resources and Technical Surveys Act*,⁵ not the *Canada Lands Survey Act*.⁶

The SGB has responsibility for setting standards for cadastral surveys on Canada Lands, which included much of Canada's offshore, and for examining and registering legal plans and field notes of such surveys.⁷ The SGB normally does not initiate legal surveys in the offshore without direction and funding from the respective administering federal department or agency that has the appropriate jurisdiction. Some surveys may be initiated by the Surveyor General to provide the necessary location reference systems for cadastral surveys in the offshore or to correct errors found when carrying out the examination of plans.

By way of analogy, when Indigenous and Northern Affairs Canada (INAC) requires a cadastral survey on a First Nation Reserve, then the type of survey is then set out in an Interdepartmental Letter of Agreement (ILA) between INAC and SGB. Further, if the offshore infrastructure is not related to a legal boundary, then there would be no requirement for any involvement by the SGB.

Consequently, where an offshore cadastral survey is required, an offshore operator may need to comply with legislation that falls under the control of the National Energy Board (NEB), Department of Fisheries and Oceans Canada (DFO), Transport Canada (TC), Industry Canada (IC), Environment Canada, Natural Resources Canada (NRCan), and/or Public Services and Procurement Canada (PSPC). Further, the SGB may not become involved, except as related to offshore cadastral (legal boundary) surveys and offshore well site surveys, to improve the offshore surveys and ensure any deliverables could meet Canada's potential future needs.

This meant that in 2017, that the SGB was involved in several power cable projects. In all cases, Canada was represented by several departments which collaborated with the applicable provinces for legal survey requirements. The SGB issued joint survey instructions where applicable, for surveys depicting the as-built location and proposed corridor for the offshore infrastructure. These projects were as follows:⁸

- 3 power cable installations across the Strait of Belle-Isle in collaboration with the province of Newfoundland and Labrador.

⁴ Personal conversations with Umar Hasany, Project Officer, Canadian Northern Economic Development Agency (CANNOR), Yellowknife on 14 August 2017 and Gary Woo, Petroleum Engineer Specialist, National Energy Board, Calgary on 19 August 2017 by Brian Ballantyne.

⁵ *Resources and Technical Surveys Act*, Revised Statutes of Canada 1985, chapter R-7 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/R-7/> (last accessed: 16 March 2018).

⁶ *Canada Lands Survey Act*, Revised Statutes of Canada 1985, chapter L-6 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/L-6/> (last accessed: 16 March 2018).

⁷ *Canada Lands Survey Act*, sections 24(1), 29 and 45 respectively.

⁸ Personal correspondence with Jean Gagnon, Surveyor General by Bruce Calderbank on 02 June 2017. Mr. Gagnon was then the Deputy Surveyor General.

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- 2 power cable installations across Cabot Strait in the collaboration with the provinces of Newfoundland and Labrador and Nova Scotia, where the corridor extended beyond 12 nautical miles from known baselines.
- 2 power cable installations across the Northumberland Strait in the collaboration with the provinces of Prince Edward Island and New Brunswick.

The SGB focus for any type of offshore infrastructure surveys is typically limited to the cadastral survey aspects defined in section 2 of the *Canada Lands Surveyors Act*⁹ which “means surveying in relation to

(a) the identification, establishment, documentation or description of a boundary or the position of anything relative to a boundary; or

(b) the generation, manipulation, adjustment, custody, storage, retrieval or display of spatial information that defines a boundary.”

Thus for the power cables which crossed the Strait of Belle-Isle and Cabot Strait, the SGB established the method and standards for the legal definition of these power cable easements. The regulatory authority of SGB was mandatory and in these cases included issuing instructions as well as managing the administrative process to ensure these surveys met the requirements for archiving and legal description use in the Canada Lands Surveys Records (CLSR). The regulatory or mandatory role applies to all cadastral boundary definition in the offshore (although this is complicated with local provincial authorities and agreements).

Section 25 of the *Canada Lands Surveys Act*, states that “The Minister shall cause surveys to be made of Canada Lands on the request of a minister of any department of the Government of Canada or a Commissioner administering the Lands and may do so in any other case in which he deems it to be expedient.” Section 25 would be activated if the administering government department, in this case Public Services and Procurement Canada (PSPC), requested SGB to manage the survey on their behalf, however it was not mandatory for the PSPC to use SGB for this task and often PSPC does not.¹⁰

In general, parcels are bounded on the seaward side by as follows:

- Upland freehold (fee simple) defined by the Mean High Water (MHW) mark.
- Province defined by the Mean Low Water (MLW) mark.
- Internal waters to Canada defined by the Baselines.
- Territorial Sea which is also part of Canada defined by the twelve (12) nautical mile limit
- Contiguous Zone defined by the twenty-four (24) nautical mile limit.
- Exclusive Economic Zone (EEZ) defined by the two hundred (200) nautical mile limit where Canada has sovereign rights; not title.

There are many exceptions where provinces often extend beyond MLW as exemplified by the following examples:

- British Columbia includes the four straits between the mainland and Vancouver Island.
- Quebec and New Brunswick each include half of the Baie de Chaleurs.
- Nova Scotia and New Brunswick each include half of the Bay of Fundy.
- Many bays in Atlantic Canada are within the provinces, owing to the jaws of the land (*intra fauces terrae*) principle.

⁹ Canada Lands Surveyors Act, Statutes of Canada 1998, chapter 14 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/L-5.8/> (last accessed: 16 March 2018).

¹⁰ Personal correspondence with Peter Sullivan, former Surveyor General on 29 January 2018 by Bruce Calderbank.

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Also, Baselines are sometimes straight lines, defined by geographic coordinates that lie seaward of (below) the MLW line and are sometimes are at the low water line (that lies below MLW).

If the internal waters of Canada and the Territorial Sea are federal real property, then the *Federal Real Property and Federal Immovables Act* was applicable.¹¹ The Minister of Public Services and Procurement Canada (PSPC) administers federal real property pursuant to section 10 of the *Department of Public Works and Government Services Act*.¹² There are three exceptions where the Minister of PSPC does not administer the following lands:

- That are in the three territories;
- That are under the administration of another Minister, Board or Agency; or
- Where administration has been transferred to another Minister through a federal Order in Council.

There is a distinction between property rights and jurisdiction. Although the Minister of PSPC has authority to grant property rights (for example licences) in the internal waters and Territorial Sea, other Ministers also have jurisdiction. For instance, in the Schedule – Navigable Water of the *Navigation Protection Act* where the limits for the Atlantic Ocean are defined “from the outer limit of the territorial sea up to the higher high water mean tide water level and includes all connecting waters up to an elevation intersecting with that level”. Another example would be section 58.29 of the *National Energy Board Act* with regard to inter-provincial transmission lines where “No person shall construct or operate an interprovincial power line in respect of which an order made under section 58.4 is in force – or an international power line – that passes in, on, over, under, through or across a navigable water unless a permit referred to in section 58.11 or a certificate has been issued in respect of the power line.”

In 1982, Canada became a signatory to *United Nations Convention of the Law of the Sea (UNCLOS)*.¹³ In 1987, the *Canada Petroleum Resources Act*¹⁴ introduced the term “frontier lands” which are currently defined in section 2 as “lands that belong to Her Majesty in right of Canada, or in respect of which Her Majesty in right of Canada has the right to dispose of or exploit the natural resources, and that are situated in

- (a) that part of the onshore that is under the administration of a federal minister,
- (b) Nunavut,
- (c) Sable Island,
- (d) the subsea areas in that part — of the internal waters of Canada or the territorial sea of Canada — that is not situated
 - (i) in a province other than the Northwest Territories, or
 - (ii) in that part of the onshore that is not under the administration of a federal minister, or
- (e) the continental shelf of Canada”

¹¹ *Federal Real Property and Federal Immovables Act*, Statutes of Canada 1991, chapter 50 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/F-8.4/> (last accessed: 16 March 2018).

¹² *Department of Public Works and Government Services Act*, Statutes of Canada 1996, chapter 16 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/P-38.2/> (last accessed: 16 March 2018).

¹³ *United Nations Convention of the Law of the Sea (UNCLOS)* online at United Nations, Oceans and Law of the Sea, United Nations Convention of the Law of the Sea, Full Text of the Conventions, Part II at: http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm (last accessed: 16 March 2018).

¹⁴ *Canada Petroleum Resources Act*, Revised Statutes of Canada 1985, chapter 36 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/C-8.5/> (last accessed: 16 March 2018).

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Amendments have been made to federal Acts relating to approvals and licensing for offshore infrastructure for energy regulation.

In 1994, *UNCLOS* came into force, and in 1997, Canada implemented the *Oceans Act*,¹⁵ which established Canada's Maritime zones including the Territorial Sea, Contiguous Zone, EEZ, and Continental Shelf. The *Oceans Act*, along with Canada's *Oceans Strategy*¹⁶ provides a management strategy for Canada's offshore within the 200 nautical mile limit. Additional amendments have been made to federal legislation for telecommunication cables, and shipping and navigation routes within the offshore.

In the Arctic, the NEB regulates Canada's oil and gas industry and operates the *National Energy Board Act*,¹⁷ *Canada Oil and Gas Operations Act*,¹⁸ and the *Canada Petroleum Resources Act* in conjunction with the governments of the Northwest Territories and Nunavut to regulate offshore development in the Inuvialuit Settlement Region and the Nunavut Settlement Area.

In Atlantic Canada, the Canada-Nova Scotia Offshore Petroleum Board and the Canada-Newfoundland and Labrador Offshore Petroleum Board regulate the offshore oil and gas industry. These boards ensure that operators comply with statutory and regulatory requirements of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*¹⁹ and the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*.²⁰

All vessels in Canadian waters must carry and use nautical charts and related publications issued officially by, or on the authority of, the Canadian Hydrographic Service (CHS) in accordance with the *Charts and Nautical Publications Regulations 1995*²¹ of the *Canada Shipping Act 2001*²² and the *Arctic Waters Pollution Prevention Act*.²³ The *International Convention for the Safety of Life at Sea* (SOLAS) 1974,²⁴ to which Canada is a signatory, also requires coastal states to provide

¹⁵ *Oceans Act*, Statutes of Canada 1996, chapter 31 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/O-2.4/> (last accessed: 16 March 2018).

¹⁶ Online at Department of Fisheries and Oceans, Ecosystems, Ecosystems More, Protecting Oceans, Reports and Publications, 2002 Canada's Ocean Strategy at <http://www.dfo-mpo.gc.ca/oceans/publications/cos-soc/page1-eng.html> (last accessed: 16 March 2018).

¹⁷ *National Energy Board Act*, Revised Statutes of Canada 1985, chapter N-7 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/N-7/> (last accessed: 16 March 2018).

¹⁸ *Canada Oil and Gas Operations Act*, Revised Statutes of Canada 1985, chapter O-7 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/O-7/> (last accessed: 16 March 2018).

¹⁹ *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*, Statutes of Canada 1987, chapter 3 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/C-7.5/> (last accessed: 16 March 2018).

²⁰ *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, Statutes of Canada 1988, chapter 28 at <http://laws-lois.justice.gc.ca/eng/acts/C-7.8/> (last accessed: 16 March 2018).

²¹ *Chart and Nautical Publications Regulations*, Statutory Order and Regulations 1995, number 149 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/regulations/SOR-95-149/index.html> (last accessed: 16 March 2018).

²² *Canada Shipping Act*, Statutes of Canada 2001, chapter 26 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/C-10.15/index.html> (last accessed: 16 March 2018).

²³ *Arctic Waters Pollution Prevention Act*, Revised Statutes of Canada 1985, chapter A-12 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/A-12/> (last accessed: 16 March 2018).

²⁴ *International Convention for the Safety of Life at Sea* (SOLAS), 1974 online at IMO, English, About IMO, Conventions, List of Conventions at [http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-\(solas\)-1974.aspx](http://www.imo.org/en/about/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas)-1974.aspx) (last accessed: 16 March 2018).

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adequate navigational charts for its waters as a fundamental component of safety of navigation. The CHS with its experts in hydrographic surveying and marine cartography, has a mandate to produce and deliver navigational charts, publications and services for Canada's vast navigable waters.²⁵

By means of section 12(1) of the *Navigation Protection Act* “An owner of a work in, on, over, under, through or across any navigable water that is listed in the schedule shall immediately notify the Minister if the work causes or is likely to cause a serious and imminent danger to navigation.”²⁶ In this instance, the “Minister” means the Minister of Transport as Transport Canada is the governmental department responsible for the *Navigation Protection Act*.

Most offshore operators have submitted (if required) some form of offshore infrastructure surveys information to Transport Canada which is then forwarded to the CHS in order to safeguard their assets from other users when anchoring or for certain types of fishing.

However, except for the location information on a CHS chart, most of the survey and other information collected by the various offshore operators and subsequently submitted to the CHS does not make it into the public domain. In addition, depending on the CHS region, the distribution of such third party information may be restricted and only released with the permission of the originator.²⁷ Irrespective that such information was information was provided as part of the Navigable Waters Protection Program conditions which are on public record.

The CHS does not distinguish between whether an offshore pipeline, flowline, umbilical, subsea structure or communication or power cable is resting on the seabed or buried (nor the actual the depth of burial). For cables, the CHS does not include information about the cable itself such as if the cable is armoured or contained within an articulated pipe. The CHS interest is limited to accurately plotting these items on CHS products using the positions and information supplied by the specific party which supplied the information.

The CHS does not have any standardized working instructions for outside data contributors. Data provided is accepted in whatever digital form the offshore operator wishes to use and is reviewed by the CHS for consistency with CHS data for the same area. In addition, the survey standards for the offshore infrastructure surveys are not uniform, as the neither the CHS nor the SGB provide oversight role. Consequently, the positioning of some offshore infrastructure is based on the vessel position not the touch down location, whilst for other infrastructure the seabed locations are quoted to 3 decimal places, an accuracy achievement which is not realistic in an offshore survey environment.

Further, not all of the information on a CHS chart may be current, as some offshore infrastructure may in due course be abandoned, but the CHS may not be notified as the owner/operator has ceased business, or the CHS has no way of knowing if the cable could be reactivated. Depending on the CHS region, some effort may be expended to ascertain the current status of some offshore

²⁵ Online at Department of Fisheries and Oceans, On the Water, Navigating, Nautical Charts, Nautical Charts and Services, Arctic Charting, “Who is responsible for nautical charting in Canada?” at <http://www.charts.gc.ca/arctic-arctique/index-eng.asp> (last accessed: 16 March 2018).

²⁶ *Navigation Protection Act*, Revised Statutes of Canada 1985, chapter N-22 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/N-22/page-1.html#h-1> (last accessed: 16 March 2018). Till 31 March 2014 this act was entitled the *Navigable Waters Protection Act*.

²⁷ For the remainder of this section, personal communications with Jonathan Griffin, Supervisor, Hydrographic Data Centre, Canadian Hydrographic Service, Dartmouth by Bruce Calderbank on 22 February 2018.

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infrastructure but that would depend on the contents, maintenance and use of the region's metadata information database which currently also differs by CHS region.

In recent years, as part of the Navigable Waters Protection Program conditions, the applicant has been required to “supply to Transport Canada with as built plans within six (6) months after completion. This information was to be in both paper and digital format where possible. The information must show the exact route for the cable(s) and include the buried depths of the cable(s).”²⁸ Once installed what governmental agency then assumes ownership and ensures proper maintenance of such “no anchor signs” could not be established although it may be the leasee.

In 2017, the SGB and CHS collaborated on a Marine Spatial Data Infrastructure (MSDI) Pilot Project prototype, with a Marine Cadastre application. The primary focus was on three areas of interests which were as follows: the Bay of Fundy (East), Dickson entrance (West), and the Beaufort Sea (North). Through both international and national research activities, the need for better management, access and sharing spatial data in the marine and coastal environment has been highlighted.

The vision of the CHS Marine Spatial Data Infrastructure (MSDI) is to design and implement a framework of geographic data, metadata, users and tools that are interactively connected in order to use spatial data in an efficient and flexible way. The intent for the SGB with respect to a marine cadastre was to develop an integrated system of registries, fundamental for a systematic public recording of all recognised legal rights, restrictions, and responsibilities; and aiming to provide a legal foundation for the management of Canada's oceans and more certainty for industry and capital investment.

The MSDI and its applications, is being developed to show case and validate an all-inclusive Spatial Data Infrastructure (SDI) solution which focuses on marine geospatial domain and activities. The presentation “Canada's Marine Spatial Data Infrastructure and Marine Cadastre Application” will be given just before this report is discussed as part of the CHC-NSC 2018 conference program on 28 March 2018.

²⁸ Memo for the approval of the Eastlink for Port Hood, Nova Scotia to Graham Pond, Prince Edward Island communication cable dated 01 November 2004 provided by Bruce Anderson, Hydrographic Data Centre, CHS, Dartmouth to Bruce Calderbank on 07 February 2018.

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4. OIS in Nova Scotia

Nova Scotia has one of the more complex offshore infrastructures in Canada with numerous offshore pipelines, flowlines, umbilicals, subsea structures and communication and power cables. Since 1992 there has been oil and gas production in offshore Nova Scotia with the associated offshore pipelines, flowlines, umbilicals and subsea structures. There are 4 active international communication cables connecting to the United States of America and to other international systems.

There are also 1 active interprovincial subsea communication cable between Nova Scotia and New Brunswick, 3 active (although 1 may be abandoned) interprovincial subsea communication cable between Nova Scotia and Prince Edward Island, and a further 4 active interprovincial subsea communication cables between Nova Scotia and Newfoundland. In addition, there are numerous abandoned subsea communication cables in offshore Nova Scotia. There are 2 interprovincial power cables between Nova Scotia and Newfoundland which were installed in 2017. There is a potential for offshore renewables via wind and tidal energy, which would require the future installation of other power cables.

Starting in the early 1960s, Nova Scotia began protracted negotiations for offshore mineral rights management and revenue with the Government of Canada.²⁹ Those negotiations resulted in the *Canada – Nova Scotia Offshore Petroleum Resources Accord* signed on 26 August 1986.³⁰ The Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) was established in 1990 pursuant to the respective federal and provincial *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.³¹ See next sections for details.

As of 16 March 2018, the existing oil and gas infrastructure types in offshore Nova Scotia were as follows:³²

- 182 well sites were plugged and abandoned (P&A) and 3 well sites were plugged and suspended (P&S), all of which should have been terminated below the level of the seabed.
- 24 well sites were associated with current active exploration.
- 2 export pipelines, with one each from Sable Offshore Energy Project (SOEP) and the Deep Panuke Offshore Gas Development Project (Deep Panuke) to the Nova Scotia mainland at Goldboro, Nova Scotia.

²⁹ For instance, see sections 4 to 7 of the *Arbitration Between Newfoundland and Labrador and Nova Scotia Concerning Portions of the Limits of their Offshore Areas as Defined in the Canada-Nova Scotia Offshore Petroleum Accord Implementation Act and the Canada-Newfoundland Atlantic Accord Implementation Act – Award of the Tribunal in the First Phase* (Ottawa: Crown Printer, 2001). Online at University of New Brunswick, Law Library at https://www.unb.ca/fredericton/law/library/resources/pdf/legal-materials/nlns-arbitration/phase1_award_english.pdf (last accessed: 16 March 2018).

³⁰ *Canada – Nova Scotia Offshore Petroleum Resources Accord* online at C-NSOPB, Reference Materials, Legislation at <https://www.cnsopb.ns.ca/sites/default/files/pdfs/Accord.pdf> (last accessed: 16 March 2018).

³¹ *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, Statutes of Canada, 1988, chapter 28 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/C-7.8/> (last accessed: 16 March 2018) in force 22 December 1989 by SI/90-9, with some sections not in force till later; and *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act (Nova Scotia)*, Statutes of Nova Scotia, 1987, chapter 3 online at C-NSOPB, References at https://www.cnsopb.ns.ca/sites/default/files/pdfs/canada-ns_offshore_petroleum.pdf (last accessed: 16 March 2018) in force 5 January 1990 (except sections 104 to 120), and 1 October 1990 (remaining sections).

³² Well site numbers from online at C-NSOPB, Resource Management, Directory of Wells, C-NSOPB Directory of Wells – Nova Scotia Offshore Area last update on 22 September 2016 at https://www.cnsopb.ns.ca/sites/default/files/pdfs/directory_of_offshore_wells.pdf (last accessed: 16 March 2018).

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- Various oil and gas flowlines and umbilicals for communication between the platforms or subsea wellheads in the vicinity of Sable Island for natural gas exploitation related to SOEP and Deep Panuke respectively.

As of 16 March 2018, of the 24 active production wells, 22 were in production, 1 at SOEP was not drilled to target depth and is not used for production, but is still labeled as a production well, and 1 at Deep Panuke is used as an acid gas injection well. There were 18 production wells at SOEP all of which are platform wells which consequently do not require a subsea structure over the well to prevent damage and entanglement from any fishing activity. There are 4 production wells at Deep Panuke which were some distance from the Production Field Centre, all of which have a subsea structure over the well to prevent damage and entanglement from any fishing activity.

For all well sites which are either plugged and abandoned or those associated with current active exploration, the C-NSOPB regulations require surveys of these offshore well sites and the survey plans have to be recorded in the Canada Lands Survey Records (CLSR). Section 75 (Surveys) of the *Nova Scotia Offshore Petroleum Drilling and Production Regulations*³³ provides as follows:

- (1) “The operator shall ensure that a survey is used to confirm the location of the well on the seafloor.
- (2) The survey shall be certified by a person licensed under the *Canada Lands Surveyors Act*, S.C. 1998, c. 14.³⁴
- (3) The operator shall ensure that a copy of the survey plan filed with the Canada Lands Surveys Records is submitted to the (C-NSPOB) Board.”

The first offshore oil production in Canada was from the Cohasset-Panuke Project west of Sable Island, Nova Scotia which started in 1992. The project was comprised of two separate fields, called Cohasset and Panuke, which were about eight kilometres apart. This project used a Floating, Storage and Offloading (FSO) vessel and a shuttle tanker to move the recovered oil to shore as shown in the Figure below.

In 2000, the C-NSOPB approved the start of the decommissioning of the Cohasset-Panuke Project with the removal of the CALM (catenary anchor leg mooring) Buoy, demobilization and removal of all mobile components, and the depressurization and de-energization of all platforms and subsea facilities. The C-NSOPB authorized EnCana to suspend the rest of the facilities while it was determined whether the jackets and topsides could be used for the Deep Panuke project. In January 2002, EnCana determined it would not use the existing facilities and the C-NSOPB requested a decommissioning plan. Further decommissioning work took place in the summer of 2003 after the C-NSOPB authorized EnCana to abandon the 14 production wells associated with Cohasset-Panuke.

The Cohasset-Panuke Project Development Plan Decision Report required the complete removal of all fabricated materials including the inter-facility flowlines and related material, which were four flowlines, a power umbilical line, two pipeline end manifolds and 1,735 tonnes of concrete mattresses.³⁵ In December 2003, EnCana applied to the C-NSOPB for an amendment to the plan in order to leave the flowlines and related materials in place. In May 2004, the C-NSOPB sought written public comment on the proposed amendment as part of its review of the application.

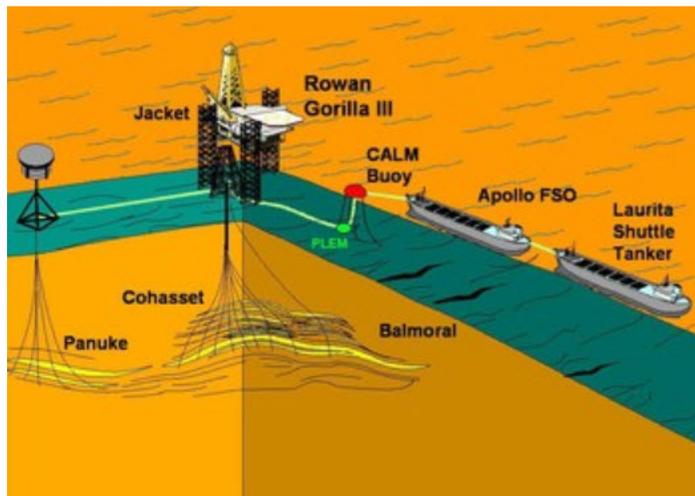
³³ *Nova Scotia Offshore Petroleum Drilling and Production Regulations*, SOR/2009-317 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2009-317/index.html> (last accessed: 16 March 2018).

³⁴ *Canada Lands Surveyors Act*, Statutes of Canada 1998, chapter 14 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/L-5.8/> (last accessed: 16 March 2018).

³⁵ Wes Reid, “Abandoning Cohasset-Panuke”, *Oil & Gas Enquirer*, Volume 15, Number 9, September 2003, pages 50 and 51.

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Figure – Cohasset-Panuke Project³⁶



On 26 January 2005, the C-NSOPB agreed with EnCana that two pipelines buried on the seabed and 1,735 tonnes of concrete mattresses could be left in place. There was no safe way to remove the concrete mattresses as the connecting wire ropes between the cement sections that made up each mattress had degraded and in any event the majority of the mattresses were already naturally buried with sand.³⁷ However, EnCana had to remove parts of other subsea equipment that could pose a snagging hazard to commercial fishing nets. The two platforms and two pipeline end manifolds (PLEM) were to be removed as had been originally planned.³⁸

In September 2005, the four-legged jacket at Cohasset and the tripod at Panuke were decommissioned and taken to the Gulf of Mexico to be scrapped. The Rowan Gorilla III was to be reused at the Deep Panuke site. Once the topsides had been removed, there was an ROV-assisted insertion of an airlift system to remove the soil plug from the foundation piles. Once the soil plugs were removed to a sufficient depth below seabed, abrasive cutting tools were inserted into the foundation piles. The length of the prefabricated rigging controlled the vertical position of the tools.³⁹

SOEP involved the development of five natural gas fields near Sable Island, which were Thebaud, Venture, North Triumph, Alma, and South Venture. The gas fields were developed in stages. Three of the fields, Venture, North Triumph and Thebaud, were brought on production between December 1999 and February 2000. Alma was brought on production in November 2003, while South Venture was brought on production in December 2004. Central facilities were installed at Thebaud for production, utilities and accommodation with the satellite platforms at Alma, North Triumph, South Venture and Venture being unattended wellhead and production platforms.

³⁶ Image from C-NSOPB, Offshore Activity, Offshore Projects, Cohasset Panuke at <https://www.cnsopb.ns.ca/offshore-activity/offshore-projects/cohasset-panuke> (last accessed: 16 March 2018).

³⁷ Personal correspondence with Doug Hock, Manager, Media Relations, EnCana Oil & Gas (USA) by Bruce Calderbank on 10 November 2017.

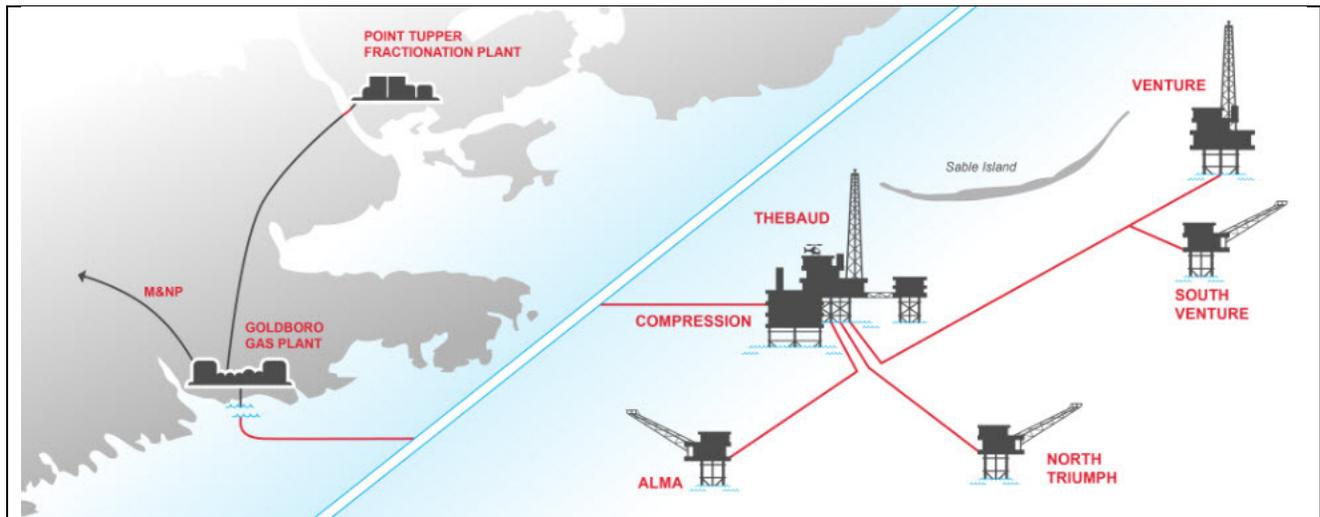
³⁸ See "EnCana Corp. Must Partially Clean Up Underwater Debris from Project-Regulator", *Oil & Gas Inquirer*, Volume 17, Number, 3, January 2005, page 45; and follow on story "N.S. Supports EnCana Plan to Leave Steel and Concrete on Sea Floor", *Oil & Gas Inquirer*, Volume 17, Number 4, April 2005, page 47.

³⁹ Online at Lennard van der Hulst, "Platform Decommissioning - Survey Opportunities to Optimise the Task", Hydro International, dated 09 May 2007 at <https://www.hydro-international.com/content/article/platform-decommissioning> (last accessed: 16 March 2018).

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The Thebaud platform has systems for remotely monitoring and control of those facilities. Hydrocarbons produced at these satellite platforms are transported through a system of flowlines to the Thebaud platform. The main export pipeline runs from the Thebaud production facility to the gas plant at Goldboro, Nova Scotia as shown in the Figure below.⁴⁰ In 2006, a compressor platform was added at Thebaud which became operational in November 2006.

Figure – SOEP – Location Sketch and Field Layout Diagram⁴¹



The various flowlines from the satellite platforms to Thebaud had planned distances of 54 kilometres from Venture, 35 kilometres from North Triumph, and 50 kilometres from Alma. There was also a 5 kilometre flowline from South Venture to tie into Venture. The main pipeline from Thebaud to shore was planned to be 255 kilometres.⁴²

In 1999, the Allseas dynamically positioned lay barges *Solitaire* and *Lorelay* were used for the offshore pipeline work, while the Strait of Canso crossing used the off bottom tow method. The inter-field flowlines were also laid at that time by *Solitaire*. The main 255 kilometre 26 inch multiphase pipeline that transported natural gas and natural gas liquids was from the Thebaud central processing platform 10 kilometres southwest of Sable Island to Goldboro, Nova Scotia. The as-built plans for the SOEP export pipeline were not available on the NEB website as only hardcopy records were provided by SOEP as digital records were not required.⁴³

⁴⁰ Bruce Calderbank et al, Canada's Offshore: Jurisdiction, Rights and Management, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006) page 251, with updates from online at C-NSOPB, Offshore Activity, Offshore Projects, SOEP at <https://www.cnsopb.ns.ca/offshore-activity/offshore-projects/sable-offshore-energy-project> (last accessed: 16 March 2018), and online at ExxonMobil, Sable Project, Timeline at <http://soep.com/about-the-project/timeline/> (last accessed: 16 March 2018). The Glenelg field was also to have been developed, but through additional drilling, it was established that there were insufficient reserves to justify development.

⁴¹ Image from online at ExxonMobil, Sable Project, About the Project at <http://soep.com/about-the-project/> (last accessed: 16 March 2018).

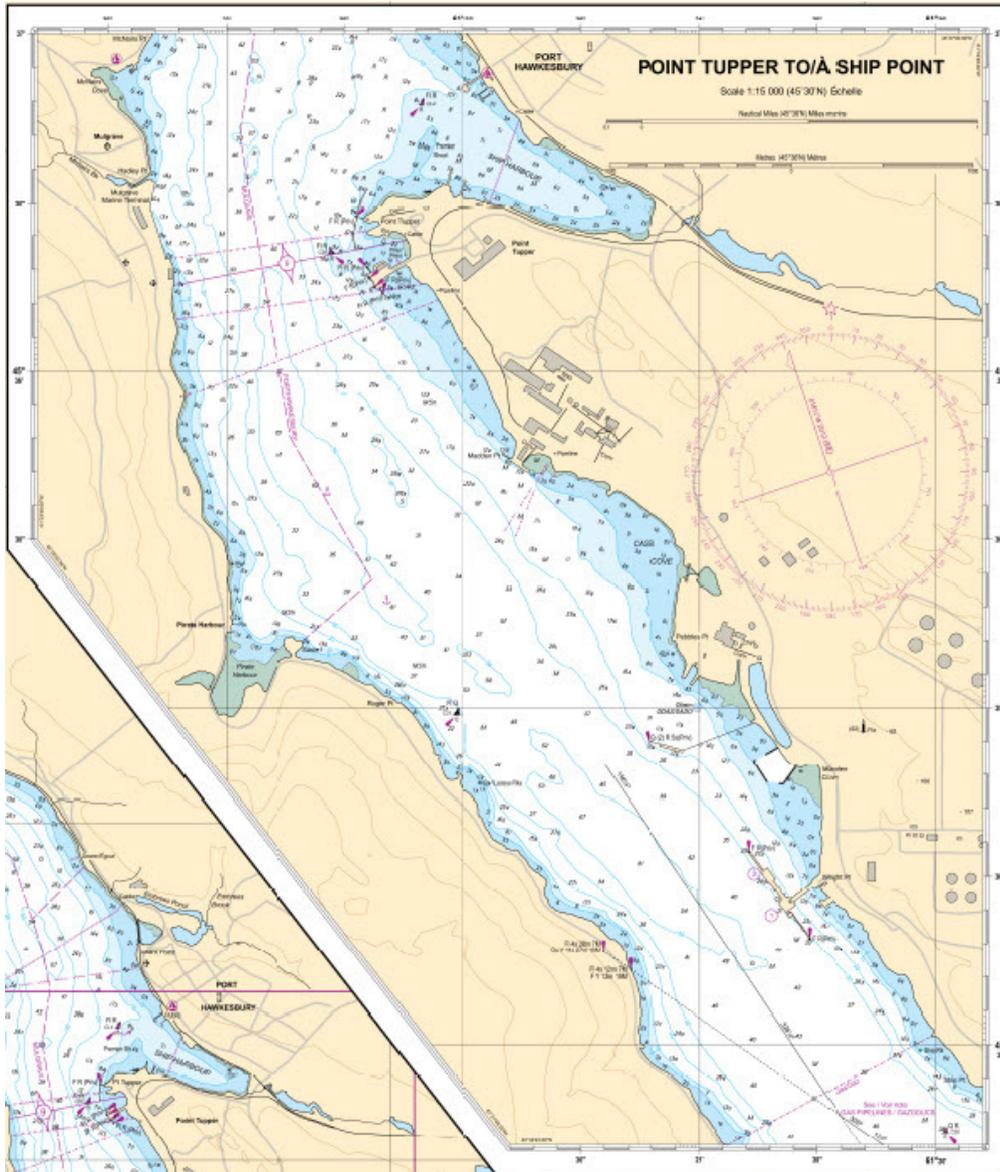
⁴² Online at C-NSOPB, Offshore Activities, Offshore Projects, SOEP, Development Plan Application (Volume 2), Volume 2D (pages 3-1 to bibliography), Table 5.5.1.1: Preliminary Production Design Criteria, page 5.30 at https://www.cnsopb.ns.ca/sites/default/files/inline/sable_dpa_vol2d.pdf (last accessed: 16 March 2018).

⁴³ Personal communications with Shelly Watt, Library and Publication Services, National Energy Board, Calgary by Bruce Calderbank on 21 February 2018.

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After a short run northeast overland to the Strait of Canso, a 6 inch natural gas liquids (NGL) pipeline, and a 6 inch natural gas pipeline were extended across the Strait of Canso seabed to the Point Tupper fractionation plant and the Ship Point NGL plant, respectively.⁴⁴ These pipelines were not shown on the CHS chart 4013 as there was the possibility of supposedly too much clutter. The pipelines were added to the large scale CHS chart 4302 as shown in the Figure below.

Figure – SOEP – Extract from CHS Chart 4302 – Strait of Canso⁴⁵



For the two (2) SOEP Canso Strait pipelines, the communication cable(s) in the designated area from the Mulgrave side of the Strait to Point Tupper, and the discharge (?) pipelines from Madden Point heading towards the south west may be part of the Port Hawkesbury paper mill, no easement plans nor easement were found.

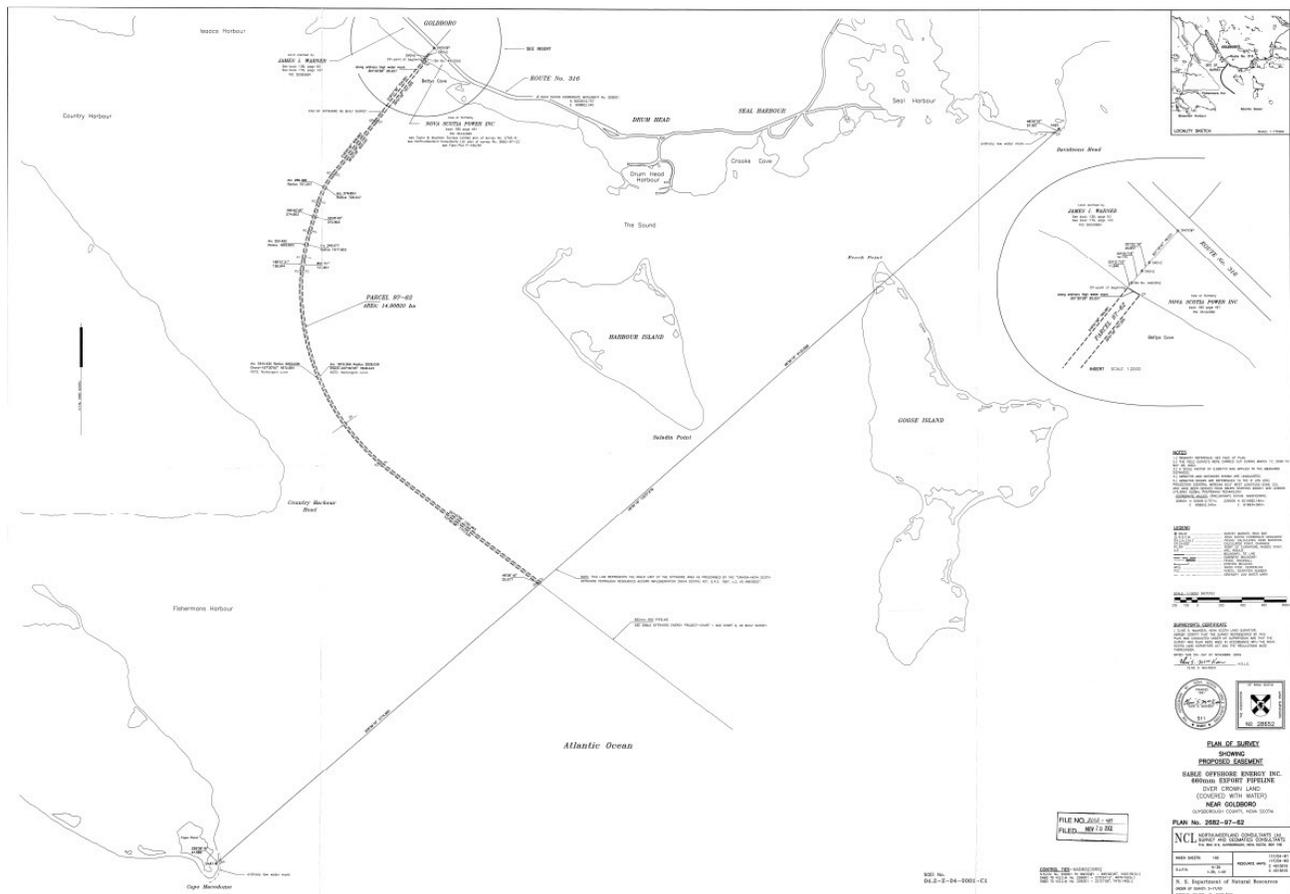
⁴⁴ Bruce Calderbank et al, *Canada's Offshore: Jurisdiction, Rights and Management*, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006) page 267.

⁴⁵ Extract from CHS chart 4302 – Strait of Canso. Not to be used for navigation.

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The Nova Scotia Department of Natural Resources was **supposed to** have granted a ± 12.5 metres easement with respect to Crown Lands for the purpose of installing, maintaining and using a gas pipeline in Stormont Bay at the request of SOEP. The export pipeline easement started in Goldboro and continued to where the pipeline exited the limit of Nova Scotian waters. The easement ran 6.0 kilometres from the shore at Betty's Cove offshore out to where the pipeline intersected a line between Cape Mocodome and Davidsons Head as shown in the Figure below.

Figure – Easement Plan for SOEP Export Pipeline at Goldboro⁴⁶



These locations were considered to be the major headlands, sometimes referred to as the “jaws of the land” or (*inter terra fauces*), and the limit of Nova Scotian jurisdiction as defined in Schedule 1 (f) of the *Canada Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.⁴⁷ In Stormont Bay, SOEP carried out rock dumping on top of the pipeline to provide protection which also improved the inshore fishery in that area, particularly the lobster fishery.⁴⁸

Although the plans for easements for these Maritimes & Northeast pipelines were submitted, no such easement could be found on the Nova Scotia Property Online (NSPOL), not could SOEP provide a copy of these easements. In addition, the Canada Lands Survey Records (CLSR) was

⁴⁶ NSPOL plan 2002-417 for Guysborough County dated 05 November 2002 where the easement Parcel 97-62 covering the SOEP pipeline was the 25 metre wide.

⁴⁷ The limit for the “jaws of the land” specified in Schedule 1 (f) was 10 kilometres whilst the distance between the two headlands was 10.038 kilometres.

⁴⁸ Personal discussions with Gordon MacDonald, Director of Economic Development, Municipality of Guysborough and Bruce Calderbank on 14 November 2017.

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searched, and the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB), and the National Energy Board (NEB) were contacted, also without success.

Easements were found for the land portions which were as follows: NSPOL Document Book 209, Page 921, Guysborough County was a Grant of Easement dated November 22, 2001 by the Province of Nova Scotia to Maritimes & Northeast Pipeline Limited Partnership for a 25 metre wide easement over Nova Scotia Crown Land (upland properties in Guysborough County) from Goldboro to the southwest side of the Strait of Canso; and NSPOL Document Book 228 Page 948 Richmond County is an Easement Agreement between the Grantor (Stora Enso Port Hawkesbury Limited) and the Grantee (Maritimes & Northeast Pipeline Limited Partnership) for an easement over land at Point Tupper, Richmond County.

Under the *National Energy Board Pipeline Crossing Regulations*,⁴⁹ which were in force from 22 March 2006 to 19 June 2016, a pipeline safety zone of ± 30 metres was allowed. As there was an easement, the pipeline safety zone started from the outside edge of the easement. Consequently the total dimension was [± 12.5 metres + ± 30 metres =] ± 42.5 metres. The *National Energy Board Pipeline Damage Prevention Regulations*,⁵⁰ which came into force from 19 June 2016, allowed for a proscribed area of 30 metres either side of the pipeline centre. Consequently, the total dimension was [± 12.5 metres + ± 17.5 metres =] ± 30 metres.⁵¹

From the seaward extend of the Nova Scotia inland waters out to the outer edge of the Thebaud platform 500 metre safety zone, to comply with the *National Energy Board Pipeline Crossing Regulations* and successor *National Energy Board Pipeline Damage Prevention Regulations* a 30 metres safety corridor either side of the pipeline centre was allowed, but no other easement or right of way was provided.

In addition, SOEP decided that sufficient protection to the flowlines and communication umbilical(s) between these platforms would be satisfied by a ± 30 metre corridor along each flowline and a 500 meter safety zone around each platform which was measured from the sides of each platform as shown in the Figure below. As the 18 production wells at SOEP were platform wells there was no need for any a subsea structure over the wells to prevent damage and entanglement from any fishing activity. See Figure below showing the SOEP pipeline layout.

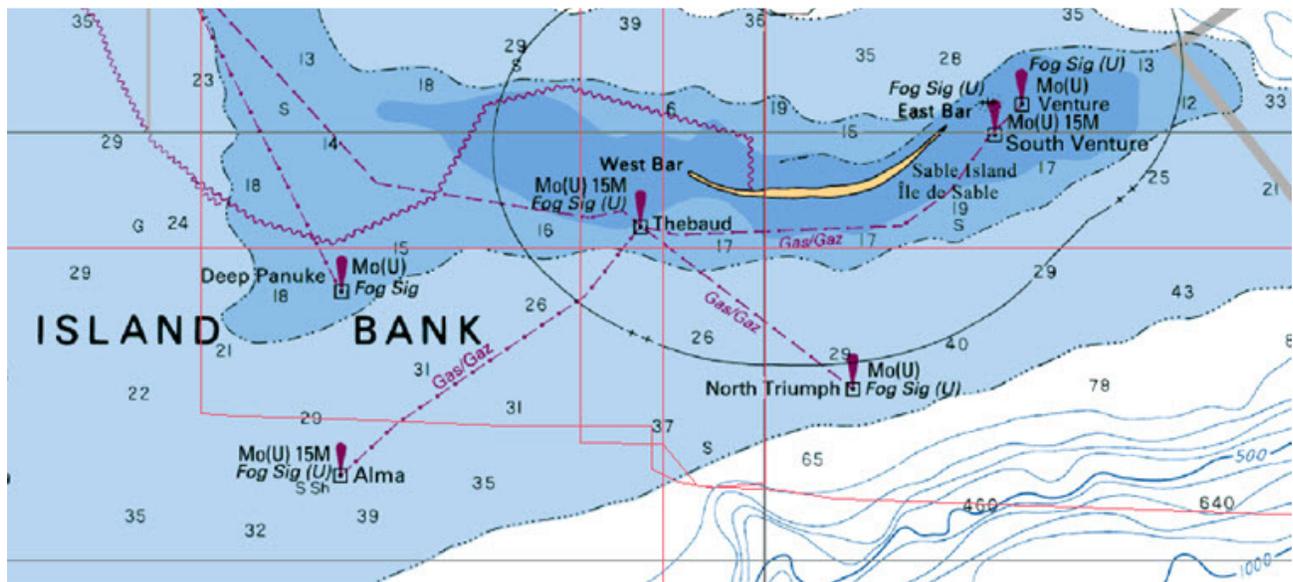
⁴⁹ *National Energy Board Regulations for Leave for Crossing Pipelines*, repealed 19 June 2016.

⁵⁰ *National Energy Board Pipeline Damage Prevention Regulations – Authorizations and National Energy Board Pipeline Damage Prevention Regulations – Obligations for Pipeline Companies*, online at Government of Canada, Justice Law Website at <https://www.neb.gc.ca/bts/ctrq/gnnb/dmgprvntnrq/ltm/index-eng.html> (last accessed: 16 March 2018).

⁵¹ Online at NEB, Safety & Environment, Damage Prevention, Pipeline Damage Prevention – Ground Disturbance, Construction and Vehicle Crossings, Table of Contents, 1. National Energy Board Regulations What is a Prescribed Area? at https://www.neb-one.gc.ca/sftnvrnmnt/dmgprvntn/grnddstrbnc-eng.html#s1_2_3 (last accessed: 16 March 2018). Clarification on implementation of these regulations via discussions with Larry Mackenzie, Operations Inspector, Safety and Damage Prevention, Field Operations, National Energy Board and Bruce Calderbank on 23 November 2017.

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Figure – SOEP – Extract from CHS Chart 4003 – Pipeline Layout⁵²



Production began on 31 December 1999 with a total project life expectancy of about 25 years. However, a rig arrived in Nova Scotia in late 2017 to begin plugging the wells at the SOEP. Production will continue while that work gets underway. ExxonMobil aims to start removing the offshore facilities in 2020.⁵³

The SOEP offshore decommissioning and abandonment activities planned will be undertaken in accordance with the regulatory requirements applicable at the time of such activities allowing for changes in industry practice, technological and regulatory requirements. The abandonment plan will be submitted to the appropriate regulatory authorities for approval prior to abandonment.

Eventual abandonment of the offshore platforms and jackets is planned by cutting off the jacket legs and/or piles below the mudline and transporting the jackets and platforms to a suitable site for recovery and disposal. Due consideration will be given to any potential contaminants that could present a hazard during recovery and transportation of the facilities. Reuse of the platforms and jackets will be considered in terms of economic benefits as the time for abandonment approaches.

Wells will be abandoned according to standard industry practices, in compliance with applicable drilling regulations.

Offshore pipelines will be abandoned 'in place' after they are flushed internally and filled with seawater. Their ends will be capped. The lines will be surveyed, and any pipelines or parts of lines presenting an environmental or commercial hazard will be recovered and scrapped.⁵⁴ The offshore

⁵² Extract from CHS chart 4003 – Cape Breton to Cape Cod. Not to be used for navigation.

⁵³ Online at CBC News, Canada, Nova Scotia, "EnCana prepares to close Deep Panuke offshore gas project – Sable project fared better" dated 13 June 2017 at <http://www.cbc.ca/news/canada/nova-scotia/EnCana-close-deep-panuke-sable-island-offshore-project-natural-gas-exxonmobil-nova-scotia-1.4153149> (last accessed: 16 March 2018). Start of decommissioning updated during discussions with Merle MacIsaac, Public and Government Affairs, ExxonMobil Canada and Bruce Calderbank on 22 November 2017.

⁵⁴ Online at C-NSOPB, Offshore Activities, Offshore Projects, SOEP, Development Plan Application (Volume 2), Volume 2D (pages 3-1 to bibliography), section 7.0 Provisions for Facilities Decommissioning and Abandonment, page 7.1 at https://www.cnsopb.ns.ca/sites/default/files/inline/sable_dpa_vol2d.pdf (last accessed: 16 March 2018).

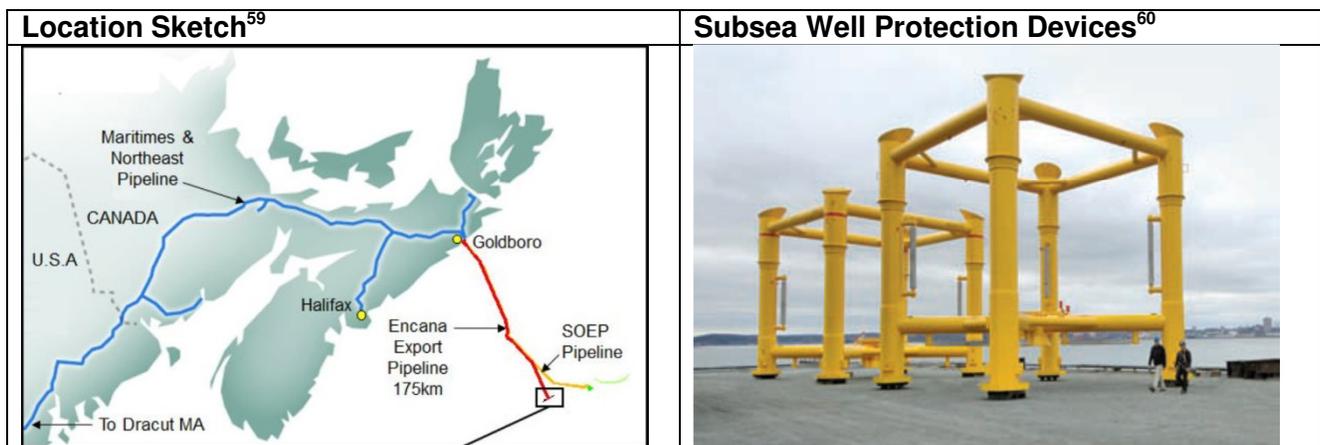
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pipelines will be flushed to remove hydrocarbons. Following this, grout (low strength concrete slurry) will be pumped into the sections of the pipelines to isolate water crossing and reinforce areas of the pipeline below roadways.⁵⁵

The Deep Panuke Offshore Gas Development Project (Deep Panuke) involved the production of natural gas from the offshore Deep Panuke field and the transportation of that gas via a 173 kilometre⁵⁶ subsea pipeline to shore at Goldboro, Nova Scotia. For approximately 127 kilometres of this pipeline's length, the Deep Panuke pipeline paralleled the SOEP pipeline to shore.

It should be noted that the subsea structures installed over the D-41, H-08, F-70 and M-79A production wells and the E-70 acid gas injection well, do not appear to be designed to allow trawled fishing gear to pass over the subsea structure without becoming entangled if the fishing gear was to come into contact with the subsea structure.⁵⁷ EnCana believed that the safety field zone, which did not allow trawling within the restricted area, would deter any fishing activity and hence the subsea well protection devices were appropriate.⁵⁸ A location sketch for Deep Panuke and with the subsea well protection devices installed, which were each about 10 metres high, are shown in the Figure below.

Figure – Deep Panuke



Production began on 17 December 2013,⁶¹ and was anticipated to continue for a mean production life of 13 years.⁶² However in June 2017, EnCana requested bids to plug and abandon the 5

⁵⁵ Online at SEOP, Decommissioning, Open House Display at http://soep.com/wp-content/uploads/2017/11/WP02353_SableOpenHouseDisplays.pdf (last accessed: 16 March 2018).

⁵⁶ This is the actual pipeline length whilst the related diagram below showed the planned pipeline length.

⁵⁷ In United Kingdom parlance the word used is "overtrawable".

⁵⁸ Personal correspondence with Doug Hock, Manager, Media Relations, EnCana Oil & Gas (USA) by Bruce Calderbank on 10 November 2017.

⁵⁹ Image from online at C-NSOPB, Offshore Activity, Offshore Projects, Deep Panuke Offshore Gas Project at <https://www.cnsopb.ns.ca/offshore-activity/offshore-projects/deep-panuke-natural-gas-project> (last accessed: 16 March 2018).

⁶⁰ Image from online at EnCana, Deep Panuke Project Newsletter, "First Gas", Subsea Program, Figure 3 at <http://www.EnCana.com/doc/communities/atlantic/dp-newsletter-first-gas.pdf> (last accessed: 16 March 2018).

⁶¹ Online at EnCana, New & Stories, New Releases for 2013, "EnCana Announces the Production Acceptance Notice at Deep Panuke Offshore Project" dated 17 December 2013 at <https://www.EnCana.com/news-stories/news-releases/details.html?release=814412> (last accessed: 16 March 2018).

⁶² Online at C-NSOPB, Offshore Activity, Offshore Projects, Deep Panuke Offshore Gas Project,

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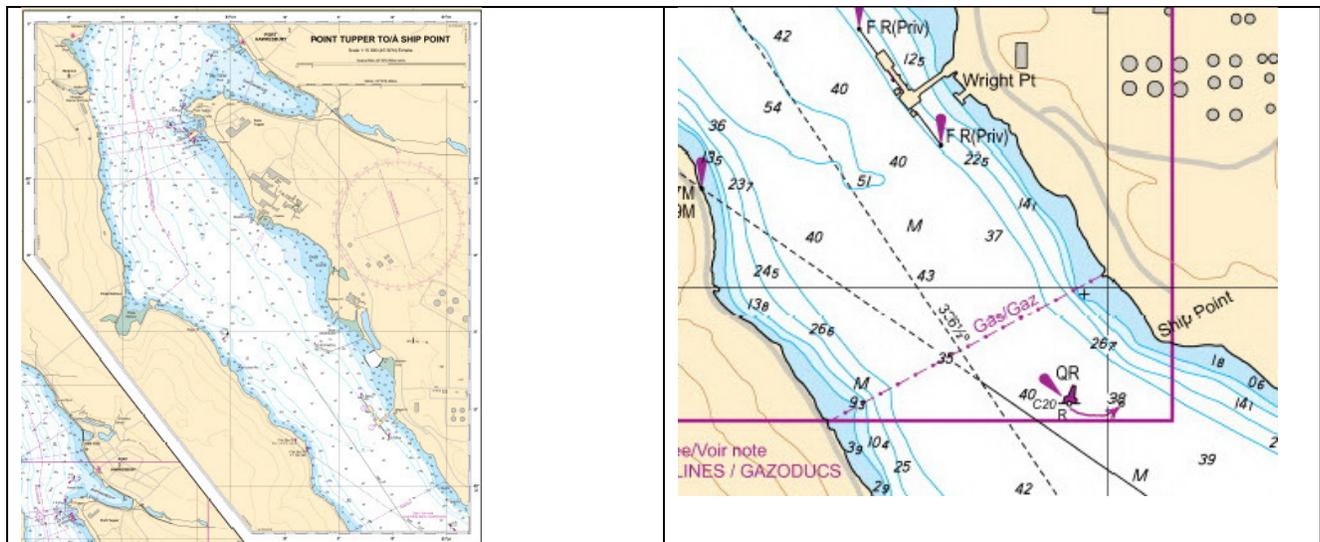
subsea wells with the work scheduled to be completed between 2019 and 2021. The Deep Panuke project has been plagued by problems since long before the gas began flowing. Originally, production was supposed to start in 2005, but production didn't begin until 2013.

In 2003, EnCana asked for a delay from the regulatory approval process because the company was no longer sure there was enough natural gas to make the project worthwhile. Crews had hit four dry wells over the previous two years. But later in 2003, the company drilled two successful wells and decided to go ahead with the project.

By October 2007, Deep Panuke had passed all the provincial and federal regulation requirements and the company set a goal of beginning production by 2010. In 2011, the dive support vessel Acergy Discovery whilst carrying out work at the platform, went off dynamic positioning and struck the platform.⁶³ The start date was repeatedly delayed – first to 2011, then to 2012, then to 2013. In addition, there were several safety incidents. On 19 January 2013, a fire broke out in an electrical cabinet in the emergency switchboard room on the platform, and on 03 August 2014, a transformer caught fire on the platform. Both situations resulted in a temporary shutdown of operations for several days.⁶⁴

What is (are) pipeline(s) crossing the Strait of Canso? Is this the other SOEP pipeline?

Figure – Deep Panuke – Extract from CHS Chart 4302 – Strait of Canso⁶⁵



Development Plan Application, Volume 2 (All Pages), section 4.10 Provisions for Decommissioning and Abandonment, page 4-33 at https://www.cnsopb.ns.ca/sites/default/files/inline/dp_dpa_vol2.pdf (last accessed: 16 March 2018).

⁶³ Online at CBC News, Canada, Nova Scotia, “Ship hits Deep Panuke natural gas platform” dated 07 September 2011 at <http://www.cbc.ca/news/canada/nova-scotia/ship-hits-deep-panuke-natural-gas-platform-1.1009683> (last accessed: 16 March 2018).

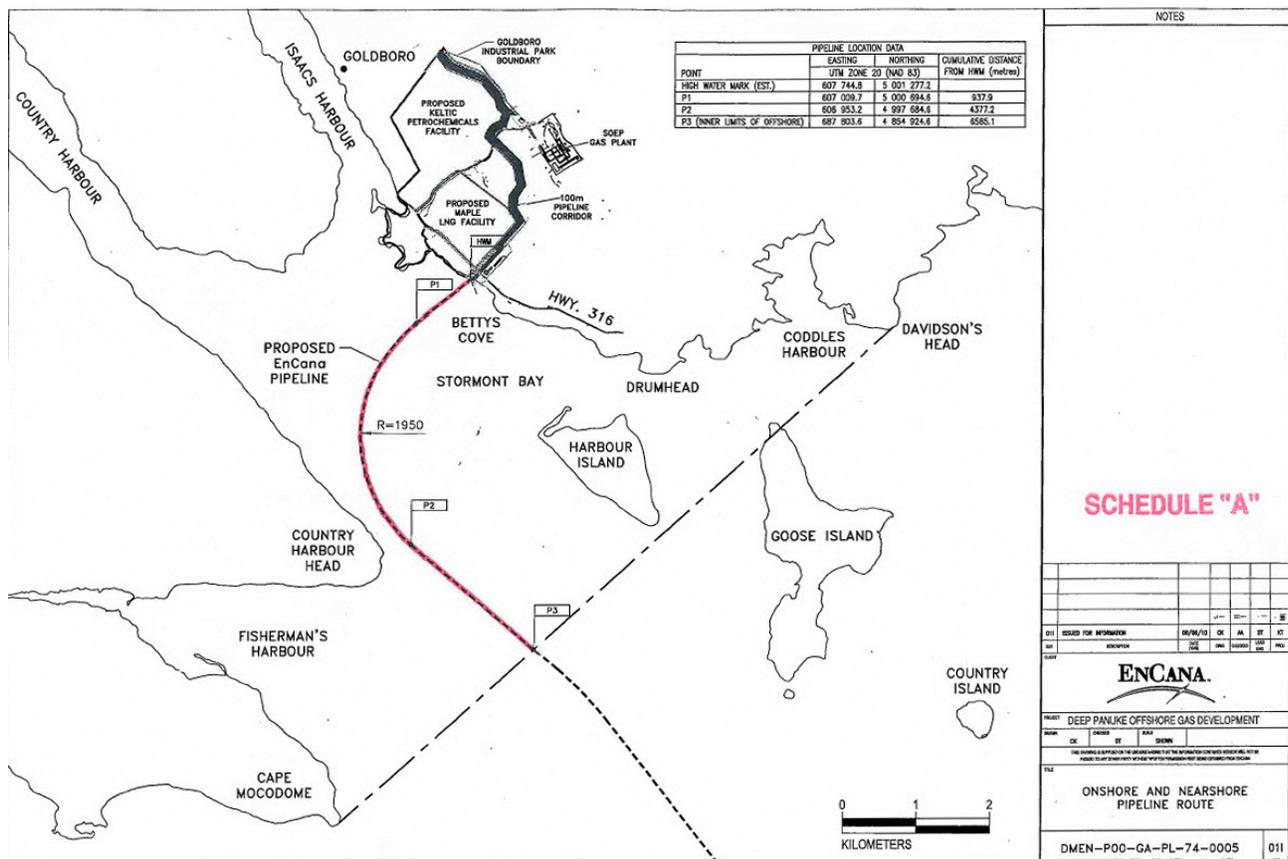
⁶⁴ Online at CBC News, Canada, Nova Scotia, “Deep Panuke natural gas platform fire being investigated”, dated 07 August 2014 at <http://www.cbc.ca/news/canada/nova-scotia/deep-panuke-natural-gas-platform-fire-being-investigated-1.2729869> (last accessed: 16 March 2018)

⁶⁵ Extract from CHS chart 4302 – Strait of Canso. Not to be used for navigation.

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The Nova Scotia Department of Natural Resources **was supposed** to have granted a ± 12.5 metres easement with respect to Crown Lands for the purpose of installing, maintaining and using a gas pipeline in Stormont Bay at the request of Deep Panuke. The export pipeline easement should have started in Goldboro and continued to where the pipeline exited the limit of Nova Scotian waters. The easement ran 6.5 kilometres from the shore at Betty's Cove offshore out to where the pipeline intersected a line between the "jaws of the land" described previously. The Deep Panuke pipeline was laid to the west of the SOEP pipeline in Stormont Bay as shown in the Figure below.

Figure – Easement Plan for Deep Panuke Export Pipeline at Goldboro⁶⁶



Although the plan for an easement for this pipeline was submitted, no such easement could be found on the Nova Scotia Property Online (NSPOL), nor could EnCana provide a copy of the easements. In addition, the Canada Lands Survey Records (CLSR) was searched, and the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB), and the National Energy Board (NEB) were contacted, also without success.

There was a NSPOL Plan 91163973 for Guysborough County which was the Design Drawing (Plan, Profile and Book of Reference) for the 172 kilometres of offshore pipeline for Deep Panuke, as proposed in July 2008. The as-built plans for the Deep Panuke export pipeline were available on the NEB website.⁶⁷ The 22 inch export pipeline was laid in April 2009 by the Allseas dynamically

⁶⁶ Letter from the Nova Scotia Department of Natural Resources to EnCana dated 17 July 2008 regarding "Proposed Easement – EnCana Corporation, Isaac's Harbour and Country Harbour, Guysborough County", provided by EnCana to Bruce Calderbank on 08 November 2017.

⁶⁷ Online at NEB, REGDOCS, Facilities, Gas, EnCana Corporation (previously PanCanadian Energy Corp.), 2006-11-08 Application for the Deep Panuke Offshore Gas Development Project (GH-2-2006), Certificate and

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positioned lay barge *Lorelay*. The pipeline was planned to be buried for its entire length which was achieved except for some rock dumping that was performed over the Deep Panuke pipeline in Stormont Bay. The pipeline was laid over 100 metres west of and parallel to the SOEP pipeline until approximately Kilometre Post 127.

The same criteria for the dimensions of the pipeline safety corridor were in effect with respect to the *National Energy Board Pipeline Crossing Regulations*, and the subsequent *National Energy Board Pipeline Damage Prevention Regulations*.

The *Nova Scotia Offshore Petroleum Drilling and Production Regulations*⁶⁸ in section 71 (1) stipulates that “the safety zone around an installation consists of the area within a line enclosing and drawn at a distance of 500 metres from the outer edge of the installation”. There was a 500 metres safety zone around the Deep Panuke Production Field Centre (PFC) which was measured from the sides of the PFC and this Safety zone was only for vessel operations near or at the PFC with approved vessels.⁶⁹

However, the Deep Panuke safety field zone did not just cover the PFC, but also included all of the wellheads and flowlines. The initial version of the safety field zone proposed a 500 metre limit but only around the PFC, wellheads, flowlines and umbilicals, which encompassed an area of approximately 22.5 square kilometres. Transport Canada requested that the safety field zone boundary be modified to a regular form in order to facilitate its navigation and enforcement as shown in the extracted portion of the CHS chart above. The regulatory approved area was approximately 29.5 square kilometres.⁷⁰ Fishing activity was restricted in the safety field zone.

Compliance, 10-04-13 EnCana Corporation – Deep Panuke Project – Certificate GC-111 (A24925) for KP 0.000 to 13.815 at <https://apps.neb-one.gc.ca/REGDOCS/Item/View/612647>; 10-04-13 EnCana Corporation – Deep Panuke Project – Certificate GC-111 (A24666) for KP 13.470 to 71.485 at <https://apps.neb-one.gc.ca/REGDOCS/Item/View/612867>; and 10-04-13 EnCana Corporation – Deep Panuke Project – Certificate GC-111 (A24930) for KP 71.140 to 172.031 at <https://apps.neb-one.gc.ca/REGDOCS/Item/View/612688> (all last accessed: 16 March 2018).

⁶⁸ *Nova Scotia Offshore Petroleum Drilling and Production Regulations*, SOR 2009-317 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2009-317/index.html> (last accessed: 16 March 2018).

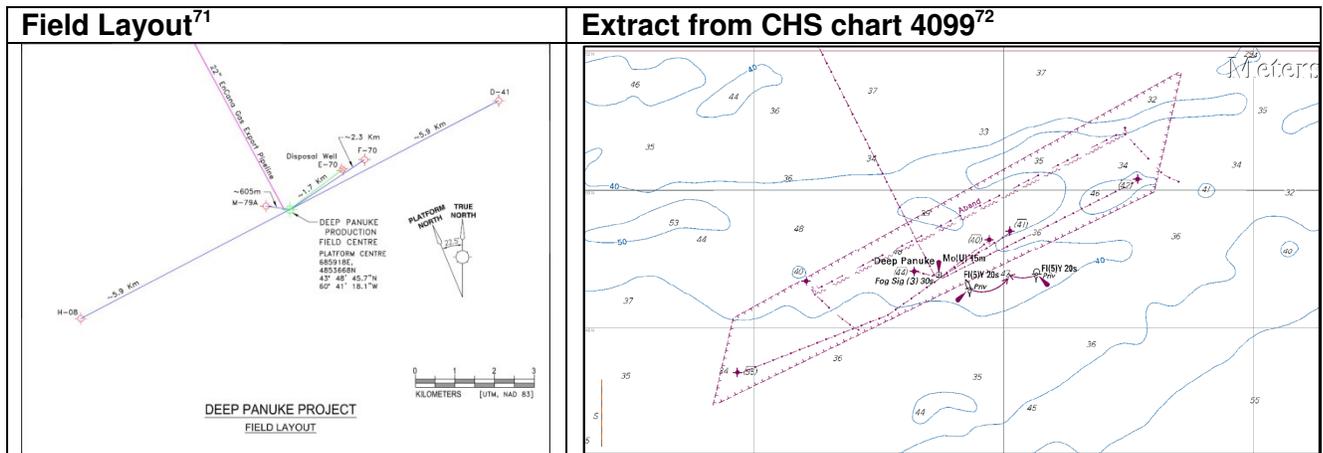
⁶⁹ Personal correspondence with Doug Hock, Manager, Media Relations, EnCana Oil & Gas (USA) to Bruce Calderbank on 08 November 2017.

⁷⁰ Letter from the C-NSOPB to EnCana dated 12 January 2007 regarding “Deep Panuke Offshore Gas Development (“Deep Panuke Project””, Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) Public Review, National Energy Board (NEB) Hearing Order GH-2-2006, Responses to Information Request (IR) EA-ENV-02 through EA-ENV-006”, see details in EA-ENV-03, provided by EnCana to Bruce Calderbank on 08 November 2017.

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The Deep Panuke field layout and associated safety field zone are shown in the Figure below.

Figure – Deep Panuke – Safety Field Zone



The usual notices for production platforms and their associated safety zones as well as for gas pipelines were included on CHS Chart 4099 as shown in the Figure below.

Figure – CHS Chart 4099 – Sable Island, Western Portion Notices

<p>PRODUCTION PLATFORMS</p> <p>Production Platforms and associated structures exhibit white lights Mo(U)15M, red air obstruction lights and sound fog signals Mo(U)30s.</p> <p>SAFETY ZONES have been established for the protection of the production facilities, other vessels and the marine environment. Unauthorized navigation within the Safety Zone is prohibited. Mariners are advised that any vessel proposing to transit the Safety Zone must contact the operator on VHF Channel 16 and, if approved, comply with the instructions given while transiting the area. Vessel movement in the area is monitored on a 24-hour basis. For additional information, consult <i>Notices to Mariners No 20, Annual Edition</i>.</p>	<p>GAS PIPELINES</p> <p>Gas pipelines and wells contain natural gas under pressure and damage to these installations could create an immediate fire hazard. Mariners are cautioned not to anchor or trawl near pipelines or wellheads.</p>
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From the seaward extend of the Nova Scotia inland waters out to the outer edge of the Deep Panuke Production Field Centre platform 500 metre safety zone, to comply with the *National Energy Board Pipeline Crossing Regulations* and successor *National Energy Board Pipeline Damage Prevention Regulations* a 30 metres safety corridor either side of the pipeline centre was allowed, but no other easement or right of way was provided.⁷³

Production started on 17 December 2013, and EnCana had good profits from the project in early 2014, due to high gas prices. But by November 2014, EnCana announced a planned shutdown to deal with water that was seeping into the gas reserve. By March 2015, EnCana announced that the

⁷¹ “Display Field Layout” provided by EnCana to Bruce Calderbank on 08 November 2017. Datum was NAD83.

⁷² Extract from CHS chart 4099 – Sable Island, Western Portion. Not to be used for navigation. EnCana noted that the safety field zone coordinates for each corner on Chart 4099 were an average of 30.3 metres from those provided to the CHS. Datum was NAD83.

⁷³ Personal correspondence with Doug Hock, Manager, Media Relations, EnCana Oil & Gas (USA) to Bruce Calderbank on 10 November 2017.

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project would yield at least 50 per cent less gas than originally thought, because of the water in the reservoir. Since then, Deep Panuke has only been operating seasonally.⁷⁴

The Deep Panuke offshore decommissioning and abandonment activities planned by will be undertaken in accordance with the regulatory requirements applicable at the time of such activities allowing for changes in industry practice, technological and regulatory requirements. The abandonment plan has been submitted to the appropriate regulatory authorities for approval prior to abandonment.

Decommissioning of the Mobile Offshore Production Unit (MOPU) will essentially be a reverse of the installation process. The processing equipment will be systematically shutdown, flushed, and cleaned. The MOPU will then be disconnected from the subsea infrastructure, jacked down, and removed from the site. It is expected that the MOPU will be reused following decommissioning but this will be evaluated on an economic basis at the time of decommissioning.

Wells will be abandoned in compliance with applicable drilling regulations and according to standard industry practices.

Subsea equipment, such as wellhead trees and manifolds, will be purged, rendered safe, and recovered. Trenched flowlines and umbilicals will be flushed and left in situ below the seafloor. All other subsea facilities above the seafloor, including subsea wellhead protection devices, will be purged and decommissioned in accordance with applicable regulations at the time. The offshore export pipeline will be abandoned “in place” after it is flushed and filled with seawater.⁷⁵

In addition, the *Canadian Environmental Assessment Act*⁷⁶ required an environmental assessment of the full life cycle of the Project, which included decommissioning and abandonment. The Environmental Assessment Report demonstrated that there were no likely, significant adverse environmental effects predicted in relation to the Deep Panuke Project’s proposed decommissioning and abandonment plan. EnCana’s plan was as follows:⁷⁷

- To degas, degrease and clean the facilities, tow the mobile offshore production unit to another location for re-use or retrofit.
- Abandon the wells and cut the conductors below the seafloor.
- Flush, clean, and decommission the pipeline; the pipeline will remain in place.

⁷⁴ Online at CBC News, Canada, Nova Scotia, “EnCana prepares to close Deep Panuke offshore gas project – Deep Panuke beset by troubles” dated 13 June 2017 at <http://www.cbc.ca/news/canada/nova-scotia/EnCana-close-deep-panuke-sable-island-offshore-project-natural-gas-exxonmobil-nova-scotia-1.4153149> (last accessed: 16 March 2018).

⁷⁵ Online at C-NSOPB, Offshore Activity, Offshore Projects, Deep Panuke Offshore Gas Project, Development Plan Application, Volume 2 (All Pages), section 4.10 – Provisions for Decommissioning and Abandonment, page 4-35 at https://www.cnsopb.ns.ca/sites/default/files/inline/dp_dpa_vol2.pdf (last accessed: 16 March 2018). The wording is almost identical to the wording used in SOEP Development Application Plan.

⁷⁶ *Canadian Environmental Assessment Act*, Statutes of Canada 2012, chapter 19, section 52 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/C-15.21/index.html> (last accessed: 16 March 2018).

⁷⁷ Letter from the C-NSOPB to EnCana dated 12 January 2007 regarding “Deep Panuke Offshore Gas Development (“Deep Panuke Project”), Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) Public Review, National Energy Board (NEB) Hearing Order GH-2-2006, Responses to Information Request (IR) EA-ENV-02 through EA-ENV-006”, see details in EA-ENV-05, provided by EnCana to Bruce Calderbank on 08 November 2017. Updated with respect to concrete mattresses based on personal correspondence with Doug Hock, Manager, Media Relations, EnCana Oil & Gas (USA) to Bruce Calderbank on 10 November 2017.

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- Flush, clean, and decommission the buried infield flowlines and umbilicals which will remain “in place” along with numerous concrete mattresses.

The oil and gas pipeline sector is primarily regulated by the National Energy Board (NEB), the Department of Fisheries and Oceans Canada (DFO), and the Canadian Environmental Assessment Agency (CEAA). However, the C-NSOPB was involved in the SOEP and Deep Panuke export pipelines as each of these offshore pipelines originated at an offshore field.

The locations of pipelines need to be advertised to mariners as hazards to navigation under the *Navigation Protection Act*⁷⁸, administered since 2004 by Transport Canada. Preliminary plans must be filed, for which a *Notice to Shipping* and/or a *Notice to Mariners* are issued. Once completed, the location will be published in a *Notice to Mariners*, and on navigation charts produced by the Canadian Hydrographic Service.

In 1990, the joint jurisdiction of the C-NSOPB provided for all of the facilities used for exploration and production, including pipelines, to fall within the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*. Some types of offshore pipelines are also subject to the requirements of this Act and the *National Energy Board Act*.⁷⁹ The C-NSOPB and the NEB have worked together to amend the scope of work for the main carrier pipeline to include many of the items that appear as conditions in the *National Energy Board Act* approvals. The NEB appointed a C-NSOPB engineer as an Inspection Officer pursuant to the *National Energy Board Act*. In this way, despite the fact that there are two regulators applying two incompatible Acts, what the operators experience is one regulator applying a combined set of requirements.

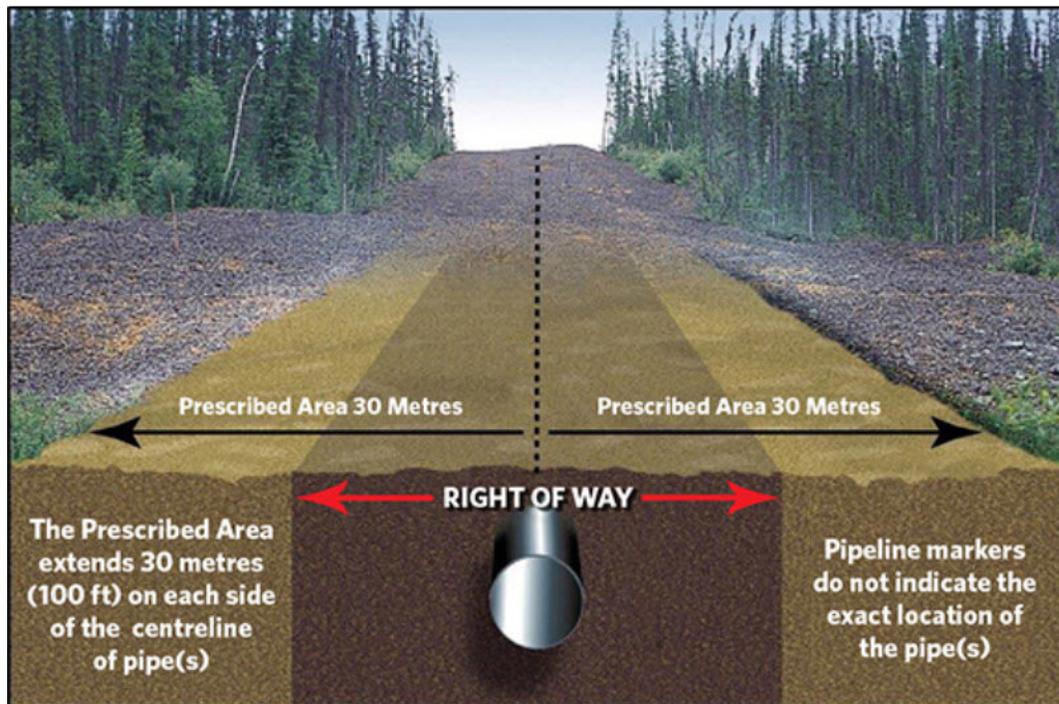
For the NEB the prescribed area was the strip of land measured 30 metres (100 feet) perpendicularly on each side of the centreline of the pipeline as shown in the Figure below. Ground disturbance activities within the prescribed area require written consent from the pipeline company. See Section 112 of the *National Energy Board Act*, the *National Energy Board Pipeline Damage Prevention Regulations – Authorizations*, and the *National Energy Board Pipeline Damage Prevention Regulations – Obligations of Pipeline Companies*. On land pipelines can be located anywhere within the allotted right of way, but with offshore pipelines generally the as-laid position is used for the location of the easement as was done in offshore Nova Scotia. The right of way will not necessarily be the same distance as the prescribed area, as that distance is defined by the operator which can typically be anywhere from 15 to 25 metres either side of the pipeline.

⁷⁸ *Navigation Protection Act*, Revised Statutes of Canada 1985, chapter N-22 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/N-22/page-1.html#h-1> (last accessed: 16 March 2018). Till 31 March 2014 this act was entitled the *Navigable Waters Protection Act*.

⁷⁹ *National Energy Board Act*, Revised Statutes of Canada 1985, chapter N-7 online at Government of Canada, Justice Laws Website at <http://laws-lois.justice.gc.ca/eng/acts/N-7/> (last accessed: 16 March 2018)

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Figure – NEB Prescribed Area⁸⁰



The pipelines crossing the Strait of Canso were laid within Nova Scotia internal waters. Hence the relevant *Pipeline Act*⁸¹ and *Pipeline Regulations (Nova Scotia)*⁸² applied to these pipelines. The *Pipeline Act* applied to all pipelines on or under “Nova Scotia lands” where these were defined as “the land mass of Nova Scotia including Sable Island, and includes the seabed and subsoil off the shore of the land mass of Nova Scotia, the seabed and subsoil of the Continental shelf and slope and the seabed and subsoil seaward from the Continental shelf and slope to the limit of exploitability.” The *Pipeline Regulations (Nova Scotia)* require that the Canadian Standard Association (CSA)-Z662 standard for “Oil and Gas Pipeline Systems” be followed.⁸³

With the development of the Cohasset-Panuke, the SOEP and Deep Panuke, there have been a number of inter field flowlines (gathering system) laid within those fields along with various flowlines, umbilicals and subsea structures. The *National Energy Board Act* does not apply to these offshore platforms or ancillary facilities such as well heads and inter field flowlines. For offshore Nova Scotia, inter-field pipelines and flowlines are governed by the C-NSOPB.⁸⁴

⁸⁰ Image from online at NEB, Safety & Environment, Damage Prevention, Pipeline Facts and Myths at <https://www.neb-one.gc.ca/sftnvrnmnt/dmgprvntn/fctmth-eng.html> (last accessed: 16 March 2018).

⁸¹ *Pipeline Act*, Revised Statutes of Nova Scotia 1989, chapter 345 online at Nova Scotia Legislature, Legislative Business, Legislation, Revised Statutes 1851 to 1989, Volume 8 (Off-highway to Prothonotary), pages 6107 to 6127 at http://0-nsleg-edeposit.gov.ns.ca/legcat.gov.ns.ca/deposit/b10564548_8.pdf (last accessed: 16 March 2018).

⁸² *Pipeline Regulations (Nova Scotia)*, Nova Scotia Regulations 66/98 of 16 September 1998 with amendments online at Nova Scotia Department of Justice, Registry of Regulations, Consolidate Regulations, Listed by Act, *Pipeline Act*, *Pipeline Regulations* at <https://novascotia.ca/just/regulations/regs/pipregns.htm> (last accessed: 16 March 2018).

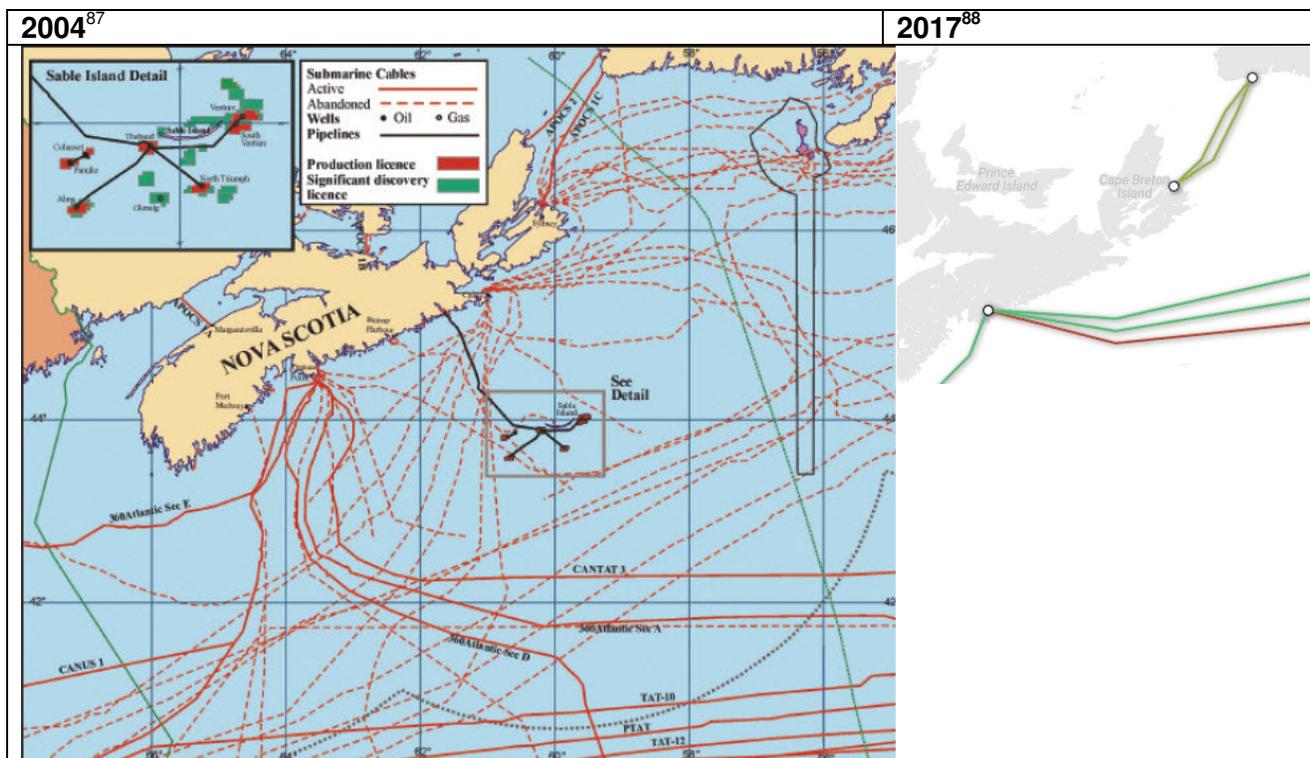
⁸³ *Pipeline Regulations (Nova Scotia)*, section 9 (1) (A) where “any code or standard referred to in these regulations means the latest issue of the code or standard and as supplemented, amended or added to from time to time”. The right of way specified in CSA-Z622 is nominally ± 30 metres.

⁸⁴ *Regulations Respecting Petroleum Installations Used in Areas Offshore Nova Scotia Under the Canada-*

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As of 16 March 2018, there were 4 active international communication cables in offshore Nova Scotia according to the International Cable Protection Committee (ICPC) all of which landed near Halifax, as shown on the right hand side of the Figure below. It would appear that the 3 communication cables labeled 360Atlantic in the 2004 image and coloured in green in the 2017 image are now called GTT Atlantic and came into service in April 2001.⁸⁵ The communication cable coloured in red in the 2017 image was called GTT Express and came into service in September 2015.⁸⁶

Figure – Nova Scotian ICPC Subsea Communication Cables



In the 2017 ICPC image, there are 2 interprovincial subsea communication cables between Nova Scotia and Newfoundland but the Atlantic Provinces Optical Cable System (APOCS) 1A, 1B, 1C and 2 are not displayed.

Nova Scotia Offshore Petroleum Resources Accord Implementation Act [short title *Nova Scotia Offshore Petroleum Installations Regulations*] online at Government of Canada, Justice Laws Website at <http://laws.justice.gc.ca/eng/regulations/SOR-95-191/page-1.html> (last accessed: 16 March 2018).

⁸⁵ Online at ICPC, Home, Cable Data, GTT Atlantic at <https://www.submarinecablemap.com/#/submarine-cable/gtt-atlantic> (last accessed: 16 March 2018). See also online at North American Submarine Cable Association, Cable Maps, North East Chart Regions, Nova Scotia South at <http://nasca.globalmarinesystems.com/northeastcharts/Nova%20Scotia%20South.pdf> (last accessed: 16 March 2018).

⁸⁶ Online at ICPC, Home, Cable Data, GTT Express at <https://www.submarinecablemap.com/#/submarine-cable/gtt-express> (last accessed: 16 March 2018). This cable came into service in September 2015.

⁸⁷ Image from Bruce Calderbank et al, *Canada's Offshore: Jurisdiction, Rights and Management*, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006), Figure 11.3 - Offshore Nova Scotia Platforms, Jackets, Pipelines and Submarine Cables, page 250.

⁸⁸ Image from online at ICPC, Home, Cable Data at <https://www.iscpc.org/cable-data/> (last accessed: 16 March 2018). According to the ICPC website the cable data locations were current to 29 September 2014.

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The other subsea communication cables listed as active in the 2004 image appear to have been abandoned, which along with those cables already abandoned when the 2004 image was created, showed there are numerous abandoned subsea communication cables in offshore Nova Scotia, some of which are more than 100 years old. At least the 2004 diagram appears to show actual cable locations, while the ICPC data only showed abstract linear locations. In addition, there are numerous subsea communication and power cables which provide services to coastal islands along Nova Scotia's coastline, which are regulated by the province.

The 2004 diagram also shows that parts of some subsea communication cables have been salvaged which may have possibly cause damage to other inactive or active communication cables. A coastal nation can require removal of an out-of-service cable within its territorial waters but beyond the 12 nautical mile limit the removal of out-of-service cables outside of national territorial seas is primarily a decision made by the cable owners.⁸⁹

Unburied subsea cables have the effect of restricting ocean use activity through the threat of legal liability in the event of damage to the subsea cable(s). As of 31 December 2004, the then subsea cable operator Teleglobe Canada advertised via the Yarmouth, Nova Scotia fishing industry publication *The Sou'Wester*, a recommend minimum clearance of 0.5 nautical miles or twice the depth of water for any bottom gear operation near Teleglobe Canada active subsea cables. Another subsea cable operator, Hibernia Networks (previously 360Networks) did not advertise a safety/exclusion zone, but has produced a public brochure with a map, and the co-ordinates for all 3 of its international subsea cable segments.

As of 31 December 2004, there had been at least 3 court cases involving Teleglobe Canada subsea cables on the Scotian Shelf going back 5 to 7 years that have all been resolved through confidential out of court settlements. These settlements were between Teleglobe Canada and fishing companies in two cases, and a shipping company in the other case.⁹⁰

As of 16 March 2018, neither GTT, Bell Aliant nor Eastlink had any educational campaign to inform the fisheries of the location of their communication cables besides what is published in the relevant Canadian Hydrographic Service charts as shown in the Figure below.

As of 16 March 2018, the Land Administration Division of the Nova Scotia Department of Natural Resource administered the cable permitting process. For the GTT Atlantic (360Atlantic in the Figure below) section E, an easement was granted from Ketch Harbour to the Canada – United States of America boundary as established by 1984 *Gulf of Maine Case* defined three geodetic lines by latitude and longitude of four points. The International Court of Justice (ICJ) decision commenced at Point A, which was some 20 nautical miles south west of the southern tip of Grand Manan Island. The offshore boundary from the boundary terminus off Passamaquoddy Bay in Maine to Point A was unresolved due to the presence of Machias Seal Island. Machias Seal Island was deliberately left out of consideration in the *Gulf of Maine Case* because neither side was willing to have its interests invalidated.⁹¹

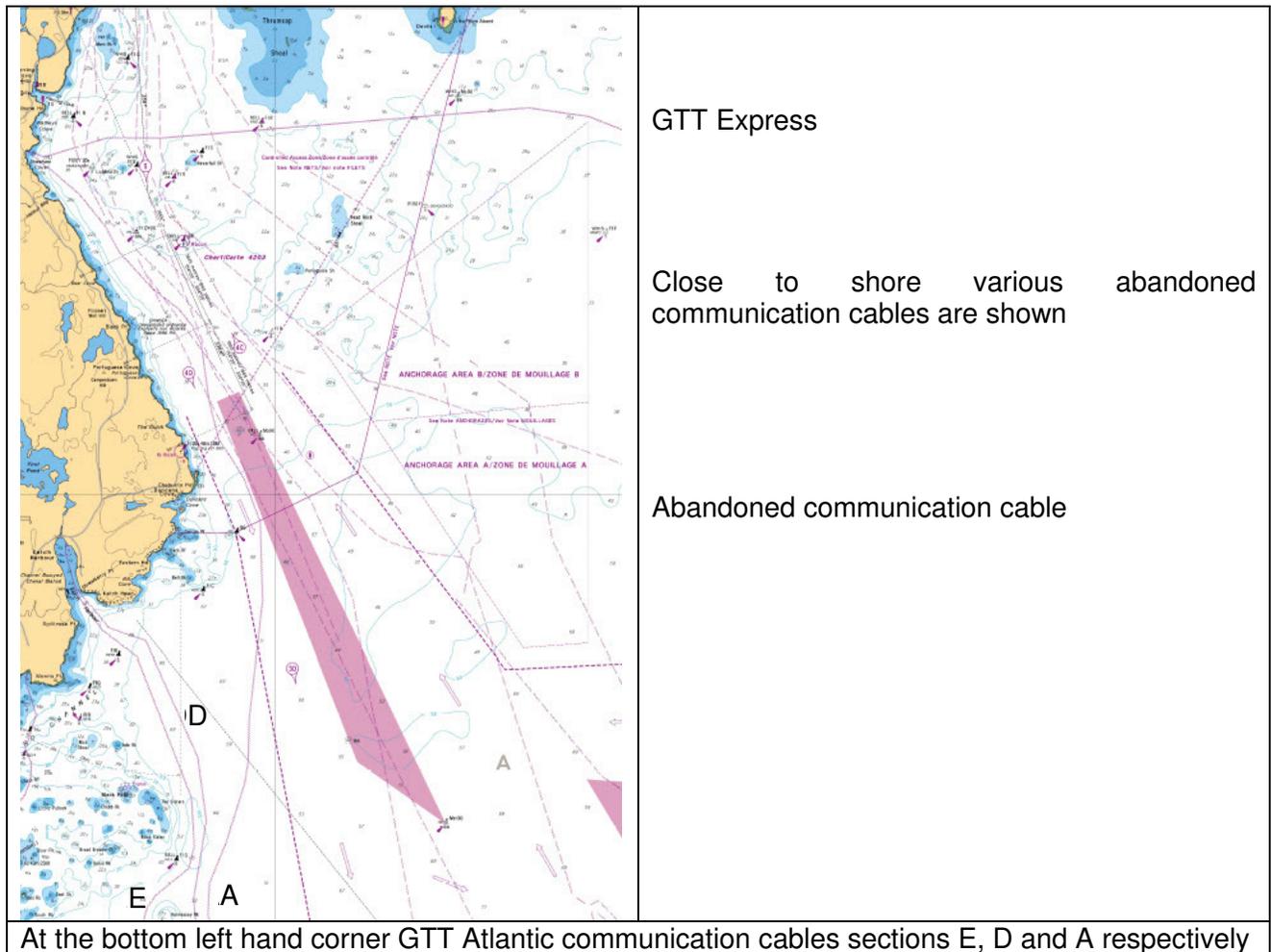
⁸⁹ Online Douglas R. Burnett, "New Developments on Out-of-Service Submarine Cables", Holland & Knight at <https://www.hklaw.com/publications/new-developments-on-out-of-service-submarine-cables-03-31-2005/> (last accessed: 16 March 2018). The article sets out decision factors to be considered prior to and after removal.

⁹⁰ Bruce Calderbank et al, *Canada's Offshore: Jurisdiction, Rights and Management*, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006) page 263. As of 16 March 2018, *The Sou'Wester* was no longer in publication.

⁹¹ Bruce Calderbank et al, *Canada's Offshore: Jurisdiction, Rights and Management*, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006), page 156.

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Figure – Extracts from CHS Chart 4237 – 4 International Communication Cables⁹²



For GTT Atlantic section E, there were 2 easements, W-5 and W-5A both of which were ± 12.5 metres wide based on the as-laid cable position. The inshore easement W-5 was from the southeasterly boundary of Water Lot W-4 Submerged Crown Land with the Ordinary High Water Mark of Ketch Harbour seaward to the line between headlands either side of Ketch Harbour and was 2.1 kilometres long. The other easement W-5A continued from the seaward end of the W-5 easement and thence southerly and westerly to the Canada – United States of America boundary and was 401.1 kilometres long.⁹³

For GTT Atlantic section A, an easement was granted from Sheehan Cove to the limit of Canada's western Exclusive Economic Zone (EEZ) boundary. There were 2 easements, W-3 and W-3A both of which were ± 12.5 metres wide based on the as-laid cable position. The inshore easement W-3 was within Water Lot W-3. The other easement W-3A continued from eastern boundary of Water Lot W-3 and thence southerly and easterly to the Canada EEZ boundary and was 870.0 kilometres long.⁹⁴

⁹² Extract from CHS chart 4237 – Approaches to Halifax. Not to be used for navigation.

⁹³ Information extracted from Nova Scotia Document Registration Number 82981086 related to the Servant, Dunbrack, McKenzie & MacDonald plan number 14-1017-0 sheets 1 of 3 inclusive.

⁹⁴ Information extracted from Nova Scotia Document Registration Number 82980351 related to the Servant, Dunbrack, McKenzie & MacDonald plan number 14-1020-0 sheets 1 of 5 inclusive.

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For GTT Atlantic section D, an easement was granted from Ketch Harbour to the limit of Canada's southern EEZ boundary. There were 2 easements, W-6 and W-6A both of which were ± 12.5 metres wide based on the as-laid cable position. The inshore easement W-6 was from the southeasterly boundary of Water Lot W-4 Submerged Crown Land with the Ordinary High Water Mark of Ketch Harbour seaward to the line between headlands either side of Ketch Harbour and was 2.1 kilometres long. The other easement W-6A continued from the seaward end of the W-5 easement and thence southerly and easterly to the Canada EEZ boundary and was 681.9 kilometres long.⁹⁵

For GTT Express, an easement was granted from Sheehan Cove to the boundary of the Nova Scotia – Newfoundland and Labrador boundary. There was 1 easement W-7A which was ± 12.5 metres wide based on the as-laid cable position. GT Express also used the inshore easement W-3 which was within Water Lot W-3. The other easement W-7A continued from eastern boundary of Water Lot W-3 and thence north-easterly to the Nova Scotia – Newfoundland and Labrador boundary and was 503.7 kilometres long.⁹⁶

Each of these easements had similar conditions attached to them in that GTT was not allowed to interfere with or impede others who have co-existing rights with respect to the subject Crown Lands under water or those who obtained such co-existing rights in the future; and GTT was allowed to disturb the seabed for installation and maintenance.⁹⁷

All distances on the GTT easements were quoted to 3 decimal places. The target laydown locations were achieved with generally a plough being used as the water depths that were less than 1000 metres. The plough was positioned by ultrashort baseline (USBL) acoustic positioning which combined with the surface vessel Differential Global Positioning System (DGPS) and inertial sensors for orientation, heave, roll and pitch so the on the seabed communication cable position might be approximately ± 4 metres. In shallow water a remotely operated vehicle (ROV) was used to place the cable in a trench and hence the ROV position was used. For surface laid cable the stern chute positions was used. In both those instances the seabed communication cable position might also be approximately ± 4 metres.

For these 4 international subsea communication cables detailed route surveys were carried out to optimize the seabed location. Prior to the cable lay a seabed clearance operation should have been carried out. This would remove items of debris such as abandoned fishing nets, wires, hawsers, etc. Removal of any debris ensured a clear route for the plough to negotiate so that burial could be maximised.

Typically a plough was used which lifted a wedge of sediment so that the cable could be inserted below as the plough was towed by the surface vessel. Due to the small diameter of the communications cable (size of a typical garden hose) the trench self-filled. In harder sediments a small tracked ROV would have been used.

⁹⁵ Information extracted from Nova Scotia Document Registration Number 82981581 related to the Servant, Dunbrack, McKenzie & MacDonald plan number 14-1019-0 sheets 1 of 4 inclusive.

⁹⁶ Information extracted from Nova Scotia Document Registration Number 108994048 related to the Servant, Dunbrack, McKenzie & MacDonald plan number 14-1736-0 sheets 1 of 4 inclusive. All of the offshore subsea communication cable lengths were provided in private correspondence with Kevin Robb, Project Surveyor, Servant, Dunbrack, McKenzie & MacDonald to Bruce Calderbank on 05 December 2017.

⁹⁷ See details of each easement listed Nova Scotia Document Registration Numbers 82981086, 82980351, 82981581 and 108994048 mentioned previously.

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Generally, there would be no specific as-laid ROV surveys, unless there was a cable or pipeline crossing location or locations where a cable plough could not be used. For these areas, the plough would be stopped a safe distance before crossing, the cable was surface laid over the crossing point and then the plough was redeployed and cable burial by plough recommenced. The ROV then inspected and buried the surface-laid cable over the crossing point.

This technique was also used if the plough has to be recovered for maintenance during plough operations as that would leave a short section of surface laid cable, or if there are any other areas where a plough was not suitable. These were the only areas subjected to ROV as-laid survey typically. Communication cables are not routinely inspected along their entire length and they are not subjected to repeated regular condition surveys as is it becoming common for power and renewable energy cables.⁹⁸

For the 3 GTT Atlantic subsea communication cables Nova Scotia levied prorated fees when a cable extended over 150 nautical miles (278 kilometres) on the seabed for an easement to be granted. Since 01 April 2015, which included the GTT Express subsea communication cable, Nova Scotia charged a fixed fee with, as before, a separate fee for landing sites.⁹⁹

The 4 interprovincial subsea APOCS communication cables are detailed in the Table below. As of 16 March 2018, all these cables are operated by Bell Aliant. To clear any debris or rocks along the planned route and ± 200 metres of that route, was dragged for each of these cables. Only the APOCS 1A and 1B cables were displayed on the ICPC website.

Table Atlantic Provinces Optical Cable System (APOCS) Communication Cables¹⁰⁰

Name	From	To	Length	Laid
APOCS 1A	Margaretsville, NS	St. Martins, NB	50.2	1991
APOCS 1B	Caribou, NS	Wood Island, PEI	23.0	1991
APOCS 1C	Sydney Mines, NS	Cape Ray, NL	171.6	1991
APOCS 2	Cabot Landing, NS	Searston Bay, NL	133.6	1995

The communication cable to the east of APOCS 1B was laid in 1937 for Maritime Telephone and Telegraph (MT&T) and was reportedly decommissioned in the early 1980's. The current ownership of this communication cable could not be determined. This was a 6 inch diameter cable which consisted of an outer layer of steel wire which surrounded a multi-stranded copper wire at the core.¹⁰¹ In 1992, the CHS carried out a magnetometer survey of this communication cable without success. Also at that time the CHS obtained information that parts of this communication cable had been recovered by the local fisheries from time to time. However, without convincing evidence that the cable was abandoned, CHS management preferred that this communication cable continued to be shown on the chart.¹⁰²

⁹⁸ Personal correspondence with David Lloyd, Senior Network Architect, GTT by Bruce Calderbank on 03 January 2018.

⁹⁹ Online at Government of Nova Scotia, Department of Natural Resources, Crown Land, Policies and Fees, Fees, For Activities on Crown Land at <http://novascotia.ca/natr/land/pdf/Fees-Activities-on-crownland.pdf> (last accessed: 16 March 2018).

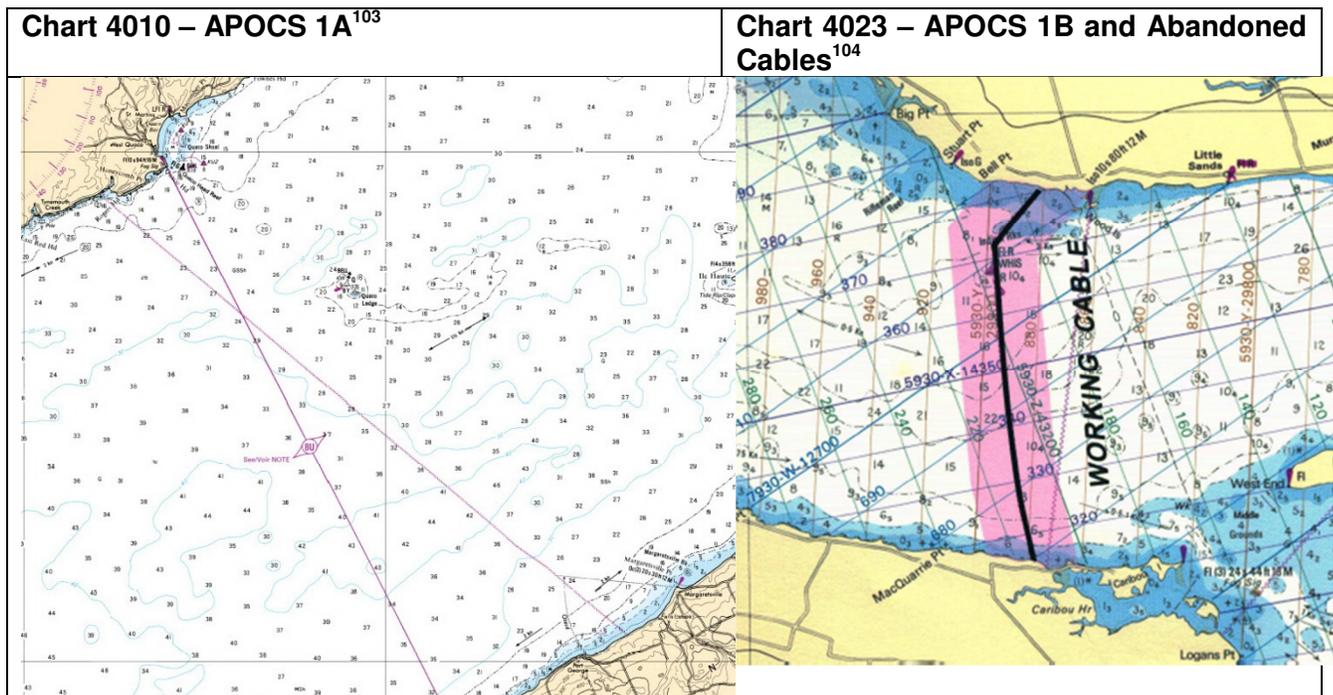
¹⁰⁰ Personal correspondence with Monty Bartlett, Implementation Manager. Bell Aliant by Bruce Calderbank on 11 December 2017.

¹⁰¹ Personal discussions with **Darren Burns ???** by Bruce Calderbank on 23 February 2018.

¹⁰² Personal correspondence with Kelly Nesbit, Acting Supervisor Chart Updating, CHS, Dartmouth by Bruce Calderbank on 05 February 2018.

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Figure – Extracts from CHS Charts 4010 and 4023 - APOCS 1A, 1B and Abandoned Communication Cables



For protection, all of the APOCS cables were supposedly covered with rock for the entire cable length. For the APOCS 2 cable the near shore segments used double armoured cable with 2 kilometres used in Nova Scotia and 2.5 kilometres used in Newfoundland. For the APOCS 2 cable on each shore, the cable was placed in a 2 metre depth trench from the Low Water Mark out to the 20 metre contour line and then buried to a target depth of 0.7 metres along the rest of the cable's length.¹⁰⁵

For the APOCS 2 cable, as part of the Navigable Waters Protection Program conditions, Bell Aliant was required to install a "No Anchor" sign on both shore ends of the cable. The sign was to be visible for ½ nautical mile (approximately 1 kilometre) and be aligned perpendicular to the cable at the point the cable left the shoreline. Similar conditions were expected to be required for the APOCS 1A, 1B and 1C cables.

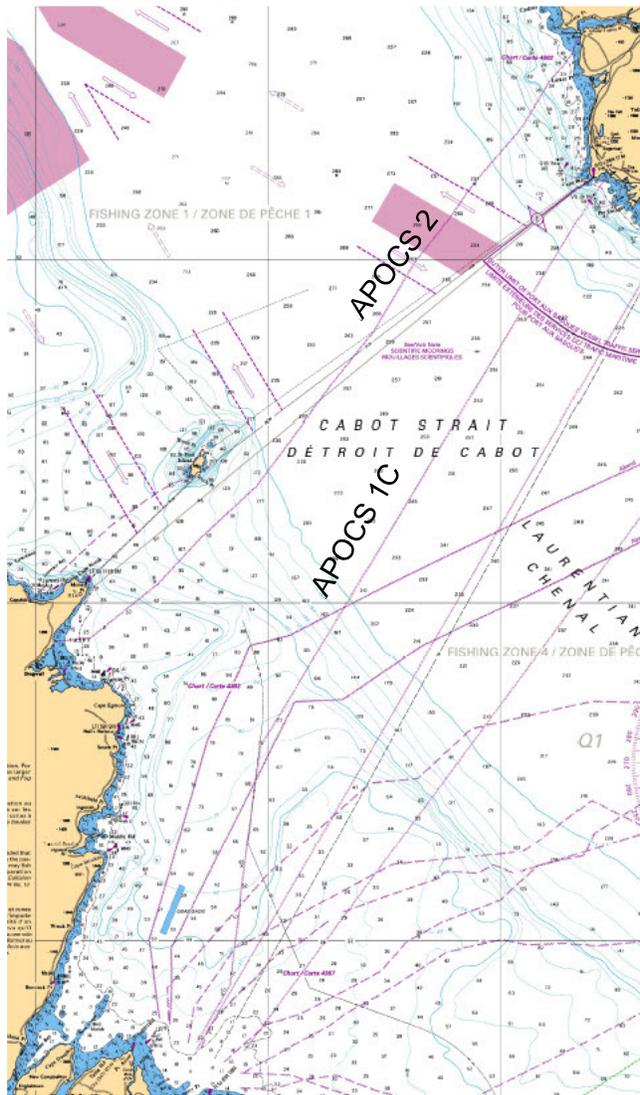
¹⁰³ Extract from CHS chart 4010 – Bay of Fundy (Inner Portion). Not to be used for navigation.

¹⁰⁴ Extract from CHS chart 4023 – Northumberland Strait. Not to be used for navigation.

¹⁰⁵ Personal correspondence with Bruce Anderson, Hydrographic Data Centre, CHS, Dartmouth by Bruce Calderbank on 07 February 2018.

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Figure – Extract from CHS Chart 4022 – APOCS 1C and 2 Communication Cables¹⁰⁶



From Cape Breton, Nova Scotia to the west coast of Newfoundland there were four (4) communication cables in use and a number of abandoned communication cables. The APOCS 1B came into service in 1991. APOCS 2, which came into service in November 1995, was severed by a ship's anchor in December 1998 and repaired in January 1999. The new cable lay for the repaired section was used to update CHS chart 4022.

Based on the ICPC website information, EastLink operated 2 interprovincial subsea communication cables from New Victoria, Nova Scotia and Rose Blanche, Newfoundland which were labeled Persona and which came into service in 2008. EastLink acquired Persona Communication in mid-2007 hence the naming convention. EastLink ranks as Canada's largest private communication cable company and was not willing to share any information on their communication cables.¹⁰⁷

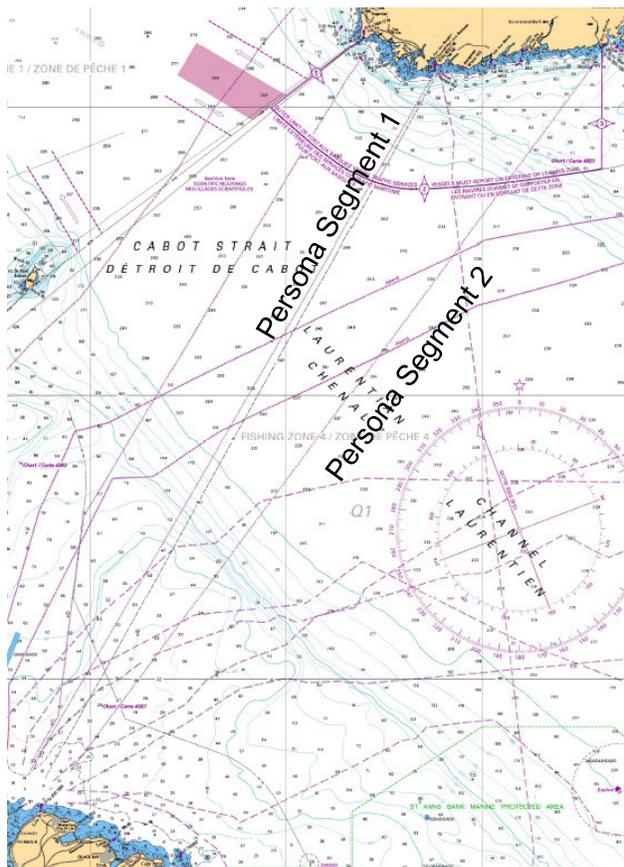
¹⁰⁶ Extract from CHS chart 4022 – Cabot Strait and Approaches. Not to be used for navigation.

¹⁰⁷ Personal correspondence with Jill Laing, Public and Media Relations, EastLink by Bruce Calderbank on 06 March 2018. The initial request for information was sent on 10 November 2017 or 117 days previously.

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However, CHS chart 4022 – Cabot Strait and Approaches showed these two (2) communication cables as two (2) separate cables as shown in the Figure below with the other communication cable from Black Point (Sydney Mines), Nova Scotia to Port aux Basques, Newfoundland labelled Segment 1. In January 2018, the Persona Segment 1 cable was repaired after being severed by a ferry on weather stand by.

Figure – Extract from CHS Chart 4022 – Persona Communication Cables¹⁰⁸



For protection, at the Nova Scotia shore both cables were buried to the 60 metre contour line. At the Newfoundland shore Segment 1 was buried from the shore to the 250 metre contour line, and Segment 2 was buried from the 80 metre to the 150 metre contour line. It was not clear why Segment 2 was not buried from the shore.

For these cables, as part of the Navigable Waters Protection Program conditions, EastLink was required to install a “No Anchor” sign on both shore ends of the cable. The sign was to be visible for ½ nautical mile (approximately 1 kilometre) and be aligned perpendicular to the cable at the point the cable left the shoreline.¹⁰⁹

EastLink also operated another cable shown on CHS chart 4403 – Gulf of St. Lawrence – East Point to Cape Bear from Port Hood, Nova Scotia to Graham Pond, Prince Edward Island as shown

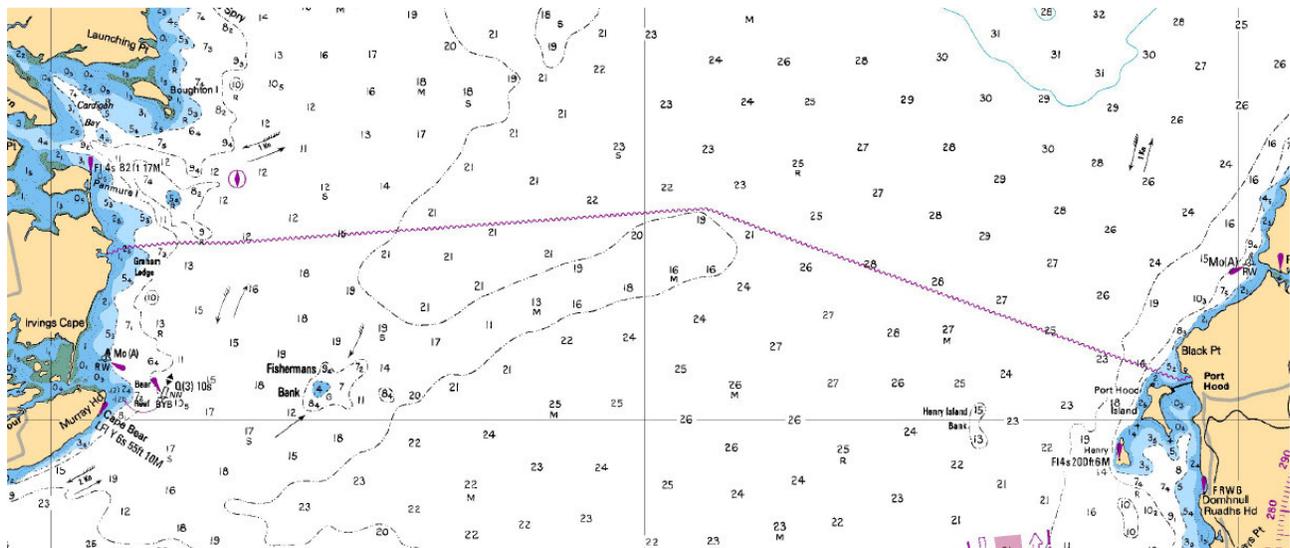
¹⁰⁸ Extract from CHS chart 4022 – Cabot Strait and Approaches. Not to be used for navigation.

¹⁰⁹ Details from information supplied by Persona to the Navigable Waters Protection Program dated June 2007 provided by Bruce Anderson, Hydrographic Data Centre, CHS, Dartmouth to Bruce Calderbank on 09 February 2018.

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in the Figure below. The route survey for this cable was carried out in July 2004 and the cable was laid in 2005.

Figure – Extract from CHS chart 4403 – EastLink Communication Cable¹¹⁰



For protection, at the Nova Scotia shore the cable was inserted into 2035 metres of articulated pipe from the High Water Mark out to the 7 metre contour and buried 1 metre below the seabed where feasible. At the Prince Edward Island shore the cable was inserted into a directionally drilled pipe from shore out 235 metres to the 2 metre contour and then into 450 metres of articulated pipe out to the 7 metre contour and buried 1 metre below the seabed where feasible. The remainder of the Single Armor Heavy cable was buried 1 metre below the seabed.

For this cable, as part of the Navigable Waters Protection Program conditions, EastLink was required to install a “No Anchor” sign on both shore ends of the cable. The sign was to be visible for ½ nautical mile (approximately 1 kilometre) and be aligned perpendicular to the cable at the point the cable left the shoreline.¹¹¹

For reason unknown none of these domestic subsea interprovincial communication cables were granted an easement. The appropriate provincial online registry systems were searched, specifically the Nova Scotia Property Online (NSPOL), Prince Edward Island Geolinc Plus and Service New Brunswick without success. In addition, Innovation, Science and Development Canada (formerly Industry Canada) and Public Service and Procurement Canada (PSPC) were contacted but also without success.

¹¹⁰ Extract from CHS chart 4403 – Gulf of St. Lawrence – East Point to Cape Bear. Not to be used for navigation.

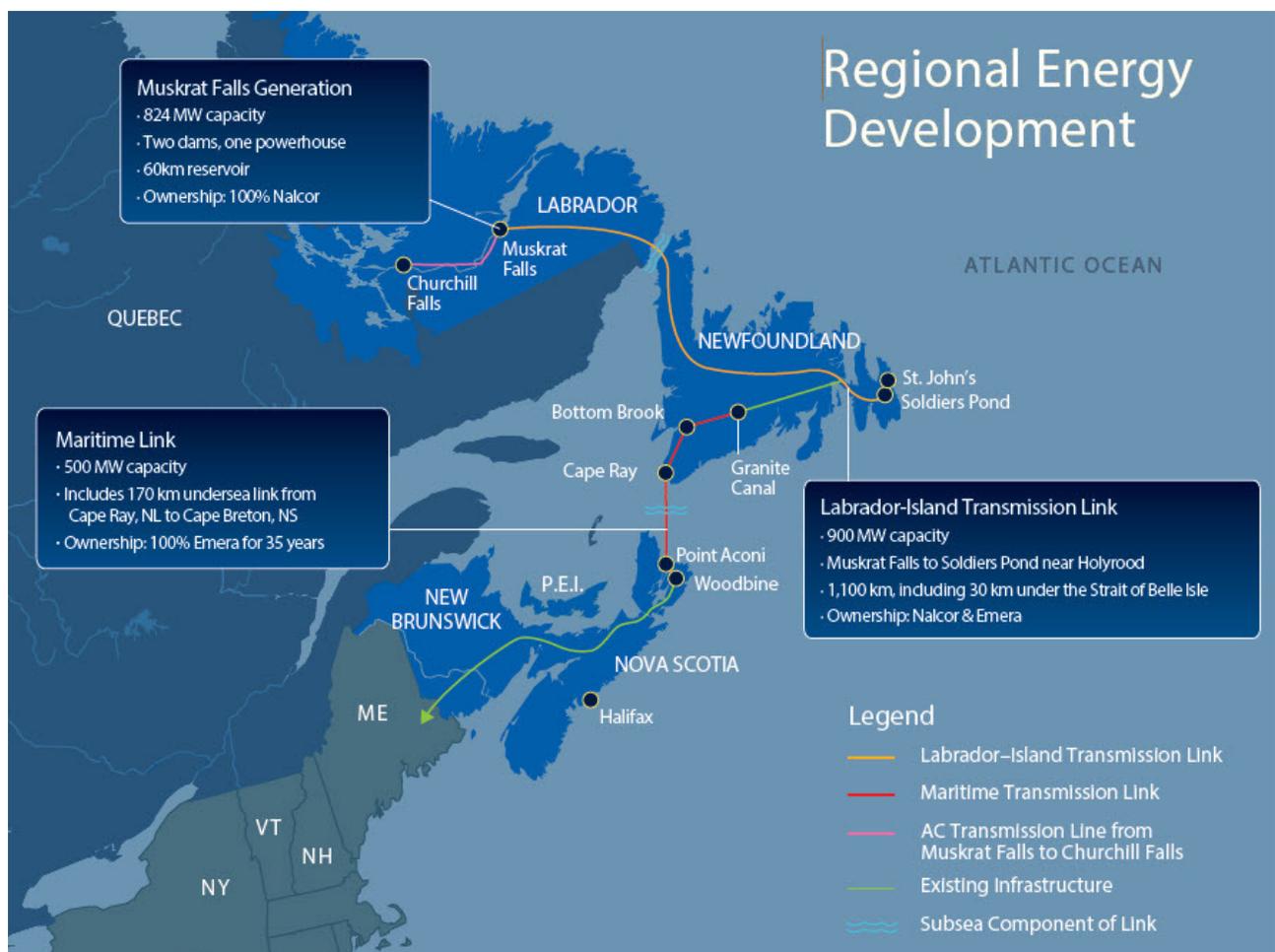
¹¹¹ Details from information supplied by EastLink to the Navigable Waters Protection Program dated December 2004 provided by Bruce Anderson, Hydrographic Data Centre, CHS, Dartmouth to Bruce Calderbank on 07 February 2018.

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In late April and June 2017, two parallel subsea power cables, each cable about 170 kilometres in length, were laid across the Cabot Strait between Cape Ray, Newfoundland to Point Aconi, Cape Breton, Nova Scotia as part of the Maritime Link project. The governments of Canada, Nova Scotia, and Newfoundland and Labrador signed a Joint Management Agreement for the project, as well as a Land Use Agreement with the project proponents.

The two power cables were part of the \$1.6-billion Maritime Link project,¹¹² which will enable Newfoundland and Labrador's Crown-owned Nalcor Energy to provide privately owned Nova Scotia Power Inc. with renewable energy from the Muskrat Falls hydroelectric project in Labrador. At 170 kilometres, the Maritime Link's subsea power cables are each twice the length of what is now North America's longest subsea electricity cable, which crosses San Francisco Bay.¹¹³ See the Figure below.

Figure – Maritime Link



¹¹² Online at Emera Newfoundland and Labrador, Maritime Link at <http://www.emeranl.com/en/home/themaritimelink/overview.aspx> (last accessed: 16 March 2018).

¹¹³ Michael MacDonald, "Engineering marvel: Ship begins laying massive power cable connecting N.L., N.S.," dated 27 April 2017 online at News 1130, at <http://www.news1130.com/2017/04/27/ship-from-norway-laying-electricity-cable-connecting-newfoundland-nova-scotia/> (last accessed: 16 March 2018).

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Emera Newfoundland & Labrador (ENL) engaged with stakeholders, including regulators, fish harvesters, First Nations and local communities, in Nova Scotia and Newfoundland during the planning and installation of the two Maritime Link subsea cables. This engagement included providing information on the location of the cables and the technical aspects of cable installation. Some updates were also available to the larger public through ENL's website.¹¹⁴ In meetings with the fisheries representatives', ENL shared the rationale behind the design of the project including physical constraints and economics which both played a significant role in the decision making. The approved cable route was selected to minimize risks to the cables, minimize environmental impacts, and minimize costs.

From the fisheries representatives' perspective there was a feeling that ENL do not want to engage in substantive discussions which could have led to cost saving for the project and less intrusion on the lobster and snow crab fisheries that operate in Cape Breton. However, ENL's efforts to compensate the fisheries appropriately were appreciated.¹¹⁵

For protection, from mid-June to mid-July 2016 at the Point Aconi, Nova Scotia location two (2) directionally drilled pipes from the shore out 1.1 kilometres, and at the Cape Ray, Newfoundland location from shore out 0.6 kilometres were drilled. During the cable installation phase from late April and June 2017, at the Point Aconi location the necessary length of cable was uncoiled from the lay vessel and "floated" on the surface with inflatable pillows. The end of the cable was then pulled in from shore through one of the conduits, and then the operation was repeated for the other cable; at the Cape Ray location the each cable was pulled in separately through its respective conduit directly from the cable vessel. This was to avoid potential damage to the majority of the coastal fisheries.

Additionally, the power cables were laid on the sea floor at depths of up to 470 metres the cables were buried if the seabed depth was less than 400 metres. If the power cables did not bury themselves in the sediment then trenching was carried out achieve the necessary burial depth. In the near shore, the target burial depth was a minimum of 2 metres. If this could not be achieved by trenching alone, rock berms were installed to achieve the designated depth of protection.

During all cable installation and burial activities a Safety Zone of \pm 500 metre from the planned seabed cable location was implemented. The Safety Zone was created after discussions with the fisheries representatives' and the Department of Fisheries and Oceans (DFO). The only limitation associated with the Safety Zone was that the fisheries agreed not to set fixed fishing gear within the safety area. Navigation within the safety zone was not restricted except around the cable laying vessel when in operation. During the cable pull-in operations described above, the Safety Zone was extended several hundred metres for 1 or 2 days to allow operations to continue. These efforts provided protection and avoided interaction with fisheries or other marine activities.¹¹⁶

The details of the final installation routing were provided to the Canadian Hydrographic Services so that marine charts could be updated, including the as laid locations and the dimension of the rock berms.¹¹⁷ As of 16 March 2018, the CHS chart 4022 had not been updated.

¹¹⁴ Personal correspondence with Heidi Kirby, Public Engagement Coordinator, Emera Newfoundland & Labrador to Bruce Calderbank on 14 November 2017.

¹¹⁵ Personal discussions with Kevin Squires, President, Local 6 (Cape Breton), Maritime Fisherman's Union by Bruce Calderbank on 16 November 2017.

¹¹⁶ Operational details provided by Jean-Marc Nicolas, Environmental Coordinator, Emera Newfoundland & Labrador to Bruce Calderbank on 13 December 2017.

¹¹⁷ Personal correspondence with Heidi Kirby, Public Engagement Coordinator, Emera Newfoundland & Labrador to Bruce Calderbank on 14 November 2017.

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The Maritime Link project involved three jurisdictions which were the Province of Nova Scotia, the Cabot Strait, and the Province of Newfoundland and Labrador. Three land surveyors, a Canada Lands Surveyor (CLS), a Nova Scotia Land Surveyor (NSLS) and a Newfoundland Land Surveyor (NLS) were contracted by the ENL to cover the legal survey requirements. The construction corridor for the cable lay was defined by a Descriptive Map Plan and a textual description.

The final Agreed Area will be defined by a CLSR plan which will be prepared from the as-built information. Specifications for the legal surveys and associated survey instructions were issued by the SGB that were acceptable in all three jurisdictions. The legal survey products being produced were for a Joint Boundary Working Group led by SGB which included representatives of Public Services and Procurement Canada (PSPC), DFO, CHS, Nova Scotia and Newfoundland and Labrador.¹¹⁸

In June 2016, Nova Scotia approved a plan to deploy two experimental in-stream tidal turbines in the Minas Passage west of Cape Sharp near Parrsboro, Nova Scotia. The program is for the Fundy Ocean Research Centre for Energy (FORCE)¹¹⁹ and Cape Sharp Tidal Venture.¹²⁰ The FORCE site is testing tidal turbines from various manufacturers.

FORCE is designed to accommodate a number of turbines “berths” throughout the demonstration site. These turbine berths are supported by four 34.5kV subsea power cables (each 2 to 3 kilometres in length) designed to transfer power to the shore and on to the Nova Scotia electricity grid.¹²¹ If a suitable tidal turbine design is found and passes the testing, there is a proposal to deploy a string of them across the Minas Passage in the Bay of Fundy.

With the installation of subsea power cables, FORCE and fisheries worked together to establish a Safety Zone in the Crown Lease Area to protect fishing gear, research equipment and subsea infrastructure from both damage and liability. The Safety Zone was a guideline based on best practices in other jurisdictions – it is a precautionary measure for all users in the area. The Safety Zone was not an exclusion zone, nor was it enforced – it is simply a tool to avoid entanglement and/or damages.¹²²

The safety zone is 500 metres from the area in which the subsea communication and power cables are located in the demonstration site is shown in the left image below. The site was displayed in the extract from CHS chart 4010 as shown in shown in the right image below.

¹¹⁸ Personal correspondence with Jim Banks, Senior Surveyor, Surveyor General Branch, Nova Scotia by Bruce Calderbank on 31 May 2015.

¹¹⁹ In the United Kingdom, the European Marine Energy Centre (EMEC) is a research facility operating a grid-connected wave test site at Billia Croo, off the west coast of the Orkney Mainland, and a tidal power test site in the Fall of Warness, off the northern island of Eday, Orkney Islands, Scotland. See <http://www.emec.org.uk/> for more details. In Holland, the Dutch Marine Energy Centre (DMEC) provides similar services. See <http://www.dutchmarineenergy.com/> for more details.

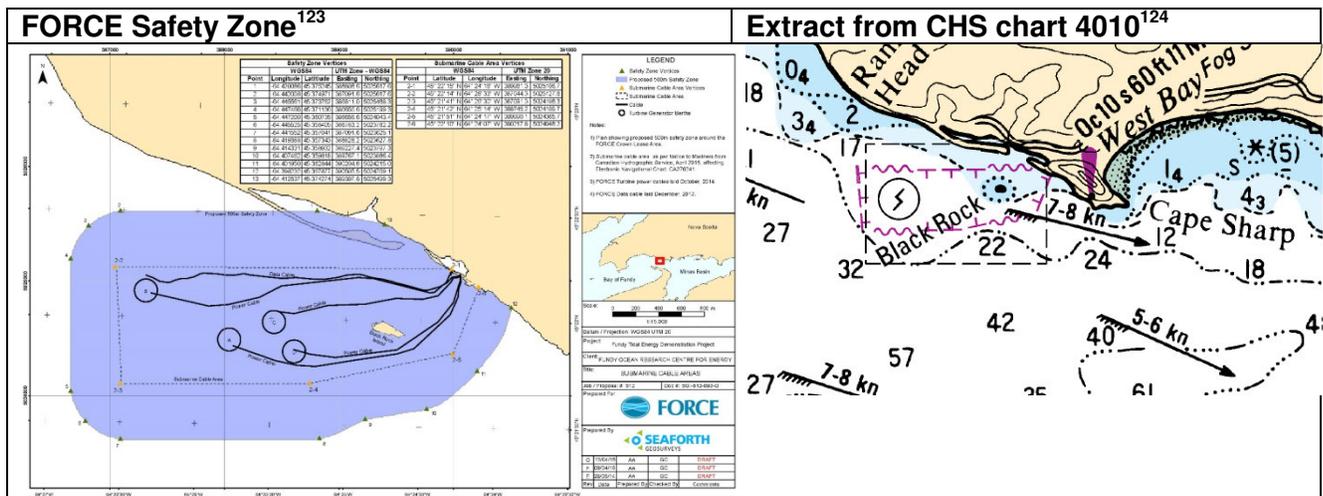
¹²⁰ Online at CBC News, Canada, Nova Scotia, “Bay of Fundy tidal power experiment approved by Nova Scotia government”, dated 20 June 2016 at www.cbc.ca/news/canada/nova-scotia/bay-fundy-tidal-project-approved-1.3643256 (last accessed: 16 March 2018).

¹²¹ Online at FORCE, Technology, Test Centre at <http://fundyforce.ca/technology/> (last accessed: 16 March 2018).

¹²² Online at FORCE, About, Site Safety, Safety Zone at <http://fundyforce.ca/about/site-safety/> (last accessed: 16 March 2018).

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Figure – FORCE Site



¹²³ Image from About, Site Safety, Safety Zone at <http://fundyforce.ca/about/site-safety/> (last accessed: 16 March 2018).

¹²⁴ Extract from CHS chart 4010 - Bay of Fundy, Inner Portion. Not to be used for navigation.

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5. OIS in Prince Edward Island

There are no offshore pipelines, flowlines, umbilicals, or subsea structures off the coast of Prince Edward Island (PEI). There are 2 active and 3 inactive subsea communication and 4 active power cables. In addition, there is also the Confederation Bridge between Prince Edward Island and New Brunswick to consider.

Interprovincial offshore mineral rights boundaries first proposed in 1964 are still informally recognized. Consequently, Prince Edward Island claims a portion of the Gulf of St. Lawrence and a portion of the Northumberland Strait on the south side of Prince Edward Island.¹²⁵ As of 16 March 2018, there has been no offshore accord struck or required to allow for the creation of any joint offshore petroleum board.

To expedite important infrastructure projects in the Northumberland Strait, such as the construction of the Confederation Bridge and the Prince Edward Island to New Brunswick (PEI-NB) Cable Interconnection Upgrade Project, Joint Management Agreements were negotiated between the Government of Canada, Prince Edward Island and New Brunswick to allow these projects to proceed, as well as a Land Use Agreement for each project with the respective proponents.

In 1943, the first offshore oil and gas exploration well in Canada was drilled off Prince Edward Island in Hillsborough Bay on an artificial island built from the near shore and later the well was plugged and abandoned (P&A).¹²⁶ From 1966 to 1979, there were 5 other wells drilled in offshore Prince Edward Island which were all P&A. Success at the East Point E-47 and E-49 wells allowed a Significant Discovery Licence (SDL) number 082 (SDL082) to be granted on 15 February 1987 to the Hudson Bay Oil and Gas Company.¹²⁷ See the Figure on the next page. Since 1980, no other offshore Prince Edward Island wells have been drilled.¹²⁸

As of 16 March 2018, oil and gas exploration offshore and onshore in Prince Edward Island was regulated via the Prince Edward Island *Oil and Natural Gas Act*.¹²⁹ In the *Permit, Lease and Survey System Regulations*, “offshore - means the seabed and the subsoil off the shore of the land mass of the province to the limits of the sovereignty of the government of Prince Edward Island and to such limits as may be determined by federal provincial agreement”.¹³⁰ The grid area system used in

¹²⁵ Bruce Calderbank et al, Canada’s Offshore: Jurisdiction, Rights and Management, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006), Figure 8.1 – Possible Inter Provincial Boundaries in the Gulf of St. Lawrence, page 180.

¹²⁶ Bruce Calderbank et al, Canada’s Offshore: Jurisdiction, Rights and Management, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006) page 247.

¹²⁷ As of 16 March 2018, the Company Representative for SDL082 was BP Canada Energy Group a successor company.

¹²⁸ Well site numbers from online at C-NSOPB, Resource Management, Directory of Wells, C-NSOPB Directory of Wells – Other Offshore Areas and Jurisdictions last update on 09 July 2013 at https://www.cnsopb.ns.ca/sites/default/files/pdfs/directory_of_wells_other_offshore_areas_and_jurisdictions_.pdf (last accessed: 16 March 2018).

¹²⁹ *Oil and Natural Gas Act*, Statutes of Prince Edward Island 2015, chapter O-5 online at Government of Prince Edward Island, Government, Government Services, Legislation, Statutes and Regulations at <https://www.princeedwardisland.ca/sites/default/files/legislation/O-05-Oil%20And%20Natural%20Gas%20Act.pdf> (last accessed: 16 March 2018).

¹³⁰ *Permit, Lease and Survey System Regulations*, Regulations of Prince Edward Island 2009, chapter O-5 online at Government of Prince Edward Island, Government, Government Services, Legislation, Statutes and Regulations, section 1 (1) (e) at <https://www.princeedwardisland.ca/sites/default/files/legislation/O%2605-3-Oil%20and%20Natural%20Gas%20Act%20Permit%2C%20Lease%20and%20Survey%20System%20Regulations.pdf> (last accessed: 16 March 2018).

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the *Permit, Lease and Survey System Regulations* was as specified in the *Canada Oil and Gas Regulations*,¹³¹ and the required surveys had to follow *Canada Lands Surveyors Act*.¹³²

Figure – Location of SDL082¹³³



The thick solid brown line indicated the accepted mineral jurisdiction boundary as provided for in the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation* enacted by the Government of Canada and Nova Scotia.¹³⁴ The dashed brown line was a typical boundary line as would be found online, such as at Google Maps.¹³⁵

There are no international communication cables landing at Prince Edward Island. There are two (2) domestic subsea communication cables one labelled the Atlantic Provinces Optical Cable System (APOCS) 1B between Caribou, Nova Scotia and Wood Island, Prince Edward Island; and

¹³¹ *Canada Oil and Gas Regulations*, Consolidated Regulations of Canada, chapter 1518 online Government of Canada, Justice Law Website at http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.._c._1518/ (last accessed: 16 March 2018).

¹³² *Canada Lands Surveyors Act*, Statutes of Canada 1998, chapter 14 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/L-5.8/> (last accessed: 16 March 2018).

¹³³ Image from C-NSOPB, Lands Management, Search Licences at <https://www.cnsopb.ns.ca/lands-management/search-licences> (last accessed: 16 March 2018).

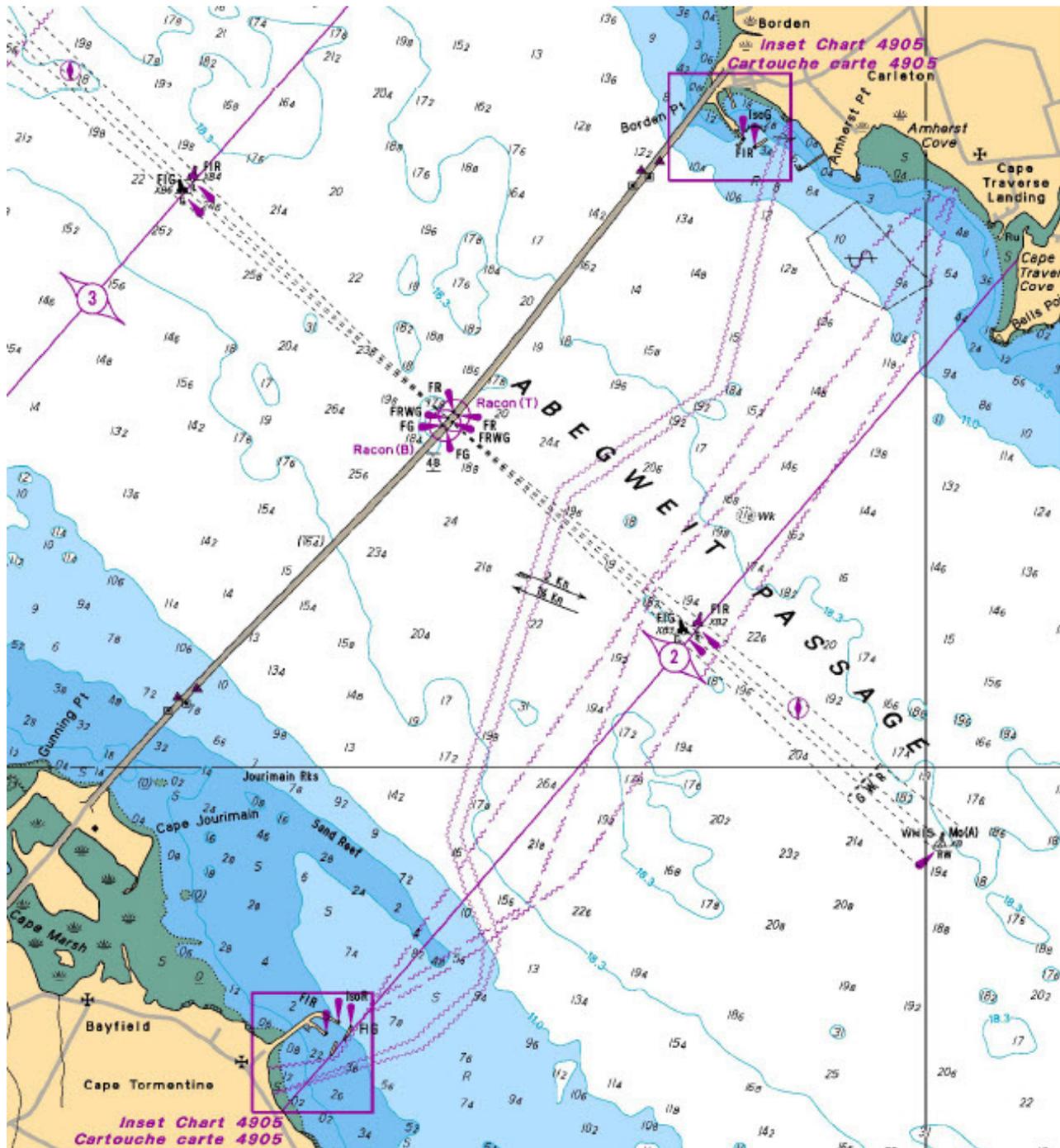
¹³⁴ *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, Statutes of Canada, 1988, chapter 28 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/C-7.8/> (last accessed: 16 March 2018) in force 22 December 1989 by SI/90-9, with some sections not in force till later; and *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act (Nova Scotia)*, Statutes of Nova Scotia, 1987, chapter 3 online at C-NSOPB, References at https://www.cnsopb.ns.ca/sites/default/files/pdfs/canada-ns_offshore_petroleum.pdf (last accessed: 16 March 2018) in force 5 January 1990 (except sections 104 to 120), and 1 October 1990 (remaining sections). See also Bruce Calderbank et al, *Canada's Offshore: Jurisdiction, Rights and Management*, 3rd edition (Ottawa: Association of Canada Lands Surveyors, 2006), Figure 8.1 – Possible Inter Provincial Boundaries in the Gulf of St. Lawrence, page 180.

¹³⁵ Confirmed SDL082 was in Prince Edward Island via personal correspondence with Carl Makrides, Director, Resources, C-NSOPB by Bruce Calderbank on 16 November 2017.

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the other labelled EastLink between Port Hood, Nova Scotia and Graham Pond, Prince Edward Island which are described in Section – OIS and Nova Scotia. There are 3 abandoned communication cables crossing the Northumberland Strait from Cape Tormentine to Cape Traverse at Amherst Cove, Prince Edward Island crossing the Abegweit Passage (part of the Northumberland Strait) as shown in the Figure below.

Figure – Extract from CHS chart 4406 – Abandoned Communication Cables¹³⁶



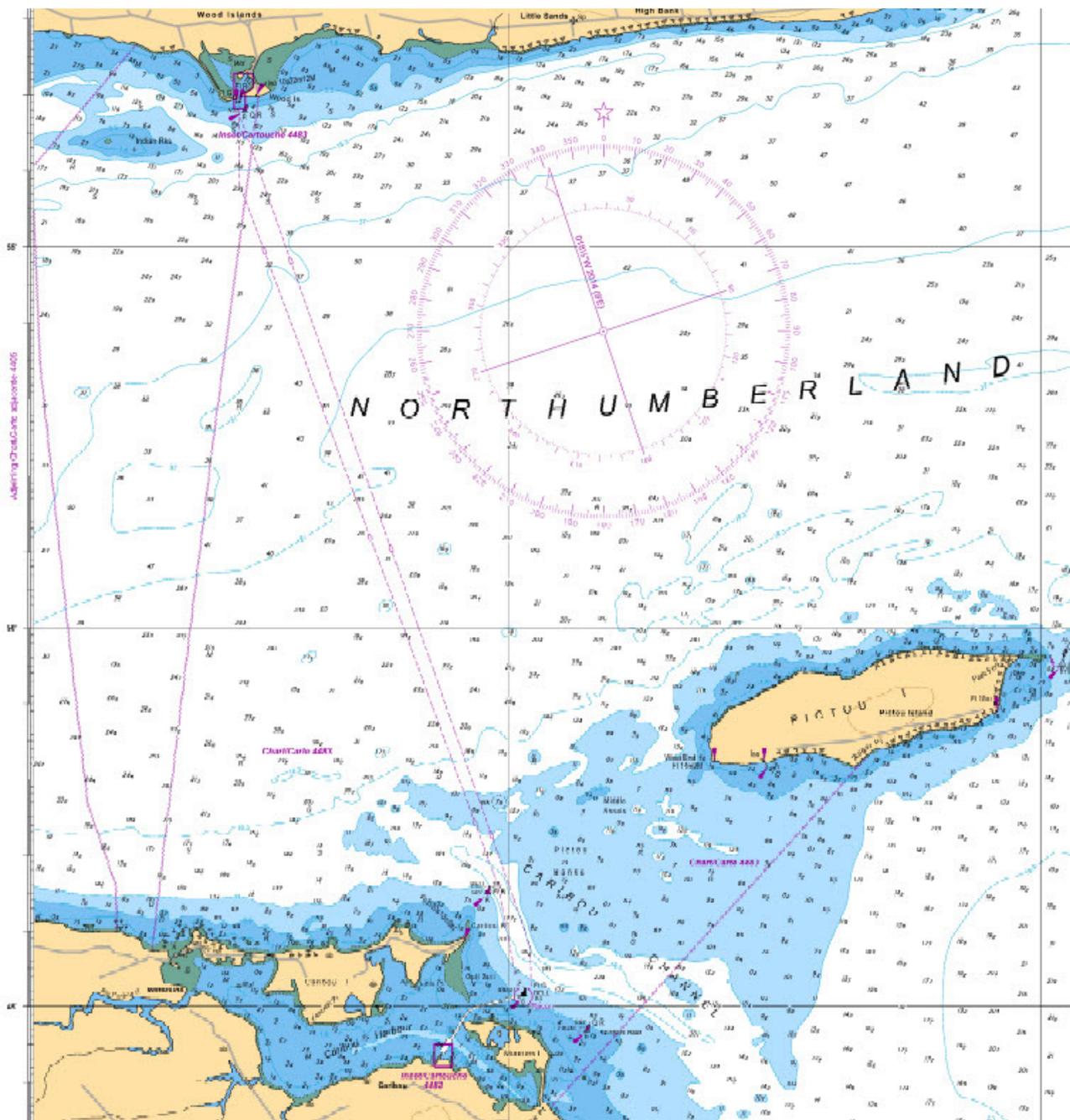
¹³⁶ Extract from Canadian Hydrographic Service (CHS) chart 4406, Tryon Shoal to Cape Egmont. Not to be used for navigation.

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This Figure also shows the PEI-NB Cable Interconnection Upgrade Project power cables and Confederation Bridge which are described later in this section.

The APOCS 1B communication cable is shown on the extreme left of the Figure below. Another supposedly abandoned communication cable which takes a direct route from Caribou, Nova Scotia to Wood Islands, Prince Edward Island is also shown in the Figure below.

Figure – Extract from CHS chart 4404 – APOCS 1B and Abandoned Cables¹³⁷



¹³⁷ Extract from CHS chart 4404, Cape George to Pictou. Not to be used for navigation.

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The communication cable from Widow Point on the Nova Scotia mainland (bottom center of the above image) to Roger Point on Pictou Island crossing Caribou Channel lies within Nova Scotian waters. DOES IT HAVE AN EASEMENT???

Since 1918, the Maritime Electric Company Limited (Maritime Electric) has delivered electricity on Prince Edward Island. As of 16 March 2018, Maritime Electric was an indirect wholly-owned subsidiary of Fortis Inc.,¹³⁸ and operated under the provisions of the Prince Edward Island *Electric Power Act*¹³⁹ and *Renewable Energy Act*.¹⁴⁰

In 1977, two oil-filled 138 kilo volt 3 phase subsea power cables were installed across the Northumberland Strait from Murray Corner, New Brunswick to Fernwood, Prince Edward Island, a route of approximately 23 kilometres. The surface vessel positioning was 3-range Trisponder radio positioning with the stern chute of the vessel and plough on the seabed positioned by layback and the reverse barge heading. There was no acoustic positioning as such systems for offshore survey work not available at that time. There were minimal deviations from the proposed location which was used by the CHS in chart 4406 shown in the Figure below.¹⁴¹

At that time there was no need for an easement, licence to lay, or lease to use the seabed required as this documentation was not required. There was limited Public Works Canada involvement in this project, although the federal government provided grant funding and a loan to the Government of Prince Edward Island for the project.¹⁴²

Maritime Electric intends to continue use these power cables until an issue arises. As of 16 March 2018, the power cables appeared to be in good condition and the lighter loading caused by the additional installed capacity described below should promote a longer life for these power cables. Maritime Electric have not determined what will be done with the power cables after decommissioning but would expect that an Environmental Impact Assessment would be completed during decommissioning and that will determine whether the power cables are left in place or removed.¹⁴³

On 02 December 1997, the northwest power cable was severed by the bulk potato carrier MV Irene about 6 kilometres from the Prince Edward Island landing. At this location the power cable was buried to 0.6 metres below the seabed which was relatively dense till. A repair crew was mobilized immediately and completed the repairs on 27 December 1997, just before heavy ice arrived which would have shut down the repair operations till the next spring.¹⁴⁴

¹³⁸ Online at Maritime Electric, About Us, Corporate Profile at http://www.maritimeelectric.com/about_us/ab_corporate_profile.aspx (last accessed: 16 March 2018).

¹³⁹ *Electrical Power Act*, Statutes of Prince Edward Island 2017, chapter E-4 online at Government of Prince Edward Island, Government, Government Services, Legislation, Statutes and Regulations at <https://www.princeedwardisland.ca/sites/default/files/legislation/E-04-Electric%20Power%20Act.pdf> (last accessed: 16 March 2018).

¹⁴⁰ *Renewable Energy Act*, Statutes of Prince Edward Island 2016, chapter R-12.1 online at Government of Prince Edward Island, Government, Government Services, Legislation, Statutes and Regulations at <https://www.princeedwardisland.ca/sites/default/files/legislation/R-12-1-Renewable%20Energy%20Act.pdf> (last accessed: 16 March 2018).

¹⁴¹ Personal discussions with Wally MacDonald, President, Marengo Engineering by Bruce Calderbank on 06 February 2018.

¹⁴² Personal correspondence with Mark Victor, Manager, T&D Operations, Maritime Electric by Bruce Calderbank on 31 January 2018.

¹⁴³ Personal correspondence with Katherine Baird, Media Communications, Maritime Electric by Bruce Calderbank on 14 December 2017.

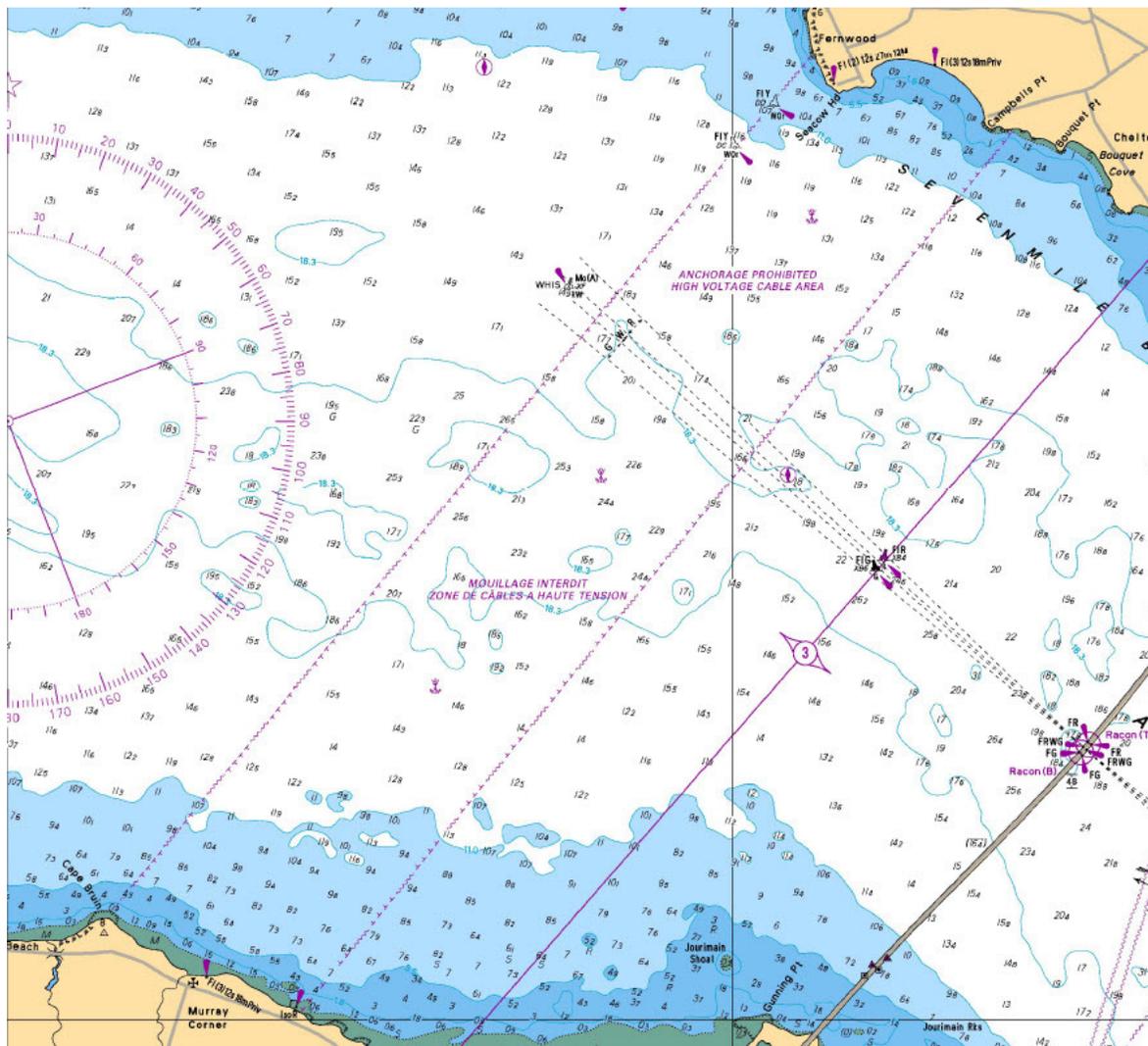
¹⁴⁴ Personal correspondence with Wally McDonald, President, Marengo Engineering, Charlottetown by Bruce Calderbank on 13 February 2018.

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On 04 December 1997, Maritime Electric submitted a Statement of Claim in Federal Court of Canada against MV Irene so that a Warrant for the Arrest of that vessel could be affected the same day. On 05 December 1997, the Irene was released and the legal proceedings could proceed against the vessel owners. On 13 November 2003, a confidential resolution between the parties was achieved which did not allow the compensation amount provided to Maritime Electric to be disclosed.¹⁴⁵

In 2012, the southwest power cable developed a leak in one of the original field splices which was repaired.

Figure – Extract from CHS chart 4406 – 1997 Maritime Electric Power Cables¹⁴⁶



¹⁴⁵ Online at Federal Court of Canada, Court Files, Court Index and Docket, Search Court Index and Docket, “Maritime Electric Company Ltd. v. Irene”, court number T-2637-97 at http://cas-cdc-www02.cas-satj.gc.ca/IndexingQueries/infp_RE_info_e.php?court_no=T-2637-97&select_court=T (last accessed: 16 March 2018).

¹⁴⁶ Extract from CHS chart 4406, Tryon Shoal to Cape Egmont. Not to be used for navigation.

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Around 2010, Maritime Electric recognized that the load on those cables was nearing capacity and that those cables were reaching the end of their planned lifespan. Consequently, the PEI-NB Cable Interconnection Upgrade Project was initiated.

The subsea portion of the PEI-NB Cable Interconnection Upgrade Project was constructed off and on between May 2016 and May 2017 along the old ferry route across the Northumberland Strait from Cape Tormentine, New Brunswick to Borden-Carleton, Prince Edward Island, a route of approximately 16.5 kilometres. Initial work carried out from May to July 2016 included preparing trenches in shallow water for the cables to be laid into and clearing rocks and debris along each cable route. The work resumed in mid-October 2016 with the cable laying and associated trenching executed by the vessel Isaac Newton.¹⁴⁷

Over the winter of 2016 / 2017 ice in the Northumberland Strait did not allow further work. During the spring of 2017 while construction and installation continued there was a ± 250 metre exclusion zone with an extra area set out close to the New Brunswick shore as shown in the Figure below (Plan R.S.ATL. 2016-001). After 03 June 2017, an exclusive zone around the cables was not required, and restrictions on scallop dragging were lifted.¹⁴⁸

The two cables were installed under the seabed in separate trenches, up to 200 metres apart. In water depths of greater than 12 metres the cables were buried to a depth of approximately 0.6 metres, while in areas of less than 12 metres depth the cables were buried to a depth of approximately 2 metres. The method of excavation within the marine environment involved trenching with excavators in water depths of up to 2.5 metres; trenching with barge based cranes using clamshell buckets between 2.5 meter water and 12 meter water depths; and a trenching Remotely Operated Vehicle (TROV) with a combination of saw cutting and water jetting for the remaining sections.¹⁴⁹

For the Prince Edward Island fisheries affected by the PEI-NB Cable Interconnection Upgrade Project, Maritime Electric held a number of information sessions and the company was willing to meet with the fisheries representatives as required. Consultation with the fisheries led to the intermittent installation program to reduce the impact on the scallop fishery in Northumberland Strait. Some compensation to the effected scallop fishery was provided by the contractor.¹⁵⁰

¹⁴⁷ Online at CBC News, Canada, Prince Edward Island, “Electric cable project work begins” posted 07 June 2016 at <http://www.cbc.ca/news/canada/prince-edward-island/pei-nb-electric-cables-maritime-1.3621108> (last accessed: 16 March 2018). With additional information provided by Katherine Baird, Media Communications, Maritime Electric.

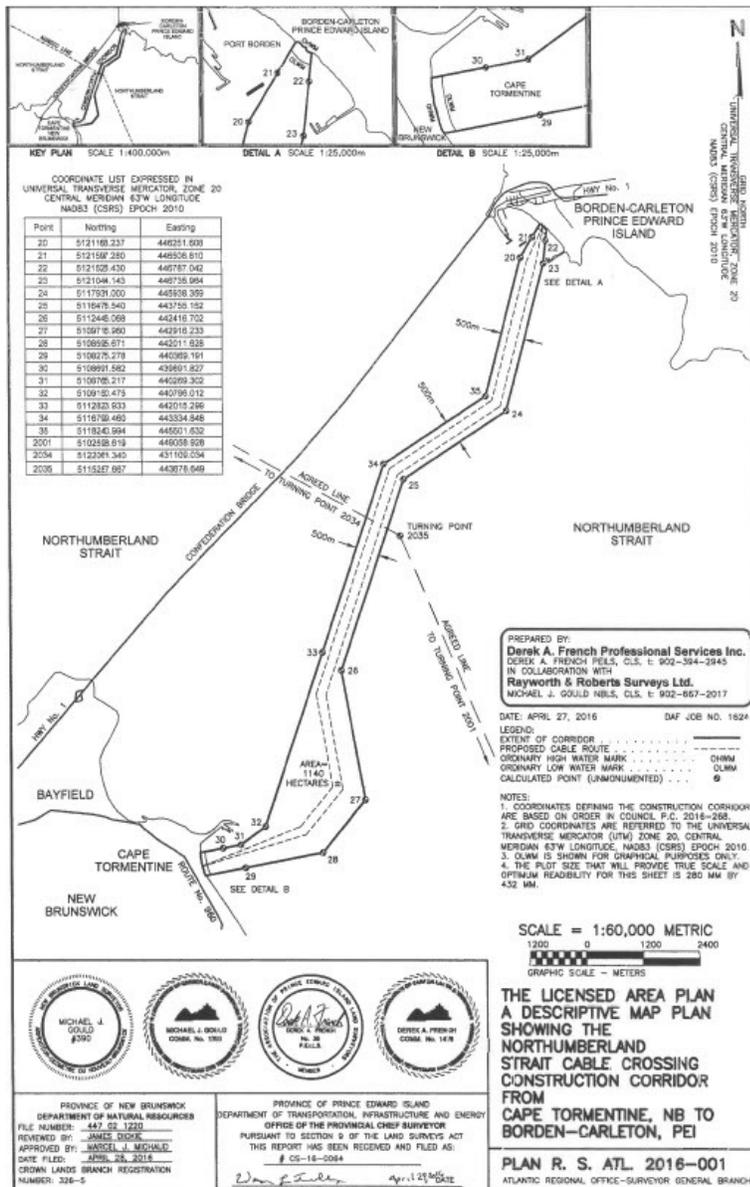
¹⁴⁸ Online at CBC News, Canada, Prince Edward Island, “P.E.I.’s underwater electric cable project complete”, posted 12 May 2017 at <http://www.cbc.ca/news/canada/prince-edward-island/pei-electrical-cable-complete-1.4113419> (last accessed: 16 March 2018). With additional information provided by Katherine Baird, Media Communications, Maritime Electric.

¹⁴⁹ Online at Maritime Electric, About Us, Projects, Interconnection Upgrade Project, Proposed Installation Methods at http://www.maritimeelectric.com/about_us/projects/ab_projects_interconnection_upgrade.aspx#future (last accessed: 16 March 2018). With additional information provided by Katherine Baird, Media Communications, Maritime Electric.

¹⁵⁰ Personal discussions with Ian MacPherson, Manager, Prince Edward Island Fisherman’s Association by Bruce Calderbank on 18 December 2017.

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Figure – PEI-NB Cable Interconnection Upgrade Project – Construction Corridor¹⁵¹



The intertidal zone, also known as the foreshore and seashore and sometimes referred to as the littoral zone, is the area that is above water at low tide and under water at high tide. The provincial governments of Prince Edward Island and New Brunswick have jurisdiction over the intertidal zones in each province based on the mean low water line and the mean high water line. Provincial jurisdiction ends at the landward side of the mean low water line and seaward of the mean low water line is the jurisdiction of Her Majesty in the right of Canada.

¹⁵¹ R.S.ATL stands for Regional Surveyor Atlantic. With respect to P.C. 2016-268 mentioned in the Notes, see Government of Canada, Privy Council Office, Order in Council Database, PCO Secretariats, search PC Number 2016-268 at <http://www.pco-bcp.gc.ca/oic-ddc.asp?lang=eng&Page=secretariats&txtOICID=2016-0268&txtFromDate=&txtToDate=&txtPrecis=&txtDepartment=&txtAct=&txtChapterNo=&txtChapterYear=&txtBillNo=&rdoComingIntoForce=&DoSearch=Search+%2F+List> (last accessed: 16 March 2018).

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The submerged lands of the Northumberland Strait below the foreshore zone are federal crown land under management of Public Works and Government Services Canada (PWGSC) [as of 16 March 2018, currently known as Public Services and Procurement Canada (PSPC)]. Government authorization for installation and operation of the subsea power cables on the seabed of the Northumberland Strait was required and included input from both provincial governments in Prince Edward Island and New Brunswick, as well as PWGSC.¹⁵² Hence the power cable corridor was considered to be Federal Real Property, but not Crown Land(?).

On 03 May 2016, to allow the PEI-NB Cable Interconnection Upgrade Project to proceed, a Joint Management Agreement was negotiated between the Government of Canada, Prince Edward Island and New Brunswick, as well as a Construction Licence Agreement and an Operations and Maintenance Licence Agreement. The Government of Canada, as represented by the Minister of Public Works and Government Services; the Government of Prince Edward Island, as represented by the Minister of Transportation, Infrastructure and Energy; and the Government of New Brunswick, as represented by the Minister of Natural Resources in the Joint Management Agreement these entities were collectively the Licensor.¹⁵³

There was no Transfer of Administration and Control (TAC) agreement related to PEI-NB Cable Interconnection Upgrade Project. Hence neither Prince Edward Island nor New Brunswick were required to transfer their possible ownership out to the Agreed Line in Northumberland Strait between Prince Edward Island and New Brunswick, as shown in the plan R.S. ATL 2016-001 in the Figure above. Nor were any provincial possible interests beyond the Agreed Line transferred to the Government of Canada.

The Construction License Agreement provided for the construction corridor to remain in place until a Legal Survey Plan was recorded for the final corridor which as of 16 March 2018 was still being drafted. The Operation and Maintenance License will be for the final corridor.¹⁵⁴

For the PEI-NB Cable Interconnection Upgrade Project, the Agreed Line turning points 2034, 2035 and 2001 were used, where those points had been defined in the Possible Inter Provincial Mineral Rights Boundaries in the Atlantic Provinces.¹⁵⁵ There was no note include on the plan or associated documentation which stipulated the purpose of the Agreed Line.

Once the power cables were installed, the respective Canadian Hydrographic Service chart 4406 – Tyron Shoals to Cape Egmont was updated as per the Navigable Waters Protection Program (NWPP) requirements set forth by the *Navigation Protection Act*¹⁵⁶ as shown in a previous Figure.

¹⁵² Online at Government of Prince Edward Island, Government, Publications, “PEI-NB Cable Interconnection Upgrade Project – VOLUME 1 Project Description”, section 1.6 Property Ownership, page 1.7 at https://www.princeedwardisland.ca/sites/default/files/publications/cle_cable_v1.pdf (last accessed: 16 March 2018).

¹⁵³ Prince Edward Island, *Executive Council Act*, EC2016-271 to EC2016-273, online at Prince Edward Island, Government, Government Topics, Publications, search Order in Council 2016 271 at https://www.princeedwardisland.ca/sites/default/files/publications/20160503_271-287.pdf (last accessed: 16 March 2018).

¹⁵⁴ Personal correspondence with James Banks, Senior Surveyor, Atlantic Region Office, Surveyor General Branch, Natural Resources Canada by Bruce Calderbank on 22 November 2017.

¹⁵⁵ “Turning points in international mineral rights boundaries (1964 – NAD27), Atlantic Provinces” dated 2004, New Brunswick Department of Natural Resources, Mineral, Policy and Planning Department, Plate 2004-27A.

¹⁵⁶ *Navigation Protection Act*, Revised Statutes of Canada 1985, chapter N-22 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/N-22/> (last accessed: 16 March 2018).

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Confederation Bridge was constructed from Cape Jourimain, New Brunswick to Borden-Carleton, Prince Edward Island across the Northumberland Strait. Construction began on 07 October 1993 and the bridge officially opened on 31 May 1997. The bridge is a multi-span balanced cantilever bridge with a post-tensioned concrete box girder structure.

Most of the curved bridge is 40 metres above water with a 60 metres high navigation span for ship traffic. The bridge rests on 62 piers, of which the 44 main piers are 250 metres apart. The bridge is 11 metres wide and 12.9 kilometres long which consists of three parts: the 1.3 kilometre-long West Approach Bridge leaving New Brunswick's Jourimain Island, over 14 piers; the 0.6 kilometre-long East Approach Bridge leaving Borden-Carleton, Prince Edward Island, over 7 piers; and the 11 kilometre-long Main Bridge which joins the approach bridges, resting on 44 piers.¹⁵⁷

To allow the Confederation Bridge to proceed, On 10 December 1992, a Prince Edward Island order-in-Council "authorized the Premier to enter into a Memorandum of Agreement with the Government of Canada and the Government of the Province of New Brunswick to establish terms and conditions under which a fixed crossing may be constructed by Canada between Prince Edward Island and New Brunswick". On 15 December 1992, another Prince Edward Island Order-in-Council authorized the Premier to enter into agreements with Strait Crossing "to define activities that will occur on Prince Edward Island as a result of the construction and operation of the Northumberland Strait Fixed Crossing", and authorizing an agreement regarding the transfer of real property in Prince Edward Island and New Brunswick to the Government of Canada.¹⁵⁸

On 19 December 1992, a federal provincial Transfer of Administration and Control (TAC) agreement was executed which provided for a Joint Management Agreement between the Government of Canada, Prince Edward Island and New Brunswick, as well as a Construction Licence Agreement and an Operations and Maintenance Licence Agreement.

On 29 September 1993, both Prince Edward Island and New Brunswick transferred their possible ownership out to an Agreement Line in Northumberland Strait between Prince Edward Island and New Brunswick, as well as any possible interest beyond the Agreement Line to the Government of Canada for which Public Services and Procurement Canada assumed responsibility.¹⁵⁹ In addition, the ramp approaches in Prince Edward Island and in New Brunswick (which included Jourimain and Trenholm Islands) were also transferred to the Government of Canada. Hence the Confederation Bridge corridor was considered to be Federal Real Property, but not provincial Crown Land.

For the Confederation Bridge, the Agreement Line turning points 2034 and 2035 were used, where those points had been defined in the Possible Inter Provincial Mineral Rights Boundaries in the Atlantic Provinces mentioned previously. As noted in Schedule C of these Transfer of Administration and Control agreements, the Agreement Line was "for every purpose related to the Fixed Crossing (the then name of Confederation Bridge) and for no other purpose whatsoever".

¹⁵⁷ Online at Confederation Bridge, About, Confederation Bridge, Design at <http://www.confederationbridge.com/about/confederation-bridge/design.html> (last accessed: 16 March 2018).

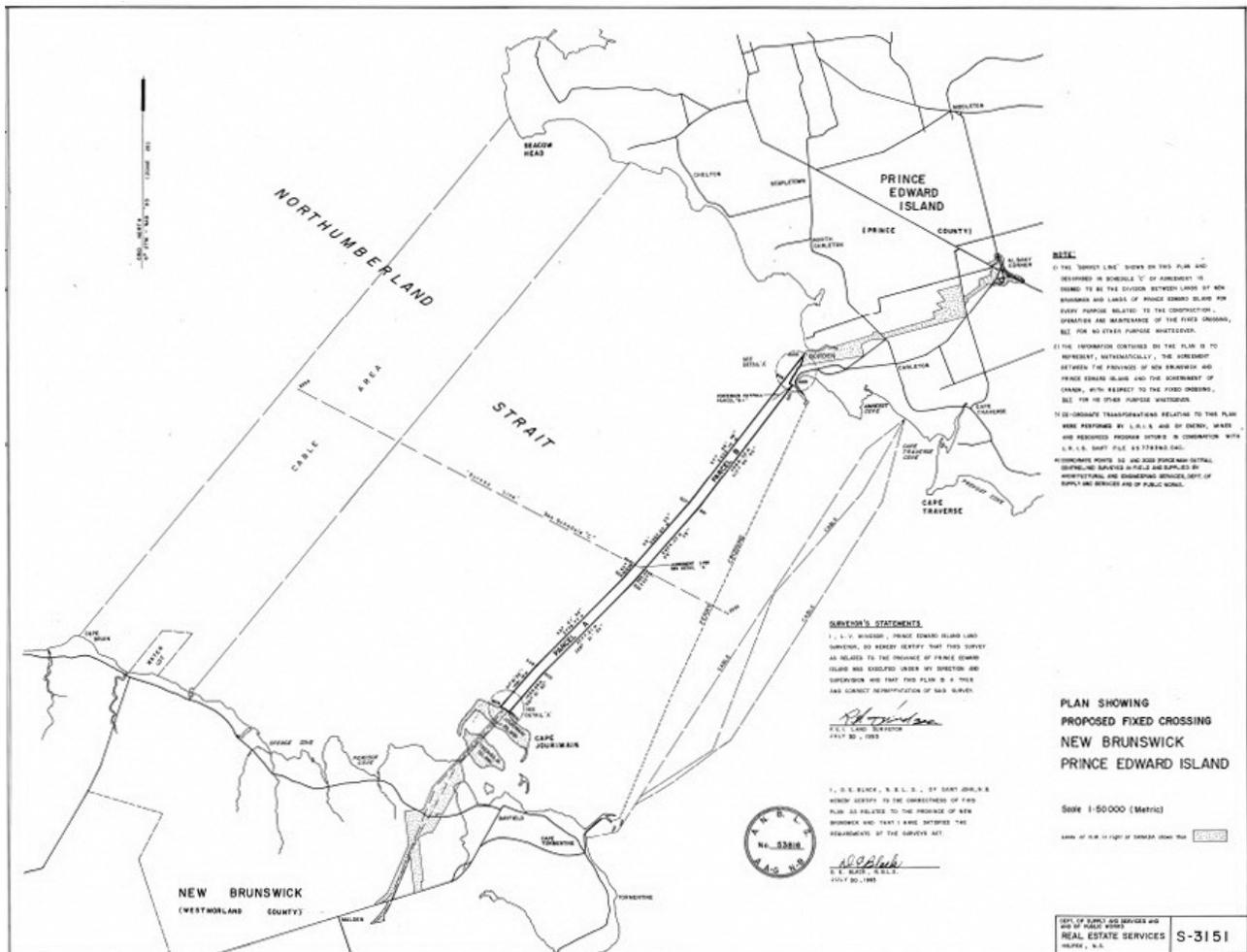
¹⁵⁸ Prince Edward Island Order-in-Council EC618/92 dated 10 December 1992 and Prince Edward Island Order-in-Council EC636/92 dated 15 December 1992, quoted in a private correspondence with John Boylan, Public Services Archivist, Public Archives and Records Office of Prince Edward Island by Bruce Calderbank on 01 December 2017. Similar orders-in-council were issued by New Brunswick.

¹⁵⁹ See Transfer of Administration and Control agreements for Prince Edward Island, Prince County Registry Office, Document Number 0137-0-9-03 registered on 29 September 1993 in Book 573 at Page 37; and for New Brunswick, Westmoreland County Registry Office, Document Number 585440 to 585443 registered on 05 October 1993 in Book 2137, page 528 (other reference numbers were 93-733 and 93-757).

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The width of the construction corridor was ± 152.4 metres (± 500 feet) which provided a marine exclusion zone across the full width of the Northumberland Strait based on the bridge alignment to allow for the vessel operations during the construction phase. Navigation corridors for vessels were provided at various points across the Strait. In addition, the approach corridors in Prince Edward Island and New Brunswick were granted to the Government of Canada¹⁶⁰ as shown in the Figure below.

Figure – Confederation Bridge



Once Confederation Bridge was installed, the respective Canadian Hydrographic Service 4406 – Tyron Shoals to Cape Egmont was updated as per the Navigable Waters Protection Program (NWPP) requirements set forth by the *Navigation Protection Act*¹⁶¹ as shown in a previous Figure showing the 3 abandoned communication and 2 new power cables in Abegweit Passage (part of the Northumberland Strait).

For the Prince Edward Island fisheries affected by the Confederation Bridge it would appear there were limited effective consultations with the fisheries. As expected, there was considerable seabed

¹⁶⁰ Personal correspondence with James Banks, Senior Surveyor, Atlantic Regional Office, Surveyor General Branch, Natural Resources Canada by Bruce Calderbank on 23 November 2017.

¹⁶¹ *Navigation Protection Act*, Revised Statutes of Canada 1985, chapter N-22 online at Government of Canada, Justice Law Website at <http://laws-lois.justice.gc.ca/eng/acts/N-22/> (last accessed: 16 March 2018).

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disturbance associated with the pier installations and the associated bridge construction. Limited compensation was offered to those immediately impacted during the construction period. As diminished catches in the bridge construction areas in the years after the bridge construction could not be scientifically proven to have been caused by the construction, then further compensation was not provided.¹⁶²

As of 16 March 2018, Maritime Electric purchases renewable energy via wind generation from Prince Edward Island's North Cape and Eastern Kings wind farms,¹⁶³ which meets 25% of Prince Edward Island's electricity needs. As yet there have been no attempts to create any offshore wind farms.

In September 2009, Prince Edward Island was considering the tidal power testing being carried out in Nova Scotia and the potential for Prince Edward Island, but any tidal power development on Prince Edward Island was then at least 5 to 10 years away.¹⁶⁴

¹⁶² Personal discussions with Malcolm Ferguson, Director, Central Northumberland Strait Fisherman's Association, Prince Edward Island Fisherman's Association by Bruce Calderbank on 21 December 2017.

¹⁶³ Online at Maritime Electric, About Us, Our Island Electricity at <http://www.maritimeelectric.com/about-us/about-our-island-electricity.aspx> (last accessed: 16 March 2018).

¹⁶⁴ Online at CBC News, Canada, Prince Edward Island, "P.E.I. exploring tidal power waters" dated 17 September 2009 at <http://www.cbc.ca/news/canada/prince-edward-island/p-e-i-exploring-tidal-power-waters-1.783304>, (last accessed: 16 March 2018).