SNC·LAVALIN

**SNC-Lavalin Inc.**
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14 August 2017 642612

**Nash Johnston LLP**
595 Burrard Street, Suite 3013
P.O. Box 49043 – Three Bentall Centre
Vancouver, BC
V7X 1C4

Attention: Mr. Brent Johnston

Dear Mr. Johnston:

**RE: Expert Opinion on Maintenance Related Cost**

This expert opinion replies to parts of the Expert Report of SC Market Analytics dated June 9, 2017 (the "SCMA Report") and is supplemental to the two SNC-Lavalin letters dated November 16, 2016 (the "November 16 SNC Report"), and December 2, 2016 (the "December 2 SNC Report") in these proceedings (collectively, the "Two SNC Reports").

More specifically, it is my opinion based on past experience, that the SCMA Report's assertions about maintenance costs for "climate-related issues" associated with the Whites Point Quarry marine terminal are not warranted. My reasons behind this are outlined below.

## 1.0 BACKGROUND AND EXPERIENCE

I have 56 years of experience in the design and construction of ports and marine facilities, bridges, industrial buildings, and heavy civil works, including the application of pre-stressed concrete, concrete slip forming and heavy lift methods and systems. I have worked at SNC-Lavalin for 31 years including, since 2005, as Senior Structural Engineer (CV provided in Attachment A).

I have extensive experience in conceptual, preliminary and detail design of wharves, breakwaters, bulk handling and oil terminal facilities both nationally and internationally. I also have construction experience as Chief Engineer for a large marine contractor doing major marine work and bridges.

I have managed feasibility studies of ports and marine terminals, channels, dams, dredging, and coastal protection around the globe, including in Abu Dhabi, Benin, Chile, Cuba, Ghana, Guinea, Equatorial Guinea, India, Jamaica, New Caledonia, Pakistan, Senegal, Sri Lanka, South Africa, Trinidad, Venezuela and Vietnam. The feasibility studies I have managed involved site selection, layout, planning, engineering, and construction supervision.

From mid-1969 to mid-1974, I lived in Digby, Nova Scotia and was employed as Resident Engineer for the construction of the Digby Ferry Terminal and, later, as Chief Engineer for Beaver Marine Ltd. While I was with Beaver Marine Ltd, I oversaw construction of the Bear River Bridge and other bridge and marine projects in the area, including the reconstruction of the wharf in Little River and the repair

of ferry ramps at Tiverton. I am therefore very familiar with the Digby area, including the coast of Digby Neck along the Bay of Fundy.

The Whites Point Quarry site and marine terminal would be on the Bay of Fundy, in a relatively isolated location out of sight of the highway and any habitation (see Attachment B). Construction of the marine terminal in the proposed location is entirely feasible: dock construction would be carried out from a floating plant consisting of tugs, barges and barge-mounted cranes and the dock support system would, in all likelihood, be constructed with steel jackets fabricated at a machine shop in Saint John NB and delivered by barge to the proposed site across the bay for installation. This type of construction was successfully used for the construction of the Canaport LNG terminal (approximately ten years ago) located at Saint John, NB.

## 2.0 ROLE IN THE TWO SNC REPORTS

I was directly involved in preparing the November 16 SNC Report and the December 2 SNC Reports. I used my experience with similar projects in the area and on other similar projects to assist in assessing the projected costs. I also helped to identify maintenance-related costs and project the expected cost of work required at 10-year intervals on the material handling and shiploader systems.

I restate and confirm the contents of the November 16 SNC Report and the December 2 SNC Report.

## 3.0 "CLIMATE-RELATED" MAINTENANCE

The SCMA Report states at page 46 that maintenance costs for the marine terminal should be "increased by a factor of 5%" to account for "climate-related issues surrounding the conveyor and supports that extend out over the sea, connecting the quarry to the ship loading area." Although this is arguably an assumption based on a hypothetical situation, I generally disagree with this assertion.

In projecting future maintenance costs for a facility such as a marine terminal and its associated ship loader, the likely effects of the natural environment in light of the facility's design and projected use must be considered. In this regard, I considered the effects of location and elements, including temperatures, precipitation and salt-water exposure, and accounted for them in preparing the December 2 SNC Report.

Additionally, I considered design features that would impact maintenance costs. In a saltwater environment steps are always taken to minimize the effects of corrosion. For example, [redacted]

In preparing my analysis, I also noted the Seabulk Systems Inc. 2008 report accounted for environmental factors in the marine terminal design, including [redacted] Indeed, this type of design has been used successfully in similar facilities located at Saint John, New Brunswick in 2008, and Whiffen Head, Newfoundland in 1998 (see Attachment D for project fact sheet).

I accounted as well for [redacted] It is assumed that normal procedures for [redacted] would be followed.

Thus, the effect of the elements or "climate-related issues" on the shiploader was considered in projecting maintenance costs has already been taken into account.

Yours truly,

**SNC-LAVALIN INC.**

Bill Collins, P.Eng

Senior Engineer – Ports and Marine
*Infrastructure Engineering – Eastern Canada (Atlantic)*

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# Attachment A

# WILSON (BILL) COLLINS

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*Mr. Wilson Collins has 55 years experience in the design and construction of ports and marine facilities, bridges, industrial buildings, and heavy civil works, some of which included the application of pre-stressed concrete, concrete slip forming and heavy lift methods and systems, Mr. Wilson Collins is able to provide innovative, workable solutions for many difficult structural problems. As a Chief Design Engineer, Mr. Collins has had extensive experience in conceptual, preliminary and detail design of wharves, breakwaters, bulk handling and oil terminal facilities both nationally and internationally. He also has construction experience as chief engineer for a large marine contractor doing major marine work and bridges.*

*Mr. Wilson (Bill) Collins has also managed and led several feasibility studies, which included site selection, layout, planning, engineering and construction supervision of ports and marine terminals, channels, dams, dredging, and coastal protection on ground in many countries including Abu Dhabi, Benin, Chile, Cuba, Ghana, Guinea, Equatorial Guinea, India, Jamaica, New Caledonia, Pakistan, Senegal, Sri Lanka, South Africa, Trinidad, Venezuela and Vietnam.*

## SECTORS OF EXPERTISE

| | |
|---|---|
| **Infrastructure & Buildings** | › Institutional; Medical Infrastructure; Industrial Buildings; Warehousing and Distribution Facilities; Office Buildings |
| **Transportation** | › Water transportation/Marine sector |
| **Oil & Gas** | › Offshore Development |

## EDUCATION

| | |
|---|---|
| **1961** | M.Sc. Civil Engineering (Structures), Rensselaer Institute, New York, United States |
| **1958** | B.Sc. Civil Engineering, University of New Brunswick, New Brunswick, Canada |

## EXPERIENCE

**SINCE 1995**

Since 2005

**SNC-LAVALIN INC., ST. JOHN'S, NEWFOUNDLAND AND LABRADOR, CANADA**

*BAE-Newplan - Newfoundland*

**Senior Structural Engineer**

- New Port Installations - Design review and input for Timber Crib Harbour Development of a marine base at Holyrood, NL and fishing harbour at Blanc Sablon, QC.
- Steel fabricatin for Vale Long Harbour Project - acted on client's behalf at fabricator's premises to ensure steel was supplied as and when needed.
- Provided general oversight for two (2) Nalcor electrode breakwaters at Dowden's Point and L'Anse au Diable.
- Oversaw maintenance work on A. Harvey & Co. wharves 14, 15 and 16 in St. John's harbour.
- Developed concepts for widening St. John's Drydock for newdock.
- New Port Installations - Beauport Sector, Port of Quebec, Quebec Port Authority, Quebec, Quebec, Canada,CA $325 000 000, (2013 - 2014) Concept development and detailed design engineering and production of drawings and specification for the construction of a 630 m dolphin wharf, and a 610 m quay of reinforced concrete cribs. The project includes quay accessories, equipment for bulk liquid transfer,

### Years of Experience

- 56 years

### Years with SNC-Lavalin

- 31 years

### Key Positions

- Designer - Structural
- Engineer - Civil
- Engineering Manager/Director - Structure

### Languages

- English
- French

and ship to shore piping design, as well as shore power design. Dredging, building a retaining dyke, a breakwater, and redevelopment of the beach are also included.
- Development of options for a proposed offshore service base at Fermeuse, NL.
- Assisting with the installation of three new 3000 tonne shore mooring points at the Bull Arm Deep Water Site, and proof testing of the six existing points for Kiewit Kvaerner Contractors.
- Review of breakwater proposals for the inshore electrode sites at Dowden's Point and L'anse au Diable for Nalcor and input on constructability of these.
- Completed analysis and design of port facilities for an existing fluorspar mine in St. Lawrence, NL, Canada. Design included both a concrete caisson and steel sheet pile cell structure option.
- Structural Engineer for the design of a steel pipe piled mooring and breasting dolphin at the St. John's Port Authority in St. John's, NL.
- Argentia Fleet Dock, Argentia, Newfoundland, CAN. Responsible for development of cost of construction for a $6 million docking facility.

1995 - 2005

*BAE-Newplan - Newfoundland*

**Manager, Structural/Marine**

- Responsible for all concept development, structural design and civil engineering constructability of marine work produced by the firm, including project management, feasibility studies, engineering, procurement and construction supervision
- Senior Port Engineer for the construction supervision and control of the expansion and rehabilitation works of the Ports of Malabo and Bata, Equatorial Guinea – The combined works of this port expansion program is expected to take seven years and cost a total of $1.3 billion Euros. The works entailed the production of almost a hundred concrete caissons to provide berths with 16 metres depth, and five kilometres of breakwaters in water depth to 20 metres
- Senior Port Engineer for a pre-feasibility study that involves a 70 MTPa iron ore load out facility to handle 200,000 DWT vessels - The project is located in Guinea, West Africa, and the new port is expected to cost about USD 500 million
- Technical support engineer for a study of ways to improve commercial navigation on the Ganges and Brahmaputra Rivers in India
- Marine Design Engineer for the Hambantota Port Feasibility Study in Southern Sri Lanka - Participated in the final siting of the port, approach channels, breakwaters, and the development of workable alternatives for a large container transhipment and bulk handling port; produced cost estimates and provided recommendations for a Bankable Feasibility Study
- Marine Design Engineer for the Bassac River Improvement Project in the Mekong Delta of Vietnam - A number of options were examined to provide increased vessel access to inland ports and a recommendation was made to the Mekong River Commission and the World Bank. The proposed solution was the creation of a 30 km long inland waterway, end structures with breakwaters, and shore protection for a channel to handle vessels to 10,000 DWT
- Design and construction supervision of a forest products marine terminal. This is a $5.5 million dollar multi user facility located at Cartwright, Southern Labrador. It went into service in the fall of 2002
- Design Lead and Project Manager for the design of second 150,000 DWT tanker berth at the Whiffen Head (Hibernia Crude Oil) Transhipment Terminal in Newfoundland, Canada - The construction of this $20 million wharf composed of

## Site Experience

- Benin
- Canada
- Ghana
- Guinea
- India
- Pakistan
- Togo
- Viet Nam

## Computer Applications

- MS Office

steel pipe jackets was completed on schedule and within budget in 1998
- Lead Structural Engineer for layout and design of harbour development and temporary wharf facilities for Goro Nickel Project, New Caledonia for INCO
- Concept Development Engineer for marine structures to accommodate ships up to 50,000 DWT, a 1500 t/hr radial shiploader, and associated facilities at Voisey's Bay Nickel-Copper-Cobalt Mine Project, Labrador, Newfoundland, Canada
- Bankable feasibility studies for proposed marine terminals in Chile, Trinidad, Venezuela, New Caledonia, South Africa (Durban 2nd Port) and Abu Dhabi for container terminal and large international base metal related industrial projects - Each of these projects involved dredging/trestle trade-off studies, approach channels, breakwaters, and shore protection for the channels and facilities

**1990 - 1995** | **NEWPLAN CONSULTANTS LIMITED, MOUNT PEARL, NEWFOUNDLAND AND LABRADOR, CANADA**
**Senior Marine Specialist**

- Seconded to Hibernia Offshore Oil Project, St. John's, NL
  - Responsible for the inshore marine infrastructure to support the Gravity Base Structure Project, NL, Canada, the largest offshore concrete structure built in North America involving preparatory dredging of over 100,000 m3 of rock, 500,000 m3 of common material, underwater fill consolidation, large drydock construction with till filled rock berms, berm removal, six wharves (aggregate length 520 m), constructed of concrete, steel pipe, sheet piling, a timber cribwork ferry dock, the main top sides structure assembly pier (150 m x 50 m x 15 m depth - concrete caissons, (live loads up to 150 t/m²) working under the most stringent QA/QC program ever used on a civil offshore project in Canada - This project involved design data input to a number of CAD stations and resulted in over 600 drawings being produced

**1985 - 1990** | **BOND ARCHITECTS & ENGINEERS LIMITED, ST. JOHN'S, NEWFOUNDLAND AND LABRADOR, CANADA**
**Director**

- Responsibilities included design, planning, construction supervision, upgrading and extension of existing marine structures, wharves, marine service centres, concrete gravity and rubble mound for water supply and safety inspection of hydro dams, an offshore fabrication facility and loadout wharf at Marystown and various offshore service bases, wharf repairs, special fendering systems and rehabilitation of deteriorated marine structures in Newfoundland and Labrador

**1980 - 1985** | **MID OCEAN ENGINEERING LTD., ST. JOHN'S, NEWFOUNDLAND AND LABRADOR, CANADA**
**Principal**

- The work generally involved Structural/Marine Consulting and typically included design/repairs for ice damaged shore arm of Newfoundland Hydro Oil Terminal at Holyrood, NL, a roll on-roll off ramp and a mooring dolphin for "MV Sir Robert Bond" at Cartwright, NL, the design of offshore service bases for oil exploration in St. John's, NL and Halifax, NS, and numerous in-shore marine projects in Newfoundland and Labrador

**1974 - 1980** | **PROJECT MANAGEMENT AND DESIGN, ST. JOHN'S, NEWFOUNDLAND AND LABRADOR, CANADA**
**Senior Consultant and General Manager**

- Project Manager for design through operational use of ten Marine Service Centres, as well as a number of timber and steel pile wharves in Newfoundland and Labrador

**1971 - 1974** | **BEAVER MARINE, HALIFAX, NOVA SCOTIA, CANADA**
**Chief Engineer**

- The Bear River Segmental Precast Bridge in Nova Scotia, and a number of other bridge and marine projects in Nova Scotia and Newfoundland

| | |
|---|---|
| 1969 - 1971 | **WHITMAN, BENN AND ASSOCIATES LTD., HALIFAX, NOVA SCOTIA, CANADA**<br>**Resident Engineer** |

› Digby Ferry Terminal in Nova Scotia – Concrete caissons with a hydraulically operated steel vehicle transfer bridge

| | |
|---|---|
| 1968 - 1969 | **T. INGLEDOW & ASSOCIATES, VANCOUVER, BRITISH COLUMBIA, CANADA**<br>**Resident Manager** |

› Location and layout of a 300 km electrical transmission line from Ghana to the Nigerian border, for the Volta River Project

| | |
|---|---|
| 1965 - 1968 | **WHITMAN, BENN & ASSOCIATES, MONTREAL, QUEBEC, CANADA**<br>**Resident Engineer** |

› Construction of new Argentia (Steel H piles) and Port aux Basques (concrete caissons) Ferry Terminals, Newfoundland

| | |
|---|---|
| 1962 - 1965 | **DELEUW, CATHER & COMPANY LTD., TORONTO, ONTARIO, CANADA**<br>**Structural Designer** |

› Fourteen pre-stressed (Post-tensioned) concrete overpass structures at the Highway 400 and 401 Interchange, Toronto, ON. These were curved structures with spans of 40 – 60 m

| | |
|---|---|
| 1958 - 1961 | **CANADIAN AERO SERVICE, OTTAWA, ONTARIO, CANADA**<br>**Resident Engineer and Location Engineer** |

› Various sections of the Quebec Cartier Mining Co. Railway in Northern Quebec and the main in-country transmission line for the Volta River Project in Ghana

## PROFESSIONAL ASSOCIATIONS

| | |
|---|---|
| **SINCE 1965** | Professional Engineers & Geoscientists of Newfoundland & Labrador (PEGNL), Membership no. 00335 |
| **SINCE 1963** | Professional Engineers Ontario (PEO) |

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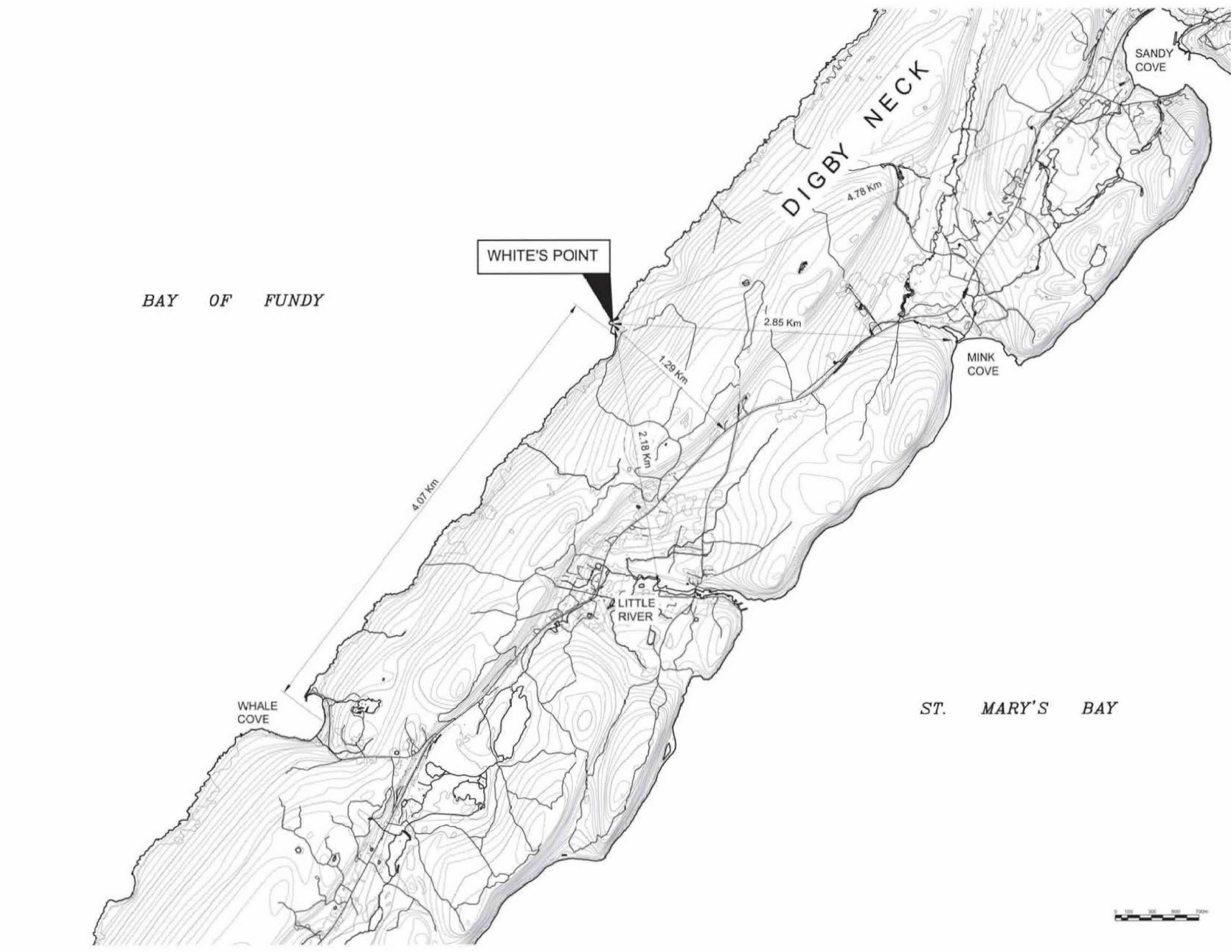
# Attachment B


DIGBY NECK
SANDY COVE
WHITE'S POINT
BAY OF FUNDY
4.78 Km
2.85 Km
1.29 Km
2.18 Km
4.07 Km
MINK COVE
LITTLE RIVER
WHALE COVE
ST. MARY'S BAY

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# Attachment C

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# Attachment D