



SNC • LAVALIN

HOLYROOD MARINE BASE PHASE IIA

Environmental Registration Document

Fisheries and Marine Institute - Memorial University of Newfoundland



INFRASTRUCTURE AND BUILDINGS

27 | 07 | 2015

REPORT

Rev. 0 > Internal ref. 512010



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1.0 NAME OF UNDERTAKING

Holyrood Marine Base Phase IIA

2.0 PROPONENT

Fisheries and Marine Institute of Memorial University of Newfoundland
P.O. Box 4920
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Derek Button

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3.0 DESCRIPTION OF THE UNDERTAKING

3.1 Purpose/Rationale/Need for the Undertaking

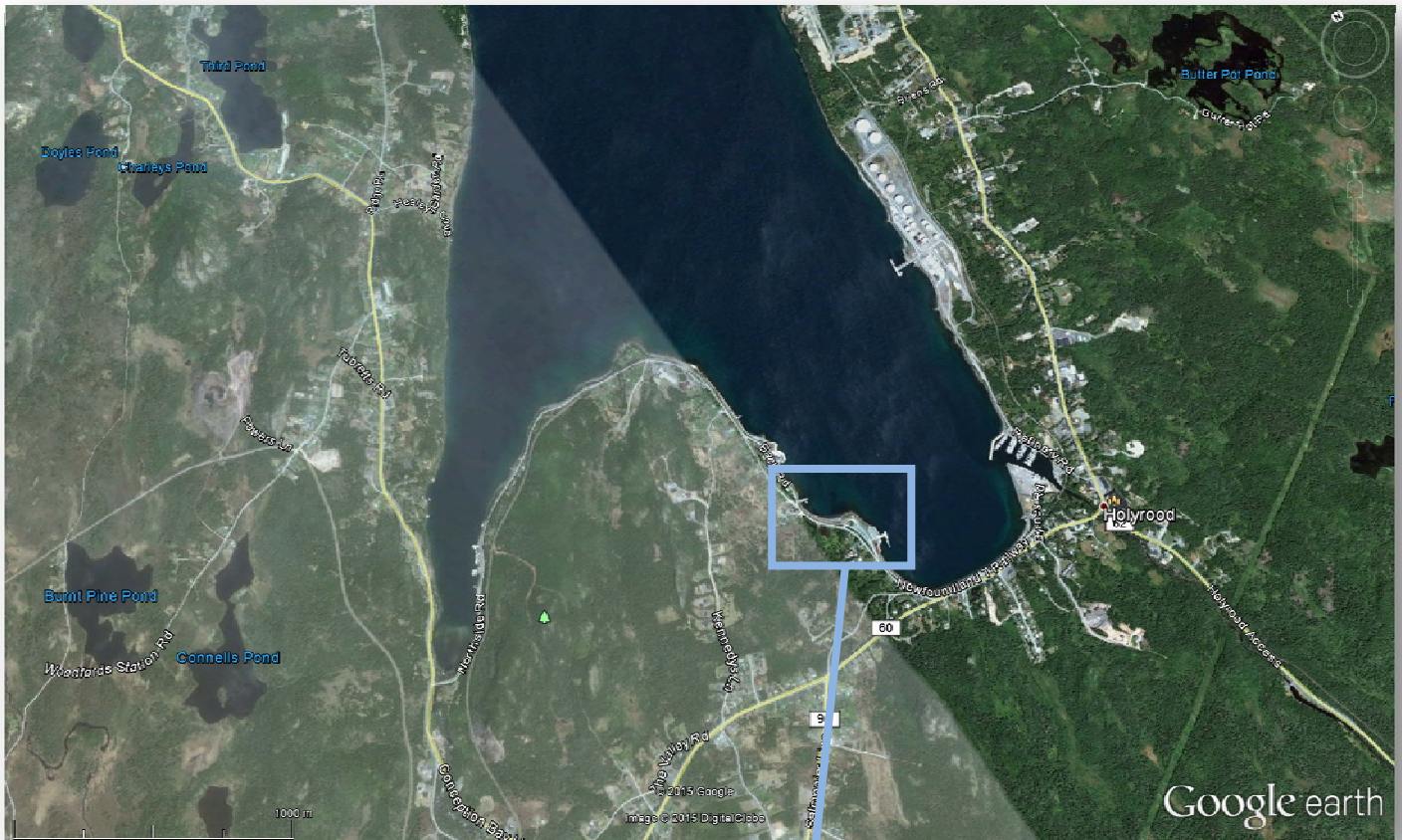
This undertaking is an expansion to the current Marine Institute facilities in Holyrood. This facility will provide the required berthing space for large research vessels, provide capabilities for offshore related ocean training, allow for ROV research and development, and provide a sheltered berth for other training related exercises.

Whereas the Fisheries and Marine Institute of Memorial University is a world oceans institute, a primary focus for any undertaking is preservation and integrity of our oceans environment.

3.2 Geographical Location

Subject property is located within the Town of Holyrood, at the south arm of Holyrood Bay along Northside Road. The site is adjacent to and includes the former Seaxx fish processing plant T-shaped wharf. The T-shaped wharf is now property of the Marine Institute.

Coordinates of the proposed development are: W 47 deg. 27 min. 19 sec. N 53 deg. 8 min. 7 sec.





3.3 Physical Features

The major features of the undertaking include:

- ☐ A timber crib marginal wharf (~125m)
- ☐ Timber crib breakwater (~57m)
- ☐ Timber crib finger pier (~52m)
- ☐ Rehabilitation of existing T-shaped Wharf by way of Steel Sheet Pile bulkhead.

The proposed breakwater and marginal wharf are constructed of timber cribs, filled with rock ballast. The top elevation of both the breakwater and marginal wharf is +3.8 m, chart datum (3.2 m geodetic.) The breakwater consists of cribs and an exterior rubble mound on the north side of the breakwater. The rubble mound is armour stone protected.

Each breakwater crib is approximately 10.4 meters long and 10.4 meters wide. Crib depths vary depending on water depth and range from 5 meters near land to 11.3 meters at the end of the breakwater. In locations where water depth is minimal, the timber cribs are installed directly on the seabed. For deeper water areas, the timber cribs are placed on a newly constructed rock mattress.

The marginal wharf cribs are stepped cribs. The base footprint of these cribs is 10.4 meters wide by 5.4 meters wide, but reduces to 2.8 meters wide at mid height. The maximum height of the cribs is 5.0 meters.

Standard construction methods for the timber cribs will be utilized. This consists of partial construction of cribs on land prior to placement in water. The above water portion would be constructed after cribs are placed in the water. At that time, each crib section would be tied together with marrying timbers.

Any required rock mattress is typically placed using a clamshell and leveled using a leveling beam. The cribs are ballasted using large rock fill.

Backfilling of the marginal wharf will be completed using standard construction equipment including tandem trucks, loaders, and excavators.

The area affected by the undertaking can be found in the following table:

Location	Area (m ²)
Uplands Property	54,150
Marginal Wharf	730
Finger Pier	1050
Breakwater	2200
T-Head Wharf	500
Total	58,630



See Appendix 'A' for a plan view and sections of the proposed undertaking.

3.4 Physical and Biological Environment

The topography of the existing site has a generally flat upland area with a significant slope to a rocky shoreline. The slope starts approximately 20 metres from the water's edge. The proposed undertaking will adjust the topography to have a gradual slope from the upland to the wharf. Grading will be completed to ensure sound drainage on the site.

The existing site contains a timber boardwalk and gazebo structure. These structures will be removed during construction and reinstated post construction. Reinstatement of these structures will be incorporated into the design of the site.

The existing site has very little vegetation and wildlife species. The parcel of land is a barren property consisting of a gravel parking lot used by the former fish plant. There is a 20 metre wide strip of land between the parking lot and rocky shoreline that has mostly grass but also includes patches of small trees and shrubs.

There are no bodies of fresh water located at the proposed site. The undertaking includes the placement of timber cribs and a stone breakwater in Holyrood Harbour.

There is no known spawning or breeding areas in the foot print of the proposed site. Also, there are no known commercial fish species located within the foot print of the proposed undertaking. An underwater ROV video survey was completed in the area and reviewed by DFO.

Photos of the project site can be found in Appendix B.

3.5 Construction

3.5.1. Construction Schedule

Total construction period for this project is as follows:

- ☐ Rehabilitation of T-shaped Wharf – 4 months
- ☐ Marginal Wharf, Breakwater, and Finger Pier Installation – 10 to 12 months

Proposed date of first physical construction related activity on site is late September 2015.

3.5.2. Sources of Pollutants

The potential sources of pollutants associated with the construction phase of the project include the following:

- ☐ Noise
- ☐ Light



- ☐ Airborne emissions
- ☐ Dust
- ☐ Hazardous Liquids
- ☐ Solid Waste Materials
- ☐ Surface Water Drainage
- ☐ Sedimentation

Noise pollution will be consistent with any heavy construction marine project. Pile driving activities will have the greatest impact. Pile driving will be limited to common work hours and will only be completed between 0800 and 1800 hours and will occur only during the first 3 to 4 months of the project schedule. Construction will not be ongoing for 24 hours. Generally, construction activity will occur during daylight hours.

Light pollution during construction will be minimal due to construction activities generally being completed during daylight hours. However, it is possible when completing marine projects that certain activities must follow tide schedules. It's possible construction would have to occur when tides are at the lowest levels which may be between dusk and dawn. Flood lights would be used but concentrated in the area of construction. Night construction would be minimized and avoided whenever possible.

Proper measures will be taken to ensure airborne emissions and dust are controlled during construction. Equipment will be inspected and monitored on a regular basis to ensure they are not producing additional airborne emissions. Required maintenance will be completed on a timely basis. Dust will be controlled by wetting surfaces which cause excess dust. Site preparation will be completed as efficiently as possible to help reduce the overall risk of dust pollution.

Diesel fuel will be present on site during construction. Fuel will be hauled to the project site to supply heavy machinery, namely cranes and earth moving equipment. Hauling of fuel and its presence on site create the possibility of spills, potentially affecting vegetation and the marine environment. The risk of such spills will be minimized by ensuring all fuel trucks are inspected and compliant to industry standards. Heavy equipment will be fuelled from fuel trucks. Refuelling will follow accepted industry practices and procedures. All refuelling will occur at designated refuelling sites, away from potentially sensitive areas and at least 30 meters from any body of water. Emergency response spill kits will be maintained on site to contain any spill of hazardous fluids.

During construction every effort will be made to divert as much material away from landfill sites as possible. Measures will be taken to recycle construction materials whenever possible.

A plan will be developed between the owner and the contractor to mitigate the amount of surface water drainage during construction. This plan will be developed prior to construction. Silt and sedimentation fencing will be provided on land and, if necessary, in the water during construction to control sedimentation concerns at the site.



3.5.3. *Potential Resource Conflicts*

Potential interactions with the Project during construction activities may include those associated with:

- ☐ Noise
- ☐ Fish and Fish Habitat
- ☐ Air Quality (dust)
- ☐ Resource Harvesting (eg: fisheries, hunting)
- ☐ Birds and Wildlife
- ☐ Water Quality (spills)
- ☐ Socio-Economic Environment

Throughout the period of site preparation and construction, particular attention will be paid to the environment to limit any significant and/or long-term alterations to the site with respect to soil and vegetation, wildlife and the marine environment.

The potential effects on the environment related to construction activities such as increased traffic, noise and dust emissions will be of limited duration. Nonetheless, mitigation measures to avoid or minimize the potential impacts of construction will be carefully defined beforehand and applied whenever required. All of the work performed, along with the materials and methodology, will conform to provincial regulations.

During construction and operation, it is the owner's responsibility to avoid serious harm to fish in compliance with the Fisheries Act. The proponent is committed to following the applicable recommendations provided by Fisheries and Oceans Canada (<http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>) to avoid causing serious harm to fish and fish habitat. Particularly, a plan will be developed with the following mitigation measures implemented:

- ☐ The proposed project shall be carried out in such a manner that sediment, concrete and/or other related material do not enter the waters of Holyrood Bay (South Arm).
- ☐ Project related activity including timber crib placement, bottom preparation and rock fill placement shall be carried out during low tide and low wind/wave conditions to minimize turbidity, and to minimize the area that might be affected by turbidity to that area immediately adjacent to the project area.
- ☐ Project related activity shall be suspended whenever wind or tide conditions cause sediment to be visible outside the immediate project area.
- ☐ All vehicles and equipment must be clean and in good repair, free of mud, oil and/or any other harmful substances that could impair water quality.
- ☐ Rock material for timber crib ballast and breakwater construction shall be clean rock free of fine erodible material and sized to resist displacement during storm and/or flood events. Rock material shall not be end dumped; rather it shall be dumped on land and placed on station using an excavator or similar equipment.
- ☐ Shoreline disturbance shall be restricted to the immediate project related work



area; any shoreline areas disturbed by project related activity shall be stabilized as soon as possible to prevent erosion.

3.5.4. Safety

Memorial University of Newfoundland is very proactive with respect to Safety Management and will have bi-weekly inspections of the project to ensure full compliance.

3.6 Operation

The undertaking is an expansion to the existing Marine Institute marine base facility in Holyrood. Currently the Marine Institute operates the Southside Marine base located at Pier 25 in St. John's harbour. It features lifeboat evacuation training systems and a 137-metre dock. The base offers nautical science training, offshore safety and survival training and is the base for the university's training and research vessels. It is anticipated that all operations will be moved from Pier 25 to Holyrood once the undertaking is complete.

There will be two main elements ongoing during operations of the facility:

- ☐ Training for offshore safety and survival;
- ☐ Research in ocean safety and technology including the operation of the Smart Bay System and other oceanographic equipment.

This is a permanent facility operating year round. Daily working hours will be from 8AM to 5PM.

3.6.1. Sources of Pollutants

The potential sources of pollutants during operations include:

- ☐ Airborne emissions
- ☐ Hazardous liquids
- ☐ Solid Waste materials

Sources of airborne emissions would include equipment and marine vessels used at the facility. It is anticipated the operations equipment used on site would include a forklift and potentially a gantry type crane used for moving vessels in and out of the water.

The hazardous liquids found at the facility will be unleaded fuel and diesel. These fluids will be used to refuel small marine vessels and equipment used at the facility. The risk of spills will be minimized by ensuring that all fuelling follows industry standards.

Solid (trash) and liquid (bilge, grey, black water) waste materials are currently being collected on site by a contracted waste management companies. Solid and liquid waste will continue to be collected by a contracted waste management company. If the amount of solid waste increases due to increase in operations, collections will be more frequent.



3.6.2. Potential Resource Conflicts

During operation, there are no anticipated potential causes of resource conflicts.

3.7 Occupations

The following table provides an estimate of the total number of employees required for construction. The table also identifies the employment status of the employee and the National Occupational Classification (NOC) code for each position. The estimated total number of positions is calculated based on the table provided in the *Economic Impact of Marine Activities in Large Ocean Management Areas*, Department of Fisheries and Oceans, 2009, Statistics Canada publication.

Occupation	NOC Code	Number of Positions	Employment Status
Construction manager	0711	1	Direct Hire
Foreman	0721	3	Contract Out
Heavy Equipment Operator	7421	6	Contract Out
Crane Operator	7371	2	Contract Out
Labourer/Trade helper	7611	20	Contract Out
Ironworkers	7236	5	Contract Out
Carpenter	7271	10	Contract Out
Electrical foreman	7202	1	Contract Out
Electricians	7242	5	Contract Out
Site inspector	2264	2	Contract Out

At this time it is not expected operations will create new employment positions at the marine base. If further expansions occur at the site, operation employment requirements will be revisited and re-evaluated.

During construction, all employment will be contracted. The construction project will be publically tendered. It will be the responsibility of the construction contractor awarded the tender to hire workers to complete the construction of the facility. Site inspectors will be



contracted by the owner.

The Marine Institute is an equal opportunity employer and encourages a workforce that is fully diversified. As such, the proponent would expect any construction contractor hired to do work at the facility to also be an equal opportunity employer. Contractors will be required to indicate in their tender bids their plan to address employment equity. The proponent will execute a zero tolerance for discrimination and harassment at the facility during construction and operations.

3.8 Project Related Documents

The following documents have been prepared for this project:

- ☐ Project Tender Drawings
- ☐ Project Tender Specifications
- ☐ Holyrood Marine Base Harbour Development Study

Copies of previously completed environmental reports are included in Appendix C.

4.0 APPROVAL OF THE UNDERTAKING

The following are a list of likely permits, licenses, and approvals required for this project:

- ☐ Fisheries Protection Program – Department of Fisheries and Oceans
- ☐ Navigable Waters Protection Act – Transport Canada
- ☐ Municipal Building Permits – Town of Holyrood

5.0 SCHEDULE

Earliest construction could commence is beginning of September, 2015. The latest date to commence work is Early October, 2015. Dates are selected so modifications to the T-Shaped wharf will be finished before the winter season allowing equipment from the St. John's Harbour Pier 25 facility to be moved to the T-Shaped wharf.

6.0 FUNDING

Expected capital costs for the project are estimated to be \$11 Million. No government agency grant or loan will be required for this project.

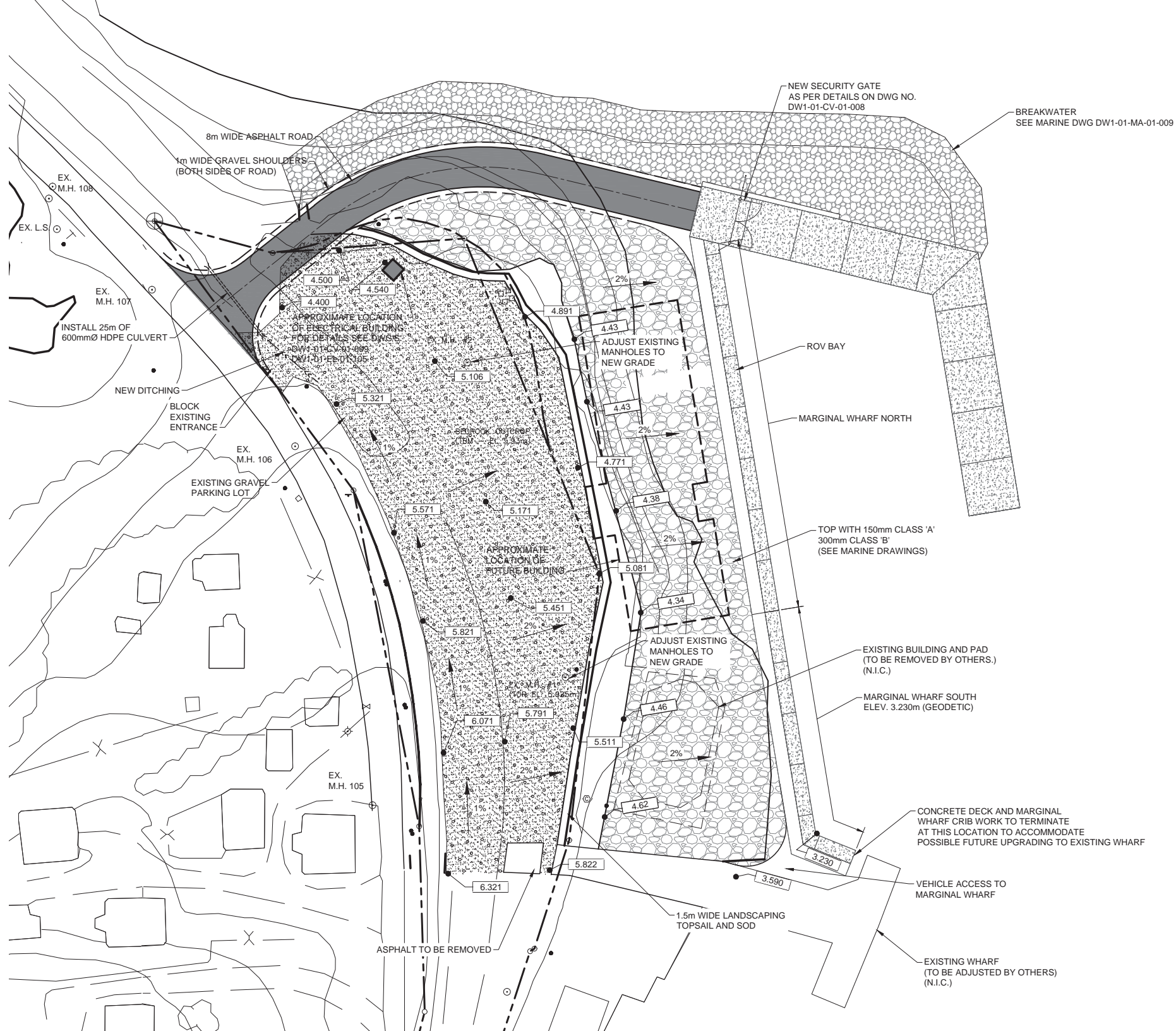
Proponent Signature

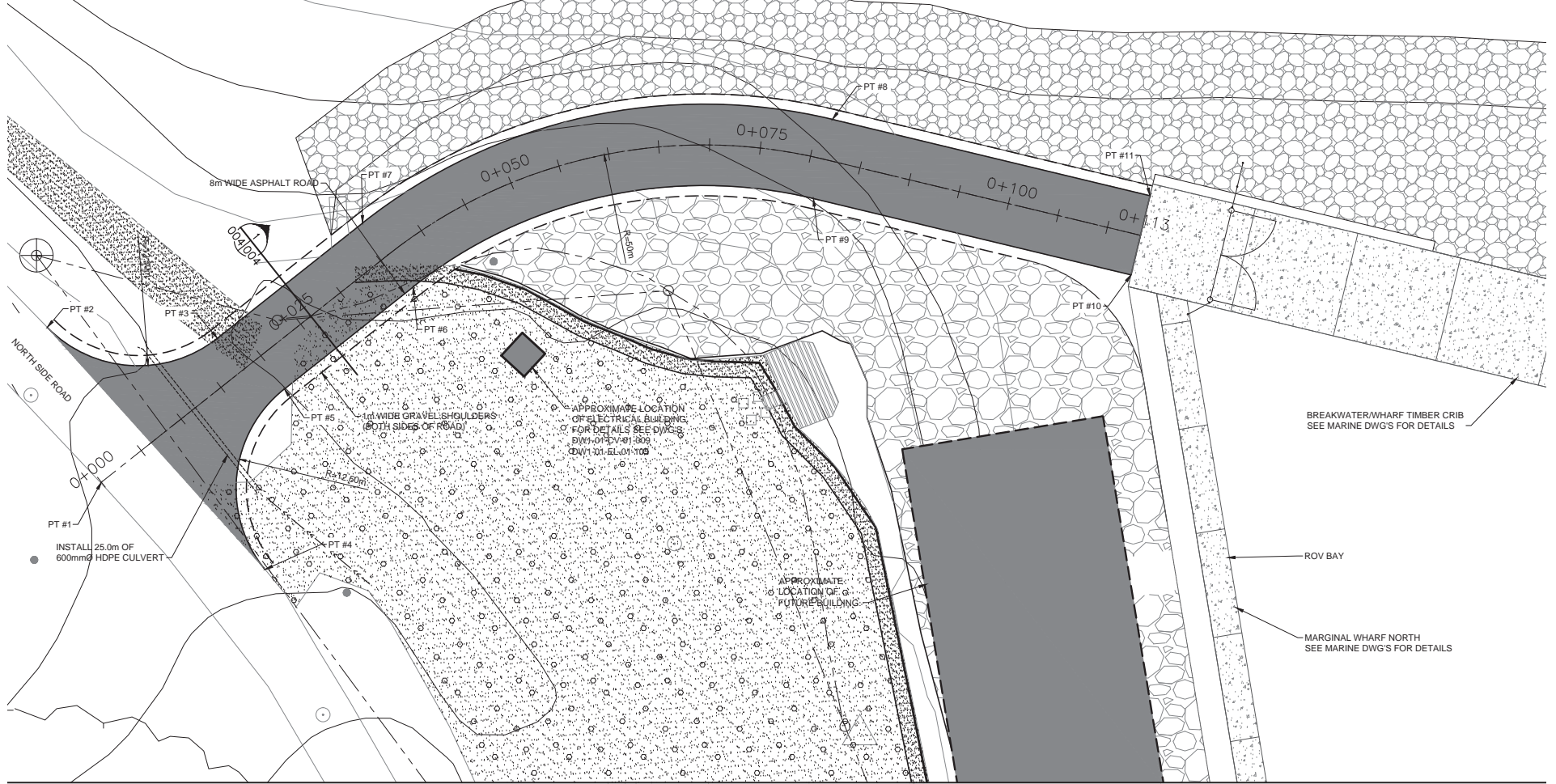
Date

Signature of Chief Executive Officer



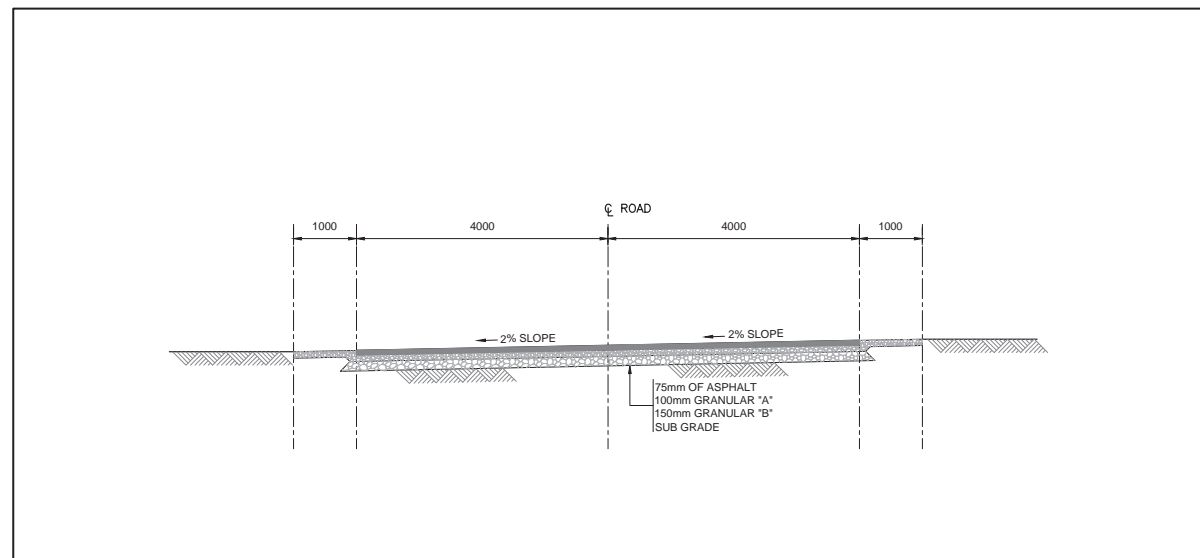
APPENDIX A – SITE PLAN AND SECTIONS





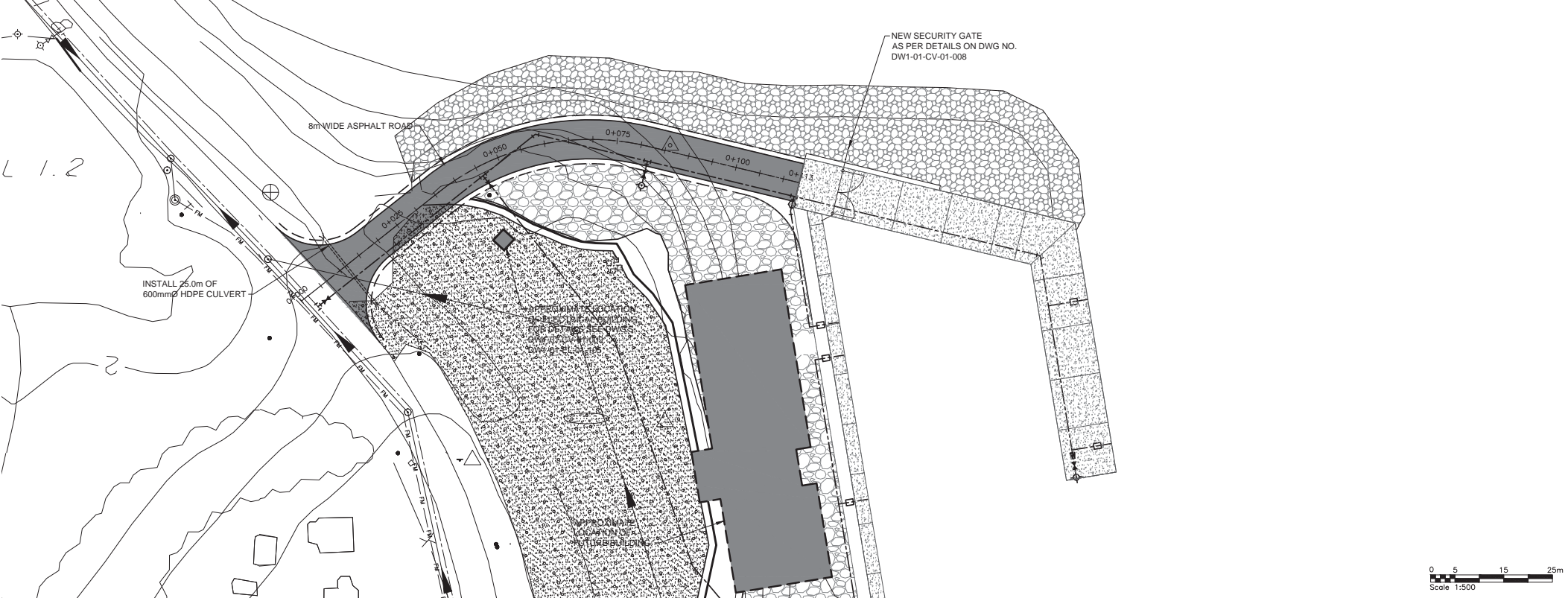
ACCESS ROAD TO WHARF

POINT	EASTING	NORTHING
PT #1	294481.833	5250043.919
PT #2	294476.517	5250059.138
PT #3	294493.236	5250058.067
PT #4	294497.925	5250035.340
PT #5	294499.813	5250053.072
PT #6	294512.472	5250063.110
PT #7	294507.501	5250069.379
PT #8	294553.674	5250079.572
PT #9	294551.804	5250071.793
PT #10	294583.017	5250064.291
PT #11	294584.886	5250072.069

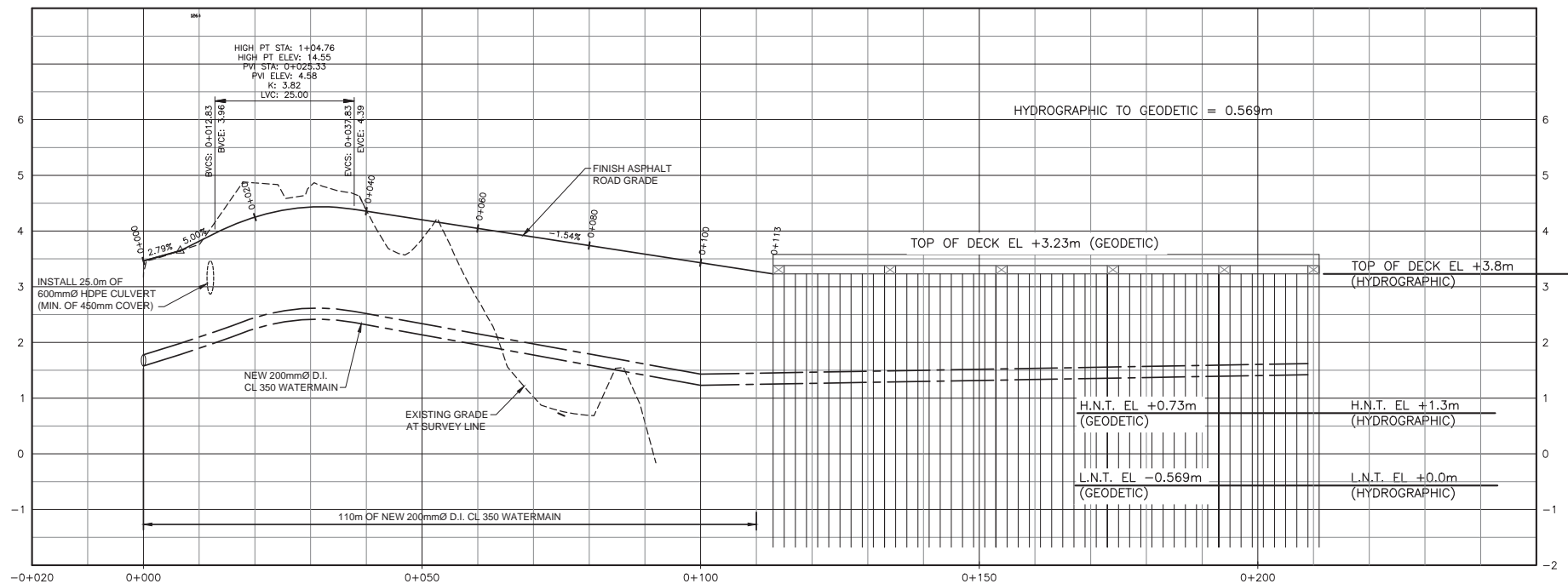


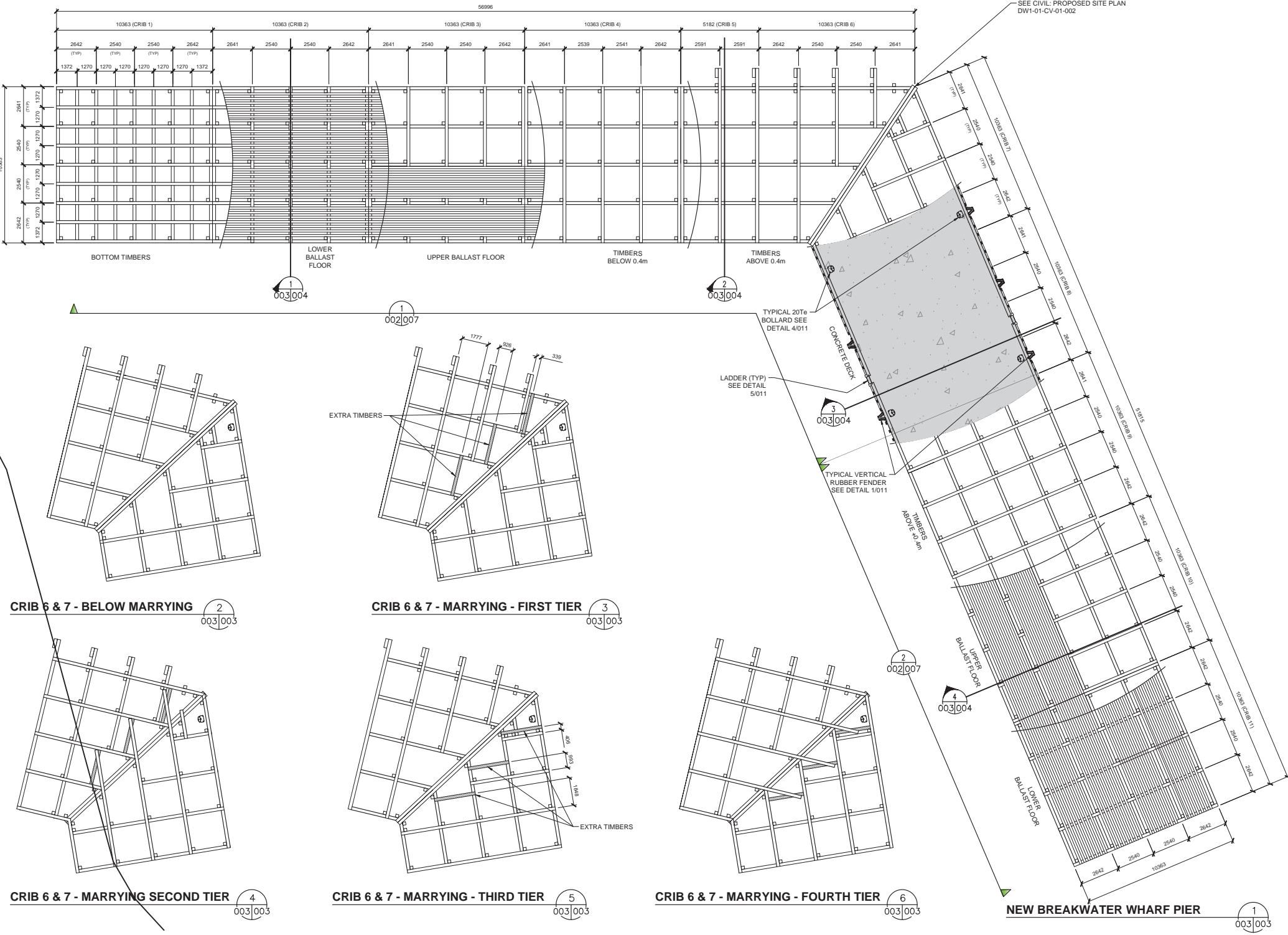
TYPICAL ROAD CROSS SECTION

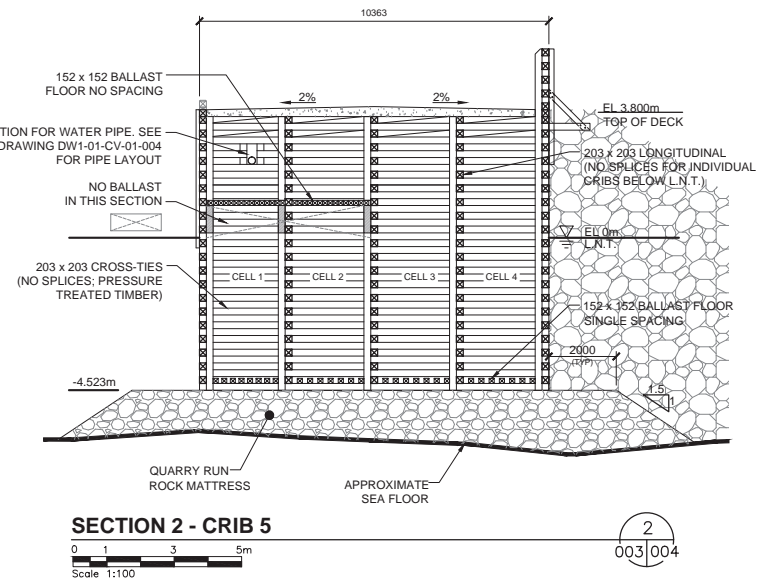
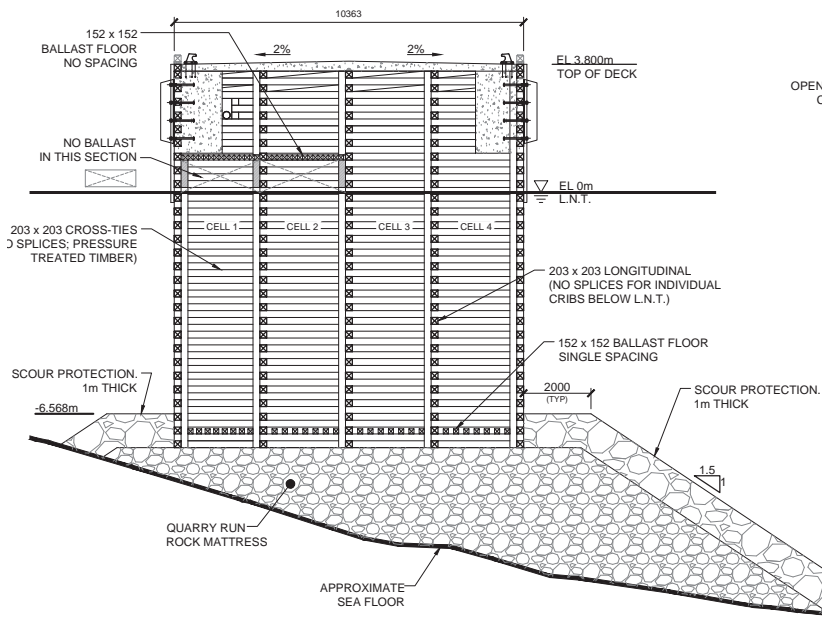
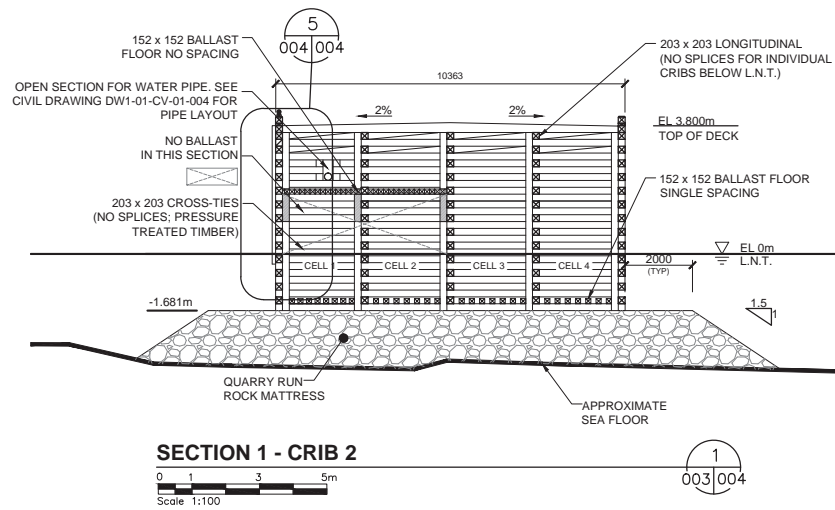
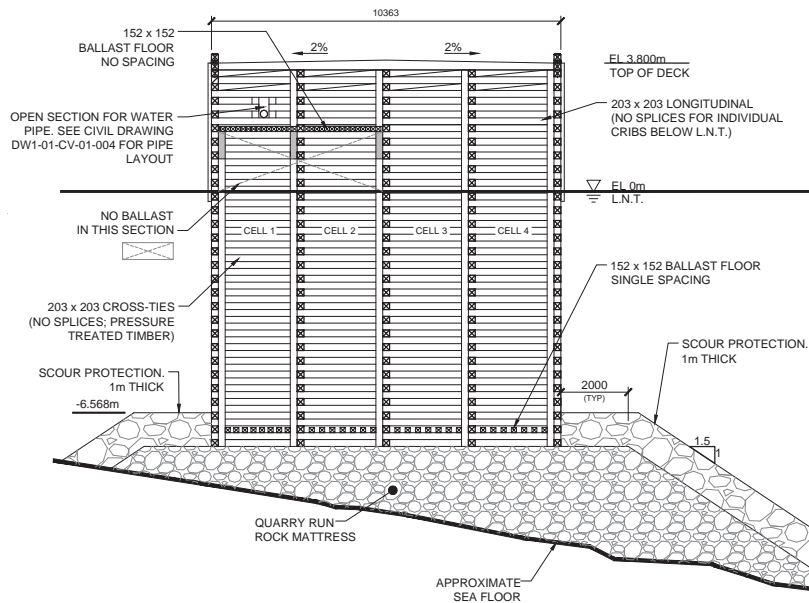


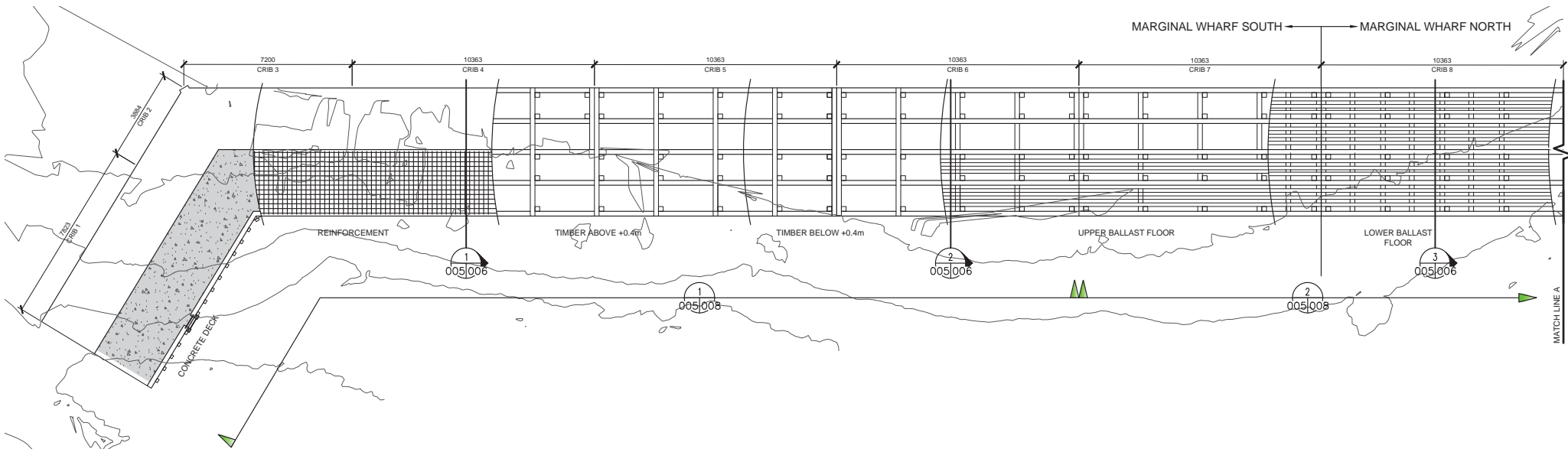


ROAD PROFILE Profile
500.000







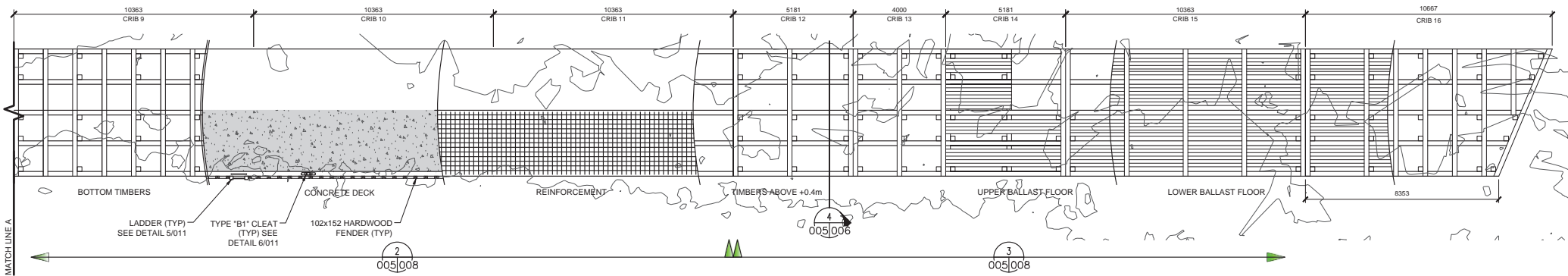


MARGINAL WHARF PLAN VIEW

0 1 3 5m
Scale 1:100

1
005|005

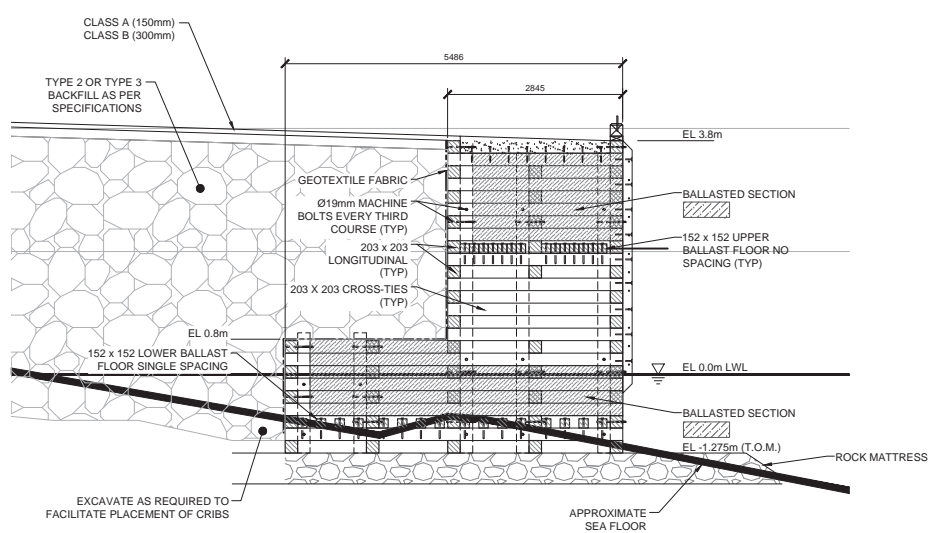
NOTES: DIMENSIONS FOR S-SHAPED REBAR AS REQUIRED TO SPLICE
HORIZONTAL REINFORCEMENT OF RETAINING WALL



MARGINAL WHARF PLAN VIEW

0 1 3 5m
Scale 1:100

2
005|005

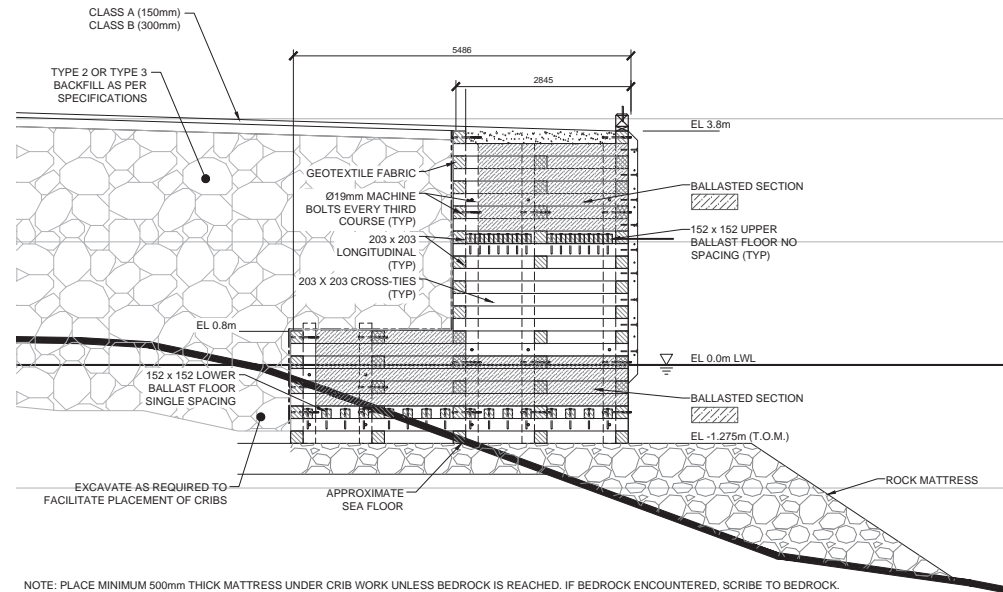


NOTE: PLACE MINIMUM 500mm THICK MATTRESS UNDER CRIB WORK UNLESS BEDROCK IS REACHED. IF BEDROCK ENCOUNTERED, SCRIBE TO BEDROCK.

SECTION - CRIB 8 LOOKING NORTH



3
006/008

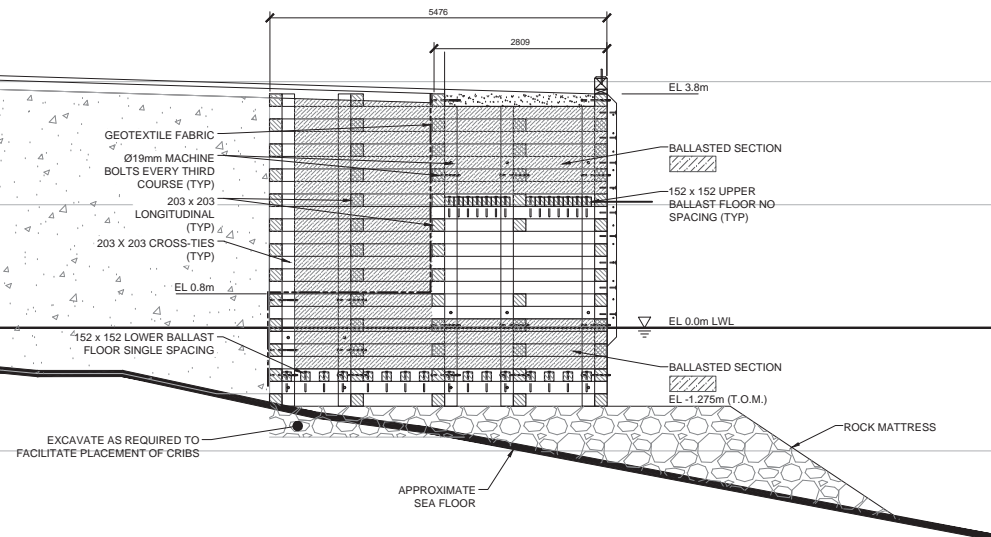


NOTE: PLACE MINIMUM 500mm THICK MATTRESS UNDER CRIB WORK UNLESS BEDROCK IS REACHED. IF BEDROCK ENCOUNTERED, SCRIBE TO BEDROCK.

SECTION - CRIB 4 LOOKING NORTH



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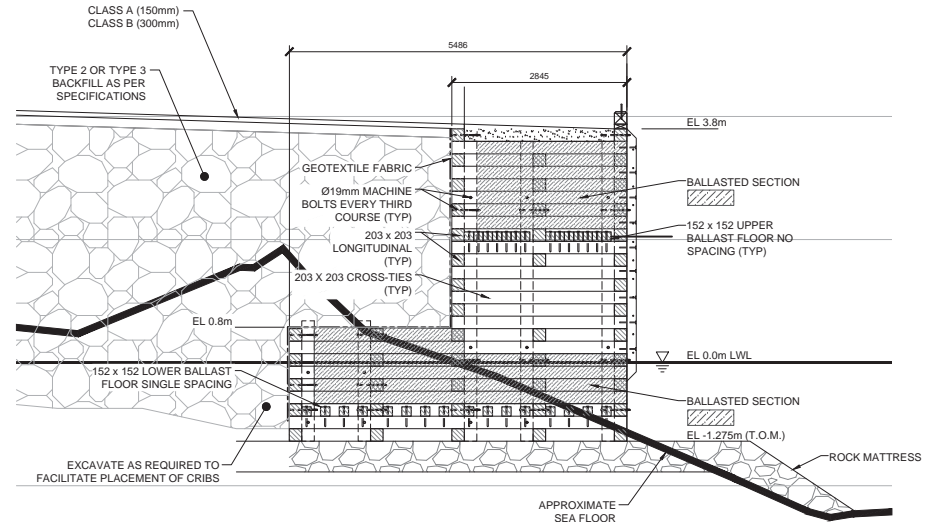


NOTE: PLACE MINIMUM 500mm THICK MATTRESS UNDER CRIB WORK UNLESS BEDROCK IS REACHED. IF BEDROCK ENCOUNTERED, SCRIBE TO BEDROCK.

SECTION - CRIB 12 LOOKING NORTH

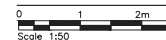


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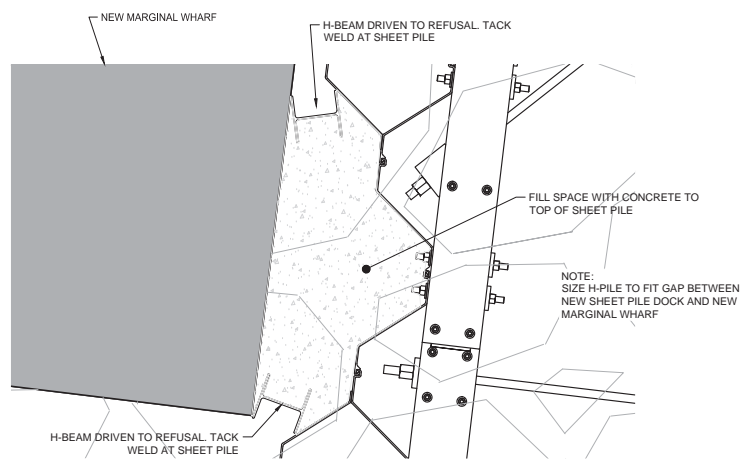
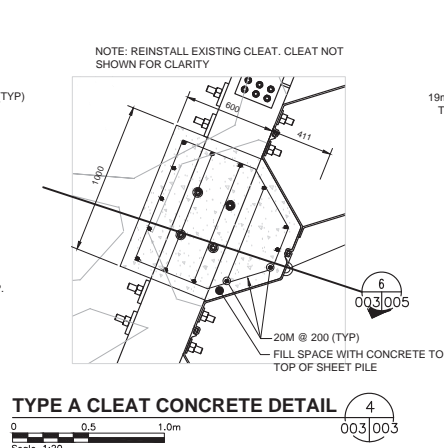
NOTE: PLACE MINIMUM 500mm THICK MATTRESS UNDER CRIB WORK UNLESS BEDROCK IS REACHED. IF BEDROCK ENCOUNTERED, SCRIBE TO BEDROCK.

SECTION - CRIB 6 LOOKING NORTH

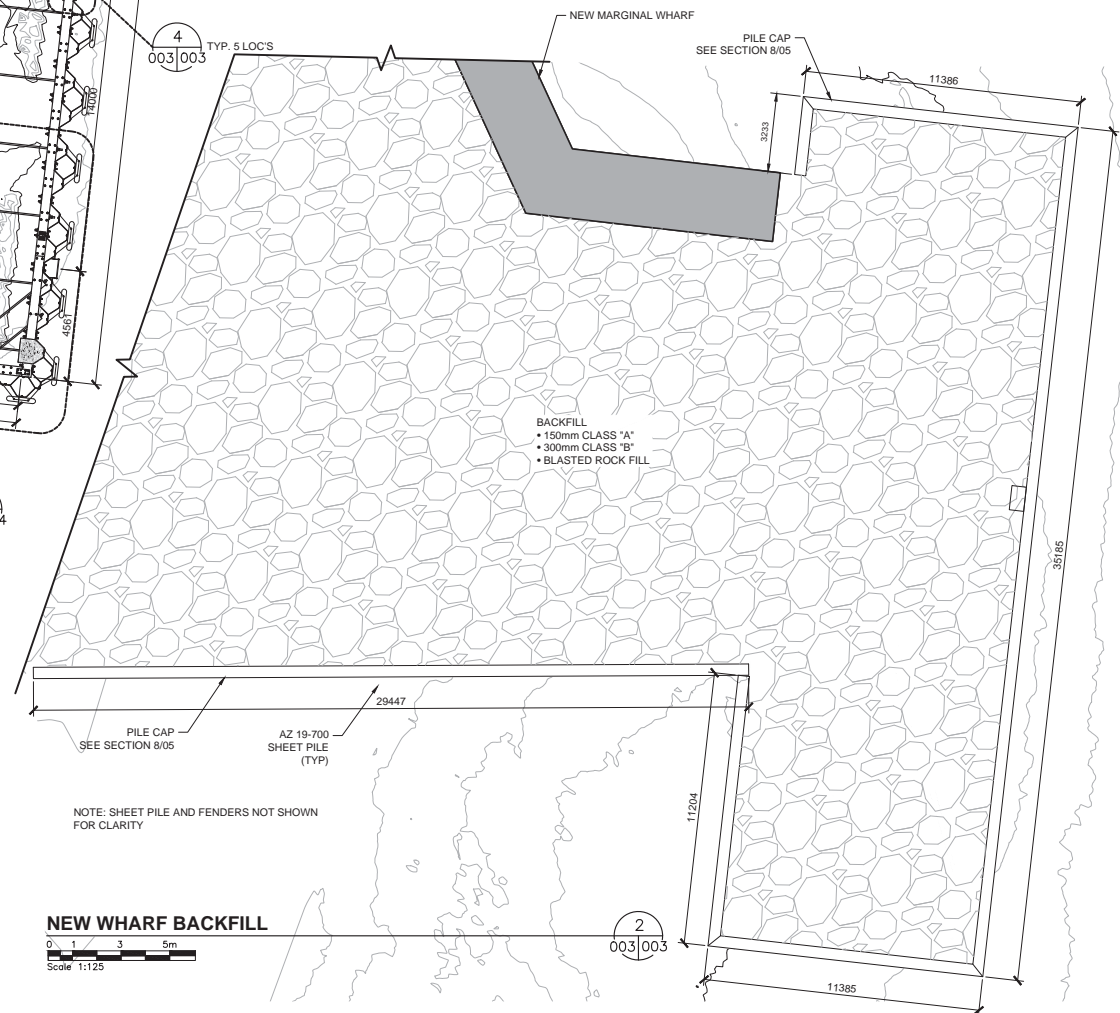
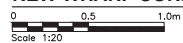


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006/008





NEW WHARF CONNECTION DETAIL





APPENDIX B – SITE PHOTOS



Photo 1: View of Property and adjacent shoreline, looking south.



Photo 2: Storage building and adjacent shore, looking north. Picture taken from wharf.



Photo 3: T-shaped wharf located within the subject property (facing east).



Photo 4: Further view of the shoreline north of the subject property.



Photo 5: North side of the T-shaped wharf, facing east.



Photo 6: Another view of the storage building, looking northwest.



Photo 7: Container located at the wharf entrance, facing southeast.



Photo 8: Detail of T-shaped wharf.



Photo 9: T-shaped wharf (left) and adjacent building, facing east.



Photo 10: Northside Road, adjacent to site (facing north).



APPENDIX C – PREVIOUS ENVIRONMENTAL REPORTS

**Final Report
PHASE I ENVIRONMENTAL
SITE ASSESSMENT
PROPOSED MARINE BASE
CIVIC NO. 4 NORTHSIDE ROAD
HOLYROOD
NEWFOUNDLAND & LABRADOR**

Prepared for:
**Fisheries and Marine Institute
of Memorial University**

(File No. 26-4553-004.1)

May 2005

**PHASE I ENVIRONMENTAL
SITE ASSESSMENT-PROPOSED MARINE BASE
CIVIC NO. 4 NORTHSIDE ROAD
HOLYROOD
NEWFOUNDLAND & LABRADOR**

Prepared for: **Fisheries and Marine Institute
of Memorial University**

ADI Nolan Davis

FILE: 26-4553-004.1

DATE: 2005



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June 9, 2005

File No. 26-4553-004.1

Fisheries and Marine Institute of Memorial University
P.O. Box 4920
St. John's, Newfoundland & Labrador
A1C 5R3

Attention: Mr. Bernard Sheehan

Dear Sirs:

RE: **Phase I Environmental Site Assessment
Proposed Marine Base
Civic No. 4 Northside Road
Holyrood, Newfoundland & Labrador**


Enclosed are two copies of our report outlining the findings of our Phase I Environmental Site Assessment at the above-noted site.

We trust this submission meets your current requirements. Should you have any questions or require clarification on any aspect of this report, please do not hesitate to contact our office.

Thank you for the opportunity of providing our services to you on this project.

Yours very truly,

ADI Nolan Davis



Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.
Environmental Geoscientist

CJP:dgn



William G. Melendy, M.A.Sc., P.Eng.
Project Manager

Enclosure: Report in duplicate

Disclaimer Statement

This report was prepared by ADI Limited for the account of Fisheries and Marine Institute of Memorial University.

The material in it reflects ADI Limited's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ADI Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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ADI Quality System Checks	
Project No.: 26-4553-004.1	Date: 2005 06 09 [yr/mo/da]
Issue Status: Final	Revision No.: 0
Prepared By: Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.	[Signature]
Reviewed By: William G. Melendy, M.A.Sc., P.Eng.	[Signature]

1.0 INTRODUCTION

Acting at the request of Mr. Bernard Sheehan with *Fisheries and Marine Institute of Memorial University (FMIMU)*, and in general accordance with our proposal dated May 3, 2004, ADI Nolan Davis has completed a Phase I Environmental Site Assessment (ESA) at the site of a proposed new Marine Base, situated at Civic No. 4 Northside Road in Holyrood, Newfoundland & Labrador. The purpose of the assessment was to investigate and identify past, existing, or potential environmental-related problems associated with the property. The project was completed in general accordance with the requirements of the Canadian Standards Association (CSA) Phase I Environmental Site Assessment Information Product, Z768-01, November 2001.

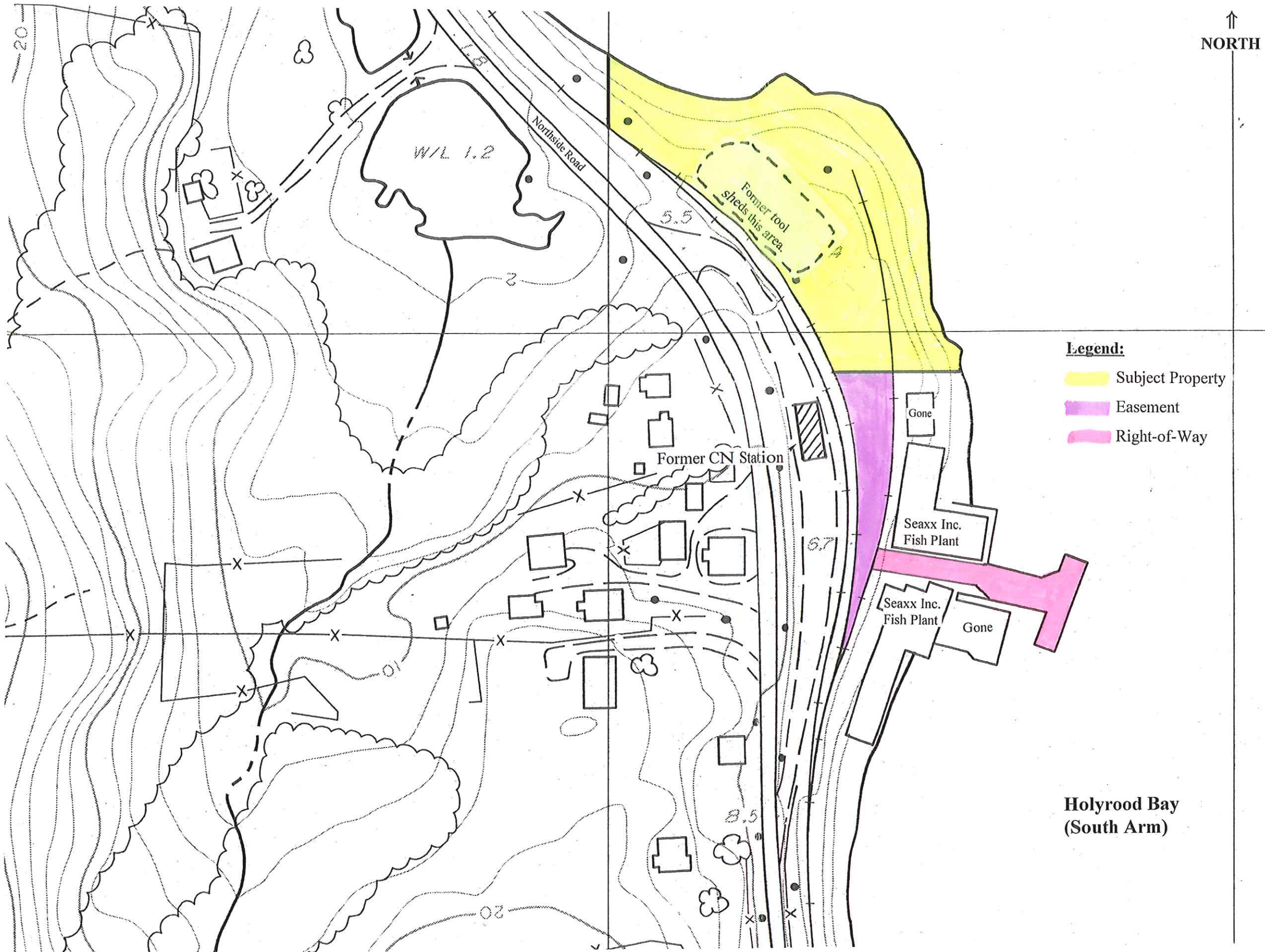
2.0 SITE DESCRIPTION

The subject property consists of an approximately 6000 m² block of vacant land, located at Civic No. 4 Northside Road, in Holyrood, Newfoundland and Labrador. The property is located on the northeast side of Northside Road, immediately adjacent to and north of the *Seaxx Fish Plant* and Federal wharf. The subject property was formerly occupied by *Canadian National Railways* (CNR) but is currently vacant. Also associated with this property is an approximately 700 m² easement, located south of the property and extending to the public wharf approach, and an approximately 400 m² right-of-way comprised of a gravel-surfaced wharf approach (east of the aforementioned easement) which bisects the *Seaxx Fish Plant* property and leads to the Federal wharf (treated timber pile/ ballast crib structure).

The site is accessible from Northside Road, a two-lane asphalt-surfaced roadway. Refer to *Dwg. No. 4-1: Site Location* for details. The property is located within the Town of Holyrood and is currently zoned as *Industrial General*. The area is presently provided water and sewer services by the Town of Holyrood.

3.0 SITE HISTORY

The subject property is currently owned by *The Province of Newfoundland and Labrador*, who acquired the property from the *Government of Canada*. The subject has been vacant since the closure of the *Canadian National Railway* in Newfoundland. It is understood the site was home to a railway station from the late 1800s until 1984. Upon examination of area air photos and the site location provided by the FMIMU, it appears that the former railway station building was not actually



↑
NORTH

Legend:

- Subject Property
- Easement
- Right-of-Way

RECORD DRAWING

	Const. North
	Drawn By: CJP
	Dwg. Standards Ckd. By: WGM
	Designed By:
Date Printed 05.MAY.12	Dwg. Design Ckd. By:

ADI ADI Limited
St. John's, NF, Canada
Engineering, Consulting, Procurement and
Project Management

Project Title		
PHASE 1 ESA PROPOSED MARINE BASE CIVIC #4 NORTHSIDE ROAD HOLYROOD, NL		
Dwg. Title		
SITE LOCATION		
Project No.	26-4553-004.1	
Dwg. No.	4-1	Rev. No.
Scale	NTS This drawing is not to be scaled	

Offices located in:
Charlottetown, Moncton, Saint John, Truro, Halifax, Sydney
Port Hawkesbury, St. John's, Fredericton and Salem, NH

on the subject property. The property contained at least one siding, with a branch line, and at least one other siding located immediately southwest of the property. The property also contained one station office/freight building and up to two tool sheds. Based on air photos for the site, the station building is believed to have been removed between 1982 and 1988. The tool sheds and rail lines were not removed until after 1988 (and before 1995). It is understood that the site has remained vacant since the mid 1990s.

The easement, south of the subject, historically formed a part of the CNR property, positioned between the rail line and a siding adjacent to the fish plant. The right of way associated with the wharf approach dates at least to 1951, based on available aerial photography. Anecdotal evidence suggests that the history of the wharf and fish plant pre-dates the 1950s.

4.0 SITE VISIT

4.1 General

A site visit to the subject property was completed by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., with ADI Nolan Davis, on May 6, 2005.

4.1.1 Limitations

There were no limitations associated with the site visit.

4.1.2 Property Use

The subject property itself was vacant and not in use at the time of the site visit, although unrestricted vehicular access was available to the site. The easement south of the subject property was also vacant, except for its partial use as an access road. The right-of-way associated with the wharf approach was vacant, although used as an access road.

4.1.3 Hazardous Materials

No hazardous materials were observed on the subject property.

4.1.4 Unidentified Substances

No unidentifiable substances were observed on the subject property.

4.1.5 Storage Tanks

No storage tanks were observed on the subject property, however, the former presence of an above-ground storage tank (AST) was suspected near the easement to the south, as evidenced by a concrete tank cradle.

4.1.6 Storage Containers

No storage containers were noted on the property at the time of the site visit.

4.1.7 Odours

No unusual odours were noted during the site visit.

4.1.8 Polychlorinated Biphenyls (PCBs)

No known or suspected sources of PCBs exist on the subject property.

4.1.9 Asbestos Containing Materials (ACMs)

Some suspected ACMs (non-friable siding) were observed as part of some surface debris near the southeast edge of the subject property (along shoreline embankment).

4.1.10 Lead

No known sources of lead were observed on the subject property.

4.1.11 Ozone Depleting Substances (ODS)

No known or suspected ODS were observed on the subject property.

4.1.12 Urea Formaldehyde Foam Insulation (UFFI)

Urea Formaldehyde Foam Insulation (UFFI) was not observed or suspected on the subject property.

4.2 Interior Observations

4.2.1 General

There are currently no structures present on the subject property.

4.2.2 Heating and Cooling/Stains/Drains and Sumps

There are currently no structures present on the subject property. At least three metal-lined pits, measuring approximately 450 mm x 450 mm, were observed near the northeast side of the subject

property. These pits were mostly filled in and are believed to have housed service connections for bunk/accommodations cars (known locally as the white fleet) associated with the former railway operations. These pits are believed to have housed the water and sewer connections (electrical service connection was reported to be from above ground).

4.3 Exterior Observations

4.3.1 General

The property is completely cleared and relatively flat, with steep slopes along the northeast edge of the site as the land slopes down to the nearby shoreline.

4.3.2 Observations of Adjoining Properties

North and East

The subject property is bounded to the north and east by the waters of South Arm.

South

The subject property is bounded to the south by an associated easement, and by the *Seaxx Fish Plant* and Federal wharf. A tank cradle, formerly supporting an above ground furnace oil tank (confirmed by neighbour), was observed adjacent to this easement beside the fish plant south structure.

West

The subject property is bounded to the west by land associated with the former CNR railway line (now part of the Provincial Trailway Park) and then by a gravel-surfaced access road associated with the subject site and the fish plant. Northside Road and associated residential properties are located west of the gravel access road.

4.3.3 Topographic, Geologic and Hydrogeologic Conditions

The majority of the site topography is fairly flat-lying, however, the property slopes fairly steeply towards the shoreline at the north and east boundaries.

Based on site observations and geological mapping for the area, subsurface conditions are expected to consist of minor fill materials, underlain by native till, which in turn is underlain by bedrock.

Bedrock was observed outcropping along the eastern edge of site shoreline. Based on a field examination of these exposures, bedrock consists of a grey to green, interbedded siltstone and fine

grained sandstone. This is consistent with geological mapping (King, A.F., 1988) for the area. Based on area topography, horizontal groundwater flow in any potential surficial aquifer is expected to be primarily towards the north and/or east.

4.3.4 Description of Structures

There are presently no structures on the site, though, as described earlier, the property once contained up to two tool sheds.

4.3.5 Wells

A suspected abandoned 150 mm diameter drilled well was noted at the south edge of the property.

4.3.6 Sewage Disposal

There is no active sewage disposal on the subject property. The area is serviced with water and sanitary sewer by the Town of Holyrood.

4.3.7 Pits and Lagoons

A series of partially-buried, metal-lined pits was observed along the northeast edge of the subject property. As noted earlier, these are believed associated with the former water/sewer connections to accommodation trains.

4.3.8 Stained Materials

Some rust-coloured staining was observed near the shoreline at the southeast corner of the subject property.

4.3.9 Stressed Vegetation

No stressed vegetation was observed on the subject property.

4.3.10 Fill

There is minimal fill associated with the subject property (< 0.7 m in places tested) as evidenced by test pits recently completed by ADI Nolan Davis during geotechnical investigations.

4.3.11 Wastewater

There are no known wastewater discharges from the subject property.

4.3.12 Watercourses, Ditches or Standing Water

There are no watercourses, ditches, or standing water on the subject property, however, the waters of South Arm are located immediately adjacent to and north/east of the subject property.

4.3.13 Roads, Parking Facilities and Rights-of-Way

The subject property is bounded to the west by the Trailway and a gravel-surfaced access road leading to the site and fish plant. Northside Road, an asphalt-surfaced roadway, is located west of this access road. Information provided by FMIMU suggests that an easement exists south of the subject, with a right-of-way connecting the easement to the wharf.

5.0 RECORDS REVIEW

The records review for this assessment consisted of the following main components:

- ▶ Newfoundland Department of Government Service Centre (NDGSC) records search
- ▶ Air Photo Review
- ▶ Historic Environmental Information Report (HEIRS I)
- ▶ Existing Information
- ▶ Interviews with persons familiar with the site.

5.1 NDGSC Records Search

The NDGSC records review was completed by the Government Service Centre in St. John's, Newfoundland & Labrador. There were no previous outstanding issues on file relative to the subject property.

5.2 Air Photo Review

A review of existing air photos was completed by ADI Nolan Davis at the Air Photo and Map Library at the Newfoundland and Labrador Department of Government Service Centre in St. John's. Air photos of the area were reviewed for the years 1951, 1966, 1971, 1978, 1982, 1988, and 1995. The following information was obtained:

1951 Air Photo # A13268-47

The subject property appears in use as a railway property. The station building is visible, however, it is located to the southwest of the subject property. Two small structures (tool sheds?) are visible near the northeast part of the subject property. Two large buildings (one on either side of the wharf approach) are located to the south of the subject property; the northern-most structure has an appendage on its north side that is no longer present, and the southern structure has a section (no longer present) that extends out into South Arm. There are two separate wharfs south of the subject property, one at approximately the same location as the existing wharf and a second smaller one adjacent to the southern-most fish plant structure; this may indicate the presence of two separate commercial enterprises.

1966 Air Photo # 19579-91

The subject appears very similar to the previous description. The northern wharf has been replaced/up-graded and appears very similar to the existing. The southern wharf has been expanded or replaced by a larger structure/stage.

1971 Air Photo # 7140-250

The subject property and surrounding area looks very similar to the 1966 photo.

1978 Air Photo # 78012-32

The subject property and surrounding area looks very similar to the 1971 photo.

1982 Air Photo # 82021-45

There is a fairly large structure present at the approximate location of the former tool sheds. There is also a small structure (possibly freight) present near the centre of the subject property.

1988 Air Photo # 31515-77

The subject property appears fairly busy, with a work train (four bunk cars) present along the northeastern siding. A stacked pile of unidentified material is stored near the northwest end of the site. There is a fairly large structure present at the tool shed location and a very large pile of material (possibly utility poles or steel rails) stored northwest of it. Stockpiles of a brown granular material are present near the south end of the site. The former CNR Station is now gone. The north structure of the fish plant has been extended to the northeast, and the large stage/wharf to the south of the existing wharf has been removed. A suspect furnace oil AST is visible near the northwest corner of the south structure.

1995 Air Photo # 95023-129

This is the latest available aerial photography for the subject property. The subject property looks completely vacant and abandoned. The subject site and surrounding area appears essentially consistent with site visit observations, except the eastern-most section of the south fish plant structure has been removed.

5.3 HEIRS I Report

An HEIRS I report was requested from *CGI Information Systems and Management Consultants Inc.* in Halifax, Nova Scotia. No file information was located relative to the site.

5.4 Existing Information

Existing information that was made available from various sources for the subject property is outlined below.

5.4.1 Environmental Reports

- ▶ Holyrood Bay Sediment Sampling, May 1999. Completed by Jacques Whitford Environment Ltd (JWEL) for Public Works and Government Services Canada (PWGSC).

This report was provided by PWGSC in St. John's, Newfoundland & Labrador and relayed the findings of a sediment sampling programme that was completed by JWEL during the winter of 1999. A total of 13 sediment samples were retrieved from various locations within Holyrood Bay and tested for a number of potential contaminants including BTEX/TPH, PCBs, PAHs, and metals. The overall results pointed to widespread contamination of bottom sediment at various locations throughout the Bay with PAHs and lesser amounts of petroleum hydrocarbons, PCBs, and metals.

One of the samples collected was from near the Federal wharf south of the subject property. This sample was found to contain up to eight PAH compounds, as well as copper, that exceeded the Canadian Council of Ministers of the Environment (CCME) Threshold Effects Level (TEL).

5.4.2 Historical Drawings

A series of historical drawings from the 1950s and early 1970s was provided by PWGSC for the public wharf adjacent to the subject property. The only structures (other than the rail line and sidings) on the subject site are two adjacent tool sheds on the northwest end of the subject property.

These drawings suggest the fish plant belonged to *Fishery Products Limited* and the public wharf was referred to as King's Wharf. The south wharf structure was referred to as FPI Wharf. No significant information concerning the subject property was noted.

5.5 Interviews

Ms. Dianne Kiely - Town of Holyrood

Ms. Kiely was interviewed by telephone on May 5, 2005 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., at which time she provided the following information:

Ms. Kiely indicated that the subject property is zoned as Industrial General and has been referenced by the Town as Civic No. 4 Northside Road since the early 1980s. The site was historically occupied by the Holyrood CNR Station. She was not aware of any environmental issues associated with the subject property.

Mr. Doug Devereaux - Neighbour and Long-Time Resident

Mr. Devereaux was interviewed during the site visit by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., at which time he provided the following information:

Mr. Devereaux has lived in the area for more than 50 years and is very familiar with the site. It had been home of the CNR Station until its ultimate closure in the 1980s. The only permanent structures present on the subject property that he could recall consisted of a tool shed (located near the northwest end of the site) and the station building (actually off subject property). He does not recall much storage of hazardous materials on the subject property. A furnace-oil AST was historically present near the west corner of the fish plant south structure. The fish plant/wharf has been present south of the site since before the 1950s. The plant has been owned by numerous companies over the years, including FPI, *Supreme Seafoods*, and others; it has typically been seasonal, processing squid, capelin, and wild berries.

Mr. Barry Hynes - Former CNR Employee

Mr. Hynes was interviewed by telephone on May 9, 2005 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., at which time he provided the following information:

Mr. Hynes was a former CNR employee at the Holyrood Station during the 1970s. He was familiar with the site and indicated that the only structure on site (as the station was not on subject property)

was a tool shed, located at the northwest end of the property. A small underground gasoline tank was formerly located on the east side of this tool shed. This tank was removed when the site was decommissioned by CNR. The site was not intensively used by CNR, however, a variety of items of potential concern may have been stored temporarily from time to time (such as drums, creosote-treated timbers, etc) . He was not aware of any other fuel storage, spills, or items of environmental concern associated with the subject property. The rail station at this site reportedly dates back to the late 1880s. Work train accommodation cars were commonly parked along the northeastern siding; these cars were provided water and sewer service connections via a series of shallow metal lined pits. These pits were tied into the Town of Holyrood sewer system.

Mr. George Rose - Former CNR Station Agent

Mr. Rose was interviewed by telephone on May 9, 2005 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., at which time he provided the following information:

Mr. Rose was the last station agent at the CN Station, working there from 1977 to 1984. He was not aware of any environmental concerns associated with the subject property and could not recall the gasoline UST associated with the tool shed.

6.0 FINDINGS AND EVALUATION

Findings	Evaluation of Findings
<i>Actual</i>	
1. The presence of PAHs and copper has been identified (1999) in sediment near the public wharf at concentrations above CCME Sediment Quality guidelines.	1. The source and distribution of these contaminants was not determined.
<i>Potential</i>	
2.a. There is potential for petroleum hydrocarbon contamination of site groundwater and soils on the subject property as a result of the former presence of a gasoline UST on site.	2.a. The potential for impact to soils associated with this source will be assessed through completion of a subsurface test pit and analyses programme.
2b. There is potential for petroleum hydrocarbon contamination of groundwater and soils on the easement/right-of-way as a result of the former storage of petroleum hydrocarbons on the fish plant property.	2b. The potential for this source to impact the easement/right-of-way may be considered low to moderate.
3. There is potential for contamination of site soils/groundwater with PAHs and metals as a results of the historical operations associated with the railway station.	3. The potential for soil contamination will be assessed through completion of a test pit programme.
4. There is potential for impacts to harbour sediments (specifically PAH and metal contamination) as a result of land operations at the CNR site.	4. Further evaluation of this potential will be assessed through sampling and analysis of near-shore sediment adjacent to the site during the marine geotechnical borehole programme.
5. Suspect ACMs are present as waste material near the southeast corner of the site.	5. ACMs, if they are found to be present within the property limits, should be properly disposed of following applicable regulations

7.0 CONCLUSIONS

Based on information collected as part of this site assessment, we conclude that there is evidence of *actual* contamination associated with bottom sediment near the public wharf. There is some *potential* for petroleum hydrocarbons, PAH, and metal contamination of site soils and groundwater, as well as off-site harbour sediment as a result of historical property use. ACMs are present on the ground surface near the southeast corner of the site.

8.0 LIMITING CONDITIONS

This Phase I ESA was performed in accordance with the substance and intent of the Phase I ESA guidelines document produced by the Canadian Standards Association (CSA Z768-01). As such, this report is based on visual observations made during a site visit, interviews with persons familiar with the property, a review of historical records concerning the current and past use of the property, and requests for information filed with regulatory agencies. The ESA did not include any sample gathering, analysis, or measurements, and is not intended to be an intrusive investigation of contamination at the property. It assumed that work reported by others and carried out by consultants, contractors, etc., is factual and was completed following industry standards and good environmental investigative techniques.

9.0 QUALIFICATIONS OF THE ASSESSOR

This Phase I ESA was completed by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo. Mr. Pumphrey has completed undergraduate degrees in Earth Science and Environmental Studies, has completed an Environmental Assessment Certificate, and has successfully completed over 150 similar Phase I ESAs. Mr. Pumphrey has also completed short courses in Asbestos Abatement and Management, Indoor Air Quality, Risk Assessment, and Contaminated Site Health and Safety Training.

Mr. Pumphrey is a member of the Professional Engineers and Geoscientists of Newfoundland and Labrador, and has over ten years experience in the environmental consulting industry.

The Project Manager and report reviewer for this project was Mr. William G. Melendy, M.A.Sc., P.Eng. Mr. Melendy has completed Bachelor of Engineering and Master of Applied Science in Environmental Engineering and Applied Science degrees. He has over 25 years experience in the

fields of Civil and Environmental Engineering and has participated in numerous similar Environmental Site Assessments.

Mr. Melendy is a member of the Professional Engineers and Geoscientists of Newfoundland and Labrador.

10.0 REFERENCES

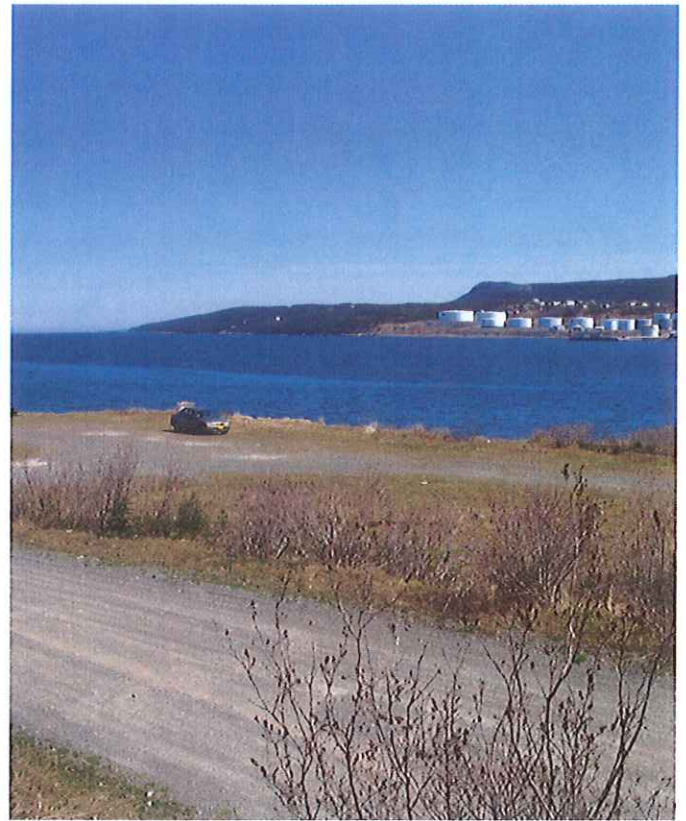
- ▶ Canadian Standards Association - *Phase I Environmental Site Assessment Information Product, Z768-01, November 2001.*
- ▶ Newfoundland Regulation 111/98, *Asbestos Abatement Regulations, 1998*, under the Occupational Health and Safety Act.
- ▶ *Heating Oil Storage Tanks System Regulations, 2003.* Under the Newfoundland Environmental Protection Act.

APPENDIX

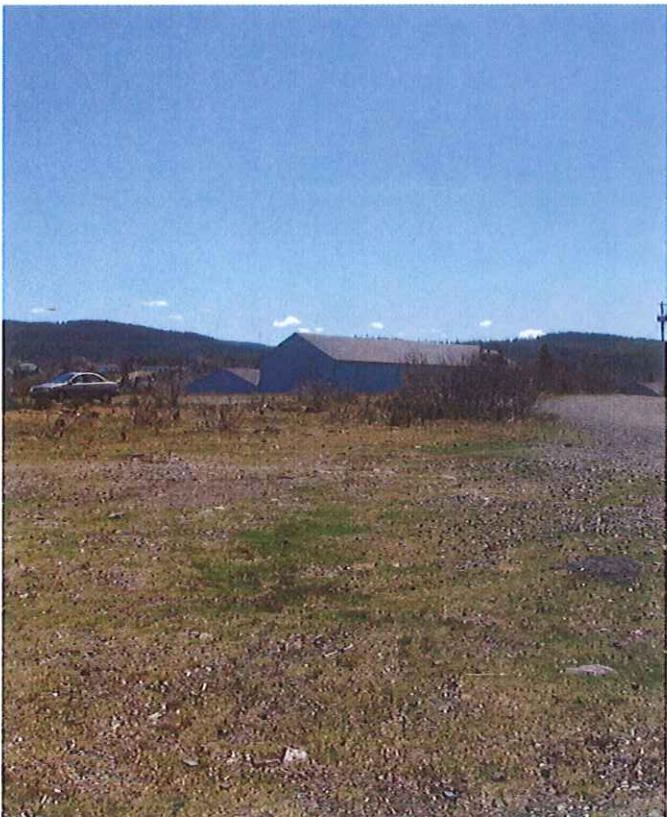
Site Photos



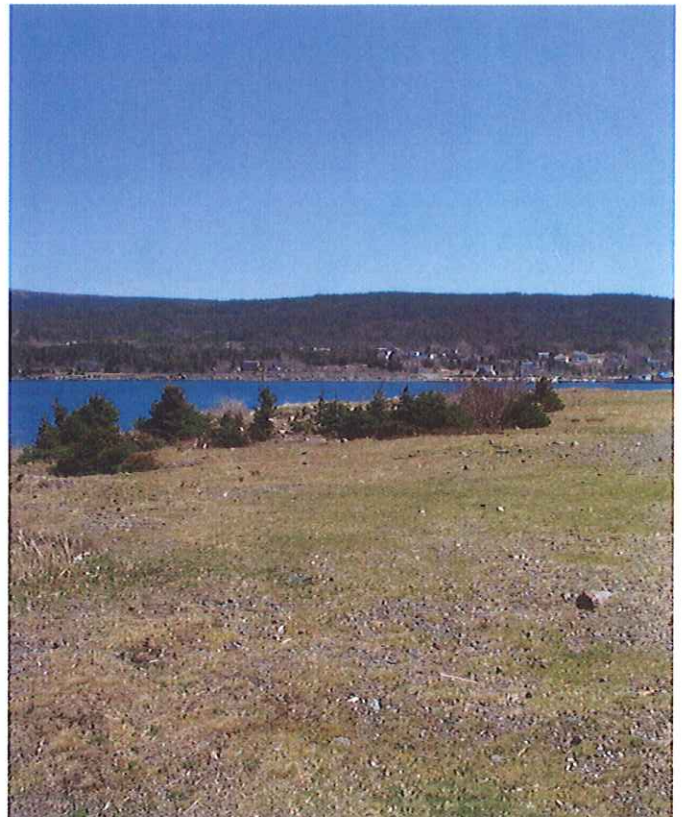
Photo#1: Looking north across subject property.
CNR was located near bushes at left.



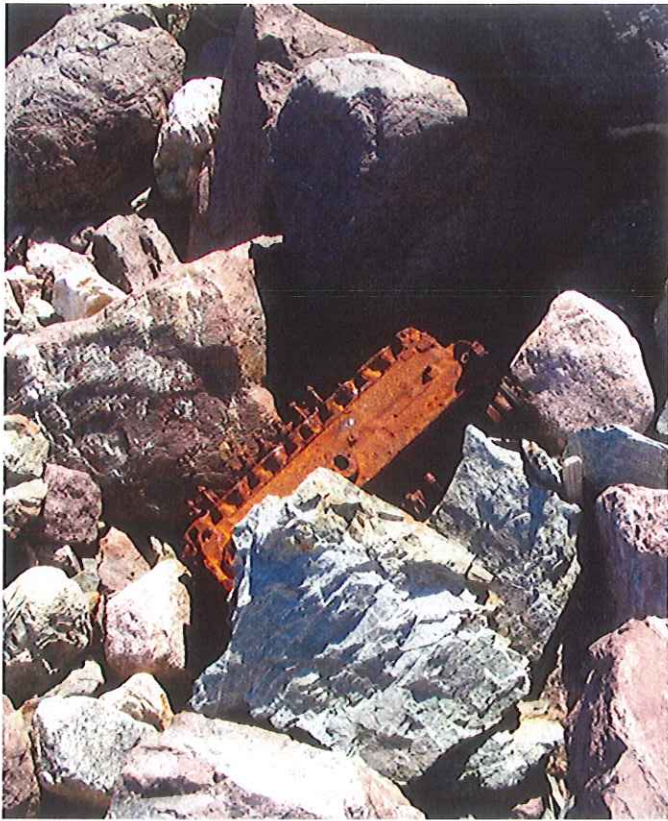
Photo#2: Looking east across a portion of the
subject property.



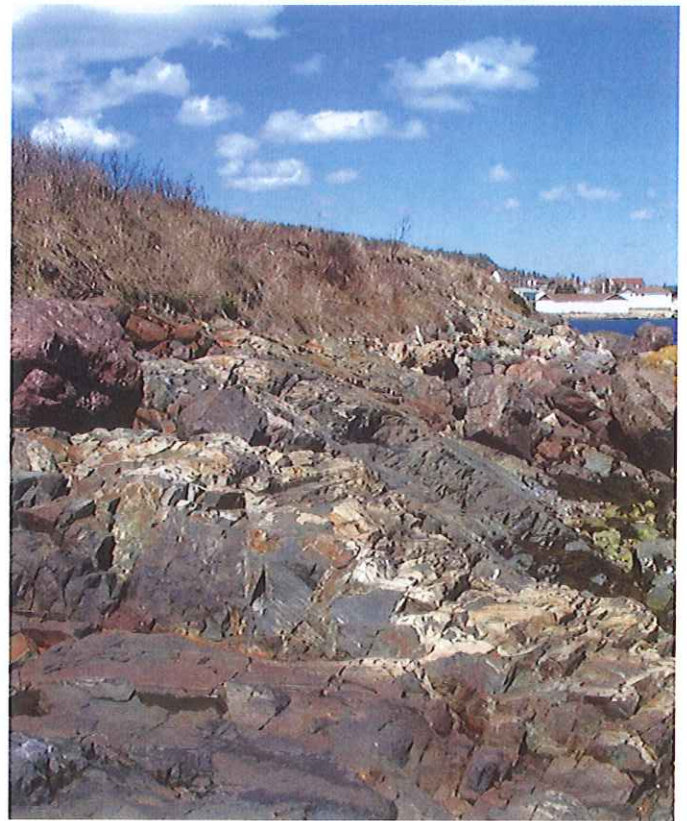
Photo#3: Looking southeast across subject
property.



Photo#4: Looking southeast across subject property
north end.



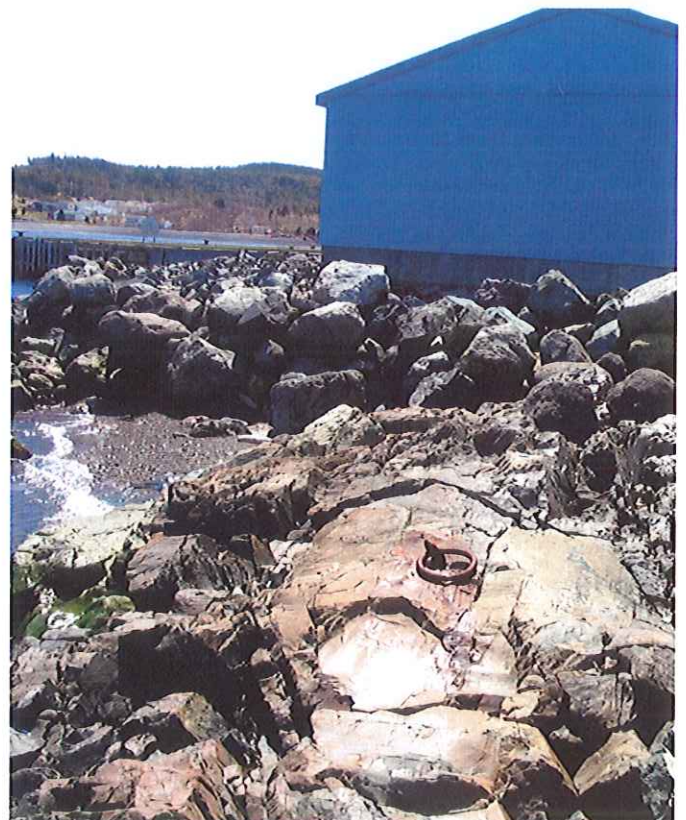
Photo#5: Discarded engine block on slope-north edge of subject property.



Photo#6: Bedrock outcropping along shoreline east side of subject property.



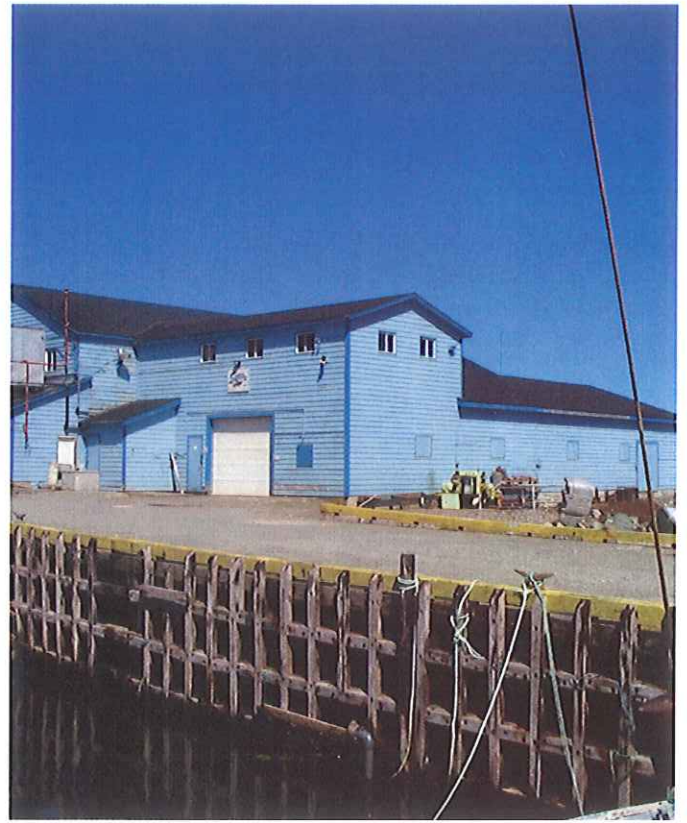
Photo#7: Garbage/debris along east edge of site (near south end).



Photo#8: Shoreline and neighbouring fish plant at southeast corner of subject property.



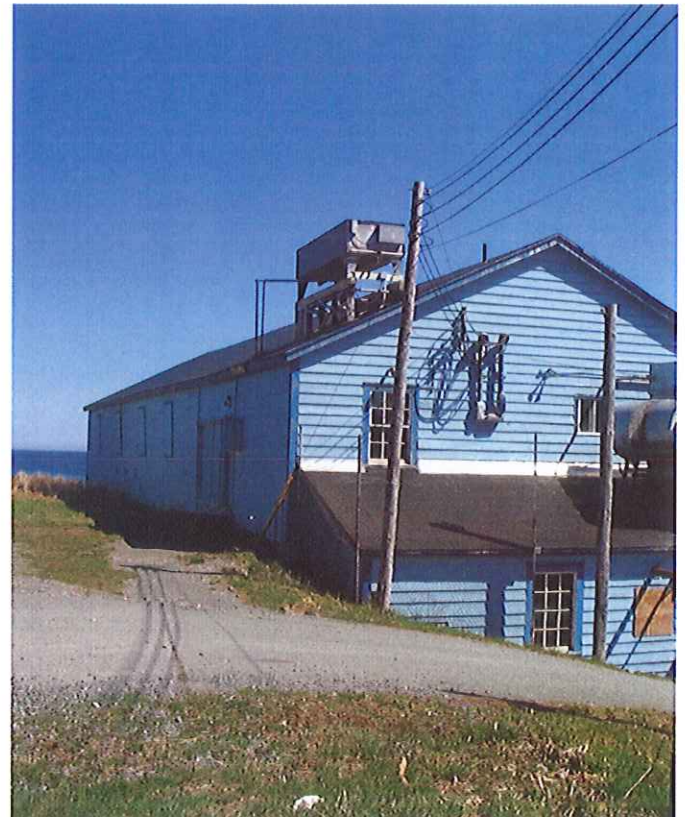
Photo#9: Former above ground fuel oil tank on west side of fish plant (south of subject property).



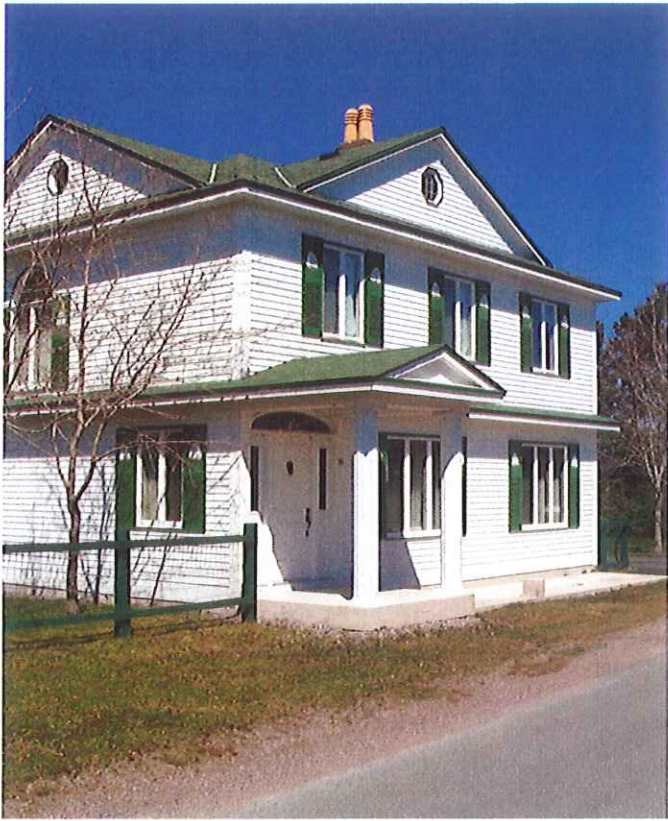
Photo#10: Main fish plant building (south of subject property) as viewed from wharf.



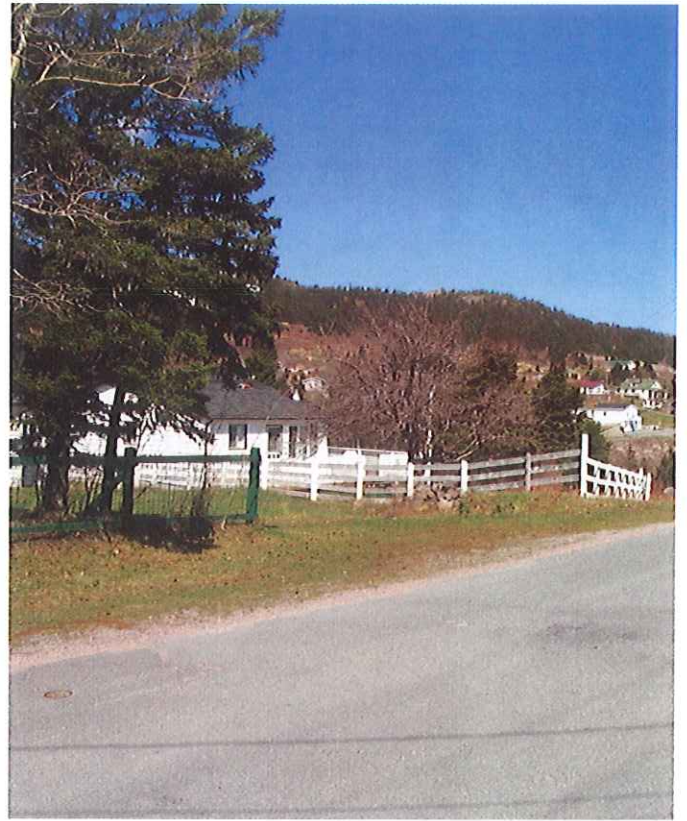
Photo#11: Looking east across wharf; south of subject property.



Photo#12: Looking north, along west side of main fish plant building.



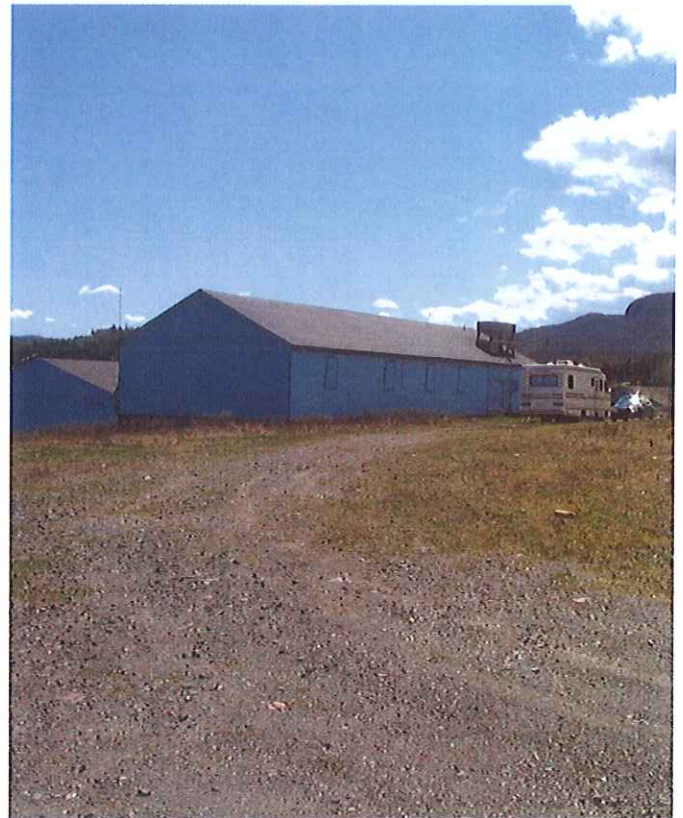
Photo#13: Residential property located west of Northside Road and subject property.



Photo#14: Residential property located west of Northside Road and subject property.



Photo#15: Suspected abandoned well at south end of subject property.



Photo#16: Looking southeast towards fish plant from subject property.

GSC Records Search



GOVERNMENT OF
NEWFOUNDLAND
AND LABRADOR

Department of
Government Services

Government Service Centre

Telephone: (709) 729-2550

Facsimile: (709) 729-7400

OPERATIONS DIVISION

June 2, 2005

Cyril Pumphrey, P.Geo.
ADI Nolan Davis
P.O. Box 7248
St. John's, NL. A1E 3Y4

Dear Mr. Pumphrey:

Re: 4 Northside Road, Holyrood, NL


This refers to your letter of May 13, 2005, requesting an environmental file search of the above mentioned property.

As we do not possess a departmental central registry of activities affecting the environment on properties in the province, we state that to the best of our knowledge and on a search of the files that we have reviewed, the Department of Government Services is not aware of any previous outstanding environmental concerns at the property in question.

The Department of Government Services makes no representations or warranties on the accuracy or completeness of the information provided.

Should you have any questions, please call the undersigned at 729-3098.

Sincerely,


TARA SMITH, M.A.Sc.
Environmental Protection Officer

Incoming Data/Product (Procedure #5)
Supplied by: Gov't Services
Project No.: 26-4553-004.1
Reviewed by: CJP
Date Reviewed: June 7/05

Final Report
PHASE I ENVIRONMENTAL
SITE ASSESSMENT
SEAXX INC. FISH PLANT
HOLYROOD,
NEWFOUNDLAND & LABRADOR

Prepared for:
Fisheries and Marine Institute
of Memorial University of Newfoundland

(File No. 26-4553-006.1)

October 2006



ADI Limited

Engineering, Consulting, Procurement
and Project Management

October 20, 2006

File No. 26-4553-006.1



Fisheries & Marine Institute
of Memorial University of Newfoundland
P.O. Box 4920
St. John's, Newfoundland Labrador
A1C 5R3

Attention: Mr. Bernard Sheehan

Dear Sirs:

RE: **Phase I Environmental Site Assessment**
Seaxx Inc Fish Plant
Holyrood, Newfoundland Labrador


Enclosed are two copies of our report outlining the findings of our Phase I Environmental Site Assessment at the above-noted site.

We trust this submission meets your current requirements. Should you have any questions or require clarification on any aspect of this report, please do not hesitate to contact our office.

Thank you for the opportunity of providing our services on this project.

Yours very truly,

ADI Limited



Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.
Environmental Geoscientist



William G. Melendy, M.A.Sc., P.Eng.
Project Manager

OUR MISSION:

Success through
satisfied customers

CJP:dgn

Enclosure: Report in duplicate

Web: www.adi.ca

Disclaimer Statement

This report was prepared by ADI Limited for the account of FISHERIES & MARINE INSTITUTE OF MEMORIAL UNIVERSITY OF NEWFOUNDLAND.

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DRAWING

Figure 1: Site Location

2

APPENDIX

Site Photos

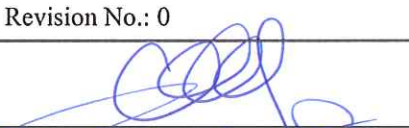

Symbols of Terms Used on Borehole, Test Pit, and Monitor Well Records

Test Pit Records

Laboratory Certificates (*Maxxam Analytics Inc.*)

HEIRS I Report

GSC Records Search [pending]

ADI Quality System Checks		
Project No.: 26-4553-006.1	Date: 2006 10 20	[yr/mo/da]
Issue Status: Final	Revision No.: 0	
Prepared by: Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.		
Reviewed by: William G. Melendy, M.A.Sc., P.Eng.		

1.0 INTRODUCTION

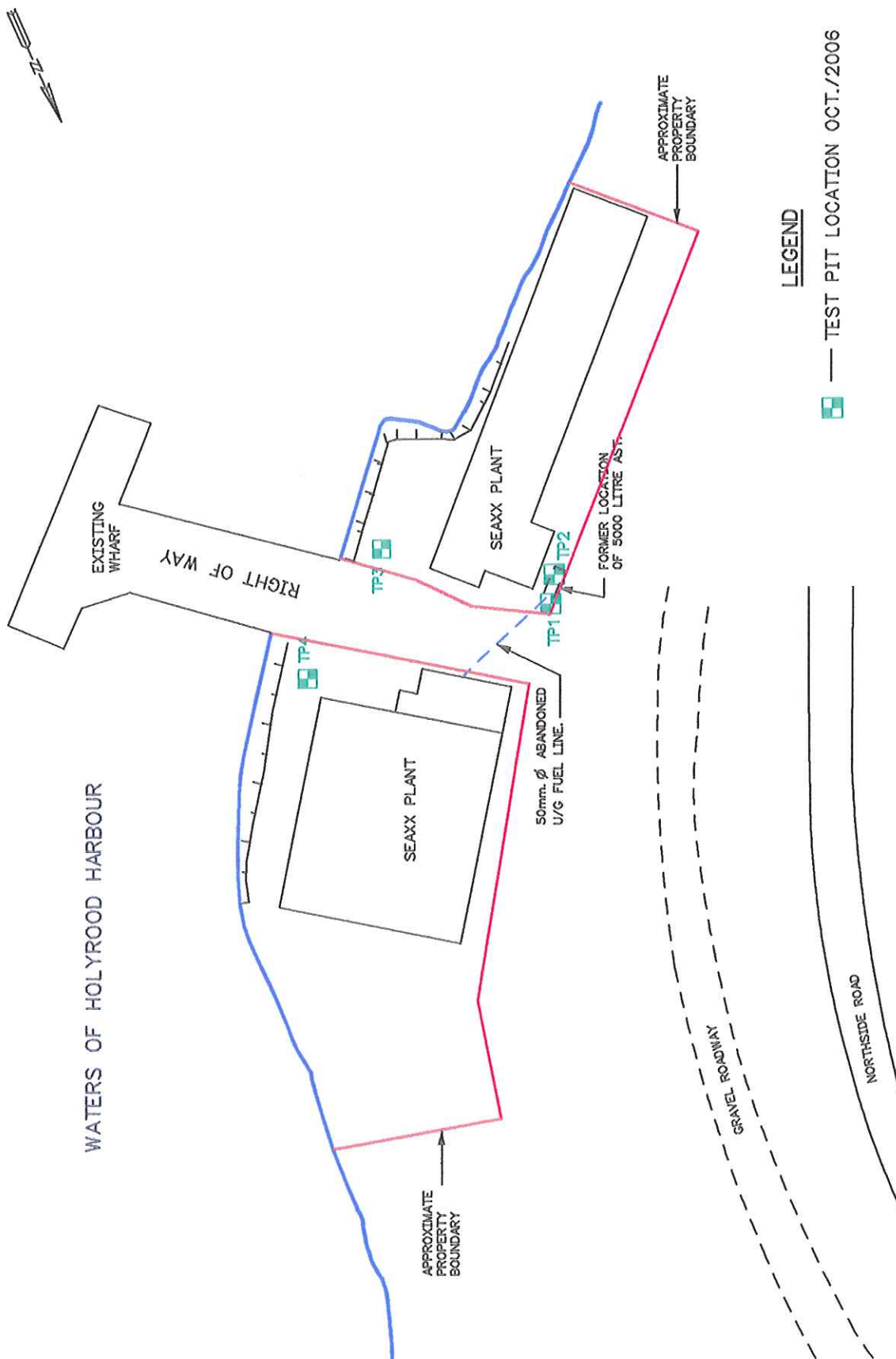
Acting at the request of Mr. Jason Daniels, M.A.Sc., P.Eng., with *Fisheries and Marine Institute of Memorial University of Newfoundland (FMIMUN)*, *ADI Limited (ADI)* has completed a Phase I Environmental Site Assessment (ESA) at the *Seaxx Inc. Fish Plant* property located in Holyrood, Newfoundland Labrador. The purpose of the assessment was to investigate and identify past, existing, or potential environmental-related problems associated with the property. The project was completed in general accordance with the requirements of the Canadian Standards Association (CSA) Phase I Environmental Site Assessment Information Product, Z768-01, November 2001.

At the request of the *FMIMUN*, the project scope of work included an enhancement to the CSA Standard, as follows:

- ▶ Completion of four sub-surface test pits with associated soil sample collection and laboratory analysis.

2.0 SITE DESCRIPTION

The subject property consists of two land parcels, totalling approximately 2364 m², and containing a fish plant. The property is located at Civic No. 2 Northside Road in Holyrood, Newfoundland Labrador. The site contains two old buildings: a cold storage building to the south and the main fish processing plant to the north. Both buildings contain ammonia-based refrigeration systems, however, all the mechanical equipment is located in the Main Plant engine/compressor room (in basement). Refer to *Figure 1: Site Location* for details. The subject property is zoned as *Industrial General (IG)* by the Town of Holyrood. The site is provided fresh water by the Town of Holyrood. The site operates sporadically on a seasonal basis and has been used recently for processing/packaging local blueberries for shipment out of province.



LEGEND

— TEST PIT LOCATION OCT./2006

SCALE: 1:750

RECORD DRAWING

This drawing is not to be scaled

Drawn By:	RJH	Proj. No.	26-4553-006.1
Dwg Standards	Chk. By: CJP	Dwg. No.	FIGURE 1
Designed By:		Dwg Design Ckd By:	Rev.

Dwg.	SITE LOCATION PLAN
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Proj.	PHASE I ENVIRONMENTAL SITE ASSESSMENT FISHERIES AND MARINE INSTITUTE OF MEMORIAL UNIVERSITY SEAXX INC. PROPERTY HOLYROOD, NL
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ADI Limited
 St. John's, NF, Canada
 Engineering, Consulting, Procurement and
 Project Management
 Charlotteville, Moncton, Saint John, Truro, Halifax, Sydney
 Port Hawkesbury, St. John's, Fredericton and Salem, NH

3.0 SITE HISTORY

The exact date of original property development is unknown, however, the area has likely been developed since at least the late 1800s. Information provided on the Town of Holyrood website indicates that the first cold storage plant was built on the site in 1916. The earliest airphotos of the area are from 1951; at this time the plant site is fully developed, containing two wharfs and larger structures than are now present. Some minor changes to the site have occurred since 1951 as evidenced by historical air photos; these changes consist of removal of some sections of both structures, as well as wharf up-grades. The current site owner is *Seaxx Inc.* *Seaxx Inc.*, in turn, purchased the property in the mid-1990s from *Aquatic Foods Ltd.* There have been a variety of other previous owners of the site, including *Fishery Products Limited* (forerunner to *FPI Limited*), *Carroll Cold Storage Co. Ltd.*, and *Olaf Olsen*. In recent years the plant has been operating sporadically on a seasonal basis.

4.0 SITE VISIT

4.1 General

A site visit to the subject property was completed by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., with *ADI Limited*, on October 4, 2006, accompanied by Mr. David Moores, P.Eng. with *Seaxx Inc.*

4.1.1 Limitations

The building inspection included areas readily accessible and did not involve any intrusive investigation or exhaustive examination of hidden/inaccessible spaces such as enclosed crawlspaces, attics, wall cavities, roofs, etc.

4.1.2 Property Use

The site has been used sporadically, mainly on a seasonal basis for fish processing and cold storage. The plant has been used recently for the processing/packaging of locally harvested blueberries.

4.1.3 Hazardous Materials

Hazardous and potentially hazardous materials stored at the property include:

- ▶ ammonia (within site refrigeration systems)

- ▶ freon (reported within smaller refrigeration system)
- ▶ compressor oils (storage of various containers at a variety of locations), as well as those oils housed within the cooling system equipment
- ▶ waste oils, including two 205 litre plastic drums of waste oils, outside, on the east side of the plant; one 205 litre drum and two 20 litre pails of unknown waste oils inside the engine room
- ▶ small amounts of paints
- ▶ waste compressor oil spilled on engine room floor
- ▶ several cylinders of compressed gas
- ▶ mercury containing thermostat in second-floor office.

4.1.4 Unidentified Substances

Some unidentified substances were observed on the subject property, as follows:

- ▶ drums/pails of unknowns (suspected compressor oils) in engine room and outside on east side of plant building

4.1.5 Storage Tanks

Several pressure vessels/tanks, all associated with the ammonia refrigeration system, were present in the engine room. A concrete tank cradle was observed near the northwest corner of the southern building. This cradle appears to be large enough to support a storage tank capacity in the range of 15 000 to 20 000 litres. The tank itself was reported removed in the 1970s-1980s and was formerly used to store diesel that supplied on-site power generators (used to power refrigeration system until 1970s).

4.1.6 Storage Containers

An assortment of containers were present throughout the building for storage of a variety of cleaners, paints, refrigerants, and oils.

4.1.7 Odours

Some ammonia odours were present throughout the main plant, with the strongest odours in the engine room. These odours were thought to be associated with waste compressor oils (containing traces of ammonia contamination) that had been spilled over the floor.

4.1.8 Polychlorinated Biphenyls (PCBs)

Some fluorescent lights were observed throughout the building. Given the age of the building, some of these may have PCB-containing ballasts. One old unlabelled transformer is present in the electrical room; although this transformer appears to be a dry type, there is some potential for PCBs.

4.1.9 Asbestos Containing Materials (ACMs)

ACMs are highly suspect as exterior shingle-type cladding over approximately 30 percent of the main plant building. ACMs are highly suspect as a rigid, corrugated sheeting on the roof and siding of approximately 50 percent of the cold storage structure. ACM debris associated with broken ACM shingles was noted on the ground along the north side of the main plant building. Corrugated ACM sheeting from the cold storage building was seen to be extensively damaged with numerous holes. ACMs may be present within other building materials such as vinyl floor tiles, ceiling tile, joint compound/plaster, and mechanical insulation.

4.1.10 Lead

Potential sources of lead presently on the site include older plumbing, solder, and lead-based paint. In the mid-1970s, both Canada and United States restricted the concentrations of lead that could be used in paints to 0.5 percent by weight (or 5000 mg/kg). In 2005, Health Canada further restricted the concentration of lead (to 0.06 percent by weight or 600 mg/kg) that could be used in paints that are applied on surface coatings to which children or pregnant women may be exposed. Given the age of the building, there is significant potential for lead-based paint at concentrations above 600 mg/kg. Some of the painted surfaces on site (particularly older, unused sections of the plant) were observed to be peeling badly.

4.1.11 Ozone-Depleting Substances (ODS)

It is understood that the main refrigeration system on site is ammonia-based, however, a smaller freon based system is also in operation. This system may not be compliant with the Federal Halocarbon Regulations, under the Canadian Environmental Protection Act (CEPA).

4.1.12 Urea Formaldehyde Foam Insulation (UFFI)

Urea Formaldehyde Foam Insulation (UFFI) was not observed or suspected during the site inspection. An affidavit sworn by Mr. Harold Wareham (previous owner) was noted in the Town of Holyrood files indicating the site buildings did not contain UFFI.

4.2 Interior Observations

4.2.1 General

The main plant building condition varied but was fair overall. The cold storage building was deteriorating and in fair to poor condition.

4.2.2 Heating and Cooling

Much of the plant and all of the cold storage building is unheated, and has been for some time. The office area of the plant is heated with baseboard electric heaters.

4.2.3 Stains

Some oil staining and free oil from recent spillage was noted on the compressor room floor (concrete).

4.2.4 Drains and Sumps

Numerous floor drains were noted on the main plant floor, including a covered trough on the fish processing floor. These discharge into a large concrete sump/trap on the plant exterior (east side) and then into the waters of Holyrood Harbour. An open sump/drain was present in the engine room with a continuous discharge of cooling water into it.

4.3 Exterior Observations

4.3.1 General

The property is located off a gravel lane southeast of the former *Canadian National Railway (CNR)* station. Most of the property is covered by buildings, the balance is primarily gravel-surfaced. An adjoining section on the north side of the main plant was demolished and removed from the site within the past ten years or so.

4.3.2 Observations of Adjoining Properties

North

The subject property is bounded to the north by vacant land formerly associated with the *CNR* station.

West

The property is bounded to the west by a gravel-surfaced access road (and thin strip of treed land), formerly used to access the CNR station. Northside Road, a two-lane, asphalt-surfaced roadway is located west of this. The area west of Northside Road contains residential properties.

South

The property is bounded to the south by the waters of Holyrood Harbour.

East

The property is bounded to the east by the waters of Holyrood Harbour.

4.3.3 Topographic, Geologic and Hydrogeologic Conditions

The topography over the western edge of the property is fairly flat-lying, however, the property slopes moderately towards the shoreline to the east.

Based on site observations and geological mapping for the area, subsurface conditions are expected to consist of fill materials, underlain by native till, which in turn is underlain by bedrock.

Bedrock was observed outcropping along the northeast edge of site shoreline. Based on a field examination of these exposures, bedrock consists of a grey to green, interbedded siltstone, and fine-grained sandstone. This is consistent with geological mapping (King, A.F., 1988) for the area. Based on area topography, horizontal groundwater flow in any potential surficial aquifer is expected to be primarily towards the east.

Groundwater flow, as well as potential contaminant transport and migration, may be further affected by bedrock and man-made subsurface features.

4.3.4 Description of Structures

The main plant is located on the north side of the site and consists of a single-storey wood-frame structure with a poured concrete basement. This building is used as a fish processing/freezing facility. The Main Plant also houses most of the mechanical equipment associated with refrigeration systems in both buildings. The cold storage building is located on the south side of the site and consists of a single-storey, steel, wood, and concrete block building. The cold storage building is at least partially founded on concrete columns/piles which sit in/at the edge of the Harbour Water.

4.3.5 Wells

There are no known active wells on the property, however, two pipes (one approximately 100 mm steel, with a cap and one approximately 200 mm plastic, in-filled) were located adjacent to the southwest corner of the main plant building. These pipes were thought to be associated with abandoned wells, however, Mr. Walt Healey confirmed that these were valves (one abandoned and one active) associated with the Town of Holyrood water supply to the building.

4.3.6 Sewage Disposal

Floor drainage and process water from the production area is discharged through a concrete sump/trap and out into Holyrood Harbour. Sanitary sewage is reported directed to the Town of Holyrood Sanitary Sewer System.

4.3.7 Pits and Lagoons

A concrete pit or sump, as described previously, was observed outside on the east side of the plant and receives floor drainage and process water from the plant, acting as a sump/trap. This was once fitted with a conveyor system for processing of capelin.

4.3.8 Stained Materials

No staining was observed during the site visit.

4.3.9 Stressed Vegetation

No stressed vegetation was observed during the site visit.

4.3.10 Fill

Fill materials of unknown origin and composition are believed to underlie portions of the site. Significant infilling has likely occurred along the east side of the site.

4.3.11 Wastewater

Wastewater discharges from the site would consist of process and cooling water during seasonal fish processing operations.

4.3.12 Watercourses, Ditches or Standing Water

There are no watercourses, ditches, or standing water on the subject property. The waters of Holyrood Harbour bound the site to the east.

4.3.13 Roads, Parking Facilities and Rights-of-Way

The property is accessed by a gravel-surfaced road. Limited gravel-surfaced parking is available on site at the west side of the main plant and the east side of the cold storage building. The property survey provided by the owners indicate a short power line easement to the west and a 2.74 m wide reservation along the west edge of the property. Also, an approximately 6 m wide, east-west-oriented right-of-way, bisects the middle of the property and permits public access to the government wharf.

5.0 RECORDS REVIEW

The records review for this assessment consisted of the following main components:

- ▶ Newfoundland Labrador Department of Government Service Centre (NLDGSC) records search
- ▶ Air Photo Review
- ▶ HEIRS I Report
- ▶ Interviews with persons familiar with the site.

5.1 NLDGSC Records Search

The NLDGSC and the Newfoundland Labrador Department of Environment and Conservation have been keeping records on oil spills for approximately the past 15 years. The NLDGSC records search was completed by the Government Service Centre in St. John's. Search results are pending. Please be advised that the records search results could affect the conclusions of this report.

5.2 Air Photo Review

A review of existing air photos was completed by *ADI Limited* at the Air Photo and Map Library at the Newfoundland Labrador Department of Environment and Conservation in St. John's. Air photos of the area were reviewed for the years 1951, 1966, 1971, 1978, 1982, 1988, and 1995. The following information was obtained:

1951 Air Photo # A13268-47

The subject property appears fully developed with two wharfs. There appears to be two structures present, although the southern building is not clear due to poor air-photo quality. The CNR Station is present west of the subject property.

1966 Air Photo # A19579-91

The subject property appears very similar to the 1951 photo. A suspected above-ground storage tank is visible near the northwest corner of the cold storage building.

1971 Air Photo # A7140-250

The subject property appears similar to the 1966 air-photo.

1978 Air Photo # 78012-32

The subject property appears similar to the 1971 air-photo.

1982 Air Photo # 82021-45

The subject property appears similar to the 1978 air-photo.

1988 Air Photo # 31315-77

The subject property appears similar to the 1982 air-photo. The smaller wharf to the south is gone.

1995 Air Photo # 82021-45

The subject property appears similar to the 1988 air-photo.

5.3 HEIRS I Report

A Historical Environmental Inventory Report (HEIRS I) was requested from *CGI Information Systems and Management Consultants Inc.* in Halifax, Nova Scotia. An outline of the information obtained is provided below:

1983 Property Underwriter Report/Plan

This report identifies the owner as *Fishery Products Limited*. At that time there was no oil-fired heating system in either building, and the site was essentially silent (not operating). A small area was heated with baseboard electric heat.

5.4 Interviews

Mr. David Moores - Seaxx Inc.

Mr. Moores was interviewed during the site visit on October 4, 2006 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., with *ADI Limited*, during which time he provided the following information:

Seaxx Inc. purchased the property in the mid-1990s from *Aquatic Foods Ltd.* Since that time the plant has operated on a seasonal basis. There has been no furnace-oil storage on site since then and he was not aware of any previous storage. Petroleum hydrocarbon storage on-site are limited to compressor oils. Mr. Moores was not aware of any environmental issues associated with the property.

Mr. Scott Devereaux - Town of Holyrood

Mr. Devereaux was interviewed on October 4, 2006 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., during which time he provided the following information:

Mr. Devereaux searched the Town's file on the subject property and did not find any issues of an environmental nature.

Mr. Walt Healey - Former Plant Manager

Mr. Healey was interviewed on October 20, 2006 by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo., during which time he provided the following information:

Mr. Healey has been familiar with the site since the late 1950s and was a former Plant Manager. Until the late 1980s the Plant often operated all year, but since that time has operated on a sporadic and seasonal basis. When he began work at the Plant, the site was equipped with diesel generators which were needed to power the refrigeration equipment, however, by the 1970s these generators were taken out. There was only one storage tank for diesel; it was an above-ground storage tank (AST) and was located near the corner of the Cold Storage Building. He was not aware of any significant spills or leaks from it. The buildings have been mostly unheated, though office areas were originally heated with wood stoves; an electric baseboard heating system was later installed in office/lunch room areas. Mr. Healey was not aware of any historical gasoline or furnace-oil storage on-site. In the later 1950s the Plant was owned by *Fishery Products Limited*, who had just previously purchased from *Olaf Olsen* and *Carroll Cold Storage*.

6.0 SUB-SURFACE TEST PIT/SAMPLING PROGRAMME

6.1 Investigation Procedure

A test-pit sampling programme was completed on October 12, 2006. Test pits were completed using a rubber-tired CAT extend-a-hoe supplied and operated by *Junior Besso* of Holyrood, Newfoundland Labrador.

Test pit locations were selected in the field by *ADI Limited* in the vicinity of the former above-ground storage tank (AST), as indicated by an existing tank cradle, as well as two points down-gradient. Test pit locations, labelled as TP1, TP2, TP3, and TP4, are shown on *Figure 1: Site Location Plan*. Test pits were excavated to probable bedrock (in the case of TP1 and TP2) or to backhoe limits (in the case of TP3 and TP4) in a coarse fill material. Conditions encountered in each test pit were recorded and representative soil samples were collected from each test pit. The programme was completed under the direct full-time monitoring of Mr. Ronald J. Hayes, CET, with *ADI Limited*. Information collected relative to each test pit is presented on the individual Test Pit Records included in the Appendix.

Representative soil samples were collected in the test pits using hand-held sampling equipment. The sampling tools were cleaned using a distilled water/methyl hydrate rinse between sampling events. All soil samples recovered were stored in new laboratory-supplied glass sample jars (for laboratory analyses), and one-litre glass mason jars (for field screening). All soil samples were field screened using a standard headspace soil vapour analyses, performed with a *GasTector Model 1238ME* gas vapour detector. Headspace measurements for all soil samples are presented on the Test Pit Records.

Selected soil samples from two of the test pits were submitted to *Maxxam Analytics Inc.* In St. John's, Newfoundland Labrador for total petroleum hydrocarbon (TPH) and benzene, toluene, ethyl benzene and xylene analyses.

6.2 Investigation Results

6.2.1 Subsurface Conditions

Conditions encountered in the test pits are described below and on the Test Pit Records included in the Appendix.

Organics

A 0.10 m thick organic grassmat layer was encountered at surface in test pit TP2.

Fill

Fill was encountered at surface in TP1, TP3, and TP4, and beneath the organics in TP2. The composition of the Fill is variable as follows: in TP1 the Fill may be described as brown Organics intermixed with silty Sand and Gravel with some cobbles and boulders; in TP2 the Fill may be described as a brown silty Sand and Gravel with some debris (pieces of metal) and some cobbles and boulders; in TP3 the Fill may be described as Cobbles and Boulders intermixed with brown Sand and Gravel with trace to some silt; in TP4 the Fill may be described as a brown Sand and Gravel with traces to some silt, and cobbles and boulders. The Fill extended to depths of 2.2 m and 2.4 m below ground surface in TP1 and TP2, respectively. TP3 and TP4 were terminated within the Fill at depths of 0.9 m and 0.8 m, respectively, below the existing ground surface.

Based on observation of backhoe performance in the Fill, the Fill is classified as loose to dense in terms of relative density.

Sand and Gravel

Sand and Gravel was encountered beneath the Fill in TP1 and TP2, at depths of 2.2 m and 2.4 m, respectively, below the existing ground surface. The composition of the Sand and Gravel is variable but may generally be described as a grey Sand and Gravel with traces to some silt and occasional to some cobbles and boulders. TP1 and TP2 were terminated in the Sand and Gravel at depths of 2.5 m and 3.5 m, respectively, below the existing ground surface.

Based on observations of backhoe performance in the Sand and Gravel, the Sand and Gravel may be classified as compact to dense in terms of relative density.

Bedrock

Test pits TP1 and TP2 were terminated on probable bedrock at depths of 2.5 m and 3.5 m, respectively, below the existing ground surface.

Groundwater

Groundwater was not encountered in any of the test pits.

6.2.2 Laboratory Analytical Results - Soils

Two soil samples, one from each of TP2 and TP4, were submitted for BTEX/TPH for analysis at *Maxxam Analytics Inc.*

BTEX

BTEX components were not detected in either of the two soil samples analysed.

TPH

TPH was not detected in sample TP2, S#4

Sample TP4,S#1 was found to have a TPH concentration of 110 mg/kg.

The laboratory reported the product resemblance as Lube Oil fraction.

Table 6-1: Summary of Soil Laboratory Results

Analyte	Units	Criteria	Sample ID	
		Tier RBSL Commercial	TP2, S#4 (3.0 - 3.5 m)	TP4, S#1 (0.0-0.8 m)
Benzene	mg/kg	1.8	nd	nd
Toluene	mg/kg	160	nd	nd
Ethyl benzene	mg/kg	430	nd	nd
Xylenes	mg/kg	200	nd	nd
C ₆ - C ₁₀ (Gas)	mg/kg	450	nd	nd
C ₁₀ - C ₂₁ (Fuel)	mg/kg	7400	nd	nd
C ₂₁ - C ₃₂ (Lube)	mg/kg	10 000	nd	110
Modified TPH	mg/kg		nd	110
Product Resemblance				Lube Oil Fraction
Notes: Criteria presented are Tier 1 RBSL, Commercial, Non-Potable Groundwater Use, Coarse Grained Soil				

6.3 Assessment of Results

6.3.1 Regulatory Framework

The Newfoundland Labrador Department of Environment and Conservation (NLDEC) policy impacted sites is outlined by NLDEC PPD05-01 (issued February 22, 2005) and a related *Guidance Document for the Management of Impacted Sites* (Version 1.0).

The purpose of the policy and guidance document is to outline the Site Management Process that is to be followed during the assessment and remediation of impacted sites in the Province. Although the process allows for two parallel paths, one for designated and one for non-designated contaminated sites, the assessment process is generally consistent with the phased approach outlined previously by the Canadian Council of Ministers of the Environment (CCME). The process follows a Tiered approach for comparison of analytical results to achieve site closure. The first level, or Tier I, consists of generally conservative values established by CCME and the Atlantic PIRI Committee and are meant to be applicable to a wide variety of sites, with less need for technical input. Tier II and Tier III methods involve an increasing level of technical complexity and usually require a higher level of Site Professional expertise.

For purposes of comparison of analytical results at this site, we have used the Atlantic PIRI Tier I Look-Up Tables, as presented in Table 6-1, (for petroleum hydrocarbons).

6.3.2 Assessment of Soils

We offer the following comments regarding the comparison of soil analytical results with criteria levels provided in the documents noted above.

BTEX/TPH

Based on the current analytical results for the site, BTEX/TPH concentrations were within levels considered acceptable for sites with the following classification: *Commercial - Potable Groundwater- Coarse Grained Soil - Diesel* resemblance.

7.0 FINDINGS AND EVALUATION

Actual and *potential* environmental issues associated with the subject property are described below:

Findings	Evaluation of Findings
Actual	
1. Waste compressor oils were noted spilled on the engine/compressor room floor.	1. These oils should be cleaned up. There is some potential for impacts beneath the floor of the plant.
2. An under-ground diesel line remains in place from the former tank location to the main plant building.	2. This line should be decommissioned and removed.
Potential	
1. There is potential for asbestos containing materials (ACMs) to be present within constituent building materials. There is suspected ACM debris present outside, around the building.	1. Under Provincial Health & Safety legislation an Asbestos Management Plan (AMP) is required for all workplaces containing ACMs.
2. There is some potential for lead-based paint in site buildings.	2. Given the age of this building, the potential for lead-based paint is moderate to high.
3. There is potential for PCBs within on-site fluorescent light ballasts.	3. Any fluorescent light ballast older than 1982 may contain PCBs. Prior to disposal of any fluorescent light ballasts, verification of PCB status is recommended.
4. There is some potential for subsurface petroleum hydrocarbon contamination at the site as a result of the historical presence of a former diesel AST as well as the historical storage and handling of compressor oils.	4. No evidence of significant subsurface petroleum hydrocarbons was noted in test pits completed in the vicinity of the former AST or at two other locations tested. Given the test pits results, the potential for significant impact from this source is considered low

8.0 CONCLUSIONS

Based on all information collected as part of this site assessment, we conclude that there is evidence of actual petroleum hydrocarbon spillage (compressor oils) on the compressor room floor. There is also an abandoned underground diesel line on site that requires decommissioning and removal. There remains some potential for compressor oil contamination beneath the plant floor in the vicinity of the compressor room. *Potential* environmental issues include the possible presence of lead-based paint, PCB containing fluorescent light ballasts and ACMs (including asbestos debris outside on the

north side of the Plant). There is *potential* for subsurface petroleum hydrocarbon contamination as a result of historic, on-site sources, though a limited test pit programme has indicated petroleum hydrocarbon concentrations were within acceptable limits in at least two test locations. There is *potential* for contamination (PAHs, PCBs, and metals) in bottom sediments to the east of the property as a result of historical marine activity associated with the subject property and surrounding sites.

9.0 STATEMENT OF LIMITATIONS

This Phase I ESA was performed in accordance with the substance and intent of the Phase I ESA guidelines document produced by the Canadian Standards Association (CSA Z768-01). As such, this report is based on visual observations made during a site visit, interviews with persons familiar with the property, a review of historical records concerning the current and past use of the property, and requests for information filed with regulatory agencies. The ESA did not include any sample gathering, analysis, or measurements, and is not intended to be an intrusive investigation of contamination at the property. It assumed that work reported by others and carried out by consultants, contractors, etc., is factual and was completed following industry standards and good environmental investigative techniques.

ADI Limited has not yet received the results of the records search by Government Service Centre. These will be forwarded upon receipt.

This report has been prepared for *Fisheries and Marine Institute of Memorial University of Newfoundland*. It is intended for the sole and exclusive use of *Fisheries and Marine Institute of Memorial University of Newfoundland*. Any use, reliance on, or decision made by any person other than *Fisheries and Marine Institute of Memorial University of Newfoundland*, based on this report, is the sole responsibility of such other person. *Fisheries and Marine Institute of Memorial University of Newfoundland* and *ADI Limited* make no representation or warranty to any other person with regard to this report and the work referred to in this report, and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties, or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made, or any action taken, based on this report or the work referred to in this report.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary.

10.0 QUALIFICATIONS OF THE ASSESSOR

This Phase I ESA was completed by Mr. Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo. Mr. Pumphrey has completed undergraduate degrees in Earth Science and Environmental Studies, has completed an Environmental Assessment Certificate, and has successfully completed over 175 similar Phase I ESAs. Mr. Pumphrey has also completed short courses in Asbestos Abatement and Management, Indoor Air Quality, Risk Assessment, and Contaminated Site Health and Safety Training.

Mr. Pumphrey is a member of the Professional Engineers and Geoscientists of Newfoundland and Labrador, and has over 15 years experience in the environmental consulting industry.

The Project Manager and report reviewer for this project was Mr. William G. Melendy, M.A.Sc., P.Eng. Mr. Melendy has completed a Bachelor of Engineering and Master of Applied Science in Environmental Engineering. He has over 25 years experience in the fields of Civil and Environmental Engineering and has participated in numerous similar Environmental Site Assessments.

Mr. Melendy is a member of the Professional Engineers and Geoscientists of Newfoundland and Labrador.

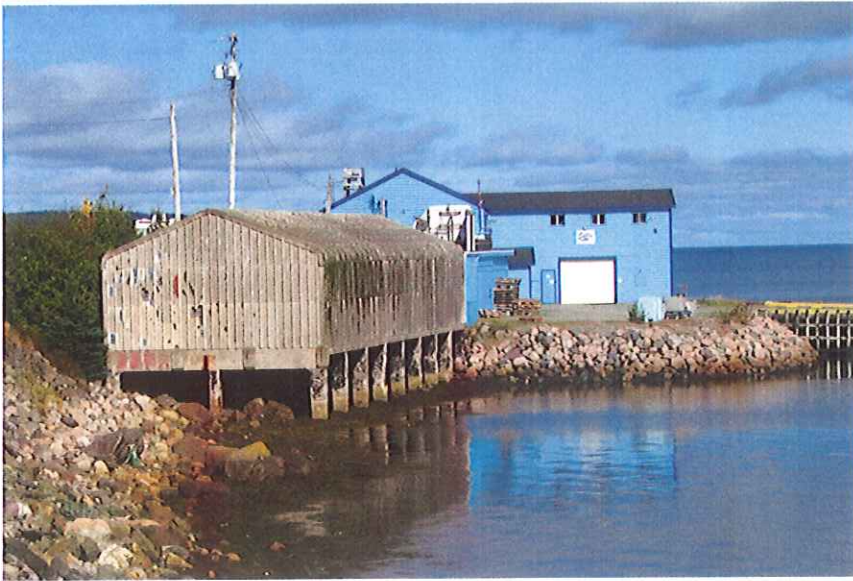
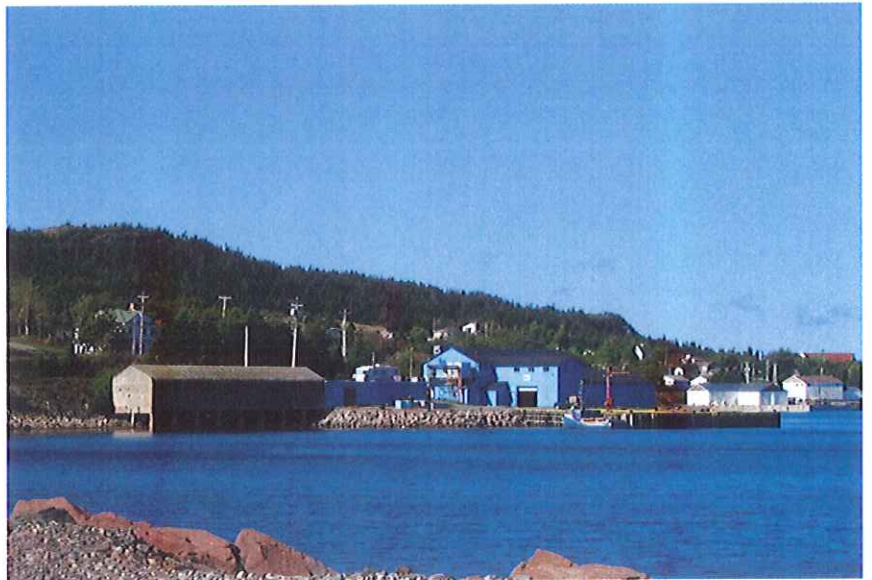
11.0 REFERENCES

- ▶ Newfoundland Regulation 111/98, *Asbestos Abatement Regulations, 1998*, under the Occupational Health and Safety Act.
- ▶ Canadian Standards Association - *Phase I Environmental Site Assessment Information Product, Z768-01, November 2001*.
- ▶ Storage and Handling of Gasoline & Associated Products Regulations. 2003, under the Newfoundland Labrador Environmental Protection Act.

APPENDIX

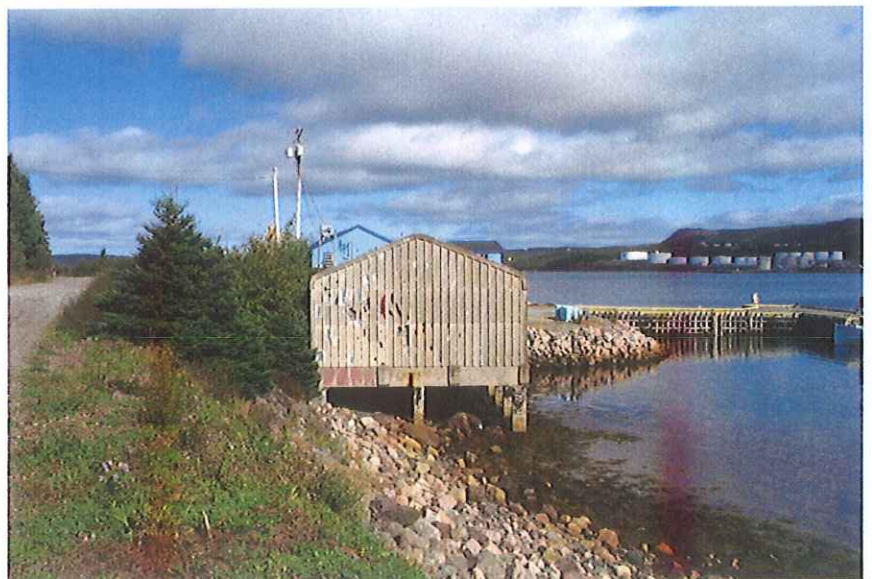
Site Photos

Photo#1: Subject property looking northwest
with Holyrood Harbour in foreground.



Photo#2: Subject property looking north.

Photo#3: Looking approximately north at
Cold Storage Building with gravel access
road at left.

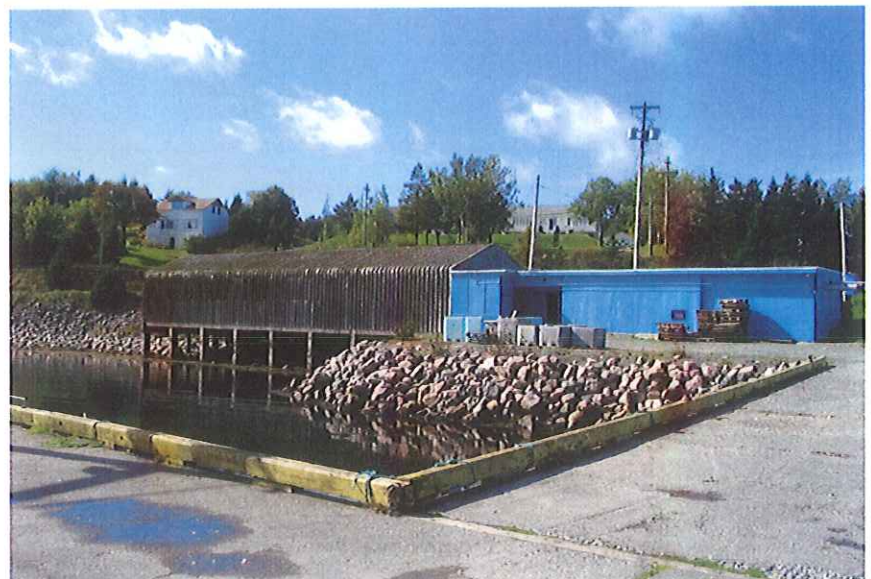


Photo#4: Looking east at Main Plant.



Photo#5: Looking west at Main Plant.

Photo#6: Looking west at Cold Storage Building.



Photo#7: Waste oil storage on east side of Main Plant.



Photo#8: Sump/trap on east side of Main Plant.

Photo#9: Looking west along north side of Main Plant.



Photo#10: Suspected ACM debris along north side of Main Plant.

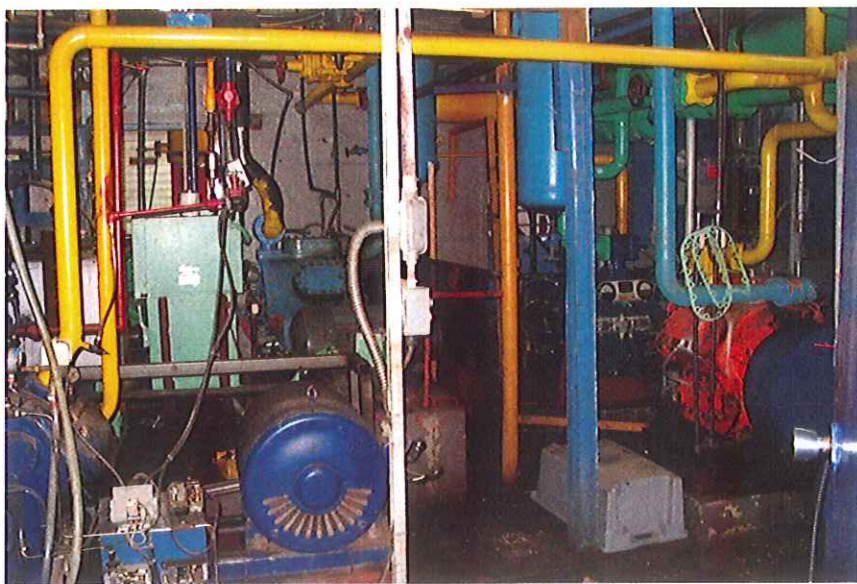


Photo#11: Two pipes near southwest corner of Main Plant.

Photo#12: Tank cradle and u/g line at northwest corner of Cold Storage Building.



Photo#13: Main Plant production floor.



Photo#14: Compressor/engine room in Main Plant.

Photo#15: Waste oil spill on compressor/engine room floor.



Photo#16: Waste oil storage in compressor/engine room.



Photo#17: Office area of Main Plant.

Photo#18: Inside of Cold Storage Building.





SYMBOLS AND TERMS USED ON THE BOREHOLE, TEST PIT, AND MONITOR WELL RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidation clay minerals, shrinkage, cracks, etc.
Fissured	-	having cracks, and hence a blocky structure
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay
Well-graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly-graded	-	predominantly of one grain size.

Terminology used for describing soil strata based upon proportion of individual particle sizes present:

Trace, or occasional	-	less than 10%
Some	-	10% to 20%
Adjective (e.g. silty or sandy)	-	20% to 35%
And (e.g. silt and sand)	-	35% to 50%

The standard terminology to describe cohesionless soils include the relative density, as determined by laboratory test or by the Standard Penetration Test N-value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2-inch (50.8 mm) O.D. split-spoon sampler 1 foot (305 mm) into the soil. On the records, where complete sampler penetration is not achieved and an N-value cannot be reported, the total number of blows are shown over actual penetration in millimetres (e.g. 75/180).

Relative Density	N-value	Relative Density %
Very Loose	<4	<15
Loose	4 - 10	15 - 35
Compact	10 - 30	35 - 65
Dense	30 - 50	65 - 85
Very Dense	>50	>85

The standard terminology to describe cohesive soils include the consistency, which is based on undrained shear strength as measured by in situ vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength		N-value
	Kips/sq.ft.	kPa	
Very Soft	< 0.25	< 12.5	< 2
Soft	0.25 to 0.5	12.5 to 25	2 to 4
Firm	0.5 to 1.0	25 to 50	4 to 8
Stiff	1.0 to 2.0	50 to 100	8 to 15
Very Stiff	2.0 to 4.0	100 to 200	15 to 30
Hard	> 4.0	> 200	> 30

SAMPLES

SS	Split-spoon sample (obtained by performing the Standard Penetration Test)	BK	Bulk sample
AS	Auger sample	WS	Wash sample
ST	Shelby tube or thin-wall tube	RC	Rock core AXT, BXL, etc.
PS	Piston sample		Rock core samples obtained with the use of standard diamond drilling bits.

OTHER TESTS

G	Specific Gravity	CU	Consolidated undrained triaxial with pore pressure measure- ments
H	Hydrometer Analysis	UU	Unconsolidated undrained triaxial
S	Sieve Analysis	RCC	Rock Core Compression
MC	Moisture Content	DS	Direct Shear
y	Unit Weight	P	Field Permeability
C	Consolidation	TPH	Total Petroleum Hydrocarbons (ppm)
CD	Consolidated drained triaxial	ND	Below Detection Limit

ROCK DESCRIPTION

The description of rock is based on the rock quality designation (RQD).

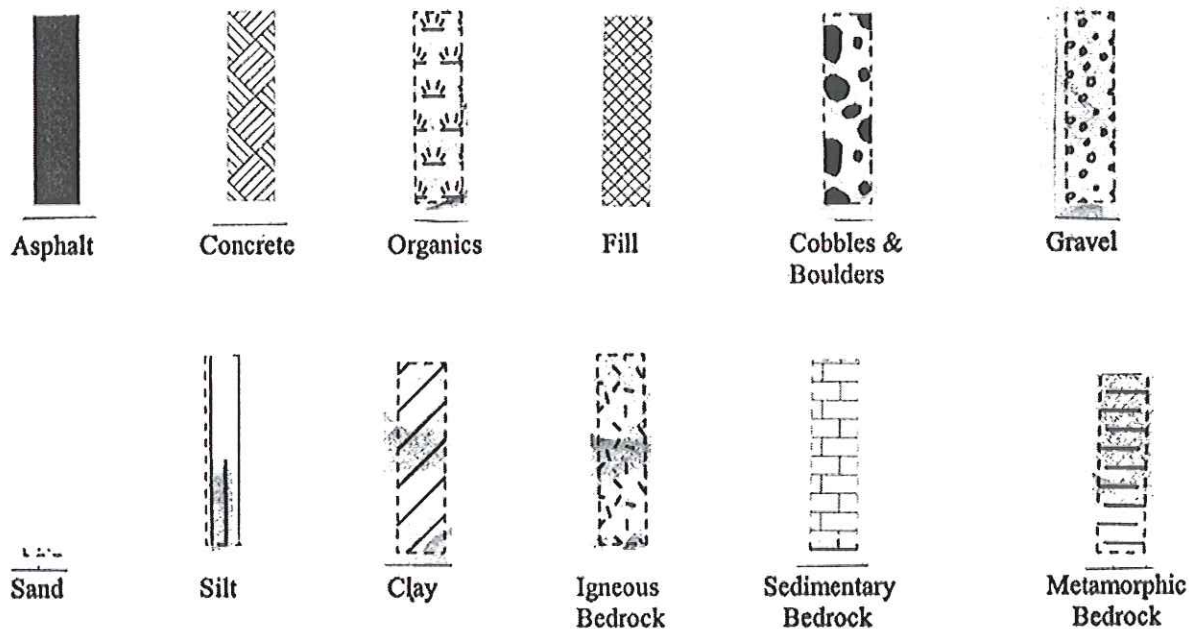
The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. In most cases, RQD is run on NXL core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from normal in situ fractures.

RQD	Rock Quality
90 to 100	excellent, intact, very sound
75 to 90	good, massive, moderately-jointed or sound
50 to 75	Fair, blocky and seamy, fractured
25 to 50	Poor, shattered and very seamy or blocky, severely-fractured
0 to 25	very poor, crushed, very-severely-fractured

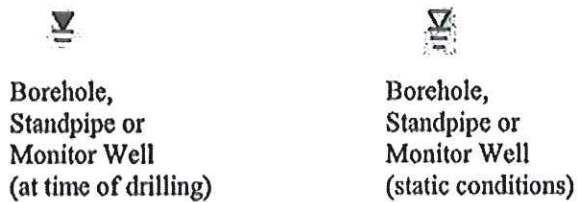
CLASSIFICATION OF ROCK WITH REGARD TO STRENGTH

STRENGTH		FIELD IDENTIFICATION METHOD	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (MPa)
Grade	Classification		
RO	Extremely weak	Indented by thumbnail	< 1
R1	Very weak	Crumbles under firm blows of geological hammer; can be peeled with a pocket-knife	1 - 5
R2	Weak rock	Can be peeled by a pocket-knife with difficulty; shallow indentations made by a firm blow with point of geological hammer	5 - 25
R3	Medium strong	Cannot be scraped or peeled with a pocket-knife; specimen can be fractured with a single firm blow of geological hammer	25 - 50
R4	Strong	Specimen requires more than one blow of geological hammer to fracture	50 - 100
R5	Very strong	Specimen requires many blows of geological hammer to fracture	100 - 250
R6	Extremely strong	Specimen can be chipped by geological hammer	> 250

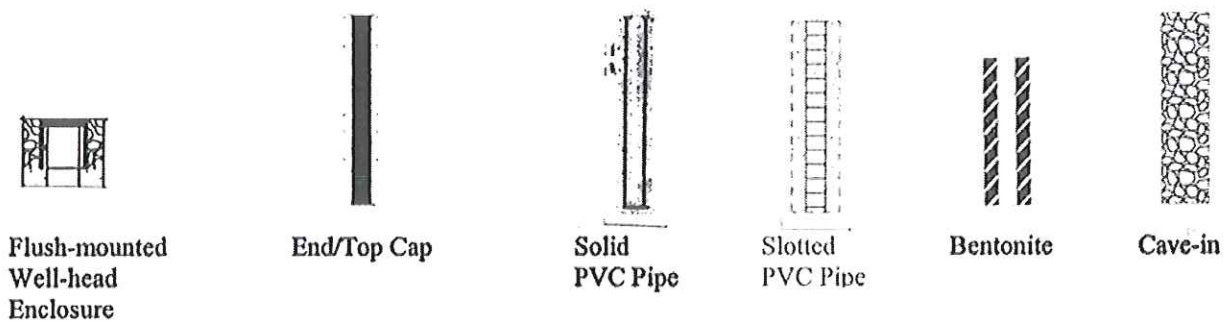
STRATA PLOT



WATER LEVEL MEASUREMENT



WELL CONSTRUCTION



Test Pit Records



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University of Newfoundland
 LOCATION Environmental and Geotechnical Services - Marine Base - Holyrood, NL
 DATES (dd-mm-yy): DUG 12-10-06 WATER LEVEL 12-10-06

PROJECT No. 26-4553-006.1
 TEST PIT No. TP 1
 DATUM

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			CHEMICAL ANALYSES (mg/kg)					
					TYPE	NUMBER	OTHER TESTS	Laboratory					GasTector Levels (ppm)
0		FILL: Loose to compact brown ORGANICS intermixed with silty SAND and GRAVEL; some cobbles and boulders - frequency increasing with depth; moist.											
					BK	1							10
1					BK	2							15
2		SAND and GRAVEL: Compact to dense grey SAND and GRAVEL; trace to some silt; occasional cobbles and boulders; moist.			BK	3							15
		End of Test Pit											
3		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock.											
4													





TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University of Newfoundland

PROJECT No. 26-4553-006.1

LOCATION Environmental and Geotechnical Services - Marine Base - Holyrood, NL

TEST PIT No. TP 2

DATES (dd-mm-yy): DUG 12-10-06 WATER LEVEL 12-10-06

DATUM

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			CHEMICAL ANALYSES (mg/kg)					
					TYPE	NUMBER	OTHER TESTS	Laboratory					GasTector Levels (ppm)
0		ORGANICS: FILL: Loose to compact brown silty SAND and GRAVEL; some debris (pieces of metal); some cobbles and boulders - frequency increasing with depth; moist.			BK	1							15
1					BK	2							10
2					BK	3							5
3		SAND and GRAVEL: Compact to dense grey SAND and GRAVEL; trace to some silt; some cobbles and large boulders; moist.			BK	4		nd	nd	nd	nd	nd	5
4		End of Test Pit											
		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock.											



ADI Limited
60 Pippy Place, Suite 200
St. John's, NL A1B 4H7
Tel 709.579.2027
Fax 709.579.7115

Technologist: R. Hayes
Reviewed By: W. Melendy
Contractor: Junior Besso
Equipment: CAT Extend-a-hoe

Water Level at Time of Drilling/Excavation
 Static Water Level



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University of Newfoundland
 LOCATION Environmental and Geotechnical Services - Marine Base - Holyrood, NL
 DATES (dd-mm-yy): DUG 12-10-06 WATER LEVEL 12-10-06

PROJECT No. 26-4553-006.1
 TEST PIT No. TP 3
 DATUM _____

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			CHEMICAL ANALYSES (mg/kg)					
					TYPE	NUMBER	OTHER TESTS	Laboratory					GasTector Levels (ppm)
								Benzene	Toluene	Ethyl Benzene	Xylene	TPH	
0		GRANULAR FILL: Compact to dense brownish grey GRAVEL and SAND; trace silt (granular Class 'A' material); moist. FILL: Compact to dense COBBLES and BOULDERS; intermixed with brown SAND and GRAVEL; trace to some silt; moist.			BK	1							5
1		End of Test Pit											
2		NOTES: 1) Test pit dry at time of excavation.											
3													
4													





TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University of Newfoundland


PROJECT No. 26-4553-006.1

LOCATION Environmental and Geotechnical Services - Marine Base - Holyrood, NL

TEST PIT No. TP 4

DATES (dd-mm-yy): DUG 12-10-06 WATER LEVEL 12-10-06

DATUM _____

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			CHEMICAL ANALYSES (mg/kg)					
					TYPE	NUMBER	OTHER TESTS	Laboratory					GasTector Levels (ppm)
								Benzene	Toluene	Ethyl Benzene	Xylene	TPH	
0		FILL: Compact brown SAND and GRAVEL; trace to some silt; cobbley and bouldery - frequency increasing with depth; moist.			BK	1		nd	nd	nd	nd	110	5
1		End of Test Pit NOTES: 1) Test pit dry at time of excavation.											
2													
3													
4													



ADI Limited
60 Pippy Place, Suite 200
St. John's, NL A1B 4H7
Tel 709.579.2027
Fax 709.579.7115

Technologist: R. Hayes
Reviewed By: W. Melendy
Contractor: Junior Besso
Equipment: CAT Extend-a-hoe



Water Level at Time of Drilling/Excavation

Static Water Level

Laboratory Certificates
(Maxxam Analytics Inc.)

Your Project #: 26-4553-006.1
Site: HOLYROOD
Your C.O.C. #: 15668

Attention: CYRIL PUMPHREY

ADI Limited
60 Pippy Pl
Suite 200
St. John's, NL
A1B 4H7

Report Date: 2006/10/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A6A8956

Received: 2006/10/12, 13:52

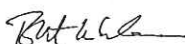
Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
TEH in Soil (PIRI) ϕ	2	2006/10/13	2006/10/13	SOP 9775	Based on Atl. PIRI
Moisture ϕ	2	N/A	2006/10/13	SOP 9740	MOE Handbook 1983
VPH in Soil (PIRI) ϕ	2	2006/10/13	2006/10/13	SOP 9785	Based on Atl. PIRI
ModTPH (T1) Calc. for Soil (2)	2	2006/10/12	2006/10/12		Based on Atl. PIRI

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by ST. JOHN'S NFLD
(2) SCC/CAEAL

Encryption Key



Rob Whelan

16 Oct 2006 04:17:02 -02:30

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ROB WHELAN,
Email Rob.WheLAN@maxxamanalytics.com
Phone# (709) 754 0203

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CAEAL have approved this reporting process and electronic report format.

Total cover pages: 1

Page 1 of 4

Maxxam Job #: A6A8956
Report Date: 2006/10/16

ADI Limited
Client Project #: 26-4553-006.1
Project name: HOLYROOD
Sampler Initials:

ATLANTIC MUST IN SOIL - PIRITIER I (SOIL)

MaxxamID		O80929	O80930		
SamplingDate		2006/10/12	2006/10/12		
COC Number		15668	15668		
	Units	TP2, S#4	TP4, S#1	RDL	QC Batch
INORGANICS					
Moisture	%	10	6	1	1076029
TPHCOMPOUNDS					
Benzene	mg/kg	ND	ND	0.03	1075792
Toluene	mg/kg	ND	ND	0.03	1075792
Ethylbenzene	mg/kg	ND	ND	0.03	1075792
Xylene(Total)	mg/kg	ND	ND	0.05	1075792
C6 - C10 (less BTEX)	mg/kg	ND	ND	3	1075792
>C10-C21Hydrocarbons	mg/kg	ND	ND	15	1076043
>C21-<C32Hydrocarbons	mg/kg	ND	110	15	1076043
Modified TPH (Tier1)	mg/kg	ND	110	20	1075168
Surrogate Recovery (%)					
Isobutylbenzene - Extractable	%	98	100		1076043
Isobutylbenzene-Volatile	%	95	78		1075792
n-Dotriacontane-Extractable	%	101	110 (1)		1076043
ND = Not detected RDL = Reportable Detection Limit QC Batch = Quality Control Batch (1) Lube oil fraction.					

Maxxam Job #: A6A8956
Report Date: 2006/10/16

ADI Limited
Client Project #: 26-4553-006.1
Project name: HOLYROOD
Sampler Initials:

GENERAL COMMENTS

Results relate only to the items tested.

ADI Limited
Attention: CYRIL PUMPHREY
Client Project #: 26-4553-006.1
P.O. #:
Project name: HOLYROOD

Quality Assurance Report

Maxxam Job Number: ZA6A8956

QA/QC Batch			Date Analyzed					
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits	
1075792 CJI	SpikedBlank	Isobutylbenzene-Volatile	2006/10/13		83	%	60 - 140	
		Benzene	2006/10/13		106	%	60 - 140	
		Toluene	2006/10/13		98	%	60 - 140	
		Ethylbenzene	2006/10/13		92	%	60 - 140	
		Xylene(Total)	2006/10/13		95	%	60 - 140	
		C6 - C10 (less BTEX)	2006/10/13		87	%	N/A	
	MethodBlank	Isobutylbenzene-Volatile	2006/10/13		67	%	60 - 140	
		Benzene	2006/10/13	ND, RDL=0.03		mg/kg		
		Toluene	2006/10/13	ND, RDL=0.03		mg/kg		
		Ethylbenzene	2006/10/13	ND, RDL=0.03		mg/kg		
		Xylene(Total)	2006/10/13	ND, RDL=0.05		mg/kg		
		C6 - C10 (less BTEX)	2006/10/13	ND, RDL=3		mg/kg		
	RPD [O80929-01]	Benzene	2006/10/13	NC		%	50	
		Toluene	2006/10/13	NC		%	50	
		Ethylbenzene	2006/10/13	NC		%	50	
		Xylene(Total)	2006/10/13	NC		%	50	
		C6 - C10 (less BTEX)	2006/10/13	NC		%	50	
		Moisture	2006/10/13	0		%	N/A	
1076029 GMA	RPD [O80929-01]	Isobutylbenzene - Extractable	2006/10/13		95	%	30 - 130	
1076043 DDE	MATRIX SPIKE [O80929-01]	n-Dotriacontane-Extractable	2006/10/13		101	%	30 - 130	
		>C10-C21Hydrocarbons	2006/10/13		107	%	30 - 130	
		>C21-<C32Hydrocarbons	2006/10/13		101	%	30 - 130	
	SpikedBlank	Isobutylbenzene - Extractable	2006/10/13		96	%	30 - 130	
		n-Dotriacontane-Extractable	2006/10/13		101	%	30 - 130	
		>C10-C21Hydrocarbons	2006/10/13		105	%	30 - 130	
		>C21-<C32Hydrocarbons	2006/10/13		105	%	30 - 130	
	MethodBlank	Isobutylbenzene - Extractable	2006/10/13		100	%	30 - 130	
		n-Dotriacontane-Extractable	2006/10/13		102	%	30 - 130	
		>C10-C21Hydrocarbons	2006/10/13	ND, RDL=15		mg/kg		
		>C21-<C32Hydrocarbons	2006/10/13	ND, RDL=15		mg/kg		
	RPD [O80929-01]	>C10-C21Hydrocarbons	2006/10/13	NC		%	50	
		>C21-<C32Hydrocarbons	2006/10/13	NC		%	50	

ND = Not detected
N/A = Not Applicable
NC = Non-calculable
RPD = Relative Percent Difference
SPIKE = Fortified sample

HEIRS I REPORT



CGI Information Systems
and Management
Consultants Inc.

238 Brownlow Ave.
3rd Floor, Suite 300
Dartmouth, N.S.
B3B 1Y2

Tel. (902) 423-9287
Fax. (902) 423-7376
www.cgi.com

CGI ENVIRONMENTAL SERVICES

Historical Environmental Information Report (HEIRS)

ADI Nolan Davis
60 Pippy Place, Suite 200
St John's, Newfoundland
A1B 4H7

September 29, 2006

Attention: Cyril Pumphrey, P.Geo.

Regarding: Seaxx Inc
Station Road, Holyrood NL
Project # Not Provided

As requested by fax on September 26, 2006, we have searched our records concerning the above property and the following information as listed is appended hereto:

<u>Information</u>		<u>Dates</u>
(1) CUA plan(s)	(0)	None
(2) Property underwriter's report(s)	(1)	1983
(3) Property underwriters plan(s)	(1)	1983

Our invoice for \$100.00 plus HST will follow.

A blue ink signature of E W Porter, written in a cursive style.

E W Porter
Customer Service Representative

Reference should be made to the reverse side hereof and to the Request for Services for the Terms and Conditions which relate to the information provided herein.

Porter, Edwin

From: Cyril Pumphrey [CPumphrey@adi.ca]
Sent: Tuesday, September 26, 2006 8:13 AM
To: Porter, Edwin
Subject: Heirs 1-2 Northside Road-Holyrood, NL.

Good Morning Ed:

It must be fish-plant week. Could you do an Heirs 1 on an old fish plant located at 2 Northside Road, in Holyrood, NL. The site is now owned by Seaxx Inc, but was formerly owned by a variety of groups, including Fishery Products. There was a railway station very near the site until the late 1970s-early 1980s.

Thanks,

Cyril



CONFIDENTIAL

LOSS CONTROL ENGINEERING DEPARTMENT
MANUFACTURING AND SPECIAL HAZARDS

INSURED: Fishery Products Limited

Date: 12 January 1983

ADDRESS: Station Road
Holyrood, Newfoundland

File No. MA 40321 (1)

NOP

MAILING ADDRESS: P. O. Box 550
St. John's
Newfoundland

IBC CODE: Terr. 36 Ind. 202
Cons. 6 Prot. 4

CONTACT: Mr. W. Healey

Freq. 24 Months

SURVEY-FIRE AND EXTENDED COVERAGE INSURANCE

Gentlemen:

Mr. R. W. Blundon visited your property on behalf of the Companies which are Members of IAO on 22 December 1982.

The recommendations contained herein were developed from a survey of the above premises and are based upon conditions, practices observed, other pertinent data supplied by management personnel, and information secured at the time of the survey. Please advise your Agent, Broker or Company Representative and IAO, of the action you will take to implement these recommendations.

RECOMMENDATIONS IN CAPITAL LETTERS ARE OF PARTICULAR IMPORTANCE AND THEIR EARLY ADOPTION IS RECOMMENDED.

REMARKS: None.

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RECOMMENDATIONS:

- 82-1 Portable fire extinguishers should be strategically installed in designated areas along routes of travel where they will be readily accessible and immediately available in the event of a fire. Distribution of Underwriters' Laboratories of Canada rated fire extinguishers should be on the basis of one 2A rated unit for each 279 sq. m. (3000 sq. ft.) of floor area or part thereof, on each floor of each building, to protect both combustibles and combustible building construction, supplemented by Class "B", "C" rated units where oil or electrical fire hazards may exist. Extinguishers should be maintained in a fully charged and operable condition and be serviced and tagged annually by an authorized representative to ensure reliability and proper working order.



R. W. Blundon, Field Supervisor
Loss Control Engineering Department

RWB/mem

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WITHDRAWN RECOMMENDATIONS: None.

CHANGES SINCE LAST SURVEY: None.

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INSURERS' ADVISORY ORGANIZATION
NEWFOUNDLAND OFFICE

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INSPECTION REPORT

File No. MA 40321 (1)

Plan Attached.

MANUFACTURING AND SPECIAL HAZARDS

NAME OF RISK: Fishery Products Limited

LOCATION: Station Road, Holyrood, Newfoundland

SURVEYED BY: R. W. Blundon

DATE: 22 December 1982

OCCUPANCY

1. (a) Fish freezing plant.

CONSTRUCTION

2. (a) FIRE DIVISIONS: See Multiple Fire Section Sheet.

HAZARDS

3. (a) COMMON HAZARDS:

(i) Heating: Buildings are unheated with the exception of a small office area in Building No. 2. This area is equipped with permanently installed electric unit heaters.

(ii) Electrical: Safe, circuit breakers and fused used.

(b) SPECIAL HAZARDS: None.

(c) RADIOACTIVE MATERIALS: None.

(d) HIGH PILING: None.

(e) HOUSEKEEPING: Safe.

(f) HAZARDOUS MATERIAL: None.

(g) EXPOSURES: None within 45.7 m (150').

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(h) ACTIVITY: Plant was silent at time of inspection. During the 1982 season the plant was in operation for four months with approximately forty people being employed. It is unknown if any production will be carried out in 1983.

(i) MAINTENANCE WELDING: None.

(j) SMOKING RESTRICTED: Yes.

(k) ELECTRONIC Data Processing Equipment: None.

(l) PROCESS DESCRIPTION:

Caplin and squid are received at plant from local inshore fishermen, quick frozen and held in cold storage to await shipment.

PROTECTION

4. (a) SPRINKLER PROTECTION: None.

(b) OTHER PROTECTION:

(i) Extinguishers: Non-standard. (Rec. made).

(ii) Standpipe and Hose: None.

(iii) Watchman Service: None.

(iv) Special Equipment and Apparatus: None.

(c) OUTSIDE PROTECTION:

(i) Hydrants: Public: Non-standard. Only one hydrant located within 155 m (500') of plant.

Private: None.

(ii) Fire Dept. Public: Volunteer.

Distance to Fire Hall: 3 km (2 miles)

F.U.S. Classification of Municipality:

Private: No.

(iii) Accessibility:

To Property: Poor.

Into Building: Fair. Access to the risk is restricted to a narrow road located in front of the plant; to the west the premises are bound by the tidal waters of Conception Bay.

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EXTENDED COVERAGE

5. (a) WINDSTORM - Unusual Hazards: Plant is open to Conception Bay with no protection from a northerly wind. Winds could reach gale force during winter time.
- (b) LIGHTNING - Unusual Features: None.
Properly Grounded: Yes.
- (c) EXPLOSION - Unusual Features: None.
- (d) SPRINKLER LEAKAGE: N. A.
- (e) RIOT, VANDALISM, MALICIOUS ACTS:
Access Restricted: No.
Guard Supervised: No.
Yards Fenced: No.
Yards Lit: No.
Remote From Populated Areas: No.
- (f) EARTHQUAKE - Zone: 2
- (g) IMPACT HAZARDS - by aircraft: No.
- by road vehicles: No.
- by trains: Railroad track is located approximately 5 m (15') from the plant.
- by floating vessels: Impact by vessels is possible due to the fact that the tidal waters are at the edge of the buildings.
- (h) FLOOD HAZARDS: There is a possibility of flood from high seas due to the fact that tidal waters are in close proximity to the building and the rear of the cold storage building projects over the tidal waters with approximately 3m (6') from the floor to the normal water surface.
- (i) SMOKE - Susceptibility of Stock to Smoke Damage: Light.
- (j) COLLAPSE - Susceptibility to Collapse: No.

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BUSINESS INTERRUPTION

6. (a) Seasonal: Yes. Normal operation from May to August.
- (b) Operation: 8 - 16 Hrs/Day, 5 Days/Wk. depending upon fish stocks available.
- (c) Interdependency: No.

(d) Raw Materials Mainly: Domestic.

Stock on hand for: 4 Months.

Stock Replacement Time: Daily.

(e) Computerized Programming: No.

(f) Single Train Production: No.

(g) Vital Machinery Custom Made: No.

(h) Private Power Generation: No.

(i) Production Dependent on Pollution Control Equipment: No.

(j) Other Important Features: Operation of plant is mainly dependent upon cold storage facilities. Due to economic conditions it is uncertain if the plant will be operating during the 1983 season.

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UNDESIRABLE FEATURES

7. PROMINENT: 1. Poor outside hydrant protection.

OTHER: 1. No portable fire extinguishers.

MANAGEMENT - LOSS PREVENTION PROGRAMMES

	CONTROL REQUIRED	CONTROL EXERCISED
8. (a) Basic Fire Protection:	Yes	Satisfactory
(b) Self-inspection:	Yes	Satisfactory
(c) Maintenance of Fire Protection Equipment:	No	Unsatisfactory (Rec. made).
(d) Pre-emergency Planning:	N. A.	
(e) Plant Security:	N. A.	
(f) Private Fire Brigade:	N. A.	
(g) Smoking Regulations:	Yes	Satisfactory
(h) Welding, Cutting & Grinding:	N. A.	

(i) Impairment Notification: N. A.
(j) Preventive Maintenance: N. A.

Comments: None.

TENANTS

9. None.

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MULTIPLE FIRE SECTION SHEET:

Bldg. No. 1 % A.S. 0%

1. (a) Occupancy: Fish sorting and cold storage building.
2. (a) Fire Division: A (Letter denotes one fire division area)

Amount of Risk Subject to One Fire: 100%

(b) BUILT IN: eng. 100-100

Repair: Fair. Signs of worn floors and eaves of building sagging. Wharf to the rear of the main cold storage building seriously deteriorated and sinking into the harbour waters.

(c) HEIGHT: 1 Storey, 3.5 m (12')

(d) WALLS: (1) Construction: 50% Steel frame, asbestos clad,
17% Solid concrete, 33% Wood frame, asbestos clad.

(11) Type: Independent, 50% Bearing & 50% Non-bearing.

(e) FLOORS: Concrete.

(f) ROOF: (1) Construction: 46% Rigid asbestos, 54% Wooden.

(11) Roof Surface: 46% Non-combustible, 54% Patent.

(g) SUPPORTING STEEL: Not protected.

(h) TOTAL GRADE FLOOR AREA: 795 sq. m. (8545 sq. ft.)

Total Area: 795 sq. m. (8545 sq. ft.)

(1) VERTICAL OPENINGS: None.

(1) INTERIOR FINISH:

Exterior Walls: 100% Combustible

Interior Walls: 100% Combustible

Total combustible interior wall area is 30% of exterior wall area.

Ceilings: 100% Combustible.

(k) (1) COMBUSTIBLE CONCEALED SPACES: Minor.
Attic space 1 m (3') over process area.

Roof: 23%

(11) NON-COMBUSTIBLE CONCEALED SPACES: None.

(1) SMOKE AND HEAT VENTING: Inadequate. No facilities provided.

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MULTIPLE FIRE SECTION SHEET:

Bldg. No. 2 % A.S. 0%

1. (a) Occupancy: Cold storage facilities and miscellaneous storage.
2. (a) Fire Division: A (Letter denotes one fire division area)

Amount of Risk Subject to One Fire: 100%

(b) BUILT IN: ----

Repair: Fair. Signs of worn floors and eaves of building sagging. Wharf to rear of main cold storage building seriously deteriorated and sinking into the harbour waters.

(c) HEIGHT: Part basement, 1 Storey 3.5 m (12')

(d) WALLS: (i) Construction: Wood frame, asbestos clad.

(ii) Type: Independent, bearing.

(e) FLOORS: Concrete.

(f) ROOF: (i) Construction: Wood.

(ii) Roof Surface: Patent.

(g) SUPPORTING STEEL: None.

(h) TOTAL GRADE FLOOR AREA: 620 sq. m. (6650 sq. ft.)

Total Area: 980 sq. m. (10,550 sq. ft.)

(i) VERTICAL OPENINGS: 100% Open. One stairway from first to second floor.

(j) INTERIOR FINISH:

Exterior Walls: 100% Combustible.

Interior Walls: 100% Combustible.

Total combustible interior wall area is 40% of exterior wall area.

Ceilings: 100% Combustible.

(k) (i) COMBUSTIBLE CONCEALED SPACES: Major.

Attic space of 1 m (3') over entire building.

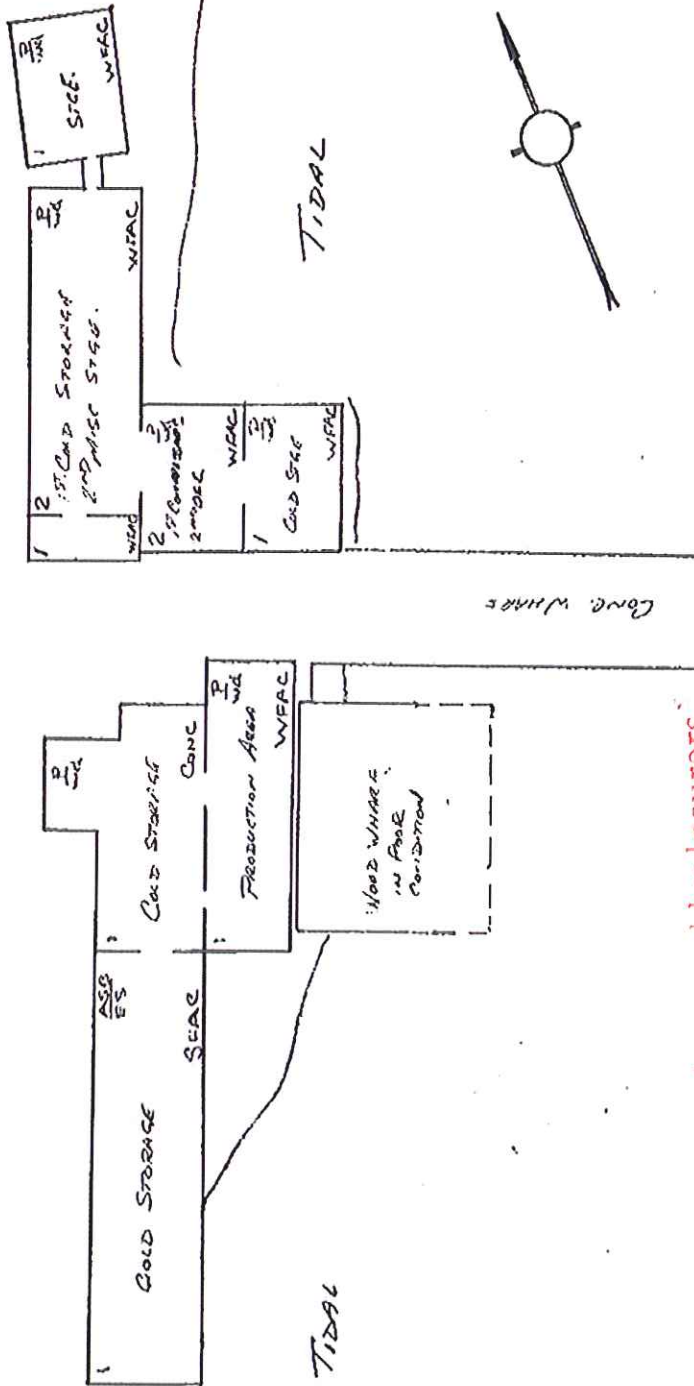
Roof: 100%

(ii) NON-COMBUSTIBLE CONCEALED SPACES: None.

(l) SMOKE AND HEAT VENTING: Inadequate. No facilities provided.

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RR SPUR
RR SPUR



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FILE NO. MA40321

Fishery Products Limited
Station Road
Holyrood, Newfoundland

Sheet: Nop Black: Nop Scale: 1:600

INSURERS' ADVISORY ORGANIZATION
NEWFOUNDLAND

Date: 12/1/83 Rep.: R.W.B.

GSC Records Search
[pending]



GOVERNMENT OF
NEWFOUNDLAND
AND LABRADOR

Department of
Government Services

Government Service Centre

Telephone: (709) 729-2550
Facsimile: (709) 729-7400

OPERATIONS DIVISION

June 2, 2005

Cyril Pumphrey, P.Geo.
ADI Nolan Davis
P.O. Box 7248
St. John's, NL. A1E 3Y4

Dear Mr. Pumphrey:

Re: 4 Northside Road, Holyrood, NL

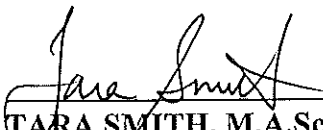
This refers to your letter of May 13, 2005, requesting an environmental file search of the above mentioned property.

As we do not possess a departmental central registry of activities affecting the environment on properties in the province, we state that to the best of our knowledge and on a search of the files that we have reviewed, the Department of Government Services is not aware of any previous outstanding environmental concerns at the property in question.

The Department of Government Services makes no representations or warranties on the accuracy or completeness of the information provided.

Should you have any questions, please call the undersigned at 729-3098.

Sincerely,


TARA SMITH, M.A.Sc.
Environmental Protection Officer

Incoming Data/Product (Procedure #3)
Supplied by: Gov't Services
Project No.: 26-4553-004.1
Reviewed by: CJP
Date Reviewed: June 7/05

Final Report
PHASE II ENVIRONMENTAL
SITE ASSESSMENT
PROPOSED MARINE BASE
HOLYROOD, CONCEPTION BAY
NEWFOUNDLAND & LABRADOR

Prepared for:
Fisheries & Marine Institute of Memorial
University of Newfoundland

(File No. 26-4553-004.1)

July 2005

**PHASE II ENVIRONMENTAL
SITE ASSESSMENT
PROPOSED MARINE BASE
HOLYROOD, CONCEPTION BAY
NEWFOUNDLAND & LABRADOR**

**Prepared for: Fisheries & Marine Institute
Memorial University of Newfoundland**

ADI Nolan Davis

FILE: 26-4553-004.1

DATE: July 2005



ADI Nolan Davis

a division of
ADI Limited



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July 21, 2005

File No. 26-4553-004.1

Fisheries & Marine Institute of
Memorial University of Newfoundland
c/o Facilities Management-Room SM2032
Memorial University of Newfoundland
St. John's, NL A1C 5S7

Attention: Mr. Keith Hiscock, P.Eng.
Assistant Director of Development

Dear Sir:

RE: **Phase II Environmental Site Assessment
Proposed Marine Base
Holyrood, Newfoundland & Labrador**


We are pleased to submit two copies of our Final Report on the findings of work completed at the above-noted site.

We trust this submission meets your present requirements. Should you have any questions or require clarification on any aspect of this submission, please do not hesitate to contact our office


Thank you for the opportunity of providing our services on this project.

Yours very truly,

ADI Nolan Davis


Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.
Environmental Geoscientist

CJP/kt


(per)
Brendan F. Davis, P.Eng.
Project Manager

Enclosure: Report in duplicate

o:/#Project Files/4553/45530041/Reports/45530041Rpt-PhaseIIESA-Jul'5

This report was prepared by ADI Limited for the account of Fisheries and Marine Institute of Memorial University of Newfoundland.

The material in it reflects ADI Limited's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ADI Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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APPENDIX

Symbols and Terms Used on the Borehole, Test Pit and Monitor Well Records
 Test Pit Records
 Laboratory Certificates

ADI Quality System Checks		
Project No.: 26-5720-001.1	Date: 2005 07 22 [yr/mo/da]	
Issue Status: Final Report	Revision No.: 0	
Prepared by: Cyril J. Pumphrey, B.Sc., B.E.S., P.Geo.	[Signature]	
Reviewed by: Brendan F. Davis, P.Eng.	[Signature]	

1.0 INTRODUCTION

Acting at the request of Mr. Bernard Sheehan, with the Fisheries and Marine Institute of Memorial University of Newfoundland (FMI), and in general accordance with our proposal dated May 3, 2005 ADI Nolan Davis has completed a Phase II Environmental Site Assessment (ESA) at the site of a proposed new Marine Base, situated at Civic No. 4 Northside Road in Holyrood, Newfoundland & Labrador. The purpose of the assessment was to evaluate the potential for subsurface contamination as outlined in our May, 2005 proposal and as identified in our Phase I ESA Report dated, May 2005.

ADI previously completed a Phase I ESA at this property entitled:

Phase I Environmental Site Assessment-Proposed Marine Base-Civic No. 4 Northside Road. Holyrood, Newfoundland and Labrador. May. 2005.

2.0 SITE DESCRIPTION

The subject property consists of an approximately 6000 m² block of vacant land, located at Civic No. 4 Northside Road, in Holyrood, Newfoundland and Labrador. The property is located on the northeast side of Northside Road, immediately adjacent to and north of the *Seaxx Fish Plant* and the adjacent wharf. The subject property was formerly occupied by *Canadian National Railways* (CNR) but is currently vacant. Also associated with this property is an approximately 700 m² easement, located south of the property and extending to the public wharf approach, and an approximately 400 m² right-of-way comprised of a gravel-surfaced wharf approach (east of the aforementioned easement) which bisects the *Seaxx Fish Plant* property and leads to the wharf (treated timber pile/ ballast crib structure). A more detailed description of the property is provided in the Phase I Site Assessment report dated May, 2005.

The property is located within the Town of Holyrood and is currently zoned as *Industrial General*. The area is presently provided water and sewer services by the Town of Holyrood.



3.0 INVESTIGATION PROCEDURE

The Phase II ESA consisted of subsurface test pit and marine drilling programmes designed to evaluate subsurface conditions as relates to both geotechnical and environmental conditions at the site.

3.1 Subsurface Test Pit Programme

The test pit sampling programme consisted of seven subsurface test pits, completed on May 10, 2005. Test pits were completed using a rubber tired backhoe provided by *Jack Hill Limited*.

Test pit locations were selected in the field by ADI Nolan Davis at locations designed to provide geotechnical information pertaining to a proposed new building, as well as provide representative information on potential subsurface contamination, as identified in our Phase I ESA report. Test pit locations, labelled as TP1 to TP7, inclusive, are shown on *Drawing 2-2: Site Location Plan*. Test pits were typically excavated to refusal on presumed bedrock. Conditions encountered in each test pit were recorded and representative soil samples collected from each test pit. The programme was completed under the direct full-time monitoring of Mr. Blair Cameron, CET, a Senior Technologist with ADI, Nolan Davis. Information collected relative to each test pit is presented on the individual Test Pit Records included in the Appendix.

Representative soil samples were collected in the test pits, using hand-held sampling equipment. Where excavation depths exceeded 1.2 metres or where excavation walls appeared unstable, samples were retrieved from the backhoe bucket. The sampling tools were cleaned using a distilled water/methyl hydrate rinse between sampling events. All soil samples recovered were stored in new laboratory-supplied glass sample jars (for laboratory analyses), and one-litre glass mason jars (for field screening). All soil samples were returned to ADI's laboratory where headspace soil vapour analyses were performed using a *GasTector Model 1238ME* gas vapour detector. Headspace measurements for soil samples are presented on the Test Pit Records.

Selected soil samples from test pits were submitted to *Maxxam Analytics* in St. John's, Newfoundland & Labrador and Bedford, Nova Scotia, for a variety of analyses (see *Table 3.1: Summary of Laboratory Testing*).

3.2 Marine Drilling Programme

The Marine Drilling programme comprised two sampled boreholes and 5 dynamic cone penetration tests (DCPTs) at selected locations. The purpose of this investigation was to obtain information for foundation design of the proposed marine structure extension and to collect representative marine sediment samples for further laboratory testing for contaminants.

Field work was carried out during the period June 28/29, 2005 under the full-time monitoring of Mr. Blair D. Cameron, C.E.T., a Senior Soils Technologist with *ADI Nolan Davis*. Borehole drilling was sub-contracted to *Barker Construction Limited* who advanced all the boreholes and dynamic cones with a skid-mounted Long-year 38 drill-rig off a floating platform.

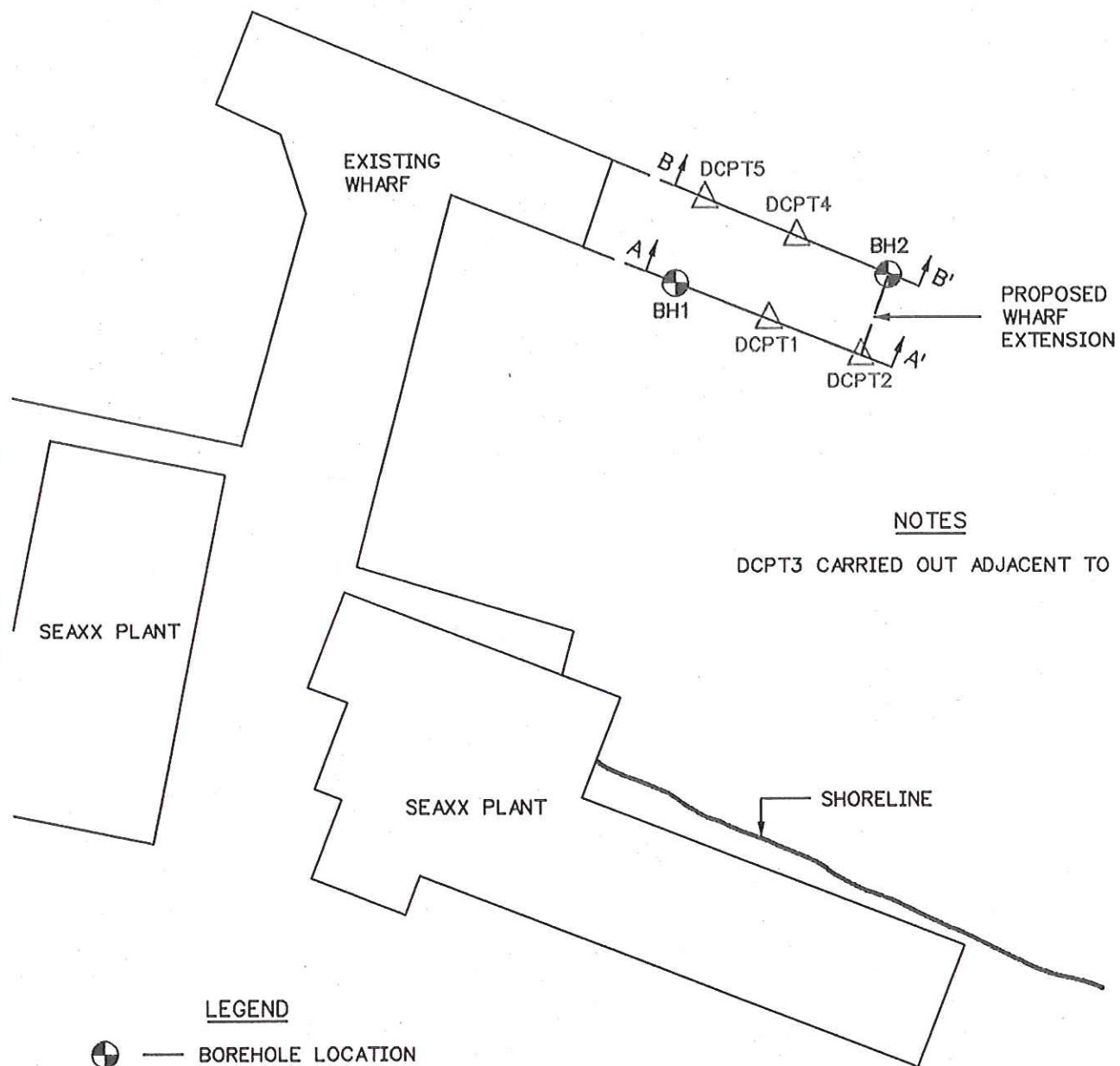
Test locations are shown on *Drawing 2-3: Borehole Location Plan*.

Representative sediment samples were collected from the bottom using a split spoon sampler driven into the sediment some 0.60 metres. The sampler was cleaned using a distilled water/methyl hydrate rinse between sampling events. All sediment samples recovered were stored in new laboratory-supplied glass sample jars for laboratory analyses.

All sediment samples were stored in coolers and submitted to *Maxxam Analytics* in St. John's, Newfoundland & Labrador and Bedford, Nova Scotia, for a variety of analyses (see *Table 3.1: Summary of Laboratory Testing*).






WATERS OF HOLYROOD HARBOUR



NOTES

DCPT3 CARRIED OUT ADJACENT TO BH2.

LEGEND

-  — BOREHOLE LOCATION
-  — DYNAMIC CONE PENETRATION TEST LOCATION
-  — SECTION

RECORD DRAWING

SCALE: 1:500

This drawing is not to be scaled

ADI ADI Limited
St. John's, NF, Canada
Engineering, Consulting, Procurement and
Project Management

Charlottetown, Moncton, Saint John, Truro, Halifax, Sydney
Port Hawkesbury, St. John's, Fredericton and Salem, NH

Proj. FISHERIES AND MARINE INSTITUTE
OF MEMORIAL UNIVERSITY
MARINE BASE, HOLYROOD, NL

Dwg. BOREHOLE AND DYNAMIC CONE
PENETRATION TEST LOCATION PLAN

Drawn By: BDC	Proj. No. 26-4553-004.1
Dwg. Standards Chk. By: BFD	Dwg. No. 2-3
Designed By:	Dwg. Design Chk. By:
	Rev.

Table 3.1: Summary of Laboratory Testing				
Sample ID	Analyte			
	TPH/BTEX	Metals	PAHs	PCBs
Soils				
TP1, SA1	✓		✓	
TP3,SA1	✓			
TP4, SA2	✓	✓		
TP5,SA1	✓			
TP6, SA1	✓	✓	✓	✓
TP7, SA2	✓			✓
Sediment				
BH1,SA1	✓	✓	✓	✓
DCPT4,SA1	✓	✓	✓	✓
DCPT5,SA1	✓	✓	✓	✓

4.0 INVESTIGATION RESULTS

4.1 Subsurface Conditions-Land Lot

The present site within the limits of the test pit investigation generally comprises thin zones of topsoil that host sparse grass and small shrubs (Test Pits Nos. 1, 2, 5, and 7). The grassmat/topsoil where present, overlies a thin Fill which is directly underlain by a dense native Till deposit which, as evidenced at Test Pits Nos. 1, 2, 3, 4, 5, and 6, extends to the bedrock surface. The native Till deposit was exposed at ground surface at Test Pits Nos. 4 and 6.

Organics

An orangey-brown 400 mm thick sand and gravel organic topsoil is present at Test Pit No. 1. Elsewhere over the site (Test Pits Nos. 2, 5, and 7), a grassmat is supported by a thin veneer of topsoil.

Fill

Fill comprising a brown Sand and Gravel with a trace to some silt and occasional cobbles and boulders was noted in Test Pits Nos. 2, 3, 5, and 7. The presence of minor debris was noted in Test Pit No. 5. The Fill varies in thickness from 0.2 m at Test Pit No. 7 to 0.6 m at Test Pit No. 5, and extends to a maximum depth of 0.7 m below ground surface (Test Pits Nos. 3 and 5). The Fill, where present, directly overlies the reddish-brown native Till deposit. Note: a thin 200 mm thick layer of granular base gravel extends from ground surface to the top of the Fill at Test Pit No. 3.

Two sieve analyses (results in Appendix) were completed on representative Fill samples, one from each of Test Pits Nos. 3 and 5, with the following results:

	Range %	Average %
Silt	7.1 to 13.1	10.1
Sand	44.7 to 52.4	48.5
Gravel	40.5 to 42.2	41.4

The natural moisture content of the two samples ranged from 4.4 percent to 7.3 percent, with an average of 5.8 percent.

Based on observations of the backhoe performance in the Fill, it is classified as compact in terms of relative density.

Till

A native Till deposit was encountered at all seven test pit locations. The reddish-brown Till was encountered directly beneath either the Organics (Test Pit No. 1), the Fill zone (Test Pits Nos. 2, 3, 5, and 7), or at ground surface (Test Pits Nos. 4 and 6). The thickness of the Till varied from 1.0 m at Test Pit No. 5 to 2.8 m at Test Pit No. 6. With the exception of Test Pit No. 7, the Till terminated at the bedrock surface which varied from 1.7 m below ground surface at Test Pits Nos. 2 and 5 to 2.8 m at Test Pit No. 6. Test Pit No. 7 terminated in the Till deposit at a depth of 2.5 m below ground surface.

The composition of the Till encountered at all seven test pits is generally described as a reddish-brown Sand and Gravel with a trace to some silt (Test Pits Nos. 2, 5, 6, and 7), to gravelly, silty Sand (Test Pits Nos. 1 and 3), to sandy Gravel with a trace of silt (Test Pit No. 4). Occasional cobbles and boulders were noted in the Till matrix at all test pit locations.

Four sieve analyses (results in Appendix) were completed, one from each of Test Pits Nos. 2, 3, 4, and 7, with the following results:

	Range %	Average %
Silt	9.9 to 20.2	14.7
Sand	32.3 to 48.5	40.3
Gravel	34.5 to 57.7	45

The natural moisture content of the four samples tested ranged from 3.2 percent to 7.2 percent, with an average of 5.5 percent.

Based on observations of the backhoe effort in penetrating the Till deposit, it is classified in terms of relative density as compact within the initial 500 mm to dense below this depth at all seven test pit locations.

Groundwater

Groundwater was not encountered at any of the seven excavated test pits.

Bedrock

Probable bedrock was encountered at Test Pits Nos. 1 through 6. Based on a field examination of bedrock exposures on Northside Road, a site outcropping, and along the eastern edge of the site shoreline, bedrock consists of a grey to green interbedded siltstone and fine-grained sandstone. This is consistent with geological mapping (King, A.F., 1988) for the area. Based on area topography, horizontal groundwater flow in any potential surficial aquifer is expected to be primarily towards the north and/or east.

4.2 Subsurface Conditions-Water Lot

The subsurface conditions encountered at the two boreholes and 5 DCPT locations off the south end of the existing wharf includes a variable thickness (0.6m to 1.5m) of marine sediment. The marine sediment at Borehole No.'s. 1 and 2 is underlain by a relatively-thin (1.3m to 2.2m thick) glacial till deposit which extends to bedrock.

The dominant bedrock which was cored in both boreholes is a fine-grained, interbedded sandstone/siltstone. No evidence of hydrostatic groundwater pressure was observed at either of the borehole locations.

To facilitate presentation, the soils encountered are combined generally into three principal groups as follows:

- marine sediments
- glacial till
- bedrock

Marine Sediments

The harbour seabed comprises a relatively thin layer of marine sediment. This unit, comprising essentially a grey sand with a trace of silt and seashells throughout was encountered in both the boreholes. This layer varies in thickness from 0.6 m at Borehole No.1 and No.2 to 1.5m at DCPT No.2.

Grain size analyses testing for a single representative sample of the marine sediment yielded the following results.

- sand 91.4 percent
- silt 8.6 percent

The materials comprising the marine sediment unit which, it is expected, covers the entire site of the proposed wharf extension, are generally in a soft or very loose state of relative density.

Glacial Till

Heterogeneous glacial till underlies the marine sediments over the entire site. The till deposit, which, directly overlies the bedrock, is relatively-thin with an average thickness of only 1.8m at the boreholes and DCPT locations it was encountered. The till penetrated at Borehole No. 1 at the north end of the extension is 2.0m thick. The thickness of till at the south end of the proposed extension, as noted for Borehole No.2 is 2.2m thick.

The till, encountered at depths of 0.6m to 1.5m below seabed and extending to Elev. - 12.1m at DCPT No.4, is a mixture of grey sand and gravel sizes with a trace to some silt and occasional cobbles and boulders.

Grain size analyses testing for a single representative sample of the Till yielded the following results:

- gravel 31.6 percent

- sand 50.8 percent
- silt 17.6 percent

The natural moisture content of the till, based on the sample tested is 11.3 percent.

Results of Standard Penetration Testing show the till to be in a very dense state with an N-value in the order of 70.

Bedrock

Bedrock, which was encountered in both boreholes, comprises interbedded light-green to dark-grey siltstone and sandstone that is highly fractured to sound. The rock is of medium strength to strong, with a bedding dip of approximately 45° to the core axis for Borehole No.1 to 10° at Borehole No.2. Bedrock was cored to depths of 3.0 m to 3.2 m into the rock mass. Examination of the core yielded calculated rock quality designations (RQDs) ranging from 27 near surface in Borehole No.1 to 100 in Borehole No.2. Based on this range of RQD values, the rock formation is described as being of poor quality (highly-fractured) to excellent (sound) quality.

4.3 Laboratory Analytical Results

Representative soil and sediment samples were selected for laboratory analysis for a variety of potential contaminants as indicated in Table 3.1: Summary of Laboratory Testing. Soil samples were analysed at *Maxxam Analytics* laboratory in St. John's, Newfoundland & Labrador (BTEx/TPH) and Bedford, Nova Scotia (Metals, PAHs & PCBs). Details of these laboratory analytical results are presented in *Table 4.1: Summary of Soil Laboratory Results* and *Table 4.2: Sediment Laboratory Results* for comparison to applicable criteria maximums. Where applicable Canadian Council of Ministers of the Environment (CCME) or Newfoundland Department of Environment and Conservation (NDEC) guidelines have been exceeded, values are indicated **in bold type** in the text.

4.3.1 Soils

Volatile Organic Compound (VOC) Measurements

Headspace measurements of Volatile Organic Compound concentrations in soil samples were obtained using a *GasTector 1238ME* gas detector, calibrated to hexane. Readings ranged from 5 ppm (parts per million) to 130 ppm. Headspace measurements are provided on individual Test Pit Records.

TPH/BTEX

Total petroleum hydrocarbons (TPH) were detected in four of the samples tested (including one laboratory duplicate) as follows;

TP3,SA1:	TPH=21 mg/kg (Lube Resemblance)
TP3,SA1Lab Dup	TPH=23 mg/kg (Lube Resemblance)
TP5,SA1	TPH=99 mg/kg (Fuel/Lube Resemblance)
TP6,SA1	TPH=33 mg/kg (Gas Resemblance)

NO TPH was detected in any of the other samples tested.

One or more BTEX components were detected in two of the samples tested as follows;

TP5,SA1:	benzene, not detected (nd); toluene, 0.04 mg/kg, ethylbenzene, nd; xylenes=nd
TP6,SA1:	benzene, nd; toluene, 0.68 mg/kg; ethyl benzene, 0.23 mg/kg; xylenes, 0.61 mg/kg

No BTEX components were detected in any of the other samples tested.

Metals

A variety of metals were detected in each of the samples tested, however, no guideline exceedances were noted.



Table 4.1: Summary of Soil Laboratory Results (Page 1 of 2)

Analyte	Units	Sample ID						
		CCME	Tier 1	TP1,SA1	TP3,SA1	TP3,SA1 (LD)	TP4,SA2	TP5,SA1
Benzene	mg/kg	5	1.8	nd	nd	nd	nd	nd
Toluene	mg/kg	0.8	160	nd	nd	nd	nd	0.04
Ethyl benzene	mg/kg	20	430	nd	nd	nd	nd	nd
Xylenes	mg/kg	17	200	nd	nd	nd	nd	nd
C ₆ - C ₁₀	mg/kg	-	450	nd	nd	nd	nd	nd
C ₁₀ - C ₂₁	mg/kg	-	7400	nd	nd	nd	nd	38
C ₂₁ - C ₃₂	mg/kg	-	10 000	nd	21	23	nd	61
Modified TPH	mg/kg	-	450	nd	21	23	nd	99
Product Resemblance					Lube	Lube		Fuel/lube
Aluminum	mg/kg	-	-				6000	
Antimony	mg/kg	40	-				nd	
Arsenic	mg/kg	12	-				nd	
Barium	mg/kg	2000	-				19	
Beryllium	mg/kg	8	-				nd	
Boron	mg/kg	-	-				nd	
Cadmium	mg/kg	22	-				nd	
Chromium	mg/kg	87	-				9.8	
Cobalt	mg/kg	300	-				5.6	
Copper	mg/kg	91	-				24	
Iron	mg/kg	-	-				8000	
Lead	mg/kg	260	-				5.3	
Manganese	mg/kg	-	-				380	
Molybdenum	mg/kg	40	-				nd	
Nickel	mg/kg	50	-				11	
Selenium	mg/kg	3.9	-				nd	
Silver	mg/kg	40	-				nd	
Strontium	mg/kg	-	-				nd	
Thalium	mg/kg	1	-				nd	
Uranium	mg/kg	-	-				0.4	
Vanadium	mg/kg	130	-				12	
Zinc	mg/kg	360	-				26	
1-Methylnaphthalene	mg/kg	-	-	nd				
2-Methylnaphthalene	mg/kg	-	-	nd				
Acenaphthene	mg/kg	-	-	nd				
Acenaphthylene	mg/kg	-	-	nd				
Anthracene	mg/kg	-	-	nd				
Benzo(a)anthracene	mg/kg	10	-	nd				
Benzo(a)pyrene	mg/kg	0.7	-	nd				
Benzo(b)fluoranthene	mg/kg	10	-	nd				
Benzo(ghi)perylene	mg/kg	-	-	nd				
Benzo(k)fluoranthene	mg/kg	10	-	nd				
Chrysene	mg/kg	-	-	nd				
Dibenzo(a,h)anthracene	mg/kg	10	-	nd				
Flouranthene	mg/kg	-	-	nd				
Fluorene	mg/kg	-	-	nd				
Indeno (1,2,3-cd)pyrene	mg/kg	10	-	nd				
Naphthalene	mg/kg	22	-	nd				
Perylene	mg/kg	-	-	nd				
Phenanthrene	mg/kg	50	-	nd				
Pyrene	mg/kg	100	-	nd				
PCBs	mg/kg	33	-					

Notes: CCME refers to CCME Commercial Site Guidelines-Soils 2001. Tier 1 - Atlantic PIRI Tier 1-Coarse Soils/Commercial/Non-potable

Table 4.1: Soil Laboratory Results (Page 2 of 2)

Analyte	Units	Sample ID					
		CCME	Tier 1	TP6,SA1	TP7, SA2		
Benzene	mg/kg	5	1.8	nd	nd		
Toluene	mg/kg	0.8	160	0.68	nd		
Ethyl benzene	mg/kg	20	430	0.23	nd		
Xylenes	mg/kg	17	200	0.61	nd		
C ₆ - C ₁₀	mg/kg	-	450	8.1	nd		
C ₁₀ - C ₂₁	mg/kg	-	7400	nd	nd		
C ₂₁ - C ₃₂	mg/kg	-	10 000	25	nd		
Modified TPH	mg/kg	-	450	33	nd		
Product Resemblance				Gas			
Aluminum	mg/kg	-	-	8700			
Antimony	mg/kg	40	-	nd			
Arsenic	mg/kg	12	-	4.8			
Barium	mg/kg	2000	-	18			
Beryllium	mg/kg	8	-	nd			
Boron	mg/kg	-	-	nd			
Cadmium	mg/kg	22	-	nd			
Chromium	mg/kg	87	-	19			
Cobalt	mg/kg	300	-	9.9			
Copper	mg/kg	91	-	46			
Iron	mg/kg	-	-	17000			
Lead	mg/kg	260	-	14			
Manganese	mg/kg	-	-	560			
Molybdenum	mg/kg	40	-	nd			
Nickel	mg/kg	50	-	24			
Selenium	mg/kg	3.9	-	nd			
Silver	mg/kg	40	-	nd			
Strontium	mg/kg	-	-	nd			
Thalium	mg/kg	1	-	nd			
Uranium	mg/kg	-	-	0.5			
Vanadium	mg/kg	130	-	19			
Zinc	mg/kg	360	-	45			
1-Methylnaphthalene	mg/kg	-	-	nd			
2-Methylnaphthalene	mg/kg	-	-	nd			
Acenaphthene	mg/kg	-	-	nd			
Acenaphthylene	mg/kg	-	-	nd			
Anthracene	mg/kg	-	-	nd			
Benzo(a)anthracene	mg/kg	10	-	nd			
Benzo(a)pyrene	mg/kg	0.7	-	0.06			
Benzo(b)fluoranthene	mg/kg	10	-	0.1			
Benzo(ghi)perylene	mg/kg	-	-	nd			
Benzo(k)fluoranthene	mg/kg	10	-	0.1			
Chrysene	mg/kg	-	-	0.06			
Dibenzo(a,h)anthracene	mg/kg	10	-	nd			
Flouranthene	mg/kg	-	-	nd			
Fluorene	mg/kg	-	-	nd			
Indeno (1,2,3-cd)pyrene	mg/kg	10	-	nd			
Naphthalene	mg/kg	22	-	nd			
Perylene	mg/kg	-	-	nd			
Phenanthrene	mg/kg	50	-	nd			
Pyrene	mg/kg	100	-	nd			
PCBs	mg/kg	33	-	nd	nd		

Notes: CCME refers to CCME Commercial Site Guidelines-Soils 2001. Tier 1 - Atlantic PIRI Tier 1-Coarse Soils/Commercial/Non-potable

PCBs

No PCBs were detected in either of the two samples tested.

PAHs

PAHs were detected in sample TP6,SA1 as follows;

benzo(a)pyrene, 0.06 mg/kg

benzo(b)fluoranthene, 0.10 mg/kg

benzo(k)fluoranthene, 0.10 mg/kg

chrysene, 0.06 mg/kg

No PAHs were detected in sample TP5,SA1.

4.3.2 Sediment

TPH/BTEX

Total petroleum hydrocarbons (TPH) were detected in two of the samples tested as follows;

DCPT4,SA1: TPH=19 mg/kg (Lube Resemblance)

DCPT5,SA1: TPH=22 mg/kg (Lube Resemblance)

No TPH was detected in the other sample tested.

No BTEX components were detected in any of the samples tested.

Metals

A variety of metals were detected in each of the samples tested, however, only copper exceeded guidelines in sample DCPT5,SA1.



Table 4.2: Sediment Laboratory Results

Analyte	Units	CCME		BH1,SA1	DCPT4,SA1	DCPT5,SA1
		ISQG	PEL			
Benzene	mg/kg	-	-	nd	nd	nd
Toluene	mg/kg	-	-	nd	nd	nd
Ethyl benzene	mg/kg	-	-	nd	nd	nd
Xylenes	mg/kg	-	-	nd	nd	nd
C ₆ - C ₁₀	mg/kg	-	-	nd	nd	nd
C ₁₀ - C ₂₁	mg/kg	-	-	nd	nd	nd
C ₂₁ - C ₃₂	mg/kg	-	-	nd	19	22
Modified TPH	mg/kg	-	-	nd	nd	22
Product Resemblance					Lube	Lube
Aluminum	mg/kg	-	-	6600	7000	7200
Antimony	mg/kg	-	-	nd	nd	nd
Arsenic	mg/kg	7.24	41.6	4.5	3.5	3.9
Barium	mg/kg	-	-	nd	5.3	6.7
Beryllium	mg/kg	-	-	nd	nd	nd
Boron	mg/kg	-	-	12	9.4	9.5
Cadmium	mg/kg	0.7	4.2	nd	nd	nd
Chromium	mg/kg	52.3	160	18	15	18
Cobalt	mg/kg	-	-	8.5	7.6	8.5
Copper	mg/kg	18.7	108	12	13	32
Iron	mg/kg	-	-	11000	10000	12000
Lead	mg/kg	30.2	112	6.2	8.6	13
Manganese	mg/kg	-	-	330	310	340
Molybdenum	mg/kg	-	-	5.6	3	3.2
Nickel	mg/kg	-	-	19	17	19
Selenium	mg/kg	-	-	nd	nd	nd
Silver	mg/kg	-	-	nd	nd	nd
Strontium	mg/kg	-	-	15	12	16
Thalium	mg/kg	-	-	0.2	0.2	0.2
Uranium	mg/kg	-	-	3.2	1.7	2
Vanadium	mg/kg	-	-	22	18	21
Zinc	mg/kg	124	271	42	40	58
1-Methylnaphthalene	mg/kg	-	-	nd	nd	nd
2-Methylnaphthalene	mg/kg	0.0202	0.201	nd	nd	nd
Acenaphthene	mg/kg	0.00671	0.0889	nd	nd	nd
Acenaphthylene	mg/kg	0.00587	0.128	nd	nd	nd
Anthracene	mg/kg	0.0469	0.245	nd	0.1	nd
Benzo(a)anthracene	mg/kg	0.0748	0.693	0.19	0.35	0.29
Benzo(a)pyrene	mg/kg	0.0888	0.763	nd	0.17	0.12
Benzo(b)fluoranthene	mg/kg	-	-	0.08	0.17	0.12
Benzo(ghi)perylene	mg/kg	-	-	nd	nd	nd
Benzo(k)fluoranthene	mg/kg	-	-	0.08	0.16	0.13
Chrysene	mg/kg	0.108	0.846	0.17	0.3	0.2
Dibenzo(a,h)anthracene	mg/kg	0.00622	0.135	nd	nd	nd
Flouranthene	mg/kg	0.113	1.494	0.29	0.24	0.47
Fluorene	mg/kg	0.0212	0.144	nd	nd	nd
Indeno (1,2,3-cd)pyrene	mg/kg	-	-	nd	nd	nd
Naphthalene	mg/kg	0.0346	0.391	nd	nd	nd
Perylene	mg/kg	-	-	nd	nd	nd
Phenanthrene	mg/kg	0.0867	0.544	0.1	0.13	0.08
Pyrene	mg/kg	0.153	1.398	0.24	0.22	0.52
PCBs	mg/kg	0.0215	0.189	nd	nd	nd

Notes: CCME refers to CCME Sediment Quality Guidelines.2001. ISQG=Interim Sediment Quality Guideline. PEL=Probable Effects Level.

PAHs

One or more PAH compounds were detected in each of the samples tested as follows;

BH1,SA1:

benzo(a)anthracene, **0.19 mg/kg**
benzo(b)fluoranthene, 0.08 mg/kg
benzo(k)fluoranthene, 0.08 mg/kg
chrysene, **0.17 mg/kg**
fluoranthene, **0.29 mg/kg**
phenanthrene, **0.10 mg/kg**
pyrene, **0.24 mg/kg**

DCPT4,SA1

anthracene, 0.10 mg/kg
benzo(a)anthracene, **0.35 mg/kg**
benzo(a)pyrene, **0.17 mg/kg**
benzo(b)fluoranthene, 0.17 mg/kg
benzo(k)fluoranthene, 0.16 mg/kg
chrysene, **0.30 mg/kg**
fluoranthene, **0.24 mg/kg**
phenanthrene, **0.13 mg/kg**
pyrene, **0.22 mg/kg**

DCPT5,SA1

benzo(a)anthracene, **0.29 mg/kg**
benzo(a)pyrene, **0.12 mg/kg**
benzo(b)fluoranthene, 0.12 mg/kg
benzo(k)fluoranthene, 0.13 mg/kg
chrysene, **0.20 mg/kg**
fluoranthene, **0.47 mg/kg**
phenanthrene, 0.08 mg/kg
pyrene, **0.52 mg/kg**

PCBs

No PCBs were detected in any of the samples tested.

5.0 ASSESSMENT OF RESULTS

5.1 Regulatory Framework

The Newfoundland Department of Environment and Conservation (NDEC) Policy Directive PPD97-01 dealing with contaminated sites has recently been replaced by NDEC PPD05-01 (issued February 22, 2005) and a related Guidance Document for the Management of Impacted Sites (Version 1.0).

The purpose of the new policy and guidance document is to outline the Site Management Process that is to be followed during the assessment and remediation of impacted sites in the Province. Although the process allows for two parallel paths, one for designated and one for non-designated contaminated sites, the assessment process is generally consistent with the phased approach outlined previously by the Canadian Council of Ministers of the Environment (CCME). The process follows a Tiered approach for comparison of analytical results to achieve site closure. The first level, or Tier I, consists of generally conservative values established Federally by CCME and regionally by the Atlantic PIRI Committee and are meant to be applicable to a wide variety of sites, with less need for technical input. Tier II and Tier III methods involve an increasing level of technical complexity and usually require a higher level of Site Professional expertise.

For purposes of comparison of analytical results at this site, we have used the applicable CCME Guidelines (for PAHs, PCBs and metals in soils and sediment) and the Atlantic PIRI Tier I Look-Up Tables, as presented in Table 4.1, (for petroleum hydrocarbons in soils only). BTEX concentrations in soils have also been compared to CCME guidelines. Note that there is currently no criteria available for comparison of TPH levels in sediment..

CCME documentation for sediment quality identify two guidelines, the first is the Interim Sediment Quality Guideline (ISQG); contaminant concentrations in sediment less than the ISQGs are rarely associated with adverse biological effects and sediments falling within this category are generally considered to be of acceptable quality. The other is the Probable Effects Level (PEL); contaminant concentrations in sediment above this level are frequently associated with adverse biological effects and sediments falling in this category are generally considered to represent significant and immediate hazards to exposed organisms. Contaminant concentrations in sediment falling between the ISQG

and the PEL are occasionally associated with adverse biological effects and sediments in this category are considered to represent potential hazards to exposed organisms (CCME, 1999).

5.2 Assessment of Soils

We offer the following comments regarding the comparison of soil analytical results with criteria levels provided in the documents noted above.

BTEX/TPH

Based on the current analytical results for the site, no TPH or BTEX exceedances were noted in any of the soil samples tested.

Metals

Based on the current analytical results for the site, no metals exceedances were noted in any of the soil samples tested.

PAHs

Based on the current analytical results for the site, no PAH exceedances were noted in any of the soil samples tested.

PCBs

Based on the current analytical results for the site, no PCB exceedances were noted in any of the soil samples tested.

5.3 Assessment of Sediment

We offer the following comments regarding the comparison of sediment analytical results with criteria levels provided in the documents noted above.

BTEX/TPH

There are currently no established criteria for BTEX/TPH in sediment; however levels found at this site can be considered low.



Metals

Based on the current analytical results for the site, the only metals exceedance was copper in sample DCPT5,SA1, where the ISQG was exceeded. Note that the copper concentration was well below the PEL.

PAHs

Based on the current analytical results for the site, PAH exceedances of the ISQG were noted in each of the sediment samples tested. No exceedances of the PEL for any of the PAHs compounds was noted.

PCBs

Based on the current analytical results for the site, no PCB exceedances were noted in any of the sediment samples tested.

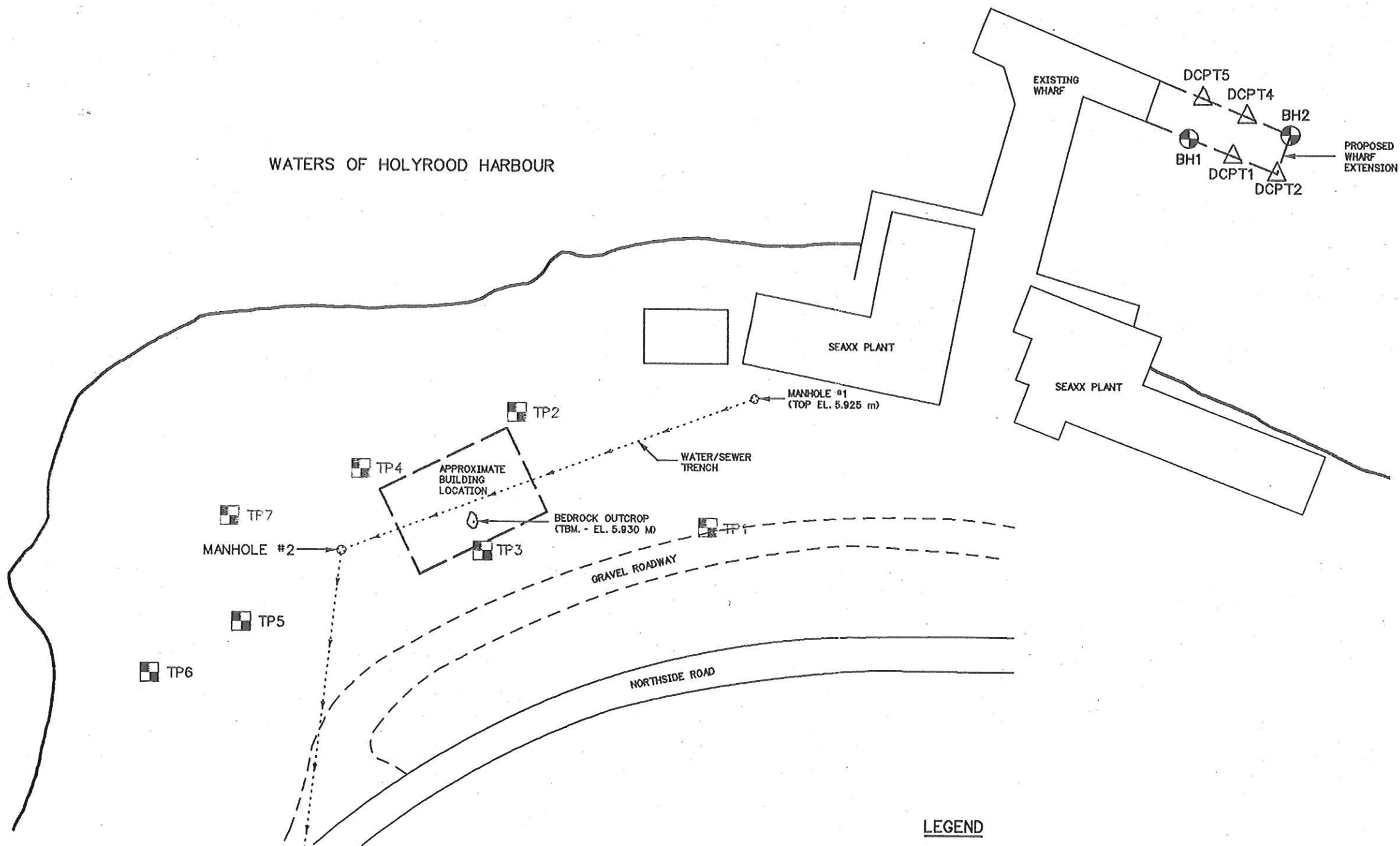
6.0 CONCLUSIONS

Based on the results of the current Phase II ESA, we conclude the following;

- no contaminants were detected at the land based parcel of property above applicable guidelines
- one minor exceedence of the CCME ISQG for copper was noted in a sediment sample (DCPT5,SA1) collected from the wharf area
- all three sediment samples collected from the wharf area were found to contain multiple PAH compounds in excess of their respective CCME ISQGs. None of these PAH concentrations exceeded their respective CCME PELs, however. The levels of PAH's detected in sediment for this Phase II ESA, are generally consistent with levels reported throughout Holyrood Bay by Jacques Whitford Environmental Limited (see ADI Phase I ESA Report) during their sediment survey for Public Works and Government Services Canada (1999).

7.0 REFERENCES

- Canadian Council of Ministers of the Environment - *Canadian Environmental Quality Guidelines*, 1999/2001.
- Newfoundland Department of Environment and Conservation, Policy Directive PPD-05-01, *Management of Impacted Sites*, 2005.
- Newfoundland Department of Environment and Conservation, Guidance Document for the Management of Impacted Sites, Version 1.0, December 2004.
- ADI Limited. Phase I Environmental Site Assessment-Proposed Marine Base: Civic No.4 Northside Road. Holyrood, Newfoundland and Labrador. 2005.



LEGEND

- TEST PIT LOCATION
- BOREHOLE LOCATION
- DYNAMIC CONE PENETRATION TEST LOCATION

No.	Revision	Ckd. By	Date

RECORD DRAWING

<p>Const. North</p>	<p>Drawn By: BDC</p>
	<p>Dwg. Standards Ckd. By: BFD</p>
	<p>Designed By:</p>
	<p>Date Printed JULY, 2005</p>
<p>Dwg. Design Ckd. By:</p>	

ADI® ADI Limited
St. John's, NF, Canada
Engineering, Consulting, Procurement and
Project Management

Project Title		
FISHERIES AND MARINE INSTITUTE OF MEMORIAL UNIVERSITY MARINE BASE, HOLYROOD, NL		
Dwg. Title		
SITE LOCATION PLAN		
Project No.	26-4553-004.1	
Dwg. No.	2-2	Rev. No.
Scale	1:750	
This drawing is not to be scaled		

Offices located in:
Charlottetown, Moncton, Saint John, Truro, Halifax, Sydney
Port Hawkesbury, St. John's, Fredericton and Salem, NH

APPENDIX

**Symbols and Terms Used on the Borehole,
Test Pit, and Monitor Well Records**



SYMBOLS AND TERMS USED ON THE BOREHOLE, TEST PIT, AND MONITOR WELL RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidation clay minerals, shrinkage, cracks, etc.
Fissured	-	having cracks, and hence a blocky structure
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay
Well-graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly-graded	-	predominantly of one grain size.

Terminology used for describing soil strata based upon proportion of individual particle sizes present:

Trace, or occasional	-	less than 10%
Some	-	10% to 20%
Adjective (e.g. silty or sandy)	-	20% to 35%
And (e.g. silt and sand)	-	35% to 50%

The standard terminology to describe cohesionless soils include the relative density, as determined by laboratory test or by the Standard Penetration Test N-value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2-inch (50.8 mm) O.D. split-spoon sampler 1 foot (305 mm) into the soil. On the records, where complete sampler penetration is not achieved and an N-value cannot be reported, the total number of blows are shown over actual penetration in millimetres (e.g. 75/180).

Relative Density	N-value	Relative Density %
Very Loose	<4	<15
Loose	4 - 10	15 - 35
Compact	10 - 30	35 - 65
Dense	30 - 50	65 - 85
Very Dense	>50	>85

The standard terminology to describe cohesive soils include the consistency, which is based on undrained shear strength as measured by in situ vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength		N-value
	Kips/sq.ft.	kPa	
Very Soft	< 0.25	< 12.5	< 2
Soft	0.25 to 0.5	12.5 to 25	2 to 4
Firm	0.5 to 1.0	25 to 50	4 to 8
Stiff	1.0 to 2.0	50 to 100	8 to 15
Very Stiff	2.0 to 4.0	100 to 200	15 to 30
Hard	> 4.0	> 200	> 30

SAMPLES

SS	Split-spoon sample (obtained by performing the Standard Penetration Test)	BK	Bulk sample
AS	Auger sample	WS	Wash sample
ST	Shelby tube or thin-wall tube	RC	Rock core AXT, BXL, etc.
PS	Piston sample		Rock core samples obtained with the use of standard diamond drilling bits.

OTHER TESTS

G	Specific Gravit	CU	Consolidated undrained triaxial with pore pressure measure- ments
H	Hydrometer Analysis	UU	Unconsolidated undrained triaxial
S	Sieve Analysis	RCC	Rock Core Compression
MC	Moisture Content	DS	Direct Shear
y	Unit Weight	P	Field Permeability
C	Consolidation	TPH	Total Petroleum Hydrocarbons (ppm)
CD	Consolidated drained triaxial	ND	Below Detection Limit

ROCK DESCRIPTION

The description of rock is based on the rock quality designation (RQD).

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. In most cases, RQD is run on NXL core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from normal in situ fractures.

RQD	Rock Quality
90 to 100	excellent, intact, very sound
75 to 90	good, massive, moderately-jointed or sound
50 to 75	Fair, blocky and seamy, fractured
25 to 50	Poor, shattered and very seamy or blocky, severely-fractured
0 to 25	very poor, crushed, very-severely-fractured

CLASSIFICATION OF ROCK WITH REGARD TO STRENGTH

STRENGTH		FIELD IDENTIFICATION METHOD	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (MPa)
Grade	Classification		
RO	Extremely weak	Indented by thumbnail	< 1
R1	Very weak	Crumbles under firm blows of geological hammer; can be peeled with a pocket-knife	1 - 5
R2	Weak rock	Can be peeled by a pocket-knife with difficulty; shallow indentations made by a firm blow with point of geological hammer	5 - 25
R3	Medium strong	Cannot be scraped or peeled with a pocket-knife; specimen can be fractured with a single firm blow of geological hammer	25 - 50
R4	Strong	Specimen requires more than one blow of geological hammer to fracture	50 - 100
R5	Very strong	Specimen requires many blows of geological hammer to fracture	100 - 250
R6	Extremely strong	Specimen can be chipped by geological hammer	> 250

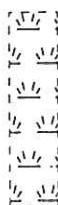
STRATA PLOT



Asphalt



Concrete



Organics



Fill



Cobbles &
Boulders



Gravel



Sand



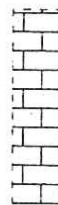
Silt



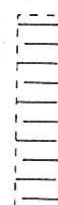
Clay



Igneous
Bedrock



Sedimentary
Bedrock



Metamorphic
Bedrock

WATER LEVEL MEASUREMENT



Borehole,
Standpipe or
Monitor Well
(at time of drilling)



Borehole,
Standpipe or
Monitor Well
(static conditions)

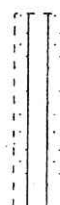
WELL CONSTRUCTION



Flush-mounted
Well-head
Enclosure



End/Top Cap



Solid
PVC Pipe



Slotted
PVC Pipe



Bentonite



Cave-in

Borehole Records



BOREHOLE RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

BOREHOLE No. BH 1

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES					Undrained Shear Strength, kPa									
					TYPE	NUMBER	RECOVERY	N-VALUE OR QD	OTHER TESTS	20 40 60 80 Water Content & Atterberg Limits W_p W W_L Dynamic Penetration Test, blows/0.3m \star Standard Penetration Test, blows/0.3m \bullet									
0	2.75	<u>Wharf Deck</u>					mm			10	20	30	40	50	60	70	80	90	
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8	-5.2	<u>Seabed</u>																	
		<u>MARINE SEDIMENTS:</u> Loose dark grey SAND; trace silt; some organics (sea shells).			SS	1	125	4		\bullet									
	-5.8	<u>TILL:</u> Very dense grey gravelly SAND; some silt; occasional cobbles and boulders.			RC	2	35%	0											
					RC	3	100%	0											
10																			\gg



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Δ Unconfined Compression Test
 \square Field Vane Test \blacksquare Remoulded



BOREHOLE RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

BOREHOLE No. BH 1

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES					Undrained Shear Strength, kPa									
					TYPE	NUMBER	RECOVERY	N-VALUE OR QD	OTHER TESTS	20 40 60 80 Water Content & Atterberg Limits W_p W W_L Dynamic Penetration Test, blows/0.3m * Standard Penetration Test, blows/0.3m ●									
10	-7.25				SS	4	mm	75/		10	20	30	40	50	60	70	80	90	
	-7.8				RC	5		125											
11		BEDROCK: Severely fractured to fairly sound grey to green interbedded siltstone and fine-grained sandstone.			RC	6	100%	27											
12					RC	7	100%	28											
13					RC	8	100%	57											
14	-11.0				RC	9	100%	78											
15		End of Borehole NOTES: 1) Laboratory results on soil sample SS1: Benzene: nd Toluene: nd Ethyl-benzene: nd Xylene: nd TPH: nd 2) Refer to tables in appendix of Phase II Environmental Report for additional soil results for metals, PAH's and PCB's.																	
16																			
17																			
18																			
19																			
20																			



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BOREHOLE RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

BOREHOLE No. BH 2

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES					Undrained Shear Strength, kPa	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	OTHER TESTS	20	40
0	2.75	<u>Wharf Deck</u>					mm			Water Content & Atterberg Limits Dynamic Penetration Test, blows/0.3m Standard Penetration Test, blows/0.3m	
1										10 20 30 40 50 60 70 80 90	
2											
3											
4											
5											
6											
7											
8											
9	-6.2	<u>Seabed</u>									
		<u>MARINE SEDIMENTS:</u> Loose dark grey SAND; trace silt; some organics (sea shells).			SS	1	0	2			
	-6.8										
10											



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BOREHOLE RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1


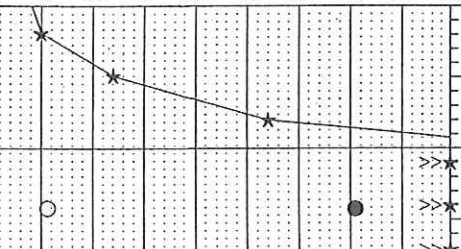
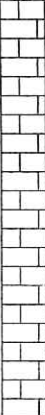
LOCATION Marine Base, Holyrood, NL

BOREHOLE No. BH 2

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES					Undrained Shear Strength, kPa												
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	OTHER TESTS	20 40 60 80												
										Water Content & Atterberg Limits Dynamic Penetration Test, blows/0.3m ★ Standard Penetration Test, blows/0.3m ●												
							mm				10	20	30	40	50	60	70	80	90			
10	-7.25	<u>TILL:</u> Very dense grey gravelly SAND; some silt; occasional cobbles and boulders. <i>(continued)</i>			RC	2																
11					SS	3	225	71	MC, S													
12	-9.0	<u>BEDROCK:</u> Fractured to fairly sound to very severely fractured grey to green interbedded siltstone and fine-grained sandstone.			RC	4	48%	100														
13					RC	5	89%	100														
14					RC	6	16%	100														
15	-12.0	End of Borehole																				
16		<u>NOTES:</u> 1) Dynamic Cone Penetration Test DCPT 3 carried out adjacent to Borehole BH 2.																				
17																						
18																						
19																						
20																						

GEOTECHNICAL 45530041.GPJ ADI.GDT 19/07/05



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Test Pit Records



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 1

DATES (dd-mm-yy): DUG

10-05-05

WATER LEVEL

10-05-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
					TYPE	NUMBER	OTHER TESTS	20 40 60 80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
								Water Content & Atterberg Limits																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													



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△ Unconfined Compression Test



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 2

DATES (dd-mm-yy): DUG




10-05-05

WATER LEVEL

10-05-05

DATUM

Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa												
					TYPE	NUMBER	OTHER TESTS													
								Water Content & Atterberg Limits												
0	5.80																			
	5.7	ORGANICS: GRASSMAT																		
		FILL: Compact brown SAND and GRAVEL; some silt; occasional cobbles and boulders; dry.																		
	5.4																			
		TILL: Compact to dense below 1 m depth reddish brown GRAVEL and SAND; some silt; occasional cobbles and boulders; dry.																		
1																				
					BK	1														
	4.1	End of Test Pit																		
2		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock from 1.2 m to 1.7 m depth. 3) Headspace results on soil samples: BK1: 20 ppm																		
3																				
4																				

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TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 3

DATES (dd-mm-yy): DUG 10-05-05 WATER LEVEL 10-05-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa										
					TYPE	NUMBER	OTHER TESTS	Water Content & Atterberg Limits										
								20	40	60	80							
0	5.87							10	20	30	40	50	60	70	80	90		
	5.7	GRANULAR FILL: Loose to compact grey GRAVEL and SAND; trace silt (Granular Base Material); dry.																
		FILL: Compact brown SAND and GRAVEL; some silt; occasional cobbles and boulders; dry.			BK	1												
	5.2																	
1		TILL: Compact to dense below 1 m depth reddish brown gravelly, silty SAND; occasional cobbles and boulders; dry.																
					BK	2												
2	3.9	End of Test Pit																
3		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock from 1.2 m to 1.7 m depth. 3) Headspace results on soil samples: BK1: 5 ppm BK2: 10 ppm 4) Laboratory results on soil sample BK1/ BK1 dup: Benzene: nd/nd Toluene: nd/nd Ethyl-benzene: nd/nd Xylene: nd/nd TPH: 21/23 mg/kg																
4																		
5																		

△ Unconfined Compression Test



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TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 4

DATES (dd-mm-yy): DUG 10-05-05 WATER LEVEL 10-05-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa									
					TYPE	NUMBER	OTHER TESTS	Water Content & Atterberg Limits									
								20	40	60	80						
0	5.45	<u>TILL:</u> Compact to dense below 0.8 m depth reddish brown sandy GRAVEL; trace silt; occasional cobbles and conglomerate boulders; dry to moist.															
					BK	1											
1																	
					BK	2											
2																	
	2.9	End of Test Pit															
3		<u>NOTES:</u> 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock at 2.6 m depth. 3) Headspace results on soil samples: BK1: 10 ppm BK2: 15 ppm 4) Laboratory results on soil sample BK2: Benzene: nd Toluene: nd Ethyl-benzene: nd Xylene: nd TPH: nd 5) Refer to tables in appendix of Phase II Environmental Report for additional soil results for metals.															
4																	
5																	



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△ Unconfined Compression Test



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 5

DATES (dd-mm-yy): DUG

10-05-05

WATER LEVEL

10-05-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa									
					TYPE	NUMBER	OTHER TESTS	20	40	60	80	Water Content & Atterberg Limits					
0	5.06																
	5.0	ORGANICS: GRASSMAT															
		FILL: Compact brown SAND and GRAVEL; some silt; some debris (piece of metal) some cobbles and boulders; dry.			BK	1											
	4.4																
1		TILL: Compact to dense below 1 m depth reddish brown SAND and GRAVEL; trace silt; some cobbles and boulders; dry to moist.			BK	2											
	3.4																
		End of Test Pit															
2		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock at 1.7 m depth. 3) Headspace results on soil samples: BK1: 15 ppm BK2: 130 ppm 4) Laboratory results on soil sample BK1: Benzene: nd Toluene: 0.04 mg/kg Ethyl-benzene: nd Xylene: nd TPH: 99 mg/kg															
3																	
4																	
5																	



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△ Unconfined Compression Test



TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 6

DATES (dd-mm-yy): DUG 10-05-05

WATER LEVEL 10-05-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa									
					TYPE	NUMBER	OTHER TESTS	Water Content & Atterberg Limits									
								20	40	60	80						
0	4.82	TILL: Compact to dense below 0.5 m depth reddish brown SAND and GRAVEL; trace silt; occasional cobbles and boulders; dry to moist.			BK	1		10	20	30	40	50	60	70	80	90	
1					BK	2											
2					BK	3											
2.0		End of Test Pit															
3		NOTES: 1) Test pit dry at time of excavation. 2) Test pit terminated on probable bedrock at 2.8 m depth. 3) Headspace results on soil samples: BK1: 10 ppm BK2: 10 ppm BK3: 10 ppm 4) Laboratory results on soil sample BK1: Benzene: nd Toluene: 0.68 mg/kg Ethyl-benzene: 0.23 mg/kg Xylene: 0.61mg/kg TPH: 33 mg/kg 5) Refer to tables in appendix of Phase II Environmental Report for additional soil results for PAHs, metals, and PCBs.															
4																	
5																	



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TEST PIT RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

TEST PIT No. TP 7

DATES (dd-mm-yy): DUG

10-05-05

WATER LEVEL

10-05-05

DATUM

Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES			Undrained Shear Strength, kPa										
					TYPE	NUMBER	OTHER TESTS	Water Content & Atterberg Limits										
								<div style="display: flex; justify-content: space-between;"> 20 40 60 80 </div> <div style="display: flex; justify-content: space-between;"> 10 20 30 40 50 60 70 80 90 </div>										
0	5.12	ORGANICS: GRASSMAT																
	5.0	FILL: Loose to compact brown SAND and GRAVEL; some silt; occasional cobbles and boulders; dry.																
	4.8	TILL: Compact to dense below 0.8 m depth reddish brown SAND and GRAVEL; some silt; occasional cobbles and boulders; dry.																
1					BK	1												
2					BK	2												
	2.6	End of Test Pit																
3		NOTES: 1) Test pit dry at time of excavation. 2) Headspace results on soil samples: BK1: 20 ppm BK2: 25 ppm 3) Laboratory results on soil sample BK2: Benzene: nd Toluene: nd Ethyl-benzene: nd Xylene: nd TPH: nd 5) Refer to tables in appendix of Phase II Environmental Report for additional soil results for PCBs.																
4																		
5																		

GEOTECHNICAL 45530041.GPJ ADI.GDT 23/05/05



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△ Unconfined Compression Test

Dynamic Cone Penetration Records



DYNAMIC CONE PENETRATION TEST RECORD

CLIENT Fisheries and Marine Institute of Memorial UniversityPROJECT No. 26-4553-004.1LOCATION Marine Base, Holyrood, NLD.C.P.T. No. DCPT 1DATES (dd-mm-yy): BORING 29-06-05WATER LEVEL 29-06-05DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	Dynamic Cone Penetration Test (DCPT), Blows/0.3m										
0	2.75	<u>Wharf Deck</u>	10	20	30	40	50	60	70	80	90	100	
1													
2													
3													
4													
5													
6													
7													
8	-5.2	<u>Seabed</u>											
9	-6.4	<u>MARINE SEDIMENTS:</u> Very loose to loose dark grey SAND; trace silt; some organics (sea shells).											
10	-6.6	<u>TILL:</u> Compact grey gravelly SAND; some silt; occasional cobbles and boulders.											
11		End of Dynamic Cone Penetration Test											
12		<u>NOTES:</u>											
13		1) Refusal at 9.37 m depth below wharf deck (elev. -6.62 m) - presumed boulder.											
14		2) Dynamic penetration value at end of DCPT is 114/230 mm with 75 mm advance in final 93 blows.											
15		3) Marine sediment and till descriptions based on borehole data.											
16													
17													
18													
19													
20													

DPT 45530041.GPJ ADI.GDT 19/07/05



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DYNAMIC CONE PENETRATION TEST RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

D.C.P.T. No. DCPT 2

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

DEPTH (m)	ELEV. (m)	DESCRIPTION	Dynamic Cone Penetration Test (DCPT), Blows/0.3m										
0	2.75	<u>Wharf Deck</u>	10	20	30	40	50	60	70	80	90	100	
1													
2													
3													
4													
5													
6													
7													
8	-5.0	<u>Seabed</u>											
9	-6.5	<u>MARINE SEDIMENTS:</u> Very loose to loose dark grey SAND; trace silt; some organics (sea shells).											
10	-7.8	<u>TILL:</u> Compact to dense grey gravelly SAND; some silt; occasional cobbles and boulders.											
11		End of Dynamic Cone Penetration Test											
12		<u>NOTES:</u>											
13		1) Refusal at 10.59 m depth below wharf deck (elev. -7.84 m) - presumed bedrock.											
14		2) Dynamic penetration value at end of DCPT is 80/125 mm with 80 mm advance in final 125 blows.											
15		3) Marine sediment and till descriptions based on borehole data.											
16													
17													
18													
19													
20													

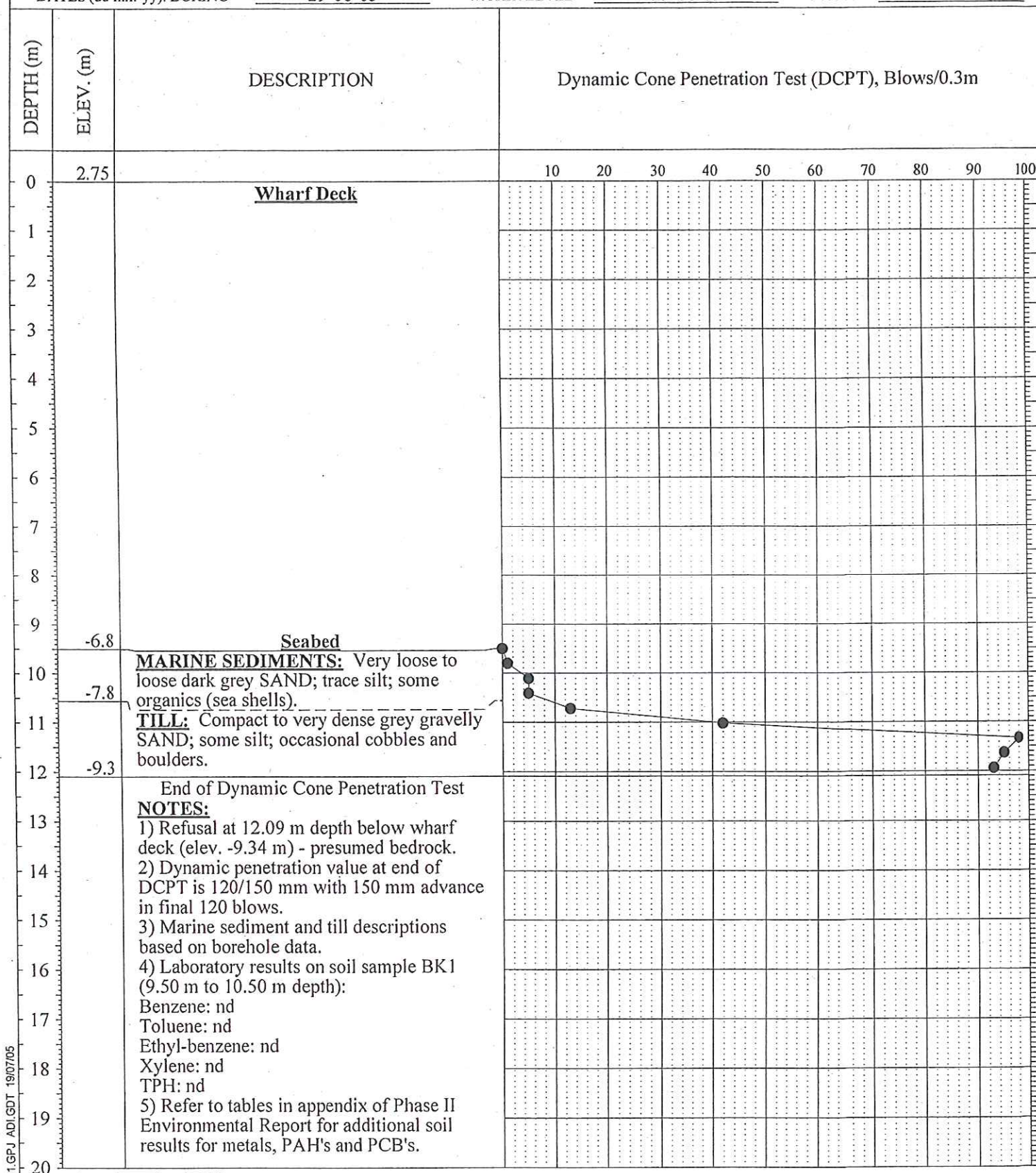
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DYNAMIC CONE PENETRATION TEST RECORD

CLIENT Fisheries and Marine Institute of Memorial UniversityPROJECT No. 26-4553-004.1LOCATION Marine Base, Holyrood, NLD.C.P.T. No. DCPT 4DATES (dd-mm-yy): BORING 29-06-05WATER LEVEL 29-06-05DATUM Geodetic

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DYNAMIC CONE PENETRATION TEST RECORD

CLIENT Fisheries and Marine Institute of Memorial University

PROJECT No. 26-4553-004.1

LOCATION Marine Base, Holyrood, NL

D.C.P.T. No. DCPT 5

DATES (dd-mm-yy): BORING 29-06-05

WATER LEVEL 29-06-05

DATUM Geodetic

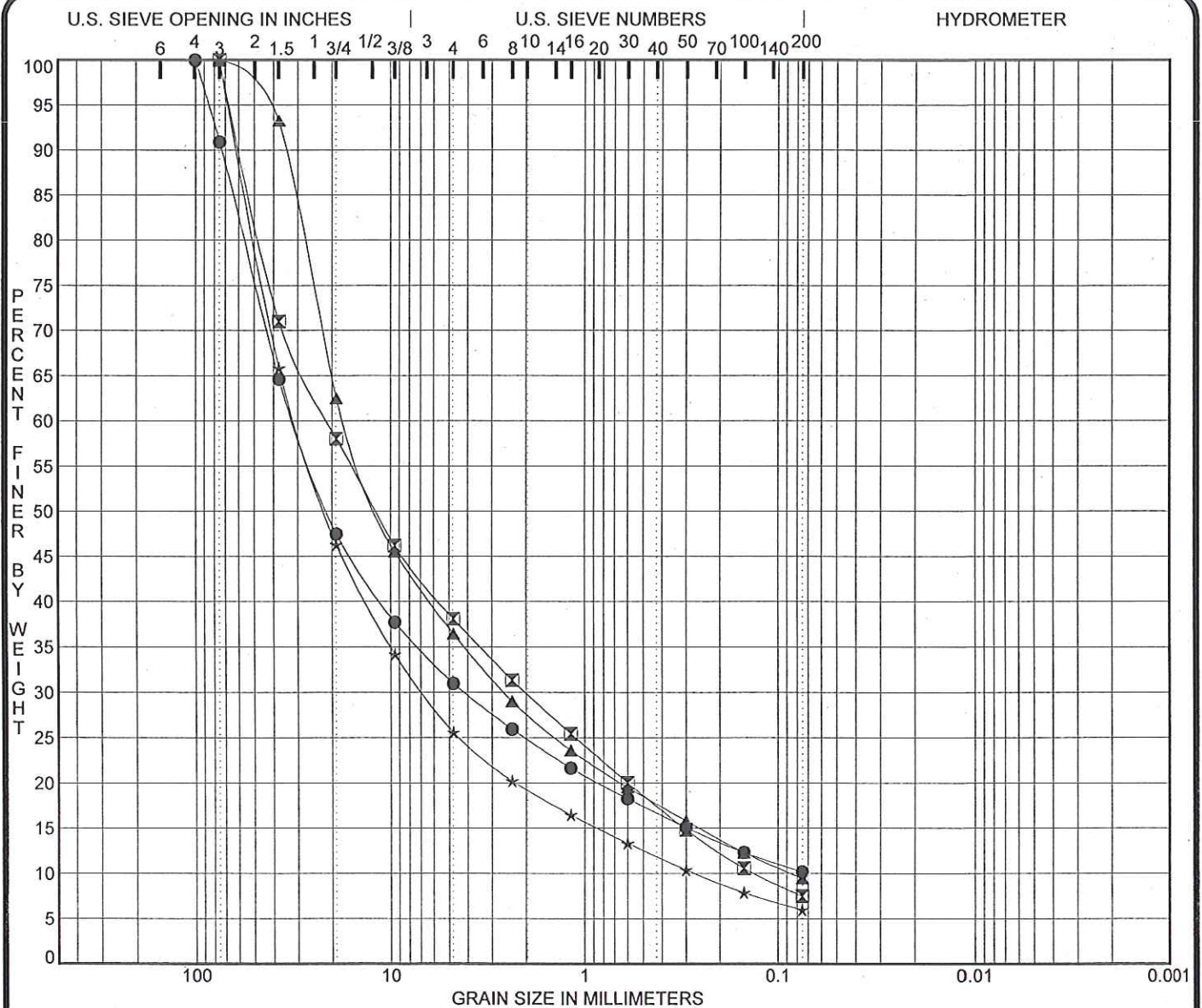
DEPTH (m)	ELEV. (m)	DESCRIPTION	Dynamic Cone Penetration Test (DCPT), Blows/0.3m										
			10	20	30	40	50	60	70	80	90	100	
0	2.75	<u>Wharf Deck</u>											
1													
2													
3													
4													
5													
6													
7													
8													
9	-6.5	<u>Seabed</u>											
10	-7.6	MARINE SEDIMENTS: Very loose to loose dark grey SAND; trace silt; some organics (sea shells).											
11	-7.9	TILL: Very dense grey gravelly SAND; some silt; some cobbles and boulders.											
12		End of Dynamic Cone Penetration Test											
13		NOTES:											
14		1) Refusal at 10.69 m depth below wharf deck (elev. -7.94 m) - presumed boulder.											
15		2) Dynamic penetration value at end of DCPT is 113/200 mm with 50 mm advance in final 75 blows.											
16		3) Marine sediment and till descriptions based on borehole data.											
17		4) Laboratory results on soil sample BK1 (9.27 m to 10.27 m depth):											
18		Benzene: nd											
19		Toluene: nd											
20		Ethyl-benzene: nd											
		Xylene: nd											
		TPH: nd											
		5) Refer to tables in appendix of Phase II Environmental Report for additional soil results for metals, PAH's and PCB's.											

DPT 45530041.GPJ ADI.GOT 19/07/05



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Gradation Analyses



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Location	Depth (m)	Classification (USCS)	MC%	LL	PL	PI	Cc	Cu
● TP 1	1.3	FILL: Sandy GRAVEL, some silt (GP-GM)	5.9				7.71	438.3
⊠ TP 2	1.3	FILL: Sandy GRAVEL, trace silt (GW-GM)	14.2				1.45	158.9
▲ TP 3	1.3	FILL: Sandy GRAVEL, trace silt (GP-GM)	11.2				4.54	199.6
★ TP 4	2.3	FILL: GRAVEL, some silt, trace silt (GP-GM)	6.0				5.57	113.2

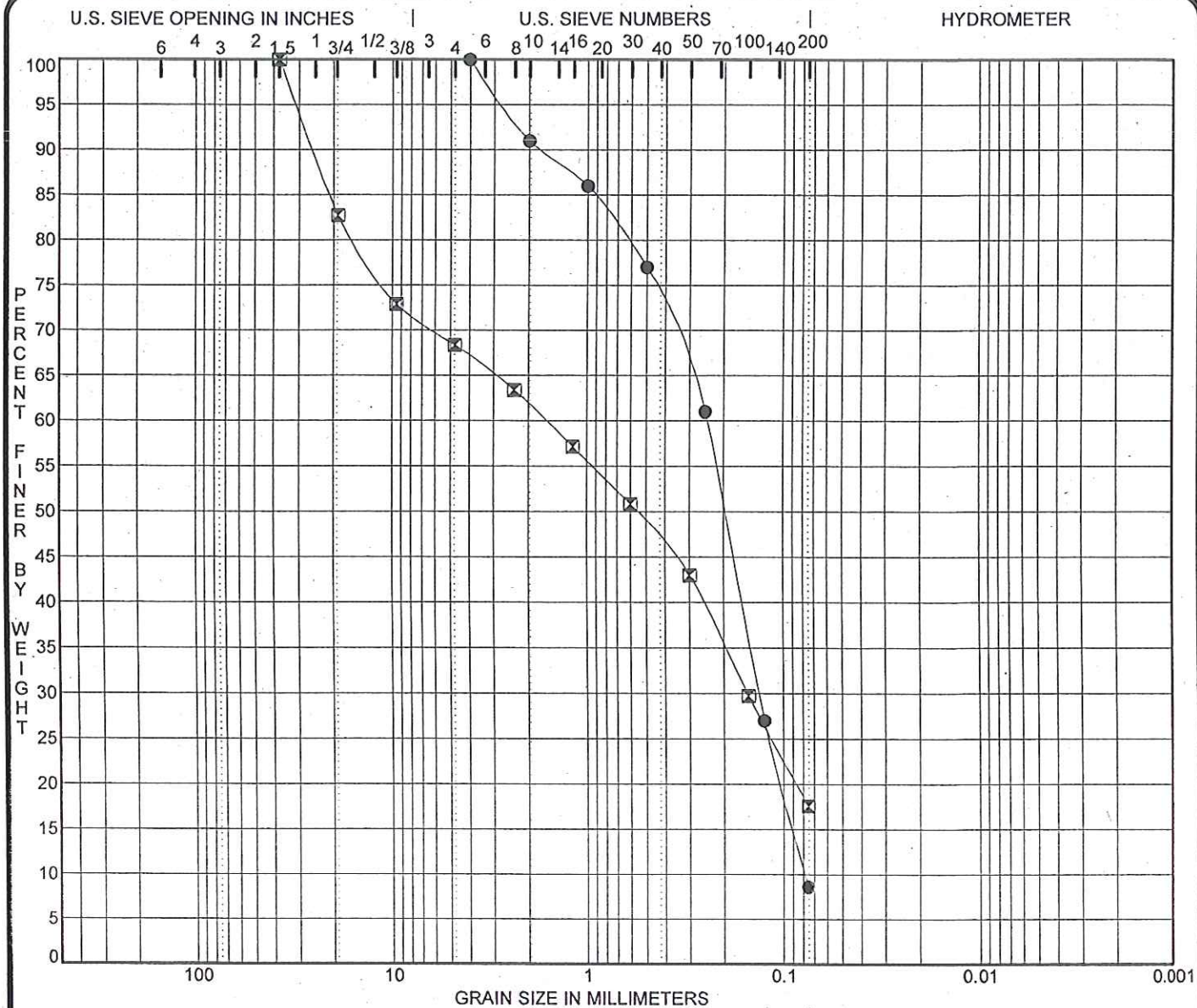
Location	Depth (m)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TP 1	1.3	100.00	31.22	4.141		59.9	20.8	10.2	
⊠ TP 2	1.3	75.00	21.08	2.014	0.1327	61.9	30.6	7.5	
▲ TP 3	1.3	75.00	17.17	2.591	0.0860	63.5	27.0	9.4	
★ TP 4	2.3	75.00	30.60	6.785	0.2703	74.4	19.6	6.0	

PROJECT **BAE-Newplan Group - Evaluation of Fill Placement**
- Spring Meadows, L'anse aux Meadows, St.
John's, NL

JOB NO. **26-3981-009.1**
DATE **17-06-05**

GRADATION CURVES

ADI Limited
St. John's, NL



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Location	Depth (m)	Classification (USCS)	MC%	LL	PL	PI	Cc	Cu
● BH 1	8.3	MARINE SEDIMENT: SAND; trace silt (SP-SM)					0.92	3.1
☒ BH 2	11.4	TILL: Gravelly SAND; some silt (SM)	11.3					

Location	Depth (m)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BH 1	8.3	4.00	0.24	0.133	0.0780	0.0	91.4	8.6	
☒ BH 2	11.4	37.50	1.62	0.152		31.6	50.8	17.6	

PROJECT Fisheries and Marine Institute of Memorial
University - Marine Base, Holyrood, NL

JOB NO. 26-4553-004.1
DATE 04-07-05

GRADATION CURVES

ADI Limited
St. John's, NL

Laboratory Certificates

ADI Nolan Davis
St. John's
PO Box 7248
St. John's, NL
A1E 3Y4

Attention: Blair Cameron

Your Project #: 26-4553-004.1
Site: HOLYROOD, NL
Your C.O.C. #: 298044

Recording Data/Product (Procedure #5)
Supplied by: Maxxam
Project No.: 26-4553-004.1
Reviewed by: CJP
Date Reviewed: July 21/05

Report Date: 2005/07/12

ANALYTICAL REPORT

MAXXAM JOB #: A561697

Received: 2005/07/04, 10:14

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Elements by ICPMS (FIAS)	3	N/A	2005/07/08	3013_1_1	Based on EPA6020A
Moisture ϕ	3	N/A	2005/07/06		MOE Handbook 1983
PAH Compounds by GCMS (SIM) ϕ	3	2005/07/06	2005/07/06	SOP 7010_1_3	Based on EPA8270C
PCBs in soil by GC/ECD ϕ	3	N/A	2005/07/07	8024_1_5	Based on EPA8082

(1) This test was performed by Bedford
(2) SCC/CAEAL

MAXXAM ANALYTICS INC.

TROY MACKAY
Project Manager

TMA/mke
encl.

Total cover pages: 1

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

This document is in electronic format, hard copy is available on request.

Maxxam Job #: A561697
Report Date: 2005/07/12

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

ATLANTIC PCBS IN SOIL (SOIL)

Maxxam ID		G98491	G98531	G98533		
Sampling Date		2005/06/29	2005/06/29	2005/06/29		
COC Number		298044	298044	298044		
	Units	BH1,SA1	DCPT,SA1	DCPT,SA1	DL	QC Batch

Physical Properties						
Moisture	%	23	21	20	1	772547
PCB'S						
Total PCB	ug/g	ND	ND	ND	0.05	773719
Surrogate Recovery (%)						
Decachlorobiphenyl	%	94	96	94		773719

ND = Not detected
QC Batch = Quality Control Batch
Please check for attached comments

Maxxam Job #: A561697
Report Date: 2005/07/12

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		G98491	G98531	G98533		
Sampling Date		2005/06/29	2005/06/29	2005/06/29		
COC Number		298044	298044	298044		
	Units	BH1,SA1	DCPT3,SA1	DCPT4,SA1	DL	QC Batch

Elements						
Available Aluminum (Al)	mg/kg	6600	7000	7200	10	776635
Available Antimony (Sb)	mg/kg	ND	ND	ND	2	776635
Available Arsenic (As)	mg/kg	4.5	3.5	3.9	2	776635
Available Barium (Ba)	mg/kg	ND	5.3	6.7	5	776635
Available Beryllium (Be)	mg/kg	ND	ND	ND	2	776635
Available Boron (B)	mg/kg	12	9.4	9.5	5	776635
Available Cadmium (Cd)	mg/kg	ND	ND	ND	0.3	776635
Available Chromium (Cr)	mg/kg	18	15	18	2	776635
Available Cobalt (Co)	mg/kg	8.5	7.6	8.5	1	776635
Available Copper (Cu)	mg/kg	12	13	32	2	776635
Available Iron (Fe)	mg/kg	11000	10000	12000	50	776635
Available Lead (Pb)	mg/kg	6.2	8.6	13	0.5	776635
Available Manganese (Mn)	mg/kg	330	310	340	2	776635
Available Molybdenum (Mo)	mg/kg	5.6	3.0	3.2	2	776635
Available Nickel (Ni)	mg/kg	19	17	19	2	776635
Available Selenium (Se)	mg/kg	ND	ND	ND	2	776635
Available Silver (Ag)	mg/kg	ND	ND	ND	0.5	776635
Available Strontium (Sr)	mg/kg	15	12	16	5	776635
Available Thallium (Tl)	mg/kg	0.2	0.2	0.2	0.1	776635
Available Uranium (U)	mg/kg	3.2	1.7	2.0	0.1	776635
Available Vanadium (V)	mg/kg	22	18	21	2	776635
Available Zinc (Zn)	mg/kg	42	40	58	5	776635

ND = Not detected
QC Batch = Quality Control Batch
Please check for attached comments

7.24

0.70

52.3

18.7 / 108

30.2

124

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

Maxxam ID		G98491	G98531	G98533		
Sampling Date		2005/06/29	2005/06/29	2005/06/29		
COC Number		298044	298044	298044		
	Units	BH1,SA1	DCPT4,SA1	DCPT4,SA1	DL	QC Batch
PAH'S						
1-Methylnaphthalene	mg/kg	ND	ND	ND	0.05	773256
2-Methylnaphthalene	mg/kg	ND	ND	ND	0.05	773256
Acenaphthene	mg/kg	ND	ND	ND	0.05	773256
Acenaphthylene	mg/kg	ND	ND	ND	0.05	773256
Anthracene	mg/kg	ND	0.10	ND	0.05	773256
Benzo(a)anthracene	mg/kg	0.19	0.35	0.29	0.05	773256
Benzo(a)pyrene	mg/kg	ND	0.17	0.12	0.05	773256
Benzo(b)fluoranthene	mg/kg	0.08	0.17	0.12	0.05	773256
Benzo(ghi)perylene	mg/kg	ND	ND	ND	0.05	773256
Benzo(k)fluoranthene	mg/kg	0.08	0.16	0.13	0.05	773256
Chrysene	mg/kg	0.17	0.30	0.20	0.05	773256
Dibenzo(a,h)anthracene	mg/kg	ND	ND	ND	0.05	773256
Fluoranthene	mg/kg	0.29	0.24	0.47	0.05	773256
Fluorene	mg/kg	ND	ND	ND	0.05	773256
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	0.05	773256
Naphthalene	mg/kg	ND	ND	ND	0.05	773256
Perylene	mg/kg	ND	ND	ND	0.05	773256
Phenanthrene	mg/kg	0.10	0.13	0.08	0.05	773256
Pyrene	mg/kg	0.24	0.22	0.52	0.05	773256
Surrogate Recovery (%)						
D14-Terphenyl (FS)	%	100	94	102		773256
D10-Anthracene	%	96	92	98		773256
D8-Acenaphthylene	%	95	93	98		773256

ND = Not detected
QC Batch = Quality Control Batch
Please check for attached comments

$$\begin{array}{l} 0.0469 / 0.245 \\ 0.0748 / 0.693 \\ 0.0888 / 0.763 \\ \hline 0.108 / 0.846 \\ 0.113 / 1.494 \\ \hline 0.0867 / 0.544 \\ .153 / 1.398. \end{array}$$

Maxxam Job #: A561697
Report Date: 2005/07/12

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

GENERAL COMMENTS

Antimony recovery from applicable digested reference material is 40 % for Work Sheet # 776635.

Results relate only to the items tested.

ADI Nolan Davis
Attention: Blair Cameron
Client Project #: 26-4553-004.1
P.O. #:
Project name: HOLYROOD, NL

Quality Assurance Report
Maxxam Job Number: DA561697

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
773256 RDE	MATRIX SPIKE	D14-Terphenyl (FS)	2005/07/06		105	%	30 - 130
		1-Methylnaphthalene	2005/07/06		104	%	30 - 130
		2-Methylnaphthalene	2005/07/06		96	%	30 - 130
		Acenaphthene	2005/07/06		88	%	30 - 130
		Acenaphthylene	2005/07/06		92	%	30 - 130
		Anthracene	2005/07/06		92	%	30 - 130
		Benzo(a)anthracene	2005/07/06		96	%	30 - 130
		Benzo(a)pyrene	2005/07/06		88	%	30 - 130
		Benzo(b)fluoranthene	2005/07/06		92	%	30 - 130
		Benzo(ghi)perylene	2005/07/06		96	%	30 - 130
		Benzo(k)fluoranthene	2005/07/06		92	%	30 - 130
		Chrysene	2005/07/06		96	%	30 - 130
		D10-Anthracene	2005/07/06		99	%	30 - 130
		D8-Acenaphthylene	2005/07/06		108	%	30 - 130
		Dibenzo(a,h)anthracene	2005/07/06		76	%	30 - 130
		Fluoranthene	2005/07/06		88	%	30 - 130
		Fluorene	2005/07/06		96	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2005/07/06		72	%	30 - 130
		Naphthalene	2005/07/06		92	%	30 - 130
		Perylene	2005/07/06		88	%	30 - 130
		Phenanthrene	2005/07/06		94	%	30 - 130
		Pyrene	2005/07/06		86	%	30 - 130
	Spiked Blank	D14-Terphenyl (FS)	2005/07/06		101	%	30 - 130
		1-Methylnaphthalene	2005/07/06		97	%	30 - 130
		2-Methylnaphthalene	2005/07/06		90	%	30 - 130
		Acenaphthene	2005/07/06		85	%	30 - 130
		Acenaphthylene	2005/07/06		89	%	30 - 130
		Anthracene	2005/07/06		94	%	30 - 130
		Benzo(a)anthracene	2005/07/06		89	%	30 - 130
		Benzo(a)pyrene	2005/07/06		97	%	30 - 130
		Benzo(b)fluoranthene	2005/07/06		94	%	30 - 130
		Benzo(ghi)perylene	2005/07/06		90	%	30 - 130
		Benzo(k)fluoranthene	2005/07/06		94	%	30 - 130
		Chrysene	2005/07/06		90	%	30 - 130
		D10-Anthracene	2005/07/06		96	%	30 - 130
		D8-Acenaphthylene	2005/07/06		97	%	30 - 130
		Dibenzo(a,h)anthracene	2005/07/06		65	%	30 - 130
		Fluoranthene	2005/07/06		90	%	30 - 130
		Fluorene	2005/07/06		87	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2005/07/06		78	%	30 - 130
		Naphthalene	2005/07/06		85	%	30 - 130
		Perylene	2005/07/06		90	%	30 - 130
		Phenanthrene	2005/07/06		96	%	30 - 130
		Pyrene	2005/07/06		89	%	30 - 130
	Method Blank	D14-Terphenyl (FS)	2005/07/06		107	%	30 - 130
		1-Methylnaphthalene	2005/07/06	ND, DL=0.05		mg/kg	
		2-Methylnaphthalene	2005/07/06	ND, DL=0.05		mg/kg	
		Acenaphthene	2005/07/06	ND, DL=0.05		mg/kg	
		Acenaphthylene	2005/07/06	ND, DL=0.05		mg/kg	
		Anthracene	2005/07/06	ND, DL=0.05		mg/kg	
		Benzo(a)anthracene	2005/07/06	ND, DL=0.05		mg/kg	
		Benzo(a)pyrene	2005/07/06	ND, DL=0.05		mg/kg	
		Benzo(b)fluoranthene	2005/07/06	ND, DL=0.05		mg/kg	
		Benzo(ghi)perylene	2005/07/06	ND, DL=0.05		mg/kg	
		Benzo(k)fluoranthene	2005/07/06	ND, DL=0.05		mg/kg	
		Chrysene	2005/07/06	ND, DL=0.05		mg/kg	

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

ADI Nolan Davis
Attention: Blair Cameron
Client Project #: 26-4553-004.1
P.O. #:
Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA561697

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
773256 RDE	Method Blank	D10-Anthracene	2005/07/06		106	%	30 - 130
		D8-Acenaphthylene	2005/07/06		105	%	30 - 130
		Dibenzo(a,h)anthracene	2005/07/06	ND, DL=0.05		mg/kg	
		Fluoranthene	2005/07/06	ND, DL=0.05		mg/kg	
		Fluorene	2005/07/06	ND, DL=0.05		mg/kg	
		Indeno(1,2,3-cd)pyrene	2005/07/06	ND, DL=0.05		mg/kg	
		Naphthalene	2005/07/06	ND, DL=0.05		mg/kg	
		Perylene	2005/07/06	ND, DL=0.05		mg/kg	
		Phenanthrene	2005/07/06	ND, DL=0.05		mg/kg	
		Pyrene	2005/07/06	ND, DL=0.05		mg/kg	
	RPD	1-Methylnaphthalene	2005/07/06	NC		%	50
		2-Methylnaphthalene	2005/07/06	NC		%	50
		Acenaphthene	2005/07/06	NC		%	50
		Acenaphthylene	2005/07/06	NC		%	50
		Anthracene	2005/07/06	NC		%	50
		Benzo(a)anthracene	2005/07/06	NC		%	50
		Benzo(a)pyrene	2005/07/06	NC		%	50
		Benzo(b)fluoranthene	2005/07/06	NC		%	50
		Benzo(ghi)perylene	2005/07/06	NC		%	50
		Benzo(k)fluoranthene	2005/07/06	NC		%	50
		Chrysene	2005/07/06	NC		%	50
		Dibenzo(a,h)anthracene	2005/07/06	NC		%	50
		Fluoranthene	2005/07/06	NC		%	50
		Fluorene	2005/07/06	NC		%	50
		Indeno(1,2,3-cd)pyrene	2005/07/06	NC		%	50
		Naphthalene	2005/07/06	NC		%	50
		Perylene	2005/07/06	NC		%	50
		Phenanthrene	2005/07/06	NC		%	50
		Pyrene	2005/07/06	NC		%	50
773719 RST	MATRIX SPIKE	Decachlorobiphenyl	2005/07/07		88	%	30 - 130
		Total PCB	2005/07/07		124	%	70 - 130
	Spiked Blank	Decachlorobiphenyl	2005/07/07		98	%	30 - 130
		Total PCB	2005/07/07		88	%	70 - 130
	Method Blank	Decachlorobiphenyl	2005/07/07		96	%	30 - 130
		Total PCB	2005/07/07	ND, DL=0.05		ug/g	
776635 JRH	MATRIX SPIKE	Available Aluminum (Al)	2005/07/08		113870	%	75 - 125
		Available Antimony (Sb)	2005/07/08		1114	%	75 - 125
		Available Arsenic (As)	2005/07/08		11-160	%	75 - 125
		Available Barium (Ba)	2005/07/08		11127	%	75 - 125
		Available Beryllium (Be)	2005/07/08		91	%	75 - 125
		Available Boron (B)	2005/07/08		95	%	75 - 125
		Available Cadmium (Cd)	2005/07/08		98	%	75 - 125
		Available Chromium (Cr)	2005/07/08		98	%	75 - 125
		Available Cobalt (Co)	2005/07/08		99	%	75 - 125
		Available Copper (Cu)	2005/07/08		111	%	75 - 125
		Available Iron (Fe)	2005/07/08		112060	%	75 - 125
		Available Lead (Pb)	2005/07/08		11-28	%	75 - 125
		Available Manganese (Mn)	2005/07/08		1118	%	75 - 125
		Available Molybdenum (Mo)	2005/07/08		86	%	75 - 125
		Available Nickel (Ni)	2005/07/08		1130	%	75 - 125
		Available Selenium (Se)	2005/07/08		92	%	75 - 125
		Available Silver (Ag)	2005/07/08		95	%	75 - 125
		Available Strontium (Sr)	2005/07/08		84	%	75 - 125
		Available Thallium (Tl)	2005/07/08		97	%	75 - 125
		Available Uranium (U)	2005/07/08		100	%	75 - 125
		Available Vanadium (V)	2005/07/08		11170	%	75 - 125

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

ADI Nolan Davis
Attention: Blair Cameron
Client Project #: 26-4553-004.1
P.O. #:
Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA561697

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
776635 JRH	MATRIX SPIKE QC STANDARD	Available Zinc (Zn)	2005/07/08		!!2470	%	75 - 125
		Available Aluminum (Al)	2005/07/08		76	%	75 - 125
		Available Antimony (Sb)	2005/07/08		79	%	75 - 125
		Available Arsenic (As)	2005/07/08		116	%	75 - 125
		Available Barium (Ba)	2005/07/08		112	%	75 - 125
		Available Beryllium (Be)	2005/07/08		88	%	75 - 125
		Available Boron (B)	2005/07/08		!!52	%	75 - 125
		Available Cadmium (Cd)	2005/07/08		111	%	75 - 125
		Available Chromium (Cr)	2005/07/08		99	%	75 - 125
		Available Cobalt (Co)	2005/07/08		104	%	75 - 125
		Available Copper (Cu)	2005/07/08		97	%	75 - 125
		Available Iron (Fe)	2005/07/08		84	%	75 - 125
		Available Lead (Pb)	2005/07/08		107	%	75 - 125
		Available Manganese (Mn)	2005/07/08		98	%	75 - 125
		Available Molybdenum (Mo)	2005/07/08		!!67	%	75 - 125
		Available Nickel (Ni)	2005/07/08		111	%	75 - 125
		Available Selenium (Se)	2005/07/08		!!129	%	75 - 125
		Available Silver (Ag)	2005/07/08		84	%	75 - 125
		Available Strontium (Sr)	2005/07/08		93	%	75 - 125
		Available Thallium (Tl)	2005/07/08		!!132	%	75 - 125
		Available Uranium (U)	2005/07/08		111	%	75 - 125
		Available Vanadium (V)	2005/07/08		93	%	75 - 125
		Available Zinc (Zn)	2005/07/08		110	%	75 - 125
	Spiked Blank	Available Aluminum (Al)	2005/07/08		102	%	75 - 125
		Available Antimony (Sb)	2005/07/08		97	%	75 - 125
		Available Arsenic (As)	2005/07/08		102	%	75 - 125
		Available Barium (Ba)	2005/07/08		99	%	75 - 125
		Available Beryllium (Be)	2005/07/08		105	%	75 - 125
		Available Boron (B)	2005/07/08		106	%	75 - 125
		Available Cadmium (Cd)	2005/07/08		96	%	75 - 125
		Available Chromium (Cr)	2005/07/08		100	%	75 - 125
		Available Cobalt (Co)	2005/07/08		102	%	75 - 125
		Available Copper (Cu)	2005/07/08		102	%	75 - 125
		Available Iron (Fe)	2005/07/08		104	%	75 - 125
		Available Lead (Pb)	2005/07/08		99	%	75 - 125
		Available Manganese (Mn)	2005/07/08		94	%	75 - 125
		Available Molybdenum (Mo)	2005/07/08		100	%	75 - 125
		Available Nickel (Ni)	2005/07/08		103	%	75 - 125
		Available Selenium (Se)	2005/07/08		98	%	75 - 125
		Available Silver (Ag)	2005/07/08		101	%	75 - 125
		Available Strontium (Sr)	2005/07/08		105	%	75 - 125
		Available Thallium (Tl)	2005/07/08		98	%	75 - 125
		Available Uranium (U)	2005/07/08		97	%	75 - 125
		Available Vanadium (V)	2005/07/08		101	%	75 - 125
		Available Zinc (Zn)	2005/07/08		96	%	75 - 125
	Method Blank	Available Aluminum (Al)	2005/07/08	ND, DL=10		mg/kg	
		Available Antimony (Sb)	2005/07/08	ND, DL=2		mg/kg	
		Available Arsenic (As)	2005/07/08	ND, DL=2		mg/kg	
		Available Barium (Ba)	2005/07/08	ND, DL=5		mg/kg	
		Available Beryllium (Be)	2005/07/08	ND, DL=2		mg/kg	
		Available Boron (B)	2005/07/08	ND, DL=5		mg/kg	
		Available Cadmium (Cd)	2005/07/08	ND, DL=0.3		mg/kg	
		Available Chromium (Cr)	2005/07/08	ND, DL=2		mg/kg	
		Available Cobalt (Co)	2005/07/08	ND, DL=1		mg/kg	
		Available Copper (Cu)	2005/07/08	ND, DL=2		mg/kg	
		Available Iron (Fe)	2005/07/08	ND, DL=50		mg/kg	

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

ADI Nolan Davis
 Attention: Blair Cameron
 Client Project #: 26-4553-004.1
 P.O. #:
 Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA561697

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
776635 JRH	Method Blank	Available Lead (Pb)	2005/07/08	ND, DL=0.5		mg/kg	
		Available Manganese (Mn)	2005/07/08	ND, DL=2		mg/kg	
		Available Molybdenum (Mo)	2005/07/08	ND, DL=2		mg/kg	
		Available Nickel (Ni)	2005/07/08	ND, DL=2		mg/kg	
		Available Selenium (Se)	2005/07/08	ND, DL=2		mg/kg	
		Available Silver (Ag)	2005/07/08	ND, DL=0.5		mg/kg	
		Available Strontium (Sr)	2005/07/08	ND, DL=5		mg/kg	
		Available Thallium (Tl)	2005/07/08	ND, DL=0.1		mg/kg	
		Available Uranium (U)	2005/07/08	ND, DL=0.1		mg/kg	
		Available Vanadium (V)	2005/07/08	ND, DL=2		mg/kg	
		Available Zinc (Zn)	2005/07/08	ND, DL=5		mg/kg	
ND = Not detected NC = Non-calculable RPD = Relative Percent Difference QC Standard = Quality Control Standard SPIKE = Fortified sample							

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

ADI Nolan Davis
St. John's
PO Box 7248
St. John's, NL
A1E 3Y4

Attention: Bill Melendy

Report Date: 2005/05/18

Your Project #: 26-4553-004.1
Site: HOLYROOD
Your C.O.C. #: 298042

Incoming Data/Product (Procedure #5)
Supplied by: Maxxam
Project No.: 26-4553-004.1
Reviewed by: CJP
Date Reviewed: May 20/05

ANALYTICAL REPORT

MAXXAM JOB #: A539036
Received: 2005/05/11, 10:41

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
TEH in Soil (PIRI) @	1	2005/05/13	2005/05/13	SOP 9775	Based on Atl. PIRI
TEH in Soil (PIRI) @	5	2005/05/16	2005/05/16	SOP 9775	Based on Atl. PIRI
Moisture	1	N/A	2005/05/13	SOP 9740	MOE Handbook 1983
Moisture	5	N/A	2005/05/16	SOP 9740	MOE Handbook 1983
VPH in Soil (PIRI) @	1	2005/05/13	2005/05/13	SOP 9785	Based on Atl. PIRI
VPH in Soil (PIRI) @	5	2005/05/16	2005/05/16	SOP 9785	Based on Atl. PIRI
ModTPH (T1) Calc. for Soil @	1	2005/05/12	N/A		Based on Atl. PIRI
ModTPH (T1) Calc. for Soil @	1	2005/05/12	2005/05/16		Based on Atl. PIRI
ModTPH (T1) Calc. for Soil @	4	2005/05/12	2005/05/18		Based on Atl. PIRI

(1) SCC/CAEAL

MAXXAM ANALYTICS INC.

ROB WHELAN

RWH/rwh
encl.

Total cover pages: 1

St. John's: 49-55 Elizabeth Avenue, Suite 101A, St. John's NL A1A 1W9 709-754-0203 Fax 709-754-8612

This document is in electronic format, hard copy is available on request.

Maxxam Job #: A539036
Report Date: 2005/05/18

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD
Sampler Initials: BC

ATLANTIC MUST IN SOIL - PIRI TIER I (SOIL)

Maxxam ID		F99984		F99990	F99990	F99991		
Sampling Date		2005/05/10		2005/05/10	2005/05/10	2005/05/10		
COC Number		298042		298042	298042	298042		
	Units	TP1, SA1	QC Batch	TP3, SA1	TP3, SA1 Dup	TP4, SA2	DL	QC Batch

Physical Properties								
Moisture	%	6.4	736337	8.9	8.9	8.1	1	738132
Hydrocarbons								
>C10-C21 Hydrocarbons	mg/kg	ND	736336	ND	ND	ND	15	738127
>C21-<C32 Hydrocarbons	mg/kg	ND	736336	21	23	ND	15	738127
Modified TPH (Tier1)	mg/kg	ND	736042	21	23	ND	20	736042
Volatile Hydrocarbons								
Benzene	mg/kg	ND	736334	ND	ND	ND	0.03	738121
Toluene	mg/kg	ND	736334	ND	ND	ND	0.03	738121
Ethylbenzene	mg/kg	ND	736334	ND	ND	ND	0.03	738121
Xylene (Total)	mg/kg	ND	736334	ND	ND	ND	0.05	738121
C6 - C10 (less BTEX)	mg/kg	ND	736334	ND	ND	ND	3	738121
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	93	736336	92	92	93		738127
n-Dotriacontane - Extractable	%	96	736336	99	99	96		738127
Isobutylbenzene - Volatile	%	111	736334	98	96	102		738121
ND = Not detected QC Batch = Quality Control Batch Please check for attached comments								

MAXXAM ANALYTICS INC.

ROB WHELAN

RWH/rwh

Maxxam Job #: A539036
Report Date: 2005/05/18

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD
Sampler Initials: BC

ATLANTIC MUST IN SOIL - PIRI TIER I (SOIL)

Maxxam ID		F99992	F99993	F99994		
Sampling Date		2005/05/10	2005/05/10	2005/05/10		
COC Number		298042	298042	298042		
	Units	TP5, SA1	TP6, SA1	TP7, SA2	DL	QC Batch

Physical Properties						
Moisture	%	8.3	5.9	4.7	1	738132
Hydrocarbons						
>C10-C21 Hydrocarbons	mg/kg	38	ND	ND	15	738127
>C21-<C32 Hydrocarbons	mg/kg	61	25	ND	15	738127
Modified TPH (Tier1)	mg/kg	99	33	ND	20	736042
Volatile Hydrocarbons						
Benzene	mg/kg	ND	ND	ND	0.03	738121
Toluene	mg/kg	0.04	0.68	ND	0.03	738121
Ethylbenzene	mg/kg	ND	0.23	ND	0.03	738121
Xylene (Total)	mg/kg	ND	0.61	ND	0.05	738121
C6 - C10 (less BTEX)	mg/kg	ND	8.1	ND	3	738121
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	92	91	91		738127
n-Dotriacontane - Extractable	%	99	97	97		738127
Isobutylbenzene - Volatile	%	102	1143	102		738121
ND = Not detected QC Batch = Quality Control Batch Please check for attached comments						

MAXXAM ANALYTICS INC.

ROB WHELAN

RWH/rwh

Maxxam Job #: A539036
Report Date: 2005/05/18

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD
Sampler Initials: BC

GENERAL COMMENTS

Sample F99990-01: Lube oil range.

Sample F99992-01: Fuel oil range. Lube oil range.

Sample F99993-01: Gasoline fraction. VPH surrogate not within acceptance limits due to matrix/co-extractive interference.
Lube oil range.

Results relate only to the items tested.

MAXXAM ANALYTICS INC.

ROB WHELAN

RWH/rwh

ADI Nolan Davis
Attention: Bill Melendy
Client Project #: 26-4553-004.1
P.O. #:
Project name: HOLYROOD

Quality Assurance Report

Maxxam Job Number: ZA539036

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
736042 RWH	RPD	Modified TPH (Tier1)		NC		%	N/A
736334 BRD	Method Blank	Isobutylbenzene - Volatile	2005/05/13		107	%	60 - 140
		Benzene	2005/05/13	ND, DL=0.025		mg/kg	
		Toluene	2005/05/13	ND, DL=0.025		mg/kg	
		Ethylbenzene	2005/05/13	ND, DL=0.025		mg/kg	
		Xylene (Total)	2005/05/13	ND, DL=0.05		mg/kg	
		C6 - C10 (less BTEX)	2005/05/13	ND, DL=3		mg/kg	
	RPD	Benzene	2005/05/13	NC		%	50
		Toluene	2005/05/13	NC		%	50
		Ethylbenzene	2005/05/13	NC		%	50
		Xylene (Total)	2005/05/13	NC		%	50
		C6 - C10 (less BTEX)	2005/05/13	NC		%	50
736336 DDE	MATRIX SPIKE	Isobutylbenzene - Extractable	2005/05/13		94	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/13		96	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/13		104	%	30 - 130
		>C21-<C32 Hydrocarbons	2005/05/13		83	%	30 - 130
	Spiked Blank	Isobutylbenzene - Extractable	2005/05/13		91	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/13		97	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/13		100	%	30 - 130
		>C21-<C32 Hydrocarbons	2005/05/13		85	%	30 - 130
	Method Blank	Isobutylbenzene - Extractable	2005/05/13		93	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/13		97	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/13	ND, DL=15		mg/kg	
		>C21-<C32 Hydrocarbons	2005/05/13	ND, DL=15		mg/kg	
	RPD	>C10-C21 Hydrocarbons	2005/05/13	NC		%	50
		>C21-<C32 Hydrocarbons	2005/05/13	NC		%	50
736337 GMA	RPD	Moisture	2005/05/13	3.5		%	N/A
738121 BRD	Method Blank	Isobutylbenzene - Volatile	2005/05/16		97	%	60 - 140
		Benzene	2005/05/16	ND, DL=0.025		mg/kg	
		Toluene	2005/05/16	ND, DL=0.025		mg/kg	
		Ethylbenzene	2005/05/16	ND, DL=0.025		mg/kg	
		Xylene (Total)	2005/05/16	ND, DL=0.05		mg/kg	
		C6 - C10 (less BTEX)	2005/05/16	ND, DL=3		mg/kg	
	RPD	Benzene	2005/05/16	NC		%	50
		Toluene	2005/05/16	NC		%	50
		Ethylbenzene	2005/05/16	NC		%	50
		Xylene (Total)	2005/05/16	NC		%	50
		C6 - C10 (less BTEX)	2005/05/16	NC		%	50
738127 DDE	MATRIX SPIKE	Isobutylbenzene - Extractable	2005/05/16		89	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/16		96	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/16		91	%	30 - 130
		>C21-<C32 Hydrocarbons	2005/05/16		74	%	30 - 130
	Spiked Blank	Isobutylbenzene - Extractable	2005/05/16		90	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/16		95	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/16		91	%	30 - 130
		>C21-<C32 Hydrocarbons	2005/05/16		88	%	30 - 130
	Method Blank	Isobutylbenzene - Extractable	2005/05/16		95	%	30 - 130
		n-Dotriacontane - Extractable	2005/05/16		96	%	30 - 130
		>C10-C21 Hydrocarbons	2005/05/16	ND, DL=15		mg/kg	
		>C21-<C32 Hydrocarbons	2005/05/16	ND, DL=15		mg/kg	
	RPD	>C10-C21 Hydrocarbons	2005/05/16	NC		%	50
		>C21-<C32 Hydrocarbons	2005/05/16	NC		%	50
738132 GMA	RPD	Moisture	2005/05/16	0		%	N/A

ND = Not detected
N/A = Not Applicable
NC = Non-calculable

St. John's: 49-55 Elizabeth Avenue, Suite 101A, St. John's NL A1A 1W9 709-754-0203 Fax 709-754-8612

This document is in electronic format, hard copy is available on request.

ADI Nolan Davis
Attention: Bill Melendy
Client Project #: 26-4553-004.1
P.O. #:
Project name: HOLYROOD

Quality Assurance Report (Continued)

Maxxam Job Number: ZA539036

RPD = Relative Percent Difference
SPIKE = Fortified sample

St. John's: 49-55 Elizabeth Avenue, Suite 101A, St. John's NL A1A 1W9 709-754-0203 Fax 709-754-8612

RECEIVED JUN - 7 2005

Attention: Bill Melendy

Report Date: 2005/05/30

Your Project #: 26-4553-004.1
Site: HOLYROOD, NL
Your C.O.C. #: 298042

ANALYTICAL REPORT

MAXXAM JOB #: A540217

Received: 2005/05/12, 9:30

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Mercury (CVAA) ^(1,2)	2	N/A	2005/05/18	3425_1_2	Based on EPA245.5
Elements by ICPMS (FIAS) ⁽¹⁾	2	N/A	2005/05/16	3013_1_1	Based on EPA6020A
Moisture	3	N/A	2005/05/16		MOE Handbook 1983
PAH in soil by GC/MS (SIM) ⁽¹⁾	2	N/A	2005/05/17	SOP 7010_1_3	Based on EPA8270C
PCBs in soil by GC/ECD ^(1,2)	1	N/A	2005/05/18	8024_1_5	Based on EPA8082
PCBs in soil by GC/ECD ^(1,2)	1	N/A	2005/05/24	8024_1_5	Based on EPA8082

- (1) This test was performed by Bedford
(2) SCC/CAEAL

MAXXAM ANALYTICS INC.



SHARLENE BAIRD
Project Manager

SBD/mke
encl.

Incoming Data/Product (Procedure #5)
Supplied by: maxxam
Project No.: 26-4553-004.1
Reviewed by: [Signature]
Date Reviewed: Jun 10/05

Total cover pages: 1

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

Maxxam Job #: A540217
 Report Date: 2005/05/30

ADI Nolan Davis
 Client Project #: 26-4553-004.1
 Project name: HOLYROOD, NL
 Sampler Initials:

RESULTS OF ANALYSES OF SOIL

Maxxam ID		G04690	G04695	G04701		
Sampling Date		2005/05/10	2005/05/10	2005/05/10		
COC Number		298042	298042	298042		
	Units	TP1, SA1	TP6, SA1	TP7, SA2	DL	QC Batch

Physical Properties						
Moisture	%	6.7	5.7	5.0	1	736580

QC Batch = Quality Control Batch
 Please check for attached comments

Maxxam Job #: A540217
Report Date: 2005/05/30

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		G04693	G04695		
Sampling Date		2005/05/10	2005/05/10		
COC Number		298042	298042		
	Units	TP4, SA2	TP6, SA1	DL	QC Batch

Elements					
Mercury (Hg)	mg/kg	ND	ND	0.01	739709
Available Aluminum (Al)	mg/kg	6000	8700	10	738357
Available Antimony (Sb)	mg/kg	ND	ND	2	738357
Available Arsenic (As)	mg/kg	ND	4.8	2	738357
Available Barium (Ba)	mg/kg	19	18	5	738357
Available Beryllium (Be)	mg/kg	ND	ND	2	738357
Available Boron (B)	mg/kg	ND	ND	5	738357
Available Cadmium (Cd)	mg/kg	ND	ND	0.3	738357
Available Chromium (Cr)	mg/kg	9.8	19	2	738357
Available Cobalt (Co)	mg/kg	5.6	9.9	1	738357
Available Copper (Cu)	mg/kg	24	46	2	738357
Available Iron (Fe)	mg/kg	8000	17000	50	738357
Available Lead (Pb)	mg/kg	5.3	14	0.5	738357
Available Manganese (Mn)	mg/kg	380	560	2	738357
Available Molybdenum (Mo)	mg/kg	ND	ND	2	738357
Available Nickel (Ni)	mg/kg	11	24	2	738357
Available Selenium (Se)	mg/kg	ND	ND	2	738357
Available Silver (Ag)	mg/kg	ND	ND	0.5	738357
Available Strontium (Sr)	mg/kg	ND	ND	5	738357
Available Thallium (Tl)	mg/kg	ND	ND	0.1	738357
Available Uranium (U)	mg/kg	0.4	0.5	0.1	738357
Available Vanadium (V)	mg/kg	12	19	2	738357
Available Zinc (Zn)	mg/kg	26	45	5	738357

ND = Not detected
QC Batch = Quality Control Batch
Please check for attached comments

Maxxam Job #: A540217
Report Date: 2005/05/30

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		G04690	G04695		
Sampling Date		2005/05/10	2005/05/10		
COC Number		298042	298042		
	Units	TP1, SA1	TP6, SA1	DL	QC Batch

PAH'S					
1-Methylnaphthalene	mg/kg	ND	ND	0.05	737963
2-Methylnaphthalene	mg/kg	ND	ND	0.05	737963
Acenaphthene	mg/kg	ND	ND	0.05	737963
Acenaphthylene	mg/kg	ND	ND	0.05	737963
Anthracene	mg/kg	ND	ND	0.05	737963
Benzo(a)anthracene	mg/kg	ND	ND	0.05	737963
Benzo(a)pyrene	mg/kg	ND	0.06	0.05	737963
Benzo(b)fluoranthene	mg/kg	ND	0.10	0.05	737963
Benzo(ghi)perylene	mg/kg	ND	ND	0.05	737963
Benzo(k)fluoranthene	mg/kg	ND	0.10	0.05	737963
Chrysene	mg/kg	ND	0.06	0.05	737963
Dibenzo(a,h)anthracene	mg/kg	ND	ND	0.05	737963
Fluoranthene	mg/kg	ND	ND	0.05	737963
Fluorene	mg/kg	ND	ND	0.05	737963
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	0.05	737963
Naphthalene	mg/kg	ND	ND	0.05	737963
Perylene	mg/kg	ND	ND	0.05	737963
Phenanthrene	mg/kg	ND	ND	0.05	737963
Pyrene	mg/kg	ND	ND	0.05	737963
Surrogate Recovery (%)					
D10-Anthracene	%	94	96		737963
D14-Terphenyl (FS)	%	92	92		737963
D8-Acenaphthylene	%	98	99		737963

ND = Not detected
QC Batch = Quality Control Batch
Please check for attached comments

Maxxam Job #: A540217
 Report Date: 2005/05/30

ADI Nolan Davis
 Client Project #: 26-4553-004.1
 Project name: HOLYROOD, NL
 Sampler Initials:

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		G04695		G04701		
Sampling Date		2005/05/10		2005/05/10		
COC Number		298042		298042		
	Units	TP6, SA1	QC Batch	TP7, SA2	DL	QC Batch
PCB'S						
Total PCB	ug/g	ND	741862	ND	0.05	739822
Surrogate Recovery (%)						
Decachlorobiphenyl	%	95	741862	96		739822
ND = Not detected QC Batch = Quality Control Batch Please check for attached comments						

Maxxam Job #: A540217
Report Date: 2005/05/30

ADI Nolan Davis
Client Project #: 26-4553-004.1
Project name: HOLYROOD, NL
Sampler Initials:

GENERAL COMMENTS

Antimony recovery from the applicable digested reference material is 50.5 for work sheet 738357.

Results relate only to the items tested.

ADI Nolan Davis
 Attention: Bill Melendy
 Client Project #: 26-4553-004.1
 P.O. #:
 Project name: HOLYROOD, NL

Quality Assurance Report
 Maxxam Job Number: DA540217

QA/QC Batch			Date Analyzed				
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits
736580 SDO	RPD	Moisture	2005/05/16	2.1		%	N/A
737963 SHR	MATRIX SPIKE	D10-Anthracene	2005/05/17		70	%	30 - 130
		D14-Terphenyl (FS)	2005/05/17		71	%	30 - 130
		D8-Acenaphthylene	2005/05/17		72	%	30 - 130
		1-Methylnaphthalene	2005/05/17		77	%	30 - 130
		2-Methylnaphthalene	2005/05/17		72	%	30 - 130
		Acenaphthene	2005/05/17		76	%	30 - 130
		Acenaphthylene	2005/05/17		66	%	30 - 130
		Anthracene	2005/05/17		74	%	30 - 130
		Benzo(a)anthracene	2005/05/17		69	%	30 - 130
		Benzo(a)pyrene	2005/05/17		73	%	30 - 130
		Benzo(b)fluoranthene	2005/05/17		77	%	30 - 130
		Benzo(ghi)perylene	2005/05/17		72	%	30 - 130
		Benzo(k)fluoranthene	2005/05/17		76	%	30 - 130
		Chrysene	2005/05/17		70	%	30 - 130
		Dibenzo(a,h)anthracene	2005/05/17		65	%	30 - 130
		Fluoranthene	2005/05/17		63	%	30 - 130
		Fluorene	2005/05/17		76	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2005/05/17		64	%	30 - 130
		Naphthalene	2005/05/17		71	%	30 - 130
		Perylene	2005/05/17		75	%	30 - 130
		Phenanthrene	2005/05/17		68	%	30 - 130
		Pyrene	2005/05/17		62	%	30 - 130
	Spiked Blank	D10-Anthracene	2005/05/17		93	%	30 - 130
		D14-Terphenyl (FS)	2005/05/17		92	%	30 - 130
		D8-Acenaphthylene	2005/05/17		94	%	30 - 130
		1-Methylnaphthalene	2005/05/17		82	%	30 - 130
		2-Methylnaphthalene	2005/05/17		78	%	30 - 130
		Acenaphthene	2005/05/17		81	%	30 - 130
		Acenaphthylene	2005/05/17		73	%	30 - 130
		Anthracene	2005/05/17		79	%	30 - 130
		Benzo(a)anthracene	2005/05/17		74	%	30 - 130
		Benzo(a)pyrene	2005/05/17		86	%	30 - 130
		Benzo(b)fluoranthene	2005/05/17		87	%	30 - 130
		Benzo(ghi)perylene	2005/05/17		83	%	30 - 130
		Benzo(k)fluoranthene	2005/05/17		87	%	30 - 130
		Chrysene	2005/05/17		80	%	30 - 130
		Dibenzo(a,h)anthracene	2005/05/17		73	%	30 - 130
		Fluoranthene	2005/05/17		71	%	30 - 130
		Fluorene	2005/05/17		81	%	30 - 130
		Indeno(1,2,3-cd)pyrene	2005/05/17		71	%	30 - 130
		Naphthalene	2005/05/17		74	%	30 - 130
		Perylene	2005/05/17		88	%	30 - 130
		Phenanthrene	2005/05/17		76	%	30 - 130
		Pyrene	2005/05/17		70	%	30 - 130
	Method Blank	D10-Anthracene	2005/05/17		93	%	30 - 130
		D14-Terphenyl (FS)	2005/05/17		93	%	30 - 130
		D8-Acenaphthylene	2005/05/17		93	%	30 - 130
		1-Methylnaphthalene	2005/05/17	ND, DL=0.05		mg/kg	
		2-Methylnaphthalene	2005/05/17	ND, DL=0.05		mg/kg	
		Acenaphthene	2005/05/17	ND, DL=0.05		mg/kg	
		Acenaphthylene	2005/05/17	ND, DL=0.05		mg/kg	
		Anthracene	2005/05/17	ND, DL=0.05		mg/kg	
		Benzo(a)anthracene	2005/05/17	ND, DL=0.05		mg/kg	
		Benzo(a)pyrene	2005/05/17	ND, DL=0.05		mg/kg	
		Benzo(b)fluoranthene	2005/05/17	ND, DL=0.05		mg/kg	

Bedford: 200 Bluewater Road Bedford NS B4B 1G9 Telephone(902)420-0203 FAX(902)420-8612

ADI Nolan Davis
 Attention: Bill Melendy
 Client Project #: 26-4553-004.1
 P.O. #:
 Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA540217

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
737963 SHR	Method Blank	Benzo(ghi)perylene	2005/05/17	ND, DL=0.05		mg/kg	
		Benzo(k)fluoranthene	2005/05/17	ND, DL=0.05		mg/kg	
		Chrysene	2005/05/17	ND, DL=0.05		mg/kg	
		Dibenzo(a,h)anthracene	2005/05/17	ND, DL=0.05		mg/kg	
		Fluoranthene	2005/05/17	ND, DL=0.05		mg/kg	
		Fluorene	2005/05/17	ND, DL=0.05		mg/kg	
		Indeno(1,2,3-cd)pyrene	2005/05/17	ND, DL=0.05		mg/kg	
		Naphthalene	2005/05/17	ND, DL=0.05		mg/kg	
		Perylene	2005/05/17	ND, DL=0.05		mg/kg	
		Phenanthrene	2005/05/17	ND, DL=0.05		mg/kg	
	RPD	Pyrene	2005/05/17	ND, DL=0.05		mg/kg	
		1-Methylnaphthalene	2005/05/17	NC		%	50
		2-Methylnaphthalene	2005/05/17	NC		%	50
		Acenaphthene	2005/05/17	NC		%	50
		Acenaphthylene	2005/05/17	NC		%	50
		Anthracene	2005/05/17	NC		%	50
		Benzo(a)anthracene	2005/05/17	NC		%	50
		Benzo(a)pyrene	2005/05/17	NC		%	50
		Benzo(b)fluoranthene	2005/05/17	NC		%	50
		Benzo(ghi)perylene	2005/05/17	NC		%	50
		Benzo(k)fluoranthene	2005/05/17	NC		%	50
		Chrysene	2005/05/17	NC		%	50
		Dibenzo(a,h)anthracene	2005/05/17	NC		%	50
		Fluoranthene	2005/05/17	NC		%	50
		Fluorene	2005/05/17	NC		%	50
		Indeno(1,2,3-cd)pyrene	2005/05/17	NC		%	50
		Naphthalene	2005/05/17	NC		%	50
		Perylene	2005/05/17	NC		%	50
		Phenanthrene	2005/05/17	NC		%	50
		Pyrene	2005/05/17	NC		%	50
738357 LKE	MATRIX SPIKE	Available Aluminum (Al)	2005/05/16		!!2980	%	75 - 125
		Available Antimony (Sb)	2005/05/16		!!14	%	75 - 125
		Available Arsenic (As)	2005/05/16		90	%	75 - 125
		Available Barium (Ba)	2005/05/16		114	%	75 - 125
		Available Beryllium (Be)	2005/05/16		103	%	75 - 125
		Available Boron (B)	2005/05/16		!!72	%	75 - 125
		Available Cadmium (Cd)	2005/05/16		94	%	75 - 125
		Available Chromium (Cr)	2005/05/16		103	%	75 - 125
		Available Cobalt (Co)	2005/05/16		100	%	75 - 125
		Available Copper (Cu)	2005/05/16		92	%	75 - 125
		Available Iron (Fe)	2005/05/16		!!5500	%	75 - 125
		Available Lead (Pb)	2005/05/16		96	%	75 - 125
		Available Manganese (Mn)	2005/05/16		!!352	%	75 - 125
		Available Molybdenum (Mo)	2005/05/16		82	%	75 - 125
		Available Nickel (Ni)	2005/05/16		99	%	75 - 125
		Available Selenium (Se)	2005/05/16		85	%	75 - 125
		Available Silver (Ag)	2005/05/16		!!72	%	75 - 125
		Available Strontium (Sr)	2005/05/16		90	%	75 - 125
		Available Thallium (Tl)	2005/05/16		95	%	75 - 125
		Available Uranium (U)	2005/05/16		103	%	75 - 125
	QC STANDARD	Available Vanadium (V)	2005/05/16		98	%	75 - 125
		Available Zinc (Zn)	2005/05/16		108	%	75 - 125
		Available Aluminum (Al)	2005/05/16		!!73	%	75 - 125
		Available Antimony (Sb)	2005/05/16		!!56	%	75 - 125
		Available Arsenic (As)	2005/05/16		107	%	75 - 125
		Available Barium (Ba)	2005/05/16		108	%	75 - 125

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 Client Project #: 26-4553-004.1
 P.O. #:
 Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA540217

QA/QC Batch			Date Analyzed				
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits
738357 LKE	QC STANDARD	Available Beryllium (Be)	2005/05/16		!!166	%	75 - 125
		Available Boron (B)	2005/05/16		!!152	%	75 - 125
		Available Cadmium (Cd)	2005/05/16		107	%	75 - 125
		Available Chromium (Cr)	2005/05/16		95	%	75 - 125
		Available Cobalt (Co)	2005/05/16		99	%	75 - 125
		Available Copper (Cu)	2005/05/16		93	%	75 - 125
		Available Iron (Fe)	2005/05/16		82	%	75 - 125
		Available Lead (Pb)	2005/05/16		113	%	75 - 125
		Available Manganese (Mn)	2005/05/16		97	%	75 - 125
		Available Molybdenum (Mo)	2005/05/16		!!158	%	75 - 125
		Available Nickel (Ni)	2005/05/16		105	%	75 - 125
		Available Selenium (Se)	2005/05/16		!!135	%	75 - 125
		Available Silver (Ag)	2005/05/16		!!155	%	75 - 125
		Available Strontium (Sr)	2005/05/16		90	%	75 - 125
		Available Thallium (Tl)	2005/05/16		!!130	%	75 - 125
		Available Uranium (U)	2005/05/16		105	%	75 - 125
		Available Vanadium (V)	2005/05/16		88	%	75 - 125
		Available Zinc (Zn)	2005/05/16		103	%	75 - 125
	Spiked Blank	Available Aluminum (Al)	2005/05/16		106	%	75 - 125
		Available Antimony (Sb)	2005/05/16		96	%	75 - 125
		Available Arsenic (As)	2005/05/16		91	%	75 - 125
		Available Barium (Ba)	2005/05/16		98	%	75 - 125
		Available Beryllium (Be)	2005/05/16		99	%	75 - 125
		Available Boron (B)	2005/05/16		97	%	75 - 125
		Available Cadmium (Cd)	2005/05/16		94	%	75 - 125
		Available Chromium (Cr)	2005/05/16		93	%	75 - 125
		Available Cobalt (Co)	2005/05/16		94	%	75 - 125
		Available Copper (Cu)	2005/05/16		94	%	75 - 125
		Available Iron (Fe)	2005/05/16		100	%	75 - 125
		Available Lead (Pb)	2005/05/16		103	%	75 - 125
		Available Manganese (Mn)	2005/05/16		95	%	75 - 125
		Available Molybdenum (Mo)	2005/05/16		95	%	75 - 125
		Available Nickel (Ni)	2005/05/16		95	%	75 - 125
		Available Selenium (Se)	2005/05/16		88	%	75 - 125
		Available Silver (Ag)	2005/05/16		90	%	75 - 125
		Available Strontium (Sr)	2005/05/16		92	%	75 - 125
		Available Thallium (Tl)	2005/05/16		102	%	75 - 125
		Available Uranium (U)	2005/05/16		104	%	75 - 125
		Available Vanadium (V)	2005/05/16		93	%	75 - 125
		Available Zinc (Zn)	2005/05/16		93	%	75 - 125
	Method Blank	Available Aluminum (Al)	2005/05/16	ND, DL=10		mg/kg	
		Available Antimony (Sb)	2005/05/16	ND, DL=2		mg/kg	
		Available Arsenic (As)	2005/05/16	ND, DL=2		mg/kg	
		Available Barium (Ba)	2005/05/16	ND, DL=5		mg/kg	
		Available Beryllium (Be)	2005/05/16	ND, DL=2		mg/kg	
		Available Boron (B)	2005/05/16	ND, DL=5		mg/kg	
		Available Cadmium (Cd)	2005/05/16	ND, DL=0.3		mg/kg	
		Available Chromium (Cr)	2005/05/16	ND, DL=2		mg/kg	
		Available Cobalt (Co)	2005/05/16	ND, DL=1		mg/kg	
		Available Copper (Cu)	2005/05/16	ND, DL=2		mg/kg	
		Available Iron (Fe)	2005/05/16	ND, DL=50		mg/kg	
		Available Lead (Pb)	2005/05/16	ND, DL=0.5		mg/kg	
		Available Manganese (Mn)	2005/05/16	ND, DL=2		mg/kg	
		Available Molybdenum (Mo)	2005/05/16	ND, DL=2		mg/kg	
		Available Nickel (Ni)	2005/05/16	ND, DL=2		mg/kg	
		Available Selenium (Se)	2005/05/16	ND, DL=2		mg/kg	

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 P.O. #:
 Project name: HOLYROOD, NL

Quality Assurance Report (Continued)

Maxxam Job Number: DA540217

QA/QC Batch			Date Analyzed				
Num Init	QC Type	Parameter	yyyy/mm/dd	Value	Recovery	Units	QC Limits
738357 LKE	Method Blank	Available Silver (Ag)	2005/05/16	ND, DL=0.5		mg/kg	
		Available Strontium (Sr)	2005/05/16	ND, DL=5		mg/kg	
		Available Thallium (Tl)	2005/05/16	ND, DL=0.1		mg/kg	
		Available Uranium (U)	2005/05/16	ND, DL=0.1		mg/kg	
		Available Vanadium (V)	2005/05/16	ND, DL=2		mg/kg	
		Available Zinc (Zn)	2005/05/16	ND, DL=5		mg/kg	
	RPD	Available Aluminum (Al)	2005/05/16	0.2		%	35
		Available Antimony (Sb)	2005/05/16	NC		%	35
		Available Arsenic (As)	2005/05/16	NC		%	35
		Available Barium (Ba)	2005/05/16	5.7		%	35
		Available Beryllium (Be)	2005/05/16	NC		%	35
		Available Boron (B)	2005/05/16	NC		%	35
		Available Cadmium (Cd)	2005/05/16	NC		%	35
		Available Chromium (Cr)	2005/05/16	NC		%	35
		Available Cobalt (Co)	2005/05/16	0.8		%	35
		Available Copper (Cu)	2005/05/16	5.2		%	35
		Available Iron (Fe)	2005/05/16	1.8		%	35
		Available Lead (Pb)	2005/05/16	5.9		%	35
		Available Manganese (Mn)	2005/05/16	1.3		%	35
		Available Molybdenum (Mo)	2005/05/16	NC		%	35
		Available Nickel (Ni)	2005/05/16	4.1		%	35
		Available Selenium (Se)	2005/05/16	NC		%	35
		Available Silver (Ag)	2005/05/16	NC		%	35
		Available Strontium (Sr)	2005/05/16	NC		%	35
		Available Thallium (Tl)	2005/05/16	NC		%	35
		Available Uranium (U)	2005/05/16	NC		%	35
		Available Vanadium (V)	2005/05/16	2.7		%	35
		Available Zinc (Zn)	2005/05/16	1.7		%	35
739709 SSI	MATRIX SPIKE	Mercury (Hg)	2005/05/18		99	%	75 - 125
	QC STANDARD	Mercury (Hg)	2005/05/18		91	%	75 - 125
	Spiked Blank	Mercury (Hg)	2005/05/18		100	%	75 - 125
	Method Blank	Mercury (Hg)	2005/05/18	ND, DL=0.01		mg/kg	
	RPD	Mercury (Hg)	2005/05/18	NC		%	35
739822 RST	MATRIX SPIKE	Decachlorobiphenyl	2005/05/18		97	%	30 - 130
		Total PCB	2005/05/18		119	%	70 - 130
	Spiked Blank	Decachlorobiphenyl	2005/05/18		95	%	30 - 130
		Total PCB	2005/05/18		112	%	70 - 130
	Method Blank	Decachlorobiphenyl	2005/05/18		97	%	30 - 130
		Total PCB	2005/05/18	ND, DL=0.05		ug/g	
	RPD	Total PCB	2005/05/18	NC		%	50
741862 RST	MATRIX SPIKE	Decachlorobiphenyl	2005/05/24		96	%	30 - 130
		Total PCB	2005/05/24		120	%	70 - 130
	Spiked Blank	Decachlorobiphenyl	2005/05/24		97	%	30 - 130
		Total PCB	2005/05/24		120	%	70 - 130
	Method Blank	Decachlorobiphenyl	2005/05/24		110	%	30 - 130
		Total PCB	2005/05/24	ND, DL=0.05		ug/g	
	RPD	Total PCB	2005/05/24	NC		%	50

ND = Not detected
 N/A = Not Applicable
 NC = Non-calculable
 RPD = Relative Percent Difference
 QC Standard = Quality Control Standard
 SPIKE = Fortified sample

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