FISHERIES AND OCEANS
CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA) 2012
PROJECT EFFECTS DETERMINATION REPORT

GENERAL INFORMATION

1. Project Title: Harbour Improvements, Petit-Rocher Small Craft Harbour	
2 Proponent: Fisheries and Oceans Canada, Small Craft Harbours (DFO-SCH)	
3. Other Contacts: Jason Keys, A/Senior Environmental Specialist Public Works and Government Services Canada (PWGSC) Environmental Services, Saint John, New Brunswick	**4. Role of Each Contact:** OGD Consultant
5. Source of Project Information: Shane Doiron – Project Manager (PWGSC)	
6. Project Review Start Date: 2016-06-20	
7. PATH No.:	**8. DFO File No:**
9. Provincial/Territorial File No.:	**10. TC NPP File No.:**
11. Other relevant file numbers: PWGSC Project # R.076440.001	

BACKGROUND

12. Background about Proposed Development (including a description of the proposed development):

The proposed harbour improvements project will take place at a developed and active Small Craft Harbour facility. The harbour is a Class B facility (300 to 900 vessel metres) and is located in Chaleur Bay, an inlet of the Gulf of St. Lawrence along the northern shore of New Brunswick (refer to **Figures 1 to 3** in **Appendix A**). Petit-Rocher is an active harbour servicing the commercial fishery and recreational user. The Petit-Rocher Small Craft Harbour currently consists of a cribwork wharf structure with concrete deck and outside rock protection, a parking/service area, and a concrete haul-out ramp. Two buildings consisting of the Harbour Authority office and a storage building as well as a waste oil aboveground storage tank (AST) are located in a gravel covered area immediately west of the wharf.

Activities associated with the proposed harbour improvements project include the dredging of approximately 8,000 cubic metres (m^3) of sediment from the harbour basin and placement of the material as fill within the proposed service area to be constructed at the harbour along with rock protection and an access road. Eight floating wharves will be installed with concrete anchor blocks following dredging and construction activities. The approximate coordinates of the project area are: 47°46’58”N and -65°42’29”W.

The proposed schedule for the construction activities is for the work to commence in the fall of 2016 and is expected to be completed by the fall of 2017.

PROJECT REVIEW

13. DFO's rationale for the project review:	**14. Fisheries Act Sections(s) (if applicable):**
Project is on federal land ☒ and; ☒ DFO is the proponent ☒ DFO to issue *Fisheries Act* Authorization, *Species at Risk Act* Permit or other regulatory permit ☐ DFO to provide financial assistance to another party to enable the project to proceed ☐ DFO to lease or sell federal land to enable the project to proceed ☐ Other	Sections 35(1) and 35(2)(b).
15. Other Authorities (if applicable):	**16. Other Authorities Rationale for Involvement:**
DFO-Fisheries Protection Program (FPP) Transport Canada – Environmental Affairs and Aboriginal Consultation Unit and Navigation Protection Program (NPP)	Permit Requirement: The project has been referred to the DFO- Fisheries Protection Program (FPP) and is currently in review. The proponent will comply with all/any of the conditions of the FPP letter/approval. Approval Requirement: The *Navigation Protection Act* (NPA) approval and review process is being conducted for the proposed project. The proponent will comply with all/any conditions of the NPA approval.
17. Other Jurisdictions Involved in Review: New Brunswick Department of Environment and Local Government – Environmental Impact Assessment Registration	
18. Other Expert Departments Providing Advice: N/A	**19. Areas of Interest of Other Expert Departments:** N/A

20. Other Contacts and Responses:

Ms. Sandra Comeau – (former) DFO Aboriginal Program Area Coordinator

Ms. Rachel Friolet – DFO Aboriginal Program Area Coordinator

Mr. Georges Moore – DFO Aboriginal Program Area Coordinator

Mr. Ronald LeBlanc – Harbour Authority Representative for Petit-Rocher DFO-SCH

21. Scope of Project (details of the project subject to review):

Project Description

Harbour Improvements

The proposed Harbour Improvements project at the Petit-Rocher DFO-SCH consists of the dredging of approximately 8,000 m^3 of sediment from an area measuring approximately 5,800 square metres (m^2) in the harbour basin and placement of the material within a containment cell to be constructed at the harbour. The containment cell is to be constructed along with rock protection extending from the wharf to the shoreline using 1 to 2 tonne armourstone (1.6 to 1.9 m thick) atop core stone/clean fill. The source of the rock and core stone/fill material will be determined following contract tendering, however the material (not of marine origin) is likely to be obtained from a quarry in Belledune. The containment cell is intended to be developed as a service area to increase parking capacity at the harbour. An access road will be located atop the edge of the containment cell to facilitate dredging and placement of material within the cell as well as facilitate access to the eight floating wharves which will be installed within the harbour basin with concrete anchor blocks following dredging and construction activities. The dredge material placement site will occupy an approximate area of 4,000 m^2 (new footprint), while the proposed rock protection will occupy an approximate area of 6,400 m^2 (new footprint). Refer to **Figure 4** in **Appendix A** for a plan of the existing site and proposed work.

Operation / Maintenance

The Environmental Management System (EMS) with an integrated Environmental Management Plan (EMP) for the Harbour Authority of Petit-Rocher covers operational aspects of environmental management and is the mitigation measure for the environmentally responsible aspects of harbour operation (fuelling, waste disposal, activities on the property and water). The proposed project will not affect continued operations at the Petit-Rocher DFO-SCH.

Decommissioning / Abandonment

This facility is not presently planned to be decommissioned. At the time of decommissioning, Small Craft Harbours will develop a site-specific re-use or reclamation plan that is appropriate for the applicable environmental legislation and Fisheries and Oceans Canada policies.

Scheduling

The proposed construction is scheduled to commence in the fall of 2016. The timeline is subject to DFO-SCH approvals/funding, therefore completion of works could extend to the fall of 2017.

22. Location of Project:

The Petit-Rocher DFO-SCH (Harbour Code 2606) is located in Chaleur Bay along the northern shore of New Brunswick in Gloucester County. The approximate coordinates of the project area are Latitude 47°46'58"N and Longitude -65°42'29"W. Refer to **Figures 1 to 3** in **Appendix A** for maps and an aerial photo showing the proposed project location and surrounding area.

23. Environment Description:

Socio-Economic Environment

The Petit-Rocher DFO-SCH is located approximately 20 kilometres (km) north of the Town of Bathurst, on the northern shore of New Brunswick in Gloucester County. The Harbour is directly accessible from either Rue LaPlante Ouest or Rue du Havre off of West Point Road via NB Highway 11 or Route 134 in the village of Petit-Rocher, New Brunswick.

The Harbour Authority, through a lease agreement with DFO-SCH, manages the property and facilities. The structures occupying the site include a cribwork wharf structure with concrete deck and outside rock protection, a parking/service area, and a concrete haul-out ramp, as well as two buildings consisting of the Harbour Authority office and a storage building, and a waste oil aboveground storage tank (AST) which are located in a gravel covered area immediately west of the wharf.

The Petit-Rocher DFO-SCH currently accommodates a home fleet of approximately 25 full-time commercial fishing vessels and three recreational vessels. Species fished from the harbour include lobster (in May and June), scallop, rock crab, herring, groundfish, smelt, mackerel, and striped bass (R. LeBlanc, pers. comm. 2015).

According to the Petit-Rocher Harbour Authority and DFO Aboriginal Program Area Coordinators, there are no Aboriginal fisheries for commercial or for food, social, or ceremonial purposes known to be occurring at the Harbour (R. LeBlanc, pers. comm., 2015; S. Comeau, pers. comm., 2015; R. Friolet, pers. comm., 2016; and G. Moore, pers. comm., 2015 and 2016).

There are no fish processing plants or lobster holding facilities located near the wharf. The nearest aquaculture site is located approximately 24 km east of the harbour near Clifton, New Brunswick (New Brunswick Department of Agriculture, Aquaculture and Fisheries, 2015).

The land in the immediate vicinity of the Harbour has been developed to serve the general fishing industry and by some residential and small commercial properties. The nearest residential property is located at the corner of Rue du Havre and Rue Maurice, approximately 400 m northwest of the wharf.

Lands adjacent to the coastlines in the Maritimes tend to have high archaeological potential given their historic importance and proximity to transportation routes and fishing resources. The shoreline around and including Petit-Rocher is considered high potential for heritage and archaeological resources. There are no registered archaeological sites in the vicinity of the wharf, with the exception of a cemetery located between Rue du Havre and Rue LaPlante Ouest (approximately 500 m from the Harbour) (New Brunswick Department of Tourism, Heritage and Culture, 2013).

Physical Environment

The Petit-Rocher DFO-SCH opens into Chaleur Bay, an inlet of the Gulf of St. Lawrence. The coastline in the area is typical of the coast found along Chaleur Bay with beaches consisting of sandstone overburden and low dunes near the shore. The tides in the area generally range from less than 1.5 to 2.5 m in height.

Based on available surficial geology maps, the native surficial soils likely consist of units of sand, silt, some gravel and clay, generally 0.5 to 3 m in thickness (Rampton et. al., 1984). Regional bedrock mapping indicates that the local bedrock consists of Silurian sedimentary rocks of greywacke, slate, siltstone, sandstone, conglomerate and limestone and minor volcanic rocks (New Brunswick Department of Natural Resources and Energy. 2000).

A marine sediment sampling program completed at the harbour in June 2010 shows the sediment at the site to be predominantly sand (35-87%) and silt (8.8-54%) with lesser amounts of clay (3.8-9.5%) and gravel (0.1-1.8%) (Stantec Consulting Ltd., 2010; **Appendix C**). An underwater benthic habitat survey was completed within the footprint of the proposed harbour developments in September 2015. The substrate surveyed in the areas surveyed was comprised of a mix of silt, sand, and hard bottom, with the eastern side of the harbour being predominated by silt with lesser amounts of sand while the western side was a mix of rock and boulder and lesser amounts of silt and cobble. The central area of the harbour consisted of a mix of silt and sand (Amec Foster Wheeler, 2015; **Appendix D**).

Regional surface drainage (apparent groundwater flow direction) appears to be to the north, east, northeast, south and southeast towards Baie Nepisiguit; part of the larger Baie des Chaleur. Surface drainage at the site, which is flat, discharges into the adjacent harbour waters on all sides. Pits, lagoons, stressed vegetation, watercourses, ditches, or standing water were not observed on the subject property (Conestoga Rovers and Associates, 2010).

The vegetation on site is limited with some grass. The upland area is primarily developed with harbour infrastructure and some commercial developments/residential properties.

Canadian Climate Normals (1981-2010) for the Bathurst climate station (47°37’45.050’’N and -65°44’54.020”W), the station located closest to the project, indicate a mean annual temperature of 4.8°C with extremes ranging from -35.6°C to 37.4°C. Measurable precipitation per year is approximately 1110.1 mm. Extreme daily precipitation of up to 96.3 mm has been recorded (Environment Canada, 2015a).

Biological Environment

Chaleur Bay is considered highly productive, supporting numerous pelagic fish species such as Atlantic herring (*Clupea harengus harengus*), capelin (*Mallotus villosus*), Atlantic mackerel (S*comber scombrus*), and rainbow smelt (O*smerus mordax*); groundfish species such as Atlantic cod (*Gadus morhua*), American plaice (*Hippoglossoides platessoides*), and yellowtail flounder (*Pleuronectes ferruginea*); and shellfish species such as lobster (*Homarus americanus*) and scallop (*Placopectin magellanicus*). Beaches in the area also support various species of clams (soft-shell clam (*Mya arenaria*), bar clam (*Spisula solidissima*), bay quahog (*Mercenaria mercenaria*), and razor clam (*Ensis patula*)).

The adjacent waters of the Gulf of St. Lawrence support Atlantic lobster and Atlantic herring fishing grounds at a distance of approximately 0.25 km from shore. Tomcod (*Microgadus tomcod*) as well as moonsnail (*Euspira heros*) and blue mussel (*Mytilus edulis*) are noted to occur along the shoreline in the Petit-Rocher area. American eel (*Anguilla rostrata*), alewife (i.e., gaspereau) (*Alosa pseudoharengus*), rainbow smelt and Atlantic salmon (*Salmo salar*) can also be found along the nearshore area of Petit-Rocher Harbour and the ice shelf ledge. Scallop and toad crab (*Hyas araneus*) fishing grounds are located at a distance of approximately 5-6 km from the Petit-Rocher Harbour, while areas associated with mackerel, dogfish (*Squalus acanthias*), and Atlantic cod are located approximately 10 to 15 km offshore. Fishing grounds associated with rock crab (*Cancer irroratus*), snow crab (*Chionoecetes opilio*), and Northern shrimp (*Pandalus borealis*) are located 25 to 50 kms offshore from the harbour

The underwater benthic habitat survey revealed that macrofaunal life was generally sparse with seven species observed. The predominant species observed was an unidentified fish species (presumed to be young of the year Northern pipefish (*Syngnathus fuscus*). Other species observed included green crab (*Carcinus maenas*), rock crab, hermit crab (*Pagarus acadianus*), Northern rock barnacle (*Semibalanus balanoides*), sand shrimp (*Crangon septemspinosa*), and unidentified flatfish (Amec Foster Wheeler, 2015; **Appendix D**). Macrofloral life was observed throughout the surveyed areas, with macrofloral life noted along the eastern portion of the harbour limited to small patches of eelgrass (*Zostera marina*) while macrofloral life noted along the western portion of the harbour was reduced eelgrass amounts and higher cover of seaweed species including bladderwrack (*Fucus vesiculosus*), rockweed (*Ascophyllum nodosum*), brown alga (*Ectocarpus* sp.), and sea lettuce (*Ulva lactuca*). The central portion of the harbour was dominated by eelgrass (Amec Foster Wheeler, 2015; **Appendix D**).

In terms of fish habitat, the easternmost section of the harbour would be considered poor habitat due to the predominance of silt and macrofloral debris and sparse patches of eelgrass. The westernmost section of the harbour located closer to shore exhibits properties of a rocky intertidal zone, with generally reduced eelgrass beds supplanted by fucoids (bladderwrack and rockweed). The algal cover in this area is patchy, however, where present, provides quality fish habitat. The central area of the harbour surveyed is marked by dense beds of eelgrass and the quality of this habitat is confirmed by the abundance of small fish taking refuge in this area. (Amec Foster Wheeler, 2015; **Appendix D**).

The Maritime Breeding Bird Atlas identifies a total of 79 species of birds in the geographical block which contains Petit-Rocher Harbour (20KT99), 22 of which are listed as confirmed for breeding (Bird Studies Canada, 2015).

The nearest provincially significant wetland is located approximately 1.1 km southwest of the existing wharf and to the west of a middle school (le Domaine Étudiant), whereas the nearest regulated wetland is located approximately 2.3 km inland from the Petit-Rocher DFO-SCH (Government of New Brunswick, nd).

Species at Risk (Aquatic and Terrestrial)

A search of the Atlantic Canada Conservation Data Centre (ACCDC) database was conducted. The ACCDC provided a list of rare/unique species (i.e. plants and animals) within a 5 km buffer zone (standard ACCDC procedure) of the site of the proposed work. All species were cross-referenced with Schedule 1 of the Species at Risk Act (SARA) listed as extirpated, endangered and threatened or of special concern. Only the olive-sided flycatcher (*Contopus cooperi*), listed as Threatened under Schedule 1 of SARA, was identified in the ACCDC search (ACCDC, 2015). The Gaspé-Southern Gulf of St. Lawrence population of Atlantic salmon (*Salmo salar*) is an aquatic species identified in the ACCDC search and is listed as a species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (ACCDC, 2015).

The olive-sided flycatcher is listed as Threatened on Schedule 1 of SARA and by COSEWIC. This songbird breeds in scattered areas throughout most forested areas in Canada, most commonly in western Canada, in mid- to late-May. They prefer edge habitat with tall, coniferous trees for perching, though breeding is less successful in open areas created by forestry maintenance activity. The olive-sided flycatcher begins its migration south in late July (Environment Canada, 2015b).

Atlantic salmon of the Gaspé-Southern Gulf of St. Lawrence population typically reproduce in tributaries of the Gulf of St. Lawrence, between the Sud-Ouest River in Québec and rivers in the northern tip of Cape Breton, Nova Scotia. This population has 78 known salmon rivers. These rivers are generally clear, cool and well oxygenated, with gravel, cobble and boulder substrates. When they leave the freshwater, Atlantic Salmon migrate to estuaries and then towards the open ocean (Environment Canada, 2015b). There are no salmon river tributaries located in vicinity of the Petit-Rocher Harbour (the nearest stream is located approximately 2.5 km north of the harbour, while the nearest river (Nigadoo River) is located approximately 4 km south of the harbour).

Sensitive Environmental Areas

A search of the ACCDC database yielded no records of sensitive environmental areas within 5 km of the Petit-Rocher Harbour (ACCDC, 2015). The nearest Important Bird Area identified by IBA Canada is located approximately 32 km northwest of the project site.

The Petit-Rocher DFO-SCH is located within the Pointe Rochette Shoreline Environmentally Significant Area (ESA) designated by the Nature Trust of New Brunswick (2005). The Pointe Rochette Shoreline ESA is located just north of the wharf at Petit-Rocher in Nepisiguit Bay and is noted for the occurrence of fossils/geological features and birds. Silurian corals, brachiopods, pelecypods, and gastropods occur in limestone beds exposed along the shore approximately 450 m north of the wharf, while deep reddish brown conglomerate containing jasper and epidote pebbles and volcanic boulders is exposed on the west side of the wharf. Quartz-epidote pebbles are not as common, but vitreous granular epidote and calcite occupy fractures (about 1 cm wide) and numerous small cavities in the grey and reddish grey volcanic boulders. Corals and brachiopods are found sparsely in shaly sandstone and limestone beds exposed along the shore at low tide between the wharf and the mouth of the Nigadoo River, located approximately 4 km to the south. This ESA is also serves as a feeding ground for a variety of gulls and shorebirds.

There are no listed wildlife species or critical habitats (including wetlands) that will likely be affected by the project activities as there is no critical or limiting habitat at the proposed work site other that those already discussed above.

24. Environmental Effects of the Project:

Potential Project/Environment Interactions and their effects are outlined below.

Harbour Improvements (Dredging, Containment Rock Protection and Containment Cell/Service Area, and Installation of Floating Wharves):

- Project activities may result in debris/material entering the marine environment.
- Potential adverse effects to migratory birds during site access.
- Potential to enhance populations of predators in the harbour area.
- Potential for suspended solids/sediments and turbidity immediately adjacent to the project site affecting fish/fish habitat.
- Impacts to fish habitat within construction footprints.
- Activities may result in construction related debris or toxic materials affecting soil and/or marine water quality.
- Potential for introduction of invasive species into the marine environment.
- Potential discovery and disturbance or loss of heritage/archaeological resources.
- Interference with vessel movement in the vicinity of the harbour.
- Interference with commercial and recreational use of the harbour.
- Noise and dust generated as a result of the construction activities.
- Use of heavy machinery may cause short-term elevated noise levels and emissions at the site.
- Safety hazards to workers during construction.

Operation / Maintenance:

- Safety hazards to workers during operation/maintenance.

Decommissioning / Abandonment:

- Safety hazards to workers during operation/maintenance.

Navigation Consideration:

Environmental effects of the project on navigation are taken into consideration as part of the Project Effects Determination (PED) only when the effects are indirect, i.e. resulting from a change in the environment affecting navigation. Direct effects on navigation are not considered in the PED, but any measures necessary to mitigate direct effects will be included as terms and conditions associated work approved or permitted pursuant to the *Navigation Protection Act*.

Table 1 of **Appendix B** provides a matrix of potential project/environmental interactions, while **Table 2** of **Appendix B** describes the assessment criteria for determination of significance.

25. Mitigation Measures for Project:

Potential Effect	Mitigation
Harbour Improvements (Dredging, Construction of Rock Protection and Containment Cell/Service Area, and Installation of Floating Wharves)	
Reversible, **immediate** degradation of soil quality occurring **once** and over the **short term**.	• Machinery must be checked for leakage of lubricants and fuel. Basic petroleum spill clean-up equipment must be kept on-site. All spills or leaks must be promptly contained, cleaned up, and reported to the 24-Hour Environmental Emergencies Report System (1-800-565-1633). • Hazardous materials (e.g., fuels, lubricants, hydraulic oil) and wastes (e.g., waste oil) should be managed so as to minimize the risk of chronic and/or accidental releases • Waste materials are not to be buried on site. Demolition debris and waste materials will be disposed of in accordance with Provincial Waste Management Regulations.
Reversible, **immediate** degradation of groundwater/marine water quality occurring **intermittently** over the **short term** / **Irreversible**, **immediate** effects to fish habitat occurring **once** and over the **short term**.	• A request for review has been submitted to DFO-FPP. The project will incorporate recommended or *Fisheries Act* Authorization mitigation measures once an approval/letter of advice is received. • Activities must be completed in such a way as to minimize the amount of fines and organic debris that may enter nearby aquatic environments. • Visual monitoring of the turbidity will be required on a daily basis in the vicinity of the project to ensure that the turbidity is limited. If excessive

	change occurs in the turbidity that differs from the existing conditions of the surrounding water body (i.e., distinct colour difference) as a result of the project activities, the work must stop immediately to determine if further mitigation measures are required. • Any equipment that has been in the marine environment will be cleaned of any sediments, plants or animals and washed with freshwater and/or sprayed with undiluted vinegar prior to being mobilized to the project site. • If a marine mammal is identified within the vicinity of the project, work shall stop until the animal is gone. • Marine equipment may be inspected by PWGSC or DFO to ensure invasive species are not introduced to the marine environment. • Heavy machinery will not be allowed in the water. Machinery shall be operated on land above the high water mark, in a manner that minimizes disturbance to the banks and bed of the waterbody. • Any construction debris/material that enters the marine environment will be removed immediately. Waste materials are not to be buried on site. Demolition debris and waste materials will be disposed of in a provincially-approved manner. • No construction or infill material may be obtained from any coastal feature, namely a beach, dune, or coastal wetland. • Onsite crews must have emergency spill clean-up equipment, adequate for the activity involved, on-site. Spill equipment will include, as a minimum, at least one 250L (i.e., 55 gallon) overpak spill kit containing items to prevent a spill from spreading; absorbent booms, pillows, and mats; rubber gloves; and plastic disposal bags. All spills or leaks must be promptly contained, cleaned up, and reported to the 24-Hour Environmental Emergencies Report System (1-800-565-1633).
Small, **immediate** disturbance of birds/bird habitat **intermittently** over the **short term**.	• All vessels and machinery must be well muffled at all times. Contractors should avoid any sharp or loud noises (e.g., not blow horns or whistles) and should maintain constant noise levels. If necessary, trucks may be required to avoid the use of “hammer” braking along specific sections of the route, while radio communication should replace whistle blasts and horns. • Adherence to the regulations set out by the *Migratory Birds Convention Act*. • Contractors must ensure that food scraps and garbage are not left at the work site. • Project staff and/or contractors shall not access beaches, sand spits, dunes, mud flats, or sand flats during any stage of the project. • Concentrations of seabirds, waterfowl, or shorebirds must not be approached when accessing the project site by water, or when ferrying supplies. • All equipment must be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline and other petroleum products. • Refueling operations will take place at least 30 metres from any watercourse and harbour and the refueling will take place on a prepared impermeable surface with a collection system. • All equipment to be used in or over the marine environment is to be free from leaks or coating of hydrocarbon-based fluids and/or lubricants harmful to the environment. Hoses and tanks are to be inspected on a regular basis to prevent fractures and breaks. • Construction activities will be carried out during times acceptable to local authorities.

Small, **immediate** disturbance to territorial/aquatic species **intermittently** over the **short term**.	• Wetlands or sensitive coastal habitats (i.e., any area in which plant or animal life or their habitats are either rare or especially valuable) must not be accessed nor used as staging areas. • All vessels and machinery should be well muffled, and maintained in proper working order and must be regularly checked for leakage of lubricants or fuel. • Waste or any miscellaneous unused materials must be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the marine or terrestrial environment.
Irreversible, **immediate** disruption or loss of heritage/archaeological resource **once** over the **short term**.	• All construction personnel will be responsible for reporting any unusual materials unearthed during project activities to the Construction Supervisor. • In those situations where the find is believed to be an archaeological resource, the Construction Supervisor will immediately stop work in the vicinity of the find and notify his/her immediate supervisor and the PWGSC Project Manager. • Work in the area will be stopped immediately and an archaeological curator at the New Brunswick Department of Tourism, Culture and Heritage – Provincial Archaeological Services will be contacted at 506-453-2738. • Work can only resume in the vicinity of the find when authorized by the PWGSC Project Manager and Construction Supervisor, after approval has been granted by the New Brunswick Department of Tourism, Culture and Heritage. • In the event of the discovery of human remains or evidence of burials, the excavation work will immediately cease and nearest law enforcement agency will be contacted immediately by the PWGSC Project Manager and/or the Construction Supervisor.
Intermittent, **immediate** disruption of commercial and recreational harbour use **intermittently** over the **short term**.	• The Harbour Authority will coordinate all construction/vessel activities within the harbour for the duration of the project so as to avoid unnecessary interference with harbour users. Any and all stipulations of federal, provincial, or municipal authorities or their officers must be strictly followed.
Immediate reduction in air quality due to noise and dust occurring **intermittently** over the **short term**.	• Construction activities must be carried out during times acceptable to local authorities and smaller, less disturbing equipment will be used where possible. • Dust suppression by the application of water must be employed when required. The project authority shall determine locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied. Waste oil must not to be used for dust control under any circumstances.
Significance of Adverse Environmental Effects: Although the potential exists for short-term environmental effects during the project, the implementation of recommended mitigation measures will result in insignificant impacts. DFO concludes that this project will not likely contribute to significant adverse environmental effects, provided that the above recommended mitigation measures are applied.	
Operation/Maintenance and Decommissioning/Abandonment	
Immediate worker health and safety hazards **intermittently** over the **short term**.	• Site access must be restricted to construction personnel and authorized visitors. • All personnel involved with activities must be adequately trained and utilize appropriate personal protective equipment.

Significance of Adverse Environmental Effects: Although the potential exists for short-term environmental effects during the project, the implementation of recommended mitigation measures will result in insignificant impacts. DFO concludes that this project will not likely contribute to significant adverse environmental effects, provided that the above recommended mitigation measures are applied.

26. Description of any Significant Adverse Environmental Effects of the project (after applying mitigation):

Significant adverse environmental effects are unlikely, taking into account mitigation measures.

27. Other Considerations (Public Consultation, Aboriginal Consultation, Follow-up)

Public Consultation

The harbour improvements at Petit-Rocher Harbour will increase the overall operational capacity and safety of the harbour and for harbour users (harbour for fishers and occasional recreational user) to conduct harbour activities, allowing the harbour to continue being a viable resource to the commercial fishery. The proposed project will increase the sustainability of the commercial fisheries at this location. No negative public concern is expected as a result of this project.

Aboriginal Consultation

PWGSC, on behalf of DFO-SCH, carried out an Aboriginal Assessment at Petit-Rocher Harbour in accordance with DFO-SCH's Preliminary Duty to Consult Assessment Guide. This Guide is intended to provide basic information to DFO-SCH in the Maritimes and Gulf Regions and to assist its Program Managers in making informed, prudent decisions that take into account statutory and other legal obligations, as well as policy objectives, related to Aboriginal and treaty rights.

The Supreme Court of Canada has held that the Crown has a duty to consult and, where appropriate, accommodate when the Crown contemplates conduct that might adversely impact potential or established Aboriginal or treaty rights. While there may be other reasons to undertake consultations (e.g. good governance, policy-based, etc.), three elements are required for a legal duty to consult to arise:

1. There is contemplated or proposed Crown conduct;
2. The Crown has knowledge of potential or established Aboriginal or treaty rights; and
3. The potential or established Aboriginal or treaty rights may be adversely impacted by the Crown

The Petit-Rocher Harbour Authority and DFO Area Aboriginal Program Coordinators advised that there are no Aboriginal vessels that fish commercially from the Petit-Rocher wharf and that, to their knowledge, the SCH facility is not utilized for Aboriginal traditional, food or ceremonial fisheries. The proposed project site was also reviewed for archaeological potential with known archeological sites (pre-contact, historic, burial) in the area of the site, the scope and type of work to be conducted to deduce a residual archaeological potential. As a result of the DTC assessment, aboriginal consultation was not pursued further for this project as there are likely no impacts on potential or established Aboriginal or Treaty Rights.

Government Consultation

Federal and provincial authorities likely to have an interest in the project were consulted by Public Works & Government Services Canada, Environmental Services during the course of this assessment. A project description was distributed to the following federal and provincial authorities: Fisheries and Oceans Canada - Fisheries Protection Program, Transport Canada – Environmental Affairs and Aboriginal Consultation Unit, Transport Canada – Navigation Protection Program, and New Brunswick Department of Environment and Local Government – Environmental Assessment Section.

Accuracy and Compliance Monitoring

Site monitoring (accuracy and compliance monitoring) may be conducted to verify whether required mitigation measures were implemented. The proponent must provide site access to Responsible Authority officials and/or its agents upon request.

28. Other Monitoring and Compliance Requirements (e.g. *Fisheries Act* or *Species at Risk Act* requirements):

N/A

CONCLUSION

29. Conclusion on Significance of Adverse Environmental Effects:

The Federal Authority has evaluated the project in accordance with Section 67 of *Canadian Environmental Assessment Act (CEAA), 2012*. On the basis of this evaluation, the department has determined that the project is not likely to cause significant adverse environmental effects with mitigation and therefore can proceed using mitigative measures as outlined.

30. Prepared by:		**31. Date:**	June 13/2016
32. Name:	Jason Keys		
33. Title:	A/Senior Environmental Specialist, PWGSC		
34. Approved by:		**35. Date:**	2016/7/13
36. Name:	Raymond Losier		
37. Title:	DFO-SCH Senior Project Engineer, NB		

DECISION

38. Decision Taken

- ☒ The project is not likely to cause significant adverse environmental effects, and DFO may exercise its power, duty or function.
- ☐ The project is likely to cause significant adverse environmental effects, and DFO has decided not to exercise its power, duty or function.
- ☐ The project is likely to cause significant adverse environmental effects, and DFO will ask the Governor in Council to determine if the significant adverse environmental effects are justified in the circumstances.

39. Approved by:		**40. Date:**	2016/7/13
41. Name:	Raymond Losier		
42. Title:	DFO-SCH Senior Project Engineer, NB		

43. Transport Canada

Project Title:	
TC File No.:	
NPP File No.:	
EED Decision:	☐ Taking into account the implementation of any mitigation measures that Transport Canada considers appropriate, the project **is not likely** to cause significant adverse environmental effects and, as such, Transport Canada may exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part. ☐ Taking into account the implementation of any mitigation measures that Transport Canada considers appropriate, the project **is likely** to cause significant adverse environmental effects that cannot be justified. As such, Transport Canada shall not exercise any power or perform any duty or function conferred on it by or under any Act of Parliament that would permit the project to be carried out in whole or in part, at this point in time. The project shall be referred to the Governor in Council to decide if those adverse environmental effects are justified under the circumstances pursuant to subsection 69(3) CEAA, 2012.

Recommended by:		
Signature:		**Date:**
Mailing Address:		
Tel:		
Fax:		
Email:		
Approved by:	**Kevin LeBlanc** Regional Manager Environmental Affairs and Aboriginal Consultation Unit	
Signature:		**Date:**

44. References:

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APPENDIX A: FIGURES

Figure 1: Map of New Brunswick showing the location of the proposed project in Petit-Rocher Harbour, Gloucester County, New Brunswick

Figure 2: Topographic map indicating proposed project site, Petit-Rocher Harbour, Gloucester County, New Brunswick

Figure 3: Oblique aerial photo of Petit-Rocher DFO-SCH, Gloucester County, New Brunswick

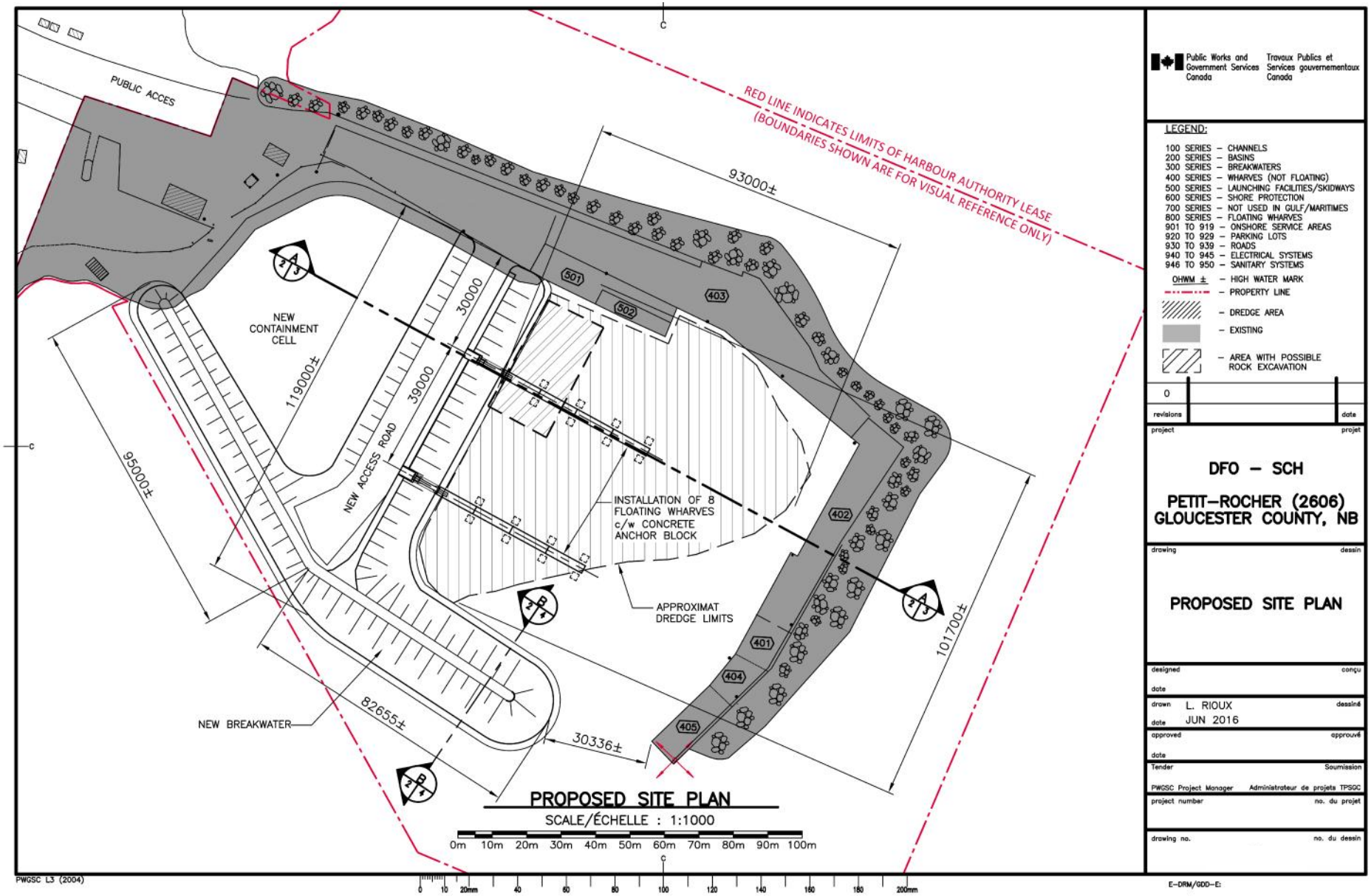

Figure 4: Site plan showing proposed dredging, construction of rock protection and containment cell, and installation of floating wharves at Petit-Rocher Harbour, Gloucester County, New Brunswick

APPENDIX B: TABLES

Scope of Effects Considered (CEAA Section 5(1) and 5(2))

Table 1: Matrix of Potential Project / Environmental Interactions

	As per Section 5(1)			*Section 5(1c)* *Aboriginal Interest*				*Section 5(2)*			*Due Diligence*						
Project Phase / Physical Work/Activity	*Fish (Fisheries Act)*	*Aquatic Species (SARA)*	*Birds (MBCA)*	*Health and Socio economic*	*Physical and cultural heritage*	*Land use*	*HAPA* Significance*	*Health and Socio economic*	*Physical and cultural heritage*	*HAPA* Significance*	*Water (ground, surface, drainage, etc)*	*Wetlands*	*Terrestrial / Aquatic Species*	*Fish*	*Birds*	*Soil*	*Air Quality*
Harbour Improvements (Dredging, Construction of Rock Protection and Containment Cell/Service Area, and Installation of Floating Wharves)																	
Transportation of material and equipment	P	P	P	-	-	-	-	-	-	-	P	-	P	P	P	P	P
Construction of rock protection and containment cell	P	P	P	-	-	-	P	-	-	P	P	-	P	P	P	-	P
Dredging and disposal	P	P	P	-	-	-	P	-	-	P	P	-	P	P	P	-	P
Installation of floating wharves and concrete anchor blocks	P	P	P	-	-	-	P	-	-	P	P	-	P	P	P	-	P
Operation / Maintenance	P	P	P	-	-	-	-	-	-	-	P	-	P	P	P	-	P
Decommissioning / Abandonment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

***** structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
- = no interaction.
P = potential effect of project on environment.

Evaluation of Environmental Effects

The VECs selected in Table 1 are addressed in **Sections 24 and 25** of the **PED**. The physical works/activities and required mitigation measures are detailed. The following ratings are based on:

- information provided by the proponent;
- a review of project related activities;
- an appraisal of the environmental setting, and identification of resources at risk;
- the identification of potential impacts within the temporal and spatial bounds; and
- Personal knowledge and professional judgment of the assessor.

Navigation Consideration

Environmental effects of the project on navigation are taken into consideration as part of the Project Effects Determination (PED) only when the effects are indirect, i.e. resulting from a change in the environment affecting navigation. Direct effects on navigation are not considered in the PED, but any measures necessary to mitigate direct effects will be included as terms and conditions associated work approved or permitted pursuant to the *Navigation Protection Act*.

☒ Only direct effects were identified; therefore the effects of the project on navigation are not addressed in this Project Effects Determination.

☐ Indirect effects were identified and have been addressed in this Project Effects Determination.

Determination of Significance

The significance of project related impacts was determined in consideration of their frequency, the duration and geographical extent of the effects, magnitude relative to natural or background levels, and whether the effects are reversible or are positive or negative in nature. These criteria are indicated in Table 2.

Table 2: Assessment Criteria for Determination of Significance

Magnitude	Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. It is rated as compared with background conditions, protective standards or normal variability.	
	Small	Relative to natural or background levels
	Moderate	Relative to natural or background levels
	Large	Relative to natural or background levels
Reversibility	Reversible	Effect can be reversed
	Irreversible	Effects are permanent
Geographic Extent	Immediate	Confined to project site
	Local	Effects beyond immediate project site but not regional in scale
	Regional	Effects on a wide scale
Duration	Short Term	Between 0 and 6 months in duration
	Medium Term	Between 6 months and 2 years
	Long Term	Beyond 2 years
Frequency	Once	Occurs only once
	Intermittent	Occurs occasionally at irregular intervals
	Continuous	Occurs on a regular basis and regular intervals

Methodology

The environmental effects evaluation methodology used in this report focuses the evaluation on those environmental components of greatest concern. The Valued Ecological Components (VECs) most likely to be affected by the project as described are indicated above in Table 1. VECs were selected based on ecological importance to the existing environment (above), the relative sensitivity of environmental components to project influences and their relative social, cultural or economic importance. The potential impacts resulting from these interactions are described below.

Scoping

This environmental effects evaluation considers the full range of project / environment interactions and the environmental factors that could be affected by the project as defined above and the significance of related impacts with mitigation.

APPENDIX C:
MARINE SEDIMENT SAMPLING PROGRAM

Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick

Report Prepared for:

Public Works and Government Services Canada

Job No. 121810261 – File No. 91781

November 1, 2010

Stantec Consulting Ltd.
165 Maple Hills Avenue
Charlottetown, PE C1C 1N9
Tel: (902) 566-2866
Fax: (902) 566-2004

November 1, 2010

Job No. 121810261 – File No. 91781

Public Works and Government Services Canada
1045 Main Street
Moncton NB E1C 1H1

Attention: **Ms. Mylène Roy**

Dear Ms. Roy:

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

INTRODUCTION

Stantec Consulting Ltd. (Stantec) is pleased to provide Public Works and Government Services Canada (PWGSC) with the findings of a marine sediment sampling program (MSSP) undertaken at Petit-Rocher Small Craft Harbour in Gloucester County, New Brunswick (NB). The sampling program was undertaken to characterize the sediment chemistry in the harbour and compare the results to a broad range of potentially applicable guidelines to determine potential sediment disposal restrictions for agricultural, residential, parkland, commercial, or industrial lands.

BACKGROUND

The Department of Fisheries and Oceans Canada (DFO) through its Small Craft Harbours Branch (SCH) operates and maintains a national system of harbours that provide commercial fishers and recreational boaters with safe and accessible facilities. SCH must maintain these facilities to ensure adequate levels of service for harbour users.

SCOPE AND METHODOLOGY

The sediment sampling program was conducted on June 22, 2010 at Petit-Rocher Small Craft Harbour in Gloucester County, NB. A total of six (6) sediment samples (Sample ID Nos.PR-1 through PR-6) were collected from six (6) locations by Canadian Standards Association and Diver Certification Board of Canada certified divers from Diversified Divers Inc. from randomly selected locations within the harbour basin (refer to Drawing 1 in **Attachment A**). On the direction of PWGSC, duplicate samples were collected and are archived at the Stantec Charlottetown office. The findings for samples PR-1 through PR-6 are discussed under the analytical results section. Divers collected sediment cores in the basin to a depth of 0.3 metres (m) at location PR-1 (three samples taken to collect an adequate amount of material) and to a depth of 1 m at PR-2 through PR-6. The material from the upper and lower portion of each core was homogenized by Stantec professional staff and placed in clean, laboratory supplied jars. All samples were stored on ice in a cooler until the time of sample analysis.

Reference: Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick

Sample locations were recorded using a global positioning system (GPS) receiver. The location coordinates of the sediment samples are provided in Table 1 as latitude and longitude in decimal degrees and in UTM (NAD 83 Zone 20) Easting and Northing in metres.

Table 1. Location of Sediment Samples collected at Petit-Rocher Small Craft Harbour, Gloucester County, NB

Sample Location	Sample Station ID	Latitude	Longitude	UTM Easting	UTM Northing
Proposed Project Area	PR-1	47º 46' 59.0"	65º 42' 31.8"	297095	5295741
	PR-2	47º 46' 57.6"	65º 42' 30.3"	297125	5295698
	PR-3	47º 46' 57.0"	65º 42' 28.2"	297167	5295679
	PR-4	47º 46' 57.9"	65º 42' 26.6"	297203	5295702
	PR-5	47º 46' 56.5"	65º 42' 26.3"	297207	5295660
	PR-6	47º 46' 55.6"	65º 42' 28.1"	297168	5295634

The samples were sent to Maxxam Analytics Inc. (Maxxam), in Bedford, Nova Scotia, for select chemical analyses. Maxxam is an accredited laboratory with the Standards Council of Canada (SCC). SCC accredited laboratories are accredited to ISO 17025 standards. Laboratories accredited to ISO 17025 standards through the SCC are considered equivalent to the Canadian Association of Environmental Analytical Laboratories (CAEAL). The CAEAL provides equivalent accreditation to the same standard. Excess sample material has been archived at Maxxam and will be held for 45 days.

The sediment samples were analyzed in accordance with the land-based disposal suite of parameters as directed by PWGSC. Analysis included ICP 23 available metals scan plus tin, mercury, and hexavalent chromium, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), total organic carbon (TOC), total inorganic carbon (TIC), and grain size distribution. BTEX and TPH were analyzed in accordance with Atlantic PIRI methodology (Partnership in RBCA (Risk-Based Corrective Action) Implementation).

Analytical results were compared to the Canadian Council of Ministers of the Environment (CCME) – Canadian Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health, for agricultural, residential/parkland, and commercial/industrial land use and the Atlantic Risk Based Corrective Action (RBCA) Version 2.1 Tier I Risk Based Screening Levels (RBSLs) for TPHs and BTEXs. For reporting purposes, the marine sediment analytical results were also compared to Environment Canada's *Canadian Environmental Protection Act* (*CEPA*) guidelines for ocean-based disposal of dredged marine sediments, and the CCME Marine Sediment Probable Effects Levels (Marine PELs).

FIELD OBSERVATIONS

In the field, notes on the general description of the sediments were taken and can be found in Table 2. The sediments at Petit-Rocher included brown silty/sand, brown silty/clay, and black/grey silty/clay.

Table 2. General Description of Sediment Samples collected at Petit-Rocher Small Craft Harbour, Gloucester County, NB

Sample Station ID	General Description of Sediments
PR-1	Brown, silty/sand, no odour, some organic material
PR-2	Brown, silty/sand, no odour, some organic material
PR-3	Brown, silty/clay, no odour, some organic material
PR-4	Black/grey, silty/clay, strong odour, organic material
PR-5	Black/grey, silty/clay, strong odour, organic material
PR-6	Brown, silty/clay, no odour, no apparent organic material

ANALYTICAL RESULTS

The analytical results are summarized in Tables B-1 to B-4 in **Appendix B** for the sediment samples obtained at Petit-Rocher Small Craft Harbour during the MSSP. The complete set of analytical results, laboratory QA/QC, and Certificates of Analysis from Maxxam for all parameters tested are also provided in **Appendix C** for reference.

PAH Concentrations

Ecological Receptors/Pathways:

Several PAHs exceeded the individual guidelines for Environmental Health, including:

- Naphthalene exceedence for agricultural (0.013 mg/kg), residential/parkland (0.013 mg/kg), and commercial/industrial (0.013 mg/kg) land uses in sample PR-4 (0.014 mg/kg);
- Phenanthrene exceedence for agricultural (0.046 mg/kg), residential/parkland (0.046 mg/kg), commercial (0.046 mg/kg), and industrial (0.046 mg/kg) land use in samples PR-3 (0.056 mg/kg) and PR-4 (0.54 mg/kg);
- Pyrene exceedence for agricultural land use (0.1 mg/kg) in samples PR-1 (0.10 mg/kg), PR-3 (0.45 mg/kg), PR-4 (0.1.5 mg/kg) and PR-5 (0.29 mg/kg);
- Benzo(a)anthracene exceedence for agricultural land use (0.1 mg/kg) in samples PR-3 (0.19 mg/kg), PR-4 (0.65 mg/kg), and PR-5 (0.12 mg/kg);
- Benzo(k)fluoranthene exceedence for agricultural land use (0.1 mg/kg) in samples PR-3 (0.10 mg/kg) and PR-4 (0.30 mg/kg);
- Indeno(1,2,3-cd)pyrene exceedence for agricultural land use (0.1 mg/kg) in samples PR-3 (0.10 mg/kg) and PR-4 (0.27 mg/kg); and
- Benzo(b)fluoranthene exceedence for agricultural land use (0.1 mg/kg) in samples PR-3 (0.16 mg/kg), PR-4 (0.57 mg/kg), and PR-5 (0.13 mg/kg).

Several PAHs exceeded CCME Marine PELs, including:

- Acenaphthene exceedence (guideline 0.0889 mg/kg) in sample PR-4 (0.093 mg/kg);
- Anthracene exceedence (guideline 0.245 mg/kg) in sample PR-4 (0.40 mg/kg);
- Fluoranthene exceedence (guideline 1.494 mg/kg) in sample PR-4 (1.9 mg/kg);
- Pyrene exceedence (guideline 1.398 mg/kg) in sample PR-4 (1.5 mg/kg); and
- Indeno(1,2,3-cd)pyrene exceedence (guideline 0.135 mg/kg) in sample PR-4 (0.27 mg/kg).

All samples met *CEPA* Disposal at Sea Guidelines for total PAH concentration (2.5 mg/kg) with the exception of sample PR-4 (5.2 mg/kg).

Human Health Receptors/Pathways:

Concentrations of PAHs were detected at levels below the applicable CCME guidelines for human health receptors/pathways, for the Benzo[a]pyrene Total Potency Equivalents guideline. The Index of Additive Cancer Risk (IACR) guideline (1.0 mg/kg) was exceeded in samples PR-3 (3.0 mg/kg), PR-4 (9.2 mg/kg), and PR-5 (2.1 mg/kg).

Metal Concentrations

CCME Soil Quality Guidelines:

The sediment sample results in Table B-2 (**Appendix B**) were compared to the CCME SQGs for agricultural, residential/parkland, and commercial/industrial land use. All metals concentrations were found at levels below the SQGs with the exception of the following:

- Arsenic concentrations greater than the guidelines for agricultural (12 mg/kg), residential/parkland (12 mg/kg), and commercial/industrial (12 mg/kg) land uses in samples PR-4 (44 mg/kg) and PR5 (13 mg/kg) and equal to the guidelines in samples PR-3 (12 mg/kg) and PR-6 (12 mg/kg); and
- Cadmium concentrations greater than the guidelines for agricultural (1.4 mg/kg) land uses in sample PR-4 (2.1 mg/kg).

Ocean Disposal Guidelines and Marine PELs:

All concentrations of metals were below applicable CCME Marine PELs. The *CEPA* Disposal at Sea Guideline for cadmium (0.6 mg/kg) was exceeded by all six samples with values ranging from 0.7 mg/kg (PR-2) to 2.1 mg/kg (PR-4).

Petroleum Hydrocarbons

BTEX compounds in sediment were below laboratory detection limits at all sample locations (Table B-3, **Appendix B**). Therefore, all sites were below Atlantic RBCA Tier I RBSLs and CCME SQGs for agricultural, residential/parkland, and commercial/industrial land use guidelines for BTEX compounds.

The sediment samples were tested for modified TPH and compared to the established Atlantic RBCA Version 2.1 Tier I RBSLs for residential and commercial land use (Table B-4, **Appendix B**). Modified TPH was detected in all six samples. The modified TPH in samples PR-1, PR-2, and PR-6 was compared to and found to be below Oil (#6) RBSLs. The modified TPH in samples PR-3, PR-4, and PR-5 was compared to Diesel (#2) RBSLs. Samples PR-4 and PR-5 exceeded the guidelines for residential, potable and non-potable sites with coarse-grained soils.

Sediment Grain Size

The analytical results shown in Table B-4, **Appendix B** for grain size distribution of sediment samples are summarized as follows:

- Location PR-1 sediments were predominantly sand (87%) with minor amounts of silt (8.8%), clay (3.8%), and gravel (0.4%);
- Location PR-2 sediments were predominantly sand (85%) with silt (10%) and minor amounts of clay (4.3%) and gravel (0.2%);
- Location PR-3 sediments were predominantly sand (65%) with silt (30%) and minor amounts of clay (5.2%) and gravel (0.1%);
- Location PR-4 sediments were predominantly sand (57%) with silt (33%) and minor amounts of clay (9.3%) and gravel (0.4%);
- Location PR-5 sediments were predominantly silt (54%) with sand (35%) and minor amounts of clay (9.5%) and gravel (1.8%); and
- Location PR-6 sediments were predominantly sand (78%) with silt (16%) and minor amounts of clay (5.1%) and gravel (0.6%).

Carbon Analysis

The total organic carbon content of the sediment samples ranged from 3.4 g/kg (sample PR-2) to 29 g/kg (sample PR-5), while total inorganic carbon content ranged from 1.3 g/kg (sample PR-4) to 5.1 g/kg (sample PR-5).

PCB Concentration

The analytical results for PCBs (Table B-1, **Appendix B**) showed non-detectable levels of total PCBs in all samples and were therefore below CCME Marine PELs and *CEPA* Disposal at Sea Guidelines.

QA/QC

As per Stantec's internal review policy, a project reviewer, Loretta Hardwick, M.Sc., was established at the outset of the project. This individual reviewed this report prior to its release.

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

SUMMARY

The analytical results for the sediment samples collected on June 22, 2010 from Petit-Rocher Small Craft Harbour in Gloucester County, NB indicate the following:

- The CCME guidelines for Environmental Health for agricultural, residential/parkland, commercial, and industrial land uses were exceeded by naphthalene (PR-4) and phenanthrene (PR-3 and PR-4);
- The CCME guidelines for Environmental Health for agricultural land use were exceeded by pyrene (PR-1, PR-3, and PR-5), benzo(a)anthracene (PR-3, PR-4, and PR-5), benzo(k)fluoranthene (PR-3 and PR-4), indeno(1,2,3-cd)pyrene (PR-3 and PR-4), and bBenzo(b)fluoranthene (PR-3 and PR-4);
- The CCME Marine PELs were exceeded by acenaphthene (PR-4), anthracene (PR-4), fluoranthene (PR-4), pyrene (PR-4), and indeno(1,2,3-cd)pyrene (PR-4);
- The *CEPA* Disposal at Sea Guidelines for total PAHs was exceeded by sample PR-4;
- The IACR was exceeded by samples PR-3, PR-4, and PR-5;
- Arsenic concentrations exceeded the CCME SQGs for agricultural, residential/parkland, and commercial/industrial land uses in samples PR-4 and PR-5, and were equal to the guidelines in samples PR-3 and PR-6;
- Cadmium concentrations exceeded the CCME SQGs for agricultural land uses in sample PR-4;
- All six samples exceeded the *CEPA* Disposal at Sea Guidelines for cadmium; and
- Modified TPH was above Diesel (#2) RBSLs for residential, potable and non-potable sites with coarse-grained soils in samples PR-4 and PR-5.

At locations PR-1 through PR-6, the sediment was characterized as follows:

- Location PR-1 sediments were predominantly sand (87%) with minor amounts of silt (8.8%), clay (3.8%), and gravel (0.4%);
- Location PR-2 sediments were predominantly sand (85%) with silt (10%) and minor amounts of clay (4.3%) and gravel (0.2%);
- Location PR-3 sediments were predominantly sand (65%) with silt (30%) and minor amounts of clay (5.2%) and gravel (0.1%);
- Location PR-4 sediments were predominantly sand (57%) with silt (33%) and minor amounts of clay (9.3%) and gravel (0.4%);
- Location PR-5 sediments were predominantly silt (54%) with sand (35%) and minor amounts of clay (9.5%) and gravel (1.8%); and

- Location PR-6 sediments were predominantly sand (78%) with silt (16%) and minor amounts of clay (5.1%) and gravel (0.6%).

Based on the above results, the sediment may not be suitable for ocean disposal on the basis of the sediment screening criteria for total PAHs, the exceedence of the CCME MPELs by several PAHs, and the exceedence of the *CEPA* Disposal at Sea Guidelines by cadmium. These exceedences would require regulatory consultation with Environment Canada to assess additional investigations that may be necessary to still possibly pursue this disposal option. The sediment may also not be suitable for land disposal in zones near potable water or in proximity to surface water (freshwater) sources and wetlands or in agricultural, residential/parkland, and commercial/industrial land uses as a result of exceedence by several of the PAHs of the CCME Soil Quality Guidelines for the protection of environmental and human health. Further investigation (e.g., leachate testing) and consultation with regulators may be required to determine if approval can be obtained for ocean and/or land disposal options on the basis of exceedence by several chemical parameters.

CLOSING COMMENTS

This report has been prepared for the sole benefit of Public Works Government Services Canada (PWGSC). The report may not be used by any other person or entity without the express written consent of Stantec and PWGSC.

Any uses that a third party makes of this report, or any reliance on decisions made based on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken, based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions and recommendations presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Stantec based on the data obtained from the work. The conclusions are based on the site conditions observed by Stantec at the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the site conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analyses have been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Stantec cannot warrant against undiscovered environmental liabilities.

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

We trust this letter contains all of the information required at this time and are available at your convenience should you have any questions.

Sincerely,

STANTEC CONSULTING LTD.

Dale Conroy, M.Sc.
Project Manager
Tel: (902) 566-2866
Fax: (902) 566-2004
dale.conroy@stantec.com

DC/lk

November 1, 2010
Ms. Mylène Roy

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

APPENDIX A

Drawing 1

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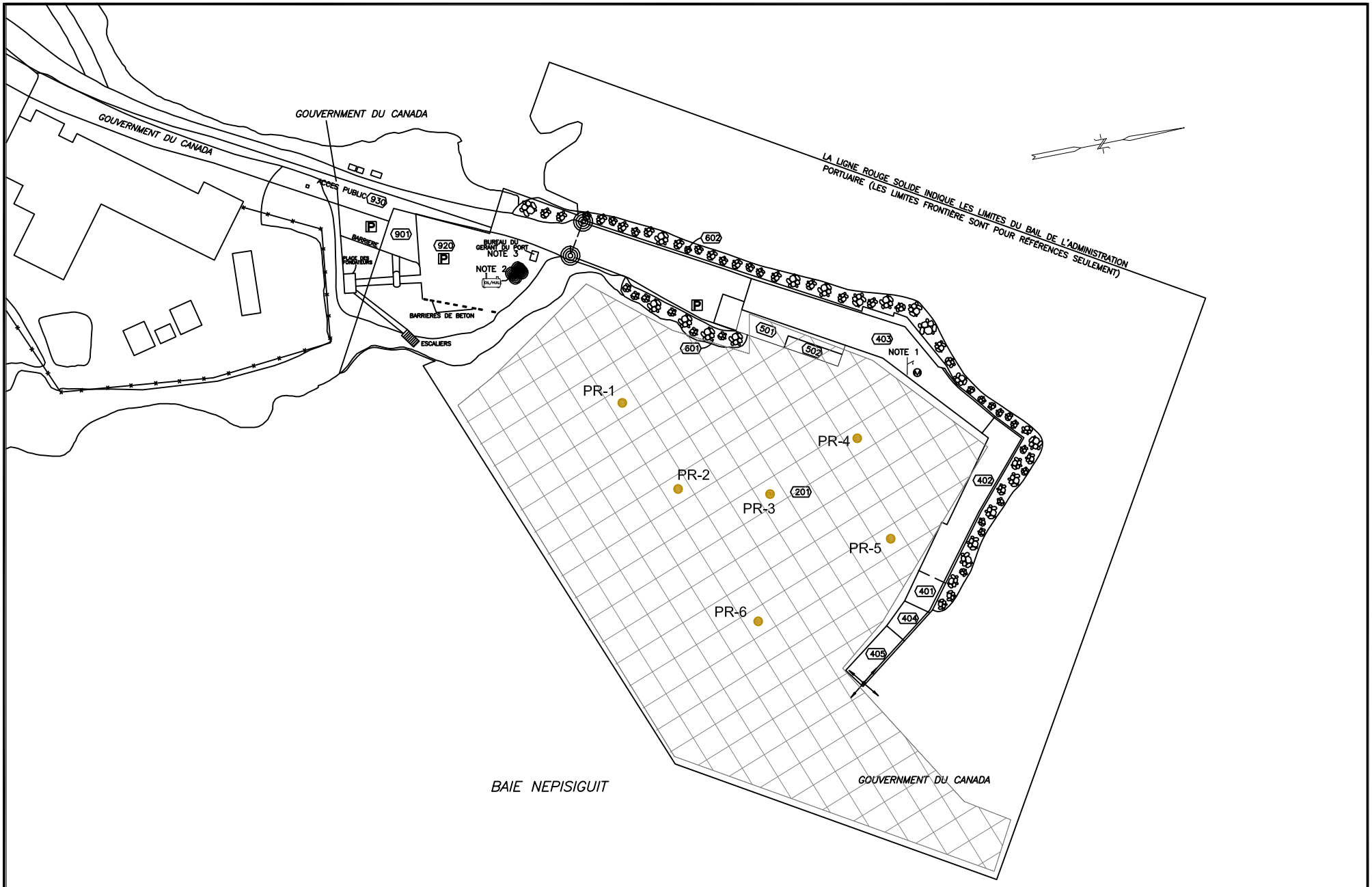

SAMPLE LOCATION PLAN

MARINE SEDIMENT SAMPLING PROGRAM
PETIT-ROCHER SMALL CRAFT HARBOUR
GLOUCESTER COUNTY, NEW BRUNSWICK

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Scale:		Job No.:	Dwg. No.:
1:2000		91781	1
Date:	**Dwn. By:**	**Appd. By:**	
2010/06/15	D.RIMMER		

Stantec

Stantec

November 1, 2010
Ms. Mylène Roy

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

APPENDIX B

Analytical Tables

Table B-1. PAH Analytical Results for Sediment Samples Collected at Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick

Parameter	RDL[1]	Units	Sample Identification and Sampling Date						CCME Soil Quality Guidelines for the Protection of Human and Environmental Health[2]					CCME Marine PELs	*CEPA* Disposal at Sea Guidelines
			PR-1	PR-2	PR-3	PR-4	PR-5	PR-6	Human Health (based on carcinogenic PAHs)[3]	Environmental Health - Agricultural	Environmental Health - Residential/ Parkland	Environmental Health - Commercial	Environmental Health - Industrial		
			22-Jun-10												
Non-Carcinogenic PAHs															
1-Methylnaphthalene	0.005	mg/kg	nd	nd	nd	0.016	nd	nd	-	-	-	-	-	-	-
2-Methylnaphthalene	0.005	mg/kg	nd	nd	nd	nd	nd	nd	-	-	-	-	-	0.201	-
Acenaphthene	0.005	mg/kg	nd	nd	0.009	0.093	0.018	nd	-	-	-	-	-	0.0889	-
Acenaphthylene	0.005	mg/kg	nd	nd	0.009	0.036	nd	nd	-	-	-	-	-	0.128	-
Anthracene	0.005	mg/kg	0.017	0.043	0.087	0.40	0.061	0.011	-	2.5	2.5	32	32	0.245	-
Fluoranthene	0.005	mg/kg	0.046	0.038	0.60	1.9	0.44	0.070	-	50	50	180	180	1.494	-
Fluorene	0.005	mg/kg	nd	nd	0.017	0.077	nd	nd	-	-	-	-	-	0.144	-
Naphthalene	0.005	mg/kg	nd	nd	nd	**0.014**	nd	nd	-	0.013	0.013	0.013	0.013	0.391	-
Perylene	0.005	mg/kg	0.011	0.022	0.11	0.25	0.086	0.029	-	-	-	-	-	-	-
Phenanthrene	0.005	mg/kg	0.020	0.016	**0.056**	**0.54**	0.043	0.014	-	0.046	0.046	0.046	0.046	0.544	-
Pyrene	0.005	mg/kg	**0.10**	0.045	**0.45**	**1.5**	**0.29**	0.071	-	0.1	10	100	100	1.398	-
Carcinogenic PAHs															
Benzo(a)anthracene	0.005	mg/kg	0.046	0.025	**0.19**	**0.65**	**0.12**	0.025	-	0.1	1	10	10	0.693	-
Benzo(a)pyrene	0.005	mg/kg	0.040	0.023	0.18	0.51	0.12	0.024	-	20	20	72	72	0.763	-
Benzo(k)fluoranthene	0.005	mg/kg	0.033	0.017	**0.10**	**0.30**	0.067	0.021	-	0.1	1	10	10	-	-
Benzo(g,h,i)perylene	0.005	mg/kg	0.023	0.016	0.11	0.28	0.092	0.015	-	-	-	-	-	-	-
Chrysene	0.005	mg/kg	0.047	0.036	0.26	0.093	0.15	0.029	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	0.005	mg/kg	nd	nd	0.024	0.062	0.014	nd	-	0.1	1	10	10	0.846	-
Indeno(1,2,3-cd)pyrene	0.005	mg/kg	0.021	0.014	**0.10**	**0.27**	0.080	0.013	-	0.1	1	10	10	0.135	-
Benzo(b)fluoranthene	0.005	mg/kg	0.041	0.020	**0.16**	**0.57**	**0.13**	0.024	-	0.1	1	10	10	-	-
B[a]P TPE ILCR[4]	-	mg/kg	0.06	0.034	0.79[7]	2.3[7]	0.53[7]	0.11[7]	5.3	-	-	-	-	-	-
IACR[5]	-	mg/kg	0.75	0.40	*3.0*	*9.2*	*2.1*	0.45	1.0	-	-	-	-	-	-
Total PAHs[6]	-	mg/kg	0.29	0.23	1.7	5.2	1.2	0.22	-	-	-	-	-	-	2.5
Total PCBs	0.01	mg/kg	nd	nd	nd	nd	nd	nd		-	-	-	-	0.189	0.1

[1] RDL = Reportable Detection Limit; nd = not detected at specifid RDL

[2] Canadian Council of Ministers of the Environment Soil Quality Guidelines (SQGs) for Polycyclic Aromatic Hydrocarbons, updated 2010

[3] Soil Quality Guidelines for Human Health. Guidelines are based on carcinogenic PAH indexes.

[4] B[a]P TPE ILCR = Benzo[a]pyrene Total Potency Equivalents Guideline based on 10^{-5} Incremental Lifetime Cancer Risk

[5] IACR = Index of additive cancer risk. Material exceeding the IACR should not be disposed in areas where there could potentially be potable water well contamination.

[6] Total PAHs does not include 1-Methylnaphthalene, 2-Methylnaphthalene, or Perylene.

[7] B[a]P TPE multiplied by uncertainty factor (UF) of 3 to account for carcinogenic potential of alkylated and other PAHs present as per 2008 CCME Guidelines for PAHs

"-" no established guideline or applicable RDL

Italicized cells indicate exceedence of IACR guideline

Bold numbers indicated exceedence of CCME SQGs

Bordered cells indicated exceedence of CCME Marine PELs

Shaded cells indicate exceedence of *CEPA* Disposal at Sea Guideline

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Job No. 121810261 - File No. 91781

Table B-2. Metal Concentrations in Marine Sediment Samples Collected at Petit-Rocher Small Craft Harbour, Gloucester County, NB

Parameter	RDL[1]	Units	Sediment Sample Identication and Date						CCME Soil Quality Guidelines[2]			CCME Marine Probable Effects Levels[3]	*CEPA* Disposal at Sea Guidelines[4]
			PR-1	PR-2	PR-3	PR-4	PR-5	PR-6	Agricultural	Residential/ Parkland	Commercial/ Industrial		
			22-Jun-10										
Chromium VI (Hexavalent Cr)	0.2	mg/kg	nd	nd	nd	nd	nd	nd	0.4	0.4	1.4	-	-
Available Aluminum (Al)	10	mg/kg	12,000	12,000	12,000	12,000	10,000	12,000	-	-	-	-	-
Available Antimony (Sb)	2	mg/kg	nd	nd	nd	nd	nd	nd	20	20	40	-	-
Available Arsenic (As)	2	mg/kg	10	9	***12***	***44***	***13***	***12***	12	12	12	41.6	-
Available Barium (Ba)	5	mg/kg	25	24	37	33	42	27	750	500	2,000	-	-
Available Beryllium (Be)	2	mg/kg	nd	nd	nd	nd	nd	nd	4	4	8	-	-
Available Bismuth (Bi)	2	mg/kg	nd	nd	nd	nd	nd	nd	-	-	-	-	-
Available Boron (B)*	5	mg/kg	17	11	23	37	45	17	*2	-	-	-	-
Available Cadmium (Cd)	0.3	mg/kg	0.9	0.7	0.9	*2.1*	1.2	1.2	1.4	10	22	4.2	0.6
Available Chromium (Cr)	2	mg/kg	34	36	36	38	33	33	64	64	87	160	-
Available Cobalt (Co)	1	mg/kg	11	11	10	10	8	11	40	50	300	-	-
Available Copper (Cu)	2	mg/kg	17	16	18	31	23	20	63	63	91	108	-
Available Iron (Fe)	50	mg/kg	22,000	23,000	23,000	25,000	22,000	23,000	-	-	-	-	-
Available Lead (Pb)	0.5	mg/kg	28	24	34	60	60	43	70	140	260 | 600	112	-
Available Lithium (Li)	2	mg/kg	19	21	21	20	18	20	-	-	-	-	-
Available Manganese (Mn)	2	mg/kg	280	290	280	310	240	300	-	-	-	-	-
Available Mercury (Hg)	0.01	mg/kg	0.05	0.04	0.06	0.09	0.06	0.06	6.6	6.6	24 | 50	0.70	0.75
Available Molybdenum (Mo)	2	mg/kg	3	nd	nd	nd	nd	2	5	10	40	-	-
Available Nickel (Ni)	2	mg/kg	34	35	35	35	31	34	50	50	50	-	-
Available Rubidium (Rb)	2	mg/kg	4	4	5	6	6	4	-	-	-	-	-
Available Selenium (Se)	1	mg/kg	nd	nd	nd	nd	nd	nd	1	1	2.9	-	-
Available Silver (Ag)	0.5	mg/kg	nd	nd	nd	nd	nd	nd	20	20	40	-	-
Available Strontium (Sr)	5	mg/kg	30	36	57	77	78	51	-	-	-	-	-
Available Thallium (Tl)	0.1	mg/kg	0.7	0.5	0.3	0.4	0.3	0.6	1	1	1	-	-
Available Tin (Sn)	2	mg/kg	nd	nd	4	2	nd	nd	5	50	300	-	-
Available Uranium (U)	0.1	mg/kg	1.2	0.9	0.8	0.9	0.8	1.0	23	23	33 | 300	-	-
Available Vanadium (V)	2	mg/kg	29	29	32	37	34	30	130	130	130	-	-
Available Zinc (Zn)	5	mg/kg	94	83	100	170	110	110	200	200	360	271	-

* Guideline is for hot water soluable and not applicable

[1] RDL = Reportable Detection Limit; nd = not detected at specified RDL

[2] Canadian Environmental Quality Guidelines, updated 2007

[3] Canadian Council of Ministers of the Environment Canadian Soil Quality Guidelines for the Protection of Aquatic Life Marine Probable Effects Levels 2002

[4] *Canadian Environmental Protection Act* Disposal at Sea sediment screening guidelines, updated 2007

Italicized numbers indicate exceedence of CCME Soil Quality Guidelines for Agricultural Land Use

Underlined numbers indicate the exceedence of CCME Soil Quality Guildelines for Residential/Parkland Land Use

Bold numbers indicate exceedence of CCME Soil Quality Guidelines for Commercial/Industrial Land Use

Shaded cells indicate exceedence of *CEPA* Disposal at Sea Guidelines

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Table B-3. BTEX/TPH Concentrations in Marine Sediment Samples Collected at Petit-Rocher Small Craft Harbour, Gloucester County, NB.

Results Table for BTEX Compounds (mg/kg)

Sample ID	Date	BTEX Compounds (mg/kg)				Individual TPH Carbon Segments (mg/kg)			
		Benzene	Toluene	Ethylbenzene	Xylenes	C6-C10	>C10-C21	>C21-C32	Modified TPH[a]
PR-1	22-Jun-10	nd	nd	nd	nd	nd	nd	53	53 [2]
PR-2		nd	nd	nd	nd	nd	nd	35	35 [2]
PR-3		nd	nd	nd	nd	nd	24	98	120 [1]
PR-4		nd	nd	nd	nd	nd	44	160	210 [1]
PR-5		nd	nd	nd	nd	nd	68	110	180 [1]
PR-6		nd	nd	nd	nd	nd	nd	36	36 [2]
Detection Limits (Maxxam)		0.003	0.03	0.01	0.05	3	15	15	20

Atlantic RBCA Version 2.1 and CCME Guidelines for Comparison with the Above Analytical Results									
Atlantic RBCA Tier I RBSLs for Soil [b]			Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Modified TPH		
							Gasoline	Diesel (#2)	Oil[a] (#6)
Residential	Potable	Coarse-grained	0.03	0.38	0.08	11	39	140	690
		Fine-grained	0.01	0.08	0.02	2.3	140	220	970
	Non-Potable	Coarse-grained	0.16	14	58	17	39	140	690
		Fine-grained	1.5	120	430	160	330	4,400	8,300
Commercial	Potable	Coarse-grained	0.03	0.38	0.08	11	450	7,400	10,000
		Fine-grained	0.01	0.08	0.02	2.3	520	840	4,700
	Non-Potable	Coarse-grained	1.8	160	430	200	450	7,400	10,000
		Fine-grained	11	680	430	650	10,000	7,700	10,000
CCME Soil Quality Guidelines[c]									
Agricultural Land Use	Surface	Coarse Soil	0.030[d]; 0.0095[e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-
	Subsoil	Coarse Soil	0.030[d]; 0.011[e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-
Residential/Parkland Land Use	Surface	Coarse Soil	0.030[d]; 0.0095[e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-
	Subsoil	Coarse Soil	0.030[d]; 0.011[e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-
Commercial/ Industrial Land Use	Surface	Coarse Soil	0.030[d,e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-
	Subsoil	Coarse Soil	0.030[d,e]	0.37	0.082	11	-	-	-
		Fine Soil	0.0068[d,e]	0.08	0.018	2.4	-	-	-

[a]Modified TPH values reflect the sum of the individual carbon fractions that resemble Gasoline, Diesel (#2) & Oil (#6) fraction

[b]Atlantic RBCA Version 2.1 Reference Document for Petroleum Impacted Sites (2003).

[c]A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines Report CCME-EPC-101E, Mar 1997 with updates to 2007

[d]10^{-5} Incremental Risk

[e]10^{-6} Incremental Risk

RBSL = Risk Based Screening Level; "-" denotes no guideline available.

[1] Modified TPH compared to the Diesel (#2) Guidelines

[2] Modified TPH compared to Oil (#6) Guidelines

Shaded cells indicate exceedence of Atlantic RBCA Tier I RBSLs

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Job No. 121810261 - File No. 91781

Table B-4. TOC, TIC, and Grain Size Analytical Results for Marine Sediment Samples Collected at Petit-Rocher Small Craft Harbour, Gloucester County, NB

Parameter	RDL	Units	Sample Identification and Date					
			PR-1	PR-2	PR-3	PR-4	PR-5	PR-6
			22-Jun-10					
Grain Size Results								
< PHI -4 (16 mm)	0.1	%	100	100	100	100	100	100
< PHI -3 (8 mm)	0.1	%	100	100	100	100	100	100
< PHI -2 (4 mm)	0.1	%	100	100	100	100	100	100
< PHI -1 (2 mm)	0.1	%	100	100	100	100	98	99
< PHI 0 (1 mm)	0.1	%	99	99	100	98	96	99
< PHI +1 (1/2 mm)	0.1	%	99	99	99	95	92	99
< PHI +2 (1/4 mm)	0.1	%	95	96	96	87	87	93
< PHI +3 (1/8 mm)	0.1	%	49	57	69	68	80	64
< PHI +4 (1/16 mm)	0.1	%	13	15	35	43	63	21
< PHI +5 (1/32mm)	0.1	%	8.0	8.7	20	36	58	14
< PHI +6 (1/64 mm)	0.1	%	6.1	6.3	9.2	19	16	8.9
< PHI +7 (1/128 mm)	0.1	%	4.4	5.0	6.0	11	10	6.0
< PHI +8 (1/256 mm)	0.1	%	3.8	4.3	5.2	9.3	9.5	5.1
< PHI +9 (1/512 mm)	0.1	%	3.2	3.6	4.2	7.3	7.9	4.1
Gravel	0.1	%	0.4	0.2	0.1	0.4	1.8	0.6
Sand	0.1	%	87	85	65	57	35	78
Silt	0.1	%	8.8	10	30	33	54	16
Clay	0.1	%	3.8	4.3	5.2	9.3	9.5	5.1
Other								
Total Organic Carbon (TOC)	0.5	g/kg	5	3.4	8.7	22	29	5.2
Total Inorganic Carbon (TIC)	0.5	g/kg	1.9	2.6	4.5	1.3	5.1	4.7
Moisture	1	%	35	33	42	53	64	34

RDL = Reportable Detection Limit

Stantec

November 1, 2010
Ms. Mylène Roy

Reference: **Marine Sediment Sampling Program, Petit-Rocher Small Craft Harbour, Gloucester County, New Brunswick**

APPENDIX C

Maxxam Laboratory Certificates

Your Project #: 121810261
Site: PETIT-ROCHER
Your C.O.C. #: B 46461

Attention: Dale Conroy
Stantec Consulting Ltd
165 Maple Hills Ave
Charlottetown, PE
C1C1N9

Report Date: 2010/07/22
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B083140
Received: 2010/06/25, 12:20

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Hexavalent Chromium in Soil by IC (1,2)	6	N/A	2010/07/22	BRL SOP-00106	EPA SW846-3060/7199
TEH in Soil (PIRI)	6	2010/06/27	2010/06/28	ATL SOP 00111 R3	Based on Atl. PIRI
Mercury (CVAA)	6	2010/07/09	2010/07/12	ATL SOP 00026 R6	Based on EPA245.5
Metals Solid Avail. Unified MS - Nper	6	2010/06/28	2010/06/28	ATL SOP 00024 R5	Based on EPA6020A
Moisture	6	N/A	2010/06/28	ATL SOP 00001 R3	MOE Handbook 1983
MOISTURE (2)	6	N/A	2010/07/21	CAM SOP-00445	McKeague 2nd ed 1978
PAH in sediment by GC/MS (Low Level)	6	2010/06/28	2010/07/10	ATL SOP 00102 R4	based on EPA8270C
PCB/DDT in Soil by GC-ECD	6	2010/06/30	2010/07/05	ATL SOP 00106 R3	Based EPA8082
VPH in Soil - Low Level	6	2010/06/26	2010/06/30	ATL SOP 00119 R6	Based on Atl. PIRI
Particle size in solids (pipette&sieve)	6	N/A	2010/07/08	ATL SOP 00012 R3	based on MSAMS-1978
Total Carbon in Soil (2)	6	N/A	2010/07/21	CAM SOP-00468	Leco Manual
Total Inorganic Carbon in Soils (2)	6	N/A	2010/07/21		Calculation
Total Organic Carbon in Soil (2)	6	N/A	2010/07/09	CAM SOP-00468	LECO Combustion
ModTPH (T1) Calc. for Soil	6	2010/06/25	2010/07/02		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 Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

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

MICHELLE HILL, Project Manager
Email: Michelle.Hill@maxxamanalytics.com
Phone# (902) 420-0203

==========

Your Project #: 121810261
Site: PETIT-ROCHER
Your C.O.C. #: B 46461

Attention: Dale Conroy
Stantec Consulting Ltd
165 Maple Hills Ave
Charlottetown, PE
C1C1N9

Report Date: 2010/07/22
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

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. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel:902-420-0203 Toll-free:800-565-7227 Fax:902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GH6272	GH6366		GH6367		GH6368	GH6368		
Sampling Date		2010/06/22	2010/06/22		2010/06/22		2010/06/22	2010/06/22		
COC Number		B 46461	B 46461		B 46461		B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**QC Batch**	**PR-3**	**QC Batch**	**PR-4**	**PR-4 Lab-Dup**	**RDL**	**QC Batch**
Inorganics										
Total Carbon (C)	mg/kg	6900	6000	2213350	13000	2213350	23000		500	2213350
Chromium (VI)	ug/g	ND	ND	2213179	ND	2213179	ND		0.2	2213179
Moisture	%	35	33	2190773	42	2190773	53		1	2190773
Total Organic Carbon	mg/kg	5000	3400	2201451	8700	2201409	22000	24000	500	2201451
< -4 Phi (16 mm)	%	100	100	2200219	100	2200219	100		0.1	2200219
< -3 Phi (8 mm)	%	100	100	2200219	100	2200219	100		0.1	2200219
< -2 Phi (4 mm)	%	100	100	2200219	100	2200219	100		0.1	2200219
< -1 Phi (2 mm)	%	100	100	2200219	100	2200219	100		0.1	2200219
< 0 Phi (1 mm)	%	99	99	2200219	100	2200219	98		0.1	2200219
< +1 Phi (0.5 mm)	%	99	99	2200219	99	2200219	95		0.1	2200219
< +2 Phi (0.25 mm)	%	95	96	2200219	96	2200219	87		0.1	2200219
< +3 Phi (0.12 mm)	%	49	57	2200219	69	2200219	68		0.1	2200219
< +4 Phi (0.062 mm)	%	13	15	2200219	35	2200219	43		0.1	2200219
< +5 Phi (0.031 mm)	%	8.0	8.7	2200219	20	2200219	36		0.1	2200219
< +6 Phi (0.016 mm)	%	6.1	6.3	2200219	9.2	2200219	19		0.1	2200219
< +7 Phi (0.0078 mm)	%	4.4	5.0	2200219	6.0	2200219	11		0.1	2200219
< +8 Phi (0.0039 mm)	%	3.8	4.3	2200219	5.2	2200219	9.3		0.1	2200219
< +9 Phi (0.0020 mm)	%	3.2	3.6	2200219	4.2	2200219	7.3		0.1	2200219
Gravel	%	0.4	0.2	2200219	0.1	2200219	0.4		0.1	2200219
Sand	%	87	85	2200219	65	2200219	57		0.1	2200219
Silt	%	8.8	10	2200219	30	2200219	33		0.1	2200219
Clay	%	3.8	4.3	2200219	5.2	2200219	9.3		0.1	2200219

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel:902-420-0203 Toll-free:800-565-7227 Fax:902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22		
COC Number		B 46461	B 46461		
	Units	**PR-5**	**PR-6**	**RDL**	**QC Batch**
Inorganics					
Total Carbon (C)	mg/kg	34000	10000	500	2213350
Chromium (VI)	ug/g	ND	ND	0.2	2213179
Moisture	%	64	34	1	2190773
Total Organic Carbon	mg/kg	29000	5200	500	2201451
< -4 Phi (16 mm)	%	100	100	0.1	2200219
< -3 Phi (8 mm)	%	100	100	0.1	2200219
< -2 Phi (4 mm)	%	100	100	0.1	2200219
< -1 Phi (2 mm)	%	98	99	0.1	2200219
< 0 Phi (1 mm)	%	96	99	0.1	2200219
< +1 Phi (0.5 mm)	%	92	99	0.1	2200219
< +2 Phi (0.25 mm)	%	87	93	0.1	2200219
< +3 Phi (0.12 mm)	%	80	64	0.1	2200219
< +4 Phi (0.062 mm)	%	63	21	0.1	2200219
< +5 Phi (0.031 mm)	%	58	14	0.1	2200219
< +6 Phi (0.016 mm)	%	16	8.9	0.1	2200219
< +7 Phi (0.0078 mm)	%	10	6.0	0.1	2200219
< +8 Phi (0.0039 mm)	%	9.5	5.1	0.1	2200219
< +9 Phi (0.0020 mm)	%	7.9	4.1	0.1	2200219
Gravel	%	1.8	0.6	0.1	2200219
Sand	%	35	78	0.1	2200219
Silt	%	54	16	0.1	2200219
Clay	%	9.5	5.1	0.1	2200219

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

MERCURY BY COLD VAPOUR AA (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368	GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461	B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**PR-5**	**PR-6**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	mg/kg	0.05	0.04	0.06	0.09	0.06	0.06	0.01	2203015

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

PCB'S AND DDT BY GC-ECD (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368	GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461	B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**PR-5**	**PR-6**	**RDL**	**QC Batch**
PCBs									
Total PCB	mg/kg	ND	ND	ND	ND	ND	ND	0.01	2193677
Surrogate Recovery (%)									
2,4,5,6-Tetrachloro-m-xylene	%	NA	NA	NA	NA	NA	NA		2193677
Decachlorobiphenyl	%	86	86	79	88	88	72		2193677

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368	GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461	B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**PR-5**	**PR-6**	**RDL**	**QC Batch**
Metals									
Available Aluminum (Al)	mg/kg	12000	12000	12000	12000	10000	12000	10	2191398
Available Antimony (Sb)	mg/kg	ND	ND	ND	ND	ND	ND	2	2191398
Available Arsenic (As)	mg/kg	10	9	12	44	13	12	2	2191398
Available Barium (Ba)	mg/kg	25	24	37	33	42	27	5	2191398
Available Beryllium (Be)	mg/kg	ND	ND	ND	ND	ND	ND	2	2191398
Available Bismuth (Bi)	mg/kg	ND	ND	ND	ND	ND	ND	2	2191398
Available Boron (B)	mg/kg	17	11	23	37	45	17	5	2191398
Available Cadmium (Cd)	mg/kg	0.9	0.7	0.9	2.1	1.2	1.2	0.3	2191398
Available Chromium (Cr)	mg/kg	34	36	36	38	33	33	2	2191398
Available Cobalt (Co)	mg/kg	11	11	10	10	8	11	1	2191398
Available Copper (Cu)	mg/kg	17	16	18	31	23	20	2	2191398
Available Iron (Fe)	mg/kg	22000	23000	23000	25000	22000	23000	50	2191398
Available Lead (Pb)	mg/kg	28	24	34	60	60	43	0.5	2191398
Available Lithium (Li)	mg/kg	19	21	21	20	18	20	2	2191398
Available Manganese (Mn)	mg/kg	280	290	280	310	240	300	2	2191398
Available Molybdenum (Mo)	mg/kg	3	ND	ND	ND	ND	2	2	2191398
Available Nickel (Ni)	mg/kg	34	35	35	35	31	34	2	2191398
Available Rubidium (Rb)	mg/kg	4	4	5	6	6	4	2	2191398
Available Selenium (Se)	mg/kg	ND	ND	ND	ND	ND	ND	1	2191398
Available Silver (Ag)	mg/kg	ND	ND	ND	ND	ND	ND	0.5	2191398
Available Strontium (Sr)	mg/kg	30	36	57	77	78	51	5	2191398
Available Thallium (Tl)	mg/kg	0.7	0.5	0.3	0.4	0.3	0.6	0.1	2191398
Available Tin (Sn)	mg/kg	ND	ND	4	2	ND	ND	2	2191398
Available Uranium (U)	mg/kg	1.2	0.9	0.8	0.9	0.8	1.0	0.1	2191398
Available Vanadium (V)	mg/kg	29	29	32	37	34	30	2	2191398
Available Zinc (Zn)	mg/kg	94	83	100	170	110	110	5	2191398

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368	GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461	B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**PR-5**	**PR-6**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	ND	ND	ND	0.016	ND	ND	0.005	2191141
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	ND	ND	0.005	2191141
Acenaphthene	mg/kg	ND	ND	0.009	0.093	0.018	ND	0.005	2191141
Acenaphthylene	mg/kg	ND	ND	0.009	0.036	ND	ND	0.005	2191141
Anthracene	mg/kg	0.017	0.043	0.087	0.40	0.061	0.011	0.005	2191141
Benzo(a)anthracene	mg/kg	0.046	0.025	0.19	0.65	0.12	0.025	0.005	2191141
Benzo(a)pyrene	mg/kg	0.040	0.023	0.18	0.51	0.12	0.024	0.005	2191141
Benzo(b)fluoranthene	mg/kg	0.041	0.020	0.16	0.57	0.13	0.024	0.005	2191141
Benzo(g,h,i)perylene	mg/kg	0.023	0.016	0.11	0.28	0.092	0.015	0.005	2191141
Benzo(k)fluoranthene	mg/kg	0.033	0.017	0.10	0.30	0.067	0.021	0.005	2191141
Chrysene	mg/kg	0.047	0.036	0.26	0.093	0.15	0.029	0.005	2191141
Dibenz(a,h)anthracene	mg/kg	ND	ND	0.024	0.062	0.014	ND	0.005	2191141
Fluoranthene	mg/kg	0.046	0.038	0.60	1.9	0.44	0.070	0.005	2191141
Fluorene	mg/kg	ND	ND	0.017	0.077	ND	ND	0.005	2191141
Indeno(1,2,3-cd)pyrene	mg/kg	0.021	0.014	0.10	0.27	0.080	0.013	0.005	2191141
Naphthalene	mg/kg	ND	ND	ND	0.014	ND	ND	0.005	2191141
Perylene	mg/kg	0.011	0.022	0.11	0.25	0.086	0.029	0.005	2191141
Phenanthrene	mg/kg	0.020	0.016	0.056	0.54	0.043	0.014	0.005	2191141
Pyrene	mg/kg	0.10	0.045	0.45	1.5	0.29	0.071	0.005	2191141
Surrogate Recovery (%)									
D10-Anthracene	%	77	101	84	78	80	76		2191141
D14-Terphenyl	%	91	93	92	88	93	91		2191141
D8-Acenaphthylene	%	87	91	93	89	94	90		2191141

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368		GH6369		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22		2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461		B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**QC Batch**	**PR-5**	**RDL**	**QC Batch**
Petroleum Hydrocarbons									
Benzene	mg/kg	ND	ND	ND	ND	2192486	ND	0.003	2192486
Toluene	mg/kg	ND	ND	ND	ND	2192486	ND	0.03	2192486
Ethylbenzene	mg/kg	ND	ND	ND	ND	2192486	ND	0.01	2192486
Xylene (Total)	mg/kg	ND	ND	ND	ND	2192486	ND	0.05	2192486
C6 - C10 (less BTEX)	mg/kg	ND	ND	ND	ND	2192486	ND	3	2192486
>C10-C21 Hydrocarbons	mg/kg	ND	ND	24	44	2191081	68	15	2191082
>C21-<C32 Hydrocarbons	mg/kg	53	35	98	160	2191081	110	15	2191082
Modified TPH (Tier1)	mg/kg	53	35	120	210	2189775	180	20	2189775
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	93	94	93	93	2191081	86		2191082
n-Dotriacontane - Extractable	%	93 (1)	95 (1)	98 (1)	96 (2)	2191081	96 (2)		2191082
Isobutylbenzene - Volatile	%	123	120	116	118	2192486	99		2192486

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Possible lube oil fraction.
(2) One product in fuel / lube range.

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		GH6370		
Sampling Date		2010/06/22		
COC Number		B 46461		
	Units	**PR-6**	**RDL**	**QC Batch**
Petroleum Hydrocarbons				
Benzene	mg/kg	ND	0.003	2192486
Toluene	mg/kg	ND	0.03	2192486
Ethylbenzene	mg/kg	ND	0.01	2192486
Xylene (Total)	mg/kg	ND	0.05	2192486
C6 - C10 (less BTEX)	mg/kg	ND	3	2192486
>C10-C21 Hydrocarbons	mg/kg	ND	15	2191082
>C21-<C32 Hydrocarbons	mg/kg	36	15	2191082
Modified TPH (Tier1)	mg/kg	36	20	2189775
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	88		2191082
n-Dotriacontane - Extractable	%	118 (1)		2191082
Isobutylbenzene - Volatile	%	109		2192486

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Possible lube oil fraction.

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

MISCELLANEOUS (SOIL)

Maxxam ID		GH6272	GH6366	GH6367	GH6368	GH6369	GH6370		
Sampling Date		2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22	2010/06/22		
COC Number		B 46461	B 46461	B 46461	B 46461	B 46461	B 46461		
	Units	**PR-1**	**PR-2**	**PR-3**	**PR-4**	**PR-5**	**PR-6**	**RDL**	**QC Batch**
Inorganics									
Total Inorganic Carbon (C)	mg/kg	1900	2600	4500	1300	5100	4700	500	2212087

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B083140
Report Date: 2010/07/22

Stantec Consulting Ltd
Client Project #: 121810261
Project name: PETIT-ROCHER

GENERAL COMMENTS

TEH Analysis: Samples GH6272, GH6366: Samples do not resemble creosote.

TEH Analysis: Samples GH6367, GH6368, GH6369, GH6370: We are unable to confirm the presence of creosote in the samples in question. The samples have chromatographic peaks present that are consistent with peaks observed in creosote reference materials. The source of the peaks cannot be determined based on the chromatographic information.

Report re-issued with additional analysis as per client request

Results relate only to the items tested.

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Stantec Consulting Ltd
Attention: Dale Conroy
Client Project #: 121810261
P.O. #:
Project name: PETIT-ROCHER

Quality Assurance Report

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2191081	LHU	Matrix Spike	Isobutylbenzene - Extractable	2010/06/28		96	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		111	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28		90	%	30 - 130
			>C21-<C32 Hydrocarbons	2010/06/28		NC	%	30 - 130
		Spiked Blank	Isobutylbenzene - Extractable	2010/06/28		94	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		102	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28		99	%	30 - 130
			>C21-<C32 Hydrocarbons	2010/06/28		122	%	30 - 130
		Method Blank	Isobutylbenzene - Extractable	2010/06/28		91	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		99	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28	ND, RDL=15		mg/kg	
			>C21-<C32 Hydrocarbons	2010/06/28	ND, RDL=15		mg/kg	
		RPD	>C10-C21 Hydrocarbons	2010/06/28	41.5		%	50
			>C21-<C32 Hydrocarbons	2010/06/28	41.5		%	50
2191082	SHR	Matrix Spike	Isobutylbenzene - Extractable	2010/06/28		81	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		106	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28		92	%	30 - 130
			>C21-<C32 Hydrocarbons	2010/06/28		102	%	30 - 130
		Spiked Blank	Isobutylbenzene - Extractable	2010/06/28		82	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		90	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28		94	%	30 - 130
			>C21-<C32 Hydrocarbons	2010/06/28		102	%	30 - 130
		Method Blank	Isobutylbenzene - Extractable	2010/06/28		80	%	30 - 130
			n-Dotriacontane - Extractable	2010/06/28		84	%	30 - 130
			>C10-C21 Hydrocarbons	2010/06/28	ND, RDL=15		mg/kg	
			>C21-<C32 Hydrocarbons	2010/06/28	ND, RDL=15		mg/kg	
		RPD	>C10-C21 Hydrocarbons	2010/06/28	NC		%	50
			>C21-<C32 Hydrocarbons	2010/06/28	NC		%	50
2191141	SOD	Matrix Spike	D10-Anthracene	2010/07/05		113	%	30 - 130
			D14-Terphenyl	2010/07/05		130	%	30 - 130
			D8-Acenaphthylene	2010/07/05		125	%	30 - 130
			1-Methylnaphthalene	2010/07/05		97	%	30 - 130
			2-Methylnaphthalene	2010/07/05		66 (1)	%	30 - 130
			Acenaphthene	2010/07/05		NC	%	30 - 130
			Acenaphthylene	2010/07/05		80	%	30 - 130
			Anthracene	2010/07/05		NC	%	30 - 130
			Benzo(a)anthracene	2010/07/05		NC	%	30 - 130
			Benzo(a)pyrene	2010/07/05		NC	%	30 - 130
			Benzo(b)fluoranthene	2010/07/05		NC	%	30 - 130
			Benzo(g,h,i)perylene	2010/07/05		NC	%	30 - 130
			Benzo(k)fluoranthene	2010/07/05		NC	%	30 - 130
			Chrysene	2010/07/05		NC	%	30 - 130
			Dibenz(a,h)anthracene	2010/07/05		58 (1)	%	30 - 130
			Fluoranthene	2010/07/05		NC	%	30 - 130
			Fluorene	2010/07/05		NC	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2010/07/05		NC	%	30 - 130
			Naphthalene	2010/07/05		70	%	30 - 130
			Perylene	2010/07/05		NC	%	30 - 130
			Phenanthrene	2010/07/05		NC	%	30 - 130
			Pyrene	2010/07/05		NC	%	30 - 130
		Spiked Blank	D10-Anthracene	2010/07/03		104	%	30 - 130
			D14-Terphenyl	2010/07/03		90	%	30 - 130
			D8-Acenaphthylene	2010/07/03		73	%	30 - 130
			1-Methylnaphthalene	2010/07/03		79	%	30 - 130
			2-Methylnaphthalene	2010/07/03		65	%	30 - 130

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Stantec Consulting Ltd
Attention: Dale Conroy
Client Project #: 121810261
P.O. #:
Project name: PETIT-ROCHER

Quality Assurance Report (Continued)

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2191141	SOD	Spiked Blank	Acenaphthene	2010/07/03		74	%	30 - 130
			Acenaphthylene	2010/07/03		69	%	30 - 130
			Anthracene	2010/07/03		123	%	30 - 130
			Benzo(a)anthracene	2010/07/03		75	%	30 - 130
			Benzo(a)pyrene	2010/07/03		76	%	30 - 130
			Benzo(b)fluoranthene	2010/07/03		73	%	30 - 130
			Benzo(g,h,i)perylene	2010/07/03		72	%	30 - 130
			Benzo(k)fluoranthene	2010/07/03		78	%	30 - 130
			Chrysene	2010/07/03		82	%	30 - 130
			Dibenz(a,h)anthracene	2010/07/03		72	%	30 - 130
			Fluoranthene	2010/07/03		79	%	30 - 130
			Fluorene	2010/07/03		74	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2010/07/03		79	%	30 - 130
			Naphthalene	2010/07/03		74	%	30 - 130
			Perylene	2010/07/03		79	%	30 - 130
			Phenanthrene	2010/07/03		113	%	30 - 130
			Pyrene	2010/07/03		83	%	30 - 130
		Method Blank	D10-Anthracene	2010/07/03		78	%	30 - 130
			D14-Terphenyl	2010/07/03		95	%	30 - 130
			D8-Acenaphthylene	2010/07/03		85	%	30 - 130
			1-Methylnaphthalene	2010/07/03	ND, RDL=0.005		mg/kg	
			2-Methylnaphthalene	2010/07/03	ND, RDL=0.005		mg/kg	
			Acenaphthene	2010/07/03	ND, RDL=0.005		mg/kg	
			Acenaphthylene	2010/07/03	ND, RDL=0.005		mg/kg	
			Anthracene	2010/07/03	ND, RDL=0.005		mg/kg	
			Benzo(a)anthracene	2010/07/03	ND, RDL=0.005		mg/kg	
			Benzo(a)pyrene	2010/07/03	ND, RDL=0.005		mg/kg	
			Benzo(b)fluoranthene	2010/07/03	ND, RDL=0.005		mg/kg	
			Benzo(g,h,i)perylene	2010/07/03	ND, RDL=0.005		mg/kg	
			Benzo(k)fluoranthene	2010/07/03	ND, RDL=0.005		mg/kg	
			Chrysene	2010/07/03	ND, RDL=0.005		mg/kg	
			Dibenz(a,h)anthracene	2010/07/03	ND, RDL=0.005		mg/kg	
			Fluoranthene	2010/07/03	ND, RDL=0.005		mg/kg	
			Fluorene	2010/07/03	ND, RDL=0.005		mg/kg	
			Indeno(1,2,3-cd)pyrene	2010/07/03	ND, RDL=0.005		mg/kg	
			Naphthalene	2010/07/03	ND, RDL=0.005		mg/kg	
			Perylene	2010/07/03	ND, RDL=0.005		mg/kg	
			Phenanthrene	2010/07/03	ND, RDL=0.005		mg/kg	
			Pyrene	2010/07/03	ND, RDL=0.005		mg/kg	
		RPD	1-Methylnaphthalene	2010/07/03	NC		%	50
			2-Methylnaphthalene	2010/07/03	NC		%	50
			Acenaphthene	2010/07/03	16.7		%	50
			Acenaphthylene	2010/07/03	NC		%	50
			Anthracene	2010/07/03	34.7		%	50
			Benzo(a)anthracene	2010/07/03	49.7		%	50
			Benzo(a)pyrene	2010/07/03	51.2 (2)		%	50
			Benzo(b)fluoranthene	2010/07/03	64.7 (2)		%	50
			Benzo(g,h,i)perylene	2010/07/03	42.8		%	50
			Benzo(k)fluoranthene	2010/07/03	48.9		%	50
			Chrysene	2010/07/03	60.7 (2)		%	50
			Dibenz(a,h)anthracene	2010/07/03	NC		%	50
			Fluoranthene	2010/07/03	35.1		%	50
			Fluorene	2010/07/03	15.5		%	50
			Indeno(1,2,3-cd)pyrene	2010/07/03	46.6		%	50
			Naphthalene	2010/07/03	NC		%	50

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Stantec Consulting Ltd
Attention: Dale Conroy
Client Project #: 121810261
P.O. #:
Project name: PETIT-ROCHER

Quality Assurance Report (Continued)

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2191141	SOD	RPD	Perylene	2010/07/03	15.8		%	50
			Phenanthrene	2010/07/03	2.0		%	50
			Pyrene	2010/07/03	40.1		%	50
2191398	MLB	Matrix Spike	Available Aluminum (Al)	2010/06/29		NC	%	75 - 125
			Available Antimony (Sb)	2010/06/29		77	%	75 - 125
			Available Arsenic (As)	2010/06/29		96	%	75 - 125
			Available Barium (Ba)	2010/06/29		NC	%	75 - 125
			Available Beryllium (Be)	2010/06/29		95	%	75 - 125
			Available Bismuth (Bi)	2010/06/29		100	%	75 - 125
			Available Boron (B)	2010/06/29		84	%	75 - 125
			Available Cadmium (Cd)	2010/06/29		97	%	75 - 125
			Available Chromium (Cr)	2010/06/29		NC	%	75 - 125
			Available Cobalt (Co)	2010/06/29		92	%	75 - 125
			Available Copper (Cu)	2010/06/29		88	%	75 - 125
			Available Iron (Fe)	2010/06/29		NC	%	75 - 125
			Available Lead (Pb)	2010/06/29		93	%	75 - 125
			Available Lithium (Li)	2010/06/29		NC	%	75 - 125
			Available Manganese (Mn)	2010/06/29		NC	%	75 - 125
			Available Molybdenum (Mo)	2010/06/29		94	%	75 - 125
			Available Nickel (Ni)	2010/06/29		NC	%	75 - 125
			Available Rubidium (Rb)	2010/06/29		NC	%	75 - 125
			Available Selenium (Se)	2010/06/29		84	%	75 - 125
			Available Silver (Ag)	2010/06/29		98	%	75 - 125
			Available Strontium (Sr)	2010/06/29		101	%	75 - 125
			Available Thallium (Tl)	2010/06/29		100	%	75 - 125
			Available Tin (Sn)	2010/06/29		98	%	75 - 125
			Available Uranium (U)	2010/06/29		103	%	75 - 125
			Available Vanadium (V)	2010/06/29		NC	%	75 - 125
			Available Zinc (Zn)	2010/06/29		96	%	75 - 125
		QC Standard	Available Aluminum (Al)	2010/06/28		89	%	75 - 125
			Available Arsenic (As)	2010/06/28		112	%	75 - 125
			Available Barium (Ba)	2010/06/28		104	%	75 - 125
			Available Chromium (Cr)	2010/06/28		86	%	75 - 125
			Available Cobalt (Co)	2010/06/28		96	%	75 - 125
			Available Copper (Cu)	2010/06/28		94	%	75 - 125
			Available Iron (Fe)	2010/06/28		106	%	75 - 125
			Available Lead (Pb)	2010/06/28		103	%	75 - 125
			Available Manganese (Mn)	2010/06/28		108	%	75 - 125
			Available Nickel (Ni)	2010/06/28		99	%	75 - 125
			Available Strontium (Sr)	2010/06/28		114	%	75 - 125
			Available Vanadium (V)	2010/06/28		103	%	75 - 125
			Available Zinc (Zn)	2010/06/28		103	%	75 - 125
		Spiked Blank	Available Aluminum (Al)	2010/06/28		105	%	75 - 125
			Available Antimony (Sb)	2010/06/28		98	%	75 - 125
			Available Arsenic (As)	2010/06/28		102	%	75 - 125
			Available Barium (Ba)	2010/06/28		101	%	75 - 125
			Available Beryllium (Be)	2010/06/28		95	%	75 - 125
			Available Bismuth (Bi)	2010/06/28		103	%	75 - 125
			Available Boron (B)	2010/06/28		101	%	75 - 125
			Available Cadmium (Cd)	2010/06/28		101	%	75 - 125
			Available Chromium (Cr)	2010/06/28		97	%	75 - 125
			Available Cobalt (Co)	2010/06/28		99	%	75 - 125
			Available Copper (Cu)	2010/06/28		98	%	75 - 125
			Available Iron (Fe)	2010/06/28		100	%	75 - 125
			Available Lead (Pb)	2010/06/28		101	%	75 - 125

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Stantec Consulting Ltd
Attention: Dale Conroy
Client Project #: 121810261
P.O. #:
Project name: PETIT-ROCHER

Quality Assurance Report (Continued)

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2191398	MLB	Spiked Blank	Available Lithium (Li)	2010/06/28		101	%	75 - 125
			Available Manganese (Mn)	2010/06/28		101	%	75 - 125
			Available Molybdenum (Mo)	2010/06/28		101	%	75 - 125
			Available Nickel (Ni)	2010/06/28		98	%	75 - 125
			Available Rubidium (Rb)	2010/06/28		103	%	75 - 125
			Available Selenium (Se)	2010/06/28		100	%	75 - 125
			Available Silver (Ag)	2010/06/28		101	%	75 - 125
			Available Strontium (Sr)	2010/06/28		105	%	75 - 125
			Available Thallium (Tl)	2010/06/28		104	%	75 - 125
			Available Tin (Sn)	2010/06/28		103	%	75 - 125
			Available Uranium (U)	2010/06/28		107	%	75 - 125
			Available Vanadium (V)	2010/06/28		98	%	75 - 125
			Available Zinc (Zn)	2010/06/28		96	%	75 - 125
		Method Blank	Available Aluminum (Al)	2010/06/28	ND, RDL=10		mg/kg	
			Available Antimony (Sb)	2010/06/28	ND, RDL=2		mg/kg	
			Available Arsenic (As)	2010/06/28	ND, RDL=2		mg/kg	
			Available Barium (Ba)	2010/06/28	ND, RDL=5		mg/kg	
			Available Beryllium (Be)	2010/06/28	ND, RDL=2		mg/kg	
			Available Bismuth (Bi)	2010/06/28	ND, RDL=2		mg/kg	
			Available Boron (B)	2010/06/28	ND, RDL=5		mg/kg	
			Available Cadmium (Cd)	2010/06/28	ND, RDL=0.3		mg/kg	
			Available Chromium (Cr)	2010/06/28	ND, RDL=2		mg/kg	
			Available Cobalt (Co)	2010/06/28	ND, RDL=1		mg/kg	
			Available Copper (Cu)	2010/06/28	ND, RDL=2		mg/kg	
			Available Iron (Fe)	2010/06/28	ND, RDL=50		mg/kg	
			Available Lead (Pb)	2010/06/28	ND, RDL=0.5		mg/kg	
			Available Lithium (Li)	2010/06/28	ND, RDL=2		mg/kg	
			Available Manganese (Mn)	2010/06/28	ND, RDL=2		mg/kg	
			Available Molybdenum (Mo)	2010/06/28	ND, RDL=2		mg/kg	
			Available Nickel (Ni)	2010/06/28	ND, RDL=2		mg/kg	
			Available Rubidium (Rb)	2010/06/28	ND, RDL=2		mg/kg	
			Available Selenium (Se)	2010/06/28	ND, RDL=2		mg/kg	
			Available Silver (Ag)	2010/06/28	ND, RDL=0.5		mg/kg	
			Available Strontium (Sr)	2010/06/28	ND, RDL=5		mg/kg	
			Available Thallium (Tl)	2010/06/28	ND, RDL=0.1		mg/kg	
			Available Tin (Sn)	2010/06/28	ND, RDL=2		mg/kg	
			Available Uranium (U)	2010/06/28	ND, RDL=0.1		mg/kg	
			Available Vanadium (V)	2010/06/28	ND, RDL=2		mg/kg	
			Available Zinc (Zn)	2010/06/28	ND, RDL=5		mg/kg	
		RPD	Available Aluminum (Al)	2010/06/29	1.6		%	35
			Available Antimony (Sb)	2010/06/29	NC		%	35
			Available Arsenic (As)	2010/06/29	NC		%	35
			Available Barium (Ba)	2010/06/29	8.1		%	35
			Available Beryllium (Be)	2010/06/29	NC		%	35
			Available Bismuth (Bi)	2010/06/29	NC		%	35
			Available Boron (B)	2010/06/29	NC		%	35
			Available Cadmium (Cd)	2010/06/29	NC		%	35
			Available Chromium (Cr)	2010/06/29	2.1		%	35
			Available Cobalt (Co)	2010/06/29	4.3		%	35
			Available Copper (Cu)	2010/06/29	NC		%	35
			Available Iron (Fe)	2010/06/29	3.9		%	35
			Available Lead (Pb)	2010/06/29	0.7		%	35
			Available Lithium (Li)	2010/06/29	1.5		%	35
			Available Manganese (Mn)	2010/06/29	3.7		%	35
			Available Molybdenum (Mo)	2010/06/29	NC		%	35

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Stantec Consulting Ltd
Attention: Dale Conroy
Client Project #: 121810261
P.O. #:
Project name: PETIT-ROCHER

Quality Assurance Report (Continued)

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2191398	MLB	RPD	Available Nickel (Ni)	2010/06/29	1.7		%	35
			Available Rubidium (Rb)	2010/06/29	0.8		%	35
			Available Selenium (Se)	2010/06/29	NC		%	35
			Available Silver (Ag)	2010/06/29	NC		%	35
			Available Strontium (Sr)	2010/06/29	NC		%	35
			Available Thallium (Tl)	2010/06/29	NC		%	35
			Available Tin (Sn)	2010/06/29	NC		%	35
			Available Uranium (U)	2010/06/29	NC		%	35
			Available Vanadium (V)	2010/06/29	2.9		%	35
			Available Zinc (Zn)	2010/06/29	0.6		%	35
2192486	GTH	Matrix Spike	Isobutylbenzene - Volatile	2010/06/30		116	%	60 - 140
			Benzene	2010/06/30		92	%	60 - 140
			Toluene	2010/06/30		132	%	60 - 140
			Ethylbenzene	2010/06/30		112	%	60 - 140
			Xylene (Total)	2010/06/30		125	%	60 - 140
		Spiked Blank	Isobutylbenzene - Volatile	2010/06/30		111	%	60 - 140
			Benzene	2010/06/30		84	%	60 - 140
			Toluene	2010/06/30		83	%	60 - 140
			Ethylbenzene	2010/06/30		84	%	60 - 140
			Xylene (Total)	2010/06/30		83	%	60 - 140
		Method Blank	Isobutylbenzene - Volatile	2010/06/30		105	%	60 - 140
			Benzene	2010/06/30	ND, RDL=0.003		mg/kg	
			Toluene	2010/06/30	ND, RDL=0.03		mg/kg	
			Ethylbenzene	2010/06/30	ND, RDL=0.01		mg/kg	
			Xylene (Total)	2010/06/30	ND, RDL=0.05		mg/kg	
			C6 - C10 (less BTEX)	2010/06/30	ND, RDL=3		mg/kg	
		RPD	Benzene	2010/06/30	NC		%	50
			Toluene	2010/06/30	NC		%	50
			Ethylbenzene	2010/06/30	NC		%	50
			Xylene (Total)	2010/06/30	NC		%	50
			C6 - C10 (less BTEX)	2010/06/30	NC		%	50
2193677	CMI	Matrix Spike	2,4,5,6-Tetrachloro-m-xylene	2010/07/05		NA	%	70 - 130
			Decachlorobiphenyl	2010/07/05		88	%	70 - 130
			Total PCB	2010/07/05		76	%	70 - 130
		Spiked Blank	2,4,5,6-Tetrachloro-m-xylene	2010/07/05		NA	%	70 - 130
			Decachlorobiphenyl	2010/07/05		79	%	70 - 130
			Total PCB	2010/07/05		72	%	70 - 130
		Method Blank	2,4,5,6-Tetrachloro-m-xylene	2010/07/05		NA	%	70 - 130
			Decachlorobiphenyl	2010/07/05		92	%	70 - 130
			Total PCB	2010/07/05	ND, RDL=0.01		mg/kg	
		RPD	Total PCB	2010/07/05	NC		%	50
2200219	BAN	RPD	< -4 Phi (16 mm)	2010/07/08	0		%	25
			< -3 Phi (8 mm)	2010/07/08	0		%	25
			< -2 Phi (4 mm)	2010/07/08	0		%	25
			< -1 Phi (2 mm)	2010/07/08	0.03		%	25
			< 0 Phi (1 mm)	2010/07/08	0.03		%	25
			< +1 Phi (0.5 mm)	2010/07/08	0.5		%	25
			< +2 Phi (0.25 mm)	2010/07/08	3.4		%	25
			< +3 Phi (0.12 mm)	2010/07/08	20.4		%	25
			< +4 Phi (0.062 mm)	2010/07/08	7.2		%	25
			< +5 Phi (0.031 mm)	2010/07/08	1.4		%	25
			< +6 Phi (0.016 mm)	2010/07/08	1.9		%	25
			< +7 Phi (0.0078 mm)	2010/07/08	24.2		%	25
			< +8 Phi (0.0039 mm)	2010/07/08	0.7		%	25
			< +9 Phi (0.0020 mm)	2010/07/08	17.9		%	25

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Quality Assurance Report (Continued)

Maxxam Job Number: DB083140

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2200219	BAN	RPD	Gravel	2010/07/08	NC		%	25
			Sand	2010/07/08	0.2		%	25
			Silt	2010/07/08	NC		%	25
			Clay	2010/07/08	0.7		%	25
2201409	OK	QC Standard	Total Organic Carbon	2010/07/09		99	%	80 - 120
		Method Blank	Total Organic Carbon	2010/07/09	ND, RDL=500		mg/kg	
		RPD	Total Organic Carbon	2010/07/09	2.9		%	35
2201451	OK	QC Standard	Total Organic Carbon	2010/07/09		101	%	80 - 120
		Method Blank	Total Organic Carbon	2010/07/09	ND, RDL=500		mg/kg	
		RPD [GH6368-02]	Total Organic Carbon	2010/07/09	9.8		%	35
2203015	JRC	Matrix Spike	Mercury (Hg)	2010/07/12		NC	%	75 - 125
		QC Standard	Mercury (Hg)	2010/07/12		86	%	N/A
		Spiked Blank	Mercury (Hg)	2010/07/12		96	%	N/A
		Method Blank	Mercury (Hg)	2010/07/12	ND, RDL=0.01		mg/kg	
		RPD	Mercury (Hg)	2010/07/12	NC		%	35
2213179	SAC	Matrix Spike	Chromium (VI)	2010/07/22		9.2 (3)	%	75 - 125
		QC Standard	Chromium (VI)	2010/07/22		91	%	80 - 120
		Method Blank	Chromium (VI)	2010/07/22	ND, RDL=0.2		ug/g	
		RPD	Chromium (VI)	2010/07/22	NC		%	25
2213350	OK	QC Standard	Total Carbon (C)	2010/07/21		101	%	80 - 120
		Method Blank	Total Carbon (C)	2010/07/21	ND, RDL=500		mg/kg	
		RPD	Total Carbon (C)	2010/07/21	3.8		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) Matrix Spike: results are outside acceptance limit. Analysis was repeated with similar results.
(2) Duplicate: results are outside acceptance limit. Analysis was repeated with similar results.
(3) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample.

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Validation Signature Page

Maxxam Job #: B083140

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

ALAN STEWART, Scientific Specialist (Organics)

EWA PRANJIC, M.Sc., C.Chem, Scientific Specialist

JERRY ARENOVICH, Inorganics Manager

KEVIN MACDONALD, Inorganics Supervisor

ROSE MACDONALD,

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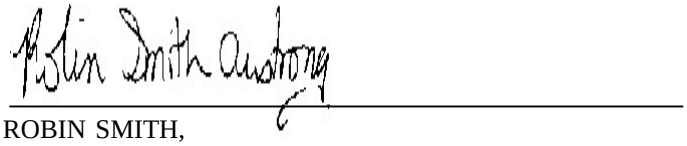
Validation Signature Page

Maxxam Job #: B083140

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



ROBIN SMITH,

==========

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. For Service Group specific validation please refer to the Validation Signature Page.

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APPENDIX D:
UNDERWATER BENTHIC HABITAT SURVEY

PWGSC PROJECT #R.076440.001
UNDERWATER BENTHIC HABITAT SURVEY
PETIT ROCHER DFO-SCH
PETIT ROCHER, NEW BRUNSWICK

FINAL REPORT

Submitted to:
Public Works and Government Services Canada
Moncton, New Brunswick

Submitted by:

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
Moncton, New Brunswick

November 2015

TE131453

12 November, 2015

TE131453

Ms. Mylène Roy
Senior Environmental Specialist
Environmental Services
Public Works and Government Services Canada
1045 Main Street
Moncton, New Brunswick
E1C 1H1

Dear Ms. Roy:

Re: Underwater Benthic Habitat Survey at the Petit Rocher Fisheries and Oceans Canada Small Craft Harbour, Petit Rocher, New Brunswick – Final Report

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), is pleased to provide Public Works and Government Services Canada with the findings of an Underwater Benthic Habitat Survey undertaken within the footprint of proposed dredge area at the Petit Rocher Fisheries and Oceans Canada – Small Craft Harbour in Petit Rocher, New Brunswick.

Amec Foster Wheeler appreciates the opportunity to provide services to your organization. Please do not hesitate to call if you have any questions regarding this or any other matter.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited

Christa Dubreuil, B.Sc., EP
Project Manager
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BM/kk

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1.0 INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), an Underwater Benthic Habitat Survey (UBHS) program was completed on 16 September, 2015 within the footprint of a dredge area at the Petit Rocher Fisheries and Oceans Canada (DFO) – Small Craft Harbour (SCH) in Petit Rocher, New Brunswick (NB).

2.0 SCOPE AND METHODOLOGY

Qualitative and quantitative observations were obtained from the footprint of a proposed dredge areas using video survey techniques to map substrate types and document macrofaunal and macrofloral species presence and abundance. Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) contracted Diversified Divers Inc. to perform the diving and video surveillance services. An Amec Foster Wheeler representative was onsite to guide the dive crew in the event that any issues arose and to obtain supporting habitat and biological information.

A total of 565 metres (m) of video surveillance was divided into two transects (T1 and T2) and two transect tie lines (TT1 and TT2) of various lengths from the footprint of a proposed dredge area at the Petit Rocher DFO-SCH (Figure 2.1).

A handheld Global Positioning System (GPS) was used to locate the pre-determined start and finish points of the transects.

The survey of the transects required the use of a video camera, operated by a Canadian Standards Association (CSA)-certified diver. Video at the Petit Rocher DFO-SCH was collected both on land and in the water. Seabed characterization involved field observations made by the field crew and a review of the video survey recording. Observations along the video transect were made for every 5 m segment. All transects were filmed from point “b” to point “a” as illustrated in Figure 2.1. A small portion of T1 was completed on dry land. Where the substrate allowed, a shovel full of material was turned over every five m.

SITE	TRANSECT		NAD83 UTM ZONE 20N EASTING (m)	NAD83 UTM ZONE 20N NORTHING (m)	NAD83 LONGITUDE (DECIMAL DEGREES)	NAD83 LATITUDE (DECIMAL DEGREES)
PETIT ROCHER	T1	a	297079.545	5295763.021	-65.70905	47.78324
		b	297217.879	5295665.208	-65.70716	47.78241
	T2	a	297049.765	5295740.261	-65.70943	47.78303
		b	297199.817	5295634.137	-65.70738	47.78212
	TT1	a	297118.719	5295746.204	-65.70852	47.78310
		b	297072.255	5295680.492	-65.70910	47.78250
	TT2	a	297200.016	5295727.210	-65.70742	47.78296
		b	297135.409	5295635.837	-65.70824	47.78212

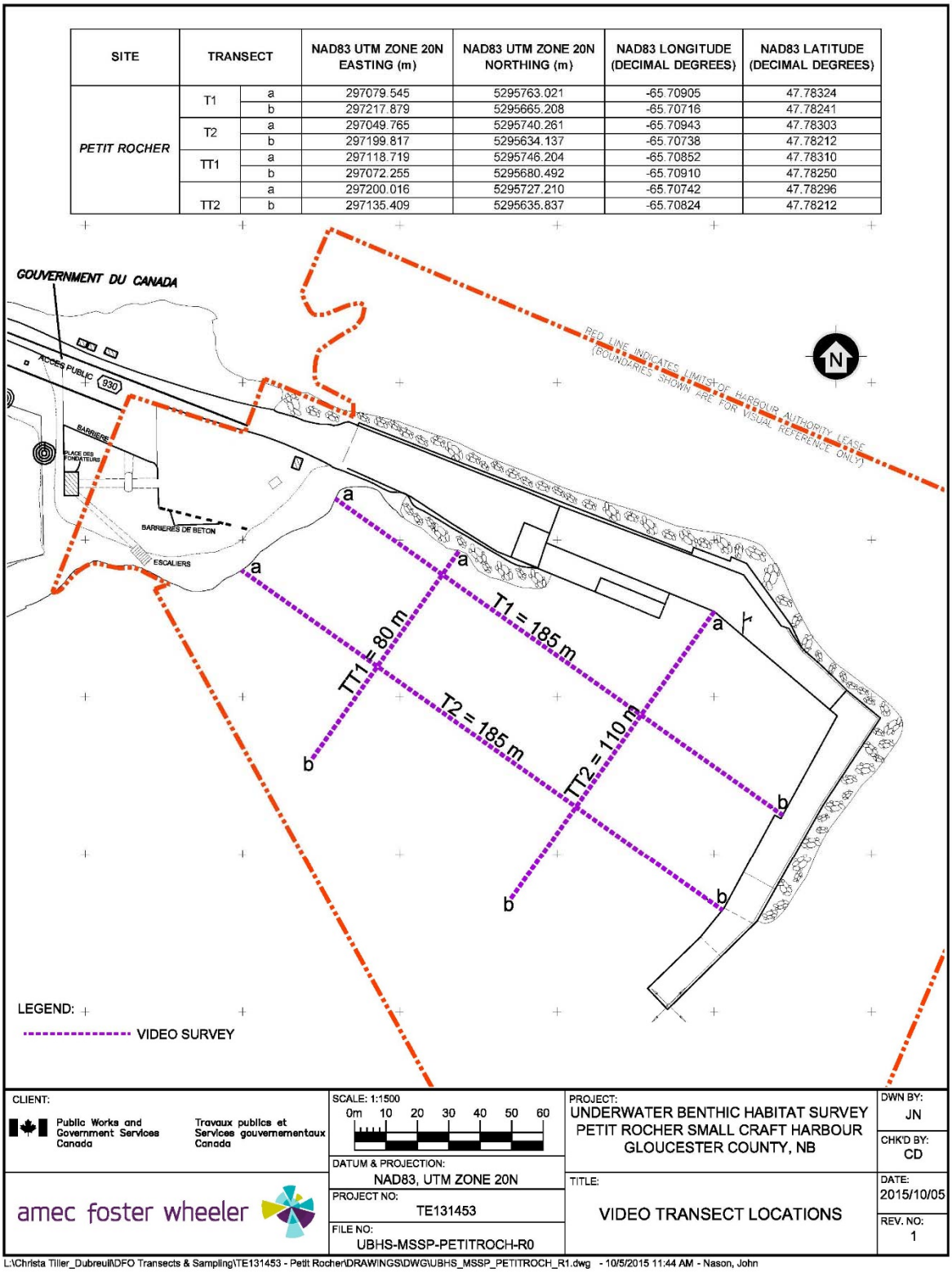


Figure 2.1 Benthic Transect Locations – Petit Rocher DFO-SCH, Petit Rocher, NB

3.0 UNDERWATER HABITAT SURVEY RESULTS

The results of the transect surveys for the proposed project footprint are presented in Appendix A (Tables A.1 to A.4), including the following information for each 5 m increment of transect line:

- visual determination of substrate type (in order of dominance);
- macrofaunal species identification and abundance; and
- macrofloral species identification and percent coverage.

A summary of the information provided in Tables A.1 to A.4 (Appendix A) is described in the following paragraphs. An annotated species list has been included in Appendix B. Photographs of habitat at the site have been included in Appendix C.

For the purposes of the video survey review and macrofaunal species identification and enumeration, four categories were developed to characterize the observed abundance levels. The categories are as follows:

A = Abundant
Numerous (not quantifiable) observations made throughout the entire 5 m segment.
C = Common
Numerous (not quantifiable) observations made intermittently along the 5 m segment.
O = Occasional
Quantifiable observations made intermittently along the 5 m segment.
U = Uncommon
Quantifiable observations made infrequently along the 5 m segment.

Observations of macrofaunal life were noted along all four transects as further described in this section and in the associated tables in Appendix A (where encountered). Shell hash was also noted only in T2.

Macrofloral life was noted in all four transects as further described below and in the associated tables in Appendix A (where encountered). Macrofloral debris (i.e., detritus from macrofloral species) was noted along segments of all four transects.

3.1 Transect 1 (T1)

Transect 1 (T1) was 185 m long. It ran from the L-wharf in an approximate north-northeast orientation to the shore (Figure 2.1).

Substrate:
The first 40 m of the transect was predominantly silty with lesser amounts of sand. The next 105 m were a mix of sand and silt with lesser amounts of rock near the end this portion. The remainder of the transect was within the intertidal zone and was alternating areas of rock, boulder and sand.

Macrofauna:
Macrofaunal life was noted throughout the transect. Benthic life was sparse consisting of uncommon occurrences of green crab (*Carcinus maenas*), rock crab (*Cancer irroratus*) and common occurrences of northern rock barnacle (*Semibalanus balanoides*). Unidentified fish species were noted as uncommon in two segments and common in eight segments. A positive identification could not be made but it is surmised that the species seen were young of the year Northern pipefish (*Syngnathus fuscus*). The pipefish is not an obligate eelgrass (*Zostera marina*) species but is commonly associated with eelgrass habitat in the Maritime Provinces during some phases of its life cycle[1]. No shell hash was noted.

Macroflora:
No macrofloral species were noted in the first 30 m of the transect. Over the next 20 m eelgrass was noted in a continuously higher coverage (5 to 40%). From the 55 m mark to the 125 m mark dense eelgrass cover (60-85%) was noted. The common observances of fish noted above were consistent with the highest cover of eelgrass. Throughout the area of high eelgrass cover a common brown algal epiphyte (*Polysiponia lanosa*) was noted in small quantities (5% cover). The next 15 m were a mix of eelgrass and seaweeds including bladderwrack (*Fucus vesiculosus*), rockweed (*Ascophyllum nodosum*), sea lettuce (*Ulva lactuca*) and brown algae (*Ectocarpus* sp.). From 140 m to 170 m the algal cover ranged between 55 and 95% except for one portion which was bare. The 170-175 m segment saw a 95% cover of eelgrass with the remainder of the transect comprised of macrofloral debris and terrestrial shrubs. Macrofloral debris was noted throughout the transect with cover between 5 and 85% and was most common in the first 50 m.

3.2 Transect 2 (T2)

Transect 2 (T2) was 185 m long. It ran parallel to T1, approximately 35 south of T1 (Figure 2.1).

Substrate:
The first 60 m of the transect were predominantly silty with lesser amounts of sand. The next 115 m were a mix of sand and silt occasionally with lesser amounts of rock. The last ten metres of the transect were a mix of rock and boulder with lesser amounts of sand and silt.

Macrofauna:
Macrofaunal life was noted throughout the transect. Benthic life was sparse consisting of uncommon occurrences of green crab, periwinkle (*Littorina* sp.) and hermit crab (*Pagarus acadianus*). Common occurrence of northern rock barnacle and occasional to uncommon observances of sand shrimp (*Crangon septemspinosa*) were noted. Uncommon and common observances of unidentified fish species, presumed to be Northern pipefish, were noted in ten segments. Unidentified flatfish species were uncommonly noted in three segments.

[1] Fisheries and Oceans Canada (DFO). 2009. Does eelgrass (*Zostera marina*) meet the criteria as an ecologically significant species? DFO Can. Sci. Advis. Rep. 2009/018

Macroflora:
No macrofloral species were noted in the first 40 m of the transect. Over the next 20 m eelgrass was noted in a continually higher cover (10 to 35%). From the 60 m mark to the 155 m mark dense eelgrass cover (70-90%) was noted. This transitioned into ten metres of a mix of eelgrass, brown algae, bladderwrack, and rockweed and sea lettuce. After 15 m devoid of any macrofloral life, 70% cover of rockweed was noted over the last five metres. Macrofloral debris was noted throughout the transect with cover between 5 and 65% and was most common in the first 50 m.

3.3 Transect Tie Line 1 (TT1)

Transect tie line 1 (TT1) was 80 m long, running perpendicular to and crossing T1 and T2, approximately 130 m west of the L-wharf (Figure 2.1).

Substrate:
The substrate of TT1 was a mix of sand and silt. Instances of rock were noted near the end of the transect within the intertidal zone.

Macrofauna:
Macrofaunal life was dominated by abundant occurrences of an unidentified fish species, presumed to be Northern pipefish, through the first 60 m of the transect. The remainder of the species noted was limited to an uncommon occurrence of rock crab and an uncommon occurrence of an unidentified flatfish. No shell hash was noted in TT1.

Macrofloral:
A dense bed of eelgrass was noted in the first 60 m of the transect with cover ranging between 65 and 95%. The last 20 m of the transect saw a reduction in eelgrass cover (10-40%) and the presence of a brown alga with a cover of 5-10%. The last five metres was dominated by rockweed with a cover of 50%. Macrofloral debris was not noted in TT1.

3.4 Transect Tie Line 2 (TT2)

Transect tie line 2 (TT2) was 115 m long and ran perpendicular to, and crossed, T1 and T2, approximately 50 west of the L-wharf (Figure 2.1).

Substrate:
The substrate of TT1 was predominantly silt with lesser amounts of sand.

Macrofauna:
Macrofaunal life in TT2 was sparse and limited to uncommon occurrences of green crab, sand shrimp and an unidentified flatfish. Common occurrences of an unidentified fish species, presumed to be Northern pipefish, were noted in two segments. No shell hash was noted in TT2.

Macroflora:
Eelgrass was noted throughout the transect; however, the cover was generally low ranging between 5 and 40%. The thick, high cover areas of eelgrass seen in other transects were not observed in TT2. No other macroflora was noted in the transect. Macrofloral debris was noted throughout the transect with cover between 5 and 85%, being higher than 50% throughout the majority of the transect.

4.0 FISH HABITAT

The Harbour east of TT2 is predominantly silt and dominated by macrofloral debris with 5-20% cover patches of eelgrass. This area would be considered poor habitat. The Harbour west of TT1 is closer to shore and exhibits properties of a rocky intertidal/subtidal zone. Eelgrass beds are generally reduced in the area and supplanted by fucoids (bladderwrack and rockweed). The algal cover is patchy though, where present, provides quality habitat. The Harbour between TT1 and TT2 is marked by dense beds of eelgrass with cover consistently greater than 80%. The quality of the habitat is confirmed by the abundance of small fish taking refuge in this area.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The diving crew was directed by an onsite Amec Foster Wheeler Biologist Ms. Jessica McPhee, B.Sc. who is experienced in data collection for environmental assessment project components. Ms. McPhee was responsible for the data collection and overall data quality as well as for ensuring that all standard operating procedures were followed and that adequate health and safety measures were taken.

6.0 SUMMARY

Characterization of the substrate and benthic communities along four transects within the footprint of a proposed dredge area at the Petit Rocher DFO–SCH in Petit Rocher, NB was completed using a combination of visual field observations and underwater video survey techniques.

The substrate was a mix of silt, sand and hard bottom. The eastern side of the Harbour was predominantly silt with lesser amounts of sand. The western side of the Harbour was a mix of rock and boulder with lesser amounts of silt and cobble. The central area of the Harbour had a mix of silt and sand.

Macrofaunal life was generally sparse with six species observed. The predominant species observed was an unidentified fish species, presumed to be young of the year Northern pipefish. Green crab were noted in all four transects and the remainder of the species noted were less common. These included Northern rock barnacle, rock crab, hermit crab, sand shrimp, and unidentified flatfish.

Macrofloral life was observed in all four transects surveyed and in 75% of the 5 m segments characterized. Macrofloral life in the eastern portion of the Harbour was limited to small patches of eelgrass with cover under 20%. The western portion of the Harbour saw reduced eelgrass amounts and higher cover of seaweed species including bladderwrack, rockweed, brown alga, and sea lettuce. The central portion of the Harbour was dominated by eelgrass with cover generally higher than 75%.

The Harbour east of TT2 is predominantly silt and dominated by macrofloral debris with 5-20% cover patches of eelgrass. This area would be considered poor habitat. The Harbour west of TT1 is closer to shore and exhibits properties of a rocky intertidal/subtidal zone. Eelgrass beds are generally reduced in the area and supplanted by fucoids (bladderwrack and rockweed). The algal cover is patchy though, where present, provides quality habitat. The Harbour between TT1 and TT2 is marked by dense beds of eelgrass with cover consistently greater than 80%. The quality of the habitat is confirmed by the abundance of small fish taking refuge in this area.

7.0 CLOSING

This Report has been prepared for the sole benefit of PWGSC and DFO. The Report may not be used by any other person or entity without the express written consent of Amec Foster Wheeler, PWGSC, and DFO. Any use which a third party makes of this Report, or any reliance upon decisions made based on it, is the responsibility of such third parties. With respect to third parties, Amec Foster Wheeler has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The Report is based on data and information collected during the Site Assessment activities conducted by Amec Foster Wheeler. It is based solely on the conditions of the Site encountered during field investigation conducted in September, 2015. Except as otherwise maybe specified, Amec Foster Wheeler disclaims any obligation to update this Report for events taking place, or with respect to information that becomes available to Amec Foster Wheeler after the time during which Amec Foster Wheeler has conducted the assessment.

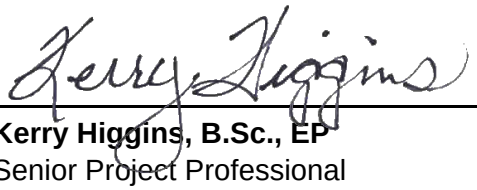
Amec Foster Wheeler makes no representation or warranty with respect to this Report other than the work was undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any information or facts provided by others and referred to or utilized in the preparation of this report was assumed by Amec Foster Wheeler to be accurate. Conclusions presented in this Report should not be construed as legal advice. The Report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this Report, we request that we be notified immediately to reassess the conclusions provided herein. This Report was prepared by Amec Foster Wheeler Marine Biologist Bruce Moore, B.Sc. and reviewed by Kerry Higgins, B.Sc., EP. The Limitations of this document are provided in Appendix D.

Prepared by:

Bruce Moore, B.Sc.
Marine Biologist /
Intermediate Project Professional

Reviewed by:



Kerry Higgins, B.Sc., EP
Senior Project Professional

APPENDIX A
Transcript of Video and Onsite Observations

Table A.1 185 m Survey – Transect T1, 16 September, 2015

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **T1 Start (b)**	185-180	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
5-10	180-175	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
10-15	175-170	Silt (80%); Sand (20%)	Unidentified fish species (**U:** 1 individual)	Macrofloral debris (85%)
15-20	170-165	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
20-25	165-155	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
25-30	160-155	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
30-35	155-150	Silt (70%); Sand (30%)	No fauna observed	Macrofloral debris (75%); Eelgrass (*Zostera marina*) (5%)
35-40	150-145	Silt (70%); Sand (30%)	No fauna observed	Macrofloral debris (75%); Eelgrass (*Zostera marina*) (10%)
40-45	145-140	Sand (60%); Silt (40%)	No fauna observed	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (40%)
45-50	140-135	Sand (60%); Silt (40%)	No fauna observed	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (25%)
50-55	135-130	Sand (60%); Silt (40%)	Green crab (*Carcinus maenas*) (**U**: 1 individual)	Eelgrass (*Zostera marina*) (65%); Macrofloral debris (30%)
55-60	130-125	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%); Macrofloral debris (10%); Brown alga (*Polysiphonia lanosa*) (5%)
60-65	125-120	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%); Brown alga (*Polysiphonia lanosa*) (5%); Macrofloral debris (5%)
65-70	120-115	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (75%); Brown alga (*Polysiphonia lanosa*) (10%); Macrofloral debris (5%)
70-75	115-110	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (75%); Brown alga (*Polysiphonia lanosa*) (10%); Macrofloral debris (5%)
75-80	110-105	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (60%); Brown alga (*Polysiphonia lanosa*) (10%); Macrofloral debris (5%)
80-85	105-100	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (55%); Macrofloral debris (25%); Brown alga (*Polysiphonia lanosa*) (10%)
85-90	100-95	Sand (60%); Silt (40%)	Unidentified fish species (**C**); Rock crab (*Cancer irroratus*) (**U**: 1 individual); Green crab (*Carcinus maenas*) (**U**: 1 individual)	Eelgrass (*Zostera marina*) (65%); Brown alga (*Polysiphonia lanosa*) (5%); Macrofloral debris (5%)
90-95	95-90	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (85%); Brown alga (*Polysiphonia lanosa*) (5%)
95-100	90-85	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (65%); Brown alga (*Polysiphonia lanosa*) (5%)
100-105	85-80	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (85%); Brown alga (*Polysiphonia lanosa*) (5%)
105-110	80-75	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (70%); Brown alga (*Polysiphonia lanosa*) (5%)
110-115	75-70	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (80%); Brown alga (*Polysiphonia lanosa*) (5%)
115-120	70-65	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (65%); Brown alga (*Polysiphonia lanosa*) (5%)
120-125	65-60	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (85%); Brown alga (*Polysiphonia lanosa*) (10%); Macrofloral debris (5%)

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
125-130	60-55	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (30%); Macrofloral debris (20%); Brown alga (*Polysiphonia lanosa*) (5%)
130-135	55-50	Sand (45%); Silt (40%); Rock (15%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (30%); Eelgrass (*Zostera marina*) (30%); Bladderwrack (*Fucus vesiculosus*) (10%); Brown alga (*Polysiphonia lanosa*) (10%); Sea lettuce (*Ulva lactuca*) (5%)
135-140	50-45	Sand (45%); Silt (40%); Rock (10%); Boulder (5%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (20%); Brown alga (*Polysiphonia lanosa*) (5%); Eelgrass (*Zostera marina*) (5%)
140-145	45-40	Sand (50%); Silt (40%); Rock (10%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (20%); Brown alga (*Polysiphonia lanosa*) (20%); Bladderwrack (*Fucus vesiculosus*) (10%); Sea lettuce (*Ulva lactuca*) (5%); Macrofloral debris (5%)
145-150	40-35	Sand (50%); Silt (40%); Rock (10%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (20%); Brown alga (*Polysiphonia lanosa*) (20%); Bladderwrack (*Fucus vesiculosus*) (10%); Sea lettuce (*Ulva lactuca*) (5%); Macrofloral debris (5%)
150-155	35-30	Rock (75%); Boulder (10%); Sand (10%); Silt (5%)	Northern rock barnacle (*Semibalanus balanoides*) (**C**)	Rockweed (*Ascophyllum nodosum*) (85%); Brown alga (*Polysiphonia lanosa*) (5%)
155-160	30-25	Sand (50%); Silt (40%); Rock (10%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (10%); Macrofloral debris (5%)
160-165	25-20	Rock (80%); Sand (15%); Silt (5%)	Northern rock barnacle (*Semibalanus balanoides*) (**C**)	Rockweed (*Ascophyllum nodosum*) (90%)
165-170	20-15	Sand (70%); Silt (20%); Rock (10%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (90%); Eelgrass (*Zostera marina*) (5%)
170-175	15-10	Sand (80%); Silt (20%)	No fauna observed	Eelgrass (*Zostera marina*) (95%)
175-180	10-5	Sand (80%); Silt (15%); Cobble (5%)	No fauna observed	Macrofloral debris (35%)
180-185 **T1 End (a)**	0-5	Sand (85%); Gravel (5%); Boulder (5%); Cobble (5%)	No fauna observed	Macrofloral debris (25%); Terrestrial shrubs

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).

Table A.2 185 m Survey – Transect T2, 16 September, 2015

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **T2 Start (b)**	185-180	Silt (80%); Sand (20%)	Shell hash	Macrofloral debris (65%)
5-10	180-175	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
10-15	175-170	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
15-20	170-165	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
20-25	165-155	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
25-30	160-155	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
30-35	155-150	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
35-40	150-145	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%)
40-45	145-140	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 1 individual)	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (25%)
45-50	140-135	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%); Eelgrass (*Zostera marina*) (10%)

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
50-55	135-130	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 1 individual); Unidentified fish species (**U:** 1 individual)	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (35%)
55-60	130-125	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 2 individuals); Unidentified fish species (**U:** 2 individuals); Unidentified flatfish species (**U:** 1 individual)	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (35%)
60-65	125-120	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
65-70	120-115	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
70-75	115-110	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
75-80	110-105	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
80-85	105-100	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%)
85-90	100-95	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (90%)
90-95	95-90	Sand (60%); Silt (40%)	Unidentified fish species (**C**)	Eelgrass (*Zostera marina*) (90%)
95-100	90-85	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
100-105	85-80	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%)
105-110	80-75	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%)
110-115	75-70	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (80%)
115-120	70-65	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (85%)
120-125	65-60	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (90%)
125-130	60-55	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (90%)
130-135	55-50	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (90%)
135-140	50-45	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (90%)
140-145	45-40	Sand (60%); Silt (40%)	Unidentified fish species (**U**)	Eelgrass (*Zostera marina*) (90%)
145-150	40-35	Sand (60%); Silt (40%)	Unidentified fish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (90%)
150-155	35-30	Sand (60%); Silt (40%)	No fauna observed	Eelgrass (*Zostera marina*) (70%)
155-160	30-25	Sand (50%); Rock (30%); Silt (20%)	Sand Shrimp (*Crangon septemspinosa*) (**O**: 5-10 individuals); Green crab (*Carcinus maenas*) (**U**: 1 individual); hermit crab (*Pagarus acadianus*) (**U**: 1 individual); Periwinkle (*Littorina* sp.)	Brown alga (*Polysiphonia lanosa*) (20%); Bladderwrack (*Fucus vesiculosus*) (10%); Rockweed (*Ascophyllum nodosum*) (10%); Eelgrass (*Zostera marina*) (5%); Macrofloral debris (5%)
160-165	25-20	Sand (60%); Silt (30%); Rock (10%)	Sand Shrimp (*Crangon septemspinosa*) (**O**: 5-10 individuals); Unidentified fish species (**U:** 1 individual)	Rockweed (*Ascophyllum nodosum*) (15%); Sea lettuce (*Ulva lactuca*) (5%)
165-170	20-15	Sand (80%); Silt (20%)	Sand Shrimp (*Crangon septemspinosa*) (**U**: 4 individuals); Unidentified flatfish species (**U:** 1 individual)	Macrofloral debris (5%)
170-175	15-10	Sand (80%); Silt (20%)	Unidentified flatfish species (**U:** 1 individual)	Macrofloral debris (5%)
175-180	10-5	Rock (40%); Boulder (25%); Sand (25%); Silt (10%)	Northern rock barnacle (*Semibalanus balanoides*) (**C**)	Macrofloral debris (5%)
180-185 **T2 End (a)**	0-5	Boulder (60%); Rock (40%)	Northern rock barnacle (*Semibalanus balanoides*) (**C**)	Rockweed (*Ascophyllum nodosum*) (70%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).

Table A.3 80 m Survey – Transect TT1, 16 September, 2015

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **TT1 Start (b)**	80-75	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (95%)
5-10	75-70	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (60%); Sea lettuce (*Ulva lactuca*) (5%)
10-15	70-65	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (85%)
15-20	65-60	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (80%)
20-25	60-55	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (90%)
25-30	55-50	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (90%)
30-35	50-45	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (95%)
35-40	45-40	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (90%)
40-45	40-35	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (95%)
45-50	35-30	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (95%)
50-55	30-25	Sand (60%); Silt (40%)	Unidentified fish species (**A**)	Eelgrass (*Zostera marina*) (85%)
55-60	25-20	Sand (60%); Silt (40%)	Unidentified fish species (**A**); Rock crab (*Cancer irroratus*) (**U**: 2 individuals)	Eelgrass (*Zostera marina*) (65%); Sea lettuce (*Ulva lactuca*) (5%)
60-65	20-15	Sand (70%); Silt (30%)	No fauna observed	Eelgrass (*Zostera marina*) (40%); Sea lettuce (*Ulva lactuca*) (5%)
65-70	15-10	Sand (65%); Silt (30%); Rock (5%)	Unidentified flatfish species (**U:** 1 individual)	Eelgrass (*Zostera marina*) (20%); Brown alga (*Ectocarpus* sp.) (10%); Macrofloral debris (5%)
70-75	10-5	Sand (65%); Silt (30%); Rock (5%)	No fauna observed	Eelgrass (*Zostera marina*) (10%); Brown alga (*Ectocarpus* sp.) (5%); Macrofloral debris (5%)
75-80 **TT1 End (a)**	0-5	Rock (65%); Sand (25%); Silt (10%)	No fauna observed	Rockweed (*Ascophyllum nodosum*) (50%); Sea lettuce (*Ulva lactuca*) (5%); Brown alga (*Polysiphonia lanosa*) (5%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).

Table A.4 115 m Survey – Transect TT2, 16 September, 2015

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **TT2 Start (b)**	115-110	Silt (80%); Sand (20%)	No fauna observed	Eelgrass (*Zostera marina*) (40%); Macrofloral debris (5%)
5-10	110-105	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (65%); Eelgrass (*Zostera marina*) (5%)
10-15	105-100	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 1 individual); Sand Shrimp (*Crangon septemspinosa*) (**U**: 1 individual)	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (15%)
15-20	100-95	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (5%)
20-25	95-90	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (75%); Eelgrass (*Zostera marina*) (5%)
25-30	90-85	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (75%)
30-35	85-80	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (75%)
35-40	80-75	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (75%)
40-45	75-70	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (75%)
45-50	70-65	Silt (80%); Sand (20%)	Unidentified fish species (**C**)	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (40%)
50-55	65-60	Silt (80%); Sand (20%)	Unidentified fish species (**C**)	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (25%)

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
55-60	60-55	Silt (80%); Sand (20%)	Unidentified flatfish species (**U:** 1 individual)	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (5%)
60-65	55-50	Silt (80%); Sand (20%)	No fauna observed	Eelgrass (*Zostera marina*) (40%); Macrofloral debris (35%);
65-70	50-45	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 1 individual)	Macrofloral debris (60%); Eelgrass (*Zostera marina*) (25%)
70-75	45-40	Silt (80%); Sand (20%)	Green crab (*Carcinus maenas*) (**U**: 1 individual)	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (35%)
75-80	40-35	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (50%); Eelgrass (*Zostera marina*) (20%)
80-85	35-30	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%); Eelgrass (*Zostera marina*) (5%)
85-90	30-25	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%)
90-95	25-20	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%)
95-100	20-15	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%)
100-105	15-10	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (85%)
105-110	10-5	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%)
110-115 **TT2 End (a)**	0-5	Silt (80%); Sand (20%)	No fauna observed	Macrofloral debris (70%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).
Anthropogenic debris noted in the 10-105, 105-110, and 110-115 m segments

A = Abundant
Numerous (not quantifiable) observations made throughout the entire 5 m segment.

C = Common
Numerous (not quantifiable) observations made intermittently along the 5 m segment.

O = Occasional
Quantifiable observations made intermittently along the 5 m segment.

U = Uncommon
Quantifiable observations made infrequently along the 5 m segment.

APPENDIX B
Annotated Species List

Table B1 Annotated Species List

Classification	Common Name	Scientific Name
Macrofauna		
Crustacea	Northern Rock Barnacle	*Semibalanus balanoides*
	Green crab	*Carcinus maenas*
	Rock crab	*Cancer irroratus*
	Hermit crab	*Pagarus acadianus*
	Sand shrimp	*Crangon septemspinosa*
Miscellaneous	Unidentified Fish	-----
Macroflora		
Angiosperm	Eelgrass	*Zostera marina*
Chlorophyta	Sea lettuce	*Ulva lactuca*
Phaeophyta	Bladderwrack	*Fucus vesiculosus*
	Rockweed	*Ascophyllum nodosum*
	Brown alga	*Ectocarpus* sp.
	Brown alga	*Polysiphonia lanosa*

APPENDIX C
Photo Log

General Site Photos

Looking south from wharf at intertidal zone

Looking west from wharf at intertidal zone

APPENDIX D
Limitations

LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:

    1. The Standard Terms and Conditions which form a part of our Professional Services Contract.
    2. The Scope of Services.
    3. Time and Budgetary limitations as described in our Contract.
    4. The Limitations stated herein.

2. The report has been prepared in accordance with generally accepted environmental study practices. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The objective of this report was solely to characterize the seabed footprint of the proposed Project area.
4. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Amec Foster Wheeler accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.