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Public Services and Procurement Canada

Marine Sediment Sampling Program and Underwater Benthic Habitat Survey – Val-Comeau, DFO-SCH New Brunswick, DRFP #23550

Final Report

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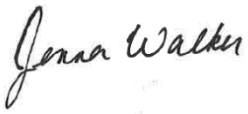
Approved by :



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EXECUTIVE SUMMARY

At the request of Public Services and Procurement Canada (PSPC), five (5) sediment samples were collected as part of a Marine Sediment Sampling Program (MSSP) at the Val-Comeau Department of Fisheries and Oceans Canada (DFO) Small Craft Harbour (SCH) Directory of Federal Real Property (DFRP) #23550 site in the Regional Municipality of Grand Tracadie-Sheila, New Brunswick. The samples were to be characterized in terms of their grain size composition and their chemical make-up. In addition, an underwater video along eight (8) transects was filmed and interpreted as part of an Underwater Benthic Habitat Survey.

The sediment samples were submitted to AGAT Laboratories in Dartmouth, Nova Scotia for detailed analyses. Results were compared to the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQGs) for the Protection of Human and Environmental Health; CCME Canada Wide Standards (CWS) for Petroleum Hydrocarbon Concentrations (PHCs); and Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 3 Risk-Based Screening Levels (RBSLs), Soil Ecological Screening Levels (ESLs) and Sediment Ecological Screening Levels (SESLs). In addition, one sample was analyzed for leachable polycyclic aromatic hydrocarbons (PAHs) and leachable metals. Leachate results were compared to the CCME Water Quality Guidelines (WQGs) for the Protection of Freshwater and Marine Aquatic Life and Agriculture, and the Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ). Tables 1 and 2, below, summarize the guideline exceedances of the sediment and leachate analyses, respectively. Figure 1 depicts the summarized substrate composition for the sediment samples collected from the Val-Comeau DFO-SCH site. Figure 2 shows the proportions of gravel, sand and mud (silt and clay) for individual sediment samples.

Table 1 - Sediment Analysis Guidelines Exceedances

Parameter / Guideline	Sample ID				
	VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
CCME Soil Quality Guidelines					
PAH (IACR)	-	-	X	X	X
PAH (EH)	-	-	-	X	X
Metals	X	X	X	X	X
BTEX	-	-	-	-	-
Total PCB	-	-	-	-	-
Total DDT	-	-	-	-	-
SAR	X	X	X	X	X
Conductivity	X	X	X	X	X
pH	X	X	-	X	X
Atlantic RBCA Tier 1 RBSLs					
BTEX	-	-	-	-	-
TPH	-	-	-	-	-
Atlantic RBCA Tier 1 ESLs and SESLs					
BTEX	-	-	-	-	-
HC Fraction	-	-	-	-	-
TPH	-	-	-	-	-
CWS for PHC in Soil					

BTEX	-	-	-	-	-
HC Fraction	-	-	-	-	-

Notes:
"-" indicates no exceedance
"X" indicates an exceedance
PAH – Polycyclic Aromatic Hydrocarbon
BTEX – Benzene, Toluene, Ethylbenzene, Xylene
PCB – Polychlorinated Biphenyl
DDT – Dichloro-Diphenyl-Trichloroethane
SAR – Sodium Adsorption Ratio
HC - Hydrocarbon
TPH – Total Petroleum Hydrocarbon

Table 2 - Leachate Analysis Guidelines Exceedances

Parameter / Guideline	Sample ID	
	VC-SED4 (TCLP)	VC-SED4 (SPLP)
CCME Water Quality Guidelines		
PAH	X	X
Metals	X	X
pH	Not Measured	-
Health Canada GCDWQ MAC, AO and/or Other		
PAH	-	-
Metals	X	X
pH	Not Measured	-

Notes:
"-" indicates no exceedance
"X" indicates an exceedance
PAH – Polycyclic Aromatic Hydrocarbon
MAC – Maximum Acceptable Concentration
AO – Aesthetic Objective

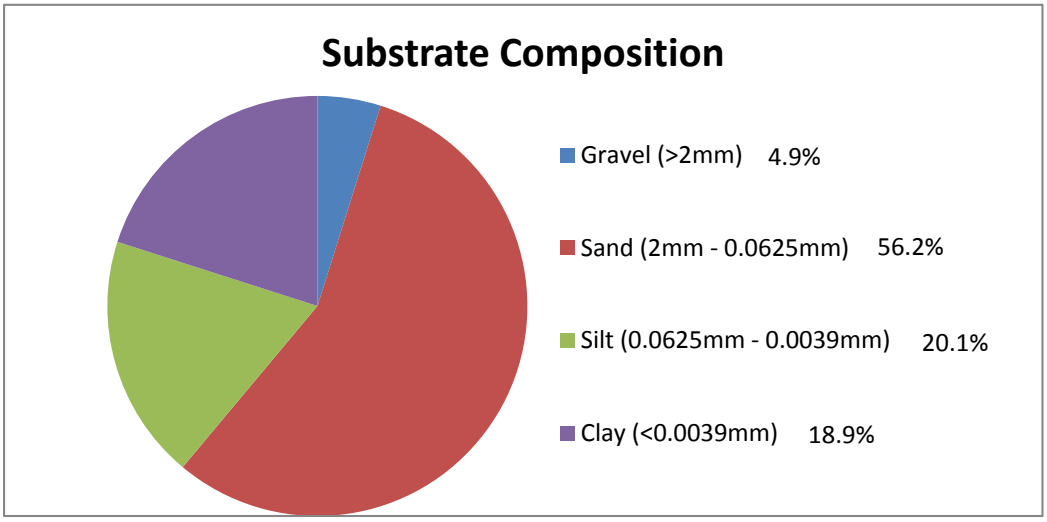

Figure 1 - Average Sediment Composition at Val-Comeau DFO-SCH

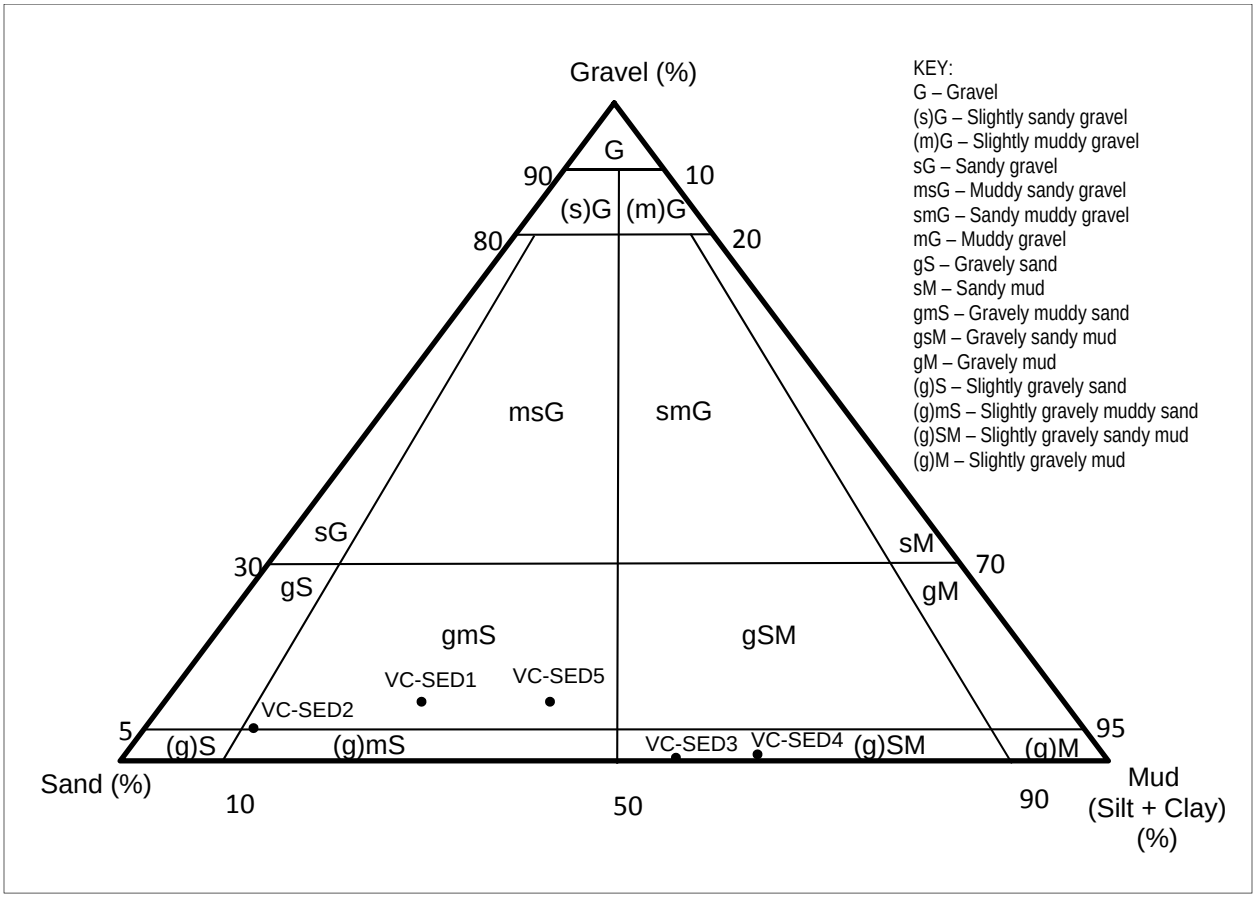

Figure 2 - Substrate Composition of Individual Sediment Samples at Val-Comeau DFO-SCH

The Val-Comeau survey area shows a variety of complex substrates running from flat sandy- silt areas with little vegetation to dense areas of eelgrass (*Zostera marina*). Further, there are very dense areas (beds) of dead mollusc shell primarily composed of the blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolus*), moon snail (*Lunatia heros*), and periwinkles (*Littorina* sp.). Where these beds occur the common barnacle (*Balanus* sp.) is usually present, encrusting on dead and live shells. Periwinkles are commonly associated with the eelgrass. A few rock crabs (*Cancer irroratus*) and one benthic shrimp (*Crangon* sp.) were identified. There were no rare or endangered species identified during the survey.

Those areas furthest from the shoreline that are covered with mollusc shells, live molluscs, periwinkles, eelgrass or eelgrass mixed with low relief leafy algae species are excellent to good habitat for fish. Eel grass beds are highly productive areas of primary production and are an important contributor to the base of the coastal food web. Closer to the shoreline, the study area is comprised of eelgrass that is storm-thrown or barren sandy silt areas which are of lower productivity and recover quickly from disturbance.

Property and Confidentiality

REVISION AND PUBLICATION REGISTER		
Revision N°	Date	Modification And/Or Publication Details
00	2017-08-18	Draft Report Issued
01	2017-09-01	Final Report Issued

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1 INTRODUCTION

At the request of Public Services and Procurement Canada (PSPC), five (5) sediment samples were collected as part of a Marine Sediment Sampling Program (MSSP) at the Val-Comeau Department of Fisheries and Oceans Canada (DFO) Small Craft Harbour (SCH) Directory of Federal Real Property (DFRP) #23550 site in the Regional Municipality of Grand Tracadie-Sheila, New Brunswick (NB). The samples were characterized in terms of their grain size composition and their chemical make-up. In addition, an underwater video along eight (8) transects was filmed and interpreted as part of an Underwater Benthic Habitat Survey (UBHS).

Refer to Appendix A for a site location plan (Figure A.1).

2 SCOPE AND METHODOLOGY

2.1 SITE PLAN

In total, five (5) surface sediment samples (0–30 cm) were collected at the Val-Comeau DFO-SCH site at locations provided by PSPC on July 18, 2017. An UBHS along eight (8) transects was also carried out on July 17 and 18, 2017. Refer to Appendix A for site and sample photos and the sample and transect location plan (Figure A.2).

2.2 MARINE SEDIMENT SAMPLING PROGRAM

Englobe Corp. (Englobe) retained the services of a diving team/crew from Connors Diving Services based in Lakeside, Nova Scotia (NS). The divers navigated to each identified sample location using a handheld Global Positioning System (GPS), collected sediment using a clean shovel, placed the sediment into a plastic bucket (underwater), put a lid on the bucket, brought the bucket up out of the water and to the wharf, removed the lid, and poured off excess water. An Englobe representative then homogenized the sample by means of a clean nitrile glove-covered hand prior to the placement in clean laboratory supplied jars. The bucket used for homogenizing the samples was washed thoroughly in the harbour water prior to processing the next sample. It is of note that an attempt to collect samples using core tubes was made however the substrate was too dense.

Each sample was immediately placed in laboratory supplied containers, preserved where necessary, and stored in coolers with ice prior to shipment (within 24 hours) to AGAT Laboratories (AGAT) in Dartmouth, NS.

Five (5) sediment samples were analysed for:

- Low-level polycyclic aromatic hydrocarbons (PAHs) including a creosote scan (presence/absence);
- Available metals including tin, hexavalent chromium, mercury and low-level selenium;
- Dichlorodiphenyl-trichloroethane (DDT) suite and total polychlorinated biphenyls (PCBs);

- Low level benzene, toluene, ethylbenzene, xylenes (BTEX), total petroleum hydrocarbons (TPH) and modified TPH (Atlantic PIRI Method) (note: a return to baseline at C32 was verified and silica gel clean-up was conducted for all samples);
- Fraction of organic carbon;
- Grain size distribution;
- Electrical conductivity (EC) and sodium adsorption ratio (SAR); and
- pH.

In addition, one sample (VC-SED4) was submitted for leachate extraction and leachate analyses for PAHs and metals based on the original results (i.e. the sample that exhibited the greatest concentrations of metals and PAHs). Leachate analyses were completed using both the Synthetic Precipitation Leaching Procedure (SPLP) and the Toxicity Characteristic Leaching Procedure (TCLP).

The field work was carried out in accordance with Englobe's standard operating procedures (SOPs) for sediment sampling and decontamination procedures; the 2016 Canadian Council of Ministers of the Environment (CCME) *Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment;* and the guidelines defined by provincial Occupational Health and Safety Standards.

The soil analytical sample results were compared to the following:

- CCME Soil Quality Guidelines (SQGs) for the Protection of Human and Environmental Health;
- Atlantic RBCA Tier 1 Version 3 Risk-Based Screening Levels (RBSLs) for soil, Soil Ecological Screening Levels (ESLs) for the Protection of Plants, Soil Invertebrates, Wildlife, and Livestock; and SESLs for the Protection of Freshwater and Marine Aquatic Life; and
- CCME Canada Wide Standards (CWS) for Petroleum Hydrocarbon Concentrations (PHCs).

Leachate analytical results were compared to the following:

- CCME Water Quality Guidelines (WQGs) for the Protection of Aquatic Life and Agriculture; and
- Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ).

Sediment sample coordinates are listed in Table 3, below and locations are indicated on Figure A.2 in Appendix A. Samples VC-SED3, VC-SED4 and VC-SED5 were collected closest to the wharf.

Table 3 - Sample Coordinates

Sample ID	Sample Coordinates (Latitude / Longitude – Decimal Degrees)	
VC-SED1	47.4655	-64.8834
VC-SED2	47.4657	-64.8824
VC-SED3	47.4653	-64.8823
VC-SED4	47.4651	-64.8832

VC-SED5	47.4655	-64.8828

2.3 QUALITY ASSURANCE AND QUALITY CONTROL

AGAT conducted their own internal QA/QC program to identify any potential sources of laboratory error, consistent with the relevant standards requirements for laboratory certification. The samples included in the QA/QC program are summarized in Table 4 below. The evaluation and results of the QA/QC assessment are discussed in Section 5.0.

Table 4 - Laboratory Duplicates

Sample ID	Duplicate ID	Parameter
VC-SED1	Dup #2	BTEX/TPH, DDT, Total PCBs
VC-SED4	Dup #2	TCLP and SPLP Leachable Metals
VC-SED5	Dup #2	Grain Size

2.4 UNDERWATER BENTHIC HABITAT SURVEY

The dive team completed an underwater video survey along eight (8) transect locations provided by PSPC for a total length of 720 m. A handheld Garmin GPSMAP 76S global positioning system (GPS) was used to locate the pre-determined start and finish points of the transects. Each transect was continuously filmed pausing at each 5 m mark and scanning to the right and left of the transect line to provide a wider view of the habitats. Refer to Table 5, below, for transect coordinates and the date and time of filming, and to Figure A.2 in Appendix A for the transect location plan.

Table 5 – Transect Coordinates & Date and Time of Sampling

Transect ID	Sample Coordinates (Latitude / Longitude – Decimal Degrees)		2017 Date & Time of Filming (24 hour Clock)
	Start	Finish	
T1	47.4654, -64.8850	47.4644, -64.8845	July 17, 15:15
T2	47.4648, -64.8850	47.4649, -64.8845	July 17, 16:00
T3	47.4654, -64.8843	47.4652, -64.8853	July 17, 16:30
T4	47.4657, -64.8837	47.4649, -64.8833	July 17, 17:00
T5	47.4654, -64.8829	47.4658, -64.8830	July 18, 9:40
T6	47.4659, -64.8824	47.4651, -64.8820	July 18, 8:40
T7	47.4654, -64.8837	47.4658, -64.8819	July 18, 9:10
T8	47.4654, -64.8818	47.4652, -64.8827	July 18, 8:00

An Englobe representative was on-site to guide the dive crew in the event that any issue arose and to obtain supporting habitat and biological information.

For each transect and every 5 m, Englobe interpreted the underwater video which includes site specific information on the substrate type and marine marine macrofloral/faunal species present; detailed descriptions of biological presence and/or habitat that are related to commercial, recreational or aboriginal

fisheries; and general delineations of substrate types and a general characterization. In addition, a summary statement about the overall quality of fish habitat in the survey area was made. Refer to Section 6.0 for the UBHS results.

3 SEDIMENT ANALYTICAL RESULTS

The analytical results of the sediment samples collected from Val-Comeau DFO-SCH are summarized throughout Appendix B, and are discussed below.

Refer to Appendix B for tabulated analytical results and their comparison to relevant guidelines. The complete set of analytical results, including laboratory QA/QC and the Certificates of Analysis for all parameters tested, are provided in Appendix C.

3.1 PAH CONCENTRATIONS

The CCME SQGs for the Protection of Environmental Health stipulate guideline values for individual PAH compounds.

The CCME stipulate values for the protection of human health (potable water) for the individual PAH compounds however it should be noted that the individual values are not stand alone SQGs. Rather, each has been incorporated into the “Index of Additive Cancer Risks” (IACR) equation to account for the combined effects of individual PAHs in the mixture. The resulting IACR value is equivalent to a hazard index and should not exceed a value of 1.0. Therefore, the final SQG is expressed as IACR $\leq$ 1.

Guidance provided in the CCME SQGs for the Protection of Environmental and Human Health (2008) indicates that for soil contaminated by coal tar or creosote mixtures, the calculated benzo(a)pyrene total potency equivalent (TPE) concentration for soil samples should be multiplied by an uncertainty factor (UF) of 3 prior to comparison with the SQGs for the Protection of Human Health (Direct Contact) to account for carcinogenic potential of alkylated and other PAHs present for which a potency equivalency factor (PEF) does not currently exist, but which are likely to contribute to the mixture’s carcinogenic potential. Laboratory analytical results revealed that the presence of creosote was not observed in any of the samples analysed.

A summary of the results compared to each of the referenced guidelines is provided in the following subsections. Refer to Table B.1 for analytical PAHs results.

CCME Soil Quality Guidelines – Human Health (Potable Water and Direct Contact)

The samples collected at VC-SED3, VC-SED4 and VC-SED5 showed exceedances of the CCME IACR of 1 at 3.84, 7.81 and 4.19, respectively.

CCME Soil Quality Guidelines – Environmental Health (Soil Contact, Soil and Food Ingestion, and Freshwater Life)

The samples collected at VC-SED4 and VC-SED5 showed exceedances of the CCME SQG for the Protection of Environmental Health (Freshwater Life) for all land-use settings for phenanthrene of 0.046 mg/kg at 0.07 mg/kg and 0.12 mg/kg, respectively.

No other exceedances of the CCME SQGs for the Protection of Human and Environmental Health for PAHs were observed.

3.2 METAL CONCENTRATIONS

Analytical results were compared to the CCME SQGs for agricultural, residential/parkland, commercial, and industrial settings. Refer to Table B.2 for analytical metals results.

CCME Soil Quality Guidelines – Human and Environmental Health

The samples collected at VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5 showed exceedances of the CCME SQG for the Protection of Human and Environmental Health for an agricultural setting for boron of 2 mg/kg at 17 mg/kg, 5 mg/kg, 9 mg/kg, 99 mg/kg, and 36 mg/kg, respectively.

No other exceedances of the SQGs for the Protection of Human and Environmental Health for metals were observed.

3.3 PETROLEUM HYDROCARBON CONCENTRATIONS

Refer to Table B.3 for analytical BTEX/TPH results.

The BTEX analytical results of the five samples collected were compared to the Atlantic RBCA Tier 1 Version 3 RBSLs, Soil ESLs and SESLs, the CCME SQGs for various land use applications, and the CWS for PHCs in Soil.

BTEX were not detected in any of the samples collected.

Modified TPH values reflect the sum of the individual carbon fractions that resemble gasoline, diesel #2 and lube oil. Based on resemblance results provided by the laboratory, the analytical results for mTPH are compared against the corresponding Atlantic RBCA Tier 1 Version 3 RBSLs and SESLs. The standard SESLs are derived using a fraction of organic carbon (FOC) value of 0.01. Modified TPH values were reported below the laboratory detection limits for all samples with the exception of the sample collected at VC-SED4 which exhibited a mTPH concentration of 44 mg/kg. No mTPH values were observed to be greater than the Atlantic RBCA Tier 1 RBSLs or SESLs for soil.

Individual carbon fractions in the F1 (C6-C10 less BTEX), F2/diesel (>C10-C16), diesel (>C16-C21), and lube oil (>C21-C32) ranges were reported below the laboratory detection limits for all samples with the exception of the sample collected at VC-SED4. This sample exhibited diesel (>C16-C21) and lube oil (>C21-C32) concentrations of 19 mg/kg and 25 mg/kg, respectively. No exceedances of the Atlantic RBCA Tier 1 ESLs and SESLs, and CWS for PHCs for individual carbon fractions were observed. All samples reached baseline at C32.

3.4 PCB CONCENTRATIONS

Refer to Table B.4 for analytical PCBs results.

The CCME SQGs stipulate guideline values for total PCBs for agricultural, residential/parkland, commercial, and industrial settings.

No PCBs were detected in the samples analysed.

3.5 DDT CONCENTRATIONS

Refer to Table B.4 for analytical DDT results.

The CCME SQGs stipulate guideline values for total DDT for agricultural, residential/parkland, commercial, and industrial settings.

No DDT compounds were detected in the samples analysed.

3.6 GRAIN SIZE DISTRIBUTION

Refer to Table B.5 for grain size results.

Sediment composition is described in Table 6 and Figures 3 and 4 below. Table 6 breaks down the sediment composition at each sampling location. Figure 3 illustrates the overall sediment composition from the samples collected, expressed as percentages to show the average grain size distributions. Figure 4 shows the proportions of gravel, sand, and mud (silt and clay) for individual sediment samples.

Table 6 - Dominant Sediment Types at Each Sample Location

Sample ID	Soil Distribution			
	1° Substrate	2° Substrate	3° Substrate	4° Substrate
VC-SED1	Sand	Clay	Silt	Gravel
VC-SED2	Sand	Clay	Gravel	Silt
VC-SED3	Sand	Silt	Clay	Gravel
VC-SED4	Sand	Silt	Clay	Gravel
VC-SED5	Sand	Clay	Silt	Gravel

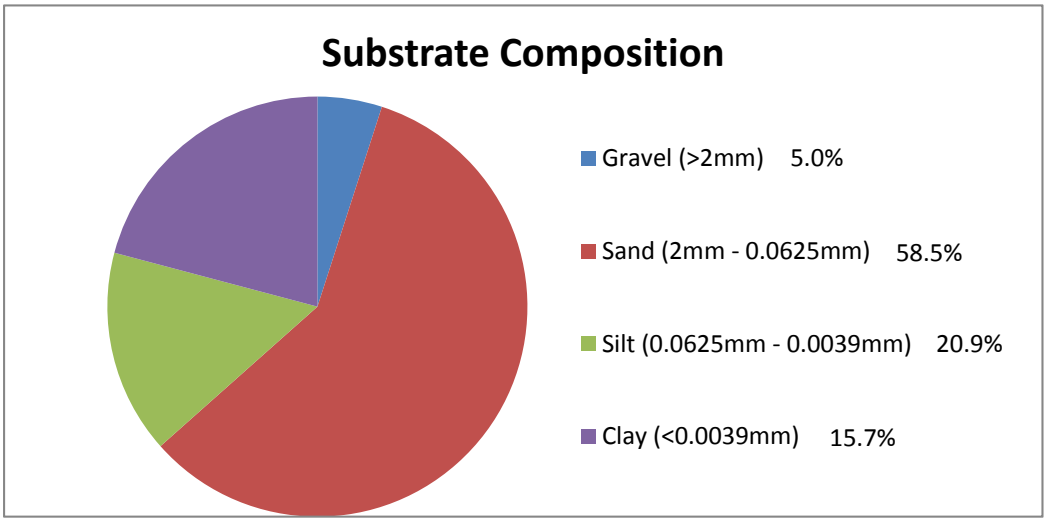

Figure 3 - Average Sediment Composition at Val-Comeau DFO-SCH

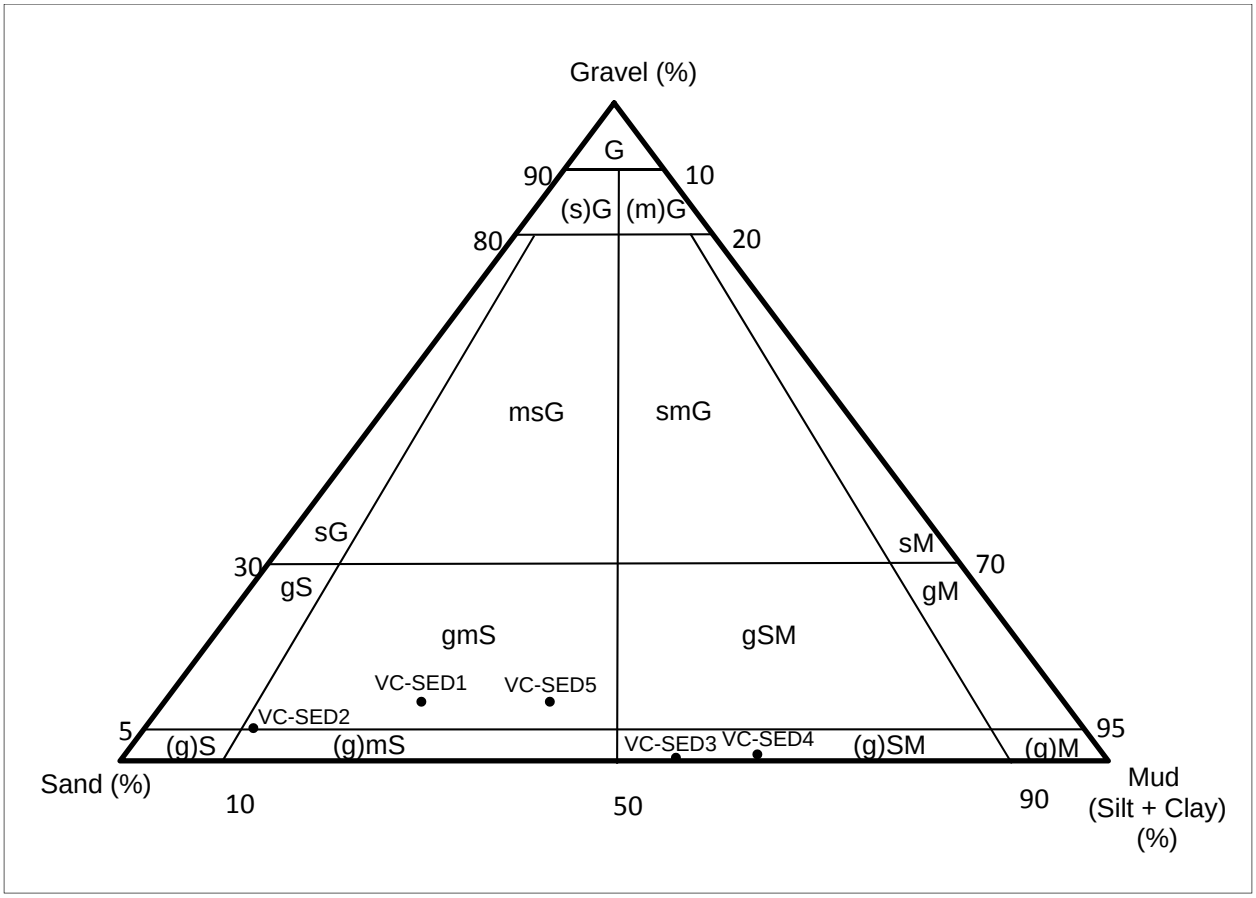

Figure 4 - Substrate Composition of Individual Sediment Samples at Val-Comeau DFO-SCH

3.7 CARBON CONTENT

Refer to Table B.5 for analytical carbon content results.

The fraction of organic carbon (FOC) is the fraction of the soil made up of organic carbon matter. The higher the FOC, the greater the ability of the sediment to adsorb organic contaminants. In this case, FOC has a direct numerical impact on the petroleum hydrocarbons SESLs for the Protection of Freshwater and Marine Aquatic Life. Standard SESLs are based on an FOC = 0.01. In the event that exceedances of the standard SESLs are observed, the measured FOC value would then be used to adjust the SESLs. No exceedances of the standard SESLs were observed for the sediment samples collected at the Val-Comeau site.

The FOC ranged from 0.0111 in the sample collected at VC-SED2, to 0.052 in the sample collected at VC-SED4.

3.8 SAR, CONDUCTIVITY AND PH

The CCME SQGs stipulate guideline values for soil SAR, conductivity and pH for various land uses. The analytical results for these parameters as they pertain to the sediment samples are presented in Table B.5.

The samples collected at VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5 showed exceedances of the CCME SQG for the Protection of Human and Environmental Health for agricultural and residential/parkland settings for SAR of 5 units, at 18.8 units, 14.8 units, 22.3 units, 36.4 units, and 26.6 units, respectively. The samples also exceeded the CCME SQG for the Protection of Human and Environmental Health for commercial and industrial settings for SAR of 12 units.

The samples collected at VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5 showed exceedances of the CCME SQG for the Protection of Human and Environmental Health for agricultural and residential/parkland settings for conductivity of 2,000 µS/cm, at 5,130 µS/cm, 2,810 µS/cm, 9,380 µS/cm, 18,500 µS/cm, and 9,640 µS/cm, respectively. The samples collected at VC-SED1, VC-SED3, VC-SED4, and VC-SED5 also exceeded the CCME SQG for the Protection of Human and Environmental Health for commercial and industrial settings for conductivity of 4,000 µS/cm.

The samples collected at VC-SED1, VC-SED2, VC-SED4, and VC-SED5 were observed to have pH values outside of the CCME SQG for the Protection of Human and Environmental Health range for pH of 6-8 units for all land-use settings, at 8.20 units, 8.84 units, 8.10 units, and 8.56 units, respectively.

No other exceedances, or values outside the range, of the SQGs for the Protection of Human and Environmental Health for SAR, conductivity or pH were observed.

4 LEACHATE ANALYTICAL RESULTS

Refer to Tables B.6 and B.7 in Appendix B for leachate analytical results.

The CCME stipulate WQGs for individual PAHs and metals for the Protection of Aquatic Life (Freshwater and Marine) and the Protection of Agriculture (Irrigation and Livestock). Health Canada has developed a GCDWQ for benzo(a)pyrene, various metals and pH. These guidelines have been used to compare to leachate analytical results (using both TCLP and SPLP) for the sample collected at VC-SED4.

CCME WQG for the Protection of Aquatic Life - Freshwater

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for benzo(a)anthracene of 0.018 µg/L at 0.02 µg/L.

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for fluoranthene of 0.04 µg/L at 0.75 µg/L and 0.83 µg/L, respectively.

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for pyrene of 0.025 µg/L at 0.38 µg/L and 0.42 µg/L, respectively.

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life (long-term) for arsenic of 0.005 mg/L at 0.027 mg/L and 0.009 mg/L, respectively.

Using the TCLP, the sampled showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for boron (long-term) of 1.5 mg/L at 2.00 mg/L.

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for iron (long-term) of 0.3 mg/L at 14.5 mg/L and 0.4 mg/L, respectively.

Using both the TCLP and SPLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for selenium (long-term) of 0.001 mg/L at 0.015 mg/L and 0.012 mg/L, respectively.

Using the TCLP, the sample showed an exceedance of the CCME WQG for the Protection of Freshwater Aquatic Life for silver (long-term) of 0.00025 mg/L at 0.0005 mg/L.

CCME WQG for the Protection of Aquatic Life - Marine

Using the TCLP, the sample showed an exceedance of the CCME WQG for the Protection of Marine Aquatic Life (long-term) for arsenic of 0.0125 mg/L at 0.027 mg/L.

CCME WQG for the Protection of Agriculture - Livestock

Using the TCLP, the sample showed an exceedance of the CCME WQG for the Protection of Agriculture (Livestock) for arsenic of 0.025 mg/L at 0.027 mg/L.

CCME WQG for the Protection of Agriculture - Irrigation

Using the TCLP, the sample showed an exceedance of the CCME WQG for the Protection of Agriculture (Irrigation) for iron of 5 mg/L at 14.5 mg/L.

Using the TCLP, the sample showed an exceedance of the CCME WQG for the Protection of Agriculture (Irrigation) for manganese of 0.2 mg/L at 0.54 mg/L.

Health Canada GCDWQ – Maximum Acceptable Concentration

Using the TCLP, the sample showed an exceedance of the Health Canada GCDWQ Maximum Acceptable Concentration (MAC) for arsenic of 0.010 mg/L at 0.027 mg/L.

Health Canada GCDWQ – Aesthetic Objective

Using the SPLP, the sample showed an exceedance of the Health Canada GCDWQ Aesthetic Objective (AO) for iron of 0.3 mg/L at 0.4 mg/L.

Using the TCLP, the sample showed an exceedance of the Health Canada GCDWQ AO for manganese of 0.05 mg/L at 0.54 mg/L.

Using the SPLP, the sample showed an exceedance of the Health Canada GCDWQ AO for sodium of 200 mg/L at 414 mg/L.

No other exceedances, or values outside the range, of the WQGs for the Protection of Aquatic Life and Agriculture, and the Health Canada GCDWQ for PAHs, metals or pH were observed.

5 QUALITY ASSURANCE/QUALITY CONTROL

Englobe conducted the environmental sampling following standard operating procedures, including job procedures and safe work practices. The sampling was conducted in accordance with all pertinent acts, regulations, codes, guidelines and standard practices. All soil samples were logged by Englobe personnel and submitted under chain of custody to AGAT.

Precision was evaluated by reviewing the laboratory relative percent difference (RPD) and comparing RPD to the acceptable amount of variation. RPD is defined as:

$$RPD = \frac{(\text{sample result} - \text{duplicate result})}{(\text{sample result} + \text{duplicate result})/2} x100$$

It should be noted that RPDs cannot be calculated in instances where the original sample, the duplicate sample, or both were found to contain no detectable concentrations or if results are within 5x the reportable detection limits. Results that have been calculated are also not included in the comparison.

RPDs for the laboratory duplicate samples are reported in the Laboratory Certificate of Analysis in Appendix C. They were generally found to be within the acceptable ranges. Based on field procedures, laboratory methods, sampling program design and field observations, the analytical results are concluded to be representative of the site conditions in general.

6 UNDERWATER BENTHIC HABITAT SURVEY

The results of the transect surveys are present in Appendix D (Tables D.1 to D.8), 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
- Macrofloral species identification and percent coverage.

A summary of the information provided in Tables D.1 to D.8 (Appendix D) is described in the following paragraphs. Photographs of typical habitat types at the site have been included in Appendix E. The numbered tag in a photo refers to the distance along the transect from the start point (0 m).

For the purpose 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.

Transect T1

The total length of transect T1 is 125 m. It is oriented perpendicular to the shoreline and ends at the shoreline.

The substrate composition from 0-100 m along transect T1 was 100% sandy-silt. From 100-125 m, the substrate was mud (silt and clay). Periwinkles (*Littorina* sp.) were observed to be abundant from 0-75 m and common from 85-90 m and 95-100 m. Barnacles (*Balanus* sp.) were abundant from 20-30 m. Blue mussels (*Mytilus edulis*) were abundant from 20-35 m. No macrofaunal life was observed along the remaining transect segments. The coverage of eelgrass (*Zostera marina*) was estimated to be 100% from 0-10 m and 80-100% or 100% from 35-70 m. Eelgrass coverage is reduced from 70-75 m after which the sea floor becomes barren with dead eelgrass from 75-100 m. It is of note that visibility was reduced from 100-125 m and therefore the benthic habitat could not be assessed there.

Transect T2

The total length of transect T2 is 45 m. It is oriented parallel to the shoreline and ends near the wharf.

Along the entire length of transect T2, it was observed that the substrate composition was 100% sandy-silt, periwinkles were abundant and the cover of eelgrass was 100%.

Transect T3

The total length of transect T3 is 75 m. It is oriented parallel to the shoreline and ends away from the wharf.

From 0-50 m along transect T3, the substrate was not visible due to heavy shell debris cover comprised of blue mussel, horse mussel (*Modiolus modiolus*) and moon snail (*Lunatia heros*) shells. It is quite likely that the substrate is 100% sandy-silt. Sandy-silt (100%) was observed from 50-75 m. From 0-50 m, barnacles, blue mussels, horse mussels, and periwinkles were observed to be abundant while moon snails were occasionally observed. Uncommon in abundance from 35-40 m were brown shrimp (*Crangon* sp.) and rock crabs (*Cancer irroratus*). From 50-70 m, periwinkles were abundant and the only macrofauna present. A substrate of heavy shell debris coincided with tuffs (<10%) of low relief leafy algae, possibly Irish moss (*Chondrus crispis*), and eelgrass (<1 to <5%). From 40-50 m, eelgrass and low

relief algae cover increased to <50% and <20%, respectively, after which eelgrass cover increased to 100% to from 50-70 m. From 70-75 m eelgrass cover was 20 to 100%.

Transect T4

The total length of transect T4 is 100 m. It is oriented perpendicular to the shoreline and ends towards the shoreline.

The substrate composition from 0-20 m along transect T4 was 100% sandy-silt. Gravel (5%) was evident from 20-45 m and 55-65 m, between which the content was higher (100%). Sandy-silt (100%) with moderate to minor shell debris was then observed to 95 m after which the substrate was just sandy-silt (100%) to 100 m. Periwinkles were observed to be abundant from 0-95 m. Barnacles and blue mussels were observed to be common from 20-30 m, abundant from 30-65 m and occasional from 65-95 m. Moon snails were common from 30-45 m and rock crab was uncommon from 30-35 m. Eelgrass coverage was 100% from 0-10 m and 80% from 10-20 m after which it was present in small patches or (dead) leaf debris.

Transect T5

The total length of transect T5 is 50 m. It is oriented perpendicular to the shoreline and ends away from the shoreline.

The substrate composition from 0-15 m along transect T5 was 100% sandy-silt covered by heavy shell debris which consists of blue mussel and oyster (*Crassostrea virginica*) shells. Shell debris cover decreased from 15-20 m after which the substrate became just sandy-silt (100%) to the end of the transect. In conjunction with heavy shell debris were abundant blue mussels and periwinkles, uncommon barnacles and rock crab and no macroflora. From 15-20 m, moon snails were uncommon. Periwinkles were abundant to 50 m. Eelgrass was first present at 15 m (<1%) with leaf debris but increased in cover (90-100%) from 20-25 m.

Transect T6

The total length of transect T6 is 100 m. It is oriented perpendicular to the shoreline and ends away from the shoreline.

The substrate composition from 0-100 m was 95-100% sandy-silt. Gravel was incorporated (5%) from 25-50 m. Shell debris composition varied. Periwinkles were generally abundant along the length of the transect. One rock crab was observed at four separate locations from 15-90 m. Moon snails were uncommon from 50-70 m. Eelgrass was present in patches (<5%) from 25-40 m and increased to 90% from 65-100 m.

Transect T7

The total length of transect T7 is 150 m. It is oriented parallel to the shoreline and ends away from the wharf.

The substrate composition from 0-50 m was sandy-silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel, horse mussel and moon snail shells. Shell debris decreased from 55-115 m after which there was just sandy-silt (100%). From 0-15 m, barnacles, blue mussels and horse mussels were observed to be abundant and moon snails were occasionally observed. Periwinkles were generally abundant along the entire length of the transect. One rock crab was observed at 15 m, 60 m and 130 m. The cover of both low relief algae, possibly Irish moss, and eelgrass was <5% within most transect segments from 0-65 m. The cover of eelgrass then increased, ranging from 50-100% from 110-150 m.

Transect T8

The total length of transect T8 is 75 m. It is oriented parallel to the shoreline and ends towards the wharf.

The substrate composition along the entire length of transect T1 was 100% sandy-silt with some shell debris from 55-75 m. Rock crabs were uncommon within most segments from 30-75 m. Brown shrimp was occasionally present from 5-10 m. Eelgrass cover was 95-100% from 0-15 m after which is was 0-<1% until the end of the transect.

The Val-Comeau survey area shows a variety of complex substrates running from flat sandy- silt areas with little vegetation to dense areas of eelgrass. Further, there are very dense areas (beds) of dead mollusc shell primarily composed of the blue mussel, horse mussel, moon snail, and periwinkles. Where these beds occur the common barnacle is usually present, encrusting on dead and live shells. Periwinkles are commonly associated with the eelgrass. The Val-Comeau site does not support areas of encrusting, filamentous or leafy macrophytes, the dominant flora is eelgrass. Further, there were no rare or endangered species identified during the survey. Other than various mollusc species that may be associated with shell debris and the common periwinkle on eelgrass, the only invertebrates identified were rock crabs and one benthic shrimp.

The three main substrate types are sandy-silt, mollusc shell covered sandy silt and sandy bottom with eel grass beds which are common throughout the southern Gulf of St. Lawrence. The shell bed substrate is excellent substrate for mussel species and snails as observed. The eel grass areas are highly productive areas of primary production and are an important contributor to the base of the coastal food web. The eelgrass also provides three dimensional habitats for other filamentous algae, bacteria and snails plus cover for feeding juveniles of many marine fish species. Not many fish were seen in the survey which is common as they move to cover or leave the area when the divers are in the shallow water and moving quickly as they were in this survey. Typically schools of small fish can be seen in these areas.

The area above (generally north of) the green dashed line on Figure A.2 in Appendix A is a combination of areas of excellent to good habitat for fish as they have bottoms covered with mollusc shells and live blue mussels, horse mussels, and periwinkles, eelgrass or eelgrass mixed with low relief leafy algae species both of which are high productive habitat areas. Below the line (generally south of) are areas covered with eelgrass that is storm-thrown or barren sandy silt areas that are of low productivity and recover quickly from disturbance.

7 CONCLUSIONS

The soil analytical results of the five (5) marine sediment samples collected at the Val-Comeau DFO-SCH DFRP# 23550 site, indicate the following guideline exceedances:

- CCME IACR for the Protection of Human Health (VC-SED3, VC-SED4 and VC-SED5);
- CCME SQG for the Protection of Environmental Health (Freshwater Life) for all land-use settings for phenanthrene (VC-SED4 and VC-SED5);
- CCME SQG for the Protection of Human and Environmental Health for an agricultural setting for boron (VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5);
- CCME SQG for the Protection of Human and Environmental Health for all land-use settings for SAR (VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5);
- CCME SQG for the Protection of Human and Environmental Health for agricultural and residential/parkland settings for conductivity (VC-SED1, VC-SED2, VC-SED3, VC-SED4, and VC-SED5);
- CCME SQG for the Protection of Human and Environmental Health for commercial and industrial settings for conductivity (VC-SED1, VC-SED3, VC-SED4, and VC-SED5);
- CCME SQG for the Protection of Human and Environmental Health for pH for all land-use settings (VC-SED1, VC-SED2, VC-SED4 and VC-SED5);

The leachate analytical results for the one (1) marine sediment sample (VC-SED4), analysed using the TCLP, indicate the following guideline exceedances:

- CCME WQG for the Protection of Freshwater Aquatic Life for benzo(a)anthracene, fluoranthene and pyrene;
- CCME WQG for the Protection of Freshwater Aquatic Life for arsenic, iron, selenium, and silver;
- CCME WQG for the Protection of Marine Aquatic Life for arsenic;
- CCME WQG for the Protection of Agriculture (Livestock) for arsenic;
- CCME WQG for the Protection of Agriculture (Irrigation) for iron and manganese;
- Health Canada GCDWQ MAC for arsenic; and
- Health Canada GCDWQ AO for manganese.

The leachate analytical results for the one (1) marine sediment sample (VC-SED4), analysed using the SPLP, indicate the following guideline exceedances:

- CCME WQG for the Protection of Freshwater Aquatic Life for benzo(a)anthracene, fluoranthene and pyrene;
- CCME WQG for the Protection of Freshwater Aquatic Life for arsenic, iron and selenium; and

- Health Canada GCDWQ AO for iron and sodium.

The Val-Comeau survey area shows a variety of complex substrates running from flat sandy- silt areas with little vegetation to dense areas of eelgrass. Further, there are very dense areas (beds) of dead mollusc shell primarily composed of the blue mussel, horse mussel, moon snail, and periwinkles. Where these beds occur the common barnacle is usually present, encrusting on dead and live shells. Periwinkles are commonly associated with the eelgrass. A few rock crabs (*Cancer irroratus*) and one benthic shrimp (*Crangon* sp.) were identified. There were no rare or endangered species identified during the survey.

Those areas furthest from the shoreline that are covered with mollusc shells, live molluscs, periwinkles, eelgrass or eelgrass mixed with low relief leafy algae species are excellent to good habitat for fish. Eel grass beds are highly productive areas of primary production and are an important contributor to the base of the coastal food web. Closer to the shoreline, the study area is comprised of eelgrass that is storm-thrown or barren sandy silt areas which are of lower productivity and recover quickly from disturbance.

8 REPORT USE AND CONDITIONS

This report was prepared for the exclusive use of PSPC and DFO and is based on data and information obtained during a site visit by Englobe on the subject property; and is based solely upon the condition of the property on the date of such inspection, supplemented by information obtained and described herein.

The evaluation and conclusions contained in this report have been prepared in light of the expertise and experience of Englobe. Environmental conditions are dynamic in nature and changing circumstances in the environment and in the use of the property can alter radically the conclusions and information contained herein.

APPENDIX A - Figures, Subject Area and Sediment Sample Photos and Field Data Collection Form

\\sc1-fil-001\Projects\148\P_Projects\P-0011130_PWGSC_Standing_Offer_Enviro_Services_NB&PEI\WBS_0-19-200_ValComeauMSSP&UBHS_NB\GIO\2_Carto\148-P-0011130-0-19-200-EN-D-0101-c1_loc_ValComeau_170901.mxd

PSPC

Marine Sediment Sampling Program and Underwater Benthic Habitat Survey – Val-Comeau
DFO-SCH, NB (DFRP #23550)

Figure A.1
Site Location Plan

Sources :

Base : Topographic Map, © 2014 DigitalGlobe Image courtesy os USGS
Mapping : Englobe

September 2017

Englobe

Project manager : D. Chenard							Date : 2017-09-01	
Prepared : J. Walker			Drawn : P. Lemieux				Vérified : G. Morency	
Department	Project	Otp			Disc.	Type	Drawing n°	Rev.
148	P-0011130	0	19	200	EN	D	0101	0A

64°53'5"
64°53'
64°52'55"
64°52'50"
47°2'55"

VC-SED1
VC-SED2
VC-SED3
VC-SED4
VC-SED5

T1 125 m
T2 45 m
T3 75 m
T4 100 m
T5 50 m
T6 100 m
T7 150 m
T8 75 m

0 m

0 10 20 m

LEGEND

VC-SED1 Sediment Sample Location

T2 (40 m) Transect Location and Length

Direction of Transect

Excellent to Good Fish Habitat

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getma
User Community

PSPC

Marine Sediment Sampling Program and Underwater Benthic Habitat Survey – Val-Comeau
DFO-SCH, NB (DFRP #23550)

Figure A.2

Sample and Transect Location Plan

Sources :

Image : © 2010 DigitalGlobe © 2010 GeoEye © 2016 Microsoft Corporation

Mapping : Englobe

September 2017

Englobe

Project manager : D. Chenard								Date : 2017-09-01	
Prepared : J. Walker			Drawn : S. Deslandes				Vérified : G. Morency		
Department	Project	Otp			Disc.	Type	Drawing n°	Rev.	
148	P-0011130	0	19	200	EN	D	0102	0A	

\\sc1-fil-001\Projects\148\P_Projects\P-0011130_PWGSC_Standing_Offer_Enviro_Services_NB&PEI\WBS_0-19-200_ValComeau\NSSP&UBHS_NBIGO\2_Carto\148-P-0011130-0-19-200-EN-D-0101-c2_stations_ValComeau_170901.mxd

Photo 1: View (facing west) of the location of transect T1 (July 17, 2017).

Photo 2: View (facing north-northeast) of the subject area (July 17, 2017).

Photo 3: View (facing west) of the subject area (July 17, 2017).

Photo 4: View (facing northeast) of the subject area (July 17, 2017).

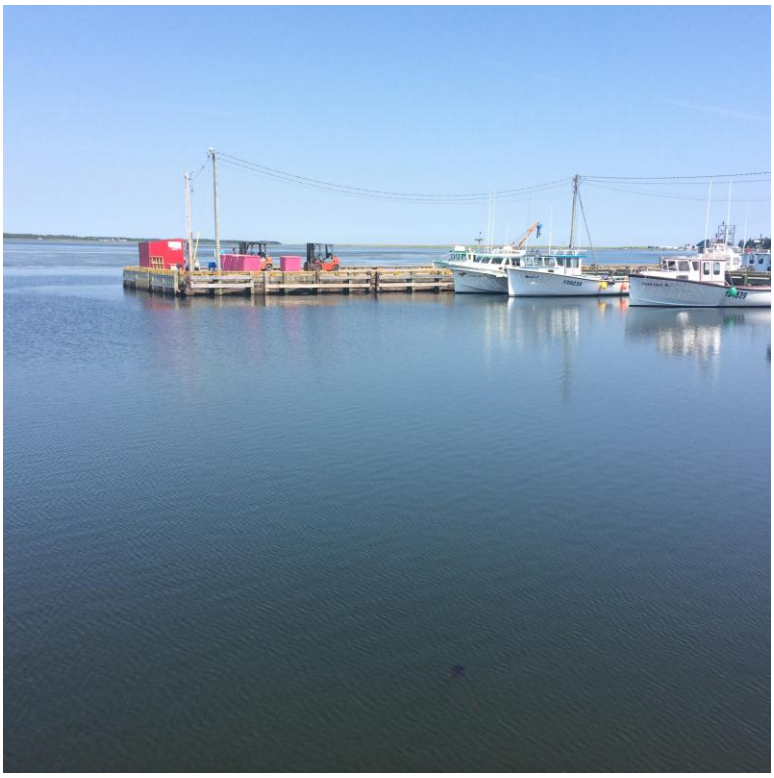

Photo 5: View (facing north) of the subject area, nearest transect T4 (July 17, 2017).

Photo 6: View (facing south-southeast) of the subject area, nearest transect T4 (July 17, 2017).

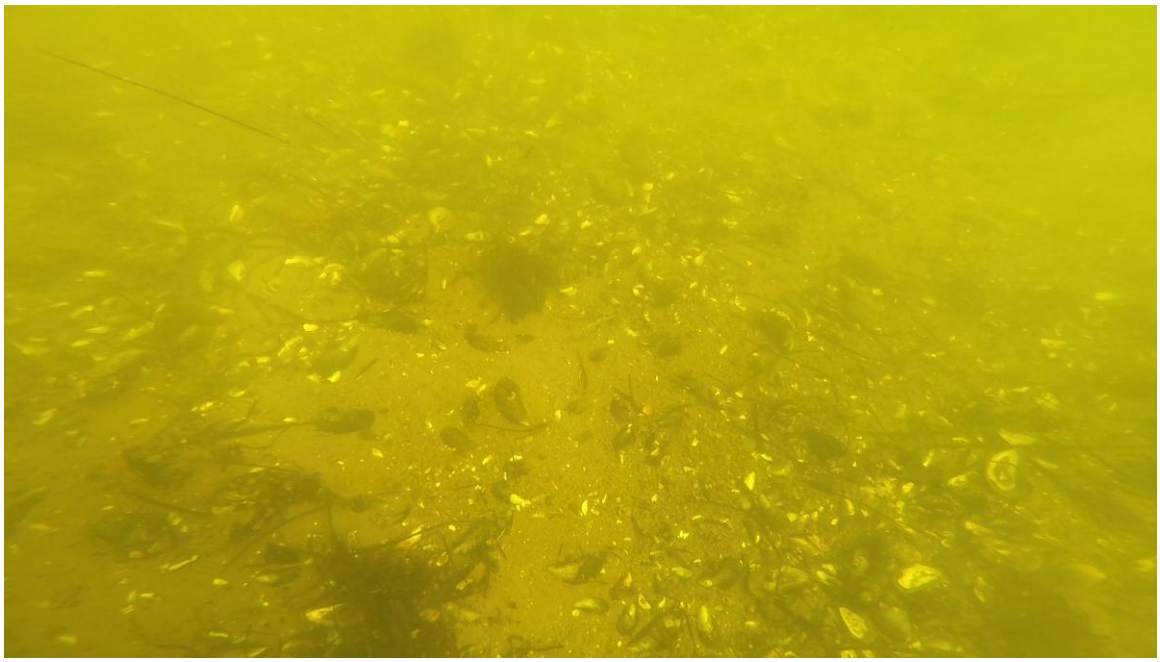

Photo 7: View of the surface sediments at sample location VC-SED1 (July 17, 2017).

Photo 8: View of the surface sediments at sample location VC-SED1 (July 17, 2017).

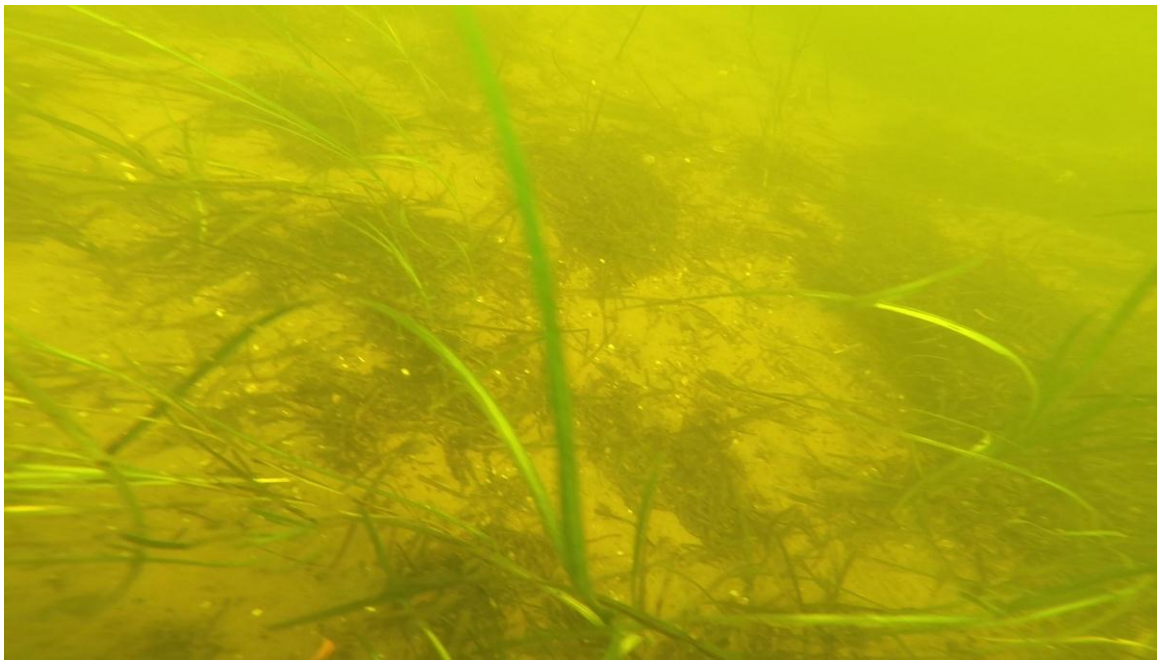

Photo 9: View of the surface sediments at sample location VC-SED2 (July 17, 2017).

Photo 10: View of the surface sediments at sample location VC-SED2 (July 17, 2017).

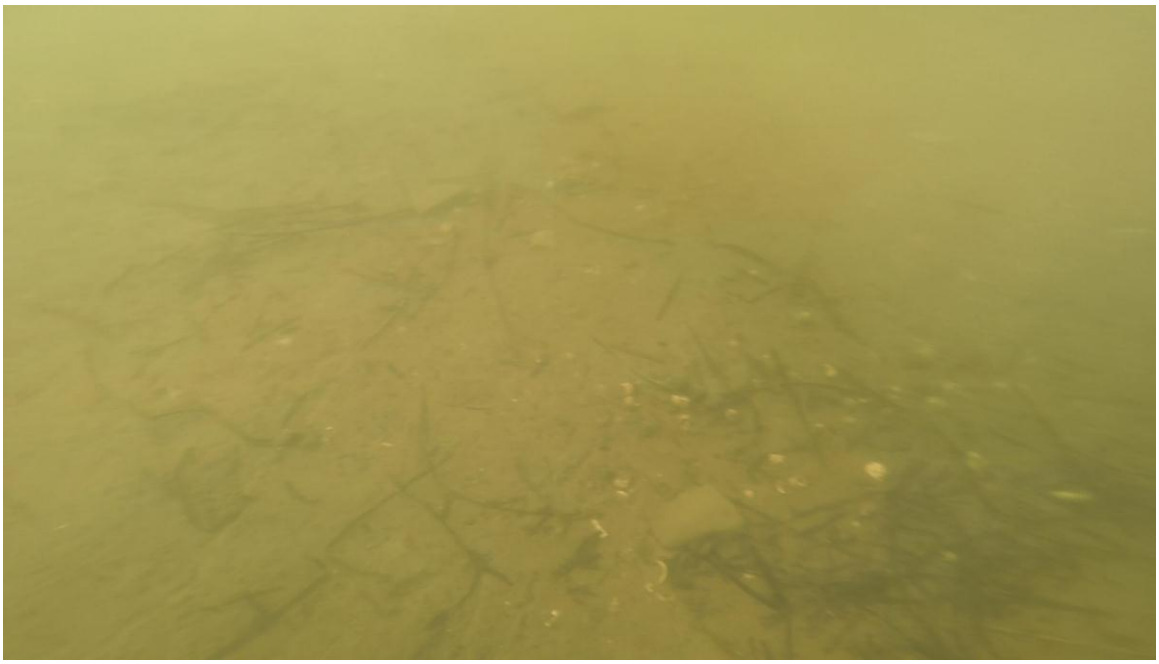

Photo 11: View of the surface sediments at sample location VC-SED3 (July 17, 2017).

Photo 12: View of the surface sediments at sample location VC-SED3 (July 17, 2017).

Photo 13: View of the surface sediments at sample location VC-SED4 (July 17, 2017).

Photo 14: View of the surface sediments at sample location VC-SED4 (July 17, 2017).

Photo 15: View of the surface sediments at sample location VC-SED4 (July 17, 2017).

Photo 16: View of the surface sediments at sample location VC-SED4 (July 17, 2017).

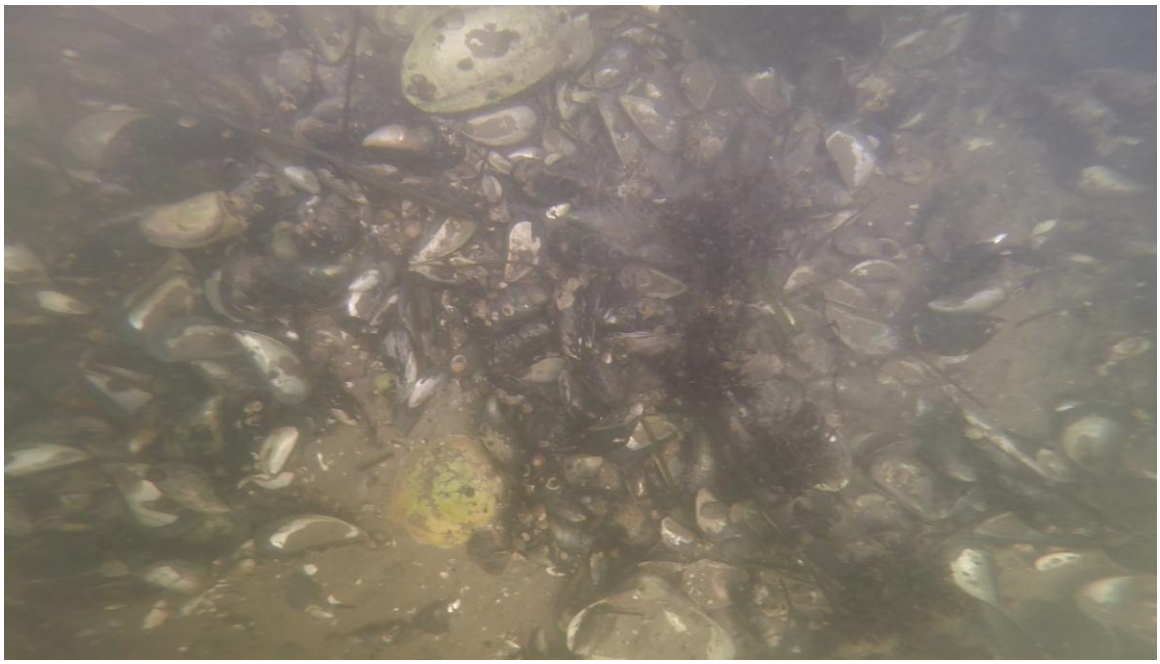

Photo 17: View of the surface sediments at sample location VC-SED5 (July 17, 2017).

Photo 18: View of the surface sediments at sample location VC-SED5 (July 17, 2017).

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FIELD DATA COLLECTION FORM

Site: Val-Comeau DFC-SCH, NB	**Location: Val-Comeau, NB**	**Date: July 18, 2017**
Sample Collector: Leeland Thomson		**Time: 8am - 2pm**
Recorder: N/A		**Average Water Temperature (°C):**
Collection Device: Grab		**Type of Vessel: Zodiak**

Site Description:		
Air Temperature: 29 **x°C** □**°F**	Weather: Sunny, clear, hot	Photographs Taken: x **Yes** □ No
Site Conditions: Calm waters		
Observations: Several boats docked in harbour		

Sample Data:

Sample ID	Sediment Description[1]	Odour[2]	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude[3]
VC - SED 1	Silty sand with clay, trace cobble, wet, dark grey to black.	Strong organic	0-30	Eel grass, mussel and clam shell	See Diver Notes
VC - SED 2	Silty sand with ash, trace clay, brown, wet.	Mild organic	0-30	Eel grass, mussel and clam shell	See Diver Notes
VC - SED 3	Sandy silt with trace clay and cobble, brown, wet.	Mild organic	0-30	Eel grass, mussel and clam shell	See Diver Notes
VC - SED 4	Silty sand with clay, trace cobble, dark grey to black, wet.	Strong organic	0-30	Eel grass, mussel and clam shell	See Diver Notes
VC - SED 5	Silty sand with clay, trace cobble, dark grey to black, wet.	Strong organic	0-30	Eel grass, mussel and clam shell	See Diver Notes

Additional Comments:

Diver Crew could not retrieve sediment sample with core sampler, resorted to grab samples, see Diver notes for additional descriptions and depths

Hot/Sunny day, calm waters

Notes:

1. Material type, texture and consistency, colour, presence of biota
2. Degree of odour (strong, slight, none)
3. Decimal degrees (DDD.dddd)

APPENDIX B - Analytical Summary Tables

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Table B.1. PAH Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL	Units	CCME Sediment Quality Guidelines [1]				CCME Soil Quality Guidelines [2]						Sample ID and Date				
			Interim Sediment Quality Guidelines		Probable Effects Levels		Human Health		Environmental Health				VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
							Potable Water	Direct Contact	Soil Contact		Soil and Food Ingestion	Freshwater Life					
			Freshwater	Marine	Freshwater	Marine	Agricultural, Residential/ Parkland, Commercial and Industrial		Agricultural, Residential/ Parkland	Commercial and Industrial	Agricultural, Residential/ Parkland	Agricultural, Residential/ Parkland, Commercial and Industrial	18-Jul-17				
Polycyclic Aromatic Hydrocarbon (PAH) Results																	
1-Methylnaphthalene	0.05	mg/kg											<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.01	mg/kg	0.0202	0.0202	0.201	0.201							<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	0.00671	mg/kg	0.00671	0.00671	0.0889	0.0889					21.5	0.28	<0.00671	<0.00671	<0.00671	0.0097 [3,4]	0.0153 [3,4]
Acenaphthylene	0.004	mg/kg	0.00587	0.00587	0.128	0.128						320	<0.004	<0.004	0.024 [3,4]	0.030 [3,4]	0.014 [3,4]
Acridine	0.05	mg/kg											<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	0.03	mg/kg	0.0469	0.0469	0.245	0.245			2.5	32	61.5		<0.03	<0.03	0.06 [3,4]	0.10 [3,4]	0.17 [3,4]
Benzo(a)anthracene	0.01	mg/kg	0.0371	0.0748	0.385	0.693					6.2		<0.01	<0.01	0.24 [3,4]	0.52 [3,4,6]	0.31 [3,4]
Benzo(a)pyrene	0.01	mg/kg	0.0319	0.0888	0.782	0.763			20	72	0.6	8,800	<0.01	<0.01	0.13 [3,4]	0.35 [3,4]	0.18 [3,4]
Benzo(b)fluoranthene	0.05	mg/kg									6.2		<0.05	<0.05	0.24	0.37	0.19
Benzo(b+j)fluoranthene	0.1	mg/kg											<0.1	<0.1	0.3	0.6	0.3
Benzo(e)pyrene	0.05	mg/kg											<0.05	<0.05	0.17	0.29	0.15
Benzo(g,h,i)perylene	0.01	mg/kg											<0.01	<0.01	0.08	0.17	0.10
Benzo(k)fluoranthene	0.01	mg/kg									6.2		<0.01	<0.01	0.11	0.19	0.10
Chrysene	0.01	mg/kg	0.0571	0.108	0.862	0.846					6.2		<0.01	<0.01	0.30 [3,4]	0.52 [3,4]	0.41 [3,4]
Dibenz(a,h)anthracene	0.006	mg/kg	0.00622	0.00622	0.135	0.135							<0.006	<0.006	<0.006	<0.006	<0.006
Fluoranthene	0.05	mg/kg	0.111	0.113	2.355	1.494			50	180	15.4		<0.05	<0.05	1.19 [3,4]	1.96 [3,4,7]	1.70 [3,4,7]
Fluorene	0.01	mg/kg	0.0212	0.0212	0.144	0.144					15.4	0.25	<0.01	<0.01	<0.01	0.02	0.01
Indeno(1,2,3-cd)pyrene	0.01	mg/kg											<0.01	<0.01	0.1	0.18	0.11
Naphthalene	0.01	mg/kg	0.0346	0.0346	0.391	0.391					8.8	0.013	<0.01	<0.01	<0.01	<0.01	<0.01
Perylene	0.05	mg/kg											<0.05	<0.05	0.05	0.13	0.06
Phenanthrene	0.03	mg/kg	0.0419	0.0867	0.515	0.544					43	0.046	<0.03	<0.03	<0.03	0.07 [3,8]	0.12 [3,4,8]
Pyrene	0.05	mg/kg	0.053	0.153	0.875	1.398					7.7		<0.05	<0.05	0.74 [3,4]	1.21 [3,4,6]	1.00 [3,4,6]
Quinoline	0.05	mg/kg											<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	0.5	mg/kg											<0.5	<0.5	2.5	4.5	3.4
Index of Additive Cancer Risk (IACR)	Calculation	None					1						0.39	0.39	3.84 [5]	7.81 [5]	4.19 [5]
Benzo(a)pyrene TPE (10^{-5})	Calculation	mg/kg						5.3					0.01	0.01	0.21	0.51	0.27
Creosote or Coal Tar source suspected / known?	Resemblance												NR	NR	NR	NR	NR
Uncertainty Factor (UF) Applied	Yes / No												No	No	No	No	No
Benzo(a)pyrene TPE (10-5) with UF	Calculation	mg/kg						5.3					NA	NA	NA	NA	NA

Notes:

value [X] - guideline exceedance

Where a calculation requires the use of a value which was not detected, a value equal to half the laboratory reportable detection limit (RDL) is ued in the equation.

NR = No Resemblance NA = Not Applicable

[1] Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life (2017 online).

[2] CCME Soil Quality Guidelines for the Protection of Human and Environmental Health (2017 online).

[3] Value exceeds the CCME Interim Sediment Quality Guideline (ISQG) for the Protection of Freshwater Aquatic Life.

[4] Value exceeds the CCME ISQG for the Protection of Marine Aquatic Life.

[5] Value exceeds the CCME IACR for the Protection of Human Health.

[6] Value exceeds the CCME Probable Effects Level (PEL) for the Protection of Freshwater Aquatic Life.

[7] Value exceeds the CCME PEL for the Protection of Marine Aquatic Life.

[8] Value exceeds the CCME Soil Quality Guideline for the Protection of Environmental Health; Freshwater Life, for all land-use settings.

Table B.2. Metals Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL	Units	CCME Sediment Quality Guidelines [1]				CCME Soil Quality Guidelines [2]				Sample ID and Date				
			Interim Sediment Quality Guidelines		Probable Effects Levels		Agricultural	Residential/ Parkland	Commercial	Industrial	VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
			Freshwater	Marine	Freshwater	Marine					18-Jul-17				
Aluminum	10	mg/kg									7,930	5,630	7,820	14,400	7,510
Antimony	1						20	20	40	40	<1	<1	<1	<1	<1
Arsenic	1		5.9	7.24	17.0	41.6	12	12	12	12	3	3	5	11 [4,5]	6 [4]
Barium	5						750	500	2,000	2,000	32	11	24	69	34
Beryllium	2						4	4	8	8	<2	<2	<2	<2	<2
Boron	2						2				17 [3]	5 [3]	9 [3]	99 [3]	36 [3]
Cadmium	0.3		0.6	0.7	3.5	4.2	1.4	10	22	22	<0.3	<0.3	0.3	0.5	<0.3
Chromium +6	0.4						0.4	0.4	1.4	1.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium (Total)	2		37.3	52.3	90	160	64	64	87	87	13	9	18	35	20
Cobalt	1						40	50	300	300	8	5	9	13	9
Copper	2		35.7	18.7	197	108	63	63	91	91	7	3	13	29 [5]	14
Iron	50										16,400	12,000	18,700	31,700	20,700
Lead	0.5		35	30.2	91.3	112	70	140	260	600	3.5	2.4	15.7	15.5	7.8
Lithium	5										24	19	23	31	23
Manganese	2										227	152	180	360	263
Mercury	0.05		0.17	0.13	0.486	0.7	6.6	6.6	24	50	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	0.05						5	10	40	40	<2	<2	<2	4	3
Nickel	2						45	45	89	89	17	12	21	34	23
Selenium	1						1	1	2.9	2.9	<1	<1	<1	<1	<1
Silver	0.5						20	20	40	40	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	5										65	18	14	50	86
Thallium	0.1						1	1	1	1	<0.1	<0.1	0.1	0.2	0.1
Tin	2						5	50	300	300	3	3	2	5	4
Uranium	0.1						23	23	33	300	0.4	0.3	0.8	1.4	1.0
Vanadium	2						130	130	130	130	21	15	25	44	27
Zinc	5		123	124	315	271	200	200	360	360	36	26	54	86	52

Notes:

value [X] - guideline exceedance

[1] Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life (2017 online).

[2] CCME Soil Quality Guidelines for the Protection of Human and Environmental Health (2017 online).

[3] Value exceeds the CCME Soil Quality Guideline (SQG) for the Protection of Human and Environmental Health for an agricultural setting.

[4] Value exceeds the CCME Interim Sediment Quality Guideline (ISQG) for the Protection of Freshwater Aquatic Life.

[5] Value exceeds the CCME ISQG for the Protection of Marine Aquatic Life.

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Table B.3. BTEX/TPH Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Sample ID		Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Modified TPH (Less BTEX)	Reached Baseline at C32 (Yes / No)	Resemblance
				Benzene	Toluene	Ethylbenzene	Xylenes	F1 (C6-C10 Less BTEX)	F2 (>C10-C16)	>C16-<C21	>C21-<C32	F3 (>C16-C34)	F4 (>C34-C50)			
VC-SED1		18-Jul-17	mg/kg	<0.005	<0.025	<0.01	<0.05	<3	<15	<15	<15			<20	Yes	NR
VC-SED2				<0.005	<0.025	<0.01	<0.05	<3	<15	<15	<15			<20	Yes	NR
VC-SED3				<0.005	<0.025	<0.01	<0.05	<3	<15	<15	<15			<20	Yes	NR
VC-SED4				<0.005	<0.025	<0.01	<0.05	<3	<15	19	25			<20	Yes	NR
VC-SED5				<0.005	<0.025	<0.01	<0.05	<3	<15	<15	<15			44	Yes	UC
RDL				0.005	0.025	0.01	0.05	3	15	15	15			20		
Atlantic RBCA Tier I RBSLs for Soil [1]																
Agricultural / Residential	Potable	Coarse-grained		0.042	0.35	0.043	0.73							74 Gas 270 Diesel 1,100 Lube Oil		
		Fine-grained		0.094	0.74	0.089	1.5							1,900 Gas 4,700 Diesel 10,000 Lube Oil		
	Non-potable	Coarse-grained		0.099	77	30	8.8							74 Gas 270 Diesel 1,100 Lube Oil		
		Fine-grained		2.3	10,000	9,300	210							2,100 Gas 8,600 Diesel 10,000 Lube Oil		
Commercial / Industrial	Potable	Coarse-grained		0.042	0.35	0.043	0.73							870 Gas 1,800 Diesel 10,000 Lube Oil		
		Fine-grained		0.094	0.74	0.089	1.5							1,900 Gas 4,700 Diesel 10,000 Lube Oil		
	Non-potable	Coarse-grained		2.5	10,000	10,000	110							870 Gas 4,000 Diesel 10,000 Lube Oil		
		Fine-grained		33	10,000	10,000	10,000							10,000 Gas 10,000 Diesel 10,000 Lube Oil		
Atlantic RBCA Tier I ESLs and SESLs [2]																
Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates - Direct Soil Contact																
Agricultural/Residential Land Use		Coarse-grained		31	75	55	95	210	150			300	2,800			
		Fine-grained		60	110	120	65	210	150			1,300	5,600			
Commercial/ Industrial Land Use		Coarse-grained		180	250	300	350	320	260			1,700	3,300			
		Fine-grained		310	330	430	230	320	260			2,500	6,600			
Soil Ecological Screening Levels for the Protection of Wildlife (Mammals and Birds) and Livestock - Soil and Food Ingestion																
Agricultural Land Use				18	980	640	2600	11,000	9,800			16,000	8,400			
Sediment Ecological Screening Levels for the Protection of Freshwater and Marine Aquatic Life																
Sediment Type (based on FOC = 0.01)		Typical		1.2	1.4	1.2	1.3	15	25		43			500		
		Other		5.4	6.1	5	5.5	67	110		190			500		
CCME Soil Quality Guidelines [3]																
Agricultural, Residential/ Parkland, Commercial/ Industrial Land Use	Surface	Coarse Soil		0.03	0.37	0.082	11									
		Fine Soil		0.0068	0.08	0.018	2.4									
	Subsoil	Coarse Soil		0.03	0.37	0.082	11									
		Fine Soil		0.0068	0.08	0.018	2.4									
CWS for PHC in Soil [4]																
Agricultural/, Residential/Parkland Land Use	Surface	Coarse Soil		0.03	0.37	0.082	11	30	150			300	2,800			
		Fine Soil		0.0068	0.08	0.018	2.4	210 (170 [5])	150			1,300	5,600			
Commercial/Industrial Land Use	Surface	Coarse Soil		0.03	0.37	0.082	11	320 (240 [5])	260			1,700	3,300			
		Fine Soil		0.0068	0.08	0.018	2.4	320 (170 [5])	260 (230 [5])			2,500	6,600			

Notes:

value [X] - guideline exceedance

NR = No Resemblance UC = Unidentified Compounds

[1] Atlantic RBCA Version 3 Risk-Based Screening Levels (RBSLs) (January 2015).

[2] Atlantic RBCA Version 3 Ecological Screening Levels (ESLs) and Sediment Ecological Screening Levels (SESLs) (January 2015).

[3] CCME Soil Quality Guidelines for the Protection of Human and Environmental Health (2017 online).

[4] Canada Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (January 2008).

[5] Where applicable, for the protection of potable groundwater.

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Table B.4. DDT and PCB Analytical Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL	Units	CCME Sediment Quality Guidelines [1]				CCME Soil Quality Guidelines [2]			Sample ID and Date				
			Interim Sediment Quality Guidelines		Probable Effects Levels		Agricultural	Residential/ Parkland	Commercial and Industrial	VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
			Freshwater	Marine	Freshwater	Marine				18-Jul-17				
Dichloro-Diphenyl-Trichloroethane (DDT)														
Dieldrin	0.005	mg/kg	0.00285	0.00071	0.00667	0.0043				<0.005	<0.005	<0.005	<0.005	<0.005
o,p-DDD	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
p,p-DDD	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
o,p-DDE	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
p,p-DDE	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
o,p-DDT	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
p,p-DDT	0.001									<0.001	<0.001	<0.001	<0.001	<0.001
o,p-DDD + p,p-DDD	0.001		0.00354	0.00122	0.00851	0.00781				<0.001	<0.001	<0.001	<0.001	<0.001
o,p-DDE + p,p-DDE	0.001		0.00142	0.00207	0.00675	0.3740				<0.001	<0.001	<0.001	<0.001	<0.001
o,p-DDT + p,p-DDT	0.001		0.00199	0.00119	0.00477	0.00477				<0.001	<0.001	<0.001	<0.001	<0.001
Total DDT	0.001						0.7	0.7	12	<0.001	<0.001	<0.001	<0.001	<0.001
Polychlorinated Biphenyls (PCBs)														
Total Polychlorinated Biphenyls	0.015		0.0341	0.0215	0.277	0.189	0.5	1.3	33	<0.02	<0.02	<0.02	<0.02	<0.02

Notes:

value [X] - guideline exceedance

[1] Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life (2017 online).

[2] CCME Soil Quality Guidelines for the Protection of Human and Environmental Health (2017 online).

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Table B.5. Grain Size and Other Analytical Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL	Units	CCME Soil Quality Guidelines [1]		Sample ID and Date				
			Agricultural, Residential / Parkland	Commercial and Industrial	VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
					18-Jul-17				
Grain Size Results									
< PHI -4 (12.5 mm)	0.1	%			98.6	100	100	100	97.5
< PHI -3 (9.5 mm)	0.1				97.7	100	100	100	96.7
< PHI -2 (4.75 mm)	0.1				95.3	100	100	100	94.1
< PHI -1 (2 mm)	0.1				90.9	94.8	99.8	98.6	91.2
< PHI 0 (1 mm)	0.1				82.6	85.9	99.2	97.5	89.9
< PHI 0 (1/2 mm)	0.1				70.8	62.4	95.8	94.9	87.8
< PHI +1 (1/4 mm)	0.1				42.1	22.5	83.4	86.1	73.1
< PHI +2 (1/8 mm)	0.1				29.1	13.7	71.1	73.6	52.6
< PHI +3 (1/16 mm)	0.1				25.1	11	55.2	63.8	38.7
< PHI +4 (1/32 mm)	0.1				23.7	10.5	47.7	57.7	35.1
< PHI +6 (1/64 mm)	0.1				21	10.1	37.4	46.8	28.4
< PHI +7 (1/128 mm)	0.1				18.1	9.4	29.6	34.4	22.1
< PHI +8 (1/256 mm)	0.1				16.5	9	24.5	29.7	19.9
< PHI +9 (1/512 mm)	0.1				14.6	8.6	20.5	25.5	17.6
Gravel	1				9	5	<1	1	9
Sand	1				66	84	45	35	53
Silt	1				9	2	31	34	19
Clay	1				17	9	25	30	20
Other									
Moisture	1.0	%			28	27	47	61	43
Fraction Organic Carbon	0.003	NA			0.013	0.011	0.040	0.052	0.028
Sodium Adsorption Ratio	NA	NA	5	12	18.8 [2,3]	14.8 [2,3]	22.3 [2,3]	36.4 [2,3]	26.6 [2,3]
Conductivity	1.0	uS/cm	2,000	4,000	5,130 [2,3]	2,810 [2]	9,380 [2,3]	18,500 [2,3]	9,640 [2,3]
pH	NA	pH	6-8	6-8	8.20 [2,3]	8.84 [2,3]	7.25	8.10 [2,3]	8.56 [2,3]

Notes:

value [X] - guideline exceedance

NA = Not Applicable

[1] Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines for the Protection of Human and Environmental Health (2017 online).

[2] Value exceeds, or is outside of the range of, the CCME Soil Quality Guideline for the Protection of Human and Environmental Health, for agricultural and residential/parkland settings.

[3] Value exceeds, or is outside of the range of, the CCME Soil Quality Guideline for the Protection of Human and Environmental Health, for commercial and industrial settings.

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Table B.6. Leachable PAHs Analytical Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL (TCLP)	RDL (SPLP)	Units	CCME Water Quality Guidelines [1]				Health Canada GCDWQ [2]	Sample ID and Date	
				Aquatic Life		Agriculture			VC-SED4 (TCLP)	VC-SED4 (SPLP)
				Freshwater	Marine	Irrigation	Livestock		18-Jul-17	
Polycyclic Aromatic Hydrocarbon (PAH) Results										
1-Methylnaphthalene	0.08	0.01	µg/L						<0.08	<0.01
2-Methylnaphthalene	0.03	0.01							<0.03	<0.01
Acenaphthene	0.01	0.04		5.8					0.04	<0.04
Acenaphthylene	0.02	0.04							<0.02	<0.04
Acridine	0.10			4.4					<0.10	
Anthracene	0.012	0.012		0.012					<0.012	<0.012
Benzo(a)anthracene	0.018	0.018		0.018					0.02 [3]	0.02 [3]
Benzo(a)pyrene	0.015	0.01		0.015				0.04 (MAC)	<0.015	<0.01
Benzo(b)fluoranthene	0.05	0.05							<0.05	<0.05
Benzo(b+j)fluoranthene	0.01	0.01							<0.01	<0.01
Benzo(e)pyrene	0.06	0.06							<0.06	<0.06
Benzo(g,h,i)perylene	0.03	0.02							<0.03	<0.02
Benzo(k)fluroanthene	0.03	0.04							<0.03	<0.04
Chrysene	0.04	0.04							<0.04	<0.04
Dibenz(a,h)anthracene	0.01	0.01							<0.01	<0.01
Fluoranthene	0.03	0.03		0.04					0.75 [3]	0.83 [3]
Fluorene	0.05	0.01		3					<0.05	<0.01
Indeno(1,2,3-cd)pyrene	0.08	0.04							<0.08	<0.04
Naphthalene	0.02	0.01		1.1					<0.02	<0.01
Perylene	0.06	0.05							<0.06	<0.05
Phenanthrene	0.04	0.02		0.4					<0.04	<0.02
Pyrene	0.01	0.01		0.025					0.38 [3]	0.42 [3]

Notes:

value [X] - guideline exceedance

TCLP = Toxicity Characteristic Leaching Procedure

SPLP = Synthetic Precipitation Leaching Procedure

MAC = Maximum Acceptable Concentration

[1] CCME Water Quality Guidelines (WQGs) for the Protection of Freshwater and Marine Aquatic Life and Agriculture (2017 online).

[2] Health Canada Guidelines for Canadian Drinking Water Quality (GCDWG) (February 2017).

[3] Value exceeds the CCME WQG for the Protection of Freshwater Aquatic Life.

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Table B.7. Leachable Metals, pH and Hardness Analytical Results for Sediment Samples - Val-Comeau DFO-SCH Site, NB

Parameter	RDL (TCLP)	RDL (SPLP)	Units	CCME Water Quality Guidelines [1]						Health Canada GCDWQ [2]		Sample ID and Date	
				Aquatic Life				Agriculture				VC-SED4 (TCLP)	VC-SED4 (SPLP)
				Freshwater		Marine		Irrigation	Livestock				
				Short Term	Long Term	Short Term	Long Term			MAC	AO / Other	18-Jul-17	
Metals Results													
Aluminum	0.02	0.02	mg/L		See note 3			5	5			0.04	0.12
Antimony	0.006	0.006								0.006		<0.006	<0.006
Arsenic	0.005	0.005			0.005		0.0125	0.1	0.025	0.010		0.027 [15,16,17,18]	0.009 [15]
Barium	0.02	0.02								1.0		0.09	<0.02
Beryllium	0.05	0.05						0.1	0.1			<0.05	<0.05
Bismuth	0.02	0.02										<0.02	<0.02
Boron	0.05	0.05		29	1.5			0.5-6 [9]	5	5		2.00 [15]	1.02
Cadmium	0.0001	0.0001		See note 4	See note 5		0.00012	0.0051	0.08	0.005		<0.0001	<0.0001
Chromium (Total)	0.02	0.02								0.05		<0.02	<0.02
Cobalt	0.01	0.01						0.05	1			<0.01	<0.01
Copper	0.002	0.002			See note 6			0.2-1 [10]	0.5-5 [14]		1.0	<0.002	<0.002
Iron	0.2	0.2			0.3			5			0.3	14.5 [15,19]	0.4 [15,20]
Lead	0.001	0.001			See note 7			0.2	0.1	0.01		<0.001	<0.001
Lithium	0.02	0.02						2.5				0.03	<0.02
Magnesium	0.05	0.05											20.9
Manganese	0.02	0.02						0.2			0.05	0.54 [19,20]	<0.02
Molybdenum	0.02	0.02			0.073			0.01-0.05 [11]	0.5			0.02	0.03
Nickel	0.02	0.02			See note 8			0.2	1			<0.02	<0.02
Selenium	0.001	0.001			0.001			0.02-0.05 [12]	0.05	0.05		0.015 [15]	0.012 [15]
Silver	0.0001	0.0001			0.00025	0.0075						0.0005 [15]	<0.0001
Sodium	200	200									200		414 [20]
Strontium	0.02	0.02										0.88	0.14
Thallium	0.0008	0.0008			0.0008							<0.0008	<0.0008
Tin	0.02	0.02										<0.02	<0.02
Uranium	0.001	0.001		0.033	0.015			0.01	0.2	0.02		<0.001	0.001
Vanadium	0.02	0.02						0.1	0.1			<0.02	<0.02
Zinc	0.02	0.02			0.03			See note 13	50		5.0	<0.02	<0.02
pH and Hardness Results													
Final pH		NA	NA		6.5-9.0		7.0-8.7				7-10.5		8.29
Hardness		0.7	mg/L										111

Notes:

value [x] - guideline exceedance

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objective

NA = Not Applicable

[1] CCME Water Quality Guidelines (WQGs) for the Protection of Freshwater and Marine Aquatic Life and Agriculture (2017 online).

[2] Health Canada Guidelines for Canadian Drinking Water Quality (GCDWG) (February 2017).

[3] Aluminum: 0.005 mg/L if pH <6.5, 0.1 mg/L if pH≥6.5.

[4] Cadmium: when hardness is 0 to <5.3 mg/L, guideline = 0.000111 mg/L; at hardness ≥5.3 to ≤360 mg/L, guideline (ug/L) = $10^{[1.016[\log[\text{hardness}]]-1.71)}$; at hardness >360 mg/L, guideline = 0.0077 mg/L.

[5] Cadmium: when hardness is 0 to <17 mg/L, guideline = 0.00004 mg/L; at hardness ≥17 to ≤280 mg/L, guideline (ug/L) = $10^{(0.83[\log[\text{hardness}]]-2.46)}$; at hardness >280 mg/L, guideline = 0.00037 mg/L.

[6] Copper: when hardness is 0 to <82 mg/L, guideline = 0.002 mg/L; at hardness ≥82 to ≤180 mg/L, guideline (ug/L) = $0.2*e^{(0.8545[\ln[\text{hardness}]]-1.465)}$; at hardness >180 mg/L, guideline = 0.004 mg/L; 0.002 mg/L when hardness is unknown.

[7] Lead: when hardness is 0 to ≤60 mg/L, guideline = 0.001 mg/L; at hardness ≥60 to ≤180 mg/L, guideline (ug/L) = $e^{(1.273[\ln[\text{hardness}]]-4.705))}$; at hardness >180 mg/L, guideline = 0.007 mg/L; 0.001 mg/L when hardness is unknown.

[8] Nickel: when hardness is 0 to ≤60 mg/L, guideline = 0.025 mg/L; at hardness ≥60 to ≤180 mg/L, guideline (ug/L) = $e^{(0.76[\ln[\text{hardness}]]+1.06))}$; at hardness >180 mg/L, guideline = 0.15 mg/L; 0.025 mg/L when hardness is unknown.

[9] Boron: 0.5-6 mg/L, value depends on crop type.

[10] Copper: 0.2 mg/L for cereals, 1 mg/L for tolerant crops.

[11] Molybdenum: 0.01 mg/L for continuous use on all soils, 0.05 mg/L for short-term use on acidic soils.

[12] Selenium: 0.02 mg/L for continuous use on all soils, 0.05 mg/L for intermittent use on all soils.

[13] Zinc: 1 mg/L when soil pH<6.5, 5 mg/L when soil pH>6.5

[14] Copper: 0.5 mg/L for sheep, 1 mg/L for cattle, 5 mg/L for swine and poultry.

[15] Value exceeds the CCME WQG for the Protection of Aquatic Life, Freshwater (long-term).

[16] Value exceeds the CCME WQG for the Protection of Aquatic Life, Marine (long-term).

[17] Value exceeds the CCME WQG for the Protection of Agriculture, Livestock.

[18] Value exceeds the GCDWG MAC.

[19] Value exceeds the CCME WQG for the Protection of Agriculture, Irrigation.

[20] Value exceeds the GCDWG AO.

APPENDIX C - Laboratory Certificate of Analysis and COC

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ATTENTION TO: Christina Caldwell

PROJECT: P-0011130-0-19-200

AGAT WORK ORDER: 17X238910

SOIL ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

TRACE ORGANICS REVIEWED BY: Kelly Hogue, B.Sc, P.Chem, Operations Manager

DATE REPORTED: Aug 11, 2017

PAGES (INCLUDING COVER): 33

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

*NOTES

VERSION 3:Version 3.0 supersedes Version 2.0- Complete report; Issued Aug 11, 2017
Version 2.0 supersedes Version 1.0. Updated report to include final parameters (minus additional analysis request). Issued, August 2, 2017.
Partial report. Issued, July 27, 2017.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Available Metals & Hg in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

SAMPLE DESCRIPTION:				VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Aluminum	mg/kg		10	7930	5630	7820	14400	7510
Antimony	mg/kg		1	<1	<1	<1	<1	<1
Arsenic	mg/kg		1	3	3	5	11	6
Barium	mg/kg		5	32	11	24	69	34
Beryllium	mg/kg		2	<2	<2	<2	<2	<2
Boron	mg/kg		2	17	5	9	99	36
Cadmium	mg/kg		0.3	<0.3	<0.3	0.3	0.5	<0.3
Chromium	mg/kg		2	13	9	18	35	20
Cobalt	mg/kg		1	8	5	9	13	9
Copper	mg/kg		2	7	3	13	29	14
Iron	mg/kg		50	16400	12000	18700	31700	20700
Lead	mg/kg		0.5	3.5	2.4	15.7	15.5	7.8
Lithium	mg/kg		5	24	19	23	31	23
Manganese	mg/kg		2	227	152	180	360	263
Molybdenum	mg/kg		2	<2	<2	<2	4	3
Nickel	mg/kg		2	17	12	21	34	23
Selenium	mg/kg		1	<1	<1	<1	<1	<1
Silver	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	mg/kg		5	65	18	14	50	86
Thallium	mg/kg		0.1	<0.1	<0.1	0.1	0.2	0.1
Tin	mg/kg		2	3	3	2	5	4
Uranium	mg/kg		0.1	0.4	0.3	0.8	1.4	1.0
Vanadium	mg/kg		2	21	15	25	44	27
Zinc	mg/kg		5	36	26	54	86	52
Mercury	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8567169-8567336 Results are based on the dry weight of the sample.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: VC-SED1 SAMPLE TYPE: Soil DATE SAMPLED: 2017-07-18 8567169	VC-SED2 Soil 2017-07-18 8567313	VC-SED3 Soil 2017-07-18 8567321	VC-SED4 Soil 2017-07-18 8567329	VC-SED5 Soil 2017-07-18 8567336
Particle Size Distribution (<12.5mm, -4 PHI)	%		0.1	98.6	100	100	100	97.5
Particle Size Distribution (<9.5mm, -3 PHI)	%		0.1	97.7	100	100	100	96.7
Particle Size Distribution (<4.75mm, -2 PHI	%		0.1	95.3	100	100	100	94.1
Particle Size Distribution (<2mm, -1 PHI)	%		0.1	90.9	94.8	99.8	98.6	91.2
Particle Size Distribution (<1mm, 0 PHI)	%		0.1	82.6	85.9	99.2	97.5	89.9
Particle Size Distribution (<1/2mm, 1 PHI)	%		0.1	70.8	62.4	95.8	94.9	87.8
Particle Size Distribution (<1/4mm, 2 PHI)	%		0.1	42.1	22.5	83.4	86.1	73.1
Particle Size Distribution (<1/8mm, 3 PHI)	%		0.1	29.1	13.7	71.1	73.6	52.6
Particle Size Distribution (<1/16mm, 4 PHI)	%		0.1	25.1	11.0	55.2	63.8	38.7
Particle Size Distribution (<1/32mm, 5 PHI)	%		0.1	23.7	10.5	47.7	57.7	35.1
Particle Size Distribution (<1/64mm, 6 PHI)	%		0.1	21.0	10.1	37.4	46.8	28.4
Particle Size Distribution (<1/128mm, 7 PHI)	%		0.1	18.1	9.4	29.6	34.4	22.1
Particle Size Distribution (<1/256mm, 8 PHI)	%		0.1	16.5	9.0	24.5	29.7	19.9
Particle Size Distribution (<1/512mm, 9 PHI)	%		0.1	14.6	8.6	20.5	25.5	17.6
Particle Size Distribution (Gravel)	%		1	9	5	<1	1	9
Particle Size Distribution (Sand)	%		1	66	84	45	35	53
Particle Size Distribution (Silt)	%		1	9	2	31	34	19
Particle Size Distribution (Clay)	%		1	17	9	25	30	20
Particles >75um	%		1	74	88	41	34	58
Classification	Coarse/Fine			Coarse	Coarse	Fine	Fine	Coarse

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Hexavalent Chromium in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

SAMPLE DESCRIPTION:				VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Chromium, Hexavalent	mg/kg		0.4	<0.4	<0.4	<0.4	<0.4	<0.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

In-house Leachable Metals

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-07-18
Parameter	Unit	G / S	RDL	8567329
Aluminum Leachate	mg/L		0.02	0.04
Antimony Leachate	mg/L		0.006	<0.006
Arsenic Leachate	mg/L		0.005	0.027
Barium Leachate	mg/L		0.02	0.09
Beryllium Leachate	mg/L		0.05	<0.05
Bismuth Leachate	mg/L		0.02	<0.02
Boron Leachate	mg/L		0.05	2.00
Cadmium Leachate	mg/L		0.0001	<0.0001
Chromium Leachate	mg/L		0.02	<0.02
Cobalt Leachate	mg/L		0.01	<0.01
Copper Leachate	mg/L		0.002	<0.002
Iron Leachate	mg/L		0.2	14.5
Lead Leachate	mg/L		0.001	<0.001
Lithium Leachate	mg/L		0.02	0.03
Manganese Leachate	mg/L		0.02	0.54
Molybdenum Leachate	mg/L		0.02	0.02
Nickel Leachate	mg/L		0.02	<0.02
Selenium Leachate	mg/L		0.001	0.015
Silver Leachate	mg/L		0.0001	0.0005
Strontium Leachate	mg/L		0.02	0.88
Thallium Leachate	mg/L		0.0008	<0.0008
Tin Leachate	mg/L		0.02	<0.02
Uranium Leachate	mg/L		0.001	<0.001
Vanadium Leachate	mg/L		0.02	<0.02
Zinc Leachate	mg/L		0.02	<0.02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Inorganic Chemistry (Soil)

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Electrical Conductivity	mS/cm		0.005	5.13	2.81	9.38	18.5	9.64
Sodium Adsorption Ratio	NA		NA	18.8	14.8	22.3	36.4	26.6
Fraction Organic Carbon-1	NA		0.003	0.013	0.011	0.039	0.052	0.028
Fraction Organic Carbon-2	NA		0.003	0.013	0.011	0.041	0.052	0.027
Fraction Organic Carbon-3	NA		0.003	0.012	0.011	0.041	0.053	0.028
Fraction Organic Carbon-Avg	NA		0.003	0.013	0.011	0.040	0.052	0.028

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8567169-8567336 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). FOC - Samples were analysed and are reported in triplicate.

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

SPLP Leachable Metals

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-07-18
Parameter	Unit	G / S	RDL	8567329
Aluminum Leachate	mg/L		0.02	0.12
Antimony Leachate	mg/L		0.006	<0.006
Arsenic Leachate	mg/L		0.005	0.009
Barium Leachate	mg/L		0.02	<0.02
Beryllium Leachate	mg/L		0.05	<0.05
Bismuth Leachate	mg/L		0.02	<0.02
Boron Leachate	mg/L		0.05	1.02
Cadmium Leachate	mg/L		0.0001	<0.0001
Chromium Leachate	mg/L		0.02	<0.02
Cobalt Leachate	mg/L		0.01	<0.01
Copper Leachate	mg/L		0.002	<0.002
Iron Leachate	mg/L		0.2	0.4
Lead Leachate	mg/L		0.001	<0.001
Lithium Leachate	mg/L		0.02	<0.02
Magnesium Leachate	mg/L		0.05	20.9
Manganese Leachate	mg/L		0.02	<0.02
Molybdenum Leachate	mg/L		0.02	0.03
Nickel Leachate	mg/L		0.02	<0.02
Selenium Leachate	mg/L		0.001	0.012
Silver Leachate	mg/L		0.0001	<0.0001
Sodium Leachate	mg/L		200	414
Strontium Leachate	mg/L		0.02	0.14
Thallium Leachate	mg/L		0.0008	<0.0008
Tin Leachate	mg/L		0.02	<0.02
Uranium Leachate	mg/L		0.001	0.001
Vanadium Leachate	mg/L		0.02	<0.02
Zinc Leachate	mg/L		0.02	<0.02
Initial pH	NA		NA	NA
Final pH	NA		NA	8.29
% Moisture	%			61

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

SPLP Leachable Metals

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-07-18
Parameter	Unit	G / S	RDL	8567329
Total Sample Mass	g			64.21
Hardness	mg/L		0.7	111

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

pH in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

				SAMPLE DESCRIPTION:	VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
				SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED:	2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL		8567169	8567313	8567321	8567329	8567336
pH					8.20	8.84	7.25	8.10	8.56

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - Atlantic RBCA Tier 1 Hydrocarbons in Soil - Field Preserved + Silica Gel + Creosote

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Benzene - by Headspace	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene - bt Headspace	mg/kg		0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Ethylbenzene - by Headspace	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylene (Total) - by Headspace	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6-C10 (less BTEX) - by Headspace	mg/kg		3	<3	<3	<3	<3	<3
>C10-C16 Hydrocarbons - 1X silica gel	mg/kg		15	<15	<15	<15	<15	<15
>C16-C21 Hydrocarbons - 1X silica gel	mg/kg		15	<15	<15	<15	19	<15
>C21-C32 Hydrocarbons - 1X silica gel	mg/kg		15	<15	<15	<15	25	<15
Modified TPH (Tier 1) - 1X silica gel	mg/kg		20	<20	<20	<20	44	<20
Resemblance Comment				NR	NR	NR	UC	NR
Creosote Comment				N	N	N	N	N
Return to Baseline at C32				Y	Y	Y	Y	Y
Silica Gel Cleanup				Y	Y	Y	Y	Y
Surrogate	Unit	Acceptable Limits						
Isobutylbenzene - EPH	%	60-140		114	117	133	128	121
Isobutylbenzene - VPH	%	60-140		91	74	93	104	102
n-Dotriacontane - EPH	%	60-140		127	126	140	139	131

Certified By: Kelly Hogue

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - Atlantic RBCA Tier 1 Hydrocarbons in Soil - Field Preserved + Silica Gel + Creosote

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8567169-8567336 Results are based on the dry weight of the soil.

Resemblance Comment Key:
GF - Gasoline Fraction
WGF - Weathered Gasoline Fraction
GR - Product in Gasoline Range
FOF - Fuel Oil Fraction
WFOF - Weathered Fuel Oil Fraction
FR - Product in Fuel Oil Range
LOF - Lube Oil Fraction
LR - Lube Range
UC - Unidentified Compounds
NR - No Resemblance
NA - Not Applicable

Certified By: Kelly Hogue

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - DDT in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Dieldrin	µg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o,p'-DDD	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o,p'-DDE	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o,p'-DDT	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
p,p'-DDD	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
p,p'-DDE	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
p,p'-DDT	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o,p'-DDT + p,p'-DDT	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o,p'-DDD + p,p'-DDD	ug/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o,p'-DDE + p,p'-DDE	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total DDT	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Kelly Hogue

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - Polycyclic Aromatic Hydrocarbons in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
1-Methylnaphthalene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	mg/kg		0.00671	<0.00671	<0.00671	<0.00671	0.0097	0.0153
Acenaphthylene	mg/kg		0.004	<0.004	<0.004	0.024	0.030	0.014
Acridine	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	mg/kg		0.03	<0.03	<0.03	0.06	0.10	0.17
Benzo(a)anthracene	mg/kg		0.01	<0.01	<0.01	0.24	0.52	0.31
Benzo(a)pyrene	mg/kg		0.01	<0.01	<0.01	0.13	0.35	0.18
Benzo(b)fluoranthene	mg/kg		0.05	<0.05	<0.05	0.24	0.37	0.19
Benzo(b+j)fluoranthene	mg/kg		0.1	<0.1	<0.1	0.3	0.6	0.3
Benzo(e)pyrene	mg/kg		0.05	<0.05	<0.05	0.17	0.29	0.15
Benzo(ghi)perylene	mg/kg		0.01	<0.01	<0.01	0.08	0.17	0.10
Benzo(k)fluoranthene	mg/kg		0.01	<0.01	<0.01	0.11	0.19	0.10
Chrysene	mg/kg		0.01	<0.01	<0.01	0.30	0.52	0.41
Dibenzo(a,h)anthracene	mg/kg		0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Fluoranthene	mg/kg		0.05	<0.05	<0.05	1.19	1.96	1.70
Fluorene	mg/kg		0.01	<0.01	<0.01	<0.01	0.02	0.01
Indeno(1,2,3)pyrene	mg/kg		0.01	<0.01	<0.01	0.10	0.18	0.11
Naphthalene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perylene	mg/kg		0.05	<0.05	<0.05	0.05	0.13	0.06
Phenanthrene	mg/kg		0.03	<0.03	<0.03	<0.03	0.07	0.12
Pyrene	mg/kg		0.05	<0.05	<0.05	0.74	1.21	1.00
Quinoline	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH	mg/Kg		0.5	<0.5	<0.5	2.5	4.5	3.4
Surrogate	Unit	Acceptable Limits						
Nitrobenzene-d5	%	50-140		78	85	81	90	97
2-Fluorobiphenyl	%	50-140		75	82	86	96	94
Terphenyl-d14	%	50-140		93	83	83	96	113

Certified By: Kelly Hogue

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Certificate of Analysis

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - Polycyclic Aromatic Hydrocarbons in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8567169-8567336 Results are based on the dry weight of the soil.

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Englobe - P-0011130 - Total Polychlorinated Biphenyls in Soil

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
Total Polychlorinated Biphenyls	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8567169-8567336 Results are based on the dry weight of the soil.

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Moisture

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

SAMPLE DESCRIPTION:				VC-SED1	VC-SED2	VC-SED3	VC-SED4	VC-SED5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-07-18	2017-07-18	2017-07-18	2017-07-18	2017-07-18
Parameter	Unit	G / S	RDL	8567169	8567313	8567321	8567329	8567336
% Moisture	%			28	27	47	61	43

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Polycyclic Aromatic Hydrocarbons - In-house Leachate

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-07-18
Parameter	Unit	G / S	RDL	8567329
1-Methylnaphthalene	ug/L		0.08	<0.08
2-Methylnaphthalene	ug/L		0.03	<0.03
Acenaphthene	ug/L		0.01	0.04
Acenaphthylene	ug/L		0.02	<0.02
Anthracene	ug/L		0.012	<0.012
Benzo(a)anthracene	ug/L		0.018	0.02
Benzo(a)pyrene	ug/L		0.015	<0.015
Benzo(b)fluoranthene	ug/L		0.05	<0.05
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01
Benzo(ghi)perylene	ug/L		0.03	<0.03
Benzo(k)fluoranthene	ug/L		0.03	<0.03
Chrysene	ug/L		0.04	<0.04
Dibenzo(a,h)anthracene	ug/L		0.01	<0.01
Fluoranthene	ug/L		0.03	0.75
Fluorene	ug/L		0.05	<0.05
Indeno(1,2,3-cd)pyrene	ug/L		0.08	<0.08
Naphthalene	ug/L		0.02	<0.02
Perylene	ug/L		0.06	<0.06
Phenanthrene	ug/L		0.04	<0.04
Pyrene	ug/L		0.01	0.38
Acridine	ug/L		0.10	<0.10
Benzo(e)pyrene	ug/L		0.06	<0.06
Surrogate	Unit	Acceptable Limits		
Nitrobenzene-d5	%	50-140		62
2-Fluorobiphenyl	%	50-140		62
Terphenyl-d14	%	50-140		67

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

CLIENT NAME: ENGLOBE CORP

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Polycyclic Aromatic Hydrocarbons in SPLP Leachate

DATE RECEIVED: 2017-07-19

DATE REPORTED: 2017-08-11

		SAMPLE DESCRIPTION:		VC-SED4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-07-18
Parameter	Unit	G / S	RDL	8567329
1-Methylnaphthalene	ug/L		0.01	<0.01
2-Methylnaphthalene	ug/L		0.01	<0.01
Acenaphthene	ug/L		0.04	<0.04
Acenaphthylene	ug/L		0.04	<0.04
Anthracene	ug/L		0.012	<0.012
Benzo(a)anthracene	ug/L		0.018	0.02
Benzo(a)pyrene	ug/L		0.01	<0.01
Benzo(b)fluoranthene	ug/L		0.05	<0.05
Benzo(b+j)fluoranthene	µg/L		0.01	<0.01
Benzo(e)pyrene	ug/L		0.06	<0.06
Benzo(ghi)perylene	ug/L		0.02	<0.02
Benzo(k)fluoranthene	ug/L		0.04	<0.04
Chrysene	ug/L		0.04	<0.04
Dibenzo(a,h)anthracene	ug/L		0.01	<0.01
Fluoranthene	ug/L		0.03	0.83
Fluorene	ug/L		0.01	<0.01
Indeno(1,2,3-cd)pyrene	ug/L		0.04	<0.04
Naphthalene	ug/L		0.01	<0.01
Perylene	ug/L		0.05	<0.05
Phenanthrene	ug/L		0.02	<0.02
Pyrene	ug/L		0.01	0.42
Total PAH	µg/L		2	<2
Surrogate	Unit	Acceptable Limits		
Nitrobenzene-d5	%	50-140		63
2-Fluorobiphenyl	%	50-140		62
Terphenyl-d14	%	50-140		67

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Aug 11, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Grain Size Analysis (Sieve & Pipette)															
Particle Size Distribution (<12.5mm, -4 PHI)	1	7336	97.5	100	2.5%	< 0.1		60%	140%						
Particle Size Distribution (<9.5mm, -3 PHI)	1	7336	96.7	94.9	1.9%	< 0.1		60%	140%						
Particle Size Distribution (<4.75mm, -2 PHI	1	7336	94.1	89.9	4.6%	< 0.1		60%	140%						
Particle Size Distribution (<2mm, -1 PHI)	1	7336	91.2	88.1	3.5%	< 0.1		60%	140%						
Particle Size Distribution (<1mm, 0 PHI)	1	7336	89.9	87.1	3.2%	< 0.1		60%	140%						
Particle Size Distribution (<1/2mm, 1 PHI)	1	7336	87.8	84.9	3.4%	< 0.1		60%	140%						
Particle Size Distribution (<1/4mm, 2 PHI)	1	7336	73.1	71.1	2.8%	< 0.1		60%	140%						
Particle Size Distribution (<1/8mm, 3 PHI)	1	7336	52.6	50.1	4.9%	< 0.1		60%	140%						
Particle Size Distribution (<1/16mm, 4 PHI)	1	7336	38.7	39.8	2.8%	< 0.1		60%	140%						
Particle Size Distribution (<1/32mm, 5 PHI)	1	7336	35.1	36.3	3.4%	< 0.1		60%	140%						
Particle Size Distribution (<1/64mm, 6 PHI)	1	7336	28.4	29.0	2.1%	< 0.1		60%	140%						
Particle Size Distribution (<1/128mm, 7 PHI)	1	7336	22.1	22.6	2.2%	< 0.1		60%	140%						
Particle Size Distribution (<1/256mm, 8 PHI)	1	7336	19.9	20.4	2.5%	< 0.1		60%	140%						
Particle Size Distribution (<1/512mm, 9 PHI)	1	7336	17.6	18.0	2.2%	< 0.1		60%	140%						
Particle Size Distribution (Gravel)	1	7336	9	12	28.6%	< 1		60%	140%						
Particle Size Distribution (Sand)	1	7336	53	48	9.9%	< 1	120%	60%	140%						
Particle Size Distribution (Silt)	1	7336	19	19	0.0%	< 1	86%	60%	140%						
Particle Size Distribution (Clay)	1	7336	20	20	0.0%	< 1	114%	60%	140%						
Particles >75um	1	7336	58	58	0.0%	< 1									
Classification	1	7336	Coarse	Coarse	0.0%	<									
Available Metals & Hg in Soil															
Aluminum	7212017		9200	8990	2.3%	< 10	105%	80%	120%	109%	80%	120%	112%	70%	130%
Antimony	7212017		< 1	< 1	NA	< 1	99%	80%	120%	92%	80%	120%	NA	70%	130%
Arsenic	7212017		7	7	0.0%	< 1	95%	80%	120%	101%	80%	120%	93%	70%	130%
Barium	7212017		38	39	2.6%	< 5	98%	80%	120%	101%	80%	120%	103%	70%	130%
Beryllium	7212017		< 2	< 2	NA	< 2	106%	80%	120%	113%	80%	120%	106%	70%	130%
Boron	7212017		< 2	< 2	NA	< 2	108%	80%	120%	111%	80%	120%	104%	70%	130%
Cadmium	7212017		< 0.3	< 0.3	NA	< 0.3	98%	80%	120%	103%	80%	120%	95%	70%	130%
Chromium	7212017		9	8	NA	< 2	98%	80%	120%	101%	80%	120%	106%	70%	130%
Cobalt	7212017		4	4	NA	< 1	101%	80%	120%	104%	80%	120%	103%	70%	130%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP
AGAT WORK ORDER: 17X238910
PROJECT: P-0011130-0-19-200
ATTENTION TO: Christina Caldwell
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Aug 11, 2017

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Copper	7212017		11	11	0.0%	< 2	103%	80%	120%	108%	80%	120%	102%	70%	130%
Iron	7212017		14700	14300	2.8%	< 50	101%	80%	120%	105%	80%	120%	101%	70%	130%
Lead	7212017		40.0	42.1	5.1%	< 0.5	103%	80%	120%	108%	80%	120%	97%	70%	130%
Lithium	7212017		11	12	NA	< 5	103%	70%	130%	113%	70%	130%	98%	70%	130%
Manganese	7212017		440	431	2.1%	< 2	100%	80%	120%	105%	80%	120%	101%	70%	130%
Molybdenum	7212017		3	3	NA	< 2	98%	80%	120%	100%	80%	120%	90%	70%	130%
Nickel	7212017		5	4	NA	< 2	103%	80%	120%	108%	80%	120%	104%	70%	130%
Selenium	7212017		< 1	< 1	NA	< 1	98%	80%	120%	103%	80%	120%	89%	70%	130%
Silver	7212017		< 0.5	< 0.5	NA	< 0.5	102%	80%	120%	104%	80%	120%	93%	70%	130%
Strontium	7212017		7	7	NA	< 5	97%	80%	120%	103%	80%	120%	103%	70%	130%
Thallium	7212017		< 0.1	< 0.1	NA	< 0.1	103%	80%	120%	111%	80%	120%	82%	70%	130%
Tin	7212017		3	3	NA	< 2	95%	80%	120%	100%	80%	120%	84%	70%	130%
Uranium	7212017		0.5	0.5	0.0%	< 0.1	102%	80%	120%	104%	80%	120%	103%	70%	130%
Vanadium	7212017		27	29	7.1%	< 2	95%	80%	120%	100%	80%	120%	105%	70%	130%
Zinc	7212017		39	39	0.0%	< 5	100%	80%	120%	105%	80%	120%	102%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

pH in Soil															
pH	1	8563717	4.03	3.86	4.3%	<	102%	80%	120%						
Inorganic Chemistry (Soil)															
Electrical Conductivity	8578291		2.40	2.58	7.2%	< 0.005	95%	90%	110%						
Sodium Adsorption Ratio	8580045		0.105	0.096	9.5%	NA									

Comments: NA signifies Not Applicable.

In-house Leachable Metals															
Aluminum Leachate	8042017	8567329	0.04	0.03	NA	< 0.02	108%	80%	120%	106%	80%	120%	101%	70%	130%
Antimony Leachate	8042017	8567329	< 0.006	< 0.006	NA	< 0.006	93%	80%	120%	87%	80%	120%	83%	70%	130%
Arsenic Leachate	8042017	8567329	0.027	0.026	3.8%	< 0.005	103%	80%	120%	98%	80%	120%	95%	70%	130%
Barium Leachate	8042017	8567329	0.09	0.09	NA	< 0.02	101%	80%	120%	98%	80%	120%	95%	70%	130%
Beryllium Leachate	8042017	8567329	< 0.05	< 0.05	NA	< 0.05	108%	80%	120%	109%	80%	120%	100%	70%	130%
Bismuth Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	98%	80%	120%	106%	80%	120%	91%	70%	130%
Boron Leachate	8042017	8567329	2.00	2.04	2.0%	< 0.05	107%	80%	120%	110%	80%	120%	96%	70%	130%
Cadmium Leachate	8042017	8567329	< 0.0001	< 0.0001	NA	< 0.0001	99%	80%	120%	95%	80%	120%	93%	70%	130%
Chromium Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	93%	80%	120%	93%	80%	120%	101%	70%	130%
Cobalt Leachate	8042017	8567329	< 0.01	< 0.01	NA	< 0.01	96%	80%	120%	95%	80%	120%	102%	70%	130%
Copper Leachate	8042017	8567329	< 0.002	< 0.002	NA	< 0.002	101%	80%	120%	96%	80%	120%	99%	70%	130%
Iron Leachate	8042017	8567329	14.5	15.2	4.7%	< 0.2	95%	80%	120%	98%	80%	120%	93%	70%	130%
Lead Leachate	8042017	8567329	< 0.001	< 0.001	NA	< 0.001	105%	80%	120%	103%	80%	120%	101%	70%	130%
Lithium Leachate	8042017	8567329	0.03	0.03	NA	< 0.02	107%	80%	120%	110%	80%	120%	105%	70%	130%

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PROJECT: P-0011130-0-19-200
SAMPLING SITE:

AGAT WORK ORDER: 17X238910
ATTENTION TO: Christina Caldwell
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Aug 11, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Manganese Leachate	8042017	8567329	0.54	0.55	1.8%	< 0.02	94%	80%	120%	91%	80%	120%	86%	70%	130%
Molybdenum Leachate	8042017	8567329	0.02	0.02	NA	< 0.02	92%	80%	120%	94%	80%	120%	103%	70%	130%
Nickel Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	98%	80%	120%	96%	80%	120%	101%	70%	130%
Selenium Leachate	8042017	8567329	0.015	0.014	6.9%	< 0.001	112%	80%	120%	102%	80%	120%	92%	70%	130%
Silver Leachate	8042017	8567329	0.0005	0.0001	NA	< 0.0001	97%	80%	120%	98%	80%	120%	94%	70%	130%
Strontium Leachate	8042017	8567329	0.88	0.90	2.2%	< 0.02	95%	80%	120%	94%	80%	120%	86%	70%	130%
Thallium Leachate	8042017	8567329	< 0.0008	< 0.0008	NA	< 0.0008	104%	80%	120%	106%	80%	120%	101%	70%	130%
Tin Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	97%	80%	120%	97%	80%	120%	99%	70%	130%
Uranium Leachate	8042017	8567329	< 0.001	< 0.001	NA	< 0.001	102%	80%	120%	101%	80%	120%	102%	70%	130%
Vanadium Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	92%	80%	120%	92%	80%	120%	107%	70%	130%
Zinc Leachate	8042017	8567329	< 0.02	< 0.02	NA	< 0.02	102%	80%	120%	99%	80%	120%	93%	70%	130%
SPLP Leachable Metals															
Aluminum Leachate	8042017	8567329	0.12	0.23	62.9%	< 0.02	108%	80%	120%	106%	80%	120%	105%	70%	130%
Antimony Leachate	8042017	8567329	< 0.006	< 0.006	0.0%	< 0.006	93%	80%	120%	87%	80%	120%	86%	70%	130%
Arsenic Leachate	8042017	8567329	0.009	0.011	20.0%	< 0.005	103%	80%	120%	98%	80%	120%	96%	70%	130%
Barium Leachate	8042017	8567329	< 0.02	0.03	NA	< 0.02	101%	80%	120%	98%	80%	120%	97%	70%	130%
Beryllium Leachate	8042017	8567329	< 0.05	< 0.05	0.0%	< 0.05	108%	80%	120%	109%	80%	120%	98%	70%	130%
Bismuth Leachate	8042017	8567329	< 0.02	< 0.02	0.0%	< 0.02	98%	80%	120%	106%	80%	120%	100%	70%	130%
Boron Leachate	8042017	8567329	1.02	1.19	15.4%	< 0.05	107%	80%	120%	110%	80%	120%	89%	70%	130%
Cadmium Leachate	8042017	8567329	< 0.0001	0.0004	NA	< 0.0001	99%	80%	120%	95%	80%	120%	94%	70%	130%
Chromium Leachate	8042017	8567329	< 0.02	< 0.02	0.0%	< 0.02	93%	80%	120%	93%	80%	120%	101%	70%	130%
Cobalt Leachate	8042017	8567329	< 0.01	< 0.01	0.0%	< 0.01	96%	80%	120%	95%	80%	120%	101%	70%	130%
Copper Leachate	8042017	8567329	< 0.002	0.011	NA	< 0.002	101%	80%	120%	96%	80%	120%	101%	70%	130%
Iron Leachate	8042017	8567329	0.4	< 0.2	NA	< 0.2	95%	80%	120%	98%	80%	120%	102%	70%	130%
Lead Leachate	8042017	8567329	< 0.001	0.005	NA	< 0.001	105%	80%	120%	103%	80%	120%	101%	70%	130%
Lithium Leachate	8042017	8567329	< 0.02	0.06	NA	< 0.02	107%	80%	120%	110%	80%	120%	101%	70%	130%
Magnesium Leachate	8042017	8567329	20.9	20.8	0.5%	< 0.05	107%	80%	120%	104%	70%	130%	93%	70%	130%
Manganese Leachate	8042017	8567329	< 0.02	< 0.02	0.0%	< 0.02	94%	80%	120%	91%	80%	120%	98%	70%	130%
Molybdenum Leachate	8042017	8567329	0.03	0.03	0.0%	< 0.02	92%	80%	120%	94%	80%	120%	100%	70%	130%
Nickel Leachate	8042017	8567329	< 0.02	< 0.02	0.0%	< 0.02	98%	80%	120%	96%	80%	120%	99%	70%	130%
Selenium Leachate	8042017	8567329	0.012	0.023	NA	< 0.001	112%	80%	120%	102%	80%	120%	86%	70%	130%
Silver Leachate	8042017	8567329	< 0.0001	0.0008	NA	< 0.0001	97%	80%	120%	98%	80%	120%	98%	70%	130%
Sodium Leachate	8042017	8567329	414	438	NA	< 200	107%	80%	120%	105%	80%	120%	NA	70%	130%
Strontium Leachate	8042017	8567329	0.14	0.14	0.0%	< 0.02	95%	80%	120%	94%	80%	120%	99%	70%	130%
Thallium Leachate	8042017	8567329	< 0.0008	< 0.0008	0.0%	< 0.0008	104%	80%	120%	106%	80%	120%	104%	70%	130%
Tin Leachate	8042017	8567329	< 0.02	< 0.02	0.0%	< 0.02	97%	80%	120%	97%	80%	120%	98%	70%	130%
Uranium Leachate	8042017	8567329	0.001	0.002	NA	< 0.001	102%	80%	120%	101%	80%	120%	106%	70%	130%
Vanadium Leachate	8042017	8567329	0.02	0.02	0.0%	< 0.02	92%	80%	120%	92%	80%	120%	100%	70%	130%
Zinc Leachate	8042017	8567329	< 0.02	0.06	NA	< 0.02	102%	80%	120%	99%	80%	120%	91%	70%	130%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Aug 11, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

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Quality Assurance

CLIENT NAME: ENGLOBE CORP
AGAT WORK ORDER: 17X238910
PROJECT: P-0011130-0-19-200
ATTENTION TO: Christina Caldwell
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Aug 11, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Englobe - P-0011130 - Atlantic RBCA Tier 1 Hydrocarbons in Soil - Field Preserved + Silica Gel + Creosote															
Benzene - by Headspace	1	8567169	< 0.005	< 0.005	NA	< 0.005	72%	60%	140%	95%	60%	140%			
Toluene - bt Headspace	1	8567169	< 0.025	< 0.025	NA	< 0.025	73%	60%	140%	92%	60%	140%			
Ethylbenzene - by Headspace	1	8567169	< 0.01	< 0.01	NA	< 0.01	81%	60%	140%	98%	60%	140%			
Xylene (Total) - by Headspace	1	8567169	< 0.05	< 0.05	NA	< 0.05	72%	60%	140%	84%	60%	140%			
C6-C10 (less BTEX) - by Headspace	1	8567169	< 3	< 3	NA	< 3	89%	60%	140%	80%	60%	140%	NA	30%	130%
>C10-C16 Hydrocarbons - 1X silica gel	1	8561854	< 15	< 15	NA	< 15	100%	60%	140%	109%	60%	140%	125%	30%	130%
>C16-C21 Hydrocarbons - 1X silica gel	1	8561854	< 15	< 15	NA	< 15	101%	60%	140%	109%	60%	140%	125%	30%	130%
>C21-C32 Hydrocarbons - 1X silica gel	1	8561854	< 15	< 15	NA	< 15	101%	60%	140%	109%	60%	140%	125%	30%	130%
Englobe - P-0011130 - Polycyclic Aromatic Hydrocarbons in Soil															
1-Methylnaphthalene	1	8564878	< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	71%	50%	140%	81%	50%	140%
2-Methylnaphthalene	1	8564878	< 0.01	< 0.01	NA	< 0.01	96%	50%	140%	70%	50%	140%	79%	50%	140%
Acenaphthene	1	8564878	< 0.00671	< 0.00671	NA	< 0.00671	98%	50%	140%	71%	50%	140%	78%	50%	140%
Acenaphthylene	1	8564878	< 0.004	< 0.004	NA	< 0.004	93%	50%	140%	66%	50%	140%	77%	50%	140%
Acridine	1	8564878	< 0.05	< 0.05	NA	< 0.05	77%	50%	140%	57%	50%	140%	63%	50%	140%
Anthracene	1	8564878	< 0.03	< 0.03	NA	< 0.03	92%	50%	140%	64%	50%	140%	68%	50%	140%
Benzo(a)anthracene	1	8564878	0.04	0.03	NA	< 0.01	90%	50%	140%	62%	50%	140%	70%	50%	140%
Benzo(a)pyrene	1	8564878	0.03	0.03	NA	< 0.01	84%	50%	140%	61%	50%	140%	63%	50%	140%
Benzo(b)fluoranthene	1	8564878	0.07	0.06	NA	< 0.05	91%	50%	140%	68%	50%	140%	79%	50%	140%
Benzo(b+j)fluoranthene	1	8564878	< 0.1	< 0.1	NA	< 0.1	78%	50%	140%	69%	50%	140%	73%	50%	140%
Benzo(e)pyrene	1	8564878	0.06	0.06	NA	< 0.05	87%	50%	140%	71%	50%	140%	73%	50%	140%
Benzo(ghi)perylene	1	8564878	0.04	0.04	NA	< 0.01	92%	50%	140%	65%	50%	140%	88%	50%	140%
Benzo(k)fluoranthene	1	8564878	0.03	0.03	NA	< 0.01	70%	50%	140%	56%	50%	140%	57%	50%	140%
Chrysene	1	8564878	0.06	0.06	0.0%	< 0.01	97%	50%	140%	68%	50%	140%	77%	50%	140%
Dibenzo(a,h)anthracene	1	8564878	< 0.006	< 0.006	NA	< 0.006	75%	50%	140%	54%	50%	140%	62%	50%	140%
Fluoranthene	1	8564878	0.08	0.08	NA	< 0.05	95%	50%	140%	67%	50%	140%	74%	50%	140%
Fluorene	1	8564878	< 0.01	< 0.01	NA	< 0.01	93%	50%	140%	68%	50%	140%	76%	50%	140%
Indeno(1,2,3)pyrene	1	8564878	0.04	0.04	NA	< 0.01	77%	50%	140%	59%	50%	140%	65%	50%	140%
Naphthalene	1	8564878	< 0.01	< 0.01	NA	< 0.01	98%	50%	140%	72%	50%	140%	81%	50%	140%
Perylene	1	8564878	0.16	0.14	NA	< 0.05	95%	50%	140%	73%	50%	140%	78%	50%	140%
Phenanthrene	1	8564878	< 0.03	< 0.03	NA	< 0.03	95%	50%	140%	68%	50%	140%	76%	50%	140%
Pyrene	1	8564878	0.09	0.10	NA	< 0.05	94%	50%	140%	69%	50%	140%	72%	50%	140%
Quinoline	1	8564878	< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	57%	50%	140%	69%	50%	140%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

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Quality Assurance

CLIENT NAME: ENGLOBE CORP
AGAT WORK ORDER: 17X238910
PROJECT: P-0011130-0-19-200
ATTENTION TO: Christina Caldwell
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Aug 11, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution. If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Englobe - P-0011130 - Total Polychlorinated Biphenyls in Soil															
Total Polychlorinated Biphenyls	1	8567169	< 0.02	< 0.02	NA	< 0.02	91%	70%	130%	90%	60%	130%	106%	60%	130%
Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution. If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Englobe - P-0011130 - DDT in Soil															
Dieldrin	1	8567169	< 0.5	< 0.5	NA	< 0.5	80%	60%	130%	88%	70%	130%	72%	60%	130%
o,p'-DDD	1	8567169	< 1.0	< 1.0	NA	< 1.0	83%	60%	130%	89%	70%	130%	74%	60%	130%
o,p'-DDE	1	8567169	< 1.0	< 1.0	NA	< 1.0	80%	60%	130%	88%	70%	130%	72%	60%	130%
o,p'-DDT	1	8567169	< 1.0	< 1.0	NA	< 1.0	91%	60%	130%	104%	70%	130%	71%	60%	130%
p,p'-DDD	1	8567169	< 1.0	< 1.0	NA	< 1.0	85%	60%	130%	104%	70%	130%	90%	60%	130%
p,p'-DDE	1	8567169	< 1.0	< 1.0	NA	< 1.0	76%	60%	130%	93%	70%	130%	78%	60%	130%
p,p'-DDT	1	8567169	< 1.0	< 1.0	NA	< 1.0	86%	60%	130%	112%	70%	130%	80%	60%	130%
Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution. If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Polycyclic Aromatic Hydrocarbons - In-house Leachate															
1-Methylnaphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.08	102%	50%	140%	78%	50%	140%	70%	50%	140%
2-Methylnaphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.03	100%	50%	140%	77%	50%	140%	71%	50%	140%
Acenaphthene	1	8597217	< 0.01	< 0.01	NA	< 0.01	102%	50%	140%	70%	50%	140%	69%	50%	140%
Acenaphthylene	1	8597217	< 0.01	< 0.01	NA	< 0.02	98%	50%	140%	70%	50%	140%	69%	50%	140%
Anthracene	1	8597217	< 0.012	< 0.012	NA	< 0.012	94%	50%	140%	61%	50%	140%	58%	50%	140%
Benzo(a)anthracene	1	8597217	< 0.018	< 0.018	NA	< 0.018	88%	50%	140%	61%	50%	140%	58%	50%	140%
Benzo(a)pyrene	1	8597217	< 0.010	< 0.010	NA	< 0.015	112%	50%	140%	73%	50%	140%	61%	50%	140%
Benzo(b)fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.05	81%	50%	140%	71%	50%	140%	59%	50%	140%
Benzo(b+j)fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.01	78%	50%	140%	66%	50%	140%	59%	50%	140%
Benzo(ghi)perylene	1	8597217	< 0.01	< 0.01	NA	< 0.03	116%	50%	140%	76%	50%	140%	63%	50%	140%
Benzo(k)fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.03	101%	50%	140%	69%	50%	140%	58%	50%	140%
Chrysene	1	8597217	< 0.01	< 0.01	NA	< 0.04	105%	50%	140%	69%	50%	140%	68%	50%	140%
Dibenzo(a,h)anthracene	1	8597217	< 0.01	< 0.01	NA	< 0.01	104%	50%	140%	74%	50%	140%	62%	50%	140%
Fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.03	90%	50%	140%	64%	50%	140%	61%	50%	140%
Fluorene	1	8597217	< 0.01	< 0.01	NA	< 0.05	97%	50%	140%	70%	50%	140%	68%	50%	140%
Indeno(1,2,3-cd)pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.08	89%	50%	140%	76%	50%	140%	59%	50%	140%
Naphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.02	104%	50%	140%	77%	50%	140%	69%	50%	140%
Perylene	1	8597217	< 0.01	< 0.01	NA	< 0.06	125%	50%	140%	78%	50%	140%	65%	50%	140%
Phenanthrene	1	8597217	< 0.01	< 0.01	NA	< 0.04	101%	50%	140%	61%	50%	140%	57%	50%	140%
Pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.01	92%	50%	140%	64%	50%	140%	60%	50%	140%
Acridine	1	8597217	< 0.01	< 0.01	NA	< 0.10	82%	50%	140%	61%	50%	140%	58%	50%	140%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP
AGAT WORK ORDER: 17X238910
PROJECT: P-0011130-0-19-200
ATTENTION TO: Christina Caldwell
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Aug 11, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Benzo(e)pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.06	109%	50%	140%	68%	50%	140%	57%	50%	140%
Polycyclic Aromatic Hydrocarbons in SPLP Leachate															
1-Methylnaphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.01	102%	50%	140%	78%	50%	140%	70%	50%	140%
2-Methylnaphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.01	100%	50%	140%	77%	50%	140%	71%	50%	140%
Acenaphthene	1	8597217	< 0.01	< 0.01	NA	< 0.04	102%	50%	140%	70%	50%	140%	69%	50%	140%
Acenaphthylene	1	8597217	< 0.01	< 0.01	NA	< 0.04	98%	50%	140%	70%	50%	140%	69%	50%	140%
Anthracene	1	8597217	< 0.012	< 0.012	NA	< 0.012	94%	50%	140%	61%	50%	140%	58%	50%	140%
Benzo(a)anthracene	1	8597217	< 0.018	< 0.018	NA	< 0.018	88%	50%	140%	61%	50%	140%	58%	50%	140%
Benzo(a)pyrene	1	8597217	< 0.010	< 0.010	NA	< 0.01	112%	50%	140%	73%	50%	140%	61%	50%	140%
Benzo(b)fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.05	81%	50%	140%	71%	50%	140%	59%	50%	140%
Benzo(e)pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.06	109%	50%	140%	68%	50%	140%	57%	50%	140%
Benzo(ghi)perylene	1	8597217	< 0.01	< 0.01	NA	< 0.02	116%	50%	140%	76%	50%	140%	63%	50%	140%
Benzo(k)fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.04	101%	50%	140%	69%	50%	140%	58%	50%	140%
Chrysene	1	8597217	< 0.01	< 0.01	NA	< 0.04	105%	50%	140%	69%	50%	140%	68%	50%	140%
Dibenzo(a,h)anthracene	1	8597217	< 0.01	< 0.01	NA	< 0.01	104%	50%	140%	74%	50%	140%	62%	50%	140%
Fluoranthene	1	8597217	< 0.01	< 0.01	NA	< 0.03	90%	50%	140%	64%	50%	140%	61%	50%	140%
Fluorene	1	8597217	< 0.01	< 0.01	NA	< 0.01	97%	50%	140%	70%	50%	140%	68%	50%	140%
Indeno(1,2,3-cd)pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.04	89%	50%	140%	76%	50%	140%	59%	50%	140%
Naphthalene	1	8597217	< 0.01	< 0.01	NA	< 0.01	104%	50%	140%	77%	50%	140%	69%	50%	140%
Perylene	1	8597217	< 0.01	< 0.01	NA	< 0.05	125%	50%	140%	78%	50%	140%	65%	50%	140%
Phenanthrene	1	8597217	< 0.01	< 0.01	NA	< 0.02	101%	50%	140%	61%	50%	140%	57%	50%	140%
Pyrene	1	8597217	< 0.01	< 0.01	NA	< 0.01	92%	50%	140%	64%	50%	140%	60%	50%	140%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
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Certified By: Kelly Hogue

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Method Summary

CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Antimony	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Arsenic	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Barium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Beryllium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Boron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cadmium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Chromium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cobalt	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Copper	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Iron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Lead	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP-MS
Lithium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP-MS
Manganese	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Molybdenum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Nickel	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Selenium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Silver	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Strontium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Thallium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Tin	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Uranium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Vanadium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Zinc	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Mercury	MET-121-6101 & MET-121-6107	EPA 245.5	CVAAS
Particle Size Distribution (<12.5mm, -4 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<9.5mm, -3 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<4.75mm, -2 PHI	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<2mm, -1 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1mm, 0 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE

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Method Summary

CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Particle Size Distribution (<1/2mm, 1 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/4mm, 2 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/8mm, 3 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/16mm, 4 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/32mm, 5 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/64mm, 6 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/128mm, 7 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/256mm, 8 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/512mm, 9 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Gravel)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Sand)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Silt)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Clay)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particles >75um	INOR-121-6031, INOR-121-6034	ASTM D-422-63	CALCULATED
Classification	INOR-121-6031, INOR-121-6031	Atlantic RBCA	CALCULATED
Chromium, Hexavalent	INOR-121-6029	SSSA 5;25 p. 683	SPECTROPHOTOMETER
Aluminum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Antimony Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Arsenic Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Barium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Beryllium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Bismuth Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Boron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cadmium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Chromium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cobalt Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Copper Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Iron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lead Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lithium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Manganese Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Molybdenum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Nickel Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Selenium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS

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Method Summary

CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Silver Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Strontium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Thallium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Tin Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Uranium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Vanadium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Zinc Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
Fraction Organic Carbon-1	INOR-93-6062	Skjemstad & Baldock, 2008 & Walkley & Balck 1934	SPECTROPHOTOMETER
Fraction Organic Carbon-2	INOR-93-6062	Skjemstad & Baldock, 2008 & Walkley & Balck 1934	SPECTROPHOTOMETER
Fraction Organic Carbon-3	INOR-93-6062	Skjemstad & Baldock, 2008 & Walkley & Balck 1934	SPECTROPHOTOMETER
Fraction Organic Carbon-Avg	INOR-93-6062	Skjemstad & Baldock, 2008 & Walkley & Balck 1934	SPECTROPHOTOMETER
Magnesium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Sodium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Initial pH	MET-121-6108		pH METER
Final pH	MET-121-6108		pH METER
% Moisture			GRAVIMETRIC
Total Sample Mass			
Hardness		SM 2340B	CALCULATION
pH	INOR-121-6006	modified from Canadian Society of Soil Science p15	pH METER

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Method Summary

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AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene - by Headspace	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Toluene - bt Headspace	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Ethylbenzene - by Headspace	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Xylene (Total) - by Headspace	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
C6-C10 (less BTEX) - by Headspace	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
>C10-C16 Hydrocarbons - 1X silica gel	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
>C16-C21 Hydrocarbons - 1X silica gel	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
>C21-C32 Hydrocarbons - 1X silica gel	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Modified TPH (Tier 1) - 1X silica gel	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Resemblance Comment	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Creosote Comment			GC/FID
Return to Baseline at C32	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Silica Gel Cleanup			GC/FID
Isobutylbenzene - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Isobutylbenzene - VPH	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
n-Dotriacontane - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Dieldrin	ORG-120-5108		GC/ECD
o,p'-DDD	ORG-120-5108		GC/ECD
o,p'-DDE	ORG-120-5108		GC/ECD
o,p'-DDT	ORG-120-5108		GC/ECD
p,p'-DDD	ORG-120-5108		GC/ECD
p,p'-DDE	ORG-120-5108		GC/ECD
p,p'-DDT	ORG-120-5108		GC/ECD
o,p'-DDT + p,p'-DDT	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
o,p'-DDD + p,p'-DDD	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
o,p'-DDE + p,p'-DDE	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Total DDT	Calculation	Calculation	GC/FID
1-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acridine	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(b)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP
AGAT WORK ORDER: 17X238910
PROJECT: P-0011130-0-19-200
ATTENTION TO: Christina Caldwell
SAMPLING SITE:
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzo(b+j)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(e)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(ghi)perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(k)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Chrysene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Dibenzo(a,h)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluorene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Indeno(1,2,3)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Naphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Phenanthrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Quinoline	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Total PAH			CALCULATION
Nitrobenzene-d5	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Fluorobiphenyl	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Terphenyl-d14	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Total Polychlorinated Biphenyls	ORG-120-5106	EPA SW846/8081/8080	GC/ECD
% Moisture		Calculation	GRAVIMETRIC
1-Methylnaphthalene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
2-Methylnaphthalene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Acenaphthene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Acenaphthylene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Anthracene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(a)anthracene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(a)pyrene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(b)fluoranthene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(b+j)fluoranthene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(ghi)perylene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(k)fluoranthene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Chrysene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Dibenzo(a,h)anthracene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Fluoranthene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Fluorene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Naphthalene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS

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Method Summary

CLIENT NAME: ENGLOBE CORP

AGAT WORK ORDER: 17X238910

PROJECT: P-0011130-0-19-200

ATTENTION TO: Christina Caldwell

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Perylene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Phenanthrene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Pyrene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Acridine	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Benzo(e)pyrene	ORG-120-5104/INOR-121-6039	EPA SW846/3510/8270D/1311	GC/MS
Nitrobenzene-d5	ORG-120-5104	EPA SW846/3510/8270C	GC/MS
2-Fluorobiphenyl	ORG-120-5104	EPA SW846/3510/8270C	GC/MS
Terphenyl-d14	ORG-120-5104	EPA SW846/3510/8270C	GC/MS
1-Methylnaphthalene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
2-Methylnaphthalene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Acenaphthene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Acenaphthylene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Anthracene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(a)anthracene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(a)pyrene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(b)fluoranthene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(b+j)fluoranthene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(e)pyrene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(ghi)perylene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Benzo(k)fluoranthene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Chrysene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Dibenzo(a,h)anthracene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Fluoranthene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Fluorene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Naphthalene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Perylene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Phenanthrene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS
Pyrene	ORG-120-5104/INOR-121-6040	CGSB 164-GP-IMP/EPA SW846/3510/8270D/354	GC/MS

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Fax: 902-468-8924
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Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes')
Arrival Temperature: 3° AGAT Job Number: 17x238910
Notes:

Drinking Water Sample (y/n): N Reg. No.
Waterworks Number:

Report To:
Company: Englobe
Contact: Christina Caldwell
Address: 97 Troop Avenue Darmouth, NS B3B 2A7
Phone: 902-468-6486 FAX: 902-468-4919
PO#: A09616
AGAT Quotation: 158369
Client Project #: P-0011130-0-19-200

Invoice to: Same (Y/N) - Circle
Company:
Contact:
Address:
Phone Fax:
PO#/Credit Card #:

Report Information
1. Name: Christina Caldwell
Email: christina.caldwell@englobecorp.com
2. Name: Jenna Walker
Email: jenna.walker@englobecorp.com

Regulatory Requirements (Check):
☐ List Guidelines on Report ■ Do Not List Guidelines on Report
☐ PIRI
Site Info (check all that apply):
☐ Tier 1 ☐ Res. ☐ Pot. ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot. ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other

Report Format
☐ Single PDF sample per page
■ Multiple PDF samples per page
■ Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT:
■ 5 - 7 days
Rush TAT:
☐ 1 day ☐ 2 days
☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Other -	Available Metals(w Sn,Se-LL)	Hexavalent Chromium	Mercury	PSA - Sieve & Pipette	FOC	TIC (Burnaby)	Pentachlorophenol	Silica Gel Cleanup + MIBE + Creosote Comment	Low-level TPH/BTEX (PIRI) Tier 1	Total PAH (LL)	Total PCB's (Calculation)	Total Cyanide (Miss.)	Hot Water Soluble Boron (Miss.)	Extract and Hold for Potential BTEX/VPH Leachate	pH (1:2 ratio)	Conductivity	Sodium Adsorption Ratio	DDT Suite	Lab Sample #
VC-SED1	July 18/17	sed./soil	Bag	marine sediment			X	X	X	X	X			X	X	X	X				X	X	X	X	
VC-SED2		sed./soil	Bottle	marine sediment			X	X	X	X	X			X	X	X	X				X	X	X	X	
VC-SED3		sed./soil	order	marine sediment			X	X	X	X	X			X	X	X	X				X	X	X	X	
VC-SED4		sed./soil		marine sediment			X	X	X	X	X			X	X	X	X				X	X	X	X	
VC-SED5		sed./soil		marine sediment			X	X	X	X	X			X	X	X	X				X	X	X	X	

Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Special Instructions
Leeigus Thomson	July 19/17	Tima Dalal	13:00	Please include a qualitative comment regarding the presence of creosote in samples as well as provide the results in GIS-ready format. Please hold for possible leachate analysis.
Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Page 1 of 1
	1:00pm		19-July	

APPENDIX D – Transect Surveys

Table D.1 Transect T1 (125 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
5-10	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
10-15	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1% to 100%). Eelgrass leaf debris common.
15-20	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<10%). Eelgrass leaf debris common.
20-25	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).. Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A).	Eelgrass, *Zostera marina* (<10%). Eelgrass leaf debris common.
25-30	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A). Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A).	Eelgrass, *Zostera marina* (<1% to 30%). Eelgrass leaf debris common.
30-35	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A). Blue mussel, *Mytilus edulis* (A).	Eelgrass, *Zostera marina* (<1% to 80%). Eelgrass leaf debris common.
35-40	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (80% to 100%).
40-45	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (80% to 100%).
45-50	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
50-55	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
55-60	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
60-65	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
65-70	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
70-75	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (0% to 100%). Some barren grounds with dead eel grass.
75-80	Sandy-Silt (100%)		Barren grounds with dead eel grass.
80-85	Sandy-Silt (100%)		Barren grounds with dead eel grass.
85-90	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (C).	Barren grounds with dead eel grass.
90-95	Sandy-Silt (100%)		
95-100	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (C).	Barren grounds with dead eel grass.
100-105	Shallow intertidal mudflat. No benthic visibility for assessment.		
105-110	Shallow intertidal mudflat. No benthic visibility for assessment.		
110-115	Shallow intertidal mudflat. No benthic visibility for assessment.		
115-120	Shallow intertidal mudflat. No benthic visibility for assessment.		
120-125	Shallow intertidal mudflat. No benthic visibility for assessment.		

Notes:

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.2 Transect T2 (45 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
5-10	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
10-15	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
15-20	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
20-25	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
25-30	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
30-35	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
35-40	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
40-45	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).

Notes:

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.3 Transect T3 (75 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<5%).
5-10	Likley sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<5%).
10-15	Likley sandy-Silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<5%).
15-20	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<5%).
20-25	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<1%).
25-30	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<1%).
30-35	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolu*s) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%). Tuffs of eelgrass, *Zostera marina* (<1%).

Table D.3 Transect T3 (75 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
35-40	Likely sandy-silt (100%) covered by dense, heavy shell debris carpet comprised of blue mussel (*Mytilus edulis*), horse mussel (*Modiolus modiolus*) and moon snail (*Lunatia heros*).	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O). Brown shrimp, *Crangon sp.* (U). Rock crab, *Cancer irroratus* (U).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<10%).
40-45	Likely sandy-silt (100%) covered with dense but decreasing shell debris.	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Patches of dense eelgrass (*Zostera marina*), overall (<50%). Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<20%).
45-50	Likely sandy-silt (100%) covered with dense but decreasing shell debris.	Barnacles, *Balanus sp*.(A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O).	Patches of dense eelgrass (*Zostera marina*), overall (<50%). Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<20%).
50-55	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
55-60	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
60-65	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
65-70	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
70-75	Sandy-Silt (100%) . Molluscan shell field begins at end of transect.	Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (20% to 100%).

Notes:

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.4 Transect T4 (100 m Survey July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%)
5-10	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%)
10-15	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (80%)
15-20	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (80%)
20-25	Sandy-Silt (95%) with gravel (5%), some shell debris.	Periwinkles, *Littorina sp.* (A). Barnacles, *Balanus sp.* (C). Blue mussel, *Mytilus edulis* (C).	Eelgrass, *Zostera marina* (0% to 80%). Eelgrass leaf debris common
25-30	Sandy-Silt (95%) with gravel (5%), heavy shell debris.	Periwinkles, *Littorina sp.* (A). Barnacles, *Balanus sp.* (C). Blue mussel, *Mytilus edulis* (C).	Eelgrass, *Zostera marina* (<5%) in patches. Eelgrass leaf debris common.
30-35	Sandy-Silt (95%) with gravel (5%), heavy shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A). Moon snail, Lunatia heros (C). Rock crab, *Cancer irroratus* (U).	Eelgrass leaf debris common.
35-40	Sandy-Silt (95%) with gravel (5%), heavy shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A). Moon snail, Lunatia heros (C).	Eelgrass leaf debris common.
40-45	Sandy-Silt (95%) with gravel (5%), heavy shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A). Moon snail, Lunatia heros (C).	Eelgrass leaf debris common.
45-50	Sandy-Silt (90%) with gravel (10%), moderate shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A).	Eelgrass leaf debris common.
50-55	Sandy-Silt (90%) with gravel (10%), moderate shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1%) in patches. Eelgrass leaf debris common.
55-60	Sandy-Silt (95%) with gravel (5%), moderate shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1%) in patches. Eelgrass leaf debris common.
60-65	Sandy-Silt (95%) with gravel (5%), moderate shell debris.	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1%) in patches. Eelgrass leaf debris common.
65-70	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.
70-75	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.

Table D.4 Transect T4 (100 m Survey July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
75-80	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.
80-85	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.
85-90	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.
90-95	Sandy-Silt (100%) with minor shell debris.	Periwinkles, Littorina sp. (A). Barnacles, *Balanus sp.* (O). Blue mussel, *Mytilus edulis* (O).	Eelgrass leaf debris common.
95-100	Sandy-Silt (100%), barren grounds.	-	-

Notes:

" - " = None Observed

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.5 Transect T5 (50 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%) covered by heavy shell debris carpet which consists of blue mussel (*Mytilus edulis)* and oyster (*Crassostrea virginica).*	Blue mussels, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A). Barnacles, *Balanus sp.* (U). Rock crab, *Cancer irroratus* (U).	-
5-10	Sandy-Silt (100%) covered by heavy shell debris carpet which consists of blue mussel (*Mytilus edulis) and oyster (* Crassostrea virginica*).*	Blue mussels, *Mytilus edulis* (A). Periwinkles, *Littorina sp.* (A). Barnacles, *Balanus sp.* (U). Rock crab, *Cancer irroratus* (U).	-
10-15	Sandy-Silt (100%) covered by heavy shell debris carpet which consists of blue mussel (*Mytilus edulis)* and oyster *(Crassostrea virginica).*	Periwinkles, *Littorina sp.* (A). Anemone, *Tealia feline* (U). Barnacles, *Balanus sp.* (U). Rock crab, *Cancer irroratus* (U).	-
15-20	Sandy-Silt (95%) with gravel (5%), some shell debris.	Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (U).	Eelgrass, *Zostera marina* (<1%). Eelgrass leaf debris common
20-25	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
25-30	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
30-35	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
35-40	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
40-45	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
45-50	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).

Notes:

" -" = None Observed

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.6 Transect T6 (100 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%), little shell debris.	-	Eelgrass, *Zostera marina*, leaf debris common.
5-10	Sandy-Silt (100%), little shell debris.	-	Eelgrass, *Zostera marina*, leaf debris common.
10-15	Sandy-Silt (100%)	-	Eelgrass, *Zostera marina*, leaf debris common.
15-20	Sandy-Silt (100%)	Rock crab, *Cancer irroratus* (U).	-
20-25	Sandy-Silt (100%)	-	-
25-30	Sandy-Silt (100%) with gravel matrix.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<5%) in patches. Eelgrass leaf debris common.
30-35	Sandy-Silt (100%) with gravel matrix.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<5%) in patches. Eelgrass leaf debris common.
35-40	Sandy-Silt (100%) with gravel matrix.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<5%) in patches. Eelgrass leaf debris common.
40-45	Sandy-Silt (100%) with gravel matrix.	-	-
45-50	Sandy-Silt (100%) with gravel matrix.	-	Eelgrass, *Zostera marina* , leaf debris common.
50-55	Sandy-Silt (100%), little shell debris.	Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros (* U).	Eelgrass, *Zostera marina* (0% to 80%).
55-60	Sandy-Silt (100%), heavy shell debris.	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (0% to <1%).
60-65	Sandy-Silt (100%), moderate shell debris.	Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros (* U).	Eelgrass, *Zostera marina* (0% to 1%). Eelgrass leaf debris common.
65-70	Sandy-Silt (100%), little shell debris.	Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros (* U). Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (90%).
70-75	Sandy-Silt (100%), little shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
75-80	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (0% to 90%). Eelgrass leaf debris common.
80-85	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (0% to 90%). Eelgrass leaf debris common.
85-90	Sandy-Silt (100%)	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* , leaf debris common.
90-95	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (0% to 90%). Eelgrass leaf debris common.
95-100	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).

Notes:

" - " = None Observed

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.7 Transect T7 (150 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O). Based on shell debris evidence.	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
5-10	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O). Based on shell debris evidence.	Tuffs of eelgrass, Zostera marina (<5%).
10-15	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Barnacles, *Balanus sp.* (A). Blue mussel, *Mytilus edulis* (A). Horse mussel, *Modiolus modiolus* (A). Periwinkles, *Littorina sp.* (A). Moon snail, *Lunatia heros* (O). Based on shell debris evidence.	Tuffs of eelgrass, Zostera marina (<5%).
15-20	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A). Rock crab, *Cancer irroratus* (U).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
20-25	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
25-30	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
30-35	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
35-40	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).

Table D.7 Transect T7 (150 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
40-45	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
45-50	Sandy-Silt (100%) covered by dense, heavy shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
50-55	Sandy-Silt (100%) covered by moderate shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	-	-
55-60	Sandy-Silt (100%) covered by moderate shell debris carpet which consists of blue mussel (*Mytilus edulis),* horse mussel (*Modiolus modiolus)* and moon snail (*Lunatia heros).*	Periwinkles, *Littorina sp.* (A).	Tuffs of low relief leafy algae possibly Irish moss, *Chondrus cripsis* (<5%). Tuffs of eelgrass, *Zostera marina* (<5%).
60-65	Sandy-Silt (100%) covered by moderate shell debris.	Periwinkles, *Littorina sp.* (A). Rock crab, *Cancer irroratus* (U).	Tuffs of eelgrass, Zostera marina (<5%).
65-70	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Patch of eelgrass, *Zostera marina* (<10%).
70-75	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Patch of eelgrass, *Zostera marina* (<20%).
75-80	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1%). Eelgrass leaf debris common.
80-85	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<1%). Eelgrass leaf debris common.
85-90	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (20%). Eelgrass leaf debris common.
90-95	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (20%). Eelgrass leaf debris common.
95-100	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (20%). Eelgrass leaf debris common.
100-105	Sandy-Silt (100%)		
105-110	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (<5%). Eelgrass leaf debris common.
110-115	Sandy-Silt (100%) covered by reduced amounts of shell debris.	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (50%). Eelgrass leaf debris common.
115-120	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
120-125	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (0% to 90%). Eelgrass leaf debris common.
125-130	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).

Table D.7 Transect T7 (150 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
130-135	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A). Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (100%).
135-140	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (100%).
140-145	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (90%).
145-150	Sandy-Silt (100%)	Periwinkles, *Littorina sp.* (A).	Eelgrass, *Zostera marina* (80%).

Notes:

" - " = None Observed

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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.

Table D.8 Transect T8 (75 m Survey, July 17, 2017) - Val-Comeau DFO-SCH, NB

Transect Distance / Interval (m)	Substrate (Estimated % Coverage[1])	Macrofaunal Life Observed (Estimated Abundances[2])	Macrofloral Life Observed (Estimated % Coverage)
0-5	Sandy-Silt (100%)	-	Eelgrass, *Zostera marina* (100%).
5-10	Sandy-Silt (100%)	Brown shrimp, *Crangon sp.* (O).	Eelgrass, *Zostera marina* (100%).
10-15	Sandy-Silt (100%)	-	Eelgrass, *Zostera marina* (95%).
15-20	Sandy-Silt (100%)	-	Dead eelgrass, *Zostera marina* .
20-25	Sandy-Silt (100%)	-	Dead eelgrass, *Zostera marina* .
25-30	Sandy-Silt (100%)	-	Dead eelgrass, *Zostera marina* .
30-35	Sandy-Silt (100%)	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).
35-40	Sandy-Silt (100%)	-	Eelgrass, *Zostera marina* (<1%).
40-45	Sandy-Silt (100%)	-	Eelgrass, *Zostera marina* (<1%).
45-50	Sandy-Silt (100%)	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).
50-55	Sandy-Silt (100%)	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).
55-60	Sandy-Silt (100%) with some shell debris.	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).
60-65	Sandy-Silt (100%) with increasing amounts of shell debris.	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).
65-70	Sandy-Silt (100%) with increasing amounts of shell debris.	-	Eelgrass, *Zostera marina* (<1%).
70-75	Sandy-Silt (100%) with shell debris.	Rock crab, *Cancer irroratus* (U).	Eelgrass, *Zostera marina* (<1%).

Notes:

" - " = None Observed

[1] Boulder (>256 mm), Cobble (>64-256 mm), Gravel (>2-64 mm), Sand (0.06-2 mm), Silt (<0.06 mm).

[2] A = Abundant, C = Common, O = Occasional, U = Uncommon (see below).

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 E – Photos of Typical Habitat Types Along Transects

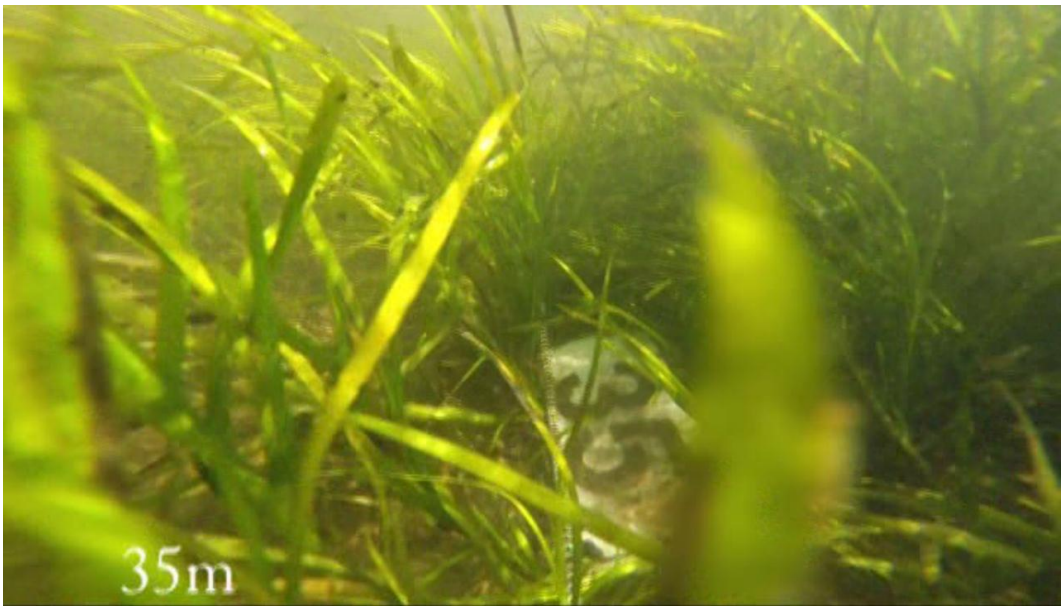

Photo 19: At 35 m from the start of transect T1, a typical eelgrass bed growing in sandy-silt sediment. Close examination shows the common periwinkle which is usually abundant on eelgrass when eelgrass is present.

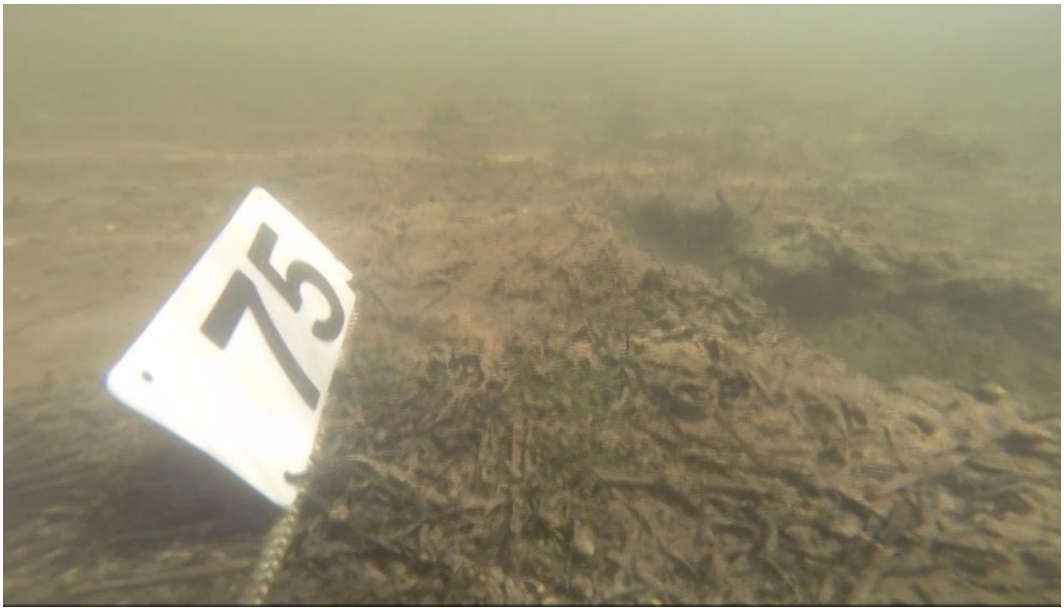

Photo 20: At 75 m from the start of transect T1, typical barren ground within this transect. There is no live marine algal growth in such areas and no evidence of marine fauna.

Photo 21: At 5 m from the start of transect T2, typical eelgrass growing in sandy-silt sediment on this transect. Close examination shows the common periwinkle which is usually abundant on eelgrass when eelgrass is present and can be seen on the exposed sandy-silt sediment.

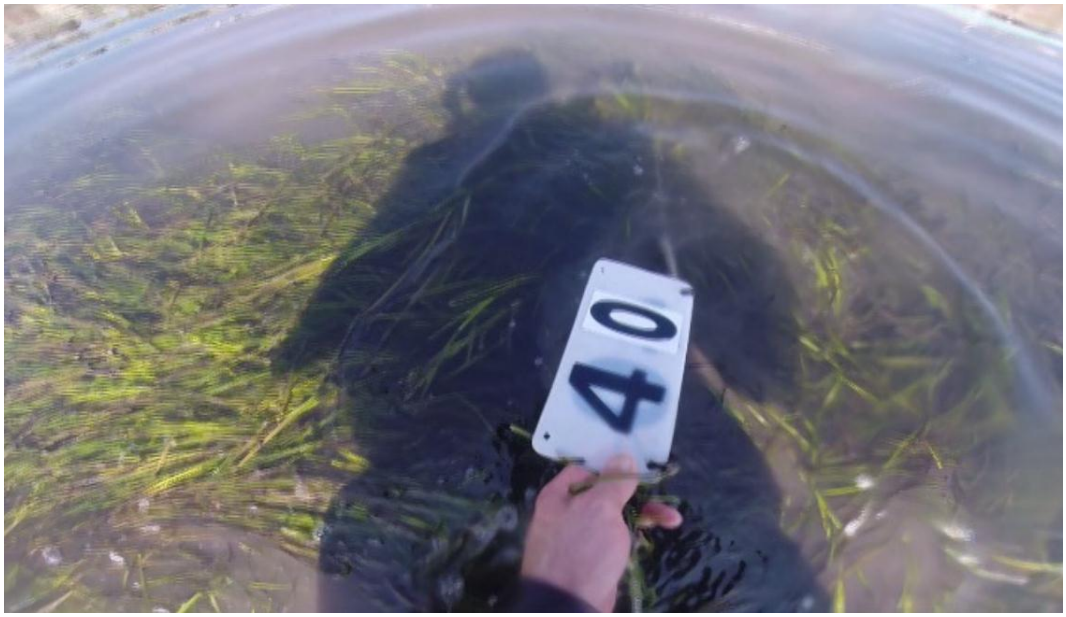

Photo 22: At 40 m from the start of transect T2, very dense eelgrass growing in the shallows of this transect.

Photo 23: At 10 m from the start of transect T3, typical cobble-gravel substrate (over silty-sand) and covered with molluscs and low relief leafy algae. Barnacles, blue mussel, horse mussel, moon snail and periwinkles are abundant here, based on shell debris evidence. Tuffs of low relief leafy algae possibly Irish moss is shown.

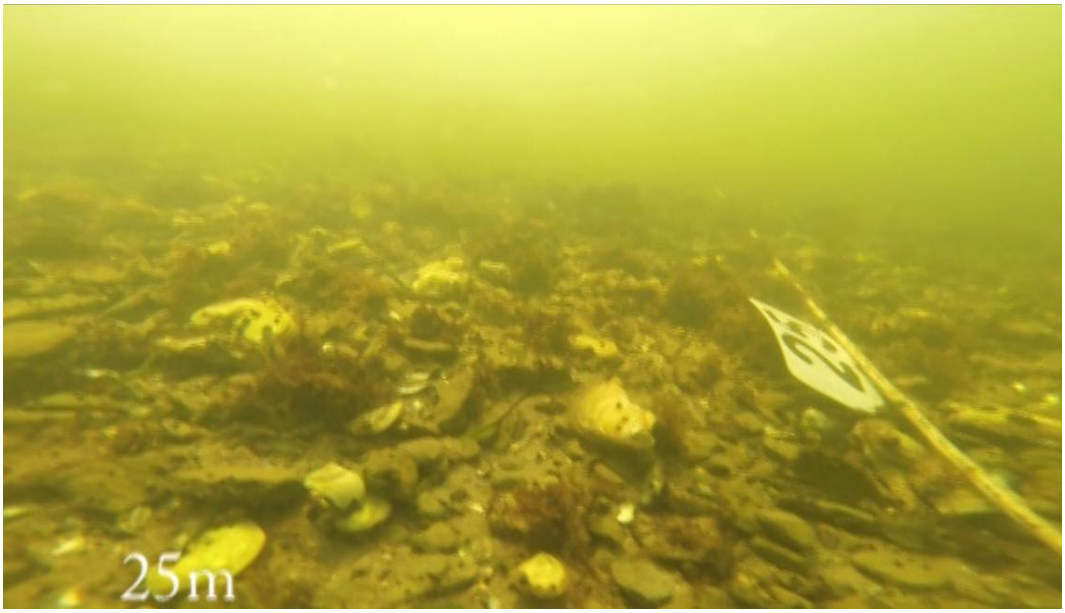

Photo 24: At 25 m from the start of transect T3, typical cobble-gravel substrate (over silty-sand) and covered with molluscs and low relief leafy algae. Barnacles, blue mussel, horse mussel, moon snail and periwinkles are abundant here based on shell debris evidence. Tuffs of low relief leafy algae possibly Irish moss is shown.

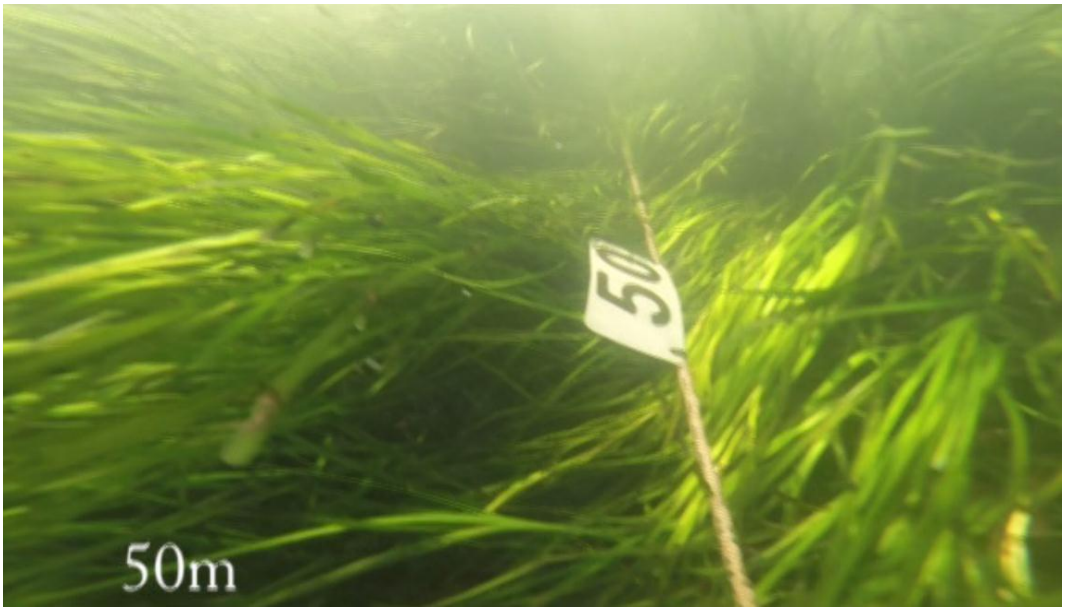

Photo 25: At 50 m from the start of transect T3, a dense bed of eelgrass known to grow on sandy-silt substrates. Periwinkles are usually abundant on eelgrass when eelgrass is present.

Photo 26: At the end (75 m) of transect 3, a gravel sandy-silt substrate with a few sprigs of eelgrass. Barnacles, blue mussel, horse mussel, and periwinkles typify the fauna here.

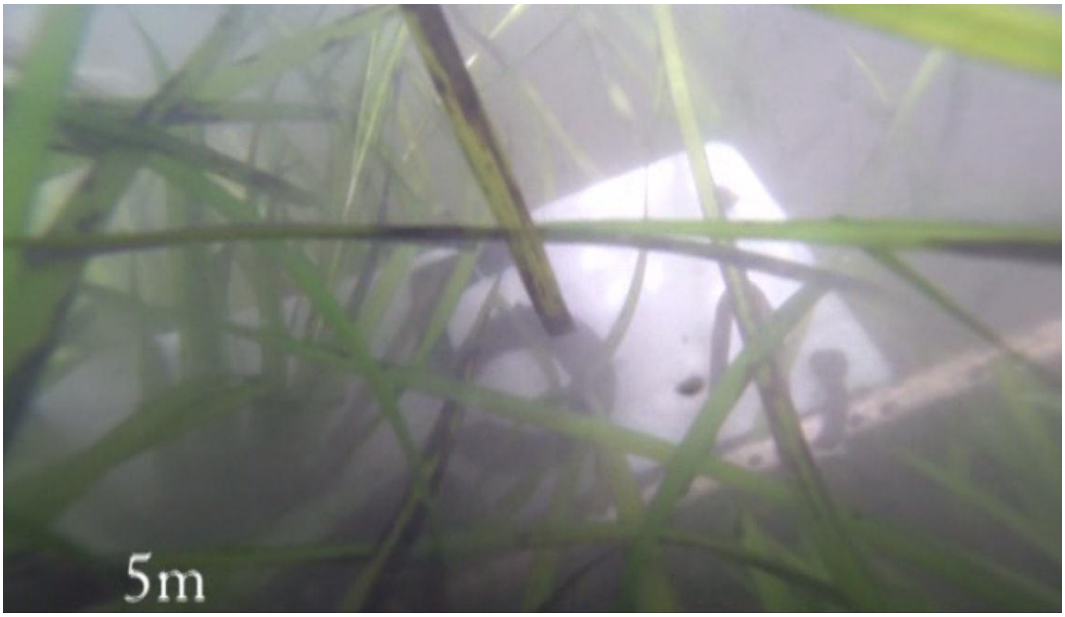

Photo 27: At 5 m from the start of transect 4, a dense bed of eelgrass which is known to grow on sandy-silt substrates. Periwinkles usually are abundant on eelgrass when eelgrass is present.

Photo 28: At 15 m from the start of transect T4, a largely sandy-silt substrate covered with limited amounts of eelgrass.

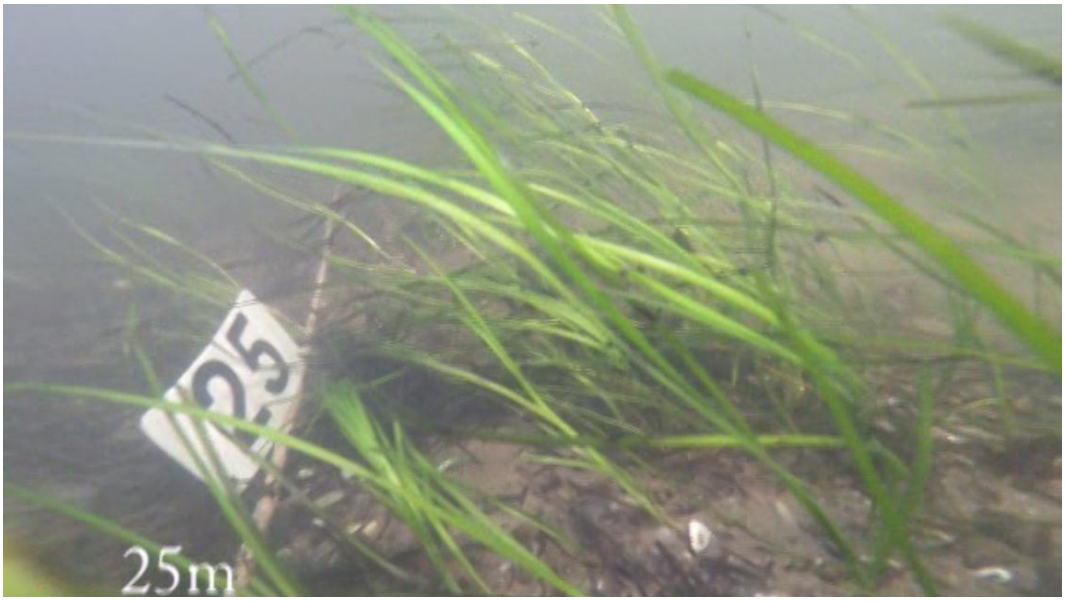

Photo 29: At 25 m from the start of transect T4, a largely gravel sandy-silt substrate is covered with moderate amounts of eelgrass. Some mollusc shells can be seen on the substrate surface and periwinkles can been seen on the blades of eelgrass.

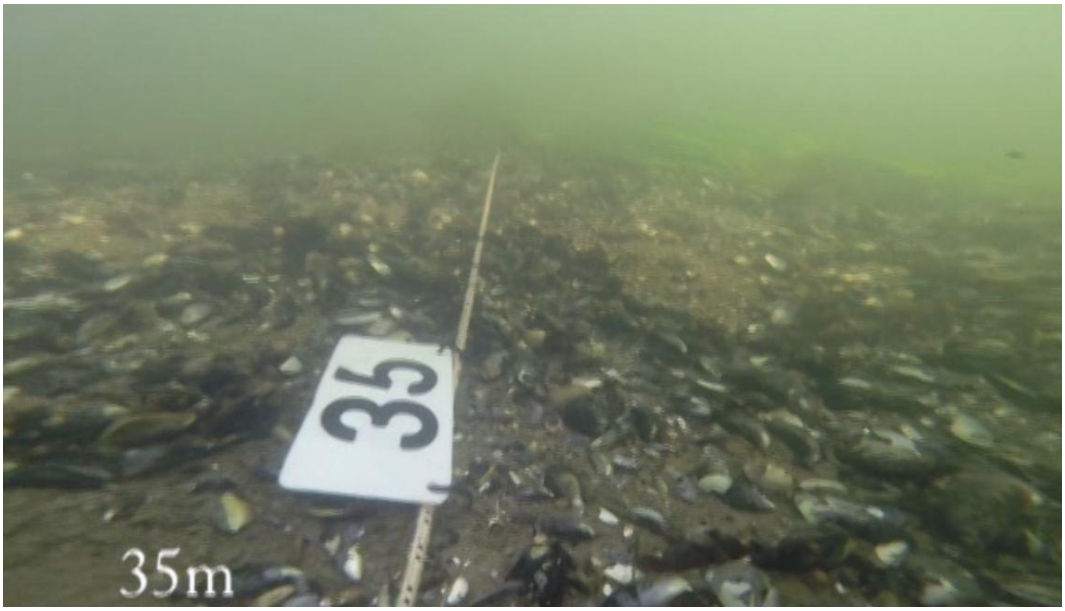

Photo 30: At 35 from the start of transect T4, a dense bivalve shell bed on gravel sandy-silt substrate. The majority of the shell bed appears to be composed of dead blue mussels. Molluscs that could be living in the shell include the moon snail and periwinkles. Barnacles also are usually found on this dead shell debris.

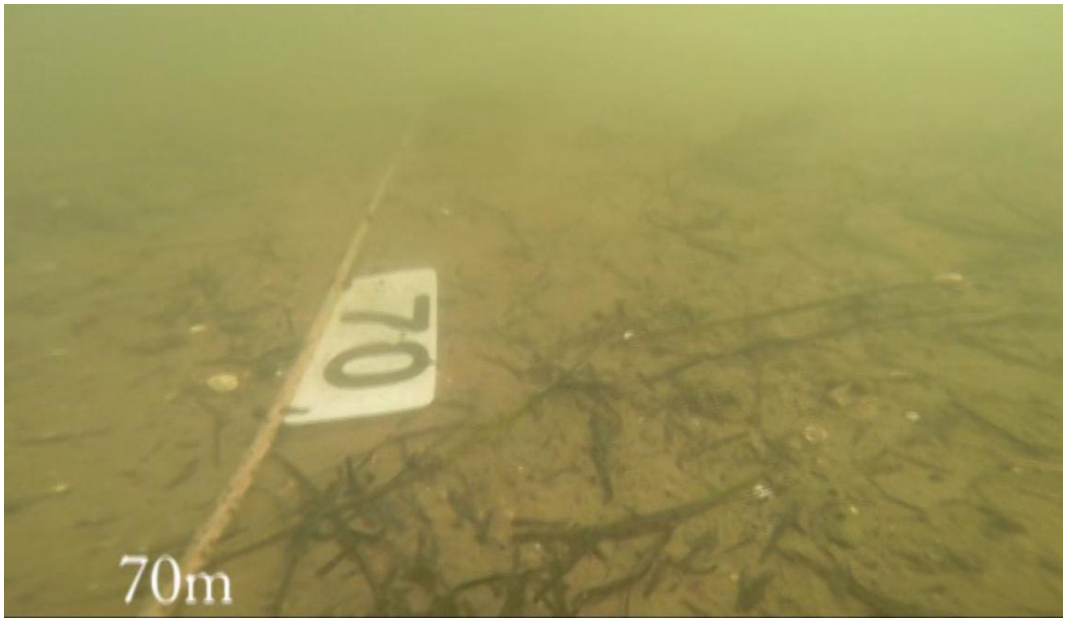

Photo 31: At 70 m from the start of transect T4, a typical flat sandy-silt substrate showing dead eelgrass.

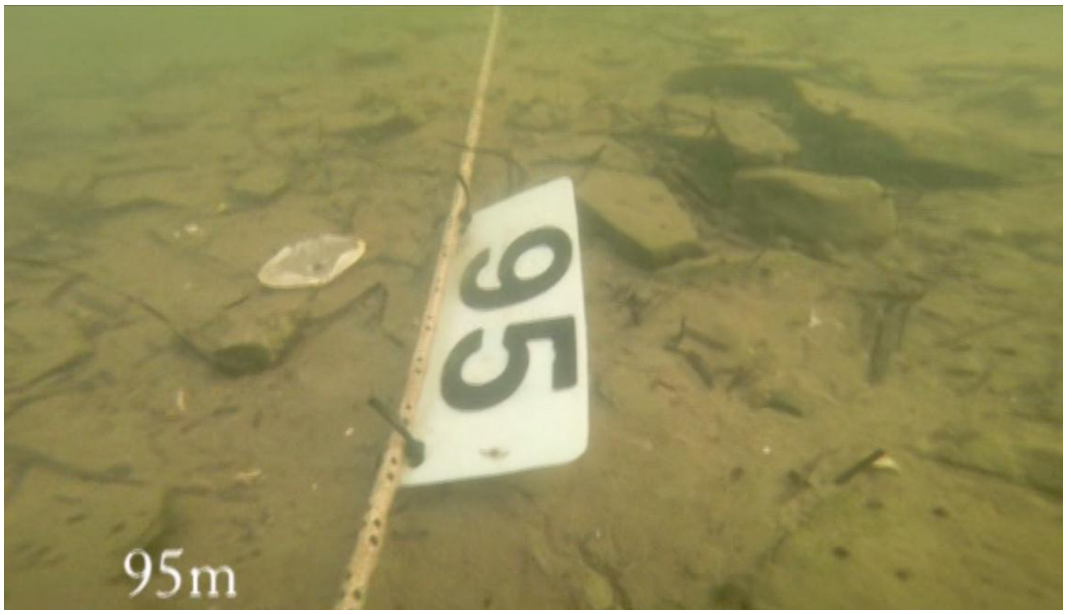

Photo 32: At 95 m from the start of transect T4, a typical flat sandy-silt substrate showing dead eelgrass.

Photo 33: At 10 m from the start of transect T5, very dense molluscan shell bed with purple anemone.

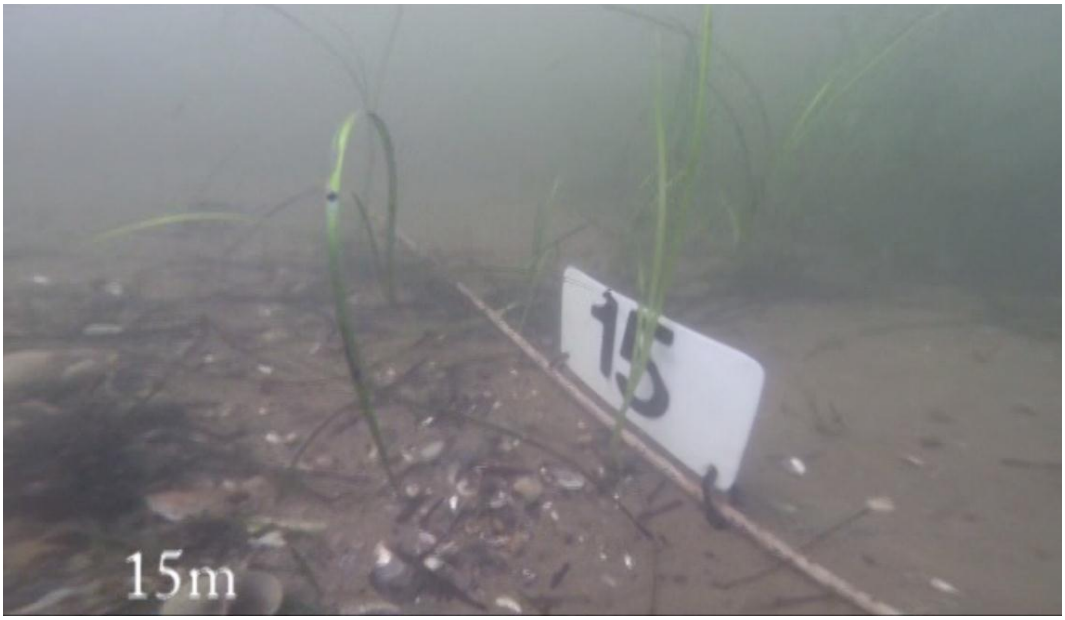

Photo 34: At 15 m from the start of transect T5, sandy-silt substrate with some molluscan shell debris and isolated patches of eelgrass present.

Photo 35: At 25 from the start of transect T5, dense eelgrass growing in sandy-silt sediment.

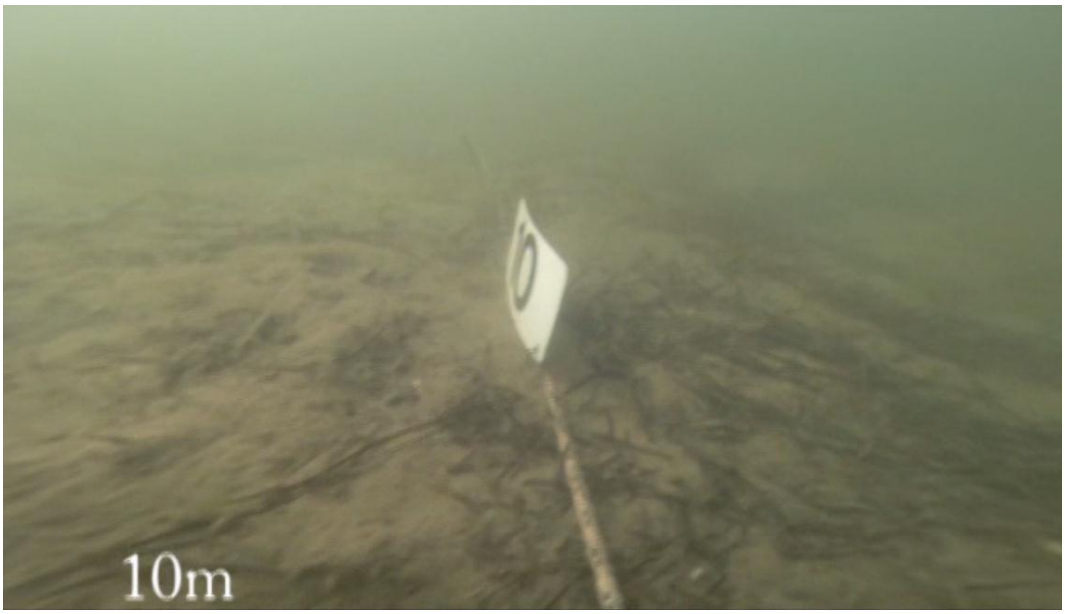

Photo 36: At 10 m from the start of transect T6, flat sandy-silt substrate showing dead eelgrass.

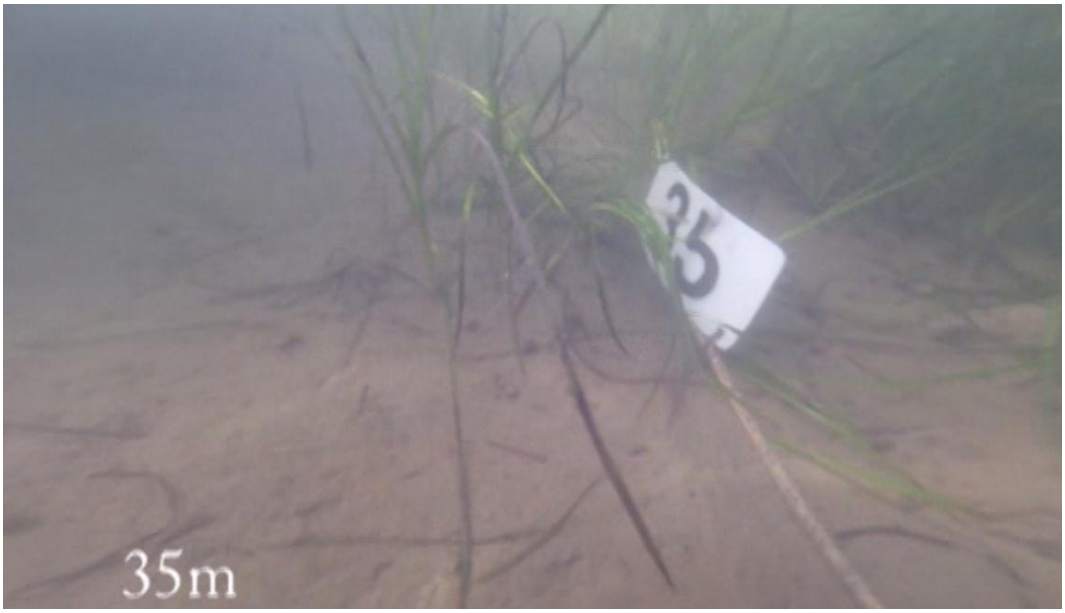

Photo 37: At 35 m from the start of transect T6, sandy-silt substrate showing a few live sprigs of eelgrass.

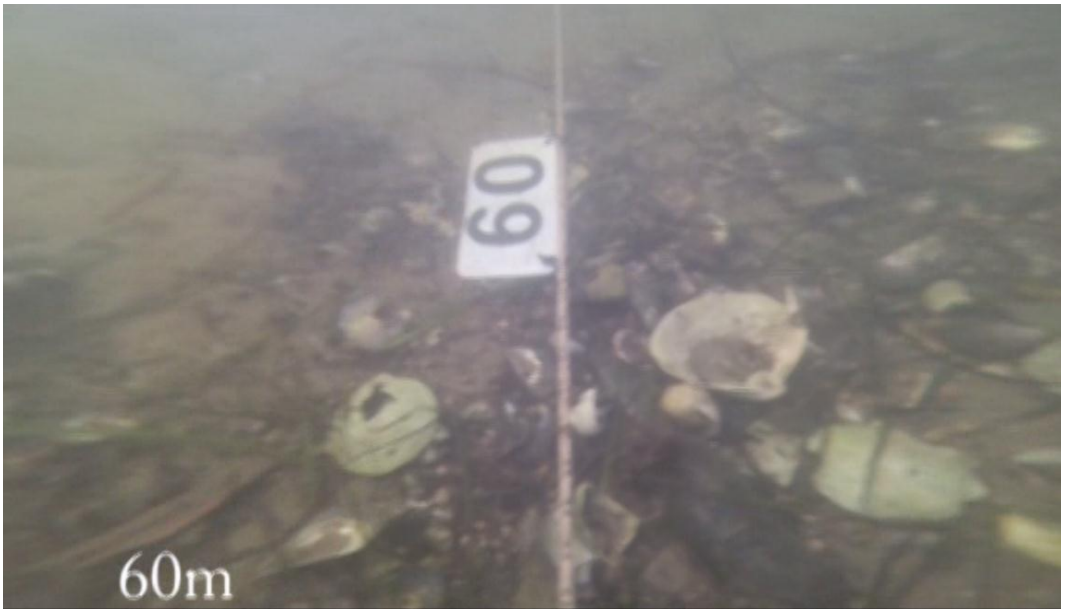

Photo 38: At 60 m from the start of transect T6, considerable shell debris composed primarily of blue mussel, horse mussel, giant scallop, and periwinkles.

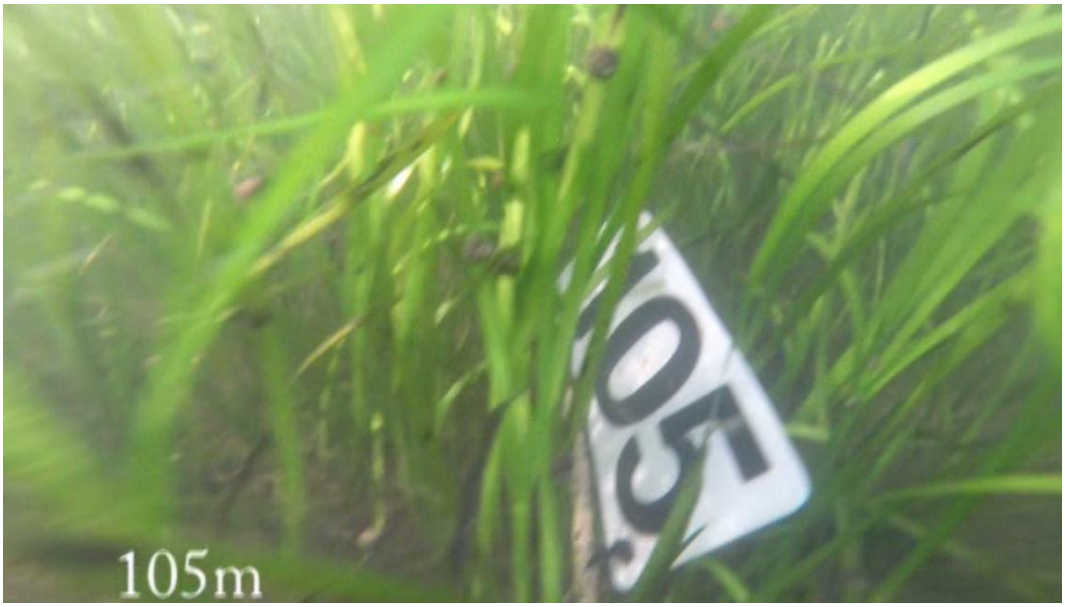

Photo 39: At 105 m from the start of transect T6, dense eelgrass growing in sandy-silt sediment.

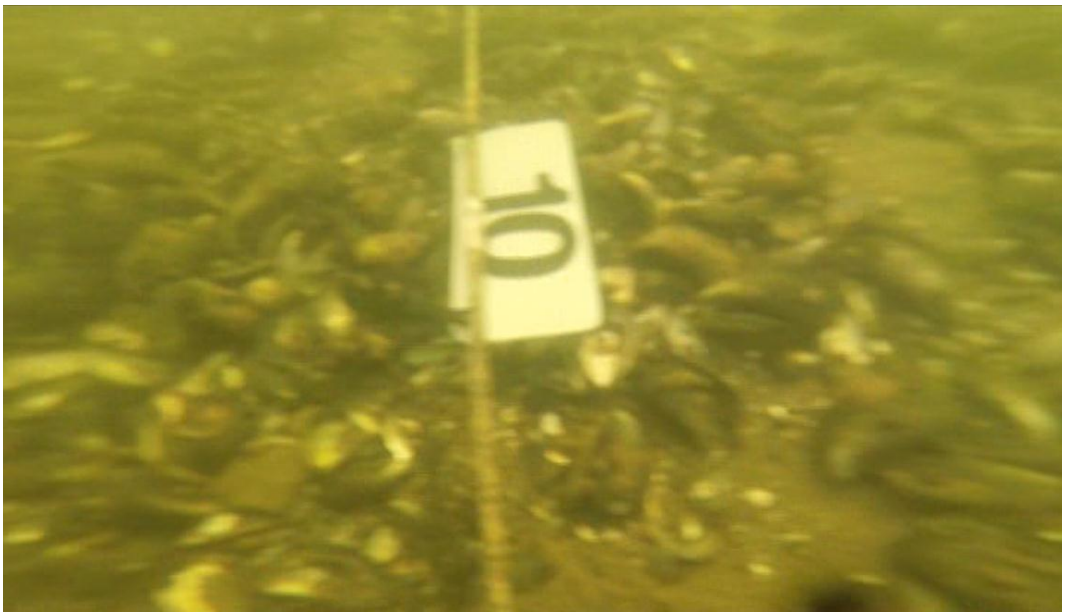

Photo 40: At 10 m from the start of transect T7, sandy-silt substrate covered by dense, heavy shell debris comprised of blue mussel, horse mussel, moon snail, barnacles and periwinkles.

Photo 41: At 35 m from the start of transect T7, sandy-silt sediment with dense shell debris cover which is comprised primarily of blue mussel, horse mussel, moon snail, barnacles and periwinkles.

Photo 42: At 35 m from the start of transect T7, sandy-silt sediment with moderate shell debris cover which is comprised primarily of blue mussel, horse mussel, moon snail, barnacles and periwinkles.

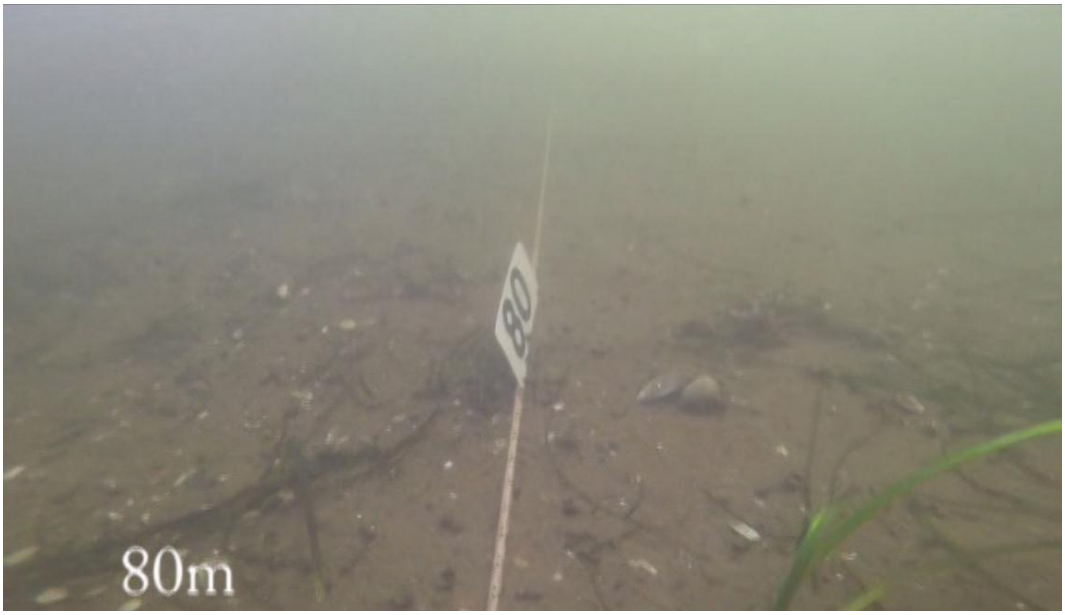

Photo 43: At 80 m from the start of transect T7, sandy-silt sediment with low shell debris cover which is comprised primarily of blue mussel, horse mussel, moon snail, barnacles and periwinkles.

Photo 44: At 95 m from the start of transect T7, moderate eelgrass cover over sandy-silt substrate with some shell debris.

Photo 45: At 130 m from the start of transect T7, a high density of eelgrass which is known to grow on sandy-silt substrates. Periwinkles are usually are abundant on eelgrass.

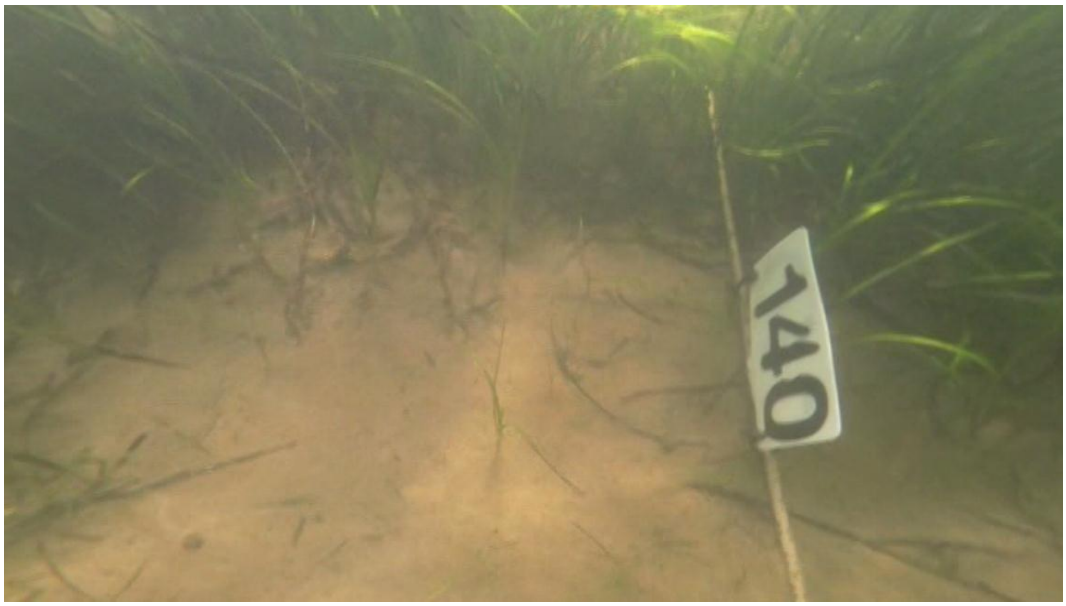

Photo 46: At 140 m from the start of transect T7, a low density of eelgrass which is known to grow on sandy-silt substrates. Periwinkles are usually abundant on eelgrass.

Photo 47: At 5 m from the start of transect T8, a high density of eelgrass which is known to grow on sandy-silt substrates. Periwinkles are usually abundant on eelgrass.

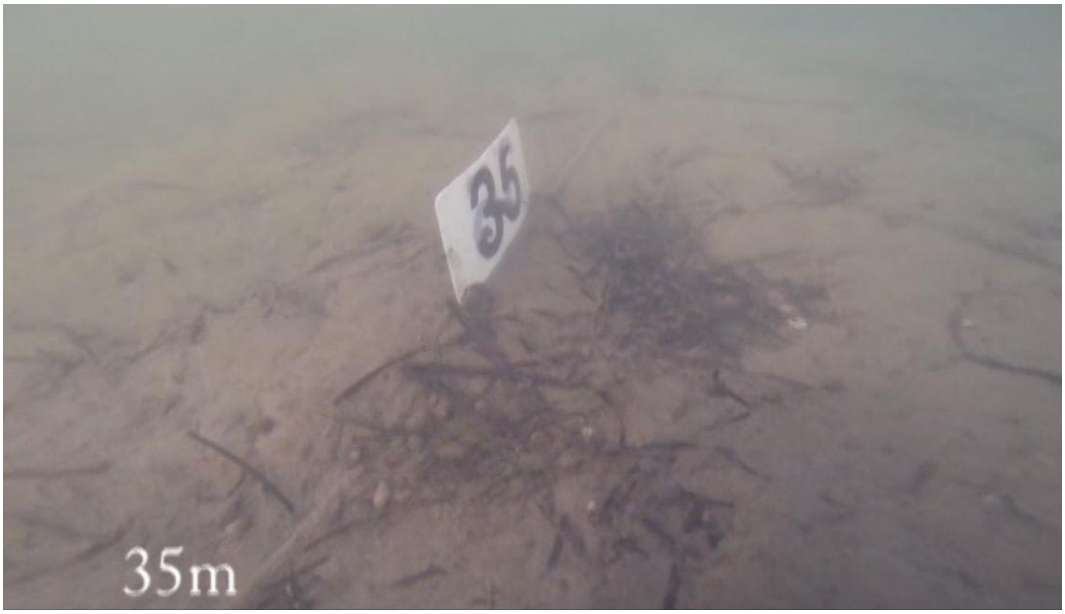

Photo 48: At 35 m from the start of transect T8, flat sandy-silt substrate with dead eelgrass.

Photo 49: At 55 m from the start of transect T8, flat sandy-silt substrate with dead eelgrass.

Photo 50: At 75 m from the start of transect T8, cobble gravel substrate with dead eelgrass.