

TABLE 1: PETROLEUM COMPOUNDS in Soil (Residential)
Client: Parks Canada
Site Location: Georges Island National Historic Site, Halifax, NS
Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME CWS ¹						CCME Residential/Parkland ²						CBCL Limited Phase II ESA					
			Human Health			Ecological			Human Health				Ecological							
			Direct Contact (Ingestion and Dermal)	Vapour Inhalation (indoor, basement)	Vapour Inhalation (indoor, slab-on-grade)	Protection of GW for Aquatic Life	Ecological Direct Soil Contact	Management Limit	Soil Ingestion	Dermal Contact	Inhalation of Indoor Air (Basement)	Inhalation of Indoor Air (Slab on Grade)	Protection of GW for Aquatic Life	Ecological Soil Contact	19SS-01	19SS-02	19SS-03	19SS-04	19SS-05	19SS-06
															0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m
															6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19
Volatile Organics																				
Benzene	0.006	ug/g	-	-	-	-	-	-	110	250	0.15	0.095	1.0	31	0.013	<0.0060	0.14	0.24	0.094	0.026
Ethylbenzene	0.01	ug/g	-	-	-	-	-	-	10000	58000	88	55	50	55	<0.01	<0.010	0.044	0.083	0.028	0.014
Toluene	0.02	ug/g	-	-	-	-	-	-	22000	220000	200	120	0.10	75	0.038	<0.020	0.27	0.57	0.2	0.08
p+m-Xylene	0.02	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Xylene	0.02	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Xylenes	0.02	ug/g	-	-	-	-	-	-	150000	NA	22	14	37	95	0.056	<0.020	0.32	0.61	0.24	0.099
F1 (C6-C10)	10	ug/g	12000	40	30	970	210	700	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10
F1 (C6-C10) - BTEX	10	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	27	23	<10	<10
F2-F4 Hydrocarbons																				
F2 (C10-C16 Hydrocarbons)	10	ug/g	6800	190	150	380	150	1000	-	-	-	-	-	-	<10	<10	27	23	<10	<10
F3 (C16-C34 Hydrocarbons)	50	ug/g	15000	-	-	-	300	2500	-	-	-	-	-	-	<50	120	840	450	120	66
F4 (C34-C50 Hydrocarbons)	50	ug/g	21000	-	-	-	2800	10000	-	-	-	-	-	-	<50	<50	360	260	78	<50
Reached Baseline at C50			-	-	-	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

value

-exceeds CWS/CCME

-

-no guideline or value

¹ 2008 Canadian Council for Ministers of the Environment (CCME) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil for a Residential Site.

² 1999 CCME Canadian Environmental Quality Guidelines for residential land use ((with updates online at the time of reporting (<http://st-ts.ccme.ca/>)).

³ Atlantic RBCA Tier II Pathway Specific Screening Levels (PSSLs) for a residential site with non-potable groundwater usage and coarse-grained soil (updated Sept 2015).

⁴ Tier 1 Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates; Direct Soil Contact, Residential Land Use (updated Sept 2015).

^a = Where applicable, for protection of potable groundwater.

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PARAMETER	RDL	UNITS	CCME CWS ¹						CCME Residential/Parkland ²						Englobe Phase II ESA									
			Human Health			Ecological			Human Health				Ecological											
			Direct Contact (Ingestion and Dermal)	Vapour Inhalation (indoor, basement)	Vapour Inhalation (indoor, slab-on-grade)	Protection of GW for Aquatic Life	Ecological Direct Soil Contact	Management Limit	Soil Ingestion	Dermal Contact	Inhalation of Indoor Air (Basement)	Inhalation of Indoor Air (Slab on Grade)	Protection of GW for Aquatic Life	Ecological Soil Contact	SS3-A	SS3-B	SS3-C	SS4-A	SS5-A	SS6-A	SS6-C	SS7-A	SS7-A Lab-Dup	SS7-C
															0 - 0.15 m	0.15 - 0.3m	0.3- 0.45 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0.3- 0.45 m	0 - 0.15 m	0 - 0.15 m	0.3- 0.45 m
															19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20
Volatile Organics																								
Benzene	0.006	ug/g	-	-	-	-	-	-	110	250	0.15	0.095	1.0	31	0.11	0.29	0.34	0.12	0.11	0.036	0.13	0.13	0.13	0.14
Ethylbenzene	0.01	ug/g	-	-	-	-	-	-	10000	58000	88	55	50	55	0.041	0.14	0.18	0.038	0.052	0.032	0.059	0.087	0.082	0.061
Toluene	0.02	ug/g	-	-	-	-	-	-	22000	220000	200	120	0.10	75	0.31	1	1.4	0.25	0.28	0.093	0.28	0.45	0.42	0.34
p+m-Xylene	0.02	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	0.25	0.96	1.3	0.2	0.23	0.071	0.2	0.38	0.36	0.26
o-Xylene	0.02	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	0.13	0.43	0.59	0.11	0.13	0.045	0.1	0.24	0.23	0.17
Total Xylenes	0.02	ug/g	-	-	-	-	-	-	150000	NA	22	14	37	95	0.37	1.4	1.9	0.31	0.35	0.12	0.3	0.63	0.59	0.43
F1 (C6-C10)	10	ug/g	12000	40	30	970	210	700	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F1 (C6-C10) - BTEX	10	ug/g	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2-F4 Hydrocarbons																								
F2 (C10-C16 Hydrocarbons)	10	ug/g	6800	190	150	380	150	1000	-	-	-	-	-	-	21	35	42	20	24	15	19	25	-	22
F3 (C16-C34 Hydrocarbons)	50	ug/g	15000	-	-	-	300	2500	-	-	-	-	-	-	420	440	490	340	330	200	370	710	-	570
F4 (C34-C50 Hydrocarbons)	50	ug/g	21000	-	-	-	2800	10000	-	-	-	-	-	-	280	270	230	210	200	110	220	290	-	210
Reached Baseline at C50			-	-	-	-	-	-	-	-	-	-	-	-	No	No	No	No	No	No	No	No	-	No

Notes:

value	-exceeds CWS/CCME
-	-no guideline or value

¹ 2008 Canadian Council for Ministers of the Environment (CCME) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil for a Residential Site.

² 1999 CCME Canadian Environmental Quality Guidelines for residential land use ((with updates online at the time of reporting (<http://st-ts.ccme.ca/>)).

³ Atlantic RBCA Tier II Pathway Specific Screening Levels (PSSLs) for a residential site with non-potable groundwater usage and coarse-grained soil (updated Sept 2015).

⁴ Tier 1 Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates; Direct Soil Contact, Residential Land Use (updated Sept 2015).

^a = Where applicable, for protection of potable groundwater.

TABLE 2: VOLATILE ORGANIC COMPOUNDS in Soil (Residential)
Client: Parks Canada
Site Location: Georges Island National Historic Site, Halifax, NS
Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME Residential/Parkland ¹							Englobe Phase II ESA					
			Human Health				Ecological Health		CCME SQGs for Residential / Parkland	SS3-A	SS3-A Lab-Dup	SS4-A	SS5-A	SS6-A	SS7-A
			Soil Ingestion	Dermal Contact	Inhalation of Indoor Air (Basement)	Inhalation of Indoor Air (Slab on Grade)	Protection of GW for Aquatic Life	Ecological Soil Contact		0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m
										19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20
1,2-Dichlorobenzene*	25	ug/kg	-	-	-	-	-	-	1,000	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene*	25	ug/kg	-	-	-	-	-	-	1,000	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene*	25	ug/kg	-	-	-	-	-	-	1,000	<25	<25	<25	<25	<25	<25
Chlorobenzene*	25	ug/kg	-	-	-	-	-	-	1,000	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,1,2,2-Tetrachloroethane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,1-Dichloroethylene*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
1,2-Dichloropropane*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
Benzene	25	ug/kg	110000	250000	150	95	1000	31000	-	330	330	300	<25	<25	31
Bromodichloromethane (Dichlorobromomethane)	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Bromoform (Tribromomethane)	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Bromomethane (Methyl bromide)	50	ug/kg	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50
Carbon tetrachloride (Tetrachloromethane)*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
Chloroethane (Ethyl chloride)	200	ug/kg	-	-	-	-	-	-	-	<200	<200	<200	<200	<200	<200
Chloroform (Trichloromethane)*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethylene	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
cis-1,3-Dichloropropene	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Dibromochloromethane	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Ethylbenzene	25	ug/kg	10000000	58000000	88000	55000	50000	55000	-	99	96	79	<25	<25	<25
Ethylene Dibromide (1,2-Dibromoethane)	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Methylene Chloride (Dichloromethane)*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
Methyl T-Butyl Ether (MTBE)	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
o-Xylene	25	ug/kg	-	-	-	-	-	-	-	300	300	240	83	<25	48
p+m-Xylene	25	ug/kg	-	-	-	-	-	-		600	580	430	140	29	77
Total Xylenes	50	ug/kg	150000000	NA	22000	14000	37000	95000	-	900	870	670	220	<50	120
Styrene*	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
Tetrachloroethylene (PCE, 1,1,2,2-Tetrachloroethene)	25	ug/kg	-	-	-	-	-	-	200	<25	<25	<25	<25	<25	<25
Toluene	25	ug/kg	22000000	220000000	200000	120000	100	75000	-	890	870	600	150	<50	100
trans-1,2-Dichloroethylene	25	ug/kg	-	-	-	-	-	-	5,000	<25	<25	<25	<25	<25	<25
trans-1,3-Dichloropropene	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Trichloroethylene (TCE, 1,1,2-Trichloroethene)	10	ug/kg	-	-	-	-	-	-	10	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane (Freon 11)	25	ug/kg	-	-	-	-	-	-	-	<25	<25	<25	<25	<25	<25
Vinyl Chloride	20	ug/kg	-	-	-	-	-	-	-	<20	<20	<20	<20	<20	<20

Notes: value - Exceeds CCME

¹ 1999 CCME Canadian Environmental Quality Guidelines for residential land use ((with updates online at the time of reporting (http://st-ts.ccm.ca/)).
- = No applicable guideline or parameter not defined.
Lab-Dup = Laboratory duplicate.
(1) Elevated VOC RDL(s) due to matrix interference.

TABLE 3: Available METALS in Soil (Residential)
Client: Parks Canada
Site Location: Georges Island National Historic Site, Halifax, NS
Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME Soil Quality Guidelines				CBCL Limited Phase II ESA					
			Residential/ Parkland ¹				19SS-01	19SS-02	19SS-03	19SS-04	19SS-05	19SS-06
			Human Health	Ecological Health		Interim Soil Quality CriteriaProvisional SGQ ²	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m
				Soil Ingestion	Soil Contact		6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19
Acid Extractable Aluminum (Al)	10	mg/kg	-	-	-	-	7100	5700	8300	7900	8900	11000
Acid Extractable Antimony (Sb)	2.0	mg/kg	-	-	-	20	<2.0	<2.0	4.1	3.6	<2.0	<2.0
Acid Extractable Arsenic (As) ³	2.0	mg/kg	31	17	-	30	11	7.3	44	24	18	30
Acid Extractable Barium (Ba)	5.0	mg/kg	6,800	-	-	500	39	40	290	120	78	130
Acid Extractable Beryllium (Be)	2.0	mg/kg	75	-	-	4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Bismuth (Bi)	2.0	mg/kg	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Boron (B)	5/50	mg/kg	-	-	-	-	<50	<50	<50	<50	<50	<50
Acid Extractable Cadmium (Cd)	0.30	mg/kg	14	10	54	5	<0.30	<0.30	0.67	0.38	0.49	0.37
Acid Extractable Chromium (Cr)	2.0	mg/kg	220	64	52	250	13	9.3	29	17	16	26
Acid Extractable Cobalt (Co)	1.0	mg/kg	-	-	-	50	6.4	4.4	11	7.1	7.6	14
Acid Extractable Copper (Cu)	2.0	mg/kg	1100	63	350	100	21	17	89	55	50	60
Acid Extractable Iron (Fe)	50	mg/kg	-	-	-	-	20000	13000	43000	26000	25000	28000
Acid Extractable Lead (Pb)	0.50	mg/kg	140	300	723	500	51	140	3300	460	400	250
Acid Extractable Lithium (Li)	2.0	mg/kg	-	-	-	-	14	16	17	16	17	22
Acid Extractable Manganese (Mn)	2.0	mg/kg	-	-	-	-	390	300	570	410	450	660
Acid Extractable Mercury (Hg)	0.10	mg/kg	6.6	12	20	2	0.28	4.8	18	2.9	1.3	1.7
Acid Extractable Molybdenum (Mo)	2.0	mg/kg	-	-	-	10	<2.0	<2.0	2.7	<2.0	<2.0	<2.0
Acid Extractable Nickel (Ni)	2.0	mg/kg	-	50	146	100	17	13	32	25	20	32
Acid Extractable Rubidium (Rb)	2.0	mg/kg	-	-	-	-	6.8	7.4	9	7.5	8.6	15
Acid Extractable Selenium (Se)	1.0	mg/kg	80	1	-	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Acid Extractable Silver (Ag)	0.50	mg/kg	20	-	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Acid Extractable Strontium (Sr)	5.0	mg/kg	-	-	-	-	23	26	41	19	47	65
Acid Extractable Thallium (Tl)	0.10	mg/kg	-	1.4	-	1	<0.10	<0.10	0.28	0.16	0.11	0.18
Acid Extractable Tin (Sn)	2.0	mg/kg	-	-	-	50	2.9	2.1	29	9.8	13	4.6
Acid Extractable Uranium (U)	0.10	mg/kg	23	500	-	-	0.44	0.62	0.55	0.54	0.51	0.78
Acid Extractable Vanadium (V)	2.0	mg/kg	-	130	-	200	20	20	95	72	39	43
Acid Extractable Zinc (Zn)	5.0	mg/kg	10000	250	280	500	100	82	530	280	270	240

Notes:

value	exceeds CCME guideline
-	-no guideline or value

¹ 1999 CCME Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for residential land use (with updates online at the time of reporting (<http://st-ts.ccm.ca/>)).

² Interim remediation criteria (1991) for soil that have not yet been replaced by the SQGs. These interim remediation criteria are considered generally protective of human and environmental health and were based on experience and professional judgement.

Arsenic guidelines have been adjusted for a 10⁵ risk factor.

Mercury analyzed as inorganic.

TABLE 3: Available METALS in Soil (Residential)
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Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME Soil Quality Guidelines				Englobe Phase II ESA															
			Residential/ Parkland ¹				SS1-A	SS1-B	SS1-C	SS2-A	SS2-B	SS2-C	SS3-A	SS3-B	SS3-C	SS3-C Lab-Dup	SS4-A	SS5-A	SS6-A	SS6-C	SS7-A	SS7-C
							0 - 0.15 m	0.15 - 0.3m	0.3- 0.45 m	0 - 0.15 m	0.15 - 0.3m	0.3- 0.45 m	0 - 0.15 m	0.15 - 0.3m	0.3- 0.45 m	0.3- 0.45 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0.3- 0.45 m	0 - 0.15 m	0.3- 0.45 m
			Human Health	Ecological Health	Nutrient and Energy Cycling Check	Interim Soil Quality CriteriaProvisional SGQ ²	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20
Acid Extractable Aluminum (Al)	10	mg/kg	-	-	-	-	7500	6900	7200	7000	6700	6500	6200	5100	6100	5600	7600	7800	6900	6900	8200	7000
Acid Extractable Antimony (Sb)	2.0	mg/kg	-	-	-	20	<2.0	<2.0	2.5	<2.0	<2.0	<2.0	2.7	2.9	3.2	2.2	2.4	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Arsenic (As) ¹	2.0	mg/kg	31	17	-	30	14	13	29	11	12	17	49	39	35	28	32	23	19	21	28	120
Acid Extractable Barium (Ba)	5.0	mg/kg	6,800	-	-	500	37	60	130	33	50	63	600	580	370	350	230	110	62	100	120	90
Acid Extractable Beryllium (Be)	2.0	mg/kg	75	-	-	4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Bismuth (Bi)	2.0	mg/kg	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Boron (B)	5/50	mg/kg	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acid Extractable Cadmium (Cd)	0.30	mg/kg	14	10	54	5	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.97	0.9	0.76	0.65	0.42	0.36	<0.30	0.31	0.4	<0.30
Acid Extractable Chromium (Cr)	2.0	mg/kg	220	64	52	250	17	13	17	12	11	13	29	16	17	14	27	15	14	13	16	14
Acid Extractable Cobalt (Co)	1.0	mg/kg	-	-	-	50	6.6	6.5	6.6	6.3	5.9	6.3	6.1	5.4	6.2	4.8	7.6	6.9	6.4	5.5	7.2	6.2
Acid Extractable Copper (Cu)	2.0	mg/kg	1100	63	350	100	26	29	230	21	37	36	100	85	90	75	490	48	43	80	75	51
Acid Extractable Iron (Fe)	50	mg/kg	-	-	-	-	18000	19000	30000	18000	20000	22000	26000	27000	25000	-	30000	25000	24000	21000	30000	32000
Acid Extractable Lead (Pb)	0.50	mg/kg	140	300	723	500	60	130	400	43	58	180	1200	1200	1800	1900	1600	400	270	540	560	450
Acid Extractable Lithium (Li)	2.0	mg/kg	-	-	-	-	14	14	16	13	14	14	13	12	14	13	14	15	15	16	16	16
Acid Extractable Manganese (Mn)	2.0	mg/kg	-	-	-	-	350	350	390	320	400	360	580	310	400	320	400	370	380	350	430	550
Acid Extractable Mercury (Hg)	0.10	mg/kg	6.6	12	20	2	0.5	1.4	3.9	0.18	0.29	1.3	8.9	11	71	76	18	2.2	3.1	6.6	3.5	2.1
Acid Extractable Molybdenum (Mo)	2.0	mg/kg	-	-	-	10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Nickel (Ni)	2.0	mg/kg	-	50	146	100	17	18	18	16	14	16	21	17	19	15	22	21	18	16	21	18
Acid Extractable Rubidium (Rb)	2.0	mg/kg	-	-	-	-	7.9	7.1	7.8	6.5	6.2	7	6.8	5.5	5.7	5.7	9	9.2	8.5	5.9	7.9	7.2
Acid Extractable Selenium (Se)	1.0	mg/kg	80	1	-	3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.55	<0.50	<0.50	<0.50	0.5	<0.50
Acid Extractable Silver (Ag)	0.50	mg/kg	20	-	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Acid Extractable Strontium (Sr)	5.0	mg/kg	-	-	-	-	29	27	27	27	30	28	46	90	60	51	25	23	15	21	19	12
Acid Extractable Thallium (Tl)	0.10	mg/kg	-	1.4	-	1	<0.10	0.11	0.16	<0.10	<0.10	<0.10	0.19	0.16	0.15	0.13	0.21	0.15	0.11	0.13	0.2	0.15
Acid Extractable Tin (Sn)	2.0	mg/kg	-	-	-	50	3	15	13	1.8	2.3	7.7	20	19	17	20	10	11	8.9	11	66	8.1
Acid Extractable Uranium (U)	0.10	mg/kg	23	500	-	-	0.51	0.45	0.55	0.42	0.46	0.46	0.45	0.43	0.45	0.48	0.59	0.49	0.49	0.45	0.55	0.51
Acid Extractable Vanadium (V)	2.0	mg/kg	-	130	-	200	21	30	41	19	22	34	62	47	38	36	59	48	49	30	49	19
Acid Extractable Zinc (Zn)	5.0	mg/kg	10000	250	280	500	73	97	160	63	57	110	940	450	470	420	330	260	160	220	300	240

Notes:

value	exceeds CCME guideline
-	-no guideline or value

¹ 1999 CCME Soil Quality Guidelines (SQG) for the Protection of Environmental and Human Health for residential land use (with updates online at the time of reporting (<http://st-ts.ccm.ca/>)).

² Interim remediation criteria (1991) for soil that have not yet been replaced by the SQGs. These interim remediation criteria are considered generally protective of human and environmental health and were based on experience and professional judgement.

Arsenic guidelines have been adjusted for a 10⁻⁵ risk factor.

Mercury analyzed as inorganic.

TABLE 4: POLYCYCLIC AROMATIC HYDROCARBONS in Soil (Residential)
Client: Parks Canada
Site Location: Georges Island National Historic Site, Halifax, NS
Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME Soil Quality Guidelines (SQGs) ¹						CBCL Limited Phase II ESA						Englobe Phase II ESA					
									19SS-01	19SS-02	19SS-03	19SS-04	19SS-05	19SS-06	SS1-A	SS1-B	SS1-B Lab-Dup	SS1-C	SS2-A	SS2-B
			Human Health	Environmental Health				Interim Soil Quality Criteria	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.3 m	0 - 0.15 m	0.15 - 0.3 m	0.15 - 0.3 m	0.3 - 0.45 m	0 - 0.15 m	0.15 - 0.3 m
			Direct Contact	Soil Contact	Soil and Food Ingestion	Protection of Freshwater Aquatic Life	SQGE	Remediation Criteria												
6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20									
1-Methylnapthalene	0.0100	mg/kg	-	-	-	-	-	-	0.022	0.013	0.45	0.38	0.048	0.08	0.024	0.041	0.048	0.13	0.02	0.026
2-Methylnapthalene	0.0100	mg/kg	-	-	-	-	-	-	0.025	0.016	0.53	0.42	0.053	0.089	0.029	0.045	0.052	0.15	0.025	0.029
Acenaphthene	0.0100	mg/kg	-	-	21.5	0.28	-	-	0.012	<0.010	0.330	0.440	0.059	0.049	0.017	0.043	0.038	0.061	0.018	0.042
Acenaphthylene	0.0100	mg/kg	-	-	-	320	-	-	<0.010	0.016	0.53	0.18	0.044	0.038	<0.010	0.012	0.012	0.033	<0.010	<0.010
Anthracene	0.0100	mg/kg	-	2.5	61.5	NA	2.5	-	0.024	0.048	2.80	1.40	0.210	0.190	0.076	0.13	0.12	0.26	0.042	0.075
Benz(a)anthracene	0.0100	mg/kg	-	-	6.2	-	-	1	0.094	0.240	11	5.2	1.1	0.780	0.25	0.47	0.47	1.3	0.12	0.22
Benzo(a)pyrene	0.0100	mg/kg	-	20	0.6	8800	20	-	0.099	0.260	12	5.3	1.3	0.900	0.24	0.49	0.5	1.4	0.12	0.21
Benzo(b)fluoranthene	0.0100	mg/kg	-	-	6.2	-	-	1	0.086	0.22	11	4.6	1.1	0.82	0.2	0.4	0.4	1.1	0.098	0.17
Benzo(b+j)fluoranthene	0.0100	mg/kg	-	-	-	-	-	-	0.13	0.35	17	7.1	1.7	1.3	0.32	0.63	-	1.7	0.16	0.27
Benzo(g,h,i)perylene	0.0100	mg/kg	-	-	-	-	-	-	0.071	0.2	7	3.2	0.9	0.61	0.15	0.32	0.33	0.9	0.087	0.13
Benzo(j)fluoranthene	0.0100	mg/kg	-	-	-	-	-	-	0.048	0.13	5.9	2.5	0.61	0.46	0.12	0.23	0.22	0.62	0.064	0.1
Benzo(k)fluoranthene	0.0100	mg/kg	-	-	6.2	-	-	1	0.046	0.13	6	2.5	0.64	0.45	0.13	0.23	0.24	0.64	0.074	0.1
Chrysene	0.0100	mg/kg	-	-	6.2	-	-	-	0.11	0.29	13	5.4	1.2	0.95	0.28	0.5	0.49	1.3	0.14	0.24
Dibenz(a,h)anthracene	0.0100	mg/kg	-	-	-	-	-	1	0.013	0.032	1.9	0.81	0.19	0.12	0.028	0.068	0.069	0.2	0.014	0.028
Fluoranthene	0.0100	mg/kg	-	50	15.4	-	50	-	0.19	0.53	21	10	1.9	1.5	0.51	0.99	0.9	2.4	0.28	0.55
Fluorene	0.0100	mg/kg	-	-	15.4	0.25	-	-	<0.010	0.014	0.56	0.45	0.063	0.047	0.023	0.044	0.041	0.072	0.017	0.039
Indeno(1,2,3-c,d)pyrene	0.0100	mg/kg	-	-	-	-	-	1	0.056	0.15	6.6	2.9	0.75	0.49	0.12	0.26	0.27	0.76	0.067	0.1
Naphthalene	0.0100	mg/kg	-	-	8.8	0.013	-	0.6	0.02	0.017	0.5	0.43	0.059	0.087	0.022	0.037	0.041	0.11	0.021	0.037
Perylene	0.0100	mg/kg	-	-	-	-	-	-	0.026	0.066	2.9	1.3	0.32	0.21	0.052	0.12	0.12	0.33	0.025	0.049
Phenanthrene	0.0100	mg/kg	-	-	43	0.046	-	5	0.13	0.23	10	6.1	0.94	0.78	0.32	0.56	0.49	1.1	0.21	0.38
Pyrene	0.0100	mg/kg	-	-	7.7	-	-	10	0.17	0.46	17	8.8	1.7	1.3	0.47	0.87	0.81	2.2	0.25	0.45
Calculated B(a)P TPE (10 ⁻⁵) ^{2,3}	-	mg/kg	5.3	-	-	-	-	-	0.44	1.15	54.45	23.9	5.79	4.01	0.354	0.725	0.737	2.064	0.179	0.311

Notes:

value	-exceeds CCME guideline
-	-no guideline or value

¹ 1999 CCME SQGs for the Protection of Human and Environmental Health with updates online at the time of reporting (<http://st-ts.ccm.ca/>) and the 1991 CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites.

² B(a)P TPE (Benzo(a)pyrene Total Potency Equivalent) is the sum of estimated cancer potency relative to B(a)P for all potentially carcinogenic unsubstituted PAH. The B(a)P TPE for a soil sample is calculated by multiplying the concentration of each PAH in the sample by its B(a)P Potency Equivalence Factor (PEF) and summing these products.

³ Where a calculation requires the use of a value which was not detected, half of the laboratory reportable detection limit (RDL) is used in the equation.
Lab-Dup = Laboratory Duplicate.

TABLE 4: POLYCYCLIC AROMATIC HYDROCARBONS in Soil (Residential)
Client: Parks Canada
Site Location: Georges Island National Historic Site, Halifax, NS
Englobe Project No.: 2000155

PARAMETER	RDL	UNITS	CCME Soil Quality Guidelines (SQGs) ¹						Englobe Phase II ESA									
									SS2-C	SS3-A	SS3-B	SS3-C	SS4-A	SS5-A	SS6-A	SS6-C	SS7-A	SS7-C
			Human Health	Environmental Health				Interim Soil Quality Criteria	0.3 - 0.45 m	0 - 0.15 m	0.15 - 0.3 m	0.3 - 0.45 m	0 - 0.15 m	0 - 0.15 m	0 - 0.15 m	0.3 - 0.45 m	0 - 0.15 m	0.3 - 0.45 m
			Direct Contact	Soil Contact	Soil and Food Ingestion	Protection of Freshwater Aquatic Life	SQG _E	Remediation Criteria	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20	19-Mar-20
1-Methylnapthalene	0.0100	mg/kg	-	-	-	-	-	-	0.056	0.35	0.25	0.18	0.34	0.22	0.15	0.15	0.39	0.38
2-Methylnapthalene	0.0100	mg/kg	-	-	-	-	-	-	0.063	0.41	0.29	0.22	0.41	0.26	0.16	0.15	0.45	0.4
Acenaphthene	0.0100	mg/kg	-	-	21.5	0.28	-	-	0.038	0.83	0.29	0.23	0.43	0.38	0.28	0.22	0.78	0.77
Acenaphthylene	0.0100	mg/kg	-	-	-	320	-	-	0.014	0.17	0.2	0.085	0.12	0.078	0.1	0.13	0.24	0.18
Anthracene	0.0100	mg/kg	-	2.5	61.5	NA	2.5	-	0.12	3	1.7	0.94	1.3	1	0.78	0.81	1.6	1.9
Benz(a)anthracene	0.0100	mg/kg	-	-	6.2	-	-	1	0.49	7.6	5.7	4.7	5.3	3.5	2.5	3.1	7.5	8.4
Benzo(a)pyrene	0.0100	mg/kg	-	20	0.6	8800	20	-	0.53	7.8	5.4	5.2	5.6	3.8	2.5	3.1	9.3	9.5
Benzo(b)fluoranthene	0.0100	mg/kg	-	-	6.2	-	-	1	0.44	6.5	4.1	4.1	4.8	3.3	2.2	2.4	7	6.9
Benzo(b+j)fluoranthene	0.0100	mg/kg	-	-	-	-	-	-	0.69	9.7	6.5	6.3	7.2	4.8	3.3	3.7	10	11
Benzo(g,h,i)perylene	0.0100	mg/kg	-	-	-	-	-	-	0.36	4.6	3.9	4	3.7	2.6	1.6	1.9	6.1	5.6
Benzo(j)fluoranthene	0.0100	mg/kg	-	-	-	-	-	-	0.25	3.3	2.4	2.2	2.3	1.6	1.1	1.4	3.4	3.6
Benzo(k)fluoranthene	0.0100	mg/kg	-	-	6.2	-	-	1	0.25	3.5	2.5	2.2	2.5	1.7	1.2	1.4	3.6	3.7
Chrysene	0.0100	mg/kg	-	-	6.2	-	-	-	0.53	7.4	5.4	4.7	5.3	3.5	2.5	3.1	7.3	8
Dibenz(a,h)anthracene	0.0100	mg/kg	-	-	-	-	-	1	0.077	1.4	0.9	0.84	1	0.73	0.44	0.48	1.7	1.4
Fluoranthene	0.0100	mg/kg	-	50	15.4	-	50	-	0.94	15	10	8.7	9.8	6.7	4.7	5.8	13	14
Fluorene	0.0100	mg/kg	-	-	15.4	0.25	-	-	0.039	0.91	0.48	0.26	0.46	0.4	0.34	0.29	0.77	0.79
Indeno(1,2,3-c,d)pyrene	0.0100	mg/kg	-	-	-	-	-	1	0.3	4.3	3.2	3.3	3.3	2.3	1.4	1.6	5.2	4.7
Naphthalene	0.0100	mg/kg	-	-	8.8	0.013	-	0.6	0.048	0.48	0.26	0.22	0.34	0.27	0.16	0.16	0.66	0.68
Perylene	0.0100	mg/kg	-	-	-	-	-	-	0.12	1.8	1.3	1.3	1.3	0.88	0.55	0.67	2.1	2.1
Phenanthrene	0.0100	mg/kg	-	-	43	0.046	-	5	0.5	11	5.9	4	5.9	5	3.8	3.5	10	8.6
Pyrene	0.0100	mg/kg	-	-	7.7	-	-	10	0.83	12	7.9	7.2	8.2	5.8	4.2	5.1	11	12
Calculated B(a)P TPE (10 ⁻⁵) ^{2,3}	-	mg/kg	5.3	-	-	-	-	-	0.789	11.84	8.183	7.777	8.51	5.831	3.821	4.620	13.804	13.766

Notes:

value	-exceeds CCME guideline
-	-no guideline or value

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² B(a)P TPE (Benzo(a)pyrene Total Potency Equivalent) is the sum of estimated cancer potency relative to B(a)P for all potentially carcinogenic unsubstituted PAH. The B(a)P TPE for a soil sample is calculated by multiplying the concentration of each PAH in the sample by its B(a)P Potency Equivalence Factor (PEF) and summing these products.

³ Where a calculation requires the use of a value which was not detected, half of the laboratory reportable detection limit (RDL) is used in the equation.
Lab-Dup = Laboratory Duplicate.