

Table 2.0

Static Water Levels and Well Completion Details

Hydrogeology and Hydrology Characterization Report

Upland Landfill

Campbell River, British Columbia

Monitoring ID	Borehole Depth (m BGS)	Easting	Northing	2015 Reference Elevation Ground Surface (m AMSL) ¹	2015 Reference Elevation TOR (m AMSL) ¹	Stick-up (m)	Screened Interval (m BGS)	Screen Interval (m AMSL)	Screen Length (m)	Well Diameter (mm)	Depth to Water (m BTOR)						Water Level ⁽³⁾ (m AMSL)						Hydraulic Conductivity (cm/s)	Screened Unit			
Date:											11-Sep-15	17-Sep-15	5-Oct-15	25-Jan-16	29-Jan-16	15-Feb-16	11-Sep-15	17-Sep-15	5-Oct-15	25-Jan-16	29-Jan-16	15-Feb-16		Primary Constituent			
MW1-14	10.97	330788.539	5541791.638	171.8	172.9	1.1	4.9	11.0	166.9	160.8	6.1	50.8	5.6	6.3	6.1	6.0	-	-	167.3	166.6	166.9	166.9	-	-	-	Sand/gravel	
MW2-14*	21.64	330961.402	5541591.181	173.1	173.8	0.8	15.5	21.6	157.5	151.4	6.1	50.8	14.5	14.7	15.2	14.7	-	14.6	159.4	159.1	158.6	159.1	-	159.3	-	Sand/gravel (Shallow Overburden)	
MW2A-16**	45.42	330961.699	5541600.583	173.1	173.9	0.8	37.5	40.5	135.6	132.6	6.1	50.8	-	-	-	14.5	-	-	-	-	159.3	-	159.3	-	-	Sand (Deep Overburden)	
MW3-14	18.59	330885.439	5541429.793	167.6	168.6	1.0	11.3	17.4	156.3	150.2	6.1	50.8	12.8	12.7	12.8	11.3	-	-	155.8	155.9	155.8	157.2	-	-	-	Sand/gravel	
MW4A-15	21.33	330737.351	5541583.042	168.5	169.3	0.8	19.8	21.4	148.7	147.2	1.52	50.8	3.9	4.3	4.9	4.0	-	-	165.4	165.0	164.4	165.3	-	-	2.2 x 10 ⁻²	Bedrock - Igneous Rock	
MW4B-15	18.28	330743.926	5541575.024	168.4	169.3	0.9	15.2	18.3	153.2	150.1	3.04	50.8	4.1	4.5	5.1	4.2	-	-	165.2	164.8	164.1	165.0	-	-	2.0 x 10 ⁻²	Sand	
MW5A-15	10.66	330675.167	5541325.831	191.3	191.9	0.6	9.1	10.7	182.1	180.6	1.52	50.8	9.0	9.0	8.3	7.3	-	-	182.9	182.9	183.6	184.6	-	-	1.4 x 10 ⁻⁵	Bedrock -Basalt (Perched)	
MW5B-15	8.22	330685.323	5541325.831	190.4	192.0	1.7	4.9	7.9	185.5	182.4	3.04	50.8	7.1	7.2	7.0	5.4	-	-	184.9	184.9	185.0	186.6	-	-	-	Sand/Silt with clay (Perched)	
RW-98020	60.96	330012.000	5541724.000	195.6	196.9	1.3	1.8	61.0	193.8	134.7	59.1	152.4	-	-	-	-	-	-	-	-	-	-	-	179.9	-	-	Bedrock - Basalt
SW15-01																											
Mclvor Lake**	-	330439.260	5542720.740	-	-	-	-	-	-	-	-	-	-	-	-	0.81 ²	-	-	-	-	-	-	177.9	-	-	-	-
SW15-02																											
Rico Lake**	-	330449.605	5541459.832	-	-	-	-	-	-	-	-	-	-	-	-	0.88 ²	-	-	-	-	-	-	181.2	-	-	-	-

Notes:

1 - Survey completed by Upland Excavating Ltd. on March 8, 2016. Elevations measured with respect to AMSL.

2 - Reference elevations have not been measured.

* - Survey completed by Upland Excavating Ltd. on January 29 2015. Elevations measured with respect to AMSL.

** - Survey completed by Upland Excavating Ltd. on April 6, 2016. Elevations measured with respect to AMSL.

m BGS - metres below ground surface

m AMSL - metres above mean sea level

TOR - top of riser

Table 4.0
Groundwater Analytical Results
Hydrogeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:						Overburden Sand and Gravel Aquifer					
Sample Location:						MW1-14	MW1-14	MW2-14	MW2-14	MW2-14	MW2A-16
Sample ID:						W-88877-091715-TDF-07	WG-88877-05102015-TE-01	W-88877-091715-TDF-05	W-88877-091715-TDF-06	WG-88877-05102015-TE-02	WG-88877-150216-JS-02
Sample Date:						9/17/2015	10/5/2015	9/17/2015	9/17/2015	10/5/2015	2/15/2016
Parameters	Units	FWAL a	DW b	FWAL c	DW d	DW e	Duplicate				
Field Parameters											
Conductivity, field	mS/cm	-	-	-	-	-	0.101	0.099	0.18	0.18	0.092
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	234	226	222	222	140
pH, field	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.45	6.79	7.52	7.05	7.39
Temperature, field	Deg C	18 (12 spring/fall) (c)	15	-	-	-	13.75	15.68 ^b	12.5	15.74 ^b	12.42
Total dissolved solids, field (TDS)	g/L	-	-	-	-	-	-	0.064	-	0.105	0.061
Turbidity, field	NTU	(c)	(c)	-	-	-	250	91	OOR	561	OOR
General Chemistry											
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	39.1	40.8	76.2	71.1	38
Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	47.7	49.8	93	86.7	46.3
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	ND (6.0)	ND (6.0)	6.7	7.8	ND (6.0)
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	25	19	60	18	25
Chloride (dissolved)	mg/L	150	250	1500	250	-	1.9	3.7	3.5	3	0.83
Conductivity	uS/cm	-	-	-	-	-	91.2	100	178	180	85.7
Cyanide (total)	mg/L	-	-	-	-	-	ND (0.00054)	-	ND (0.00057)	ND (0.00056)	ND (0.00054)
Hardness (dissolved)	mg/L	-	-	-	-	-	38.7	43.3	81.1	80.5	34.9
Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Oil and grease	mg/L	-	-	-	-	-	-	-	-	-	-
pH	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.65 J	7.85 J	8.01 J	7.96 J	7.85 J
Phenols (total)	mg/L	0.002	-	0.01	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	-	-	-	0.337	0.675	0.275 J	0.387 J	0.121
Sulfate (dissolved)	mg/L	[b]	500	1000	500	-	3.17	2.31	8.22	7.72	4.52
Hardness < 30	mg/L	128	-	-	-	-	ND (0.0050)	0.0062 ^a	ND (0.0050)	ND (0.0075)	ND (0.0019)
Hardness > 30 - 75	mg/L	218	-	-	-	-	ND (0.0050)	0.007	ND (0.0050)	ND (0.0075)	ND (0.0019)
Hardness > 75 - 180	mg/L	309	-	-	-	-	52 J	ND (72)	108 J	94	60
Hardness > 250	mg/L	[b] TBD	-	-	-	-	212	717	330	362	139
Sulfide	mg/L	0.002 w	-	-	-	-	ND (0.0050)	0.0062 ^a	ND (0.0050)	ND (0.0075)	ND (0.0019)
Hydrogen sulfide	mg/L	-	-	0.02	0.05	-	ND (0.0050)	0.007	ND (0.0050)	ND (0.0075)	ND (0.0019)
Total dissolved solids (TDS)	mg/L	-	500 (*)	-	-	-	52 J	ND (72)	108 J	94	60
Total suspended solids (TSS)	mg/L	(c)	-	-	-	-	212	717	330	362	139
Nutrients											
Ammonia-N	mg/L	[d]	-	[a]	-	-	0.021	0.012	0.058 J	0.034 J	ND (0.0050)
Varies with pH and Temperature	mg/L	[d]	-	-	-	-	0.021	0.012	0.058 J	0.034 J	ND (0.0050)
pH < 7.0	mg/L	-	-	18.4	-	-	-	0.012	-	-	-
pH 7.0 - < 7.5	mg/L	-	-	18.5	-	-	0.021	-	-	-	-
pH 7.5 - < 8.0	mg/L	-	-	11.3	-	-	-	-	0.058 J	0.034 J	ND (0.0050)
Nitrate (as N)	mg/L	3	10	400	10	-	0.15	0.26	0.26	0.24	ND (0.10) J
Nitrite (as N)	mg/L	[c]	1	[c]	3.2	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10) J
Chloride < 2 mg/L	mg/L	0.02	-	0.2	-	-	ND (0.10)	-	-	-	ND (0.10) J
Chloride 2 - < 4 mg/L	mg/L	0.04	-	0.4	-	-	-	ND (0.10)	-	-	-
Chloride 4 - < 6 mg/L	mg/L	0.06	-	0.6	-	-	-	-	ND (0.10)	-	-
Chloride 6 - < 8 mg/L	mg/L	0.08	-	0.8	-	-	-	-	-	-	-
Chloride 8 - < 10 mg/L	mg/L	0.10	-	1	-	-	-	-	-	-	-
Chloride >= 10 mg/L	mg/L	0.20	-	2	-	-	-	-	-	-	-
Nitrite/Nitrate	mg/L	-	-	400	10	-	0.15	0.26	0.26	0.24	ND (0.10) J
Nitrogen	mg/L	-	-	-	-	-	0.185	0.303	0.507	0.446	0.095
Orthophosphate	mg/L	-	-	-	-	-	ND (0.10) J	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10) J
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	ND (0.10)	ND (0.10)	0.25	0.21	ND (0.10)

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Hydrogeologic Unit:		Overburden Sand and Gravel Aquifer											
Sample Location:		BC WQG ⁽¹⁾		BC WQG ⁽¹⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	MW1-14	MW1-14	MW2-14	MW2-14	MW2-14	MW2A-16
Sample ID:				Schedule 6	Schedule 6	Schedule 10		W-88877-091715-TDF-07	WG-88877-05102015-TE-01	W-88877-091715-TDF-05	W-88877-091715-TDF-06	WG-88877-05102015-TE-02	WG-88877-150216-JS-02
Sample Date:								9/17/2015	10/5/2015	9/17/2015	9/17/2015	10/5/2015	2/15/2016
Parameters	Units	FWAL	DW	FWAL	DW	DW					Duplicate		
Dissolved Metals		a	b	c	d	e							
Aluminum (dissolved)	ug/L	[a]	200	-	9500	-	9 J	6.6	9.6 J	9.8 J	6.1	24.2	
pH >= 6.5	ug/L	50					9 J	6.6	9.6 J	9.8 J	6.1	24.2	
Antimony (dissolved)	ug/L	2 w	14 w	200	6	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Arsenic (dissolved)	ug/L	5	25	50	10	-	0.13	0.15	0.18	0.18	0.17	0.83	
Barium (dissolved)	ug/L	1000 w	1000	10000	1000	-	ND (1.0)	ND (1.0)	1.7	1.7	1.9	2.8	
Beryllium (dissolved)	ug/L	0.13 w	4 w	53	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	
Bismuth (dissolved)	ug/L	-	-	-	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Boron (dissolved)	ug/L	1200	5000	50000	5000	-	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	
Cadmium (dissolved)	ug/L	[b]	5	[b]	5	-	ND (0.010)	ND (0.010)	0.014	0.011	0.017	ND (0.010)	
Hardness < = 30	ug/L			0.1									
Hardness 3.4 - 285 (calculated ^b)	ug/L	[b]					ND (0.010)	ND (0.010)	0.014	0.011	0.017	ND (0.010)	
Hardness 30 - < 90	ug/L			0.3			ND (0.010)	ND (0.010)	0.014	0.011	0.017	ND (0.010)	
Hardness 90 - < 150	ug/L			0.5									
Hardness 450 - < 500 [bx]	ug/L			1.3									
Calcium (dissolved)	ug/L	-	-	-	-	-	12600	14200	25500	25100	24300	11100	
Chromium (dissolved)	ug/L	-	50	10	50	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Cobalt (dissolved)	ug/L	4	-	40	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	
Copper (dissolved)	ug/L	[b]	500	[b]	1000	-	0.33	0.44	0.72	0.85	0.99	ND (0.20)	
Hardness < 50	ug/L	2		20			0.33	0.44				ND (0.20)	
Hardness 50 - < 75	ug/L			30									
Hardness 75 - < 100	ug/L			40					0.72	0.85	0.99		
Hardness 125 - < 150	ug/L			60									
Hardness >= 50 (calculated ^c)	ug/L	[b]							0.72	0.85	0.99		
Hardness >= 200	ug/L			90									
Iron (dissolved)	ug/L	350	-	-	6500	-	53.9	7.5	ND (5.0)	5.1	9.5	ND (5.0)	
Lead (dissolved)	ug/L	[b]	50	[b]	10	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Hardness < 50	ug/L			40			ND (0.20)	ND (0.20)				ND (0.20)	
Hardness 50 - < 100	ug/L			50					ND (0.20)	ND (0.20)	ND (0.20)		
Hardness 100 - < 200	ug/L			60									
Hardness dependent (calculated ^d)	ug/L	[b]					ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	
Hardness >= 300	ug/L			160									
Lithium (dissolved)	ug/L	14 w	-	-	-	730	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Magnesium (dissolved)	ug/L	-	-	-	100000	-	1740	1870	4250	4300	3920	1730	
Manganese (dissolved)	ug/L	[b]	50 (*)	-	550	550	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	16.2	
Hardness dependent (calculated ^e)	ug/L	[b]					ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	16.2	
Mercury (dissolved)	ug/L	0.02	1	1	1	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	
Molybdenum (dissolved)	ug/L	1000	250	10000	250	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	8.7	
Nickel (dissolved)	ug/L	[b]	-	[b]	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
Hardness < 60	ug/L	25		250			ND (1.0)	ND (1.0)				ND (1.0)	
Hardness 60 - < 120	ug/L	65		650					ND (1.0)	ND (1.0)	ND (1.0)		
Hardness 120 - < 180	ug/L	110		1100									
Hardness >= 180	ug/L	150		1500									
Phosphorus (dissolved)	ug/L	-	-	-	-	-	-	-	-	-	-	17	
Potassium (dissolved)	ug/L	-	-	-	-	-	181	176	291	292	254	541	
Selenium (dissolved)	ug/L	2	10	10	10	-	0.18	ND (0.10)	0.18	0.18	0.11	0.2	
Silicon (dissolved)	ug/L	-	-	-	-	-	5310	5500	6250	6500	6530	4540	
Silver (dissolved)	ug/L	[b]	-	[b]	-	-	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	
Hardness < 100	ug/L	0.05		0.5			ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	
Hardness >= 100	ug/L	1.5		15									
Sodium (dissolved)	ug/L	-	200000	-	200000	-	2850	2620	4720	4630	4370	2830	
Strontium (dissolved)	ug/L	-	-	-	-	-	21.7	23	36.6	37.8	34.7	23.7	
Sulfur (dissolved)	ug/L	-	-	-	-	-	ND (3000)	ND (3000)	ND (3000)	ND (3000)	3800	5500	
Thallium (dissolved)	ug/L	0.8 w	2 w	3	-	-	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	
Tin (dissolved)	ug/L	-	-	-	-	22000	ND (5.0)	ND (5.0)	5	ND (5.0)	ND (5.0)	ND (5.0)	
Titanium (dissolved)	ug/L	2000 w	-	1000	-	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Uranium (dissolved)	ug/L	8.5 w	20	3000	20	20	ND (0.10)	0.13	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	
Vanadium (dissolved)	ug/L	-	-	-	-	-	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	
Zinc (dissolved)	ug/L	[b]	5000	[b]	5000	-	ND (5.0)	8.7	ND (5.0)	ND (5.0)	5	ND (5.0)	
Hardness < 90	ug/L	7.5		75			ND (5.0)	8.7 ^a	ND (5.0)	ND (5.0)	5	ND (5.0)	
Hardness 100 - < 200	ug/L			900									
Hardness 400 - < 500 [bx]	ug/L			3150									
Hardness >= 90 (calculated ^f)	ug/L	[b]											
Zirconium (dissolved)	ug/L	-	-	-	-	-	ND (0.50)	ND (0.50) J	ND (0.50)	ND (0.50)	ND (0.50) J	ND (0.50)	

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Sample Location:		BC WQG ⁽¹⁾		BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	MW1-14	MW1-14	MW2-14	MW2-14	MW2-14	MW2A-16
Sample ID:				Schedule 6	Schedule 6	Schedule 10	W-88877-091715-TDF-07	WG-88877-05102015-TE-01	W-88877-091715-TDF-05	W-88877-091715-TDF-06	WG-88877-05102015-TE-02	WG-88877-150216-JS-02
Sample Date:							9/17/2015	10/5/2015	9/17/2015	9/17/2015	10/5/2015	2/15/2016
Parameters	Units	FWAL a	DW b	FWAL c	DW d	DW e	Duplicate					
PAH												
2-Methylnaphthalene	ug/L			-	-	-	-	-	-	-	-	-
Acenaphthene	ug/L			60	-	-	-	-	-	-	-	-
Acenaphthylene	ug/L			-	-	-	-	-	-	-	-	-
Acridine	ug/L			0.5	-	-	-	-	-	-	-	-
Anthracene	ug/L			1	-	-	-	-	-	-	-	-
Benzo(a)anthracene	ug/L			1	-	-	-	-	-	-	-	-
Benzo(a)pyrene	ug/L			0.1	0.01	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L			-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	ug/L			34	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L			-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	ug/L			-	-	-	-	-	-	-	-	-
Chrysene	ug/L			1	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L			-	-	-	-	-	-	-	-	-
Fluoranthene	ug/L			2	-	-	-	-	-	-	-	-
Fluorene	ug/L			120	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	ug/L			-	-	-	-	-	-	-	-	-
Naphthalene	ug/L			10	-	-	-	-	-	-	-	-
PAH high molecular weight	ug/L			-	-	-	-	-	-	-	-	-
PAH low molecular weight	ug/L			-	-	-	-	-	-	-	-	-
Phenanthrene	ug/L			3	-	-	-	-	-	-	-	-
Pyrene	ug/L			0.2	-	-	-	-	-	-	-	-
Total PAH	ug/L			-	-	-	-	-	-	-	-	-
Petroleum Products												
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L			5	5	-	-	-	-	-	-	-
Extractable Petroleum Hydrocarbons (C19-C32)	mg/L			-	-	-	-	-	-	-	-	-
HEPH (C19-C32 less PAH)	mg/L			-	-	-	-	-	-	-	-	-
LEPH (C10-C19 less PAH)	mg/L			0.5	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L			1.5	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons VH (C6-C10)	mg/L			15	15	-	-	-	-	-	-	-
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	ug/L			-	-	26	-	-	-	-	-	-
1,1,1-Trichloroethane	ug/L			-	-	10000	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	ug/L			-	-	3.4	-	-	-	-	-	-
1,1,2-Trichloroethane	ug/L			-	-	12	-	-	-	-	-	-
1,1-Dichloroethane	ug/L			-	-	3700	-	-	-	-	-	-
1,1-Dichloroethene	ug/L			-	14	-	-	-	-	-	-	-
1,2,3-Trichlorobenzene	ug/L			80	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	ug/L			240	-	-	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	ug/L			-	-	0.34	-	-	-	-	-	-
1,2-Dichlorobenzene	ug/L			7	3	-	-	-	-	-	-	-
1,2-Dichloroethane	ug/L			1000	5	-	-	-	-	-	-	-
1,2-Dichloropropane	ug/L			-	-	9.9	-	-	-	-	-	-
1,3-Butadiene	ug/L			-	-	6.1	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L			1500	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/L			260	1	-	-	-	-	-	-	-

Table 4.0
Groundwater Analytical Results
Hydrgological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:		Overburden Sand and Gravel Aquifer										
Sample Location:		BC WQG ⁽¹⁾		BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	MW1-14	MW1-14	MW2-14	MW2-14	MW2-14	MW2A-16
Sample ID:				Schedule 6	Schedule 6	Schedule 10	W-88877-091715-TDF-07	WG-88877-05102015-TE-01	W-88877-091715-TDF-05	W-88877-091715-TDF-06	WG-88877-05102015-TE-02	WG-88877-150216-JS-02
Sample Date:							9/17/2015	10/5/2015	9/17/2015	9/17/2015	10/5/2015	2/15/2016
Parameters	Units	FWAL	DW	FWAL	DW	DW	Duplicate					
		a	b	c	d	e						
Benzene	ug/L			4000	5	-	-	-	-	-	-	-
Bromobenzene	ug/L			-	-	730	-	-	-	-	-	-
Bromodichloromethane	ug/L			-	16	16	-	-	-	-	-	-
Bromoform	ug/L			-	100	100	-	-	-	-	-	-
Bromomethane (Methyl bromide)	ug/L			-	-	51	-	-	-	-	-	-
Carbon tetrachloride	ug/L			130	5	-	-	-	-	-	-	-
Chlorobenzene	ug/L			13	30	-	-	-	-	-	-	-
Chloroethane	ug/L			-	-	46	-	-	-	-	-	-
Chloroform (Trichloromethane)	ug/L			20	100	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	ug/L			-	-	950	-	-	-	-	-	-
cis-1,2-Dichloroethene	ug/L			-	-	370	-	-	-	-	-	-
cis-1,3-Dichloropropene	ug/L			-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L			-	100	100	-	-	-	-	-	-
Dibromomethane	ug/L			-	-	370	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	ug/L			-	-	7300	-	-	-	-	-	-
Ethylbenzene	ug/L			2000	2.4	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L			1	-	8.6	-	-	-	-	-	-
m&p-Xylenes	ug/L			-	-	-	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	ug/L			34000	15	15	-	-	-	-	-	-
Methylene chloride	ug/L			980	50	-	-	-	-	-	-	-
o-Xylene	ug/L			-	-	-	-	-	-	-	-	-
Styrene	ug/L			720	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L			1100	30	-	-	-	-	-	-	-
Toluene	ug/L			390	24	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	ug/L			-	-	730	-	-	-	-	-	-
trans-1,3-Dichloropropene	ug/L			-	-	-	-	-	-	-	-	-
Trichloroethene	ug/L			200	5	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	ug/L			-	-	11000	-	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	ug/L			-	-	1000000	-	-	-	-	-	-
Vinyl chloride	ug/L			-	2	2	-	-	-	-	-	-
Xylenes (total)	ug/L			-	300	-	-	-	-	-	-	-

Notes:

⁽¹⁾ British Columbia Approved Water Quality Guidelines (WQG), 2006 Edition or Canadian Drinking Guidelines unless otherwise stated.

⁽²⁾ Bristish Columbia Contaminated Sites Regulation (CSR)

a Exceeds BC WQG Freshwater Aquatic Life (FWAL) Guideline.

b Exceeds BC WQG Drinking Water (DW) Guideline.

c Exceeds BC CSR Schedule 6 Freshwater Aquatic Life (FWAL) Guideline.

d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

[a] Limit varies with pH.

[b] Limit varies with Hardness.

[bx] Limit varies with Hardness. Limit as per Protocol 10 - Hardness Dependent Site-Specific Freshwater Water Quality Standards for Cadmium and Zinc.

[b] TBD Limit varies with Hardness. Determined on a site-specific basis.

[c] Limit varies with Chloride (mg/L).

[d] Limit varies with pH and Temperature.

[e] Background dependent. Not evaluated until background limits established.

Exceeds guideline.

ND Not detected at the associated reporting limit.

OOR Out of range.

(c) Background dependant. Background location not established.

w Values reported from BC MOE - Working Water Quality Guidelines for British Columbia (2015).

* Aesthetic objective

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

calculation^a Exp(1.6-3.327*pH+0.402*pH^2)

calculation^b (10^(0.86*LOG(HARDNESS))-3.2))/1000

calculation^c (0.04* hardness)/1000

calculation^d 3.31 + e(1.273 ln (mean hardness) - 4.704)

calculation^e 0.01102*hardness+0.54

calculation^f 7.5 + 0.75 x (hardness -90)

calculation^g ((-51.73)+(92.57*(LOG(hardness)/LOG(10))))*0.01

- Currently no Standard/Guideline.

Table 4.0
Groundwater Analytical Results
Hydrgeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:							Overburden Sand and Gravel Aquifer				Bedrock Unit				Perched Aquifer		
Sample Location:							MW3-14	MW3-14	MW4B-15	MW4B-15	RW-98020	MW4A-15	MW4A-15	MW4A-15	MW5A-15	MW5A-15	MW5B-15
Sample ID:							W-88877-091715-TDF-04	WG-88877-05102015-TE-03	W-88877-091715-TDF-02	WG-88877-06102015-TE-07	WG-88877-150216-JS-01	W-88877-091715-TDF-01	WG-88877-06102015-TE-08	WG-88877-06102015-TE-09	W-88877-091715-TDF-03	WG-88877-05102015-TE-05	WG-88877-05102015-TE-04
Sample Date:							9/17/2015	10/5/2015	9/17/2015	10/6/2015	2/15/2016	9/17/2015	10/6/2015	10/6/2015	9/17/2015	10/5/2015	10/5/2015
Parameters	Units	BC WQG ⁽¹⁾ FWAL a	BC WQG ⁽¹⁾ DW b	BC CSR ⁽²⁾ Schedule 6 FWAL c	BC CSR ⁽²⁾ Schedule 6 DW d	BC CSR ⁽²⁾ Schedule 10 DW e								Duplicate			
Field Parameters																	
Conductivity, field	mS/cm	-	-	-	-	-	0.251	0.157	0.238	0.283	0.135	0.221	0.323	0.323	0.459	0.329	0.404
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	194	231	174	92	333	131	89	89	162	177	229
pH, field	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.4	7.06	7.83	6.95	6.58	7.97	7.7	7.7	7.92	7.98	7
Temperature, field	Deg C	18 (12 spring/fall) (c)	15	-	-	-	12.98	14.34	15.52 ^b	11.92	8.05	17.61 ^b	11.5	11.5	14.12	16.61 ^b	16.99 ^b
Total dissolved solids, field (TDS)	g/L	-	-	-	-	-	-	0.101	-	0.184	0.088	-	0.21	0.21	-	0.216	0.264
Turbidity, field	NTU	(c)	(c)	-	-	-	00R	00R	7.4	2.5	6.2	8.1	2.6	2.6	500	92	36.1
General Chemistry																	
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	37.8	40.5	66.4	15.4	58.6	91.4	72 J	102 J	117	121	160
Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	46.1	49.4	80.9	18.8	71.4	112	87.9 J	124 J	143	148	195
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	6.5	ND (6.0)	ND (6.0)
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	21	66	ND (10)	12	ND (10)	ND (10)	ND (10)	ND (10)	163	26	ND (10)
Chloride (dissolved)	mg/L	150	250	1500	250	-	5.3	9.6	24	6.2	2.4	24	27	26	20	15	3
Conductivity	uS/cm	-	-	-	-	-	111	121	240	55.5	124	283	251 J	309 J	487	342	338
Cyanide (total)	mg/L	-	-	-	-	-	ND (0.00091)	-	ND (0.00080)	-	ND (0.00057)	0.00078	-	-	ND (0.00119)	-	-
Hardness (dissolved)	mg/L	-	-	-	-	-	47.6	56.1	21.2	16.8	53.3	43	23.5 J	52.2 J	135	126	141
Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Oil and grease	mg/L	-	-	-	-	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	ND (1.0)	ND (1.0)
pH	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.83 J	7.73 J	7.8 J	7.48 J	7.14 J	8.12 J	8 J	8.16 J	8.15 J	8.13 J	8.03 J
Phenols (total)	mg/L	0.002	-	0.01	-	-	-	-	ND (0.0010)	-	-	ND (0.0010)	-	-	-	ND (0.0010)	ND (0.0010)
Phosphorus	mg/L	-	-	-	-	-	0.123	1.47	0.02	ND (0.0050)	0.013	0.0162	0.0184 J	0.0108 J	2.64	0.0746	ND (0.0050)
Sulfate (dissolved)	mg/L	[b]	500	1000	500	-	5.78	5.62	5.68	ND (0.50)	3.72	6.3	6.26	6.84	87.5	31.4	3.32
Hardness < 30	mg/L	128	-	-	-	-	-	-	5.68	ND (0.50)	-	-	6.26	-	-	-	-
Hardness > 30 - 75	mg/L	218	-	-	-	-	5.78	5.62	-	ND (0.50)	3.72	6.3	-	-	-	-	-
Hardness > 75 - 180	mg/L	309	-	-	-	-	-	-	-	-	-	-	-	-	87.5	31.4	3.32
Hardness > 250	mg/L	[b] TBD	-	-	-	-	-	-	-	-	-	-	6.26	6.84	-	-	-
Sulfide	mg/L	0.002 w	-	-	-	-	ND (0.0050)	0.027 ^a	ND (0.0058)	ND (0.0019)	ND (0.0019)	ND (0.0078)	ND (0.0019)	ND (0.0019)	ND (0.0050)	0.01 ^a	ND (0.0019)
Hydrogen sulfide	mg/L	-	-	0.02	0.05	-	ND (0.0050)	0.029 ^a	ND (0.0058)	ND (0.0019)	ND (0.0019)	ND (0.0078)	ND (0.0019)	ND (0.0019)	ND (0.0050)	0.011	ND (0.0019)
Total dissolved solids (TDS)	mg/L	-	500 (*)	-	-	-	78 J	ND (82)	162	ND (58)	58	146 J	158 J	204 J	292 J	222	186
Total suspended solids (TSS)	mg/L	(c)	-	-	-	-	59	882	ND (4.0)	ND (4.0)	13.8	ND (4.0)	ND (4.0)	ND (4.0)	4540	280	30.5
Nutrients																	
Ammonia-N	mg/L	[d]	-	[a]	-	-	0.017	0.15	0.015	0.012	ND (0.0050)	0.018	0.02	0.017	0.026	0.019	0.021
Varies with pH and Temperature	mg/L	[d]	-	-	-	-	0.017	0.15	0.015	0.012	ND (0.0050)	0.018	0.02	0.017	0.026	0.019	0.021
pH < 7.0	mg/L	-	-	18.4	-	-	-	-	-	-	-	-	-	-	-	-	-
pH 7.0 - < 7.5	mg/L	-	-	18.5	-	-	0.017	0.15	-	0.012	ND (0.0050)	-	-	-	-	-	0.021
pH 7.5 - < 8.0	mg/L	-	-	11.3	-	-	-	-	0.015	-	-	0.018	0.02	0.017	0.026	0.019	-
Nitrate (as N)	mg/L	3	10	400	10	-	0.49	0.54	0.9	ND (0.10)	0.15 J	0.9	0.77 J	1.11 J	ND (0.10)	0.29	1.33
Nitrite (as N)	mg/L	[c]	1	[c]	3.2	-	ND (0.10)	0.11	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Chloride < 2 mg/L	mg/L	0.02	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride 2 - < 4 mg/L	mg/L	0.04	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride 4 - < 6 mg/L	mg/L	0.06	-	0.6	-	-	ND (0.10)	-	-	-	ND (0.10) J	-	-	-	-	-	ND (0.10)
Chloride 6 - < 8 mg/L	mg/L	0.08	-	0.8	-	-	-	-	-	ND (0.10)	-	-	-	-	-	-	-
Chloride 8 - < 10 mg/L	mg/L	0.10	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride >= 10 mg/L	mg/L	0.20	-	2	-	-	-	-	ND (0.10)	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	-
Nitrite/Nitrate	mg/L	-	-	400	10	-	0.49	0.65	0.9	ND (0.10)	0.15 J	0.9	0.77 J	1.11 J	ND (0.10)	0.29	1.33
Nitrogen	mg/L	-	-	-	-	-	0.584	1.18	0.95	0.154	0.155	0.928	0.99 J	1.31 J	1.26	0.388	1.75
Orthophosphate	mg/L	-	-	-	-	-	ND (0.10) J	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10) J	ND (0.10) J	ND (0.10)	ND (0.10)	ND (0.10) J	ND (0.10)	ND (0.10)
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	ND (0.10)	0.54	ND (0.10)	0.15	ND (0.10)	ND (0.10)	0.22	0.2	1.26	ND (0.10)	0.41

Table 4.0
Groundwater Analytical Results
Hydrgological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:		Overburden Sand and Gravel Aquifer								Bedrock Unit								Perched Aquifer					
Sample Location:		MW3-14		MW3-14		MW4B-15		MW4B-15		RW-98020		MW4A-15		MW4A-15		MW5A-15		MW5A-15		MW5B-15			
Sample ID:		W-88877-091715-TDF-04		WG-88877-05102015-TE-03		W-88877-091715-TDF-02		WG-88877-06102015-TE-07		WG-88877-150216-JS-01		W-88877-091715-TDF-01		WG-88877-06102015-TE-08		WG-88877-06102015-TE-09		W-88877-091715-TDF-03		WG-88877-05102015-TE-05		WG-88877-05102015-TE-04	
Sample Date:		9/17/2015		10/5/2015		9/17/2015		10/6/2015		2/15/2016		9/17/2015		10/6/2015		10/6/2015		9/17/2015		10/5/2015		10/5/2015	
Parameters		FWAL		DW		FWAL		DW		FWAL		DW		FWAL		DW		FWAL		DW		FWAL	
Units		a		b		c		d		e		f		g		h		i		j		k	
Dissolved Metals																							
Aluminum (dissolved)	ug/L	[a]	200	-	9500	-	127 J	9.4	9.9 J	18.4	10.6	10.6 J	16.6 J	8.5 J	17.2 J	12	16.3	17.2 J	12	16.3	17.2 J	12	16.3
pH >= 6.5	ug/L	50					127 J ^a	9.4	9.9 J	18.4	10.6	10.6 J	16.6 J	8.5 J	17.2 J	12	16.3	17.2 J	12	16.3	17.2 J	12	16.3
Antimony (dissolved)	ug/L	2 w	14 w	200	6	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Arsenic (dissolved)	ug/L	5	25	50	10	-	0.17	ND (0.10)	0.21	0.15	1.1	0.56	0.26 J	0.42 J	0.91	0.89	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Barium (dissolved)	ug/L	1000 w	1000	10000	1000	-	2.9	1.7	2.8	2.1	4.4	12.4	2.1 J	15.5 J	16	12.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
Beryllium (dissolved)	ug/L	0.13 w	4 w	53	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	-	-	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Boron (dissolved)	ug/L	1200	5000	50000	5000	-	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Cadmium (dissolved)	ug/L	[b]	5	[b]	5	-	0.016	0.012	0.019	0.011	ND (0.010)	0.01	0.019	0.025	0.027	0.029	0.059	0.027	0.029	0.027	0.029	0.027	0.059
Hardness < = 30	ug/L			0.1					0.019	0.011													
Hardness 3.4 - 285 (calculated ^b)	ug/L	[b]					0.016	0.012	0.019	0.011	ND (0.010)	0.01			0.027	0.029	0.059	0.027	0.029	0.027	0.029	0.027	0.059
Hardness 30 - < 90	ug/L			0.3			0.016	0.012			ND (0.010)	0.01											
Hardness 90 - < 150	ug/L			0.5																			
Hardness 450 - < 500 [bx]	ug/L			1.3																			
Calcium (dissolved)	ug/L	-	-	-	-	-	13700	16500	6660	4770	16000	14500	7280 J	17900 J	40000	36600	49700	40000	36600	49700	40000	36600	49700
Chromium (dissolved)	ug/L	-	50	10	50	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Cobalt (dissolved)	ug/L	4	-	40	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	0.5	ND (0.50)	0.67	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Copper (dissolved)	ug/L	[b]	500	[b]	1000	-	1.59	0.3	1.26	1.02	1.71	0.36	0.54	0.43	1	1.59	0.97	1	1.59	0.97	1	1.59	0.97
Hardness < 50	ug/L	2		20			1.59		1.26	1.02													
Hardness 50 - < 75	ug/L			30				0.3			1.71												
Hardness 75 - < 100	ug/L			40																			
Hardness 125 - < 150	ug/L			60																			
Hardness >= 50 (calculated ^c)	ug/L	[b]						0.3			1.71		0.54	0.43	1	1.59	0.97						
Hardness >= 200	ug/L			90									0.54	0.43									
Iron (dissolved)	ug/L	350	-	-	6500	-	305	10.1	9.9	162	20.1	5.9	17.5 J	6.1 J	8.2	14.7	ND (5.0)	20.1	5.9	162	20.1	5.9	162
Lead (dissolved)	ug/L	[b]	50	[b]	10	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Hardness < 50	ug/L			40			ND (0.20)		ND (0.20)	ND (0.20)		ND (0.20)											
Hardness 50 - < 100	ug/L			50				ND (0.20)			ND (0.20)												
Hardness 100 - < 200	ug/L			60							ND (0.20)												
Hardness dependent (calculated ^d)	ug/L	[b]					ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Hardness >= 300	ug/L			160									ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)						
Lithium (dissolved)	ug/L	14 w	-	-	-	730	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Magnesium (dissolved)	ug/L	-	-	-	100000	-	3230	3620	1120	1190	3230	1630	1300 J	1820 J	8570	8480	4010	3230	3620	1120	1190	3230	1630
Manganese (dissolved)	ug/L	[b]	50 (*)	-	550	550	20	ND (1.0)	7.1	24	8.5	42.4	1.8 J	19.8 J	167 ^b	163 ^b	226 ^b	20	ND (1.0)	7.1	24	8.5	42.4
Hardness dependent (calculated ^e)	ug/L	[b]					20	ND (1.0)	7.1	24	8.5	42.4	1.8 J	19.8 J	167	163	226	20	ND (1.0)	7.1	24	8.5	42.4
Mercury (dissolved)	ug/L	0.02	1	1	-	-	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
Molybdenum (dissolved)	ug/L	1000	250	10000	250	-	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1	ND (1.0)	ND (1.0)	ND (1.0)	6	2.8	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Nickel (dissolved)	ug/L	[b]	-	[b]	-	-	ND (1.0)	ND (1.0)	ND (1.0)	2.2	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.4	1.8	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Hardness < 60	ug/L	25		250			ND (1.0)	ND (1.0)	ND (1.0)	2.2	ND (1.0)	ND (1.0)											
Hardness 60 - < 120	ug/L	65		650																			
Hardness 120 - < 180	ug/L	110		1100																			
Hardness >= 180	ug/L	150		1500																			
Phosphorus (dissolved)	ug/L	-	-	-	-	-	-	-	-	-	ND (10)	-	-	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	ug/L	-	-	-	-	-	212	190	237	187	132	435	288 J	476 J	1670	1280	489	212	190	237	187	132	435
Selenium (dissolved)	ug/L	2	10	10	10	-	0.22	0.24	0.47	ND (0.10)	0.68	0.38	0.46	0.56	1.07	0.53	0.23	0.22	0.24	0.47	ND (0.10)	0.68	0.38
Silicon (dissolved)	ug/L	-	-	-	-	-	7700	8240	7940	1480	6480	8010	8810	8730	5010	6810	4720	7700	8240	7940	1480	6480	8010
Silver (dissolved)	ug/L	[b]	-	[b]	-	-	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
Hardness < 100	ug/L	0.05		0.5			ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)											
Hardness >= 100	ug/L	1.5		15									ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)						
Sodium (dissolved)	ug/L	-	200000	-	200000	-	2910	5150	44800	4700	5130	44200	45000	49100	46000	23200	9350	2910	5150	44800	4700	5130	44200
Strontium (dissolved)	ug/L	-	-	-	-	-	22.6	31	36.3	15.1	73	40.5	42.3	50.8	125	101	67.2	22.6	31	36.3	15.1	73	40.5
Sulfur (dissolved)	ug/L	-	-	-	-	-	ND (3000)	ND (3000)	ND (3000)	3600	5500	ND (3000)	4500	4600	24500	12500	3000	ND (3000)	ND (3000)	3600	5500	ND (3000)	3600
Thallium (dissolved)	ug/L	0.8 w	2 w	3	-	-	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)
Tin (dissolved)	ug/L	-	-	-	-	22000	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5				

Table 4.0
Groundwater Analytical Results
Hydrogeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:		Overburden Sand and Gravel Aquifer										Bedrock Unit				Perched Aquifer			
Sample Location:		BC WQG ⁽¹⁾		BC CSR ⁽²⁾		BC CSR ⁽²⁾		MW3-14	MW3-14	MW4B-15	MW4B-15	RW-98020	MW4A-15	MW4A-15	MW4A-15	MW5A-15	MW5A-15	MW5B-15	
Sample ID:				Schedule 6		Schedule 6		W-88877-091715-TDF-04	WG-88877-05102015-TE-03	W-88877-091715-TDF-02	WG-88877-06102015-TE-07	WG-88877-150216-JS-01	W-88877-091715-TDF-01	WG-88877-06102015-TE-08	WG-88877-06102015-TE-09	W-88877-091715-TDF-03	WG-88877-05102015-TE-05	WG-88877-05102015-TE-04	
Sample Date:				FWAL		DW		9/17/2015	10/5/2015	9/17/2015	10/6/2015	2/15/2016	9/17/2015	10/6/2015	10/6/2015	Duplicate	9/17/2015	10/5/2015	10/5/2015
Parameters	Units	FWAL	DW	FWAL	DW	DW													
a	b	c	d	e															
PAH																			
2-Methylnaphthalene	ug/L			-	-	-		-	-	ND (0.10)	-	-	ND (0.10)	-	-	-	ND (0.10)	ND (0.10)	
Acenaphthene	ug/L			60	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Acenaphthylene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Acridine	ug/L			0.5	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Anthracene	ug/L			1	-	-		-	-	ND (0.010)	-	-	ND (0.010)	-	-	-	ND (0.010)	ND (0.010)	
Benzo(a)anthracene	ug/L			1	-	-		-	-	ND (0.010)	-	-	ND (0.010)	-	-	-	ND (0.010)	ND (0.010)	
Benzo(a)pyrene	ug/L			0.1	0.01	-		-	-	ND (0.0090)	-	-	ND (0.0090)	-	-	-	ND (0.0090)	ND (0.0090)	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Benzo(b)pyridine (Quinoline)	ug/L			34	-	-		-	-	ND (0.24)	-	-	ND (0.24)	-	-	-	ND (0.24)	ND (0.24)	
Benzo(g,h,i)perylene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Benzo(k)fluoranthene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Chrysene	ug/L			1	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Dibenz(a,h)anthracene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Fluoranthene	ug/L			2	-	-		-	-	ND (0.020)	-	-	ND (0.020)	-	-	-	ND (0.020)	ND (0.020)	
Fluorene	ug/L			120	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Indeno(1,2,3-cd)pyrene	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Naphthalene	ug/L			10	-	-		-	-	ND (0.10)	-	-	ND (0.10)	-	-	-	ND (0.10)	ND (0.10)	
PAH high molecular weight	ug/L			-	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
PAH low molecular weight	ug/L			-	-	-		-	-	ND (0.24)	-	-	ND (0.24)	-	-	-	ND (0.24)	ND (0.24)	
Phenanthrene	ug/L			3	-	-		-	-	ND (0.050)	-	-	ND (0.050)	-	-	-	ND (0.050)	ND (0.050)	
Pyrene	ug/L			0.2	-	-		-	-	ND (0.020)	-	-	ND (0.020)	-	-	-	ND (0.020)	ND (0.020)	
Total PAH	ug/L			-	-	-		-	-	ND (0.24)	-	-	ND (0.24)	-	-	-	ND (0.24)	ND (0.24)	
Petroleum Products																			
Extractable Petroleum Hydrocarbons (C10-C19)	mg/L			5	5	-		-	-	ND (0.20)	-	-	ND (0.20)	-	-	-	ND (0.20)	ND (0.20)	
Extractable Petroleum Hydrocarbons (C19-C32)	mg/L			-	-	-		-	-	ND (0.20)	-	-	ND (0.20)	-	-	-	ND (0.20)	ND (0.20)	
HEPH (C19-C32 less PAH)	mg/L			-	-	-		-	-	ND (0.20)	-	-	ND (0.20)	-	-	-	ND (0.20)	ND (0.20)	
LEPH (C10-C19 less PAH)	mg/L			0.5	-	-		-	-	ND (0.20)	-	-	ND (0.20)	-	-	-	ND (0.20)	ND (0.20)	
Total Petroleum Hydrocarbons VPH (C6-C10)LessBTEX	mg/L			1.5	-	-		-	-	ND (0.3)	-	-	ND (0.3)	-	-	-	-	-	
Total Petroleum Hydrocarbons VH (C6-C10)	mg/L			15	15	-		-	-	ND (0.3)	-	-	ND (0.3)	-	-	-	-	-	
Volatile Organic Compounds																			
1,1,1,2-Tetrachloroethane	ug/L			-	-	26		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,1,1-Trichloroethane	ug/L			-	-	10000		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,1,2,2-Tetrachloroethane	ug/L			-	-	3.4		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,1,2-Trichloroethane	ug/L			-	-	12		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,1-Dichloroethane	ug/L			-	-	3700		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,1-Dichloroethene	ug/L			-	14	-		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,2,3-Trichlorobenzene	ug/L			80	-	-		-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-	
1,2,4-Trichlorobenzene	ug/L			240	-	-		-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-	
1,2-Dibromoethane (Ethylene dibromide)	ug/L			-	-	0.34		-	-	ND (0.20)	-	-	ND (0.20)	-	-	-	-	-	
1,2-Dichlorobenzene	ug/L			7	3	-		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,2-Dichloroethane	ug/L			1000	5	-		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,2-Dichloropropane	ug/L			-	-	9.9		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,3-Butadiene	ug/L			-	-	6.1		-	-	ND (5.0)	-	-	ND (5.0)	-	-	-	-	-	
1,3-Dichlorobenzene	ug/L			1500	-	-		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	
1,4-Dichlorobenzene	ug/L			260	1	-		-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-	

Table 4.0
Groundwater Analytical Results
Hydrgeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Hydrogeologic Unit:							Overburden Sand and Gravel Aquifer				Bedrock Unit				Perched Aquifer		
Sample Location:							MW3-14	MW3-14	MW4B-15	MW4B-15	RW-98020	MW4A-15	MW4A-15	MW4A-15	MW5A-15	MW5A-15	MW5B-15
Sample ID:							W-88877-091715-TDF-04	WG-88877-05102015-TE-03	W-88877-091715-TDF-02	WG-88877-06102015-TE-07	WG-88877-150216-JS-01	W-88877-091715-TDF-01	WG-88877-06102015-TE-08	WG-88877-06102015-TE-09	W-88877-091715-TDF-03	WG-88877-05102015-TE-05	WG-88877-05102015-TE-04
Sample Date:							9/17/2015	10/5/2015	9/17/2015	10/6/2015	2/15/2016	9/17/2015	10/6/2015	10/6/2015	9/17/2015	10/5/2015	10/5/2015
Parameters	Units	BC WQG ⁽¹⁾ FWAL a	BC WQG ⁽¹⁾ DW b	BC CSR ⁽²⁾ Schedule 6 FWAL c	BC CSR ⁽²⁾ Schedule 6 DW d	BC CSR ⁽²⁾ Schedule 10 DW e								Duplicate			
Benzene	ug/L			4000	5	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-
Bromobenzene	ug/L			-	-	730	-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-
Bromodichloromethane	ug/L			-	16	16	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Bromoform	ug/L			-	100	100	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Bromomethane (Methyl bromide)	ug/L			-	-	51	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Carbon tetrachloride	ug/L			130	5	-	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Chlorobenzene	ug/L			13	30	-	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Chloroethane	ug/L			-	-	46	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Chloroform (Trichloromethane)	ug/L			20	100	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Chloromethane (Methyl chloride)	ug/L			-	-	950	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
cis-1,2-Dichloroethene	ug/L			-	-	370	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
cis-1,3-Dichloropropene	ug/L			-	-	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Dibromochloromethane	ug/L			-	100	100	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Dibromomethane	ug/L			-	-	370	-	-	ND (0.90)	-	-	ND (0.90)	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	ug/L			-	-	7300	-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-
Ethylbenzene	ug/L			2000	2.4	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-
Hexachlorobutadiene	ug/L			1	-	8.6	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
m&p-Xylenes	ug/L			-	-	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-
Methyl tert butyl ether (MTBE)	ug/L			34000	15	15	-	-	ND (4.0)	-	-	ND (4.0)	-	-	-	-	-
Methylene chloride	ug/L			980	50	-	-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-
o-Xylene	ug/L			-	-	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-
Styrene	ug/L			720	-	-	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Tetrachloroethene	ug/L			1100	30	-	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Toluene	ug/L			390	24	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-
trans-1,2-Dichloroethene	ug/L			-	-	730	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
trans-1,3-Dichloropropene	ug/L			-	-	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-	-	-	-
Trichloroethene	ug/L			200	5	-	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	ug/L			-	-	11000	-	-	ND (4.0)	-	-	ND (4.0)	-	-	-	-	-
Trifluorotrichloroethane (CFC-113)	ug/L			-	-	1000000	-	-	ND (2.0)	-	-	ND (2.0)	-	-	-	-	-
Vinyl chloride	ug/L			-	2	2	-	-	ND (0.50)	-	-	ND (0.50)	-	-	-	-	-
Xylenes (total)	ug/L			-	300	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-	-	-	-

Notes:

⁽¹⁾ British Columbia Approved Water Quality Guidelines (WQG), 2006 Edition or Canadian Drinking Guidelines unless otherwise stated.

⁽²⁾ Bristish Columbia Contaminated Sites Regulation (CSR)

a Exceeds BC WQG Freshwater Aquatic Life (FWAL) Guideline.

b Exceeds BC WQG Drinking Water (DW) Guideline.

c Exceeds BC CSR Schedule 6 Freshwater Aquatic Life (FWAL) Guideline.

d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

[a] Limit varies with pH.

[b] Limit varies with Hardness.

[bx] Limit varies with Hardness. Limit as per Protocol 10 - Hardness Dependent Site-Specific Freshwater Water Quality Standards for Cadmium and Zinc.

[b] TBD Limit varies with Hardness. Determined on a site-specific basis.

[c] Limit varies with Chloride (mg/L).

[d] Limit varies with pH and Temperature.

[e] Background dependent. Not evaluated until background limits established.

Exceeds guideline.

ND Not detected at the associated reporting limit.

OOR Out of range.

(c) Background dependant. Background location not established.

w Values reported from BC MOE - Working Water Quality Guidelines for British Columbia (2015).

* Aesthetic objective

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

calculation^a Exp(1.6-3.327*pH+0.402*pH^2)

calculation^b (10^(0.86*LOG(HARDNESS))-3.2))/1000

calculation^c (0.04* hardness)/1000

calculation^d 3.31 + e(1.273 ln (mean hardness) - 4.704)

calculation^e 0.01102*hardness+0.54

calculation^f 7.5 + 0.75 x (hardness -90)

calculation^g ((-51.73)+(92.57*(LOG(hardness)/LOG(10))))*0.01

- Currently no Standard/Guideline.

Table 4.1
Surface Water Analytical Results
Hydrogeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Surface Water Body:		Mclvor Lake										Rico Lake		
Sample Location:		BC WQG ⁽¹⁾	BC WQG ⁽¹⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	SW15-01	SW15-01	SW15-01	SW15-02	SW15-02	SW15-02		
Sample ID:				Schedule 6	Schedule 6	Schedule 10	W-88877-091815-TDF-08	WS-88877-06102015-TE-10	WS-88877-06102015-TE-11	W-88877-091815-TDF-09	W-88877-091815-TDF-10	WS-88877-05102015-TE-06		
Sample Date:		FWAL	DW	FWAL	DW	DW	9/18/2015	10/6/2015	10/6/2015	9/18/2015	9/18/2015	10/5/2015		
Parameters	Units	a	b	c	d	e	Duplicate			Duplicate				
Field Parameters														
Conductivity, field	mS/cm	-	-	-	-	-	0.071	0.073	0.073	0.069	0.069	0.056		
Dissolved oxygen (DO), fi	mg/L	>5	-	-	-	-	10	8.09	8.09	6.6	6.6	2.58 ^a		
Oxidation reduction poten	millivolts	-	-	-	-	-	219	262	262	231	231	220		
pH, field	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.73	6.82	6.82	7.52	7.52	6.96		
Temperature, field	Deg C	18 (12 spring/fall) (c)	15	-	-	-	18.11 ^{ab}	15.09 ^b	15.09 ^b	16.38 ^b	16.38 ^b	19.9 ^{ab}		
Total dissolved solids, fiel	g/L	-	-	-	-	-	-	0.046	0.046	-	-	0.037		
Turbidity, field	NTU	(c)	(c)	-	-	-	11.8	0	0	2.1	2.1	3		
General Chemistry														
%difference/ion balance	none	-	-	-	-	-	-	0.92	-	-	-	1		
Alkalinity (as CaCO3 pH=	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Alkalinity, total (as CaCO:	mg/L	-	-	-	-	-	22.5	22	21.2	14.9	14.7	105		
Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	27.5	26.8	25.9	18.2	17.9	128		
Biochemical oxygen dema	mg/L	-	-	-	-	-	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)		
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Chemical oxygen demanc	mg/L	-	-	-	-	-	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)		
Chloride (dissolved)	mg/L	150	250	1500	250	-	1	1.6	0.9	5.8	5.6	25		
Conductivity	uS/cm	-	-	-	-	-	53.1	47.1	47.8	55.3	56.5	317		
Cyanide (total)	mg/L	-	-	-	-	-	ND (0.00062)	-	-	ND (0.00050)	-	-		
Cyanide, weak acid disso	mg/L	0.005	-	0.05	-	-	-	ND (0.00050)	-	-	-	ND (0.00050)		
Hardness	mg/L	-	-	-	-	-	24.8	24.5	-	16.3	-	51.6		
Hardness (dissolved)	mg/L	-	-	-	-	-	-	22.4	-	-	-	48.3		
Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)		
Oil and grease	mg/L	-	-	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-		
pH	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.52 J	7.54 J	7.46 J	7.45 J	7.33 J	8.18 J		
Phenolics (total)	mg/L	0.002	-	0.01	-	-	ND (0.0010)	-	-	ND (0.0010)	-	-		
Phosphorus	mg/L	-	-	-	-	-	ND (0.0050)	ND (0.0050)	-	0.0056	0.0053	0.0098		
Sulfate (dissolved)	mg/L	[b]	500	1000	500	-	3.04	2.22	3.02	0.75	1.12	8.51		
Hardness < 30	mg/L	128	-	-	-	-	3.04	2.22	3.02	0.75	1.12	-		
Hardness > 30 - 75	mg/L	218	-	-	-	-	-	-	-	-	-	8.51		
Sulfide	mg/L	0.002 w	-	-	-	-	0.0068 ^a	ND (0.0019)	-	0.0085 ^a	-	ND (0.0019)		
Hydrogen sulfide	mg/L	-	-	0.02	0.05	-	-	ND (0.0019)	-	-	-	ND (0.0019)		
Total dissolved solids (TC	mg/L	-	500 (*)	-	-	-	26	ND (51)	ND (51)	32 J	44 J	192		
Total suspended solids (T	mg/L	(c)	-	-	-	-	ND (4.0)	ND (4.0) J	ND (4.0) J	ND (4.0)	ND (4.0)	ND (4.0)		
Nutrients														
Ammonia-N	mg/L	[d]	-	[a]	-	-	0.016	0.02	-	0.019	0.017	0.018		
Varies with pH and Te	mg/L	-	-	-	-	-	0.016	0.02	-	0.019	0.017	0.018		
pH < 7.0	mg/L	-	-	18.4	-	-	-	0.02	-	-	-	0.018		
pH 7.5 - < 8.0	mg/L	-	-	11.3	-	-	0.016	-	-	0.019	0.017	-		
pH 8.0 - < 8.5	mg/L	-	-	3.7	-	-	-	-	-	-	-	-		
Nitrate (as N)	mg/L	3	10	400	10	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	1.16		
Nitrite (as N)	mg/L	[c]	1	[c]	3.2	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)		
Chloride < 2 mg/L	mg/L	0.02	-	0.2	-	-	ND (0.10)	ND (0.10)	ND (0.10)	-	-	-		
Chloride 2 - < 4 mg/L	mg/L	0.04	-	0.4	-	-	-	-	-	-	-	-		
Chloride 4 - < 6 mg/L	mg/L	0.06	-	0.6	-	-	-	-	-	-	-	-		
Chloride >= 10 mg/L	mg/L	0.20	-	2	-	-	-	-	-	ND (0.10)	ND (0.10)	ND (0.10)		
Nitrite/Nitrate	mg/L	-	-	400	10	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	1.16		
Nitrogen	mg/L	-	-	-	-	-	0.107	0.074	-	0.159	0.175	1.41		
Orthophosphate	mg/L	-	-	-	-	-	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)		
Total kjeldahl nitrogen (T	mg/L	-	-	-	-	-	0.11	ND (0.10)	-	0.16	0.17	0.25		
Total Metals														
Aluminum	ug/L	[a]	200	-	9500	-	18.8	20.4	-	15.6	-	ND (9.5)		
pH >= 6.5	ug/L	50	-	-	-	-	18.8	20.4	-	15.6	-	ND (9.5)		
Antimony	ug/L	20 w	14 w	200	6	-	ND (0.50)	ND (0.50)	-	ND (0.50)	-	ND (0.50)		
Arsenic	ug/L	5	25	50	10	-	0.12	ND (0.10)	-	0.11	-	0.37		
Barium	ug/L	1000 w	1000	10000	1000	-	2.9	2.8	-	2.2	-	13.6		
Beryllium	ug/L	0.13 w	4 w	53	-	-	ND (0.10)	ND (0.10)	-	ND (0.10)	-	ND (0.10)		
Bismuth	ug/L	-	-	-	-	-	ND (1.0)	ND (1.0)	-	ND (1.0)	-	ND (1.0)		
Boron	ug/L	1200	5000	50000	5000	-	ND (50)	ND (50)	-	ND (50)	-	ND (50)		
Cadmium	ug/L	[b]	5	[b]	5	-	ND (0.010)	ND (0.010)	-	ND (0.010)	-	ND (0.010)		
Hardness <= 30	ug/L	-	-	0.1	-	-	ND (0.010)	ND (0.010)	-	ND (0.010)	-	-		
Hardness 3.4 - 285 (c	ug/L	[b]	-	-	-	-	ND (0.010)	ND (0.010)	-	ND (0.010)	-	ND (0.010)		
Hardness 30 - < 90	ug/L	-	-	0.3	-	-	-	-	-	-	-	ND (0.010)		
Calcium	ug/L	-	-	-	-	-	8490	8460	-	4600	-	18000		
Chromium	ug/L	-	50	-	50	-	ND (1.0)	ND (1.0)	-	ND (1.0)	-	ND (1.0)		
Cobalt	ug/L	4	-	40	-	-	ND (0.50)	ND (0.50)	-	ND (0.50)	-	ND (0.50)		
Copper	ug/L	[b]	500	[b]	1000	-	0.51	0.67 J	-	0.92	-	0.53 J		
Hardness < 50	ug/L	2	-	20	-	-	0.51	0.67 J	-	0.92	-	-		
Hardness < 50	ug/L	2	-	20	-	-	0.51	0.67 J	-	0.92	-	-		
Hardness 50 - < 75	ug/L	-	-	30	-	-	-	-	-	-	-	-		
Hardness >= 50 (calci	ug/L	[b]	-	-	-	-	-	-	-	-	-	0.53 J		
Iron	ug/L	1000	-	-	6500	-	20	ND (29)	-	86	-	ND (10)		
Lead	ug/L	[b]	50	[b]	10	-	ND (0.20)	ND (0.20)	-	ND (0.20)	-	ND (0.20)		
Hardness < 50	ug/L	-	-	40	-	-	ND (0.20)	ND (0.20)	-	ND (0.20)	-	-		
Hardness 50 - < 100	ug/L	-	-	50	-	-	-	-	-	-	-	ND (0.20)		
Hardness dependent i	ug/L	[b]	-	-	-	-	ND (0.20)	ND (0.20)	-	ND (0.20)	-	ND (0.20)		
Lithium	ug/L	14 w	-	-	-	730	ND (5.0)	ND (5.0)	-	ND (5.0)	-	ND (5.0)		

Surface Water Body:		Mclvor Lake					Rico Lake		
Sample Location:		BC WQG ⁽¹⁾	BC WQG ⁽¹⁾	BC CSR ⁽²⁾ Schedule 6	BC CSR ⁽²⁾ Schedule 6	BC CSR ⁽²⁾ Schedule 10	SW15-01 W-88877-091815-TDF-08	SW15-01 WS-88877-06102015-TE-10	SW15-01 WS-88877-06102015-TE-11
Sample ID:									
Sample Date:		FWAL a	DW b	FWAL c	DW d	DW e	9/18/2015	10/6/2015	10/6/2015 Duplicate
Parameters	Units								
Magnesium	ug/L	-	-	-	100000	-	868	825	-
Manganese	ug/L	[b]	50 (*)	-	550	550	2.5	2.5	-
Hardness dependent i	ug/L	[b]					2.5	2.5	
Mercury	ug/L	0.02	1	1	1	-	ND (0.010)	ND (0.010)	-
Molybdenum	ug/L	1000	250	10000	250	-	ND (1.0)	ND (1.0)	-
Nickel	ug/L	[b]	-	[b]	-	-	ND (1.0)	ND (1.0)	-
Hardness < 60	ug/L	25		250			ND (1.0)	ND (1.0)	
Potassium	ug/L	-	-	-	-	-	87	78	-
Selenium	ug/L	2	10	10	10	-	ND (0.10)	ND (0.10)	-
Silicon	ug/L	-	-	-	-	-	1740	1770	-
Silver	ug/L	[b]	-	[b]	-	-	ND (0.020)	ND (0.020)	-
Hardness < 100	ug/L	0.05		0.5			ND (0.020)	ND (0.020)	
Sodium	ug/L	-	200000 (*)	-	200000	-	800	895	-
Strontium	ug/L	-	-	-	-	-	12.2	10.4	-
Sulfur	ug/L	-	-	-	-	-	ND (3000)	ND (3000)	-
Thallium	ug/L	0.8 w	2 w	3	-	-	ND (0.050)	ND (0.050)	-
Tin	ug/L	-	-	-	-	22000	ND (5.0)	ND (5.0)	-
Titanium	ug/L	2000 w	-	1000	-	-	ND (5.0)	ND (5.0)	-
Uranium	ug/L	8.5 w	20	3000	20	20	ND (0.10)	ND (0.10)	-
Vanadium	ug/L	-	-	-	-	-	ND (5.0)	ND (5.0)	-
Zinc	ug/L	[b]	5000	[b]	5000	-	ND (5.0)	ND (5.0)	-
Hardness < 90	ug/L	7.5		75			ND (5.0)	ND (5.0)	
Zirconium	ug/L	-	-	-	-	-	ND (0.50)	ND (0.50)	-
PAH									
2-Methylnaphthalene	ug/L	-	-	-	-	-	ND (0.10)	-	-
Acenaphthene	ug/L	-	-	60	-	-	ND (0.050)	-	-
Acenaphthylene	ug/L	-	-	-	-	-	ND (0.050)	-	-
Acridine	ug/L	-	-	0.5	-	-	ND (0.050)	-	-
Anthracene	ug/L	-	-	1	-	-	ND (0.010)	-	-
Benzo(a)anthracene	ug/L	-	-	1	-	-	ND (0.010)	-	-
Benzo(a)pyrene	ug/L	-	-	0.1	0.01	-	ND (0.0090)	-	-
Benzo(b)fluoranthene/Ber	ug/L	-	-	-	-	-	ND (0.050)	-	-
Benzo(b)pyridine (Quinolii	ug/L	-	-	34	-	-	ND (0.24)	-	-
Benzo(g,h,i)perylene	ug/L	-	-	-	-	-	ND (0.050)	-	-
Benzo(k)fluoranthene	ug/L	-	-	-	-	-	ND (0.050)	-	-
Chrysene	ug/L	-	-	1	-	-	ND (0.050)	-	-
Dibenz(a,h)anthracene	ug/L	-	-	-	-	-	ND (0.050)	-	-
Fluoranthene	ug/L	-	-	2	-	-	ND (0.020)	-	-
Fluorene	ug/L	-	-	120	-	-	ND (0.050)	-	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	-	-	ND (0.050)	-	-
Naphthalene	ug/L	-	-	10	-	-	ND (0.10)	-	-
PAH high molecular weigl	ug/L	-	-	-	-	-	ND (0.050)	-	-
PAH low molecular weigh	ug/L	-	-	-	-	-	ND (0.24)	-	-
Phenanthrene	ug/L	-	-	3	-	-	ND (0.050)	-	-
Pyrene	ug/L	-	-	0.2	-	-	ND (0.020)	-	-
Total PAH	ug/L	-	-	-	-	-	ND (0.24)	-	-
Petroleum Products									
Extractable Petroleum Hy	mg/L	-	-	5	5	-	ND (0.20)	-	-
Extractable Petroleum Hy	mg/L	-	-	-	-	-	ND (0.20)	-	-
HEPH (C19-C32 less PA	mg/L	-	-	-	-	-	ND (0.20)	-	-
LEPH (C10-C19 less PA	mg/L	-	-	0.5	-	-	ND (0.20)	-	-
Total Petroleum Hydrocar	mg/L	-	-	1.5	-	-	ND (0.3)	-	-
Total Petroleum Hydrocar	mg/L	-	-	15	15	-	ND (0.3)	-	-

Surface Water Body:		Mclvor Lake						Rico Lake				
Sample Location:		BC WQG ⁽¹⁾	BC WQG ⁽¹⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	SW15-01	SW15-01	SW15-01	SW15-02	SW15-02	SW15-02
Sample ID:				Schedule 6	Schedule 6	Schedule 10	W-88877-091815-TDF-08	WS-88877-06102015-TE-10	WS-88877-06102015-TE-11	W-88877-091815-TDF-09	W-88877-091815-TDF-10	WS-88877-05102015-TE-06
Sample Date:		FWAL	DW	FWAL	DW	DW	9/18/2015	10/6/2015	10/6/2015	9/18/2015	9/18/2015	10/5/2015
Parameters	Units	a	b	c	d	e	Duplicate			Duplicate		
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	ug/L	-	-	-	-	26	ND (0.50)	-	-	ND (0.50)	-	-
1,1,1-Trichloroethane	ug/L	-	-	-	-	10000	ND (0.50)	-	-	ND (0.50)	-	-
1,1,2,2-Tetrachloroethane	ug/L	-	-	-	-	3.4	ND (0.50)	-	-	ND (0.50)	-	-
1,1,2-Trichloroethane	ug/L	-	-	-	-	12	ND (0.50)	-	-	ND (0.50)	-	-
1,1-Dichloroethane	ug/L	-	-	-	-	3700	ND (0.50)	-	-	ND (0.50)	-	-
1,1-Dichloroethene	ug/L	-	-	-	14	-	ND (0.50)	-	-	ND (0.50)	-	-
1,2,3-Trichlorobenzene	ug/L	-	-	80	-	-	ND (2.0)	-	-	ND (2.0)	-	-
1,2,4-Trichlorobenzene	ug/L	-	-	240	-	-	ND (2.0)	-	-	ND (2.0)	-	-
1,2-Dibromoethane (Ethyl	ug/L	-	-	-	-	0.34	ND (0.20)	-	-	ND (0.20)	-	-
1,2-Dichlorobenzene	ug/L	-	-	7	3	-	ND (0.50)	-	-	ND (0.50)	-	-
1,2-Dichloroethane	ug/L	-	-	1000	5	-	ND (0.50)	-	-	ND (0.50)	-	-
1,2-Dichloropropane	ug/L	-	-	-	-	9.9	ND (0.50)	-	-	ND (0.50)	-	-
1,3-Butadiene	ug/L	-	-	-	-	6.1	ND (5.0)	-	-	ND (5.0)	-	-
1,3-Dichlorobenzene	ug/L	-	-	1500	-	-	ND (0.50)	-	-	ND (0.50)	-	-
1,4-Dichlorobenzene	ug/L	-	-	260	1	-	ND (0.50)	-	-	ND (0.50)	-	-
Benzene	ug/L	-	-	4000	5	-	ND (0.40)	-	-	ND (0.40)	-	-
Bromobenzene	ug/L	-	-	-	-	730	ND (2.0)	-	-	ND (2.0)	-	-
Bromodichloromethane	ug/L	-	-	-	16	16	ND (1.0)	-	-	ND (1.0)	-	-
Bromoform	ug/L	-	-	-	100	100	ND (1.0)	-	-	ND (1.0)	-	-
Bromomethane (Methyl bi	ug/L	-	-	-	-	51	ND (1.0)	-	-	ND (1.0)	-	-
Carbon tetrachloride	ug/L	-	-	130	5	-	ND (0.50)	-	-	ND (0.50)	-	-
Chlorobenzene	ug/L	-	-	13	30	-	ND (0.50)	-	-	ND (0.50)	-	-
Chloroethane	ug/L	-	-	-	-	46	ND (1.0)	-	-	ND (1.0)	-	-
Chloroform (Trichloromett	ug/L	-	-	20	100	-	ND (1.0)	-	-	ND (1.0)	-	-
Chloromethane (Methyl cl	ug/L	-	-	-	-	950	ND (1.0)	-	-	ND (1.0)	-	-
cis-1,2-Dichloroethene	ug/L	-	-	-	-	370	ND (1.0)	-	-	ND (1.0)	-	-
cis-1,3-Dichloropropene	ug/L	-	-	-	-	-	ND (1.0)	-	-	ND (1.0)	-	-
Dibromochloromethane	ug/L	-	-	-	100	100	ND (1.0)	-	-	ND (1.0)	-	-
Dibromomethane	ug/L	-	-	-	-	370	ND (0.90)	-	-	ND (0.90)	-	-
Dichlorodifluoromethane (	ug/L	-	-	-	-	7300	ND (2.0)	-	-	ND (2.0)	-	-
Ethylbenzene	ug/L	-	-	2000	2.4	-	ND (0.40)	-	-	ND (0.40)	-	-
Hexachlorobutadiene	ug/L	-	-	1	-	8.6	ND (0.50)	-	-	ND (0.50)	-	-
m&p-Xylenes	ug/L	-	-	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-
Methyl tert butyl ether (MT	ug/L	-	-	34000	15	15	ND (4.0)	-	-	ND (4.0)	-	-
Methylene chloride	ug/L	-	-	980	50	-	ND (2.0)	-	-	ND (2.0)	-	-
o-Xylene	ug/L	-	-	-	-	-	ND (0.40)	-	-	ND (0.40)	-	-
Styrene	ug/L	-	-	720	-	-	ND (0.50)	-	-	ND (0.50)	-	-
Tetrachloroethene	ug/L	-	-	1100	30	-	ND (0.50)	-	-	ND (0.50)	-	-
Toluene	ug/L	-	-	390	24	-	ND (0.40)	-	-	ND (0.40)	-	-
trans-1,2-Dichloroethene	ug/L	-	-	-	-	730	ND (1.0)	-	-	ND (1.0)	-	-
trans-1,3-Dichloropropene	ug/L	-	-	-	-	-	ND (1.0)	-	-	ND (1.0) J	-	-
Trichloroethene	ug/L	-	-	200	5	-	ND (0.50)	-	-	ND (0.50)	-	-
Trichlorofluoromethane (C	ug/L	-	-	-	-	11000	ND (4.0)	-	-	ND (4.0)	-	-
Trifluorotrichloroethane (C	ug/L	-	-	-	-	1000000	ND (2.0)	-	-	ND (2.0)	-	-
Vinyl chloride	ug/L	-	-	-	2	2	ND (0.50)	-	-	ND (0.50)	-	-
Xylenes (total)	ug/L	-	-	-	300	-	ND (0.40)	-	-	ND (0.40)	-	-

Notes:

⁽¹⁾ British Columbia Approved Water Quality Guidelines (WQG), 2006 Edition or Canadian Drinking Guidelines unless otherwise stated.

⁽²⁾ British Columbia Contaminated Sites Regulation (CSR)

^a Exceeds BC WQG Freshwater Aquatic Life (FWAL) Guideline.

^b Exceeds BC WQG Drinking Water (DW) Guideline.

^c Exceeds BC CSR Schedule 6 Freshwater Aquatic Life (FWAL) Guideline.

^d Exceeds BC CSR Schedule 6 Drinking Water (DW) Guideline.

^e Exceeds BC CSR Schedule 10 Drinking Water (DW) Guideline.

[a] Limit varies with pH.

[b] Limit varies with Hardness.

[bx] Limit varies with Hardness. Limit as per Protocol 10 - Hardness Dependent Site-Specific Freshwater Water Quality Standards for Cadmium and Zinc.

[b] TBD Limit varies with Hardness. Determined on a site-specific basis.

[c] Limit varies with Chloride (mg/L).

[d] Limit varies with pH and Temperature.

[e] Background dependent. Not evaluated until background limits established.

Exceeds guideline.

ND Not detected at the associated reporting limit.

OOR Out of range.

(c) Background dependant. Background location not established.

w Values reported from BC MOE - Working Water Quality Guidelines for British Columbia (2015).

* Aesthetic objective

J The analyte was positively identified; the associated numerical value is the estimated concentration of the analyte in the sample.

calculation^a Exp(1.6-3.327*pH+0.402*pH^2)

calculation^b (10^((0.86*LOG(HARDNESS))-3.2))/1000

calculation^c (0.04* hardness)/1000

calculation^d 3.31 + e(1.273 ln (mean hardness) - 4.704)

calculation^e 0.01102*hardness+0.54

calculation^f 7.5 + 0.75 x (hardness -90)

calculation^g ((-51.73)+(92.57*(LOG(hardness)/LOG(10))))*0.01

- Currently no Standard/Guideline.

Table 4.2

Wash Plant Analytical Results
Hydrgeological and Hydrology Characterization Report
Upland Landfill
Campbell River, British Columbia

Sample Location:							SW16-03
Sample ID:		BC WQG ⁽¹⁾	BC WQG ⁽¹⁾	BC CSR ⁽²⁾	BC CSR ⁽²⁾	BC CSR ⁽³⁾	SW-88877-290116-JS-01
Sample Date:				Schedule 6	Schedule 6	Schedule 10	1/29/2016
Parameters	Units	FWAL a	DW b	FWAL c	DW d	DW e	
Field Parameters							
Conductivity, field	uS/cm	-	-	-	-	-	0.072
Dissolved oxygen (DO), field	mg/L	>5	-	-	-	-	13.8
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	182
pH, field	s.u.	6.5-9.0	6.5-8.5	-	-	-	8.35
Temperature, field	Deg C .8 (12 spring/fall) (c		15	-	-	-	5.58
Total dissolved solids, field (TDS)	ug/L	-	-	-	-	-	847
Turbidity, field	NTU	(c)	(c)	-	-	-	OOR
General Chemistry							
%difference/ion balance	none	-	-	-	-	-	1
Alkalinity (as CaCO3 pH=8.3)	mg/L	-	-	-	-	-	ND (0.50)
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	23.6
Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	28.8
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	ND (6.0)
Carbonate (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	ND (10)
Chloride (dissolved)	mg/L	150	250	1500	250	-	3.6
Conductivity	uS/cm	-	-	-	-	-	65.5
Hardness (dissolved)	mg/L	-	500	-	-	-	26.8
Hydrogen sulphide	mg/L	-	-	0.02	0.05	-	0.008 J
Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	ND (0.50)
pH	s.u.	6.5-9.0	6.5-8.5	-	-	-	7.63 J
Phosphorus	mg/L	-	-	-	-	-	0.0738
Sulfate (dissolved)	mg/L	[b]	500	1000	500	-	4.94
Hardness < 30	mg/L	128					4.94
Sulphide	mg/L	0.002 w	-	-	-	-	0.0078 J ^a
Total dissolved solids (TDS)	mg/L	-	500 (*)	-	-	-	32
Total suspended solids (TSS)	mg/L	(c)	-	-	-	-	20
Nutrients							
Ammonia-N	mg/L	[d]	-	[a]	-	-	0.016
Varies with pH and Temperature	mg/L	[d]					0.016
pH 8.0 - < 8.5	mg/L			3.7			0.016
Nitrate (as N)	mg/L	3	10	400	10	-	ND (0.10)
Nitrite (as N)	mg/L	[c]	1	[c]	3.2	-	ND (0.10)
Chloride 2 - < 4 mg/L	mg/L	0.04		0.4			ND (0.10)
Nitrite/Nitrate	mg/L	-	-	400	10	-	ND (0.10)
Nitrogen	mg/L	-	-	-	-	-	0.19
Orthophosphate	mg/L	-	-	-	-	-	ND (0.10)
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	0.19
Dissolved Metals							
Aluminum (dissolved)	ug/L	[a]	200	-	9500	-	53.2
pH >= 6.5	ug/L	50					53.2 ^a
Antimony (dissolved)	ug/L	2 w	14 w	200	6	-	ND (0.50)
Arsenic (dissolved)	ug/L	5	25	50	10	-	0.18
Barium (dissolved)	ug/L	1000 w	1000	10000	1000	-	2
Beryllium (dissolved)	ug/L	0.13 w	4 w	53	-	-	ND (0.10)
Bismuth (dissolved)	ug/L	-	-	-	-	-	ND (1.0)
Boron (dissolved)	ug/L	1200	5000	50000	5000	-	ND (50)
Cadmium (dissolved)	ug/L	[b]	5	[b]	5	-	ND (0.010)
Hardness < = 30	ug/L			0.1			ND (0.010)
Hardness 3.4 - 285 (calculated ^b)	ug/L	[b]					ND (0.010)
Calcium (dissolved)	ug/L	-	-	-	-	-	8130
Chromium (dissolved)	ug/L	-	50	10	50	-	ND (1.0)
Cobalt (dissolved)	ug/L	4	-	40	-	-	ND (0.50)
Copper (dissolved)	ug/L	[b]	500	[b]	1000	-	0.38
Hardness < 50	ug/L	2		20			0.38
Iron (dissolved)	ug/L	350	-	-	6500	-	11.8
Lead (dissolved)	ug/L	[b]	50	[b]	10	-	ND (0.20)
Hardness < 50	ug/L			40			ND (0.20)
Hardness dependent (calculated ^d)	ug/L	[b]					ND (0.20)
Lithium (dissolved)	ug/L	14 w		-	-	-	ND (5.0)
Magnesium (dissolved)	ug/L	-	-	-	100000	-	1580
Manganese (dissolved)	ug/L	[b]	50 (*)	-	550	550	20.9
Hardness dependent (calculated ^e)	ug/L	[b]					20.9
Mercury (dissolved)	ug/L	0.02	1	1	1	-	ND (0.010)
Molybdenum (dissolved)	ug/L	1000	250	10000	250	-	ND (1.0)
Nickel (dissolved)	ug/L	[b]	-	[b]	-	-	ND (1.0)
Hardness < 60	ug/L	25		250			ND (1.0)
Potassium (dissolved)	ug/L	-	-	-	-	-	231
Selenium (dissolved)	ug/L	2	10	10	10	-	0.12
Silicon (dissolved)	ug/L	-	-	-	-	-	1110
Silver (dissolved)	ug/L	[b]	-	[b]	-	-	ND (0.020)
Hardness < 100	ug/L	0.05		0.5			ND (0.020)
Sodium (dissolved)	ug/L		200000	-	-	-	3100
Strontium (dissolved)	ug/L	-	-	-	-	-	18.7
Sulfur (dissolved)	ug/L	-	-	-	-	-	ND (3000)
Thallium (dissolved)	ug/L	0.8 w	2 w	3	-	-	ND (0.050)
Tin (dissolved)	ug/L	-	-	-	-	-	ND (5.0)
Titanium (dissolved)	ug/L	2000 w	-	1000	-	-	ND (5.0)
Uranium (dissolved)	ug/L	8.5 w	20	3000	20	-	ND (0.10)
Vanadium (dissolved)	ug/L	-	-	-	-	-	ND (5.0)
Zinc (dissolved)	ug/L	[b]	5000	[b]	5000	-	ND (5.0)
Hardness < 90	ug/L	7.5		75			ND (5.0)
Zirconium (dissolved)	ug/L	-	-	-	-	-	ND (0.50)

Notes:

(1)

British Columbia Approved Water Quality Guidelines, 2006 Edition or Canadian Drinking Guidelines unless otherwise stated.

(2)

Contaminated Sites Regualtion (CSR) - Schedule 6 - Generic Numerical Water Standards

(3)

CSR - Schedule 10 - Generic Numerical Soil and Water Standards

a

BC MOE Guidelines, Drinking Water (DW)

b

BC MOE Guidelines, Freshwater Aquatic Life (FWAL)

c

CSR, Schedule 6, Column II (Aquatic Life Standard) Freshwater

d

CSR, Schedule 6, Column V (Drinking Water Standard)

e

CSR, Schedule 10, Column V (Drinking Water Standard)

[a]

Limit varies with pH.

[b]

Limit varies with Hardness.

[c]

Limit varies with Chloride (mg/L).

[d]

Limit varies with pH and Temperature.

2.3

Exceeds Standard or Guideline.

ND

Not detected. The detection limit is in brackets.

(c)

Background dependant. Background location not established.

w

A Compendium of Working Water Quality Guidelines for British Columbia (1998), 2006 Edition.

*

Aesthetic objective (taste and odour concerns)

J

The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

calculation^b

(10^{^(}(0.86*LOG(HARDNESS))-3.2)) ug/L

calculation^d

3.31 + e(1.273 ln (mean hardness) - 4.704) ug/L

calculation^e

0.01102*hardness+0.54 mg/L

Appendices

Appendix A

Permit



Province of
British Columbia

Ministry of Environment,
Lands and Parks

BC
Environment

Vancouver Island Region 1
Regional Headquarters
2569 Kenworth Road
Nanaimo
British Columbia
V9T 4P7
Telephone: (604) 751-3100

JUN 01 1992

File: PR-10807

REGISTERED MAIL

Upland Excavating Ltd.
480 - 10th Avenue
Campbell River, British Columbia
V9W 4E3

Gentlemen:

Enclosed is a copy of Permit No. PR-10807 issued under the provisions of the Waste Management Act, in the name of Upland Excavating Ltd. Your attention is respectfully directed to the terms and conditions outlined in the Permit.

The administration of this Permit will be carried out by staff from our Regional Office located at 2569 Kenworth Road, Nanaimo, British Columbia, V9T 4P7 (telephone 751-3100). Plans, data and reports pertinent to the Permit are to be submitted to the Regional Waste Manager at this address.

Yours truly,

G.E. Oldham, P. Eng.
Regional Waste Manager

Enclosure

PROVINCE OF
BRITISH COLUMBIA



ENVIRONMENTAL PROTECTION
2569 Kenworth Road
Nanaimo, British Columbia
V9T 4P7
Telephone: (604) 751-3100

MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

PERMIT

Under the Provisions of the Waste Management Act

Upland Excavating Ltd.

480 - 10th Avenue

Campbell River, British Columbia

V9W 4E3

is authorized to discharge refuse from Campbell River and the surrounding area to the land and air contaminants from a regulated open burning operation.

An annual fee will be determined on the basis of your industrial code and capacity in accordance with the Waste Management Fees Regulation.

This Permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Permittee.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 1 of 6


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807

1. AUTHORIZED DISCHARGES AND RELATED REQUIREMENTS

1.1 Refuse

1.1.1 The maximum rate at which refuse may be discharged is 3200 m³/year.

1.1.2 The type of refuse which may be discharged is inert municipal.

1.1.3 The components of the refuse which may be discharged are stumps, trees, land clearing waste, selected building demolition debris, and residue of combustion from the open burning of woodwaste.

1.1.4 The works authorized are a landfill operation as directed, located approximately as shown on the attached Appendix A-1.

1.1.5 The works authorized must be complete and in operation on and from the date of this permit.

1.2 Emissions

1.2.1 The works authorized are a regulated open burning operation, as directed, located approximately as shown on the attached Appendix A-1.

1.2.2 The works authorized must be complete and in operation on and from the date of this permit.

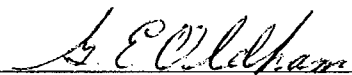
2. LOCATION OF THE FACILITIES

Lot A, District Lot 85, Plan 30709, Sayward District.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 2 of 6


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807

3. LANDFILL OPERATION

The Permittee shall maintain the landfill as a Level E operation in accordance with the Pollution Control Objectives for Municipal Type Waste Discharges in British Columbia, dated September 1975, which, in normal conditions, requires that cover material be applied once per forty days of operation and at least once every two months. The Regional Waste Manager may vary the frequency of covering when freezing conditions or other circumstances affect normal operation.

4. SITE PREPARATION AND RESTORATION

Provision of fencing, site access, vehicle safety barriers, surface water diversionary works, firebreaks and site restoration as required, shall be carried out to the satisfaction of the Regional Waste Manager.

5. PUTRESCIBLE WASTE

No putrescible wastes shall be discharged at this site.

6. OPERATIONAL REQUIREMENTS FOR REGULATED OPEN BURNING

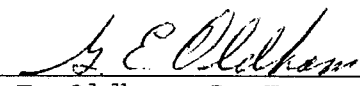
(a) Area

The operation shall be restricted to an area on the site which is satisfactory to the Regional Waste Manager. If required, this area shall be fenced to restrict access to the burn area stockpile.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 3 of 6


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807

(b) Quantity and Frequency

The maximum quantity of wastes to be treated is 750 m³ per burn at a frequency not to exceed four burns per year. Each burn shall comprise one continuous period necessary to reduce the stockpiled waste to ashes, and shall not exceed 48 hours.

(c) Nature of Wastes

Generally, no waste shall be burned which is unacceptable to the Regional Waste Manager. Acceptable materials may include stumps, trees and similar items, but exclude nuisance causing combustibles such as rubber, plastics, tars, insulation, etc. Demolition debris, excepting wood products, shall not be burned at this site. Burning of any antisapstain treated wood products is prohibited.

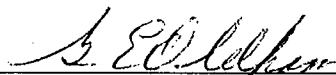
(d) Timing

Burning shall take place only when an attendant is on duty and when conditions promote rapid combustion and dispersion of combustion products with a wind direction that conveys the resulting gases away from McIvor Lake and Highway #28 (Gold River Highway). Burning shall take place only when the ventilation index for the Campbell River area is forecasted to exceed 33 for the period of the burn. The ventilation index is issued by the Pacific Weather Centre, Environment Canada, Vancouver, telephone 664-9032. Materials shall be charged to the facility in a manner to promote best combustion and restrict the uplift of lighter constituents. No burning shall take place during periods of fire hazard or when burning is prohibited by other government agencies.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 4 of 6


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807

(e) Fire Control

Suitable approved devices shall be available for extinguishing fires to prevent them from spreading to surrounding areas. Such devices may include a pressurized water supply, chemical type fire extinguishers, or an earth stockpile. If an earth stockpile is contemplated for fire control, earth moving equipment shall be available at the site during burning. A fireguard shall be cleared and maintained free of combustible materials.

(f) Residue of Combustion

As soon as the residue of combustion has cooled to ambient temperature, it shall be incorporated into the adjacent landfill.

(g) Other Requirements

The Ministry of Environment, Lands and Parks has established a Smoke Management Steering Committee to review the present practice of burning wood residue. A need for additional controls, such as auxiliary forced air, or other requirements, may result from the recommendations of the Steering Committee or following the observation of any burning episode, and the Permittee shall install such equipment or take measures as may be required by the Regional Waste Manager.

The Ministry is also in the process of revising the existing pollution control objectives for municipal landfills. Based on the provisions of the new criteria, the Permittee may be required to terminate open burning at this site.

7. GROUNDWATER MONITORING WELLS

The Permittee shall install not more than two groundwater monitoring wells. The number, locations and structural details of these facilities are subject to the approval of the Regional Waste Manager.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 5 of 6


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807

8. WASTE REDUCTION

The Ministry of Environment, Lands and Parks has developed a policy to reduce, recycle and reuse solid wastes. The Permittee is encouraged to segregate for recycling and reuse, where possible, materials destined for disposal at this site.

In certain landfill environments, some construction and demolition debris, may create air and water quality concerns. If problems arise at this site that are attributable to specific wastes, the Regional Waste Manager may require that alternate disposal procedures be implemented.

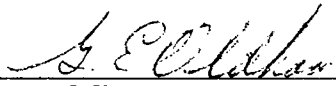
9. WASTE MANAGEMENT PLANNING

The Permittee is advised that the Regional District of Comox-Strathcona is developing a Solid Waste Management Plan which may have an impact on the discharge authorized by this Permit.

Date issued: JUN 01 1992

Date amended:
(most recent)

Page: 6 of 6

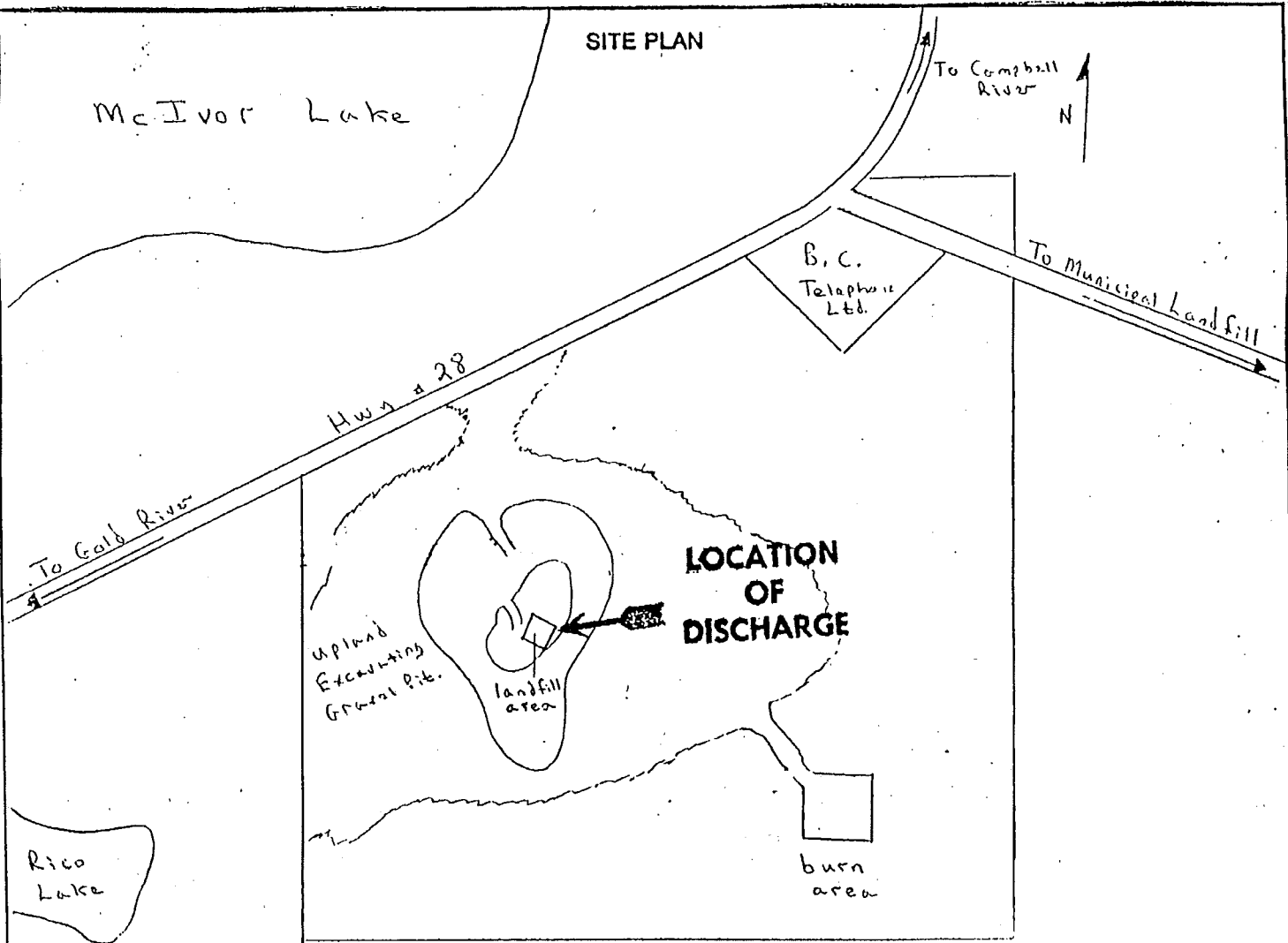


G. E. Oldham, P. Eng.
Regional Waste Manager

Permit No. PR-10807



SITE PLAN

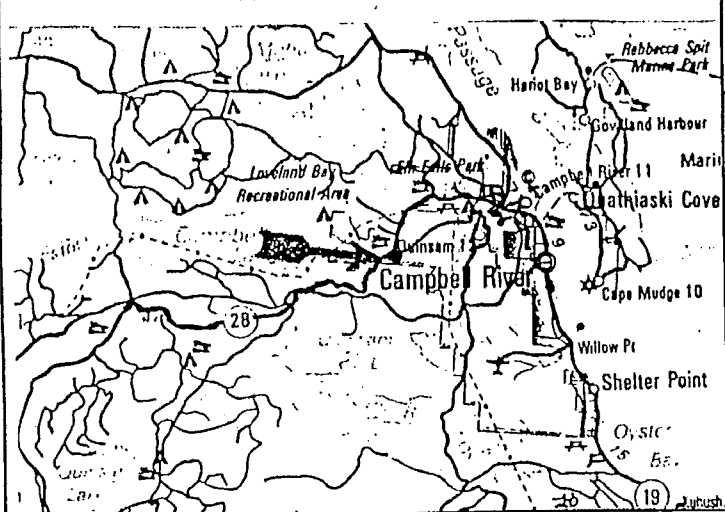


SCALE: $\approx 1:8,500$

LEGAL DESCRIPTION:

Lot A, District Lot 85, Plan 30709,
Sayward District

LOCATION MAP



Upland Excavating Ltd.

Name of Permittee

Appendix A-1 to Permit No. PR-10807

Approval No.

Date Issued

JUN 01 1992

Date Amended

Regional Waste Manager

[Signature]

Appendix B

Detailed Well Records



Report 1 - Detailed Well Record

Well Tag Number: 39950	Construction Date: 1978-06-26 00:00:00
Owner: ISLAND READY MIX	Driller: Drillwell Enterprises
Address: GOLD RIVER HIGHWAY NEAR DUMP	Well Identification Plate Number:
Area: CAMPBELL RIVER	Plate Attached By:
WELL LOCATION:	Where Plate Attached:
SAYWARD Land District	PRODUCTION DATA AT TIME OF DRILLING:
District Lot: Plan: Lot:	Well Yield: 0 (Driller's Estimate)
Township: Section: 85 Range:	Development Method:
Indian Reserve: Meridian: Block:	Pump Test Info Flag:
Quarter:	Artesian Flow:
Island: VANCOUVER	Artesian Pressure (ft):
BCGS Number (NAD 83): 092K004112 Well: 1	Static Level: 7 feet
Class of Well:	WATER QUALITY:
Subclass of Well:	Character:
Orientation of Well:	Colour:
Status of Well: New	Odour:
Licence General Status: UNLICENSED	Well Disinfected: N
Well Use: Commercial and Industrial	EMS ID:
Observation Well Number:	Water Chemistry Info Flag:
Observation Well Status:	Field Chemistry Info Flag:
Construction Method: Drilled	Site Info (SEAM):
Diameter: 10.0 inches	Water Utility:
Casing drive shoe:	Water Supply System Name:
	Water Supply System Well Name:

Well Depth: 55 feet			
Elevation: 0 feet (ASL)	SURFACE SEAL:		
Final Casing Stick Up: inches	Flag:		
Well Cap Type:	Material:		
Bedrock Depth: feet	Method:		
Lithology Info Flag:	Depth (ft):		
File Info Flag:	Thickness (in):		
Sieve Info Flag:			
Screen Info Flag:	WELL CLOSURE INFORMATION:		
	Reason For Closure:		
Site Info Details:	Method of Closure:		
Other Info Flag:	Closure Sealant Material:		
Other Info Details:	Closure Backfill Material:		
	Details of Closure:		
Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material Drive Shoe
GENERAL REMARKS:			
LITHOLOGY INFORMATION:			
From	0 to	10 Ft.	silty gravel
From	10 to	55 Ft.	sand & gravel
From	55 to	55 Ft.	sand

- [Return to Main](#)
- [Return to Search Options](#)
- [Return to Search Criteria](#)

Information Disclaimer

The Province disclaims all responsibility for the accuracy of information provided. Information provided should not be used as a basis for making financial or any other commitments.



Report 1 - Detailed Well Record

Well Tag Number: 73577	Construction Date: 1981-03-09 00:00:00
Owner: FR FRANZEN CONSTUCTI	Driller: Anderson Well Drilling
Address:	Well Identification Plate Number:
Area:	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
SAYWARD Land District	Well Yield: 0 (Driller's Estimate)
District Lot: Plan: 31913 Lot: 7	Development Method:
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level: 120 feet
BCGS Number (NAD 83): 092K004112 Well:	WATER QUALITY:
Class of Well:	Character:
Subclass of Well:	Colour:
Orientation of Well:	Odour:
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Private Domestic	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method: Drilled	Water Utility:
Diameter: 0.0 inches	Water Supply System Name:
Casing drive shoe:	Water Supply System Well Name:

Well Depth: 149 feet			
Elevation: 0 feet (ASL)	SURFACE SEAL:		
Final Casing Stick Up: inches	Flag: N		
Well Cap Type:	Material:		
Bedrock Depth: feet	Method:		
Lithology Info Flag: N	Depth (ft):		
File Info Flag: N	Thickness (in):		
Sieve Info Flag: N			
Screen Info Flag: N	WELL CLOSURE INFORMATION:		
	Reason For Closure:		
Site Info Details:	Method of Closure:		
Other Info Flag:	Closure Sealant Material:		
Other Info Details:	Closure Backfill Material:		
	Details of Closure:		
Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material
			Drive Shoe
GENERAL REMARKS:			
STEEL CASING, CONTINUOUS,			
LITHOLOGY INFORMATION:			
From	0 to	117 Ft.	BLUE GRAVEL
From	117 to	132 Ft.	BLUE WATER BEARING SAND
From	142 to	149 Ft.	WATER BEARING SAND & GRAVEL
From	138 to	142 Ft.	WHITE WATER BEARING SAND
From	132 to	138 Ft.	BLUE WATER BEARING GRAVEL

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Report 1 - Detailed Well Record

Well Tag Number: 74191	Construction Date: 1991-10-23 00:00:00
Owner: AL & SONS BACKHOE &	Driller: Anderson Air Drilling
Address: GOLD RIVER HIGHWAY	Well Identification Plate Number:
Area:	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
SAYWARD Land District	Well Yield: 100 (Driller's Estimate) U.S. Gallons per Minute
District Lot: 85 Plan: 47695 Lot: 2	Development Method:
Township: Section: Range:	Pump Test Info Flag: Y
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island: VANCOUVER ISLAND	Static Level: 80 feet
BCGS Number (NAD 83): 092K004112 Well: 3	WATER QUALITY:
Class of Well:	Character:
Subclass of Well:	Colour:
Orientation of Well:	Odour:
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Other	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method: Drilled	Water Utility:
Diameter: 6.0 inches	Water Supply System Name:
Casing drive shoe:	Water Supply System Well Name:
Well Depth: 123 feet	
Elevation: 0 feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: inches	Flag: N
Well Cap Type:	Material:
Bedrock Depth: feet	Method:
Lithology Info Flag: N	Depth (ft):
File Info Flag: N	Thickness (in):
Sieve Info Flag: N	
Screen Info Flag: N	WELL CLOSURE INFORMATION:
Site Info Details:	Reason For Closure:
Other Info Flag:	Method of Closure:
Other Info Details:	Closure Sealant Material:
	Closure Backfill Material:

Details of Closure:				
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
GENERAL REMARKS:				
STEEL CASING, 0.0 TO 123.2, .250 THICK, A53 LBS, CONTINUOUS, STAINLESS STEEL, PUMP TEST RATE 100 USGM, 80 FT AFTER 24 HRS				
LITHOLOGY INFORMATION:				
From	0 to	20 Ft.	GREY SAND & GRAVEL	
From	20 to	50 Ft.	GREY SAND & GRAVEL	
From	50 to	75 Ft.	BROWN SAND & GRAVEL	
From	122 to	124 Ft.	WATER BEARING SAND & GRAVEL	
From	85 to	100 Ft.	WATER BEARING SAND & GRAVEL	
From	100 to	125 Ft.	WATERBEARING SAND & GRAVEL	
From	115 to	122 Ft.	ROCKS & SAND	
From	75 to	85 Ft.	BROWN SAND & GRAVEL	

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Report 1 - Detailed Well Record

Well Tag Number: 74207	Construction Date: 1987-05-01 00:00:00
Owner: M & S FOREST PRODUCT	Driller: Anderson Well Drilling
Address: GOLD RIVER HIGHWAY	Well Identification Plate Number:
Area:	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
SAYWARD Land District	Well Yield: 20 (Driller's Estimate) Gallons per Minute (U.S./Imperial)
District Lot: 85 Plan: Lot:	Development Method:
Township: Section: Range:	Pump Test Info Flag: Y
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island: VANCOUVER ISLAND	Static Level: 85 feet
BCGS Number (NAD 83): 092K004112 Well: 2	WATER QUALITY:
Class of Well:	Character:
Subclass of Well:	Colour:
Orientation of Well:	Odour:
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Commercial and Industrial	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method: Drilled	Water Utility:
Diameter: 7.0 inches	Water Supply System Name:
Casing drive shoe:	Water Supply System Well Name:
Well Depth: 138 feet	
Elevation: 0 feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: inches	Flag: N
Well Cap Type:	Material:
Bedrock Depth: feet	Method:
Lithology Info Flag: N	Depth (ft):
File Info Flag: N	Thickness (in):
Sieve Info Flag: N	
Screen Info Flag: N	WELL CLOSURE INFORMATION:
Site Info Details:	Reason For Closure:
Other Info Flag:	Method of Closure:
	Closure Sealant Material:

Other Info Details:		Closure Backfill Material:		
		Details of Closure:		
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
GENERAL REMARKS:				
STEEL CASING, 0.0 TO 129.0, .250 THICK, 53 LBS, CONTINUOUS, STAINLESS STEEL, PUMP TEST RATE 20 USGM, 5 FT AFTER 2 HRS				
LITHOLOGY INFORMATION:				
From	0 to	93 Ft.	BROWN SAND & GRAVEL	
From	100 to	138 Ft.	WB SAND	
From	93 to	100 Ft.	BROWN WB SAND & GRAVEL	

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Report 1 - Detailed Well Record

Well Tag Number: 84136	Construction Date: 2004-07-05 00:00:00
Owner: CAMPBELL RIVER LANDFILL	Driller: Drillwell Enterprises
Address: 6700 ARGONAUT RD	Well Identification Plate Number:
Area:	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
Land District	Well Yield: 75 (Driller's Estimate) U.S. Gallons per Minute
District Lot: Plan: Lot:	Development Method:
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level:
BCGS Number (NAD 83): 092K004121 Well:	WATER QUALITY:
Class of Well:	Character:
Subclass of Well:	Colour:
Orientation of Well:	Odour:
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Commercial and Industrial	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method: Drilled	Water Utility:
Diameter: 6.00 inches	Water Supply System Name:
Casing drive shoe:	Water Supply System Well Name:
Well Depth: 215 feet	
Elevation: feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: inches	Flag: N
Well Cap Type:	Material:
Bedrock Depth: feet	Method:
Lithology Info Flag: Y	Depth (ft):
File Info Flag: N	Thickness (in):

Sieve Info Flag: N				
Screen Info Flag: Y	WELL CLOSURE INFORMATION:			
Site Info Details:	Reason For Closure:			
Other Info Flag:	Method of Closure:			
Other Info Details:	Closure Sealant Material:			
	Closure Backfill Material:			
	Details of Closure:			
Screen from	to feet	Type	Slot Size	
206.3	215		200	
Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null
GENERAL REMARKS:				
CHLORINE & WELDED LID				
LITHOLOGY INFORMATION:				
From	0 to	13 Ft.	COARSE GRAVEL	
From	13 to	36 Ft.	COARSE SAND & GRAVEL	
From	36 to	42 Ft.	COARSE GRAVEL	
From	42 to	87 Ft.	BROWN SAND	
From	87 to	130 Ft.	BROWN SILTY SAND & SOME GRAVEL	
From	130 to	142 Ft.	CLEAN BROWN COARSE SAND	
From	142 to	150 Ft.	SLIGHTLY SILTY SAND & GRAVEL	
From	150 to	220 Ft.	COARSE SAND & GRAVEL (WB)	
From	220 to	224 Ft.	MORE SAND & SILTYER BROWN WATER	

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Report 1 - Detailed Well Record

Well Tag Number: 93413	Construction Date: 2005-12-15 00:00:00
Owner: EMCON (MINISTRY OF HIGHWAYS)	Driller: Drillwell Enterprises
Address: 7025 GOLD RIVER HIGHWAY	Well Identification Plate Number: 12472
Area:	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
RENFREW Land District	Well Yield: 10 (Driller's Estimate) U.S. Gallons per Minute
District Lot: 85 Plan: Lot:	Development Method: Bailing
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level: 159 feet
BCGS Number (NAD 83): 092K004114 Well: 2	WATER QUALITY:
Class of Well: Water supply	Character:
Subclass of Well: Non-domestic	Colour:
Orientation of Well: Vertical	Odour:
Status of Well: Alteration	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Commercial and Industrial	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method:	Water Utility:
Diameter: inches	Water Supply System Name:
Casing drive shoe:	Water Supply System Well Name:
Well Depth: 180 feet	
Elevation: feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: 24 inches	Flag: N
Well Cap Type: PITLESS UNIT & CAP	Material:
Bedrock Depth: feet	Method:
Lithology Info Flag: N	Depth (ft):
File Info Flag: N	Thickness (in):
Sieve Info Flag: N	Liner from To: feet

Screen Info Flag: N				
Site Info Details:		WELL CLOSURE INFORMATION:		
Other Info Flag:		Reason For Closure:		
Other Info Details:		Method of Closure:		
		Closure Sealant Material:		
		Closure Backfill Material:		
		Details of Closure:		
Screen from	to feet	Type	Slot Size	
180	182		null	
182	186		12	
Casing from	to feet	Diameter	Material	Drive Shoe
GENERAL REMARKS:				
MEASUREMENTS FROM GROUND LEVEL. RECOMMENDED PUMPING RATE: 10 USGPM.				
LITHOLOGY INFORMATION:				
From	160 to	178 Ft.	GRAVEL	
From	178 to	184 Ft.	FINER & SANDIER AS GOING DEEPER	
From	184 to	187 Ft.	brown	
From	187 to	188 Ft.	VERY SILTY brown	

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Report 1 - Detailed Well Record

Well Tag Number: 103257	Construction Date: 2010-08-18 00:00:00
Owner: CAMPBELL RIVER MOTOCROSS ASSOCIATION	Driller: Red William's Drilling
Address: GOLD RIVER HIGHWAY	Well Identification Plate Number: 34915
Area: CAMPBELL RIVER	Plate Attached By: THOMAS WILLIAMS
	Where Plate Attached: TOP OF CASING
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
Land District	Well Yield: 50 (Driller's Estimate) U.S. Gallons per Minute
District Lot: Plan: Lot:	Development Method: Air lifting
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level: 158 feet
BCGS Number (NAD 83): 092K004114 Well:	WATER QUALITY:
Class of Well: Water supply	Character:
Subclass of Well: Domestic	Colour:
Orientation of Well: Vertical	Odour:
Status of Well: New	Well Disinfected: Y
Licence General Status: UNLICENSED	EMS ID:
Well Use: Private Domestic	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method:	Water Utility:
Diameter: inches	Water Supply System Name:
Casing drive shoe: Y	Water Supply System Well Name:
Well Depth: 239 feet	
Elevation: 599 feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: 30 inches	Flag: N
Well Cap Type: SIMPLE	Material: Bentonite clay and cement mixture
Bedrock Depth: feet	Method: Poured
Lithology Info Flag: N	Depth (ft): 15 feet
File Info Flag: N	Thickness (in): 1 inches
Sieve Info Flag: N	Liner from To: feet
Screen Info Flag: N	

Site Info Details:		WELL CLOSURE INFORMATION:		
Other Info Flag:		Reason For Closure:		
Other Info Details:		Method of Closure:		
		Closure Sealant Material:		
		Closure Backfill Material:		
		Details of Closure:		
Screen from	to feet	Type	Slot Size	
230.17	null		null	
230.17	234.58		20	
234.58	239		15	
Casing from	to feet	Diameter	Material	Drive Shoe
0	231.17	6	Steel	Y
GENERAL REMARKS:				
SCREEN BOTTOM: BLANK. BAILED 10 GPM DREW 1' - DRAWDOWN AVAILABLE 90'.				
LITHOLOGY INFORMATION:				
From	0 to	170 Ft.	SAND & GRAVEL	brown
From	170 to	185 Ft.		brown
From	185 to	240 Ft.	WATER-BEARING MEDIUM GRAINED SAND	brown

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Report 1 - Detailed Well Record

Well Tag Number: 109728	Construction Date: 2015-01-14 00:00:00
Owner: AL+SONS EXCAVATING	Driller: Drillwell Enterprises
Address: 6700 ARGONAUT ROAD	Well Identification Plate Number: 42401
Area: CAMPBELL RIVER	Plate Attached By: Driller
	Where Plate Attached: ON WELL CASING
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
SAYWARD Land District	Well Yield: 50 (Driller's Estimate) Gallons per Minute (U.S./Imperial)
District Lot: Plan: Lot: 85	Development Method: Air lifting
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block: B	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level: 110 feet
BCGS Number (NAD 83): 092K004121 Well:	WATER QUALITY:
Class of Well: Water supply	Character:
Subclass of Well: Domestic	Colour:
Orientation of Well: Vertical	Odour:
Status of Well: New	Well Disinfected: Y
Licence General Status: UNLICENSED	EMS ID:
Well Use: Private Domestic	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method:	Water Utility:
Diameter: 6 inches	Water Supply System Name:
Casing drive shoe: N Y	Water Supply System Well Name:
Well Depth: 208 feet	
Elevation: 520 feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: 20 inches	Flag: Y
Well Cap Type: WELDED LID	Material: Bentonite clay
Bedrock Depth: feet	Method: Poured
Lithology Info Flag: Y	Depth (ft): 16 feet
File Info Flag: N	Thickness (in): 2 inches
Sieve Info Flag: N	Liner from To: feet
Screen Info Flag: Y	
Site Info Details:	WELL CLOSURE INFORMATION:
Other Info Flag:	Reason For Closure:
	Method of Closure:

Other Info Details:		Closure Sealant Material:		
		Closure Backfill Material:		
		Details of Closure:		
Screen from	to feet	Type	Slot Size	
197	199		null	
199	203.6		15	
203.6	208		12	
Casing from	to feet	Diameter	Material	Drive Shoe
0	216	6	Steel	Y
0	16	10	null	N
GENERAL REMARKS:				
EWELLS SUBMISSION				
LITHOLOGY INFORMATION:				
From	0 to	8 Ft.	Medium GRAVEL AND SILTY SANDY	brown
From	8 to	14 Ft.	Medium GRAVEL	ZONE WOOD brown
From	14 to	72 Ft.	Medium GRAVEL, SANDY	LOOSE brown
From	72 to	110 Ft.	Medium SAND, SILTY.	SILT LAYERS AND GRAVEL LAYERS brown
From	110 to	144 Ft.	Medium SAND	CLEAN, LOOSE brown
From	144 to	156 Ft.	Medium GRAVEL	WB, COARSE CLEAN brown
From	156 to	209 Ft.	Medium SAND MED FINE	WB, CLEAN brown
From	209 to	216 Ft.	Medium SAND, SILTY	WB, FINE brown

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Ministry of
Environment

- ☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Red Williams Well
Drilling Ltd
980 Pratt Road
Vancouver, BC
phone: 604-248-5552

Ministry Well ID Plate Number: 26019
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information.

See reverse for notes & definitions of abbreviations.

Owner name: Brian Toner
Mailing address: P.O. Box 624 Campbell River Prov. BC Postal Code V9W5T
Well Location: Address: Street no. 8050 Street name Gold River Highway Town Campbell River
Legal description: Lot 1 Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
or PID: _____ and Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: 10 UTM Easting: 330012 m Latitude (see note 3): _____
(see note 2) and UTM Northing: 5541724 m or Longitude: _____

Method of drilling: ☒ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 652 ft (asl) Method (see note 4): GPS Accuracy 27'
Class of well (see note 5): Water Supply Sub-class of well: Domestic
Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	3		Brown	FILL		
3	5		Brown	ORGANIC		
5	6		Brown	SILT AND GRAVEL		
6	200			GRANITE		
				Fracture @ 150' - 1.6 GPM		
				Fracture @ 160' - 1.5 GPM		
				Fracture @ 180' - 1.5 GPM		
				Fracture @ 200' - 2.0 GPM		
				ESTIMATED YIELD 6.0 AT TIME OF DRILLING		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
+2	16	6	STEEL	219	No

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Clay Grout Depth: 16 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: _____ in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: _____ ft (bgl) To: _____ ft (bgl) Perforated: From: _____ ft (bgl) To: _____ ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:

☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☒ Bailing
☐ Other (specify): _____ Total duration: 1.0 hrs
Notes: _____

Well yield estimated by:

☒ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 7.0 USgpm Duration: _____ hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Thomas Williams

Registration no. (see note 20): WD 06102703

Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible per Thomas Williams

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
pink: Driller copy
pink: Ministry copy
Sheet 1 of 1

Final well completion data:

Total depth drilled: 200 ft Finished well depth: 200 ft (bgl)
Final stick up: 24 in Depth to bedrock: _____ ft (bgl)
SWL: _____ ft (btoc) Estimated well yield: 7.0 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft

Type of well cap: SIMPLE Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: TOP OF CASING

Well closure information:

Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: POSTED
Details of closure (see note 17): _____

Date of work (YYYY/MM/DD):

Started: 2008/05/13 Completed: 2008/05/13

Comments: _____



Report 1 - Detailed Well Record

Well Tag Number: 98020	Construction Date: 2008-05-13 00:00:00			
Owner: TONER	Driller: Red William's Drilling			
Address: 8050 GOLD RIVER HIGHWAY	Well Identification Plate Number: 26019			
Area: CAMPBELL RIVER	Plate Attached By: THOMAS WILLIAMS			
WELL LOCATION:	Where Plate Attached: TOP OF CASING			
Land District	PRODUCTION DATA AT TIME OF DRILLING:			
District Lot: Plan: Lot:	Well Yield: 7 (Driller's Estimate) U.S. Gallons per Minute			
Township: Section: Range:	Development Method: Air lifting			
Indian Reserve: Meridian: Block:	Pump Test Info Flag: N			
Quarter:	Artesian Flow:			
Island: VANCOUVER ISLAND	Artesian Pressure (ft):			
BCGS Number (NAD 83): 092K004112 Well:	Static Level:			
Class of Well: Water supply	WATER QUALITY:			
Subclass of Well: Domestic	Character:			
Orientation of Well: Vertical	Colour:			
Status of Well: New	Odour:			
Licence General Status: UNLICENSED	Well Disinfected: Y			
Well Use: Private Domestic	EMS ID:			
Observation Well Number:	Water Chemistry Info Flag: N			
Observation Well Status:	Field Chemistry Info Flag:			
Construction Method:	Site Info (SEAM):			
Diameter: inches	Water Utility:			
Casing drive shoe: N	Water Supply System Name:			
Well Depth: 200 feet	Water Supply System Well Name:			
Elevation: 652 feet (ASL)	SURFACE SEAL:			
Final Casing Stick Up: 24 inches	Flag: Y			
Well Cap Type: SIMPLE	Material: Bentonite clay and cement mixture			
Bedrock Depth: feet	Method: Poured			
Lithology Info Flag: Y	Depth (ft): 16 feet			
File Info Flag: N	Thickness (in):			
Sieve Info Flag: N	Liner from To: feet			
Screen Info Flag: N	WELL CLOSURE INFORMATION:			
Site Info Details:	Reason For Closure:			
Other Info Flag:	Method of Closure:			
Other Info Details:	Closure Sealant Material:			
	Closure Backfill Material:			
	Details of Closure:			
Screen from to feet	Type	Slot Size		
Casing from to feet	Diameter	Material	Drive Shoe	
0 16	6	Steel	N	
GENERAL REMARKS:				
GPS ACCURACY 27 FEET. ESTIMATED YIELD 6 AT TIME OF DRILLING.				
LITHOLOGY INFORMATION:				
From 0 to 3 Ft. FILL brown				

From	3 to	5 Ft.	ORGANIC	brown
From	5 to	6 Ft.	SILT & GRAVEL	brown
From	6 to	200 Ft.	1 Gallons per Minute (U.S./Imperial) FRACTURES AT 150' - 1 GPM, 160' - 1.5 GPM, 180' - 1.5 GPM, 200' - 2.0 GPM.	

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Information Disclaimer

The Province disclaims all responsibility for the accuracy of information provided. Information provided should not be used as a basis for making financial or any other commitments.

Appendix C

Stratigraphic and Instrumentation Logs



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: BH1-16
DATE COMPLETED: 27 January 2016
DRILLING METHOD: Rotasonic
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	NORTHING: 5541551.18 EASTING: 330846.01	GROUND SURFACE 168.41						
1	SW-GRAVELY SAND, well graded, fine to medium sand, fine to coarse gravel, brown, dry, dense		SOIL CUTTINGS BENONITE GRAVEL	RS-1		100		
2				SPT-2		80	43	
3	SW/GW-SAND AND GRAVEL, well graded, fine to medium sand, fine gravel, brown, dry, very dense	165.67		RC-2		100		
4	- with coarse sand at 3.05m BGS			SPT-3		80	45	
5	- moist at 5.15m BGS	163.23		RS-3		100		
6	SP-SAND with gravel, fine sand with trace coarse sand and fine gravel, moist, sub-rounded, very dense	162.31	152 mm Ø BOREHOLE	SPT-4		50	85	
7	SW/GW-SAND AND GRAVEL, well graded, fine to coarse sand and gravel, subangular, grey, moist, very dense			RS-4		100		
8								
9	- Grain Size Result: SAND, trace gravel, trace silt (Gravel=3.9%, Sand=93.3%, Fines=2.8%) from 8.84 to 10.36m BGS			SPT-5		100	87	
10								
11	SP-FINE SAND, trace coarse gravel, grey, moist, dense	158.05		SPT-6		50	41	
12	SW-SAND with gravel, fine to medium grained sand and gravel, grey, moist, very dense	157.13	SOIL CUTTINGS	GB-1		100		
13	- cobbles at 12.80m BGS			RS-5		100		
14								
15	SW-SAND, with gravel to trace gravel, fine to medium grained sand and gravel, grey, wet, loose	154.39		SPT-7		50	4	
16	- heaving sands at 14.94m BGS							
17								
18	SP-SAND, fine to medium grained sand, grey, moist	150.43		RS-7		100		
19								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼

GRAIN SIZE ANALYSIS ☐

OVERBURDEN LOG 088877 UPLANDS.GPJ CRA_CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: BH1-16
DATE COMPLETED: 27 January 2016
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
21								
22								
23								
24	BEDROCK, (highly weathered), silty, slight plasticity, soft, grey, wet	145.25 144.94						
25	BEDROCK, Karmutsen, porphyritic basalt, igneous extrusive, black (blueish) with white crystals, phaneritic, moderate iron staining on fractures	144.33						
26	vertical fracturing, with iron staining on fracture surface, largely non-intact, RQD=0.25							
27	END OF BOREHOLE @ 24.08m BGS							
28	Borehole completed to target depth in bedrock							
29	No topsoil evident/surface compact sand and gravel							
30	Borehole backfilled with soil cuttings and sealed with bentonite							
31	Static water level in boring - 11.21 m BGS							
32	measured after 14 hours							
33	RS - Rotosonic Core Sample							
34	SPT - Standard Penetration Test (splitspoon sample)							
35	GB - Grab Sample							
36								
37								
38								
39								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼

GRAIN SIZE ANALYSIS



OVERBURDEN LOG 088877 UPLANDS.GPJ CRA_CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 2

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: BH2-16
DATE COMPLETED: 28 January 2016
DRILLING METHOD: Rotasonic
FIELD PERSONNEL: J. Stewart

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	NORTHING: 5541470.18 EASTING: 330839.01	GROUND SURFACE	167.83					
1	SW-GRAVELY SAND, with cobbles, well graded, fine to coarse sand and gravel, brown, moist, dense		SOIL CUTTINGS	SPT-1 RS-1		20 100	48	
2			BENONITE GRAVEL	SPT-2 RS-2		20 100	42	
3			152 mm Ø BOREHOLE	SPT-3 RS-3		50 100	44	
4	SW/GW-SAND AND GRAVEL, fine to medium grain sand, dry, compact	164.48		GB-1 SPT-4 RS-4		60 100	21	
5	SP-SAND, poorly graded, fine sand, brown, dry, very dense	162.65		SPT-5		50	>66	
6			SOIL CUTTINGS	RS-5		100		
7				GB-2				
8	SW/GW-GRAVELY SAND, well graded, grey, moist, dense	159.60		SPT-6		50	37	
9				RS-6		100		
10				GB-3				
11				STP-7 GB-4		50	13	
12	ML-SILTY SAND, with gravel, slightly cohesive, low plasticity, fine sand and gravel, grey with brown ribbons, moist, compact - Grain Size Result: SAND, some gravel and silt (Gravel: 28.3%, Sand: 39.4%, Fines=32.3%) from 11.89 to 13.41m BGS	156.25		RS-7		100		
13	BEDROCK, highly weathered (saprolite) surface, silt, crumbly, interbedded grey and brown, moist	153.81 153.50	BENTONITE GRAVEL	GB-5				
14	BEDROCK, Karmutsen, porphyritic basalt, igneous extrusive, black (blueish) with white crystals, phaneritic, moderate iron staining on fractures							
15	vertical fracturing, with iron staining on fracture surface, largely non-intact, RQD=0	151.37						
16	END OF BOREHOLE @ 16.46m BGS							
17	Borehole completed to target depth in bedrock No topsoil evident/surface compact sand and gravel Borehole dry upon completion Borehole backfilled with soil cuttings and							
18								
19								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS



OVERBURDEN LOG 088877 UPLANDS.GPJ CRA CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 2

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: BH2-16
DATE COMPLETED: 28 January 2016
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: J. Stewart

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
21	sealed with bentonite RS - Rotosonic Core Sample SPT - Standard Penetration Test (splitspoon sample) GB - Grab Sample							
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS

☐

OVERBURDEN LOG 088877 UPLANDS.GPJ CRA_CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: BMD

HOLE DESIGNATION: BH5-15

DATE COMPLETED: August 6, 2015

DRILLING METHOD: Sonic

FIELD PERSONNEL: T. Fitzgerald

DRILLER: A. McRea

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	BOREHOLE	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
2	GW GRAVEL, with sand, well graded gravel, medium to coarse grained sand							
		3.05						
4	GW GRAVEL, well graded, up to 7.5 cm	3.66						
	GW GRAVEL, with sand, well graded gravel up to 7.5 cm, medium to coarse grained sand	4.27						
6	SW SAND, with gravel, medium to coarse grained well graded sand, gravel up to 7.5 cm							
8	- bed of silty sand from 7.01 to 7.32m BGS							
		9.14						
10	GW GRAVEL, with sand, well graded gravel, coarse grained sand	10.36						
	SW SAND, medium grained	11.28						
12	SW SAND, with gravel, gravel up to 2 cm	12.19						
	GW GRAVEL, with sand, well graded gravel, coarse grained sand	13.11						
14	SW SAND, medium grained	13.41						
	SW SAND, with gravel, gravel up to 2 cm, some cementation	15.24						
16	GW GRAVEL, with sand, gravel up to 10 cm, coarse grained sand	17.37						
18	SW SAND, with gravel, gravel up to 2 cm, some cementation	18.29						
20	GW GRAVEL, with sand, gravel up to 3 cm, medium to coarse grained sand	20.42						
22	SW SAND, with gravel up to 6 cm, medium to coarse grained sand							
24	- sand with gravel at 24.38m BGS	24.38						
26	END OF BOREHOLE @ 24.38m BGS							
28								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

INSTALLED BY: Red Williams Drilling Ltd

HOLE DESIGNATION: MW1-14

DATE COMPLETED: December 4, 2014

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: Red Williams Drilling Ltd

DRILLER: T. Johnson

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541791.638 EASTING: 330788.539		1.2m Stickup					
2	SP/GP-SAND AND GRAVEL		5.08cm Ø PVC Well Casing Bentonite					
4			15.24cm Ø Borehole					
6	- wet at 5.49m BGS		5.08cm Ø PVC Well Screen Sand Pack					
8								
10								
12	END OF BOREHOLE @ 10.97m BGS	10.97						
14								
16								
18								
20								
22								
24								
26								
28								

WELL DETAILS

Screened interval:

4.88 to 10.97m BGS

Length: 6.1m

Diameter: 51mm

Material: PVC

Seal:

0.00 to 4.57m BGS

Material: Bentonite

Sand Pack:

4.57 to 10.97m BGS

Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 12/4/14

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

INSTALLED BY: Red Williams Drilling Ltd

HOLE DESIGNATION: MW2-14

DATE COMPLETED: December 4, 2014

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: Red Williams Drilling Ltd

DRILLER: T. Johnson

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541591.181 EASTING: 330961.402		0.8m Stickup					
2	SP/GP-SAND AND GRAVEL		5.08cm Ø PVC Well Casing					
4			Bentonite					
6			15.24cm Ø Borehole					
6.71	BOULDERS	7.32						
8	SP/GP-SAND AND GRAVEL							
10								
12								
14								
16								
17.07	GP-SANDY GRAVEL, wet		5.08cm Ø PVC Well Screen					
18			Sand Pack					
20								
21.64	END OF BOREHOLE @ 21.64m BGS							

WELL DETAILS

Screened interval:
15.54 to 21.64m BGS

Length: 6.1m
Diameter: 51mm
Material: PVC

Seal:
0.00 to 4.57m BGS

Material: Bentonite
Sand Pack:
4.57 to 21.64m BGS
Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 12/4/14

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 3

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW2A-16
DATE COMPLETED: 27 January 2016
DRILLING METHOD: Rotasonic
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
	NORTHING: 5541600.583 EASTING: 330961.699	TOP OF RISER GROUND SURFACE	173.86 173.10					
			STICKUP 0.80 M					
1	SW/GW-SAND AND GRAVEL, medium to coarse sand to coarse gravel, well graded, grey, dry, subrounded to rounded, dense - Compact, brown, dry at 1.22m BGS			SPT-1 RS-1		25 100	32	
2			BENTONITE GRAVEL	SPT-2 GB-1 RS-2		25 100	15	
3	GW-GRAVEL with sand and cobbles, fine to coarse grain gravel, cobbles, coarse sand, well graded, grey, dry, sub-angular-subrounded, compact	170.35	51 mm Ø PVC RISER PIPE	SPT-3 RS-3		25 100	12	
4				SPT-4 RS-4		50 0	12	
5	- Cobble rich (7-9 cm diameter) from 5.18 to 6.71m BGS	167.61		RS-5 GB-2		100		
6	- Sandy silt layer, increase in fines, very dense, grey, moist at 5.49m BGS	166.70	152 mm Ø BOREHOLE	SPT-5 RS-6		25 100	69	
7	SW/GW-SAND AND GRAVEL, medium sand to coarse gravel, with cobbles, grey moist, well rounded to subrounded, very dense							
8	SW/GW-SAND AND GRAVEL, fine to medium sand fine to coarse gravel, grey, dry, very dense			RS-7		100		
9				RS-8		100		
10				SPT-6		50	90	
11				RS-9		100		
12				GB-3				
13	SP-SAND with gravel, poorly graded, fine to medium sand, fine gravel, grey, moist, subangular to subrounded, very dense - Becoming wet at 13.41m BGS	160.91	SOIL CUTTINGS	SPT-7		20	>100	
14				RS-10		100		
15	- Grain Size Result: gravelly SAND, trace silt (Gravel=41.7%, Sand=55.5%, Fines=2.8%) from 14.94 to 16.46m BGS							
16		156.64		GB-7				
17	SP-SAND, trace gravel, poorly graded, fine to medium sand, grey, wet, very dense			RS-11		100		
18								
19				RS-12		100		
	- Cobbles at 19.81m BGS							
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE								
STATIC WATER LEVEL ▼								
GRAIN SIZE ANALYSIS								

OVERBURDEN LOG 088877 UPLANDS.GPJ CRA_CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 2 of 3

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW2A-16
DATE COMPLETED: 27 January 2016
DRILLING METHOD: Rotasonic
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
21	SW/GW-SAND AND GRAVEL, fine to coarse sand and gravel to cobble, sand heaving, grey, wet	152.68 152.07		GB-4 SPT-9		50	7	
22	SP-SAND, fine grain, grey, sand heaving, wet							
23				RS-13		100		
24	- Silt rich layer (20 cm) at 24.08m BGS - Grain Size Result: SAND, some silt and clay (Gravel=0.4%, Sand=65.8%, Fines=33.8%) from 24.38 to 24.69m BGS			GB-5				
25				RS-14		100		
26								
27				RS-15		100		
28								
29				RS-16		100		
30								
31				RS-17		100		
32								
33	- Wood detritus (carbon) 2 cm at 32.92m BGS			RS-18		100		
34				GB-6				
35								
36								
37								
38	- Grain Size Result: SAND, trace silt (Gravel=0%, Sand=91.9%, Fines=8.1%) from 38.10 to 38.71m BGS							
39								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼

GRAIN SIZE ANALYSIS



OVERBURDEN LOG 088877 UPLANDS.GPJ CRA_CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 3 of 3

PROJECT NAME: Upland Landfill
PROJECT NUMBER: 088877
CLIENT: Uplands Excavating Limited
LOCATION: Campbell River, BC
DRILLING CONTRACTOR: Drillwell

HOLE DESIGNATION: MW2A-16
DATE COMPLETED: 27 January 2016
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: S. Foster

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	
41				RS-19		100		
42								
43								
44				RS-20		100		
45								
46	END OF BOREHOLE @ 45.42m BGS	127.68						
47	Borehole terminated at maximum drilling method depth							
48	No topsoil evident/surface compact sand and gravel							
49	Static Groundwater Elevation - 13.74 m BGS after completion of well							
50	RS - Rotosonic Core Sample							
51	SPT - Standard Penetration Test (splitspoon sample)							
52	GB - Grab Sample							
53								
54								
55								
56								
57								
58								
59								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼

GRAIN SIZE ANALYSIS



OVERBURDEN LOG 088877 UPLANDS.GPJ CRA CORP.GDT 20/4/16



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

INSTALLED BY: Red Williams Drilling Ltd

HOLE DESIGNATION: MW3-14

DATE COMPLETED: December 4, 2014

DRILLING METHOD: Air Rotary

FIELD PERSONNEL: Red Williams Drilling Ltd

DRILLER: T. Johnson

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541429.793 EASTING: 330885.439		0.9m Stickup					
2	SP/GP-SAND AND GRAVEL		5.08cm Ø PVC Well Casing Bentonite 15.24cm Ø Borehole					
4	GP-SANDY GRAVEL	4.27						
6								
8	SP/GP-SAND AND GRAVEL	7.62						
10								
12	GP-SANDY GRAVEL, wet	12.50	5.08cm Ø PVC Well Screen Sand Pack					
14								
16	GRANITE BEDROCK	16.76						
18								
	END OF BOREHOLE @ 18.59m BGS	18.59						
20								
22								
24								
26								
28								

WELL DETAILS

Screened interval:

11.28 to 17.37m BGS

Length: 6.1m

Diameter: 51mm

Material: PVC

Seal:

0.00 to 4.57m BGS

Material: Bentonite

Sand Pack:

4.57 to 18.59m BGS

Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 12/4/14

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: BMD

HOLE DESIGNATION: MW4A-15

DATE COMPLETED: August 5, 2015

DRILLING METHOD: Sonic

FIELD PERSONNEL: T. Fitzgerald

DRILLER: A. McRea

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541583.042 EASTING: 330737.351		0.8m Stickup Concrete Bentonite Chips Soil Cuttings					
2	GW GRAVEL, with sand, subrounded up to 5 cm diameter, medium to coarse grained sand							
4								
6								
8	SW SAND, well graded, medium to coarse grained, moist	6.40						
10	SW SAND, well graded, fine to medium grained, moist	9.45						
12								
	SW SAND, with trace gravel, well graded sand, medium to coarse grained gravel	12.19						
	SP SAND, fine grained	12.80						
14		13.11						
	SW SAND, with trace gravel, medium to coarse grained well graded sand							
16	GW GRAVEL, clean, up to 5 cm diameter	15.24						
	SW SAND, medium to coarse grained - wet at 16.15m BGS	15.54						
18	- with trace gravel from 17.98 to 18.29m BGS							
	BEDROCK	18.29						
		18.59						
20	IGNEOUS ROCK, porphyritic, aphanitic, brown, phenocrysts approximately 1-3 mm, reddish brown, no evidence of fractures	19.20						
	IGNEOUS ROCK, fine grained, phenocrysts up to 1 cm							
22	- horizontal fracture, fine sediment filling at 19.51m BGS	21.34						
	- vertical and oblique fractures at 19.81m BGS							
24	- with secondary mineralization from 20.88 to 21.34m BGS							
	END OF BOREHOLE @ 21.34m BGS							
26								
28								

WELL DETAILS

Screened interval:

19.81 to 21.34m BGS

Length: 1.52m

Diameter: 51mm

Slot Size: 10

Material: PVC

Seal:

17.98 to 19.51m BGS

Material: Bentonite Chips

Sand Pack:

19.51 to 21.34m BGS

Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 8/5/15

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

HOLE DESIGNATION: MW4B-15

PROJECT NUMBER: 088877

DATE COMPLETED: August 5, 2015

CLIENT: Uplands

DRILLING METHOD: Sonic

LOCATION: Campbell River, British Columbia

FIELD PERSONNEL: T. Fitzgerald

DRILLING CONTRACTOR: BMD

DRILLER: A. McRea

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541575.024 EASTING: 330743.926		0.8m Stickup Concrete Bentonite Chips Soil Cuttings					
2	GW GRAVEL, with sand, subrounded up to 5.1 cm diameter, medium to coarse grained sand							
4								
6								
8	SW SAND, well graded, medium to coarse grained, moist	6.40						
10	SW SAND, well graded, fine to medium grained, moist	9.45						
12								
12	SW SAND, trace gravel, well graded, medium to coarse grained gravel	12.19						
12		12.80						
14	SP SAND, fine grained	13.11						
14	SW SAND, some gravel, medium to coarse grained well graded sand		Bentonite Chips					
16	GW GRAVEL, clean, up to 5.1 cm diameter	15.24						
16	SW SAND, medium to coarse grained - wet at 16.15m BGS	15.54	15.2 cm Ø Borehole Sand Pack					
18	- trace gravel from 17.98 to 18.29m BGS - bedrock at 18.29m BGS	18.29	5.1 cm Ø Well Screen					
20	END OF BOREHOLE @ 18.29m BGS							
22								
24								
26								
28								

WELL DETAILS

Screened interval:

15.24 to 18.29m BGS

Length: 3.05m

Diameter: 51mm

Slot Size: 10

Material: PVC

Seal:

13.41 to 14.94m BGS

Material: Bentonite Chips

Sand Pack:

14.94 to 18.29m BGS

Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 8/5/15

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

PROJECT NUMBER: 088877

CLIENT: Uplands

LOCATION: Campbell River, British Columbia

DRILLING CONTRACTOR: BMD

HOLE DESIGNATION: MW5A-15

DATE COMPLETED: August 7, 2015

DRILLING METHOD: Sonic

FIELD PERSONNEL: T. Fitzgerald

DRILLER: A. McRea

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541325.831 EASTING: 330675.167		0.8m Stickup Concrete					
2	GW GRAVEL (FILL), with sand, subrounded up to 10 cm, medium to coarse grained sand							
4	GW GRAVEL, with sand, up to 10 cm, medium to coarse grained sand	3.05						
6			Bentonite Chips					
6	SM SAND, silty, fine grained, light brown, wet	6.10						
6	ML SILT, light brown, dry	6.40						
6		6.71						
8	MH SILT, with clay, brownish grey, moist	7.32						
8	SM SAND, silty, fine grained, grey, wet	7.92						
8	MH SILT, with clay, light brown	8.23						
10	IGNEOUS ROCK, porphyritic, aphanitic, phenocrysts approximately 1-3 mm, some weathered rock possibly from fracture infilling, reddish brown		15.2 cm Ø Borehole Sand Pack					
10		10.67	5.1 cm Ø Well Screen					
12	- vertical fracture, reddish brown, green phenocrysts up to 5 mm from 9.45 to 9.60m BGS							
14	END OF BOREHOLE @ 10.67m BGS							
16								
18								
20								
22								
24								
26								
28								

WELL DETAILS

Screened interval:

9.14 to 10.67m BGS

Length: 1.52m

Diameter: 51mm

Slot Size: 10

Material: PVC

Seal:

0.91 to 8.84m BGS

Material: Bentonite Chips

Sand Pack:

8.84 to 10.67m BGS

Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 8/7/15

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: Upland Landfill

HOLE DESIGNATION: MW5B-15

PROJECT NUMBER: 088877

DATE COMPLETED: August 7, 2015

CLIENT: Uplands

DRILLING METHOD: Sonic

LOCATION: Campbell River, British Columbia

FIELD PERSONNEL: T. Fitzgerald

DRILLING CONTRACTOR: BMD

DRILLER: A. McRea

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (m)	'N' VALUE	
	NORTHING: 5541325.831 EASTING: 330685.323							
	GW GRAVEL (FILL), with sand, subrounded up to 10 cm, medium to coarse grained sand		0.8m Stickup Concrete					
2			Bentonite Chips					
4	GW GRAVEL, with sand, up to 10 cm, medium to coarse grained sand	3.05						
6			15.2 cm Ø Borehole					
	SM SAND, silty, fine grained, light brown, wet	6.10	Sand Pack					
	ML SILT, light brown, dry	6.40						
	MH SILT, with clay, brownish grey, moist	6.71						
8		7.32	5.1 cm Ø Well Screen					
	SM SAND, silty, fine grained, grey, wet	7.92						
	MH SILT, with clay, light brown	8.23						
10	- bedrock at 8.23m BGS							
	END OF BOREHOLE @ 8.23m BGS							
12								
14								
16								
18								
20								
22								
24								
26								
28								

WELL DETAILS

Screened interval:

4.88 to 7.92m BGS

Length: 3.05m

Diameter: 51mm

Slot Size: 10

Material: PVC

Seal:

0.61 to 4.57m BGS

Material: Bentonite Chips

Sand Pack:

4.57 to 8.23m BGS

Material: Sand

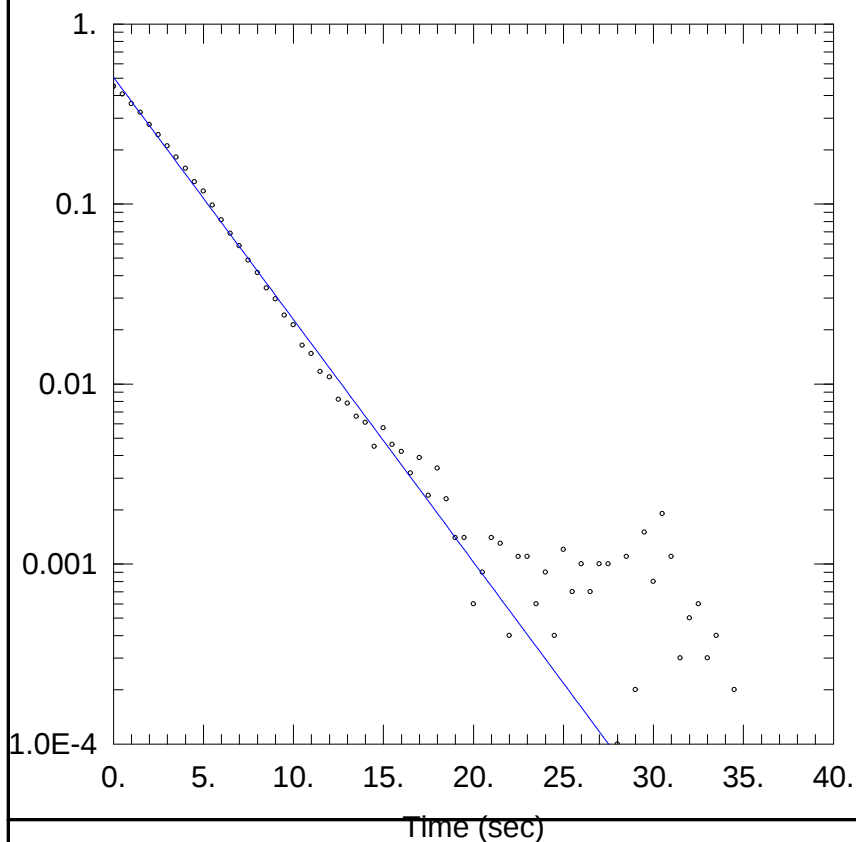
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ 8/7/15

OVERBURDEN LOG 088877-CO.GPJ CRA_CORP.GDT 11/5/15

Appendix D

Single Well Response Plots

D
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MW4A-15 RISING HEAD

Data Set: I:\...\88877 MW4A RH.aqt

Date: 04/19/16

Time: 10:01:30

PROJECT INFORMATION

Company: GHD

Client: Uplands

Project: 88877

Location: Uplands

Test Well: MW4A-15

Test Date: 9/18/15

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.02203 cm/sec

y0 = 0.506 m

AQUIFER DATA

Saturated Thickness: 17.84 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW4A-15)

Initial Displacement: 0.45 m

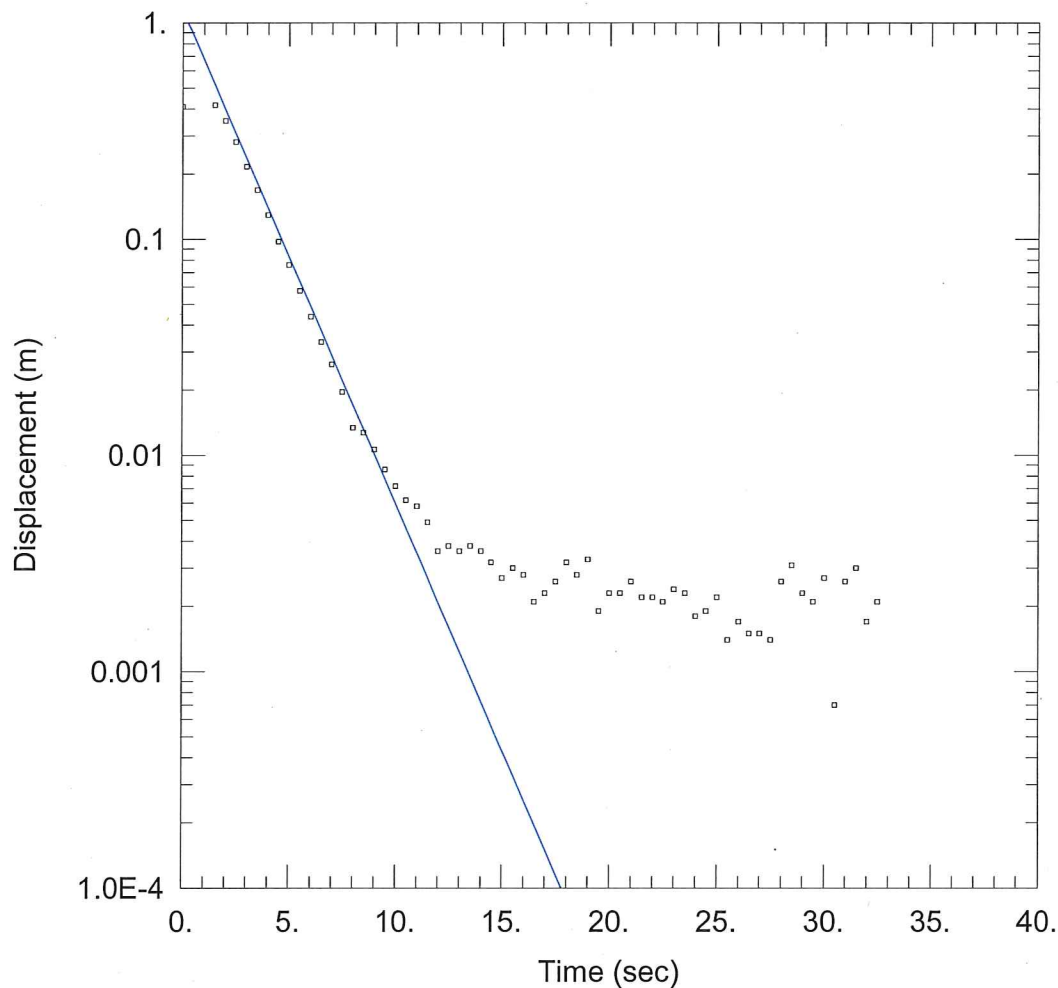
Total Well Penetration Depth: 17.81 m

Casing Radius: 0.025 m

Static Water Column Height: 17.84 m

Screen Length: 1.5 m

Well Radius: 0.075 m



MW4B-15 RISING HEAD

Data Set: I:\...\88877 MW4B RH.aqt
Date: 02/12/16

Time: 13:16:42

PROJECT INFORMATION

Company: GHD
Client: Uplands Exc
Project: 88877
Location: Uplands
Test Well: MW4B-15
Test Date: 9/18/15

AQUIFER DATA

Saturated Thickness: 14.08 m

Anisotropy Ratio (K_z/K_r): 0.5

WELL DATA (MW4B-15)

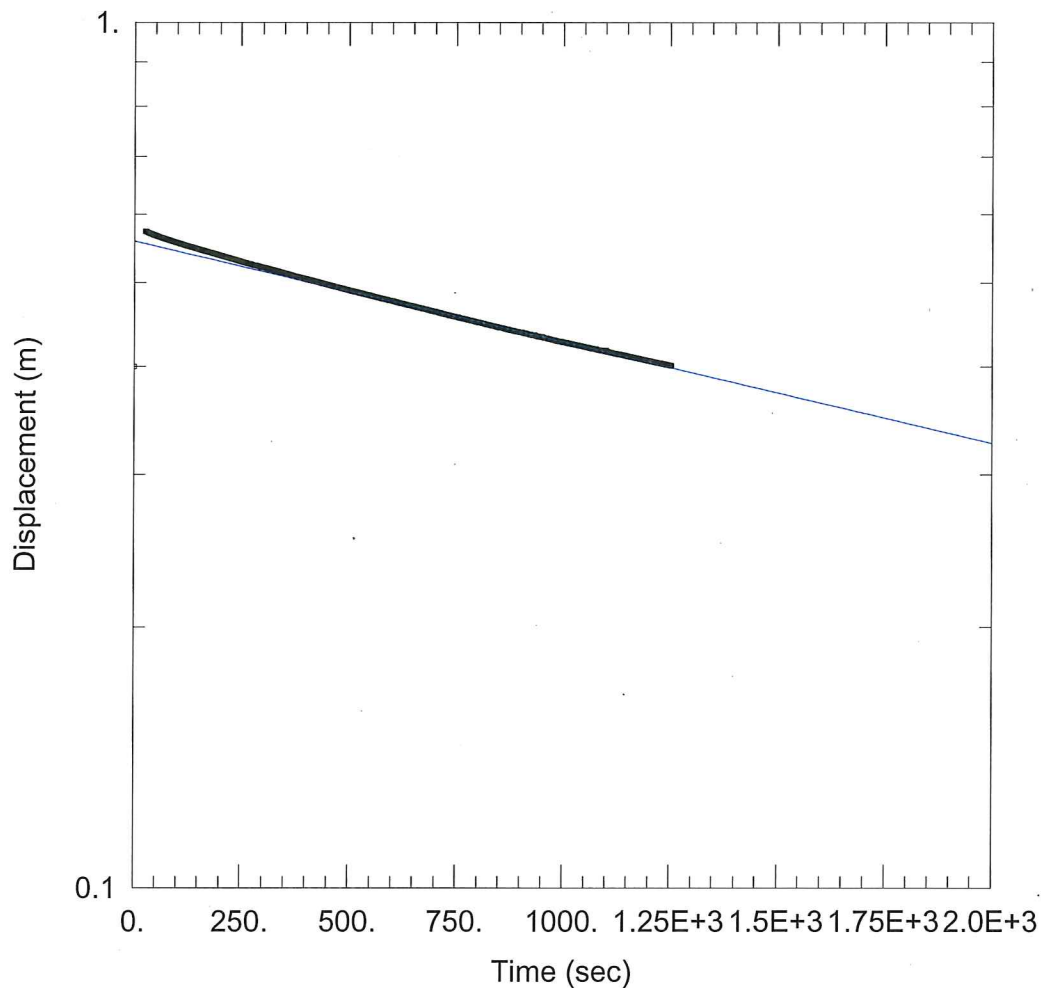
Initial Displacement: 0.41 m
Total Well Penetration Depth: 13.65 m
Casing Radius: 0.025 m

Static Water Column Height: 14.08 m
Screen Length: 3.05 m
Well Radius: 0.075 m

SOLUTION

Aquifer Model: Unconfined
 $K = 0.01959$ cm/sec

Solution Method: Bouwer-Rice
 $y_0 = 1.141$ m



MW5A-15 RISING HEAD

Data Set: I:\...\88877 MW5A RH.aqt

Date: 02/12/16

Time: 13:14:14

PROJECT INFORMATION

Company: GHD

Client: Uplands Exc

Project: 88877

Location: Uplands

Test Well: MW5A-15

Test Date: 9/18/15

AQUIFER DATA

Saturated Thickness: 2.41 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.4 m

Static Water Column Height: 2.41 m

Total Well Penetration Depth: 2.44 m

Screen Length: 1.5 m

Casing Radius: 0.025 m

Well Radius: 0.075 m

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.405E-5 cm/sec

y0 = 0.5589 m

Appendix E

FSK and Laboratory Reports



GHD Field Sample Key (FSK)

Site	Uplands Excavating
Sample Reason	hydro/geo investigation
Sampler Name	TDF
Sampling Company	GHD
Laboratory(s)	Maxxam

SSOW Reference Code : _____

SSOW Reference Code : _____

Sample ID	Location	Sample Date (mm/dd/yyyy)	Sample Time (hh:mm)	Sample Type	Sample Matrix	Grab or Composite	Parent Sample ID for Field Dups	Footnote(s)
W-88877-091715-TDF-01	MW4A-15	9/17/2015	14:10	N	WG	grab		
W-88877-091715-TDF-02	MW4B-15	9/17/2015	14:55	N	WG	grab		
W-88877-091715-TDF-03	MW5A-15	9/17/2015	15:45	N	WG	grab		
W-88877-091715-TDF-04	MW3-14	9/17/2015	16:30	N	WG	grab		1
W-88877-091715-TDF-05	MW2-14	9/17/2015	17:00	N	WG	grab		1
W-88877-091715-TDF-06	MW2-14	9/17/2015	17:10	FD	WG	grab	Duplicate of W-88877-091715-TDF-05	1
W-88877-091715-TDF-07	MW1-14	9/17/2015	17:50	N	WG	grab		
W-88877-091815-TDF-08	SW15-01	9/18/2015	6:50	N	WS	grab		
W-88877-091815-TDF-09	SW15-02	9/18/2015	7:40	N	WS	grab		
W-88877-091815-TDF-10	SW15-02	9/18/2015	7:50	N	WS	grab	Duplicate of W-88877-091815-TDF-09	

Footnotes

1. OOR - out of range (>800 NTU)
2. _____
3. _____
4. _____
5. _____
6. _____

pH	Temperature	Conductivity	Turbidity	DO	Eh / ORP
----	-------------	--------------	-----------	----	----------

Volume of Water Purged	Field pH	Sample Temp.	Ambient Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	DO	DO Units	Eh/ORP	Eh/ORP Units
7	7.97	17.61	NM	C	0.221	mS	8.1	ntu	-	mg/L	131	mV
5	7.83	15.52	NM	C	0.238	mS	7.4	ntu	-	mg/L	174	mV
4	7.92	14.12	NM	C	0.459	mS	500	ntu	-	mg/L	162	mV
30	7.4	12.98	NM	C	0.251	mS	OOOR	ntu	-	mg/L	194	mV
30	7.52	12.5	NM	C	0.18	mS	OOOR	ntu	-	mg/L	222	mV
30	7.52	12.5	NM	C	0.18	mS	OOOR	ntu	-	mg/L	222	mV
36	7.45	13.75	NM	C	0.101	mS	250	ntu	-	mg/L	234	mV
na	7.73	18.11	NM	C	0.071	mS	11.8	ntu	-	mg/L	219	mV
na	7.52	16.38	NM	C	0.069	mS	2.1	ntu	-	mg/L	231	mV
na	7.52	16.38	NM	C	0.069	mS	2.1	ntu	-	mg/L	231	mV

Key	
	Required Field
	Populate When Appropriate
	Field Data

Your P.O. #: 73500976
Your Project #: 088877-02-01
Site Location: UPLANDS
Your C.O.C. #: 476602-01-01

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2015/09/28

Report #: R2048939

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B582021

Received: 2015/09/19, 10:15

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	10	2015/09/22	2015/09/22	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	10	2015/09/19	2015/09/19	BBY6SOP-00045	SM 22 5210 B m
Chloride by Automated Colourimetry	7	N/A	2015/09/21	BBY6SOP-00011	SM 22 4500-Cl- G m
Chloride by Automated Colourimetry	3	N/A	2015/09/22	BBY6SOP-00011	SM 22 4500-Cl- G m
Cyanide SAD (strong acid dissociable)	1	N/A	2015/09/21	BBY6SOP-00004	SM 22 4500-CN O m
Cyanide SAD (strong acid dissociable)	8	N/A	2015/09/23	BBY6SOP-00004	SM 22 4500-CN O m
COD by Colorimeter	10	2015/09/22	2015/09/23	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	10	N/A	2015/09/22	BBY6SOP-00026	SM 22 2510 B m
Hardness Total (calculated as CaCO ₃)	2	N/A	2015/09/24	BBY7SOP-00002	EPA 6020a R1 m
Hardness (calculated as CaCO ₃)	7	N/A	2015/09/25	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAf	7	N/A	2015/09/25	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	2	2015/09/25	2015/09/25	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Ion Balance	7	N/A	2015/09/25	BBY WI-00033	SM 22 1030E
EPH in Water when PAH required	3	2015/09/23	2015/09/23	BBY8SOP-00029	BCMOE EPH w 12/00 m
EPH in Water when PAH required	1	2015/09/24	2015/09/24	BBY8SOP-00029	BCMOE EPH w 12/00 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	7	N/A	2015/09/25	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved)	7	N/A	2015/09/25	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2015/09/19	2015/09/24	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (total)	2	2015/09/21	2015/09/23	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	10	2015/09/23	2015/09/24	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	10	N/A	2015/09/23	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (highlevel)	10	N/A	2015/09/19	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	10	N/A	2015/09/19	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	10	N/A	2015/09/22	BBY6SOP-00010	SM 22 4500-NO ₃ I m
PAH in Water by GC/MS (SIM)	3	2015/09/23	2015/09/23	BBY8SOP-00021	EPA 8270d R4 m
PAH in Water by GC/MS (SIM)	1	2015/09/24	2015/09/24	BBY8SOP-00021	EPA 8270d R4 m
Total LMW, HMW, Total PAH Calc	3	N/A	2015/09/24	BBY WI-00033	Auto Calc
Total LMW, HMW, Total PAH Calc	1	N/A	2015/09/25	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	7	N/A	2015/09/25	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (1)	10	N/A	2015/09/22	BBY6SOP-00026	SM 22 4500-H+ B m

Your P.O. #: 73500976
Your Project #: 088877-02-01
Site Location: UPLANDS
Your C.O.C. #: 476602-01-01

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2015/09/28

Report #: R2048939

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B582021

Received: 2015/09/19, 10:15

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phenols (4-AAP)	4	N/A	2015/09/24	BBY6SOP-00008	SM 22 5530 D m
Orthophosphate by Konelab (highlevel)	10	N/A	2015/09/21	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	9	N/A	2015/09/21	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	1	N/A	2015/09/22	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphide	7	N/A	2015/09/23	BBY6SOP-00006	SM 22 4500-S2- D m
Sulphide	2	N/A	2015/09/25	BBY6SOP-00006	SM 22 4500-S2- D m
Total Dissolved Solids (Filt. Residue)	1	2015/09/23	2015/09/24	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	1	2015/09/24	2015/09/26	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	8	2015/09/25	2015/09/26	BBY6SOP-00033	SM 22 2540 C m
EPH less PAH in Water by GC/FID	3	N/A	2015/09/24	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID	1	N/A	2015/09/25	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	10	N/A	2015/09/25	BBY WI-00033	Calculation
Total Oil and Grease	4	N/A	2015/09/23	BBY8SOP-00004	BCMOE BCLM Sep2011 m
Total Phosphorus	10	N/A	2015/09/21	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	10	N/A	2015/09/24	BBY6SOP-00034	SM 22 2540 D
VOCs, VH, F1, LH in Water by HS GC/MS	3	2015/09/21	2015/09/22	BBY8SOP-00009	EPA 8260c R3 m
VOCs, VH, F1, LH in Water by HS GC/MS	1	2015/09/22	2015/09/23	BBY8SOP-00009	EPA 8260c R3 m
Volatile HC-BTEX	3	N/A	2015/09/22	BBY WI-00033	Auto Calc
Volatile HC-BTEX	1	N/A	2015/09/23	BBY WI-00033	Auto Calc

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Your P.O. #: 73500976
Your Project #: 088877-02-01
Site Location: UPLANDS
Your C.O.C. #: 476602-01-01

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2015/09/28

Report #: R2048939

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B582021

Received: 2015/09/19, 10:15

Encryption Key

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

Tabitha Rudkin, ASCT, Burnaby Project Manager

Email: TRudkin@maxxam.ca

Phone# (604)638-2639

=====

This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0803		NE0804		
Sampling Date		2015/09/17 14:10		2015/09/17 14:55		
COC Number		476602-01-01		476602-01-01		
	UNITS	W-88877-091715-TDF-01	QC Batch	W-88877-091715-TDF-02	RDL	QC Batch
Calculated Parameters						
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Ion Balance	N/A	1.0	8043882	1.1	0.010	8043882
Demand Parameters						
Biochemical Oxygen Demand	mg/L	<6.0	8043714	<6.0	6.0	8043714
Chemical Oxygen Demand	mg/L	<10	8046135	<10	10	8046135
Misc. Inorganics						
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00078	8045121	0.00080	0.00050	8047923
Alkalinity (Total as CaCO3)	mg/L	91.4	8047763	66.4	0.50	8047763
Alkalinity (PP as CaCO3)	mg/L	<0.50	8047763	<0.50	0.50	8047763
Bicarbonate (HCO3)	mg/L	112	8047763	80.9	0.50	8047763
Carbonate (CO3)	mg/L	<0.50	8047763	<0.50	0.50	8047763
Hydroxide (OH)	mg/L	<0.50	8047763	<0.50	0.50	8047763
Nutrients						
Total Ammonia (N)	mg/L	0.018	8048220	0.015	0.0050	8048221
Total Phosphorus (P)	mg/L	0.0162	8045579	0.0200	0.0050	8045579
OIL & GREASE						
Total Oil and grease	mg/L	<1.0	8047224	<1.0	1.0	8047224
Misc. Organics						
Phenols	mg/L	<0.0010	8049283	<0.0010	0.0010	8049283
Physical Properties						
Conductivity	uS/cm	283	8047768	240	1.0	8047768
pH	pH	8.12	8047769	7.80	N/A	8047769
Physical Properties						
Total Suspended Solids	mg/L	<4.0	8047646	<4.0	4.0	8047646
Total Dissolved Solids	mg/L	146 (1)	8049095	162	10	8046946
RDL = Reportable Detection Limit						
N/A = Not Applicable						
(1) Sample analysed past recommended hold time.						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0804			NE0805		
Sampling Date		2015/09/17 14:55			2015/09/17 15:45		
COC Number		476602-01-01			476602-01-01		
	UNITS	W-88877-091715-TDF-02 Lab-Dup	RDL	QC Batch	W-88877-091715-TDF-03	RDL	QC Batch
Calculated Parameters							
Filter and HNO3 Preservation	N/A	N/A	N/A	ONSITE	FIELD	N/A	ONSITE
Ion Balance	N/A	N/A	0.010	8043882	1.0	0.010	8043882
Demand Parameters							
Biochemical Oxygen Demand	mg/L	N/A	6.0	8043714	6.5	6.0	8043714
Chemical Oxygen Demand	mg/L	N/A	10	8046135	163	10	8046135
Misc. Inorganics							
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00081	0.00050	8047923	0.00119	0.00050	8047923
Alkalinity (Total as CaCO3)	mg/L	N/A	0.50	8047763	117	0.50	8047763
Alkalinity (PP as CaCO3)	mg/L	N/A	0.50	8047763	<0.50	0.50	8047763
Bicarbonate (HCO3)	mg/L	N/A	0.50	8047763	143	0.50	8047763
Carbonate (CO3)	mg/L	N/A	0.50	8047763	<0.50	0.50	8047763
Hydroxide (OH)	mg/L	N/A	0.50	8047763	<0.50	0.50	8047763
Nutrients							
Total Ammonia (N)	mg/L	0.014	0.0050	8048221	0.026	0.0050	8048221
Total Phosphorus (P)	mg/L	N/A	0.0050	8045579	2.64	0.050	8045579
Physical Properties							
Conductivity	uS/cm	N/A	1.0	8047768	487	1.0	8047768
pH	pH	N/A	N/A	8047769	8.15	N/A	8047769
Physical Properties							
Total Suspended Solids	mg/L	N/A	4.0	8047646	4540 (1)	32	8047646
Total Dissolved Solids	mg/L	N/A	10	8046946	292 (2)	10	8049095
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to high concentration of solids in the sample. (2) Sample analysed past recommended hold time.							

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0806		NE0807	NE0807		
Sampling Date		2015/09/17 16:30		2015/09/17 17:00	2015/09/17 17:00		
COC Number		476602-01-01		476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-04	RDL	W-88877-091715-TDF-05	W-88877-091715-TDF-05 Lab-Dup	RDL	QC Batch

Calculated Parameters

Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Ion Balance	N/A	1.0	0.010	1.0	N/A	0.010	8043882

Demand Parameters

Biochemical Oxygen Demand	mg/L	<6.0	6.0	6.7	N/A	6.0	8043714
Chemical Oxygen Demand	mg/L	21	10	60	N/A	10	8046135

Misc. Inorganics

Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00091	0.00050	0.00057	N/A	0.00050	8047923
Alkalinity (Total as CaCO3)	mg/L	37.8	0.50	76.2	N/A	0.50	8047763
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	N/A	0.50	8047763
Bicarbonate (HCO3)	mg/L	46.1	0.50	93.0	N/A	0.50	8047763
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	N/A	0.50	8047763
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	N/A	0.50	8047763

Nutrients

Total Ammonia (N)	mg/L	0.017	0.0050	0.058	N/A	0.0050	8048221
Total Phosphorus (P)	mg/L	0.123	0.0050	0.275	0.283	0.0050	8045579

Physical Properties

Conductivity	uS/cm	111	1.0	178	N/A	1.0	8047768
pH	pH	7.83	N/A	8.01	N/A	N/A	8047769

Physical Properties

Total Suspended Solids	mg/L	59.0	4.0	330 (1)	N/A	32	8047646
Total Dissolved Solids	mg/L	78 (2)	10	108 (2)	N/A	10	8049095

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) RDL raised due to high concentration of solids in the sample.

(2) Sample analysed past recommended hold time.

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0808	NE0808		NE0809		
Sampling Date		2015/09/17 17:10	2015/09/17 17:10		2015/09/17 17:50		
COC Number		476602-01-01	476602-01-01		476602-01-01		
	UNITS	W-88877-091715-TDF-06	W-88877-091715-TDF-06 Lab-Dup	RDL	W-88877-091715-TDF-07	RDL	QC Batch

Calculated Parameters							
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	ONSITE
Ion Balance	N/A	1.0	N/A	0.010	0.99	0.010	8043882

Demand Parameters							
Biochemical Oxygen Demand	mg/L	7.8	N/A	6.0	<6.0	6.0	8043714
Chemical Oxygen Demand	mg/L	65	N/A	10	25	10	8046135

Misc. Inorganics							
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00056	N/A	0.00050	0.00054	0.00050	8047923
Alkalinity (Total as CaCO3)	mg/L	77.9	78.2	0.50	39.1	0.50	8047725
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8047725
Bicarbonate (HCO3)	mg/L	95.0	95.4	0.50	47.7	0.50	8047725
Carbonate (CO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8047725
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8047725

Nutrients							
Total Ammonia (N)	mg/L	0.034	N/A	0.0050	0.021	0.0050	8048220
Total Phosphorus (P)	mg/L	0.387	N/A	0.0050	0.337	0.0050	8045579

Physical Properties							
Conductivity	uS/cm	180	179	1.0	91.2	1.0	8047724
pH	pH	7.96	8.03	N/A	7.65	N/A	8047717

Physical Properties							
Total Suspended Solids	mg/L	362 (1)	N/A	32	212 (1)	8.0	8047646
Total Dissolved Solids	mg/L	100 (2)	N/A	10	52 (2)	10	8049095

RDL = Reportable Detection Limit
 Lab-Dup = Laboratory Initiated Duplicate
 N/A = Not Applicable
 (1) RDL raised due to high concentration of solids in the sample.
 (2) Sample analysed past recommended hold time.

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0810	NE0811		
Sampling Date		2015/09/18 06:50	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01		
	UNITS	W-88877-091815-TDF-08	W-88877-091815-TDF-09	RDL	QC Batch
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<6.0	<6.0	6.0	8043714
Chemical Oxygen Demand	mg/L	<10	<10	10	8046135
Misc. Inorganics					
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00062	<0.00050	0.00050	8047923
Alkalinity (Total as CaCO ₃)	mg/L	22.5	14.9	0.50	8047725
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	<0.50	0.50	8047725
Bicarbonate (HCO ₃)	mg/L	27.5	18.2	0.50	8047725
Carbonate (CO ₃)	mg/L	<0.50	<0.50	0.50	8047725
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	8047725
Nutrients					
Total Ammonia (N)	mg/L	0.016	0.019	0.0050	8048220
Total Phosphorus (P)	mg/L	<0.0050	0.0056	0.0050	8045579
OIL & GREASE					
Total Oil and grease	mg/L	<1.0	<1.0	1.0	8047224
Misc. Organics					
Phenols	mg/L	<0.0010	<0.0010	0.0010	8049283
Physical Properties					
Conductivity	uS/cm	53.1	55.3	1.0	8047724
pH	pH	7.52	7.45	N/A	8047717
Physical Properties					
Total Suspended Solids	mg/L	<4.0	<4.0	4.0	8047646
Total Dissolved Solids	mg/L	26	32	10	8049095
RDL = Reportable Detection Limit					
N/A = Not Applicable					

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NE0812	NE0812		
Sampling Date		2015/09/18 07:40	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01		
	UNITS	W-88877-091815-TDF-10	W-88877-091815-TDF-10 Lab-Dup	RDL	QC Batch
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<6.0	N/A	6.0	8043714
Chemical Oxygen Demand	mg/L	<10	12	10	8046138
Misc. Inorganics					
Alkalinity (Total as CaCO ₃)	mg/L	14.7	N/A	0.50	8047725
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	N/A	0.50	8047725
Bicarbonate (HCO ₃)	mg/L	17.9	N/A	0.50	8047725
Carbonate (CO ₃)	mg/L	<0.50	N/A	0.50	8047725
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	8047725
Nutrients					
Total Ammonia (N)	mg/L	0.017	N/A	0.0050	8048220
Total Phosphorus (P)	mg/L	0.0053	N/A	0.0050	8045579
Physical Properties					
Conductivity	uS/cm	56.5	N/A	1.0	8047724
pH	pH	7.33	N/A	N/A	8047717
Physical Properties					
Total Suspended Solids	mg/L	<4.0	N/A	4.0	8047646
Total Dissolved Solids	mg/L	44	N/A	10	8049124
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

MISCELLANEOUS (WATER)

Maxxam ID		NE0803	NE0804	NE0805		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/17 15:45		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091715-TDF-03	RDL	QC Batch

MISCELLANEOUS						
Sulphide	mg/L	0.0078	0.0058	<0.0050	0.0050	8047784
RDL = Reportable Detection Limit						

Maxxam ID		NE0806	NE0807	NE0808		
Sampling Date		2015/09/17 16:30	2015/09/17 17:00	2015/09/17 17:10		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-04	W-88877-091715-TDF-05	W-88877-091715-TDF-06	RDL	QC Batch

MISCELLANEOUS						
Sulphide	mg/L	<0.0050	<0.0050	0.0075	0.0050	8047784
RDL = Reportable Detection Limit						

Maxxam ID		NE0809		NE0810	NE0810		
Sampling Date		2015/09/17 17:50		2015/09/18 06:50	2015/09/18 06:50		
COC Number		476602-01-01		476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-07	QC Batch	W-88877-091815-TDF-08	W-88877-091815-TDF-08 Lab-Dup	RDL	QC Batch

MISCELLANEOUS							
Sulphide	mg/L	<0.0050	8047784	0.0068	0.0071	0.0050	8050357
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							

Maxxam ID		NE0811		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-09	RDL	QC Batch

MISCELLANEOUS				
Sulphide	mg/L	0.0085	0.0050	8050357
RDL = Reportable Detection Limit				

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		NE0803		NE0804		
Sampling Date		2015/09/17 14:10		2015/09/17 14:55		
COC Number		476602-01-01		476602-01-01		
	UNITS	W-88877-091715-TDF-01	QC Batch	W-88877-091715-TDF-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8046982	<0.10	0.10	8046982
Calculated Parameters						
Nitrate (N)	mg/L	0.90	8043755	0.90	0.10	8043755
Anions						
Dissolved Sulphate (SO4)	mg/L	6.30	8046021	5.68	0.50	8046014
Dissolved Chloride (Cl)	mg/L	24	8046016	24	0.50	8046006
Nutrients						
Orthophosphate (P)	mg/L	<0.10 (1)	8045491	<0.10 (1)	0.10	8045491
Nitrate plus Nitrite (N)	mg/L	0.90	8046981	0.90	0.10	8046981
RDL = Reportable Detection Limit						
(1) Sample analysed past recommended hold time.						

Maxxam ID		NE0805	NE0806	NE0807		
Sampling Date		2015/09/17 15:45	2015/09/17 16:30	2015/09/17 17:00		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-03	W-88877-091715-TDF-04	W-88877-091715-TDF-05	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	<0.10	<0.10	0.10	8046982
Calculated Parameters						
Nitrate (N)	mg/L	<0.10	0.49	0.26	0.10	8043755
Anions						
Dissolved Sulphate (SO4)	mg/L	87.5	5.78	8.22	0.50	8046021
Dissolved Chloride (Cl)	mg/L	20	5.3	3.5	0.50	8046016
Nutrients						
Orthophosphate (P)	mg/L	<0.10 (1)	<0.10 (1)	<0.10 (1)	0.10	8045491
Nitrate plus Nitrite (N)	mg/L	<0.10	0.49	0.26	0.10	8046981
RDL = Reportable Detection Limit						
(1) Sample analysed past recommended hold time.						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		NE0808		NE0809		
Sampling Date		2015/09/17 17:10		2015/09/17 17:50		
COC Number		476602-01-01		476602-01-01		
	UNITS	W-88877-091715-TDF-06	QC Batch	W-88877-091715-TDF-07	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10	8046982	<0.10	0.10	8046982
Calculated Parameters						
Nitrate (N)	mg/L	0.24	8043755	0.15	0.10	8043755
Anions						
Dissolved Sulphate (SO4)	mg/L	7.72	8046014	3.17	0.50	8046014
Dissolved Chloride (Cl)	mg/L	3.0	8046006	1.9	0.50	8047341
Nutrients						
Orthophosphate (P)	mg/L	<0.10 (1)	8045491	<0.10 (1)	0.10	8045491
Nitrate plus Nitrite (N)	mg/L	0.24	8046981	0.15	0.10	8046981
RDL = Reportable Detection Limit						
(1) Sample analysed past recommended hold time.						

Maxxam ID		NE0810	NE0810		NE0811		
Sampling Date		2015/09/18 06:50	2015/09/18 06:50		2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01		476602-01-01		
	UNITS	W-88877-091815-TDF-08	W-88877-091815-TDF-08 Lab-Dup	QC Batch	W-88877-091815-TDF-09	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	<0.10	N/A	8046982	<0.10	0.10	8046982
Calculated Parameters							
Nitrate (N)	mg/L	<0.10	N/A	8043755	<0.10	0.10	8043755
Anions							
Dissolved Sulphate (SO4)	mg/L	3.04	2.99	8047350	0.75	0.50	8046014
Dissolved Chloride (Cl)	mg/L	1.0	1.0	8047341	5.8	0.50	8046006
Nutrients							
Orthophosphate (P)	mg/L	<0.10	N/A	8045491	<0.10	0.10	8045491
Nitrate plus Nitrite (N)	mg/L	<0.10	N/A	8046981	<0.10	0.10	8046981
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		NE0812	NE0812		
Sampling Date		2015/09/18 07:40	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01		
	UNITS	W-88877-091815-TDF-10	W-88877-091815-TDF-10 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	<0.10	0.10	8046982
Calculated Parameters					
Nitrate (N)	mg/L	<0.10	N/A	0.10	8043755
Anions					
Dissolved Sulphate (SO4)	mg/L	1.12	N/A	0.50	8046014
Dissolved Chloride (Cl)	mg/L	5.6	N/A	0.50	8047341
Nutrients					
Orthophosphate (P)	mg/L	<0.10	<0.10	0.10	8045491
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	0.10	8046981
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NE0803	NE0804	NE0810		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/18 06:50		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091815-TDF-08	RDL	QC Batch
Polycyclic Aromatics						
Low Molecular Weight PAH's	ug/L	<0.24	<0.24	<0.24	0.24	8043693
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	0.050	8043693
Total PAH	ug/L	<0.24	<0.24	<0.24	0.24	8043693
Naphthalene	ug/L	<0.10	<0.10	<0.10	0.10	8047638
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	0.10	8047638
Quinoline	ug/L	<0.24	<0.24	<0.24	0.24	8047638
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	8047638
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	8047638
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	8047638
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	8047638
Chrysene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Benzo(b&j)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	0.0090	8047638
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	0.050	8047638
Calculated Parameters						
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	8043776
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	8043776
Ext. Pet. Hydrocarbon						
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	0.20	8047645
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	0.20	8047645
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	97	98	98	N/A	8047645
D10-ANTHRACENE (sur.)	%	98	102	107	N/A	8047638
D8-ACENAPHTHYLENE (sur.)	%	100	100	102	N/A	8047638
D8-NAPHTHALENE (sur.)	%	101	100	102	N/A	8047638
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B582021
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GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NE0803	NE0804	NE0810		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/18 06:50		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091815-TDF-08	RDL	QC Batch
D9-Acridine	%	95	98	102	N/A	8047638
TERPHENYL-D14 (sur.)	%	95	100	105	N/A	8047638
RDL = Reportable Detection Limit N/A = Not Applicable						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NE0811		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-09	RDL	QC Batch
Polycyclic Aromatics				
Low Molecular Weight PAH's	ug/L	<0.24	0.24	8043693
High Molecular Weight PAH's	ug/L	<0.050	0.050	8043693
Total PAH	ug/L	<0.24	0.24	8043693
Naphthalene	ug/L	<0.10	0.10	8049027
2-Methylnaphthalene	ug/L	<0.10	0.10	8049027
Quinoline	ug/L	<0.24	0.24	8049027
Acenaphthylene	ug/L	<0.050	0.050	8049027
Acenaphthene	ug/L	<0.050	0.050	8049027
Fluorene	ug/L	<0.050	0.050	8049027
Phenanthrene	ug/L	<0.050	0.050	8049027
Anthracene	ug/L	<0.010	0.010	8049027
Acridine	ug/L	<0.050	0.050	8049027
Fluoranthene	ug/L	<0.020	0.020	8049027
Pyrene	ug/L	<0.020	0.020	8049027
Benzo(a)anthracene	ug/L	<0.010	0.010	8049027
Chrysene	ug/L	<0.050	0.050	8049027
Benzo(b&j)fluoranthene	ug/L	<0.050	0.050	8049027
Benzo(k)fluoranthene	ug/L	<0.050	0.050	8049027
Benzo(a)pyrene	ug/L	<0.0090	0.0090	8049027
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	8049027
Dibenz(a,h)anthracene	ug/L	<0.050	0.050	8049027
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	8049027
Calculated Parameters				
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	8043776
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	8043776
Ext. Pet. Hydrocarbon				
EPH (C10-C19)	mg/L	<0.20	0.20	8049033
EPH (C19-C32)	mg/L	<0.20	0.20	8049033
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	98	N/A	8049033
D10-ANTHRACENE (sur.)	%	73	N/A	8049027
D8-ACENAPHTHYLENE (sur.)	%	81	N/A	8049027
D8-NAPHTHALENE (sur.)	%	85	N/A	8049027
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
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LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NE0811		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-09	RDL	QC Batch
D9-Acridine	%	69	N/A	8049027
TERPHENYL-D14 (sur.)	%	80	N/A	8049027
RDL = Reportable Detection Limit N/A = Not Applicable				

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0803	NE0804	NE0805		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/17 15:45		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091715-TDF-03	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	43.0	21.2	135	0.50	8043769
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8050464
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	10.6	9.9	17.2	3.0	8046218
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8046218
Dissolved Arsenic (As)	ug/L	0.56	0.21	0.91	0.10	8046218
Dissolved Barium (Ba)	ug/L	12.4	2.8	16.0	1.0	8046218
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8046218
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Boron (B)	ug/L	<50	<50	78	50	8046218
Dissolved Cadmium (Cd)	ug/L	0.010	0.019	0.027	0.010	8046218
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	0.50	0.50	8046218
Dissolved Copper (Cu)	ug/L	0.36	1.26	1.00	0.20	8046218
Dissolved Iron (Fe)	ug/L	5.9	9.9	8.2	5.0	8046218
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8046218
Dissolved Lithium (Li)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Manganese (Mn)	ug/L	42.4	7.1	167	1.0	8046218
Dissolved Molybdenum (Mo)	ug/L	1.0	<1.0	6.0	1.0	8046218
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	2.4	1.0	8046218
Dissolved Selenium (Se)	ug/L	0.38	0.47	1.07	0.10	8046218
Dissolved Silicon (Si)	ug/L	8010	7940	5010	100	8046218
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8046218
Dissolved Strontium (Sr)	ug/L	40.5	36.3	125	1.0	8046218
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	0.050	8046218
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Uranium (U)	ug/L	0.12	<0.10	1.80	0.10	8046218
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Zinc (Zn)	ug/L	<5.0	7.7	<5.0	5.0	8046218
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8046218
Dissolved Calcium (Ca)	mg/L	14.5	6.66	40.0	0.050	8043796
Dissolved Magnesium (Mg)	mg/L	1.63	1.12	8.57	0.050	8043796
RDL = Reportable Detection Limit						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0803	NE0804	NE0805		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/17 15:45		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091715-TDF-03	RDL	QC Batch
Dissolved Potassium (K)	mg/L	0.435	0.237	1.67	0.050	8043796
Dissolved Sodium (Na)	mg/L	44.2	44.8	46.0	0.050	8043796
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	24.5	3.0	8043796
RDL = Reportable Detection Limit						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0806	NE0807	NE0808		
Sampling Date		2015/09/17 16:30	2015/09/17 17:00	2015/09/17 17:10		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-04	W-88877-091715-TDF-05	W-88877-091715-TDF-06	RDL	QC Batch
Misc. Inorganics						
Dissolved Hardness (CaCO ₃)	mg/L	47.6	81.1	80.5	0.50	8043769
Elements						
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8050464
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	127	9.6	9.8	3.0	8046218
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8046218
Dissolved Arsenic (As)	ug/L	0.17	0.18	0.18	0.10	8046218
Dissolved Barium (Ba)	ug/L	2.9	1.7	1.7	1.0	8046218
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8046218
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8046218
Dissolved Cadmium (Cd)	ug/L	0.016	0.014	0.011	0.010	8046218
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	0.50	8046218
Dissolved Copper (Cu)	ug/L	1.59	0.72	0.85	0.20	8046218
Dissolved Iron (Fe)	ug/L	305	<5.0	5.1	5.0	8046218
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8046218
Dissolved Lithium (Li)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Manganese (Mn)	ug/L	20.0	<1.0	<1.0	1.0	8046218
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8046218
Dissolved Selenium (Se)	ug/L	0.22	0.18	0.18	0.10	8046218
Dissolved Silicon (Si)	ug/L	7700	6250	6500	100	8046218
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8046218
Dissolved Strontium (Sr)	ug/L	22.6	36.6	37.8	1.0	8046218
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	0.050	8046218
Dissolved Tin (Sn)	ug/L	<5.0	5.0	<5.0	5.0	8046218
Dissolved Titanium (Ti)	ug/L	9.7	<5.0	<5.0	5.0	8046218
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8046218
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8046218
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8046218
Dissolved Calcium (Ca)	mg/L	13.7	25.5	25.1	0.050	8043796
Dissolved Magnesium (Mg)	mg/L	3.23	4.25	4.30	0.050	8043796
RDL = Reportable Detection Limit						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0806	NE0807	NE0808		
Sampling Date		2015/09/17 16:30	2015/09/17 17:00	2015/09/17 17:10		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-04	W-88877-091715-TDF-05	W-88877-091715-TDF-06	RDL	QC Batch
Dissolved Potassium (K)	mg/L	0.212	0.291	0.292	0.050	8043796
Dissolved Sodium (Na)	mg/L	2.91	4.72	4.63	0.050	8043796
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8043796
RDL = Reportable Detection Limit						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0809	NE0809		
Sampling Date		2015/09/17 17:50	2015/09/17 17:50		
COC Number		476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-07	W-88877-091715-TDF-07 Lab-Dup	RDL	QC Batch
Misc. Inorganics					
Dissolved Hardness (CaCO ₃)	mg/L	38.7	N/A	0.50	8043769
Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	N/A	0.010	8050464
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	9.0	12.7	3.0	8046218
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8046218
Dissolved Arsenic (As)	ug/L	0.13	0.13	0.10	8046218
Dissolved Barium (Ba)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8046218
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Boron (B)	ug/L	<50	<50	50	8046218
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	8046218
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	0.50	8046218
Dissolved Copper (Cu)	ug/L	0.33	0.35	0.20	8046218
Dissolved Iron (Fe)	ug/L	53.9	51.4	5.0	8046218
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8046218
Dissolved Lithium (Li)	ug/L	<5.0	<5.0	5.0	8046218
Dissolved Manganese (Mn)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Molybdenum (Mo)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	8046218
Dissolved Selenium (Se)	ug/L	0.18	0.15	0.10	8046218
Dissolved Silicon (Si)	ug/L	5310	5750	100	8046218
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8046218
Dissolved Strontium (Sr)	ug/L	21.7	21.7	1.0	8046218
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	0.050	8046218
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8046218
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8046218
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8046218
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	8046218
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	8046218
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	0.50	8046218
RDL = Reportable Detection Limit					
Lab-Dup = Laboratory Initiated Duplicate					
N/A = Not Applicable					

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0809	NE0809		
Sampling Date		2015/09/17 17:50	2015/09/17 17:50		
COC Number		476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-07	W-88877-091715-TDF-07 Lab-Dup	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	12.6	N/A	0.050	8043796
Dissolved Magnesium (Mg)	mg/L	1.74	N/A	0.050	8043796
Dissolved Potassium (K)	mg/L	0.181	N/A	0.050	8043796
Dissolved Sodium (Na)	mg/L	2.85	N/A	0.050	8043796
Dissolved Sulphur (S)	mg/L	<3.0	N/A	3.0	8043796
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0810	NE0810	NE0811		
Sampling Date		2015/09/18 06:50	2015/09/18 06:50	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091815-TDF-08	W-88877-091815-TDF-08 Lab-Dup	W-88877-091815-TDF-09	RDL	QC Batch

Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	24.8	N/A	16.3	0.50	8043691
Elements						
Total Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	0.010	8050474
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	18.8	N/A	15.6	3.0	8045645
Total Antimony (Sb)	ug/L	<0.50	N/A	<0.50	0.50	8045645
Total Arsenic (As)	ug/L	0.12	N/A	0.11	0.10	8045645
Total Barium (Ba)	ug/L	2.9	N/A	2.2	1.0	8045645
Total Beryllium (Be)	ug/L	<0.10	N/A	<0.10	0.10	8045645
Total Bismuth (Bi)	ug/L	<1.0	N/A	<1.0	1.0	8045645
Total Boron (B)	ug/L	<50	N/A	<50	50	8045645
Total Cadmium (Cd)	ug/L	<0.010	N/A	<0.010	0.010	8045645
Total Chromium (Cr)	ug/L	<1.0	N/A	<1.0	1.0	8045645
Total Cobalt (Co)	ug/L	<0.50	N/A	<0.50	0.50	8045645
Total Copper (Cu)	ug/L	0.51	N/A	0.92	0.50	8045645
Total Iron (Fe)	ug/L	20	N/A	86	10	8045645
Total Lead (Pb)	ug/L	<0.20	N/A	<0.20	0.20	8045645
Total Lithium (Li)	ug/L	<5.0	N/A	<5.0	5.0	8045645
Total Manganese (Mn)	ug/L	2.5	N/A	25.1	1.0	8045645
Total Molybdenum (Mo)	ug/L	<1.0	N/A	<1.0	1.0	8045645
Total Nickel (Ni)	ug/L	<1.0	N/A	<1.0	1.0	8045645
Total Selenium (Se)	ug/L	<0.10	N/A	<0.10	0.10	8045645
Total Silicon (Si)	ug/L	1740	N/A	1450	100	8045645
Total Silver (Ag)	ug/L	<0.020	N/A	<0.020	0.020	8045645
Total Strontium (Sr)	ug/L	12.2	N/A	15.4	1.0	8045645
Total Thallium (Tl)	ug/L	<0.050	N/A	<0.050	0.050	8045645
Total Tin (Sn)	ug/L	<5.0	N/A	<5.0	5.0	8045645
Total Titanium (Ti)	ug/L	<5.0	N/A	<5.0	5.0	8045645
Total Uranium (U)	ug/L	<0.10	N/A	<0.10	0.10	8045645
Total Vanadium (V)	ug/L	<5.0	N/A	<5.0	5.0	8045645
Total Zinc (Zn)	ug/L	<5.0	N/A	<5.0	5.0	8045645
Total Zirconium (Zr)	ug/L	<0.50	N/A	<0.50	0.50	8045645

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NE0810	NE0810	NE0811		
Sampling Date		2015/09/18 06:50	2015/09/18 06:50	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091815-TDF-08	W-88877-091815-TDF-08 Lab-Dup	W-88877-091815-TDF-09	RDL	QC Batch
Total Calcium (Ca)	mg/L	8.49	N/A	4.60	0.050	8043692
Total Magnesium (Mg)	mg/L	0.868	N/A	1.18	0.050	8043692
Total Potassium (K)	mg/L	0.087	N/A	0.198	0.050	8043692
Total Sodium (Na)	mg/L	0.800	N/A	4.51	0.050	8043692
Total Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8043692
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

TOTAL TKN IN WATER (WATER)

Maxxam ID		NE0803	NE0804	NE0805		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/17 15:45		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091715-TDF-03	RDL	QC Batch

Nutrients						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	<0.10	1.26	0.10	8043883
Total Nitrogen (N)	mg/L	0.928	0.950	1.26	0.020	8048559
RDL = Reportable Detection Limit						

Maxxam ID		NE0806	NE0807	NE0808		
Sampling Date		2015/09/17 16:30	2015/09/17 17:00	2015/09/17 17:10		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-04	W-88877-091715-TDF-05	W-88877-091715-TDF-06	RDL	QC Batch

Nutrients						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	0.25	0.21	0.10	8043883
Total Nitrogen (N)	mg/L	0.584	0.507	0.446	0.020	8048559
RDL = Reportable Detection Limit						

Maxxam ID		NE0809	NE0810	NE0811		
Sampling Date		2015/09/17 17:50	2015/09/18 06:50	2015/09/18 07:40		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-07	W-88877-091815-TDF-08	W-88877-091815-TDF-09	RDL	QC Batch

Nutrients						
Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	0.11	0.16	0.10	8043883
Total Nitrogen (N)	mg/L	0.185	0.107	0.159	0.020	8048559
RDL = Reportable Detection Limit						

Maxxam ID		NE0812		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-10	RDL	QC Batch

Nutrients				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.17	0.10	8043883
Total Nitrogen (N)	mg/L	0.175	0.020	8048559
RDL = Reportable Detection Limit				

Maxxam Job #: B582021
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GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		NE0803	NE0804	NE0810		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/18 06:50		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091815-TDF-08	RDL	QC Batch
Volatiles						
VPH (VHW6 to 10 - BTEX)	ug/L	<300	<300	<300	300	8043541
Chloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Vinyl chloride	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Chloroethane	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Trichlorofluoromethane	ug/L	<4.0	<4.0	<4.0	4.0	8044829
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	<2.0	<2.0	2.0	8044829
Dichlorodifluoromethane	ug/L	<2.0	<2.0	<2.0	2.0	8044829
1,1-dichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Dichloromethane	ug/L	<2.0	<2.0	<2.0	2.0	8044829
trans-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8044829
1,1-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
cis-1,2-dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	8044829
1,1,1-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
1,2-dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Carbon tetrachloride	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	8044829
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	8044829
1,2-dichloropropane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
cis-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8044829
trans-1,3-dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Bromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8044829
1,1,2-trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Trichloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Chlorodibromomethane	ug/L	<1.0	<1.0	<1.0	1.0	8044829
1,2-dibromoethane	ug/L	<0.20	<0.20	<0.20	0.20	8044829
1,3-Butadiene	ug/L	<5.0	<5.0	<5.0	5.0	8044829
Tetrachloroethene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	8044829
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	8044829
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8044829
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	8044829
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
RDL = Reportable Detection Limit						

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GHD Limited
Client Project #: 088877-02-01
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Your P.O. #: 73500976
Sampler Initials: DF

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		NE0803	NE0804	NE0810		
Sampling Date		2015/09/17 14:10	2015/09/17 14:55	2015/09/18 06:50		
COC Number		476602-01-01	476602-01-01	476602-01-01		
	UNITS	W-88877-091715-TDF-01	W-88877-091715-TDF-02	W-88877-091815-TDF-08	RDL	QC Batch
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	8044829
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	0.40	8044829
1,1,1,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
1,1,2,2-tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	8044829
1,2-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
1,3-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
1,4-dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Chlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
Dibromomethane	ug/L	<0.90	<0.90	<0.90	0.90	8044829
Bromobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8044829
1,2,3-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8044829
1,2,4-trichlorobenzene	ug/L	<2.0	<2.0	<2.0	2.0	8044829
Hexachlorobutadiene	ug/L	<0.50	<0.50	<0.50	0.50	8044829
VH C6-C10	ug/L	<300	<300	<300	300	8044829
Surrogate Recovery (%)						
1,4-Difluorobenzene (sur.)	%	98	99	99	N/A	8044829
4-Bromofluorobenzene (sur.)	%	73	73	73	N/A	8044829
D4-1,2-Dichloroethane (sur.)	%	90	90	89	N/A	8044829
RDL = Reportable Detection Limit						
N/A = Not Applicable						

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		NE0811		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-09	RDL	QC Batch
Volatiles				
VPH (VHW6 to 10 - BTEX)	ug/L	<300	300	8043541
Chloromethane	ug/L	<1.0	1.0	8046486
Vinyl chloride	ug/L	<0.50	0.50	8046486
Chloroethane	ug/L	<1.0	1.0	8046486
Trichlorofluoromethane	ug/L	<4.0	4.0	8046486
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	<2.0	2.0	8046486
Dichlorodifluoromethane	ug/L	<2.0	2.0	8046486
1,1-dichloroethene	ug/L	<0.50	0.50	8046486
Dichloromethane	ug/L	<2.0	2.0	8046486
trans-1,2-dichloroethene	ug/L	<1.0	1.0	8046486
1,1-dichloroethane	ug/L	<0.50	0.50	8046486
cis-1,2-dichloroethene	ug/L	<1.0	1.0	8046486
Chloroform	ug/L	<1.0	1.0	8046486
1,1,1-trichloroethane	ug/L	<0.50	0.50	8046486
1,2-dichloroethane	ug/L	<0.50	0.50	8046486
Carbon tetrachloride	ug/L	<0.50	0.50	8046486
Benzene	ug/L	<0.40	0.40	8046486
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	8046486
1,2-dichloropropane	ug/L	<0.50	0.50	8046486
cis-1,3-dichloropropene	ug/L	<1.0	1.0	8046486
trans-1,3-dichloropropene	ug/L	<1.0	1.0	8046486
Bromomethane	ug/L	<1.0	1.0	8046486
1,1,2-trichloroethane	ug/L	<0.50	0.50	8046486
Trichloroethene	ug/L	<0.50	0.50	8046486
Chlorodibromomethane	ug/L	<1.0	1.0	8046486
1,2-dibromoethane	ug/L	<0.20	0.20	8046486
1,3-Butadiene	ug/L	<5.0	5.0	8046486
Tetrachloroethene	ug/L	<0.50	0.50	8046486
Bromodichloromethane	ug/L	<1.0	1.0	8046486
Toluene	ug/L	<0.40	0.40	8046486
Ethylbenzene	ug/L	<0.40	0.40	8046486
m & p-Xylene	ug/L	<0.40	0.40	8046486
Bromoform	ug/L	<1.0	1.0	8046486
Styrene	ug/L	<0.50	0.50	8046486
RDL = Reportable Detection Limit				

Maxxam Job #: B582021
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GHD Limited
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Your P.O. #: 73500976
Sampler Initials: DF

CSR VOC + VPH IN WATER (WATER)

Maxxam ID		NE0811		
Sampling Date		2015/09/18 07:40		
COC Number		476602-01-01		
	UNITS	W-88877-091815-TDF-09	RDL	QC Batch
o-Xylene	ug/L	<0.40	0.40	8046486
Xylenes (Total)	ug/L	<0.40	0.40	8046486
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	8046486
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	8046486
1,2-dichlorobenzene	ug/L	<0.50	0.50	8046486
1,3-dichlorobenzene	ug/L	<0.50	0.50	8046486
1,4-dichlorobenzene	ug/L	<0.50	0.50	8046486
Chlorobenzene	ug/L	<0.50	0.50	8046486
Dibromomethane	ug/L	<0.90	0.90	8046486
Bromobenzene	ug/L	<2.0	2.0	8046486
1,2,3-trichlorobenzene	ug/L	<2.0	2.0	8046486
1,2,4-trichlorobenzene	ug/L	<2.0	2.0	8046486
Hexachlorobutadiene	ug/L	<0.50	0.50	8046486
VH C6-C10	ug/L	<300	300	8046486
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	101	N/A	8046486
4-Bromofluorobenzene (sur.)	%	86	N/A	8046486
D4-1,2-Dichloroethane (sur.)	%	93	N/A	8046486
RDL = Reportable Detection Limit				
N/A = Not Applicable				

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GHD Limited
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GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B582021
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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8044829	1,4-Difluorobenzene (sur.)	2015/09/22	98	70 - 130	101	70 - 130	100	%		
8044829	4-Bromofluorobenzene (sur.)	2015/09/22	85	70 - 130	98	70 - 130	78	%		
8044829	D4-1,2-Dichloroethane (sur.)	2015/09/22	92	70 - 130	112	70 - 130	87	%		
8046486	1,4-Difluorobenzene (sur.)	2015/09/23	100	70 - 130	100	70 - 130	101	%		
8046486	4-Bromofluorobenzene (sur.)	2015/09/23	99	70 - 130	100	70 - 130	88	%		
8046486	D4-1,2-Dichloroethane (sur.)	2015/09/23	94	70 - 130	94	70 - 130	91	%		
8047638	D10-ANTHRACENE (sur.)	2015/09/23	105	60 - 130	109	60 - 130	106	%		
8047638	D8-ACENAPHTHYLENE (sur.)	2015/09/23	103	50 - 130	104	50 - 130	104	%		
8047638	D8-NAPHTHALENE (sur.)	2015/09/23	102	50 - 130	101	50 - 130	106	%		
8047638	D9-Acridine	2015/09/23	101	50 - 130	104	50 - 130	100	%		
8047638	TERPHENYL-D14 (sur.)	2015/09/23	104	60 - 130	99	60 - 130	107	%		
8047645	O-TERPHENYL (sur.)	2015/09/23	108	50 - 130	107	50 - 130	99	%		
8049027	D10-ANTHRACENE (sur.)	2015/09/24	78	60 - 130	82	60 - 130	86	%		
8049027	D8-ACENAPHTHYLENE (sur.)	2015/09/24	79	50 - 130	80	50 - 130	80	%		
8049027	D8-NAPHTHALENE (sur.)	2015/09/24	78	50 - 130	79	50 - 130	82	%		
8049027	D9-Acridine	2015/09/24	83	50 - 130	83	50 - 130	80	%		
8049027	TERPHENYL-D14 (sur.)	2015/09/24	62	60 - 130	84	60 - 130	86	%		
8049033	O-TERPHENYL (sur.)	2015/09/24	102	50 - 130	101	50 - 130	102	%		
8043714	Biochemical Oxygen Demand	2015/09/19			97	85 - 115	<6.0	mg/L	13 (1)	20
8044829	1,1,1,2-tetrachloroethane	2015/09/22	79	70 - 130	84	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,1,1-trichloroethane	2015/09/22	81	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,1,2,2-tetrachloroethane	2015/09/22	89	70 - 130	91	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,1,2Trichloro-1,2,2Trifluoroethane	2015/09/22					<2.0	ug/L	NC (1)	30
8044829	1,1,2-trichloroethane	2015/09/22	79	70 - 130	84	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,1-dichloroethane	2015/09/22	82	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,1-dichloroethene	2015/09/22	83	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,2,3-trichlorobenzene	2015/09/22	75	70 - 130	78	70 - 130	<2.0	ug/L	NC (1)	30
8044829	1,2,4-trichlorobenzene	2015/09/22	76	70 - 130	79	70 - 130	<2.0	ug/L	NC (1)	30
8044829	1,2-dibromoethane	2015/09/22	75	70 - 130	79	70 - 130	<0.20	ug/L	NC (1)	30
8044829	1,2-dichlorobenzene	2015/09/22	85	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8044829	1,2-dichloroethane	2015/09/22	78	70 - 130	82	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,2-dichloropropane	2015/09/22	84	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,3-Butadiene	2015/09/22					<5.0	ug/L		
8044829	1,3-dichlorobenzene	2015/09/22	87	70 - 130	92	70 - 130	<0.50	ug/L	NC (1)	30
8044829	1,4-dichlorobenzene	2015/09/22	85	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30
8044829	Benzene	2015/09/22	82	70 - 130	88	70 - 130	<0.40	ug/L	NC (1)	30
8044829	Bromobenzene	2015/09/22	81	70 - 130	84	70 - 130	<2.0	ug/L		
8044829	Bromodichloromethane	2015/09/22	79	70 - 130	85	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Bromoform	2015/09/22	82	70 - 130	84	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Bromomethane	2015/09/22	70	60 - 140	85	60 - 140	<1.0	ug/L	NC (1)	30
8044829	Carbon tetrachloride	2015/09/22	81	70 - 130	88	70 - 130	<0.50	ug/L	NC (1)	30
8044829	Chlorobenzene	2015/09/22	79	70 - 130	83	70 - 130	<0.50	ug/L	NC (1)	30
8044829	Chlorodibromomethane	2015/09/22	78	70 - 130	82	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Chloroethane	2015/09/22	84	60 - 140	91	60 - 140	<1.0	ug/L	NC (1)	30
8044829	Chloroform	2015/09/22	82	70 - 130	89	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Chloromethane	2015/09/22	109	60 - 140	116	60 - 140	<1.0	ug/L	NC (1)	30
8044829	cis-1,2-dichloroethene	2015/09/22	84	70 - 130	91	70 - 130	<1.0	ug/L	NC (1)	30
8044829	cis-1,3-dichloropropene	2015/09/22	75	70 - 130	82	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Dibromomethane	2015/09/22	77	70 - 130	81	70 - 130	<0.90	ug/L		
8044829	Dichlorodifluoromethane	2015/09/22	129	60 - 140	134	60 - 140	<2.0	ug/L	NC (1)	30
8044829	Dichloromethane	2015/09/22	84	70 - 130	91	70 - 130	<2.0	ug/L	NC (1)	30
8044829	Ethylbenzene	2015/09/22	70	70 - 130	76	70 - 130	<0.40	ug/L	NC (1)	30
8044829	Hexachlorobutadiene	2015/09/22	86	70 - 130	91	70 - 130	<0.50	ug/L	NC (1)	30
8044829	m & p-Xylene	2015/09/22	72	70 - 130	79	70 - 130	<0.40	ug/L	NC (1)	30
8044829	Methyl-tert-butylether (MTBE)	2015/09/22	76	70 - 130	82	70 - 130	<4.0	ug/L	NC (1)	30
8044829	o-Xylene	2015/09/22	71	70 - 130	76	70 - 130	<0.40	ug/L	NC (1)	30
8044829	Styrene	2015/09/22	65 (2)	70 - 130	70	70 - 130	<0.50	ug/L		
8044829	Tetrachloroethene	2015/09/22	78	70 - 130	84	70 - 130	<0.50	ug/L	NC (1)	30
8044829	Toluene	2015/09/22	71	70 - 130	77	70 - 130	<0.40	ug/L	NC (1)	30
8044829	trans-1,2-dichloroethene	2015/09/22	77	70 - 130	83	70 - 130	<1.0	ug/L	NC (1)	30

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QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8044829	trans-1,3-dichloropropene	2015/09/22	69 (2)	70 - 130	75	70 - 130	<1.0	ug/L	NC (1)	30
8044829	Trichloroethene	2015/09/22	78	70 - 130	85	70 - 130	<0.50	ug/L	NC (1)	30
8044829	Trichlorofluoromethane	2015/09/22	101	60 - 140	109	60 - 140	<4.0	ug/L	NC (1)	30
8044829	VH C6-C10	2015/09/22			93	70 - 130	<300	ug/L		
8044829	Vinyl chloride	2015/09/22	109	60 - 140	119	60 - 140	<0.50	ug/L	NC (1)	30
8044829	Xylenes (Total)	2015/09/22					<0.40	ug/L	NC (1)	30
8045121	Strong Acid Dissoc. Cyanide (CN)	2015/09/21	94	80 - 120	102	80 - 120	<0.00050	mg/L	NC (1)	20
8045491	Orthophosphate (P)	2015/09/21	97 (3)	80 - 120	91	80 - 120	<0.10	mg/L	NC (4)	20
8045579	Total Phosphorus (P)	2015/09/21	NC (5)	80 - 120	99	80 - 120	<0.0050	mg/L	2.7 (6)	20
8045645	Total Aluminum (Al)	2015/09/23	104	80 - 120	109	80 - 120	<3.0	ug/L		
8045645	Total Antimony (Sb)	2015/09/23	107	80 - 120	107	80 - 120	<0.50	ug/L		
8045645	Total Arsenic (As)	2015/09/23	105	80 - 120	105	80 - 120	<0.10	ug/L		
8045645	Total Barium (Ba)	2015/09/23	NC	80 - 120	104	80 - 120	<1.0	ug/L		
8045645	Total Beryllium (Be)	2015/09/23	108	80 - 120	105	80 - 120	<0.10	ug/L		
8045645	Total Bismuth (Bi)	2015/09/23	100	80 - 120	103	80 - 120	<1.0	ug/L		
8045645	Total Boron (B)	2015/09/23					<50	ug/L		
8045645	Total Cadmium (Cd)	2015/09/23	102	80 - 120	100	80 - 120	<0.010	ug/L		
8045645	Total Chromium (Cr)	2015/09/23	100	80 - 120	99	80 - 120	<1.0	ug/L		
8045645	Total Cobalt (Co)	2015/09/23	99	80 - 120	99	80 - 120	<0.50	ug/L		
8045645	Total Copper (Cu)	2015/09/23	97	80 - 120	100	80 - 120	<0.50	ug/L		
8045645	Total Iron (Fe)	2015/09/23	113	80 - 120	114	80 - 120	<10	ug/L		
8045645	Total Lead (Pb)	2015/09/23	100	80 - 120	102	80 - 120	<0.20	ug/L		
8045645	Total Lithium (Li)	2015/09/23	103	80 - 120	104	80 - 120	<5.0	ug/L		
8045645	Total Manganese (Mn)	2015/09/23	101	80 - 120	101	80 - 120	<1.0	ug/L		
8045645	Total Molybdenum (Mo)	2015/09/23	108	80 - 120	99	80 - 120	<1.0	ug/L		
8045645	Total Nickel (Ni)	2015/09/23	98	80 - 120	98	80 - 120	<1.0	ug/L		
8045645	Total Selenium (Se)	2015/09/23	99	80 - 120	96	80 - 120	<0.10	ug/L		
8045645	Total Silicon (Si)	2015/09/23					<100	ug/L		
8045645	Total Silver (Ag)	2015/09/23	102	80 - 120	100	80 - 120	<0.020	ug/L		
8045645	Total Strontium (Sr)	2015/09/23	NC	80 - 120	103	80 - 120	<1.0	ug/L		

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8045645	Total Thallium (Tl)	2015/09/23	106	80 - 120	92	80 - 120	<0.050	ug/L		
8045645	Total Tin (Sn)	2015/09/23	103	80 - 120	105	80 - 120	<5.0	ug/L		
8045645	Total Titanium (Ti)	2015/09/23	112	80 - 120	96	80 - 120	<5.0	ug/L		
8045645	Total Uranium (U)	2015/09/23	101	80 - 120	99	80 - 120	<0.10	ug/L		
8045645	Total Vanadium (V)	2015/09/23	101	80 - 120	100	80 - 120	<5.0	ug/L		
8045645	Total Zinc (Zn)	2015/09/23	103	80 - 120	102	80 - 120	<5.0	ug/L		
8045645	Total Zirconium (Zr)	2015/09/23					<0.50	ug/L		
8046006	Dissolved Chloride (Cl)	2015/09/21	NC	80 - 120	105	80 - 120	<0.50	mg/L	1.4 (1)	20
8046014	Dissolved Sulphate (SO4)	2015/09/21			97	80 - 120	<0.50	mg/L		
8046016	Dissolved Chloride (Cl)	2015/09/21			96	80 - 120	<0.50	mg/L	NC (1)	20
8046021	Dissolved Sulphate (SO4)	2015/09/21			95	80 - 120	<0.50	mg/L	0.099 (1)	20
8046135	Chemical Oxygen Demand	2015/09/23	95	80 - 120	98	80 - 120	<10	mg/L	NC (1)	20
8046138	Chemical Oxygen Demand	2015/09/23	99 (7)	80 - 120	101	80 - 120	<10	mg/L	NC (8)	20
8046218	Dissolved Aluminum (Al)	2015/09/25	106 (9)	80 - 120	111	80 - 120	<3.0	ug/L	NC (10)	20
8046218	Dissolved Antimony (Sb)	2015/09/25	105 (9)	80 - 120	102	80 - 120	<0.50	ug/L	NC (10)	20
8046218	Dissolved Arsenic (As)	2015/09/25	96 (9)	80 - 120	101	80 - 120	<0.10	ug/L	NC (10)	20
8046218	Dissolved Barium (Ba)	2015/09/25	96 (9)	80 - 120	101	80 - 120	<1.0	ug/L	NC (10)	20
8046218	Dissolved Beryllium (Be)	2015/09/25	102 (9)	80 - 120	103	80 - 120	<0.10	ug/L	NC (10)	20
8046218	Dissolved Bismuth (Bi)	2015/09/25	97 (9)	80 - 120	101	80 - 120	<1.0	ug/L	NC (10)	20
8046218	Dissolved Boron (B)	2015/09/25					<50	ug/L	NC (10)	20
8046218	Dissolved Cadmium (Cd)	2015/09/25	97 (9)	80 - 120	99	80 - 120	<0.010	ug/L	NC (10)	20
8046218	Dissolved Chromium (Cr)	2015/09/25	98 (9)	80 - 120	102	80 - 120	<1.0	ug/L	NC (10)	20
8046218	Dissolved Cobalt (Co)	2015/09/25	102 (9)	80 - 120	104	80 - 120	<0.50	ug/L	NC (10)	20
8046218	Dissolved Copper (Cu)	2015/09/25	102 (9)	80 - 120	104	80 - 120	<0.20	ug/L	NC (10)	20
8046218	Dissolved Iron (Fe)	2015/09/25	NC (9)	80 - 120	107	80 - 120	<5.0	ug/L	4.7 (10)	20
8046218	Dissolved Lead (Pb)	2015/09/25	96 (9)	80 - 120	99	80 - 120	<0.20	ug/L	NC (10)	20
8046218	Dissolved Lithium (Li)	2015/09/25	102 (9)	80 - 120	100	80 - 120	<5.0	ug/L	NC (10)	20
8046218	Dissolved Manganese (Mn)	2015/09/25	96 (9)	80 - 120	100	80 - 120	<1.0	ug/L	NC (10)	20
8046218	Dissolved Molybdenum (Mo)	2015/09/25	102 (9)	80 - 120	100	80 - 120	<1.0	ug/L	NC (10)	20
8046218	Dissolved Nickel (Ni)	2015/09/25	102 (9)	80 - 120	106	80 - 120	<1.0	ug/L	NC (10)	20

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8046218	Dissolved Selenium (Se)	2015/09/25	102 (9)	80 - 120	99	80 - 120	<0.10	ug/L	NC (10)	20
8046218	Dissolved Silicon (Si)	2015/09/25					<100	ug/L	7.8 (10)	20
8046218	Dissolved Silver (Ag)	2015/09/25	102 (9)	80 - 120	99	80 - 120	<0.020	ug/L	NC (10)	20
8046218	Dissolved Strontium (Sr)	2015/09/25	NC (9)	80 - 120	96	80 - 120	<1.0	ug/L	0.11 (10)	20
8046218	Dissolved Thallium (Tl)	2015/09/25	92 (9)	80 - 120	98	80 - 120	<0.050	ug/L	NC (10)	20
8046218	Dissolved Tin (Sn)	2015/09/25	90 (9)	80 - 120	99	80 - 120	<5.0	ug/L	NC (10)	20
8046218	Dissolved Titanium (Ti)	2015/09/25	86 (9)	80 - 120	95	80 - 120	<5.0	ug/L	NC (10)	20
8046218	Dissolved Uranium (U)	2015/09/25	94 (9)	80 - 120	98	80 - 120	<0.10	ug/L	NC (10)	20
8046218	Dissolved Vanadium (V)	2015/09/25	95 (9)	80 - 120	101	80 - 120	<5.0	ug/L	NC (10)	20
8046218	Dissolved Zinc (Zn)	2015/09/25	101 (9)	80 - 120	108	80 - 120	<5.0	ug/L	NC (10)	20
8046218	Dissolved Zirconium (Zr)	2015/09/25					<0.50	ug/L	NC (10)	20
8046486	1,1,1,2-tetrachloroethane	2015/09/23	93	70 - 130	88	70 - 130	<0.50	ug/L		
8046486	1,1,1-trichloroethane	2015/09/24	94	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30
8046486	1,1,2,2-tetrachloroethane	2015/09/23	97	70 - 130	92	70 - 130	<0.50	ug/L		
8046486	1,1,2Trichloro-1,2,2Trifluoroethane	2015/09/23					<2.0	ug/L		
8046486	1,1,2-trichloroethane	2015/09/23	92	70 - 130	88	70 - 130	<0.50	ug/L		
8046486	1,1-dichloroethane	2015/09/24	92	70 - 130	89	70 - 130	<0.50	ug/L	NC (1)	30
8046486	1,1-dichloroethene	2015/09/24	98	70 - 130	93	70 - 130	<0.50	ug/L	NC (1)	30
8046486	1,2,3-trichlorobenzene	2015/09/23	106	70 - 130	97	70 - 130	<2.0	ug/L		
8046486	1,2,4-trichlorobenzene	2015/09/23	106	70 - 130	99	70 - 130	<2.0	ug/L		
8046486	1,2-dibromoethane	2015/09/23	89	70 - 130	86	70 - 130	<0.20	ug/L		
8046486	1,2-dichlorobenzene	2015/09/23	105	70 - 130	100	70 - 130	<0.50	ug/L		
8046486	1,2-dichloroethane	2015/09/23	88	70 - 130	88	70 - 130	<0.50	ug/L		
8046486	1,2-dichloropropane	2015/09/23	95	70 - 130	92	70 - 130	<0.50	ug/L		
8046486	1,3-Butadiene	2015/09/23					<5.0	ug/L		
8046486	1,3-dichlorobenzene	2015/09/23	107	70 - 130	100	70 - 130	<0.50	ug/L		
8046486	1,4-dichlorobenzene	2015/09/23	104	70 - 130	98	70 - 130	<0.50	ug/L		
8046486	Benzene	2015/09/23	95	70 - 130	91	70 - 130	<0.40	ug/L		
8046486	Bromobenzene	2015/09/23	98	70 - 130	94	70 - 130	<2.0	ug/L		
8046486	Bromodichloromethane	2015/09/23	92	70 - 130	89	70 - 130	<1.0	ug/L		

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			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8046486	Bromoform	2015/09/23	91	70 - 130	88	70 - 130	<1.0	ug/L		
8046486	Bromomethane	2015/09/23	90	60 - 140	83	60 - 140	<1.0	ug/L		
8046486	Carbon tetrachloride	2015/09/23	95	70 - 130	90	70 - 130	<0.50	ug/L		
8046486	Chlorobenzene	2015/09/23	95	70 - 130	92	70 - 130	<0.50	ug/L		
8046486	Chlorodibromomethane	2015/09/23	90	70 - 130	87	70 - 130	<1.0	ug/L		
8046486	Chloroethane	2015/09/24	91	60 - 140	89	60 - 140	<1.0	ug/L	NC (1)	30
8046486	Chloroform	2015/09/23	93	70 - 130	89	70 - 130	<1.0	ug/L		
8046486	Chloromethane	2015/09/24	105	60 - 140	98	60 - 140	<1.0	ug/L	NC (1)	30
8046486	cis-1,2-dichloroethene	2015/09/24	98	70 - 130	93	70 - 130	<1.0	ug/L	NC (1)	30
8046486	cis-1,3-dichloropropene	2015/09/23	78	70 - 130	74	70 - 130	<1.0	ug/L		
8046486	Dibromomethane	2015/09/23	89	70 - 130	86	70 - 130	<0.90	ug/L		
8046486	Dichlorodifluoromethane	2015/09/23	138	60 - 140	134	60 - 140	<2.0	ug/L		
8046486	Dichloromethane	2015/09/24	102	70 - 130	96	70 - 130	<2.0	ug/L	NC (1)	30
8046486	Ethylbenzene	2015/09/23	92	70 - 130	91	70 - 130	<0.40	ug/L		
8046486	Hexachlorobutadiene	2015/09/23	106	70 - 130	99	70 - 130	<0.50	ug/L		
8046486	m & p-Xylene	2015/09/23	98	70 - 130	95	70 - 130	<0.40	ug/L		
8046486	Methyl-tert-butylether (MTBE)	2015/09/23	93	70 - 130	91	70 - 130	<4.0	ug/L		
8046486	o-Xylene	2015/09/23	97	70 - 130	94	70 - 130	<0.40	ug/L		
8046486	Styrene	2015/09/23	85	70 - 130	84	70 - 130	<0.50	ug/L		
8046486	Tetrachloroethene	2015/09/24	95	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30
8046486	Toluene	2015/09/23	91	70 - 130	89	70 - 130	<0.40	ug/L		
8046486	trans-1,2-dichloroethene	2015/09/24	87	70 - 130	82	70 - 130	<1.0	ug/L	NC (1)	30
8046486	trans-1,3-dichloropropene	2015/09/23	69 (2)	70 - 130	66 (2)	70 - 130	<1.0	ug/L		
8046486	Trichloroethene	2015/09/24	94	70 - 130	90	70 - 130	<0.50	ug/L	NC (1)	30
8046486	Trichlorofluoromethane	2015/09/23	124	60 - 140	116	60 - 140	<4.0	ug/L		
8046486	VH C6-C10	2015/09/23			97	70 - 130	<300	ug/L		
8046486	Vinyl chloride	2015/09/24	112	60 - 140	105	60 - 140	<0.50	ug/L	NC (1)	30
8046486	Xylenes (Total)	2015/09/23					<0.40	ug/L		
8046946	Total Dissolved Solids	2015/09/24	97 (11)	80 - 120	106	80 - 120	<10	mg/L	3.5 (1)	20
8046981	Nitrate plus Nitrite (N)	2015/09/19	107 (3)	80 - 120	105	80 - 120	<0.10	mg/L	NC (4)	25

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			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8046982	Nitrite (N)	2015/09/19	103 (3)	80 - 120	103	80 - 120	<0.10	mg/L	NC (4)	20
8047224	Total Oil and grease	2015/09/23			93	70 - 130	<1.0	mg/L		
8047341	Dissolved Chloride (Cl)	2015/09/22	118	80 - 120	102	80 - 120	<0.50	mg/L	NC (1)	20
8047350	Dissolved Sulphate (SO4)	2015/09/22	NC	80 - 120	97	80 - 120	<0.50	mg/L	0.81 (1)	20
8047638	2-Methylnaphthalene	2015/09/23	100	50 - 130	99	50 - 130	<0.10	ug/L	6.9 (1)	40
8047638	Acenaphthene	2015/09/23	101	50 - 130	101	50 - 130	<0.050	ug/L	NC (13,1)	40
8047638	Acenaphthylene	2015/09/23	98	50 - 130	98	50 - 130	<0.050	ug/L	NC (13,1)	40
8047638	Acridine	2015/09/23	107	50 - 130	108	50 - 130	<0.050	ug/L	NC (1)	40
8047638	Anthracene	2015/09/23	102	60 - 130	104	60 - 130	<0.010	ug/L	NC (13,1)	40
8047638	Benzo(a)anthracene	2015/09/23	96	60 - 130	90	60 - 130	<0.010	ug/L	NC (1)	40
8047638	Benzo(a)pyrene	2015/09/23	103	60 - 130	96	60 - 130	<0.0090	ug/L	NC (1)	40
8047638	Benzo(b&j)fluoranthene	2015/09/23	105	60 - 130	93	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Benzo(g,h,i)perylene	2015/09/23	98	60 - 130	90	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Benzo(k)fluoranthene	2015/09/23	93	60 - 130	92	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Chrysene	2015/09/23	93	60 - 130	86	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Dibenz(a,h)anthracene	2015/09/23	95	60 - 130	92	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Fluoranthene	2015/09/23	91	60 - 130	92	60 - 130	<0.020	ug/L	NC (1)	40
8047638	Fluorene	2015/09/23	88	50 - 130	88	50 - 130	<0.050	ug/L	5.8 (1)	40
8047638	Indeno(1,2,3-cd)pyrene	2015/09/23	103	60 - 130	94	60 - 130	<0.050	ug/L	NC (1)	40
8047638	Naphthalene	2015/09/23	99	50 - 130	99	50 - 130	<0.10	ug/L	NC (13,1)	40
8047638	Phenanthrene	2015/09/23	95	60 - 130	95	60 - 130	<0.050	ug/L	12 (1)	40
8047638	Pyrene	2015/09/23	95	60 - 130	96	60 - 130	<0.020	ug/L	NC (1)	40
8047638	Quinoline	2015/09/23	104	50 - 130	103	50 - 130	<0.24	ug/L	NC (13,1)	40
8047645	EPH (C10-C19)	2015/09/23	NC	50 - 130	82	50 - 130	<0.20	mg/L	13 (1)	30
8047645	EPH (C19-C32)	2015/09/23	100	50 - 130	104	50 - 130	<0.20	mg/L	NC (1)	30
8047646	Total Suspended Solids	2015/09/24	110	80 - 120	102	80 - 120	<4.0	mg/L	0 (1)	20
8047717	pH	2015/09/22			102	97 - 103			0.88 (14)	N/A
8047724	Conductivity	2015/09/22			98	80 - 120	1.0, RDL=1.0	uS/cm	0.17 (14)	20
8047725	Alkalinity (PP as CaCO3)	2015/09/22					<0.50	mg/L	NC (14)	20
8047725	Alkalinity (Total as CaCO3)	2015/09/22	NC (15)	80 - 120	95	80 - 120	0.61, RDL=0.50	mg/L	0.37 (14)	20

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			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8047725	Bicarbonate (HCO ₃)	2015/09/22					0.74, RDL=0.50	mg/L	0.37 (14)	20
8047725	Carbonate (CO ₃)	2015/09/22					<0.50	mg/L	NC (14)	20
8047725	Hydroxide (OH)	2015/09/22					<0.50	mg/L	NC (14)	20
8047763	Alkalinity (PP as CaCO ₃)	2015/09/22					<0.50	mg/L	NC (1)	20
8047763	Alkalinity (Total as CaCO ₃)	2015/09/22	95	80 - 120	90	80 - 120	0.93, RDL=0.50	mg/L	0.35 (1)	20
8047763	Bicarbonate (HCO ₃)	2015/09/22					1.13, RDL=0.50	mg/L	0.35 (1)	20
8047763	Carbonate (CO ₃)	2015/09/22					<0.50	mg/L	NC (1)	20
8047763	Hydroxide (OH)	2015/09/22					<0.50	mg/L	NC (1)	20
8047768	Conductivity	2015/09/22			99	80 - 120	1.0, RDL=1.0	uS/cm	0.36 (1)	20
8047769	pH	2015/09/22			102	97 - 103				
8047784	Sulphide	2015/09/23	NC	80 - 120	99	80 - 120	0.0054, RDL=0.0050	mg/L	5.6 (1)	20
8047923	Strong Acid Dissoc. Cyanide (CN)	2015/09/23	103 (16)	80 - 120	103	80 - 120	0.00052, RDL=0.00050	mg/L	NC (17)	20
8048220	Total Ammonia (N)	2015/09/23	101	80 - 120	97	80 - 120	<0.0050	mg/L	NC (1)	20
8048221	Total Ammonia (N)	2015/09/23	104 (18)	80 - 120	100	80 - 120	<0.0050	mg/L	NC (19)	20
8048559	Total Nitrogen (N)	2015/09/24	NC	80 - 120	94	80 - 120	<0.020	mg/L	3.9 (1)	20
8049027	2-Methylnaphthalene	2015/09/24	82	50 - 130	97	50 - 130	<0.10	ug/L	NC (1)	40
8049027	Acenaphthene	2015/09/24	83	50 - 130	96	50 - 130	<0.050	ug/L	NC (1)	40
8049027	Acenaphthylene	2015/09/24	82	50 - 130	96	50 - 130	<0.050	ug/L	NC (1)	40
8049027	Acridine	2015/09/24	87	50 - 130	78	50 - 130	<0.050	ug/L	NC (1)	40
8049027	Anthracene	2015/09/24	83	60 - 130	84	60 - 130	<0.010	ug/L	NC (1)	40
8049027	Benzo(a)anthracene	2015/09/24	77	60 - 130	93	60 - 130	<0.010	ug/L	NC (1)	40
8049027	Benzo(a)pyrene	2015/09/24	80	60 - 130	96	60 - 130	<0.0090	ug/L	NC (1)	40
8049027	Benzo(b&j)fluoranthene	2015/09/24	80	60 - 130	85	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Benzo(g,h,i)perylene	2015/09/24	72	60 - 130	100	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Benzo(k)fluoranthene	2015/09/24	79	60 - 130	101	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Chrysene	2015/09/24	67	60 - 130	102	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Dibenz(a,h)anthracene	2015/09/24	82	60 - 130	90	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Fluoranthene	2015/09/24	74	60 - 130	84	60 - 130	<0.020	ug/L	NC (1)	40

Maxxam Job #: B582021
Report Date: 2015/09/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8049027	Fluorene	2015/09/24	71	50 - 130	94	50 - 130	<0.050	ug/L	NC (1)	40
8049027	Indeno(1,2,3-cd)pyrene	2015/09/24	82	60 - 130	91	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Naphthalene	2015/09/24	NC	50 - 130	95	50 - 130	<0.10	ug/L	NC (1)	40
8049027	Phenanthrene	2015/09/24	77	60 - 130	85	60 - 130	<0.050	ug/L	NC (1)	40
8049027	Pyrene	2015/09/24	77	60 - 130	85	60 - 130	<0.020	ug/L	NC (1)	40
8049027	Quinoline	2015/09/24	112	50 - 130	98	50 - 130	<0.24	ug/L	NC (1)	40
8049033	EPH (C10-C19)	2015/09/24	82	50 - 130	87	50 - 130	<0.20	mg/L	NC (1)	30
8049033	EPH (C19-C32)	2015/09/24	103	50 - 130	112	50 - 130	<0.20	mg/L	NC (1)	30
8049095	Total Dissolved Solids	2015/09/25	103	80 - 120	102	80 - 120	<10	mg/L	11 (1)	20
8049124	Total Dissolved Solids	2015/09/26	101	80 - 120	98	80 - 120	<10	mg/L	1.3 (1)	20
8049283	Phenols	2015/09/24	100	80 - 120	95	80 - 120	<0.0010	mg/L	NC (1)	20
8050357	Sulphide	2015/09/25	83 (20)	80 - 120	95	80 - 120	0.0070, RDL=0.0050	mg/L	NC (21)	20
8050464	Dissolved Mercury (Hg)	2015/09/25	86	80 - 120	94	80 - 120	<0.010	ug/L	NC (1)	20
8050474	Total Mercury (Hg)	2015/09/25	85 (22)	80 - 120	96	80 - 120	<0.010	ug/L	NC (23)	20

Maxxam Job #: B582021
Report Date: 2015/09/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

		Matrix Spike		Spiked Blank		Method Blank		RPD		
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
N/A = Not Applicable										
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.										
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.										
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.										
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.										
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.										
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).										
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).										
(1) Duplicate Parent ID										
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.										
(3) Matrix Spike Parent ID [NE0812-02]										
(4) Duplicate Parent ID [NE0812-02]										
(5) Matrix Spike Parent ID [NE0807-06]										
(6) Duplicate Parent ID [NE0807-06]										
(7) Matrix Spike Parent ID [NE0812-05]										
(8) Duplicate Parent ID [NE0812-05]										
(9) Matrix Spike Parent ID [NE0809-04]										
(10) Duplicate Parent ID [NE0809-04]										
(11) Matrix Spike Parent ID [NE0804-04]										
(12) Duplicate Parent ID [NE0810-04]										
(13) Detection limits raised due to matrix interference.										
(14) Duplicate Parent ID [NE0808-02]										
(15) Matrix Spike Parent ID [NE0808-02]										
(16) Matrix Spike Parent ID [NE0804-10]										
(17) Duplicate Parent ID [NE0804-10]										

Maxxam Job #: B582021
Report Date: 2015/09/28

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
(18)	Matrix Spike Parent ID [NE0804-08]									
(19)	Duplicate Parent ID [NE0804-08]									
(20)	Matrix Spike Parent ID [NE0811-11]									
(21)	Duplicate Parent ID [NE0810-11]									
(22)	Matrix Spike Parent ID [NE0810-07]									
(23)	Duplicate Parent ID [NE0810-07]									

Maxxam Job #: B582021
Report Date: 2015/09/28

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLANDS
Your P.O. #: 73500976
Sampler Initials: DF

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-Free: 800-563-6266 Fax: (604) 731 2385 www.maxxam.ca

Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	#27087 GHD Limited	Quotation #	B31426	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #			
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	179 Colonnade Road, Suite 400 Ottawa ON K2E 7J4	Project #	088877-02-01		
Phone	(519) 884-0510	Phone	(613) 727-0510	Project Name	Upgrades	Chain Of Custody Record	Project Manager
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@CRAworld.com	Site #			Tabitha Rudkin
				Sampled By	Danny Fitzgerald		

Regulatory Criteria:	Special Instructions	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required:
☐ CSR				Please provide advance notice for rush projects
☐ CCME				Regular (Standard) TAT:
☐ BC Water Quality				(will be applied if Rush TAT is not specified)
☐ Other				Standard TAT = 5-7 Working days for most tests
				Please note: Standard TAT for certain tests such as BOD and Cloxins/Furans are > 5 days - contact your Project Manager for details
				Job Specific Rush TAT (if applies to entire submission)
				1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐
				Rush Confirmation Number: ☐
				(call lab for #)

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM															1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: _____	
															Rush Confirmation Number: _____ (call lab for #)	
															# of Bottles	Comments
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered	Alkalinity, pH, E, NO3, PO4, Ion	BOD, TSS	COD, NH4, TKN	Cyanide SAD, S	CSR Dissolved CV Hg	CSR Total Metals Hg	VOCMPH, LEPI	Phenols (4-AAP)	LAB I.D.		
1 SID#135075	W-88877-091715-TDF-01	9/17/15	1710	GW	Y	X	X	X	X	X	X	X	X	NE0807	14	dissolved metals only
2 SID#135076	W-88877-091715-TDF-02	9/17/15	1755	GW	Y	X	X	X	X	X	X	X	X	NE0804	14	↓
3 SID#135077	W-88877-091715-TDF-03	9/17/15	1545	GW	Y	X	X	X	X	X	X	X	X	NE0805	9	
4 SID#135078	W-88877-091715-TDF-04	9/17/15	1630	GW	Y	X	X	X	X	X	X	X	X	NE0806	9	
5 SID#135079	W-88877-091715-TDF-05	9/17/15	1700	GW	Y	X	X	X	X	X	X	X	X	NE0807	9	
6 SID#135080	W-88877-091715-TDF-06	9/17/15	1710	GW	Y	X	X	X	X	X	X	X	X	NE0808	9	
7 SID#135081	W-88877-091715-TDF-07	9/17/15	1750	GW	Y	X	X	X	X	X	X	X	X	NE0809	9	↓
8 SID#135082	W-88877-091715-TDF-08	09/18/15	0650	SW	Y	X	X	X	X	X	X	X	X	NE0810		Total metals only
9 SID#135083	W-88877-091815-TDF-09	9/18/15	0740	SW	Y	X	X	X	X	X	X	X	X	NE0811		↓
10 SID#135084	W-88877-091815-TDF-10	9/18/15	0740	SW	Y	X	X	X						NE0812		

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only
	15/09/19	1015	2 SARAH B M TACHAN	2015/09/19	10:15		Time Sensitivity ☐ Temperature (°C) on Receipt 22.1/11.1-2 Custody Seal Intact on Cooler? N/A Yes ☐ No ☐

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

INVOICE TO:

Company Name **#163 GHD Limited**
Contact Name **Airesse MacPhee**
Address **651 COLBY DRIVE
WATERLOO ON N2V 1C2**
Phone **(519) 884-0510** Fax: **(519) 725-1394**
Email **airesse.macphee@ghd.com; NationalEDDSupport@ma**

Report Information

Company Name **#27087 GHD Limited**
Contact Name **Airesse MacPhee**
Address **179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4**
Phone **(613) 727-0510** Fax:
Email **amacphee@CRAworld.com**

Project Information

Quotation # **B31426**
P.O. #
Project # **088877-02-01**
Project Name **Upgrades**
Site #
Sampled By **Danny F. Gould**

Laboratory Use Only

Maxxam Job #
Bottle Order #
Chain Of Custody Record
Project Manager
Tabitha Rudkin
C#476602-01-01

Regulatory Criteria:

- ☐ CSR
☐ CCME
☐ BC Water Quality
☐ Other

Special Instructions

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT:

(will be applied if Rush TAT is not specified):

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐

Rush Confirmation Number:

(call lab for #)

of Bottles

Comments

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Alkalinity, pH, EC, Cl, SO4, NO2, NO3, PO4, ion bal, TDS	BOD, TSS	COD, NH4, TKN, T-Phos	Cyanide SAD, Sulphide	CSR Dissolved Metals in Water with CV Hg	CSR Total Metals in Water with CV Hg	VOC/PH, LE/PH/HE/PAH, TOG	Phenols (4-AAP)					
1	SID#135075	W-88877-091715-TDF-01	9/17/15	1410	GW	Y	X	X	X	X	X	X	X	X					
2	SID#135076	W-88877-091715-TDF-02	9/17/15	1455	GW	Y	X	X	X	X	X	X	X	X					
3	SID#135077	W-88877-091715-TDF-03	9/17/15	1545	GW	Y	X	X	X	X	X	X	X	X					
4	SID#135078	W-88877-091715-TDF-04	9/17/15	1630	GW	Y	X	X	X	X	X	X	X	X					
5	SID#135079	W-88877-091715-TDF-05	9/17/15	1700	GW	Y	X	X	X	X	X	X	X	X					
6	SID#135080	W-88877-091715-TDF-06	9/17/15	1710	GW	Y	X	X	X	X	X	X	X	X					
7	SID#135081	W-88877-091715-TDF-07	9/17/15	1750	GW	Y	X	X	X	X	X	X	X	X					
8	SID#135082	W-88877-091715-TDF-08	09/18/15	0650	SW	Y	X	X	X	X	X	X	X	X					
9	SID#135083	W-88877-091815-TDF-09	9/18/15	0740	SW	Y	X	X	X	X	X	X	X	X					
10	SID#135084	W-88877-091815-TDF-10	9/18/15	0740	SW	Y	X	X	X	X	X	X	X	X					

dissolved metals only

Do not analyze

samples TDF-03 through TDF-07 for phenols

Total metals only

RELINQUISHED BY: (Signature/Print)

Date: (YY/MM/DD)

Time

RECEIVED BY: (Signature/Print)

Date: (YY/MM/DD)

Time

jars used and not submitted

Lab Use Only

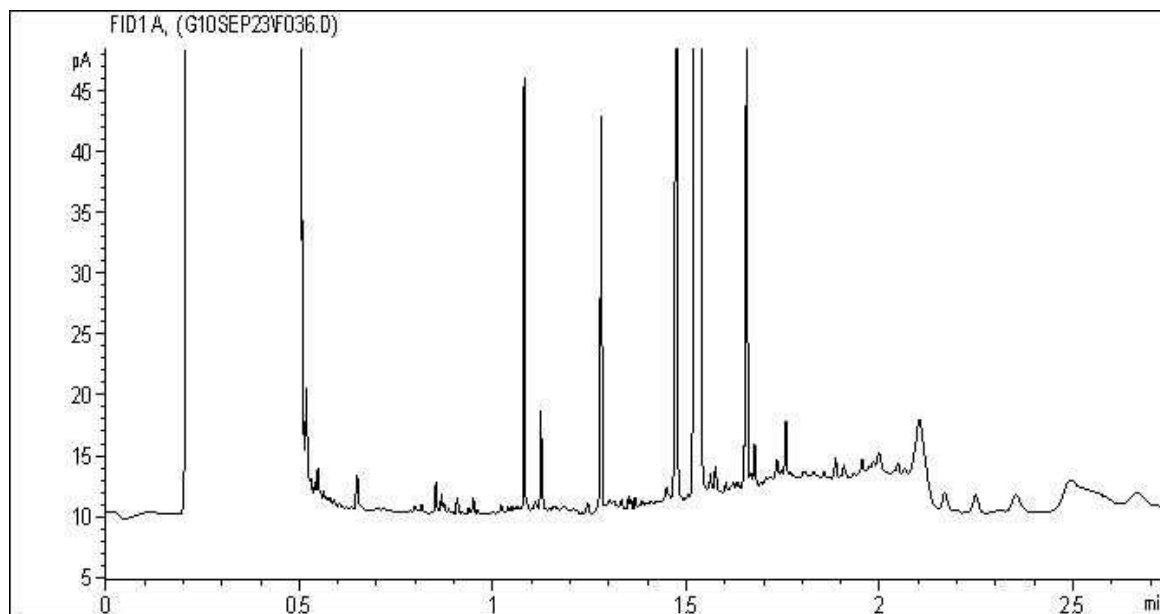
Time Sensitive

Temperature (°C) on Receipt

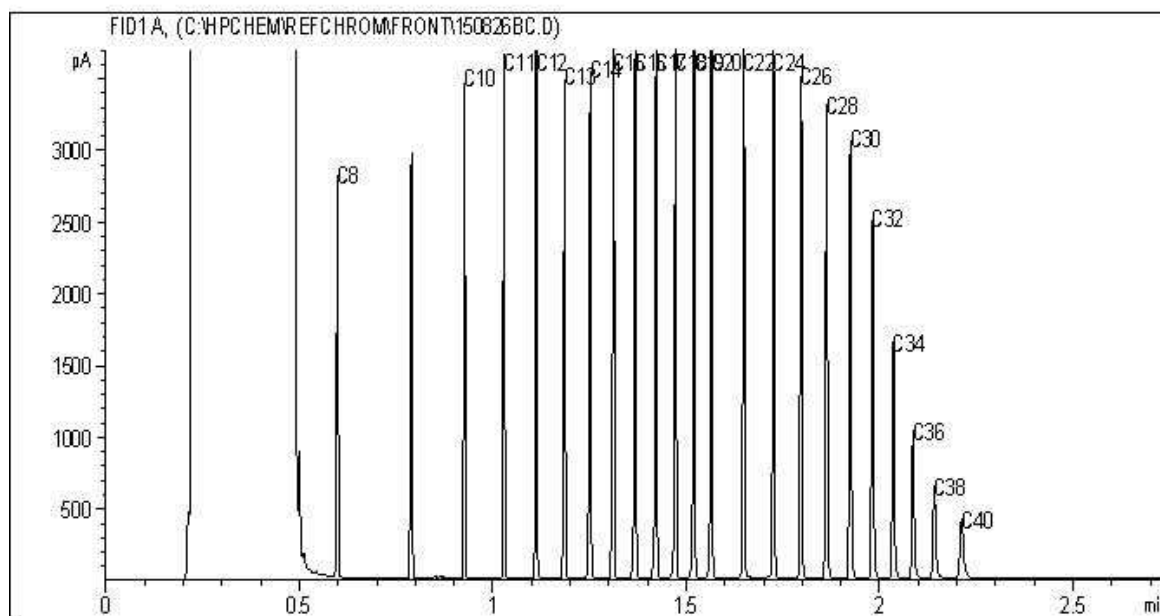
Custody Seal Intact on Cooler?

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram

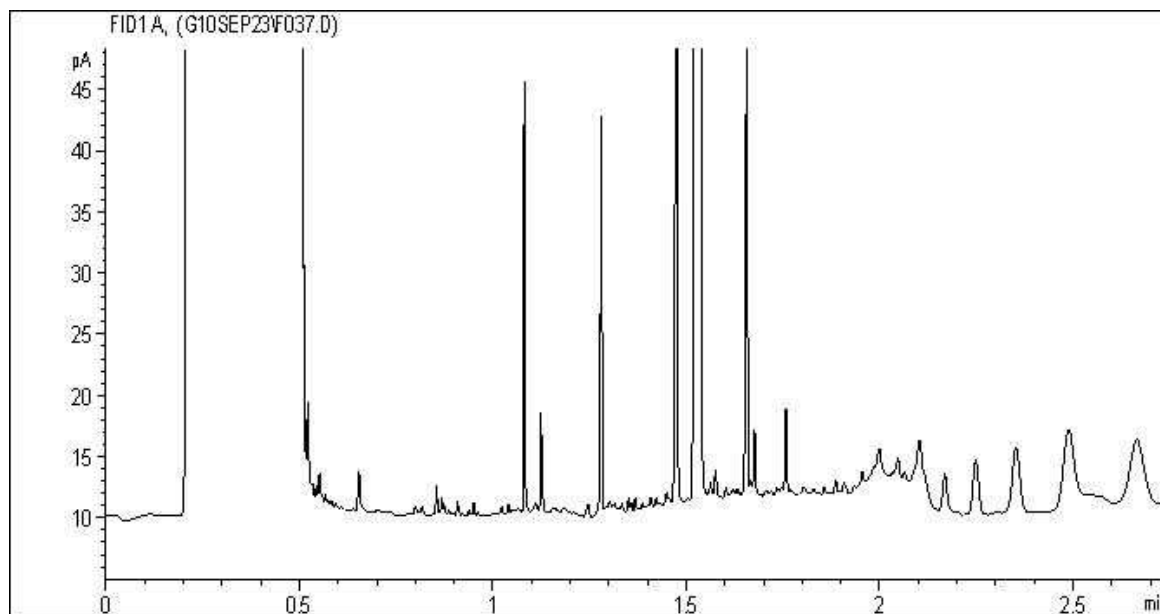


TYPICAL PRODUCT CARBON NUMBER RANGES

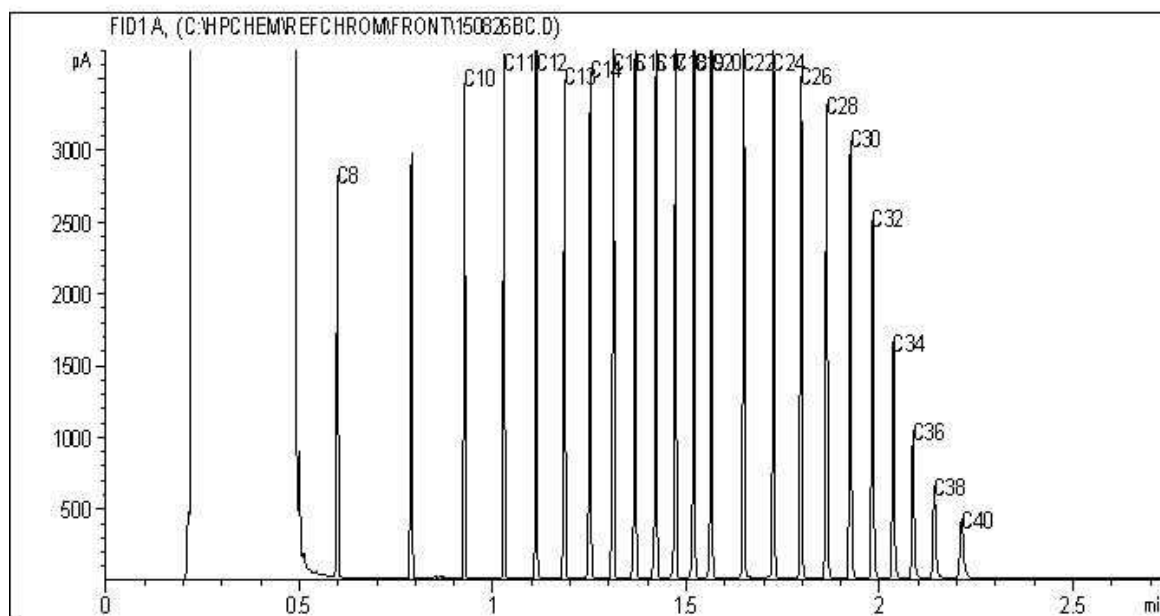
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram

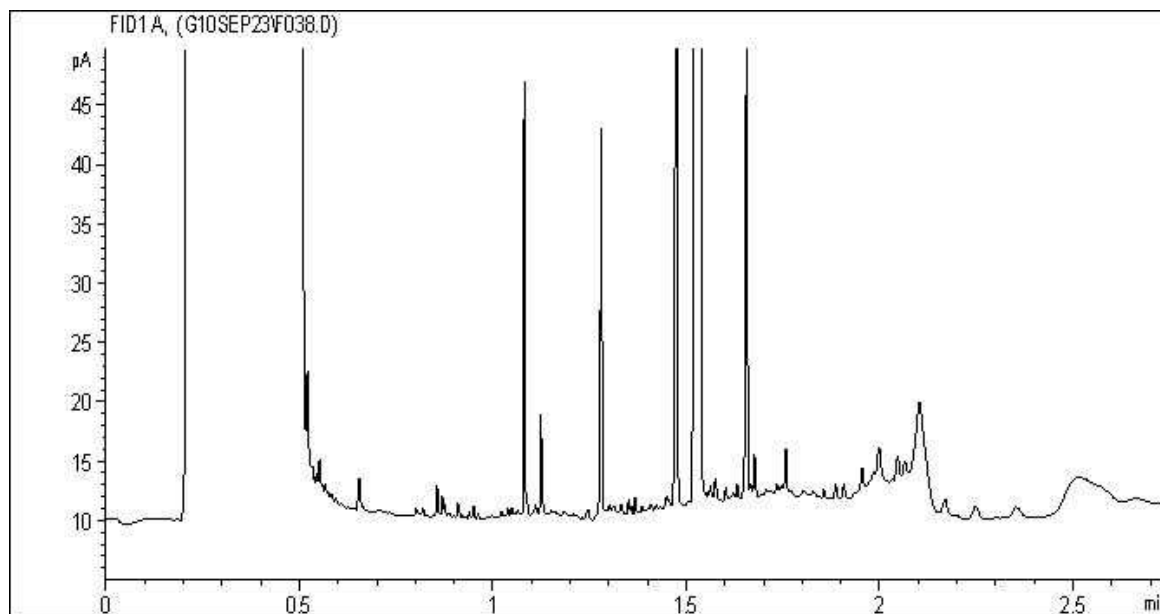


TYPICAL PRODUCT CARBON NUMBER RANGES

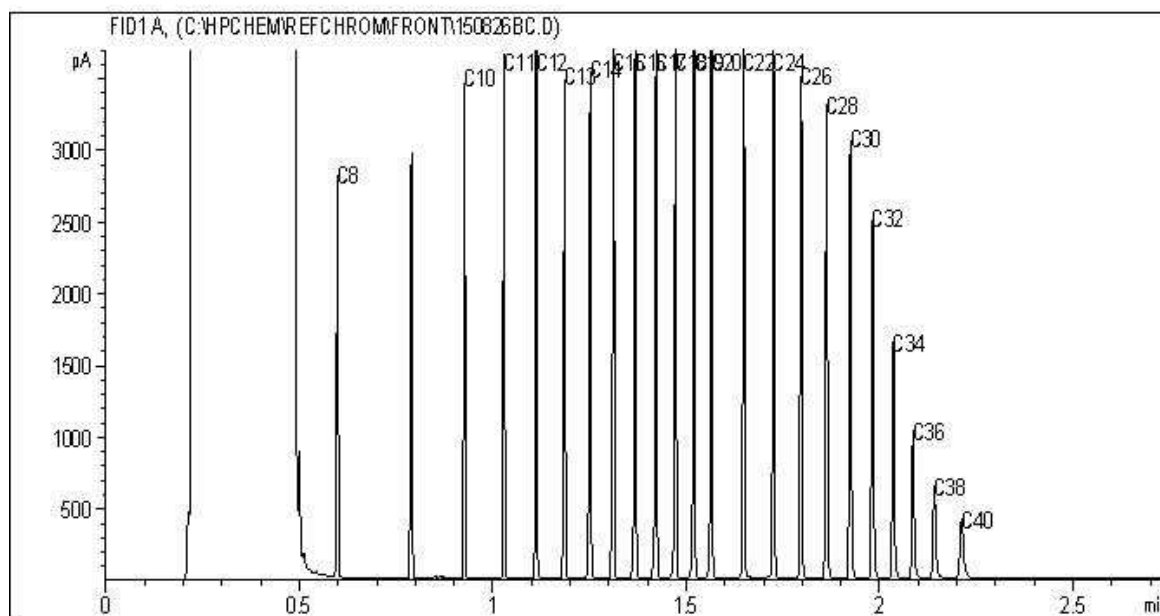
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram

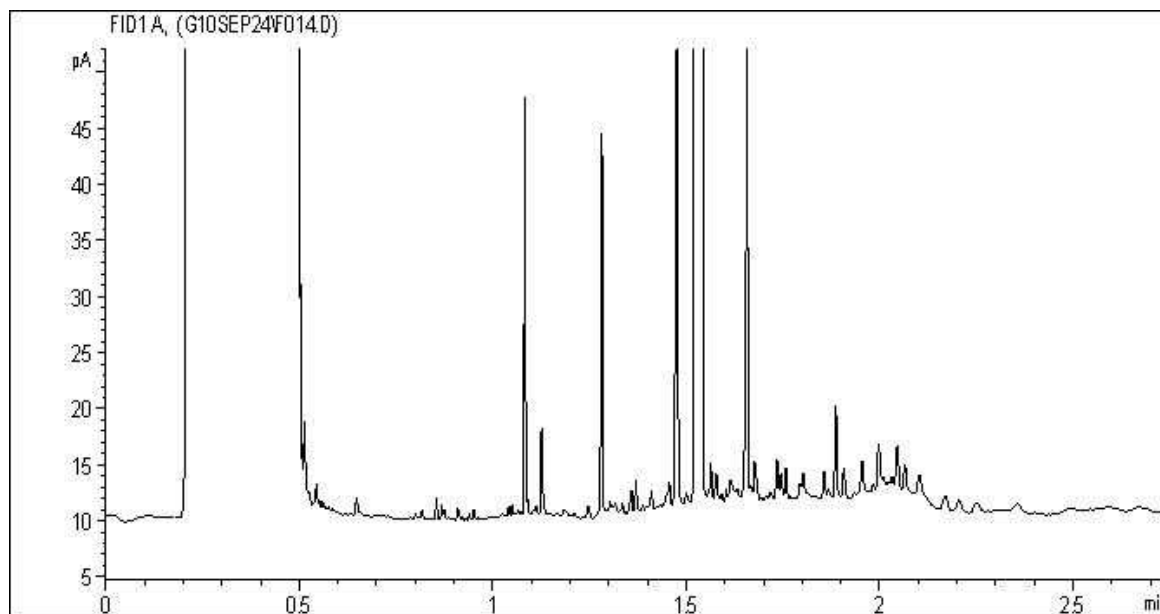


TYPICAL PRODUCT CARBON NUMBER RANGES

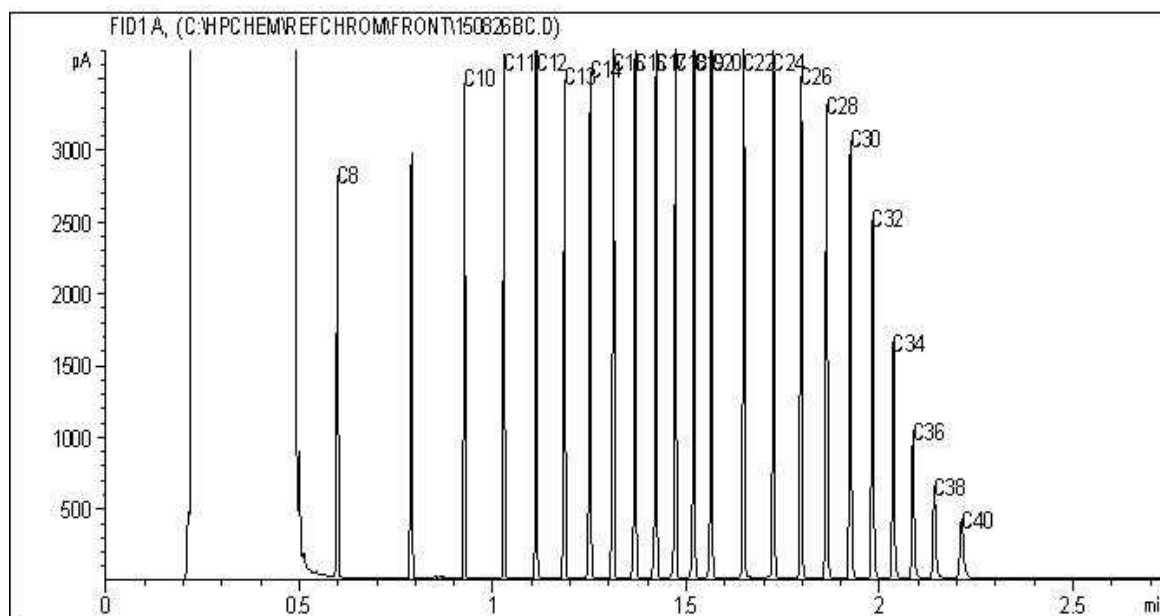
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.



GHD Field Sample Key (FSK)

Site Uplands Excavating

Sample Reason hydro/geo investigation

Sampler Name Thomas Elliott/James Stewart

Sampling Company GHD

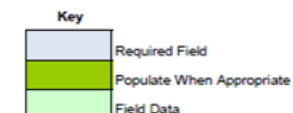
Laboratory(s) Maxxam

SSOW Reference Code : 73500976

Sample ID	Location	Sample Date (mm/dd/yyyy)	Sample Time (hh:mm)	Sample Type	Sample Matrix	Grab or Composite	Start Depth (ft bgs)	End Depth (ft bgs)	Parent Sample ID for Field Dups	Footnote(s)
WG-88877-05102015-TE-01	MW1-14	10/5/2015	11:30	N	WG	grab	-	-	-	1
WG-88877-05102015-TE-02	MW2-14	10/5/2015	12:30	N	WG	grab	-	-	-	1
WG-88877-05102015-TE-03	MW3-14	10/5/2015	13:45	N	WG	grab	-	-	-	1
WG-88877-05102015-TE-04	MW5B-15	10/5/2015	15:00	N	WG	grab	-	-	-	2
WG-88877-05102015-TE-05	MW5A-15	10/5/2015	16:30	N	WG	grab	-	-	-	2
WS-88877-05102015-TE-06	SW15-02	10/6/2015	16:00	N	WS	grab	-	-	-	
WG-88877-06102015-TE-07	MW4B-15	10/5/2015	16:00	N	WG	grab	-	-	-	2
WG-88877-06102015-TE-08	MW4A-15	10/6/2015	8:30	N	WG	grab	-	-	-	2
WG-88877-06102015-TE-09	MW4A-15	10/6/2015	9:00	FD	WGQ	grab	-	-	Duplicate of WG-88877-06102015-TE-08	2
WS-88877-06102015-TE-10	SW15-01	10/6/2015	11:45	N	WS	grab	-	-	-	
WS-88877-06102015-TE-11	SW15-01	10/6/2015	12:00	FD	WSQ	grab	-	-	Duplicate of WS-88877-06102015-TE-10	

Footnotes

1. Sampled using high flow methodology
2. Sampled using low flow methodology
3. _____
4. _____
5. _____
6. _____





GHD Field Sample Key (FSK)

Site Uplands Excavating
Sample Reason hydro/geo investigation
Sampler Name Thomas Elliott/James Stewart
Sampling Company GHD
Laboratory(s) Maxxam

SSOW Reference Code :

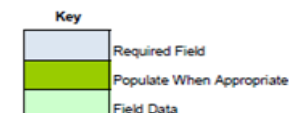
73500976

pH	Temperature	Conductivity	Turbidity	TDS			Eh / ORP
----	-------------	--------------	-----------	-----	--	--	----------

Sample ID	Location	Sample Date (mm/dd/yyyy)	Sample Time (hh:mm)	Volume of Water Purged	Field pH	Sample Temp.	Ambient Temp.	Temp Units	Conductivity	Conductivity Units	Turbidity	Turbidity Units	TDS	Units	DO	Units	EHORP	EHORP Units
WG-88877-05102015-TE-01	MW1-14	10/5/2015	11:30	48	6.79	15.68	NM	C	0.099	mS	91	ntu	0.064	g/L	-	mg/L	226	mV
WG-88877-05102015-TE-02	MW2-14	10/5/2015	12:30	42	7.05	15.74	NM	C	0.163	mS	561	ntu	0.105	g/L	-	mg/L	222	mV
WG-88877-05102015-TE-03	MW3-14	10/5/2015	13:45	36	7.06	14.34	NM	C	0.157	mS	00R	ntu	0.101	g/L	-	mg/L	231	mV
WG-88877-05102015-TE-04	MW5B-15	10/5/2015	15:00	1.5	7.00	16.99	NM	C	0.404	mS	36.1	ntu	0.264	g/L	-	mg/L	229	mV
WG-88877-05102015-TE-05	MW5A-15	10/5/2015	16:30	1.5	7.98	16.61	NM	C	0.329	mS	92	ntu	0.216	g/L	0.05	mg/L	177	mV
WS-88877-05102015-TE-06	SW15-02	10/6/2015	16:00	-	6.96	19.9	NM	C	0.056	mS	3.0	ntu	0.037	g/L	2.58	mg/L	220	mV
WG-88877-06102015-TE-07	MW4B-15	10/5/2015	16:00	2.5	6.95	11.92	NM	C	0.283	mS	2.5	ntu	0.184	g/L	0.00	mg/L	92	mV
WG-88877-06102015-TE-08	MW4A-15	10/6/2015	8:30	3.75	7.70	11.50	NM	C	0.323	mS	2.6	ntu	0.210	g/L	0.00	mg/L	89	mV
WG-88877-06102015-TE-09	MW4A-15	10/6/2015	9:00	3.75	7.70	11.50	NM	C	0.323	mS	2.6	ntu	0.210	g/L	0.00	mg/L	89	mV
WS-88877-06102015-TE-10	SW15-01	10/6/2015	11:45	-	6.82	15.09	NM	C	0.073	mS	0.0	ntu	0.046	g/L	8.09	mg/L	262	mV
WS-88877-06102015-TE-11	SW15-01	10/6/2015	12:00	-	6.82	15.09	NM	C	0.073	mS	0.0	ntu	0.046	g/L	8.09	mg/L	262	mV

Footnotes

1. Sampled using high flow methodology
2. Sampled using low flow methodology
3. _____
4. _____
5. _____
6. _____



Your P.O. #: 73500976-1
Your Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your C.O.C. #: 478427-01-01, 478427-02-01

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2015/10/19

Report #: R2060072

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B588841

Received: 2015/10/08, 09:40

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	2015/10/09	2015/10/10	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	10	2015/10/10	2015/10/10	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	11	2015/10/08	2015/10/08	BBY6SOP-00045	SM 22 5210 B m
Chloride by Automated Colourimetry	9	N/A	2015/10/08	BBY6SOP-00011	SM 22 4500-Cl- G m
Chloride by Automated Colourimetry	2	N/A	2015/10/09	BBY6SOP-00011	SM 22 4500-Cl- G m
Cyanide WAD (weak acid dissociable)	10	N/A	2015/10/16	BBY6SOP-00004	SM 22 4500-CN O
COD by Colorimeter	5	2015/10/08	2015/10/09	BBY6SOP-00024	SM 22 5220 D m
COD by Colorimeter	6	2015/10/09	2015/10/10	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	11	N/A	2015/10/10	BBY6SOP-00026	SM 22 2510 B m
Sulphide (as H ₂ S)	10	N/A	2015/10/13	BBY6SOP-00006	SM 22 4500-S ₂ -D m
Hardness Total (calculated as CaCO ₃)	2	N/A	2015/10/16	BBY7SOP-00002	EPA 6020a R1 m
Hardness (calculated as CaCO ₃)	8	N/A	2015/10/14	BBY7SOP-00002	EPA 6020a R1 m
Hardness (calculated as CaCO ₃)	2	N/A	2015/10/15	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAf	5	N/A	2015/10/16	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Dissolved) by CVAf	3	N/A	2015/10/18	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	2	2015/10/16	2015/10/18	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Ion Balance	10	N/A	2015/10/15	BBY WI-00033	SM 22 1030E
EPH in Water when PAH required	2	2015/10/09	2015/10/11	BBY8SOP-00029	BCMOE EPH w 12/00 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	8	N/A	2015/10/14	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved)	8	N/A	2015/10/13	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	2015/10/08	2015/10/16	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (total)	2	2015/10/14	2015/10/16	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	10	2015/10/09	2015/10/13	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	10	N/A	2015/10/14	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (highlevel)	11	N/A	2015/10/08	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	11	N/A	2015/10/08	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	11	N/A	2015/10/09	BBY6SOP-00010	SM 22 4500-NO ₃ I m
PAH in Water by GC/MS (SIM)	2	2015/10/09	2015/10/10	BBY8SOP-00021	EPA 8270d R4 m
Total LMW, HMW, Total PAH Calc	2	N/A	2015/10/13	BBY WI-00033	Auto Calc
Filter and HNO ₃ Preserve for Metals	10	N/A	2015/10/09	BBY7 WI-00004	BCMOE Reqs 08/14

Your P.O. #: 73500976-1
Your Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your C.O.C. #: 478427-01-01, 478427-02-01

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2015/10/19

Report #: R2060072

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B588841

Received: 2015/10/08, 09:40

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH Water (2)	11	N/A	2015/10/10	BBY6SOP-00026	SM 22 4500-H+ B m
Phenols (4-AAP)	2	N/A	2015/10/16	BBY6SOP-00008	SM 22 5530 D m
Orthophosphate by Konelab (highlevel)	11	N/A	2015/10/08	BBY6SOP-00013	SM 22 4500-P E m
Sulphide (1)	10	N/A	2015/10/10	EENV SOP-00096	SM 22 4500-S2 D m
Sulphate by Automated Colourimetry	9	N/A	2015/10/08	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	2	N/A	2015/10/09	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	7	2015/10/10	2015/10/14	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	4	2015/10/13	2015/10/14	BBY6SOP-00033	SM 22 2540 C m
EPH less PAH in Water by GC/FID	2	N/A	2015/10/13	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	10	N/A	2015/10/13	BBY WI-00033	Calculation
Total Oil and Grease	2	N/A	2015/10/09	BBY8SOP-00004	BCMOE BCLM Sep2011 m
Total Phosphorus	10	N/A	2015/10/09	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	6	N/A	2015/10/13	BBY6SOP-00034	SM 22 2540 D
Total Suspended Solids	3	N/A	2015/10/14	BBY6SOP-00034	SM 22 2540 D
Total Suspended Solids	2	N/A	2015/10/16	BBY6SOP-00034	SM 22 2540 D

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Maxxam Edmonton Environmental

(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

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

Tabitha Rudkin, ASCT, Burnaby Project Manager

Email: TRudkin@maxxam.ca

Phone# (604)638-2639

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This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total Cover Pages : 2

Page 2 of 34

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NI3984	NI3984		NI3985	NI3985		
Sampling Date		2015/10/05 11:30	2015/10/05 11:30		2015/10/05 12:30	2015/10/05 12:30		
COC Number		478427-01-01	478427-01-01		478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-01	WG-88877-051 02015-TE-01 Lab-Dup	RDL	WG-88877-051 02015-TE-02	WG-88877-051 02015-TE-02 Lab-Dup	RDL	QC Batch
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	FIELD	N/A	N/A	ONSITE
Hydrogen Sulphide (H2S)	mg/L	0.0070	N/A	0.0019	0.010	N/A	0.0019	8071889
Ion Balance	N/A	1.0	N/A	0.010	1.1	N/A	0.010	8066661
Demand Parameters								
Biochemical Oxygen Demand	mg/L	<6.0	N/A	6.0	<6.0	N/A	6.0	8067243
Chemical Oxygen Demand	mg/L	19	N/A	10	18	N/A	10	8066984
Misc. Inorganics								
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	N/A	0.00050	<0.00050	N/A	0.00050	8077103
Alkalinity (Total as CaCO3)	mg/L	40.8	N/A	0.50	71.1	63.0	0.50	8075072
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	0.50	<0.50	<0.50	0.50	8075072
Bicarbonate (HCO3)	mg/L	49.8	N/A	0.50	86.7	76.8	0.50	8075072
Carbonate (CO3)	mg/L	<0.50	N/A	0.50	<0.50	<0.50	0.50	8075072
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	<0.50	<0.50	0.50	8075072
Anions								
Sulphide	mg/L	0.0062	N/A	0.0019	0.0093	N/A	0.0019	8070663
Nutrients								
Total Ammonia (N)	mg/L	0.012	N/A	0.0050	0.20	N/A	0.0050	8074137
Total Phosphorus (P)	mg/L	0.675	N/A	0.050	0.150	N/A	0.0050	8067890
Physical Properties								
Conductivity	uS/cm	100	N/A	1.0	162	148	1.0	8075078
pH	pH	7.85	N/A	N/A	7.98	8.01	N/A	8075077
Physical Properties								
Total Suspended Solids	mg/L	717 (1)	N/A	16	174 (1)	N/A	16	8070271
Total Dissolved Solids	mg/L	72	62	10	94	N/A	10	8070333
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to high concentration of solids in the sample.								

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NI3986		NI3987		NI3988	NI3988		
Sampling Date		2015/10/05 13:45		2015/10/05 15:00		2015/10/05 16:30	2015/10/05 16:30		
COC Number		478427-01-01		478427-01-01		478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-03	RDL	WG-88877-051 02015-TE-04	RDL	WG-88877-051 02015-TE-05	WG-88877-051 02015-TE-05 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	FIELD	N/A	N/A	ONSITE
Hydrogen Sulphide (H2S)	mg/L	0.029	0.0019	<0.0019	0.0019	0.011	N/A	0.0019	8071889
Ion Balance	N/A	1.1	0.010	0.94	0.010	1.0	N/A	0.010	8066661
Demand Parameters									
Biochemical Oxygen Demand	mg/L	<6.0	6.0	<6.0	6.0	<6.0	N/A	6.0	8067243
Chemical Oxygen Demand	mg/L	66	10	<10	10	26	N/A	10	8066984
Misc. Inorganics									
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	0.00050	<0.00050	0.00050	<0.00050	N/A	0.00050	8077103
Alkalinity (Total as CaCO3)	mg/L	40.5	0.50	160	0.50	121	109	0.50	8075072
Alkalinity (PP as CaCO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	8075072
Bicarbonate (HCO3)	mg/L	49.4	0.50	195	0.50	148	134	0.50	8075072
Carbonate (CO3)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	8075072
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	8075072
Anions									
Sulphide	mg/L	0.027	0.0019	<0.0019	0.0019	0.010	N/A	0.0019	8070663
Nutrients									
Total Ammonia (N)	mg/L	0.15	0.0050	0.021	0.0050	0.019	N/A	0.0050	8074137
Total Phosphorus (P)	mg/L	1.47	0.050	<0.0050	0.0050	0.0746	N/A	0.0050	8067890
OIL & GREASE									
Total Oil and grease	mg/L	N/A	N/A	<1.0	1.0	<1.0	N/A	1.0	8068696
Misc. Organics									
Phenols	mg/L	N/A	N/A	<0.0010	0.0010	<0.0010	N/A	0.0010	8077145
Physical Properties									
Conductivity	uS/cm	121	1.0	338	1.0	342	312	1.0	8075078
pH	pH	7.73	N/A	8.03	N/A	8.13	8.16	N/A	8075077
Physical Properties									
Total Suspended Solids	mg/L	882 (1)	32	30.5	4.0	280 (1)	N/A	32	8070271
Total Dissolved Solids	mg/L	82	10	186	10	222	N/A	10	8070333
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) RDL raised due to high concentration of solids in the sample.									

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NI3989	NI3989	NI3990		NI3991		
Sampling Date		2015/10/06 08:30	2015/10/06 08:30	2015/10/06 09:00		2015/10/06 09:05		
COC Number		478427-01-01	478427-01-01	478427-01-01		478427-01-01		
	UNITS	WG-88877-061 02015-TE-07	WG-88877-061 02015-TE-07 Lab-Dup	WG-88877-061 02015-TE-08	QC Batch	WG-88877-061 02015-TE-09	RDL	QC Batch
Calculated Parameters								
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	ONSITE	FIELD	N/A	ONSITE
Hydrogen Sulphide (H2S)	mg/L	<0.0019	N/A	<0.0019	8071889	<0.0019	0.0019	8071889
Ion Balance	N/A	1.1	N/A	1.0	8066661	1.1	0.010	8066661
Demand Parameters								
Biochemical Oxygen Demand	mg/L	<6.0	N/A	<6.0	8067243	<6.0	6.0	8067243
Chemical Oxygen Demand	mg/L	12	<10	<10	8069011	<10	10	8069011
Misc. Inorganics								
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	N/A	<0.00050	8077103	<0.00050	0.00050	8077103
Alkalinity (Total as CaCO3)	mg/L	15.4	N/A	72.0	8075072	102	0.50	8075072
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	<0.50	8075072	<0.50	0.50	8075072
Bicarbonate (HCO3)	mg/L	18.8	N/A	87.9	8075072	124	0.50	8075072
Carbonate (CO3)	mg/L	<0.50	N/A	<0.50	8075072	<0.50	0.50	8075072
Hydroxide (OH)	mg/L	<0.50	N/A	<0.50	8075072	<0.50	0.50	8075072
Anions								
Sulphide	mg/L	<0.0019	N/A	<0.0019	8070663	<0.0019	0.0019	8070663
Nutrients								
Total Ammonia (N)	mg/L	0.012	N/A	0.020	8074137	0.017	0.0050	8074137
Total Phosphorus (P)	mg/L	<0.0050	N/A	0.0184	8067890	0.0108	0.0050	8067890
Physical Properties								
Conductivity	uS/cm	55.5	N/A	251	8075078	309	1.0	8075078
pH	pH	7.48	N/A	8.00	8075077	8.16	N/A	8075077
Physical Properties								
Total Suspended Solids	mg/L	<4.0	N/A	<4.0	8071670	<4.0	4.0	8071670
Total Dissolved Solids	mg/L	58	N/A	158	8071654	204	10	8070333
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		NI3999		NI4000	NI4001		
Sampling Date		2015/10/05 16:00		2015/10/06 11:45	2015/10/06 12:00		
COC Number		478427-02-01		478427-02-01	478427-02-01		
	UNITS	WS-88877-051 02015-TE-06	QC Batch	WS-88877-061 02015-TE-10	WS-88877-061 02015-TE-11	RDL	QC Batch
Calculated Parameters							
Filter and HNO3 Preservation	N/A	LAB	8068985	LAB	N/A	N/A	8068985
Hydrogen Sulphide (H2S)	mg/L	<0.0019	8071889	<0.0019	N/A	0.0019	8071889
Ion Balance	N/A	1.0	8066661	0.92	N/A	0.010	8066661
Demand Parameters							
Biochemical Oxygen Demand	mg/L	<6.0	8067243	<6.0	<6.0	6.0	8067726
Chemical Oxygen Demand	mg/L	<10	8069011	<10	<10	10	8069011
Misc. Inorganics							
Weak Acid Dissoc. Cyanide (CN)	mg/L	<0.00050	8077103	<0.00050	N/A	0.00050	8077103
Alkalinity (Total as CaCO3)	mg/L	105	8070054	22.0	21.2	0.50	8075072
Alkalinity (PP as CaCO3)	mg/L	<0.50	8070054	<0.50	<0.50	0.50	8075072
Bicarbonate (HCO3)	mg/L	128	8070054	26.8	25.9	0.50	8075072
Carbonate (CO3)	mg/L	<0.50	8070054	<0.50	<0.50	0.50	8075072
Hydroxide (OH)	mg/L	<0.50	8070054	<0.50	<0.50	0.50	8075072
Anions							
Sulphide	mg/L	<0.0019	8070663	<0.0019	N/A	0.0019	8070663
Nutrients							
Total Ammonia (N)	mg/L	0.018	8074137	0.020	N/A	0.0050	8074137
Total Phosphorus (P)	mg/L	0.0098	8067890	<0.0050	N/A	0.0050	8067890
Physical Properties							
Conductivity	uS/cm	317	8070059	47.1	47.8	1.0	8075078
pH	pH	8.18	8070057	7.54	7.46	N/A	8075077
Physical Properties							
Total Suspended Solids	mg/L	<4.0	8070271	<4.0 (1)	<4.0 (1)	4.0	8071672
Total Dissolved Solids	mg/L	192	8070333	51	51	10	8071654
RDL = Reportable Detection Limit N/A = Not Applicable (1) Sample analysed past recommended hold time.							

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		NI3984	NI3985	NI3986	NI3986	NI3987		
Sampling Date		2015/10/05 11:30	2015/10/05 12:30	2015/10/05 13:45	2015/10/05 13:45	2015/10/05 15:00		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-01	WG-88877-051 02015-TE-02	WG-88877-051 02015-TE-03	WG-88877-051 02015-TE-03 Lab-Dup	WG-88877-051 02015-TE-04	RDL	QC Batch

ANIONS								
Nitrite (N)	mg/L	<0.10	<0.10	0.11	N/A	<0.10	0.10	8068005
Calculated Parameters								
Nitrate (N)	mg/L	0.26	0.14	0.54	N/A	1.33	0.10	8066502
Anions								
Dissolved Sulphate (SO4)	mg/L	2.31	7.24	5.62	5.80	3.32	0.50	8068167
Dissolved Chloride (Cl)	mg/L	3.7	2.1	9.6	9.5	3.0	0.50	8068165
Nutrients								
Orthophosphate (P)	mg/L	<0.10	<0.10	<0.10	N/A	<0.10	0.10	8068060
Nitrate plus Nitrite (N)	mg/L	0.26	0.14	0.65	N/A	1.33	0.10	8068004
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								
N/A = Not Applicable								

Maxxam ID		NI3988	NI3989	NI3990	NI3991		NI3999		
Sampling Date		2015/10/05 16:30	2015/10/06 08:30	2015/10/06 09:00	2015/10/06 09:05		2015/10/05 16:00		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01		478427-02-01		
	UNITS	WG-88877-051 02015-TE-05	WG-88877-061 02015-TE-07	WG-88877-061 02015-TE-08	WG-88877-061 02015-TE-09	QC Batch	WS-88877-051 02015-TE-06	RDL	QC Batch

ANIONS									
Nitrite (N)	mg/L	<0.10	<0.10	<0.10	<0.10	8068005	<0.10	0.10	8068005
Calculated Parameters									
Nitrate (N)	mg/L	0.29	<0.10	0.77	1.11	8066502	1.16	0.10	8066502
Anions									
Dissolved Sulphate (SO4)	mg/L	31.4	<0.50	6.26	6.84	8068167	8.51	0.50	8069967
Dissolved Chloride (Cl)	mg/L	15	6.2	27	26	8068165	25	0.50	8069965
Nutrients									
Orthophosphate (P)	mg/L	<0.10	<0.10	<0.10	<0.10	8068060	<0.10	0.10	8068060
Nitrate plus Nitrite (N)	mg/L	0.29	<0.10	0.77	1.11	8068004	1.16	0.10	8068004
RDL = Reportable Detection Limit									

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		NI4000	NI4000		NI4001	NI4001		
Sampling Date		2015/10/06 11:45	2015/10/06 11:45		2015/10/06 12:00	2015/10/06 12:00		
COC Number		478427-02-01	478427-02-01		478427-02-01	478427-02-01		
	UNITS	WS-88877-061 02015-TE-10	WS-88877-061 02015-TE-10 Lab-Dup	QC Batch	WS-88877-061 02015-TE-11	WS-88877-061 02015-TE-11 Lab-Dup	RDL	QC Batch
ANIONS								
Nitrite (N)	mg/L	<0.10	N/A	8068005	<0.10	<0.10	0.10	8068005
Calculated Parameters								
Nitrate (N)	mg/L	<0.10	N/A	8066502	<0.10	N/A	0.10	8066502
Anions								
Dissolved Sulphate (SO ₄)	mg/L	2.22	2.06	8068167	3.02	N/A	0.50	8071651
Dissolved Chloride (Cl)	mg/L	1.6	1.2	8068165	0.90	N/A	0.50	8071637
Nutrients								
Orthophosphate (P)	mg/L	<0.10	N/A	8068060	<0.10	<0.10	0.10	8068060
Nitrate plus Nitrite (N)	mg/L	<0.10	N/A	8068004	<0.10	<0.10	0.10	8068004
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NI3987	NI3988		
Sampling Date		2015/10/05 15:00	2015/10/05 16:30		
COC Number		478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-04	WG-88877-051 02015-TE-05	RDL	QC Batch
Polycyclic Aromatics					
Low Molecular Weight PAH's	ug/L	<0.24	<0.24	0.24	8066842
High Molecular Weight PAH's	ug/L	<0.050	<0.050	0.050	8066842
Total PAH	ug/L	<0.24	<0.24	0.24	8066842
Naphthalene	ug/L	<0.10	<0.10	0.10	8069794
2-Methylnaphthalene	ug/L	<0.10	<0.10	0.10	8069794
Quinoline	ug/L	<0.24	<0.24	0.24	8069794
Acenaphthylene	ug/L	<0.050	<0.050	0.050	8069794
Acenaphthene	ug/L	<0.050	<0.050	0.050	8069794
Fluorene	ug/L	<0.050	<0.050	0.050	8069794
Phenanthrene	ug/L	<0.050	<0.050	0.050	8069794
Anthracene	ug/L	<0.010	<0.010	0.010	8069794
Acridine	ug/L	<0.050	<0.050	0.050	8069794
Fluoranthene	ug/L	<0.020	<0.020	0.020	8069794
Pyrene	ug/L	<0.020	<0.020	0.020	8069794
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	8069794
Chrysene	ug/L	<0.050	<0.050	0.050	8069794
Benzo(b&j)fluoranthene	ug/L	<0.050	<0.050	0.050	8069794
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	8069794
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	0.0090	8069794
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	8069794
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	0.050	8069794
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	8069794
Calculated Parameters					
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	0.20	8066845
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.20	8066845
Ext. Pet. Hydrocarbon					
EPH (C10-C19)	mg/L	<0.20	<0.20	0.20	8069797
EPH (C19-C32)	mg/L	<0.20	<0.20	0.20	8069797
Surrogate Recovery (%)					
O-TERPHENYL (sur.)	%	108	110	N/A	8069797
D10-ANTHRACENE (sur.)	%	99	99	N/A	8069794
D8-ACENAPHTHYLENE (sur.)	%	102	101	N/A	8069794
RDL = Reportable Detection Limit N/A = Not Applicable					

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		NI3987	NI3988		
Sampling Date		2015/10/05 15:00	2015/10/05 16:30		
COC Number		478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-04	WG-88877-051 02015-TE-05	RDL	QC Batch
D8-NAPHTHALENE (sur.)	%	100	98	N/A	8069794
D9-Acridine	%	102	101	N/A	8069794
TERPHENYL-D14 (sur.)	%	90	91	N/A	8069794
RDL = Reportable Detection Limit N/A = Not Applicable					

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER (WATER)

Maxxam ID		NI3999	NI4000		
Sampling Date		2015/10/05 16:00	2015/10/06 11:45		
COC Number		478427-02-01	478427-02-01		
	UNITS	WS-88877-051 02015-TE-06	WS-88877-061 02015-TE-10	RDL	QC Batch
Misc. Inorganics					
Dissolved Hardness (CaCO ₃)	mg/L	48.3	22.4	0.50	8067792
RDL = Reportable Detection Limit					

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3984	NI3984	NI3985	NI3986		
Sampling Date		2015/10/05 11:30	2015/10/05 11:30	2015/10/05 12:30	2015/10/05 13:45		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-01	WG-88877-051 02015-TE-01 Lab-Dup	WG-88877-051 02015-TE-02	WG-88877-051 02015-TE-03	RDL	QC Batch
Misc. Inorganics							
Dissolved Hardness (CaCO ₃)	mg/L	43.3	N/A	77.0	56.1	0.50	8067173
Elements							
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	8078653
Dissolved Metals by ICPMS							
Dissolved Aluminum (Al)	ug/L	6.6	N/A	6.1	9.4	3.0	8068823
Dissolved Antimony (Sb)	ug/L	<0.50	N/A	<0.50	<0.50	0.50	8068823
Dissolved Arsenic (As)	ug/L	0.15	N/A	0.17	<0.10	0.10	8068823
Dissolved Barium (Ba)	ug/L	<1.0	N/A	1.9	1.7	1.0	8068823
Dissolved Beryllium (Be)	ug/L	<0.10	N/A	<0.10	<0.10	0.10	8068823
Dissolved Bismuth (Bi)	ug/L	<1.0	N/A	<1.0	<1.0	1.0	8068823
Dissolved Boron (B)	ug/L	<50	N/A	<50	<50	50	8068823
Dissolved Cadmium (Cd)	ug/L	<0.010	N/A	0.017	0.012	0.010	8068823
Dissolved Chromium (Cr)	ug/L	<1.0	N/A	<1.0	<1.0	1.0	8068823
Dissolved Cobalt (Co)	ug/L	<0.50	N/A	<0.50	<0.50	0.50	8068823
Dissolved Copper (Cu)	ug/L	0.44	N/A	0.99	0.30	0.20	8068823
Dissolved Iron (Fe)	ug/L	7.5	N/A	9.5	10.1	5.0	8068823
Dissolved Lead (Pb)	ug/L	<0.20	N/A	<0.20	<0.20	0.20	8068823
Dissolved Lithium (Li)	ug/L	<5.0	N/A	<5.0	<5.0	5.0	8068823
Dissolved Manganese (Mn)	ug/L	<1.0	N/A	<1.0	<1.0	1.0	8068823
Dissolved Molybdenum (Mo)	ug/L	<1.0	N/A	<1.0	<1.0	1.0	8068823
Dissolved Nickel (Ni)	ug/L	<1.0	N/A	<1.0	<1.0	1.0	8068823
Dissolved Selenium (Se)	ug/L	<0.10	N/A	0.11	0.24	0.10	8068823
Dissolved Silicon (Si)	ug/L	5500	N/A	6530	8240	100	8068823
Dissolved Silver (Ag)	ug/L	<0.020	N/A	<0.020	<0.020	0.020	8068823
Dissolved Strontium (Sr)	ug/L	23.0	N/A	34.7	31.0	1.0	8068823
Dissolved Thallium (Tl)	ug/L	<0.050	N/A	<0.050	<0.050	0.050	8068823
Dissolved Tin (Sn)	ug/L	<5.0	N/A	<5.0	<5.0	5.0	8068823
Dissolved Titanium (Ti)	ug/L	<5.0	N/A	<5.0	<5.0	5.0	8068823
Dissolved Uranium (U)	ug/L	0.13	N/A	<0.10	<0.10	0.10	8068823
Dissolved Vanadium (V)	ug/L	<5.0	N/A	<5.0	<5.0	5.0	8068823
Dissolved Zinc (Zn)	ug/L	8.7	N/A	5.0	<5.0	5.0	8068823
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3984	NI3984	NI3985	NI3986		
Sampling Date		2015/10/05 11:30	2015/10/05 11:30	2015/10/05 12:30	2015/10/05 13:45		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-01	WG-88877-051 02015-TE-01 Lab-Dup	WG-88877-051 02015-TE-02	WG-88877-051 02015-TE-03	RDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.50	N/A	<0.50	<0.50	0.50	8068823
Dissolved Calcium (Ca)	mg/L	14.2	N/A	24.3	16.5	0.050	8066734
Dissolved Magnesium (Mg)	mg/L	1.87	N/A	3.92	3.62	0.050	8066734
Dissolved Potassium (K)	mg/L	0.176	N/A	0.254	0.190	0.050	8066734
Dissolved Sodium (Na)	mg/L	2.62	N/A	4.37	5.15	0.050	8066734
Dissolved Sulphur (S)	mg/L	<3.0	N/A	3.8	<3.0	3.0	8066734
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3987	NI3988	NI3989	NI3990	NI3991		
Sampling Date		2015/10/05 15:00	2015/10/05 16:30	2015/10/06 08:30	2015/10/06 09:00	2015/10/06 09:05		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-04	WG-88877-051 02015-TE-05	WG-88877-061 02015-TE-07	WG-88877-061 02015-TE-08	WG-88877-061 02015-TE-09	RDL	QC Batch
Misc. Inorganics								
Dissolved Hardness (CaCO ₃)	mg/L	141	126	16.8	23.5	52.2	0.50	8067173
Elements								
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	8076419
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	ug/L	16.3	12.0	18.4	16.6	8.5	3.0	8068823
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	8068823
Dissolved Arsenic (As)	ug/L	0.22	0.89	0.15	0.26	0.42	0.10	8068823
Dissolved Barium (Ba)	ug/L	23.2	12.2	2.1	2.1	15.5	1.0	8068823
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8068823
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	8068823
Dissolved Boron (B)	ug/L	<50	90	<50	<50	<50	50	8068823
Dissolved Cadmium (Cd)	ug/L	0.059	0.029	0.011	0.019	0.025	0.010	8068823
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	8068823
Dissolved Cobalt (Co)	ug/L	0.67	<0.50	<0.50	<0.50	<0.50	0.50	8068823
Dissolved Copper (Cu)	ug/L	0.97	1.59	1.02	0.54	0.43	0.20	8068823
Dissolved Iron (Fe)	ug/L	<5.0	14.7	162	17.5	6.1	5.0	8068823
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8068823
Dissolved Lithium (Li)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	8068823
Dissolved Manganese (Mn)	ug/L	226	163	24.0	1.8	19.8	1.0	8068823
Dissolved Molybdenum (Mo)	ug/L	<1.0	2.8	<1.0	<1.0	<1.0	1.0	8068823
Dissolved Nickel (Ni)	ug/L	<1.0	1.8	2.2	<1.0	<1.0	1.0	8068823
Dissolved Selenium (Se)	ug/L	0.23	0.53	<0.10	0.46	0.56	0.10	8068823
Dissolved Silicon (Si)	ug/L	4720	6810	1480	8810	8730	100	8068823
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8068823
Dissolved Strontium (Sr)	ug/L	67.2	101	15.1	42.3	50.8	1.0	8068823
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	8068823
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	8068823
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	8068823
Dissolved Uranium (U)	ug/L	0.16	0.77	<0.10	<0.10	<0.10	0.10	8068823
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	8068823
Dissolved Zinc (Zn)	ug/L	6.5	10.7	<5.0	<5.0	<5.0	5.0	8068823
Dissolved Zirconium (Zr)	ug/L	3.67	<0.50	<0.50	<0.50	<0.50	0.50	8068823
Dissolved Calcium (Ca)	mg/L	49.7	36.6	4.77	7.28	17.9	0.050	8066734
RDL = Reportable Detection Limit								

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3987	NI3988	NI3989	NI3990	NI3991		
Sampling Date		2015/10/05 15:00	2015/10/05 16:30	2015/10/06 08:30	2015/10/06 09:00	2015/10/06 09:05		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-04	WG-88877-051 02015-TE-05	WG-88877-061 02015-TE-07	WG-88877-061 02015-TE-08	WG-88877-061 02015-TE-09	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	4.01	8.48	1.19	1.30	1.82	0.050	8066734
Dissolved Potassium (K)	mg/L	0.489	1.28	0.187	0.288	0.476	0.050	8066734
Dissolved Sodium (Na)	mg/L	9.35	23.2	4.70	45.0	49.1	0.050	8066734
Dissolved Sulphur (S)	mg/L	3.0	12.5	3.6	4.5	4.6	3.0	8066734
RDL = Reportable Detection Limit								

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3991		
Sampling Date		2015/10/06 09:05		
COC Number		478427-01-01		
	UNITS	WG-88877-061 02015-TE-09 Lab-Dup	RDL	QC Batch
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	7.3	3.0	8068823
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8068823
Dissolved Arsenic (As)	ug/L	0.44	0.10	8068823
Dissolved Barium (Ba)	ug/L	14.8	1.0	8068823
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8068823
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8068823
Dissolved Boron (B)	ug/L	<50	50	8068823
Dissolved Cadmium (Cd)	ug/L	0.023	0.010	8068823
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8068823
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	8068823
Dissolved Copper (Cu)	ug/L	0.53	0.20	8068823
Dissolved Iron (Fe)	ug/L	5.6	5.0	8068823
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8068823
Dissolved Lithium (Li)	ug/L	<5.0	5.0	8068823
Dissolved Manganese (Mn)	ug/L	20.0	1.0	8068823
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8068823
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8068823
Dissolved Selenium (Se)	ug/L	0.59	0.10	8068823
Dissolved Silicon (Si)	ug/L	8680	100	8068823
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8068823
Dissolved Strontium (Sr)	ug/L	48.6	1.0	8068823
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	8068823
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8068823
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8068823
Dissolved Uranium (U)	ug/L	<0.10	0.10	8068823
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8068823
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8068823
Dissolved Zirconium (Zr)	ug/L	2.27	0.50	8068823
RDL = Reportable Detection Limit				
Lab-Dup = Laboratory Initiated Duplicate				

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3999	NI3999	NI4000		
Sampling Date		2015/10/05 16:00	2015/10/05 16:00	2015/10/06 11:45		
COC Number		478427-02-01	478427-02-01	478427-02-01		
	UNITS	WS-88877-051 02015-TE-06	WS-88877-051 02015-TE-06 Lab-Dup	WS-88877-061 02015-TE-10	RDL	QC Batch
Calculated Parameters						
Total Hardness (CaCO ₃)	mg/L	51.6	N/A	24.5	0.50	8066659
Elements						
Total Mercury (Hg)	ug/L	<0.010	N/A	<0.010	0.010	8076829
Total Metals by ICPMS						
Total Aluminum (Al)	ug/L	9.5	9.5	20.4	3.0	8073701
Total Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8073701
Total Arsenic (As)	ug/L	0.37	0.35	<0.10	0.10	8073701
Total Barium (Ba)	ug/L	13.6	14.9	2.8	1.0	8073701
Total Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8073701
Total Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8073701
Total Boron (B)	ug/L	<50	<50	<50	50	8073701
Total Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8073701
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8073701
Total Cobalt (Co)	ug/L	<0.50	<0.50	<0.50	0.50	8073701
Total Copper (Cu)	ug/L	0.53	1.10	0.67	0.50	8073701
Total Iron (Fe)	ug/L	<10	<10	29	10	8073701
Total Lead (Pb)	ug/L	<0.20	<0.20	<0.20	0.20	8073701
Total Lithium (Li)	ug/L	<5.0	<5.0	<5.0	5.0	8073701
Total Manganese (Mn)	ug/L	17.7	18.8	2.5	1.0	8073701
Total Molybdenum (Mo)	ug/L	<1.0	<1.0	<1.0	1.0	8073701
Total Nickel (Ni)	ug/L	<1.0	<1.0	<1.0	1.0	8073701
Total Selenium (Se)	ug/L	0.45	0.46	<0.10	0.10	8073701
Total Silicon (Si)	ug/L	8800	8620	1770	100	8073701
Total Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8073701
Total Strontium (Sr)	ug/L	42.1	45.2	10.4	1.0	8073701
Total Thallium (Tl)	ug/L	<0.050	<0.050	<0.050	0.050	8073701
Total Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8073701
Total Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8073701
Total Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8073701
Total Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8073701
Total Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8073701
RDL = Reportable Detection Limit						
Lab-Dup = Laboratory Initiated Duplicate						
N/A = Not Applicable						

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CSR TOTAL METALS IN WATER WITH CV HG (WATER)

Maxxam ID		NI3999	NI3999	NI4000		
Sampling Date		2015/10/05 16:00	2015/10/05 16:00	2015/10/06 11:45		
COC Number		478427-02-01	478427-02-01	478427-02-01		
	UNITS	WS-88877-051 02015-TE-06	WS-88877-051 02015-TE-06 Lab-Dup	WS-88877-061 02015-TE-10	RDL	QC Batch
Total Zirconium (Zr)	ug/L	<0.50	<0.50	<0.50	0.50	8073701
Total Calcium (Ca)	mg/L	18.0	N/A	8.46	0.050	8066941
Total Magnesium (Mg)	mg/L	1.60	N/A	0.825	0.050	8066941
Total Potassium (K)	mg/L	0.457	N/A	0.078	0.050	8066941
Total Sodium (Na)	mg/L	42.4	N/A	0.895	0.050	8066941
Total Sulphur (S)	mg/L	<3.0	N/A	<3.0	3.0	8066941
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

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TOTAL TKN IN WATER (WATER)

Maxxam ID		NI3984		NI3985	NI3986		NI3987		
Sampling Date		2015/10/05 11:30		2015/10/05 12:30	2015/10/05 13:45		2015/10/05 15:00		
COC Number		478427-01-01		478427-01-01	478427-01-01		478427-01-01		
	UNITS	WG-88877-051 02015-TE-01	QC Batch	WG-88877-051 02015-TE-02	WG-88877-051 02015-TE-03	QC Batch	WG-88877-051 02015-TE-04	RDL	QC Batch

Nutrients

Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	8067348	<0.10	0.54	8067348	0.41	0.10	8067348
Total Nitrogen (N)	mg/L	0.303	8069742	0.211	1.18	8069744	1.75	0.020	8069742

RDL = Reportable Detection Limit

Maxxam ID		NI3988	NI3989	NI3990	NI3991	NI3991		
Sampling Date		2015/10/05 16:30	2015/10/06 08:30	2015/10/06 09:00	2015/10/06 09:05	2015/10/06 09:05		
COC Number		478427-01-01	478427-01-01	478427-01-01	478427-01-01	478427-01-01		
	UNITS	WG-88877-051 02015-TE-05	WG-88877-061 02015-TE-07	WG-88877-061 02015-TE-08	WG-88877-061 02015-TE-09	WG-88877-061 02015-TE-09 Lab-Dup	RDL	QC Batch

Nutrients

Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	0.15	0.22	0.20	N/A	0.10	8067348
Total Nitrogen (N)	mg/L	0.388	0.154	0.990	1.31	1.34	0.020	8069742

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam ID		NI3999	NI4000		
Sampling Date		2015/10/05 16:00	2015/10/06 11:45		
COC Number		478427-02-01	478427-02-01		
	UNITS	WS-88877-051 02015-TE-06	WS-88877-061 02015-TE-10	RDL	QC Batch

Nutrients

Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.25	<0.10	0.10	8067348
Total Nitrogen (N)	mg/L	1.41	0.074	0.020	8069742

RDL = Reportable Detection Limit

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GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B588841
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QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8069794	D10-ANTHRACENE (sur.)	2015/10/10	91	60 - 130	96	60 - 130	103	%		
8069794	D8-ACENAPHTHYLENE (sur.)	2015/10/10	96	50 - 130	100	50 - 130	107	%		
8069794	D8-NAPHTHALENE (sur.)	2015/10/10	97	50 - 130	99	50 - 130	109	%		
8069794	D9-Acridine	2015/10/10	98	50 - 130	100	50 - 130	107	%		
8069794	TERPHENYL-D14 (sur.)	2015/10/10	84	60 - 130	94	60 - 130	103	%		
8069797	O-TERPHENYL (sur.)	2015/10/11	117	50 - 130	114	50 - 130	108	%		
8066984	Chemical Oxygen Demand	2015/10/09	97	80 - 120	99	80 - 120	<10	mg/L	NC (1)	20
8067243	Biochemical Oxygen Demand	2015/10/08			99	85 - 115	<6.0	mg/L	18 (1)	20
8067726	Biochemical Oxygen Demand	2015/10/08			99	85 - 115	<6.0	mg/L	2.6 (1)	20
8067890	Total Phosphorus (P)	2015/10/09	NC (2)	80 - 120	99	80 - 120	<0.0050	mg/L	0.76 (1)	20
8068004	Nitrate plus Nitrite (N)	2015/10/08	108 (3)	80 - 120	99	80 - 120	<0.10	mg/L	NC (4)	25
8068005	Nitrite (N)	2015/10/08	104 (3)	80 - 120	97	80 - 120	<0.10	mg/L	NC (4)	20
8068060	Orthophosphate (P)	2015/10/08	92 (3)	80 - 120	89	80 - 120	<0.10	mg/L	NC (4)	20
8068165	Dissolved Chloride (Cl)	2015/10/08	102 (5)	80 - 120	101	80 - 120	<0.50	mg/L	NC (7)	20
8068167	Dissolved Sulphate (SO4)	2015/10/08	98 (5)	80 - 120	91	80 - 120	<0.50	mg/L	NC (7)	20
8068696	Total Oil and grease	2015/10/09			98	70 - 130	<1.0	mg/L		
8068823	Dissolved Aluminum (Al)	2015/10/14	105 (8)	80 - 120	105	80 - 120	<3.0	ug/L	NC (9)	20
8068823	Dissolved Antimony (Sb)	2015/10/14	110 (8)	80 - 120	102	80 - 120	<0.50	ug/L	NC (9)	20
8068823	Dissolved Arsenic (As)	2015/10/14	103 (8)	80 - 120	101	80 - 120	<0.10	ug/L	NC (9)	20
8068823	Dissolved Barium (Ba)	2015/10/14	NC (8)	80 - 120	98	80 - 120	<1.0	ug/L	4.9 (9)	20
8068823	Dissolved Beryllium (Be)	2015/10/14	110 (8)	80 - 120	103	80 - 120	<0.10	ug/L	NC (9)	20
8068823	Dissolved Bismuth (Bi)	2015/10/14	103 (8)	80 - 120	102	80 - 120	<1.0	ug/L	NC (9)	20
8068823	Dissolved Boron (B)	2015/10/14					<50	ug/L	NC (9)	20
8068823	Dissolved Cadmium (Cd)	2015/10/14	101 (8)	80 - 120	98	80 - 120	<0.010	ug/L	NC (9)	20
8068823	Dissolved Chromium (Cr)	2015/10/14	100 (8)	80 - 120	102	80 - 120	<1.0	ug/L	NC (9)	20
8068823	Dissolved Cobalt (Co)	2015/10/14	101 (8)	80 - 120	101	80 - 120	<0.50	ug/L	NC (9)	20
8068823	Dissolved Copper (Cu)	2015/10/14	106 (8)	80 - 120	102	80 - 120	<0.20	ug/L	NC (9)	20
8068823	Dissolved Iron (Fe)	2015/10/14	107 (8)	80 - 120	115	80 - 120	<5.0	ug/L	NC (9)	20
8068823	Dissolved Lead (Pb)	2015/10/14	108 (8)	80 - 120	104	80 - 120	<0.20	ug/L	NC (9)	20
8068823	Dissolved Lithium (Li)	2015/10/14	104 (8)	80 - 120	101	80 - 120	<5.0	ug/L	NC (9)	20

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GHD Limited
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Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8068823	Dissolved Manganese (Mn)	2015/10/14	NC (8)	80 - 120	102	80 - 120	<1.0	ug/L	0.84 (9)	20
8068823	Dissolved Molybdenum (Mo)	2015/10/14	NC (8)	80 - 120	98	80 - 120	<1.0	ug/L	NC (9)	20
8068823	Dissolved Nickel (Ni)	2015/10/14	100 (8)	80 - 120	103	80 - 120	<1.0	ug/L	NC (9)	20
8068823	Dissolved Selenium (Se)	2015/10/14	101 (8)	80 - 120	98	80 - 120	<0.10	ug/L	5.9 (9)	20
8068823	Dissolved Silicon (Si)	2015/10/14					<100	ug/L	0.61 (9)	20
8068823	Dissolved Silver (Ag)	2015/10/14	113 (8)	80 - 120	93	80 - 120	<0.020	ug/L	NC (9)	20
8068823	Dissolved Strontium (Sr)	2015/10/14	NC (8)	80 - 120	100	80 - 120	<1.0	ug/L	4.5 (9)	20
8068823	Dissolved Thallium (Tl)	2015/10/14	91 (8)	80 - 120	92	80 - 120	<0.050	ug/L	NC (9)	20
8068823	Dissolved Tin (Sn)	2015/10/14	103 (8)	80 - 120	100	80 - 120	<5.0	ug/L	NC (9)	20
8068823	Dissolved Titanium (Ti)	2015/10/14	94 (8)	80 - 120	101	80 - 120	<5.0	ug/L	NC (9)	20
8068823	Dissolved Uranium (U)	2015/10/14	108 (8)	80 - 120	103	80 - 120	<0.10	ug/L	NC (9)	20
8068823	Dissolved Vanadium (V)	2015/10/14	101 (8)	80 - 120	98	80 - 120	<5.0	ug/L	NC (9)	20
8068823	Dissolved Zinc (Zn)	2015/10/14	107 (8)	80 - 120	104	80 - 120	<5.0	ug/L	NC (9)	20
8068823	Dissolved Zirconium (Zr)	2015/10/14					<0.50	ug/L	NC (9)	20
8069011	Chemical Oxygen Demand	2015/10/10	97 (10)	80 - 120	98	80 - 120	<10	mg/L	NC (11)	20
8069742	Total Nitrogen (N)	2015/10/13	NC (12)	80 - 120	94	80 - 120	<0.020	mg/L	2.2 (13)	20
8069744	Total Nitrogen (N)	2015/10/13	NC	80 - 120	95	80 - 120	<0.020	mg/L	2.3 (1)	20
8069794	2-Methylnaphthalene	2015/10/10	90	50 - 130	86	50 - 130	<0.10	ug/L	NC (1)	40
8069794	Acenaphthene	2015/10/10	NC	50 - 130	89	50 - 130	<0.050	ug/L	NC (1)	40
8069794	Acenaphthylene	2015/10/10	91	50 - 130	91	50 - 130	<0.050	ug/L	NC (1)	40
8069794	Acridine	2015/10/10	95	50 - 130	93	50 - 130	<0.050	ug/L	NC (1)	40
8069794	Anthracene	2015/10/10	84	60 - 130	87	60 - 130	<0.010	ug/L	NC (1)	40
8069794	Benzo(a)anthracene	2015/10/10	86	60 - 130	88	60 - 130	<0.010	ug/L	NC (1)	40
8069794	Benzo(a)pyrene	2015/10/10	86	60 - 130	90	60 - 130	<0.0090	ug/L	NC (1)	40
8069794	Benzo(b&j)fluoranthene	2015/10/10	85	60 - 130	88	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Benzo(g,h,i)perylene	2015/10/10	80	60 - 130	91	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Benzo(k)fluoranthene	2015/10/10	82	60 - 130	86	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Chrysene	2015/10/10	90	60 - 130	91	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Dibenz(a,h)anthracene	2015/10/10	81	60 - 130	91	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Fluoranthene	2015/10/10	80	60 - 130	79	60 - 130	<0.020	ug/L	NC (1)	40

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Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8069794	Fluorene	2015/10/10	81	50 - 130	80	50 - 130	<0.050	ug/L	NC (1)	40
8069794	Indeno(1,2,3-cd)pyrene	2015/10/10	82	60 - 130	92	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Naphthalene	2015/10/10	85	50 - 130	87	50 - 130	<0.10	ug/L	NC (1)	40
8069794	Phenanthrene	2015/10/10	88	60 - 130	86	60 - 130	<0.050	ug/L	NC (1)	40
8069794	Pyrene	2015/10/10	82	60 - 130	82	60 - 130	<0.020	ug/L	NC (1)	40
8069794	Quinoline	2015/10/10	92	50 - 130	106	50 - 130	<0.24	ug/L	NC (1)	40
8069797	EPH (C10-C19)	2015/10/11	101	50 - 130	93	50 - 130	<0.20	mg/L	NC (1)	30
8069797	EPH (C19-C32)	2015/10/11	119	50 - 130	111	50 - 130	<0.20	mg/L	NC (1)	30
8069965	Dissolved Chloride (Cl)	2015/10/09	99	80 - 120	101	80 - 120	<0.50	mg/L	0.57 (1)	20
8069967	Dissolved Sulphate (SO4)	2015/10/09	NC	80 - 120	98	80 - 120	<0.50	mg/L	4.5 (1)	20
8070054	Alkalinity (PP as CaCO3)	2015/10/10					<0.50	mg/L	NC (1)	20
8070054	Alkalinity (Total as CaCO3)	2015/10/10	NC	80 - 120	97	80 - 120	<0.50	mg/L	8.3 (1)	20
8070054	Bicarbonate (HCO3)	2015/10/10					<0.50	mg/L	8.3 (1)	20
8070054	Carbonate (CO3)	2015/10/10					<0.50	mg/L	NC (1)	20
8070054	Hydroxide (OH)	2015/10/10					<0.50	mg/L	NC (1)	20
8070057	pH	2015/10/10			101	97 - 103			0.12 (1)	N/A
8070059	Conductivity	2015/10/10			101	80 - 120	<1.0	uS/cm	8.4 (1)	20
8070271	Total Suspended Solids	2015/10/13	105	80 - 120	99	80 - 120	<4.0	mg/L	NC (1)	20
8070333	Total Dissolved Solids	2015/10/14	98 (14)	80 - 120	98	80 - 120	18, RDL=10	mg/L	15 (15)	20
8070663	Sulphide	2015/10/10			81	80 - 120	<0.0019	mg/L	NC (1)	20
8071637	Dissolved Chloride (Cl)	2015/10/09			102	80 - 120	<0.50	mg/L	1.1 (1)	20
8071651	Dissolved Sulphate (SO4)	2015/10/09	116	80 - 120	98	80 - 120	<0.50	mg/L	14 (1)	20
8071654	Total Dissolved Solids	2015/10/14	NC	80 - 120	116	80 - 120	16, RDL=10	mg/L	5.8 (1)	20
8071670	Total Suspended Solids	2015/10/14	110	80 - 120	101	80 - 120	<4.0	mg/L	NC (1)	20
8071672	Total Suspended Solids	2015/10/16	109	80 - 120	103	80 - 120	<4.0	mg/L	NC (1)	20
8073701	Total Aluminum (Al)	2015/10/16	101 (16)	80 - 120	100	80 - 120	3.2, RDL=3.0	ug/L	NC (17)	20
8073701	Total Antimony (Sb)	2015/10/16	107 (16)	80 - 120	100	80 - 120	<0.50	ug/L	NC (17)	20
8073701	Total Arsenic (As)	2015/10/16	99 (16)	80 - 120	104	80 - 120	<0.10	ug/L	NC (17)	20
8073701	Total Barium (Ba)	2015/10/16	NC (16)	80 - 120	106	80 - 120	<1.0	ug/L	9.4 (17)	20
8073701	Total Beryllium (Be)	2015/10/16	104 (16)	80 - 120	103	80 - 120	<0.10	ug/L	NC (17)	20

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Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8073701	Total Bismuth (Bi)	2015/10/16	93 (16)	80 - 120	88	80 - 120	<1.0	ug/L	NC (17)	20
8073701	Total Boron (B)	2015/10/16					<50	ug/L	NC (17)	20
8073701	Total Cadmium (Cd)	2015/10/16	98 (16)	80 - 120	94	80 - 120	<0.010	ug/L	NC (17)	20
8073701	Total Chromium (Cr)	2015/10/16	98 (16)	80 - 120	99	80 - 120	<1.0	ug/L	NC (17)	20
8073701	Total Cobalt (Co)	2015/10/16	98 (16)	80 - 120	97	80 - 120	<0.50	ug/L	NC (17)	20
8073701	Total Copper (Cu)	2015/10/16	93 (16)	80 - 120	100	80 - 120	<0.50	ug/L	NC (17)	20
8073701	Total Iron (Fe)	2015/10/16	102 (16)	80 - 120	111	80 - 120	12, RDL=10	ug/L	NC (17)	20
8073701	Total Lead (Pb)	2015/10/16	94 (16)	80 - 120	92	80 - 120	<0.20	ug/L	NC (17)	20
8073701	Total Lithium (Li)	2015/10/16	95 (16)	80 - 120	95	80 - 120	<5.0	ug/L	NC (17)	20
8073701	Total Manganese (Mn)	2015/10/16	NC (16)	80 - 120	101	80 - 120	<1.0	ug/L	6.1 (17)	20
8073701	Total Molybdenum (Mo)	2015/10/16	NC (16)	80 - 120	86	80 - 120	<1.0	ug/L	NC (17)	20
8073701	Total Nickel (Ni)	2015/10/16	94 (16)	80 - 120	98	80 - 120	<1.0	ug/L	NC (17)	20
8073701	Total Selenium (Se)	2015/10/16	88 (16)	80 - 120	93	80 - 120	<0.10	ug/L	NC (17)	20
8073701	Total Silicon (Si)	2015/10/16					<100	ug/L	2.0 (17)	20
8073701	Total Silver (Ag)	2015/10/16	94 (16)	80 - 120	100	80 - 120	<0.020	ug/L	NC (17)	20
8073701	Total Strontium (Sr)	2015/10/16	NC (16)	80 - 120	94	80 - 120	<1.0	ug/L	7.0 (17)	20
8073701	Total Thallium (Tl)	2015/10/16	96 (16)	80 - 120	86	80 - 120	<0.050	ug/L	NC (17)	20
8073701	Total Tin (Sn)	2015/10/16	NC (16)	80 - 120	110	80 - 120	<5.0	ug/L	NC (17)	20
8073701	Total Titanium (Ti)	2015/10/16	104 (16)	80 - 120	105	80 - 120	<5.0	ug/L	NC (17)	20
8073701	Total Uranium (U)	2015/10/16	94 (16)	80 - 120	90	80 - 120	<0.10	ug/L	NC (17)	20
8073701	Total Vanadium (V)	2015/10/16	100 (16)	80 - 120	97	80 - 120	<5.0	ug/L	NC (17)	20
8073701	Total Zinc (Zn)	2015/10/16	85 (16)	80 - 120	114	80 - 120	<5.0	ug/L	NC (17)	20
8073701	Total Zirconium (Zr)	2015/10/16					<0.50	ug/L	NC (17)	20
8074137	Total Ammonia (N)	2015/10/14	101	80 - 120	103	80 - 120	<0.0050	mg/L	NC (1)	20
8075072	Alkalinity (PP as CaCO3)	2015/10/10					<0.50	mg/L	NC (1)	20
8075072	Alkalinity (Total as CaCO3)	2015/10/10	107	80 - 120	94	80 - 120	0.58, RDL=0.50	mg/L	NC (1)	20
8075072	Bicarbonate (HCO3)	2015/10/10					0.71, RDL=0.50	mg/L	NC (1)	20
8075072	Carbonate (CO3)	2015/10/10					<0.50	mg/L	NC (1)	20
8075072	Hydroxide (OH)	2015/10/10					<0.50	mg/L	NC (1)	20
8075077	pH	2015/10/10			101	97 - 103			0.37 (19)	N/A

Maxxam Job #: B588841
Report Date: 2015/10/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8075078	Conductivity	2015/10/10			100	80 - 120	<1.0	uS/cm	8.9 (19)	20
8076419	Dissolved Mercury (Hg)	2015/10/16	83	80 - 120	97	80 - 120	<0.010	ug/L	NC (1)	20
8076829	Total Mercury (Hg)	2015/10/18	90	80 - 120	93	80 - 120	<0.010	ug/L	NC (1)	20
8077103	Weak Acid Dissoc. Cyanide (CN)	2015/10/16	99	80 - 120	98	80 - 120	<0.00050	mg/L	NC (1)	20
8077145	Phenols	2015/10/16	99	80 - 120	98	80 - 120	<0.0010	mg/L	NC (1)	20
8078653	Dissolved Mercury (Hg)	2015/10/18	85 (20)	80 - 120	87	80 - 120	<0.010	ug/L	NC (21)	20

Maxxam Job #: B588841
Report Date: 2015/10/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

QC Batch		Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
				% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
N/A = Not Applicable											
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.											
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.											
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.											
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.											
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.											
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).											
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).											
(1) Duplicate Parent ID											
(2) Matrix Spike Parent ID [NI3985-06]											
(3) Matrix Spike Parent ID [NI4001-02]											
(4) Duplicate Parent ID [NI4001-02]											
(5) Matrix Spike Parent ID [NI4000-02]											
(6) Duplicate Parent ID [NI3986-02]											
(7) Duplicate Parent ID [NI4000-02]											
(8) Matrix Spike Parent ID [NI3991-04]											
(9) Duplicate Parent ID [NI3991-04]											
(10) Matrix Spike Parent ID [NI3989-06]											
(11) Duplicate Parent ID [NI3989-06]											
(12) Matrix Spike Parent ID [NI3991-06]											
(13) Duplicate Parent ID [NI3991-06]											
(14) Matrix Spike Parent ID [NI3991-02]											
(15) Duplicate Parent ID [NI3984-02]											
(16) Matrix Spike Parent ID [NI3999-04]											
(17) Duplicate Parent ID [NI3999-04]											

Maxxam Job #: B588841
Report Date: 2015/10/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
(18) Duplicate Parent ID [NI3985-02]										
(19) Duplicate Parent ID [NI3988-04]										
(20) Matrix Spike Parent ID [NI3984-05]										
(21) Duplicate Parent ID [NI3984-05]										

Maxxam Job #: B588841
Report Date: 2015/10/19

GHD Limited
Client Project #: 088877-02-01
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: TE

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator



Winnie Au, B.Sc., Supervisor - Water Lab

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics
4806 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll Free: 800-563-6266 Fax: (604) 731 2366 www.maxxam.ca

Chain Of Custody Record

Page 1 of 2

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	#27087 GHD Limited	Quotation #	B31426	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #			
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	179 Colonnade Road, Suite 400 Ottawa ON K2E 7J4	Project #	088877-02-01		
Phone	(519) 884-0510	Phone	(613) 727-0510	Project Name		Chain Of Custody Record	Project Manager
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@CRAworld.com	Site #			Tabitha Rudkin
				Sampled By			

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required:		
☐ CSR														Please provide advance notice for rush projects.		
☐ CCME														Regular (Standard) TAT:		
☐ BC Water Quality														(will be applied if Rush TAT is not specified):		
☐ Other														Standard TAT = 5-7 Working days for most tests.		
														Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.		
														Job Specific Rush TAT (if applies to entire submission)		
														1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐		
														Rush Confirmation Number:		
														(call lab for #)		
SAMPLES MUST BE KEPT COOL (≤ 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM																
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y/N)	Alkalinity, pH, EC, Cl, SO4, NO2, NO3, PO4, ion bal, TDS	BOD, TSS	COD, NH4, TKN, T-Phos	Cyanide SAD, Sulphide-LL	CSR Dissolved Metals in Water with CV Hg	CSR Total Metals in Water with CV Hg	Phenols (4-AAP)	LEPH/HEP/PAH, TOG	Total oil & grease	# of Bottles	Comments
1 N13984	WG-88877-05102015-TE-01	5/10/15	1130	N	Y	X	X	X	X	X					8	
2 N13985	-02		1230			X	X	X	X	X					8	
3 N13986	-03		1345			X	X	X	X	X					8	
4 N13987	-04		1500			X	X	X	X	X		X	X		11	
5 N13988	-05		1630			X	X	X	X	X		X	X		11	
6 N13989	WG-88877-06102015-TE-07	6/10/15	830			X	X	X	X	X					8	
7 N13990	-08		900			X	X	X	X	X					8	
8 N13991	-09		905			X	X	X	X	X					8	2x 2L bottle filled for Gen Chem instead of 250 mL
9																
10																

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
J. Stewart		15/10/06	1200	A. MacPhee		20/5/10/08	09:40		Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
									☐	6.6/4.6	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

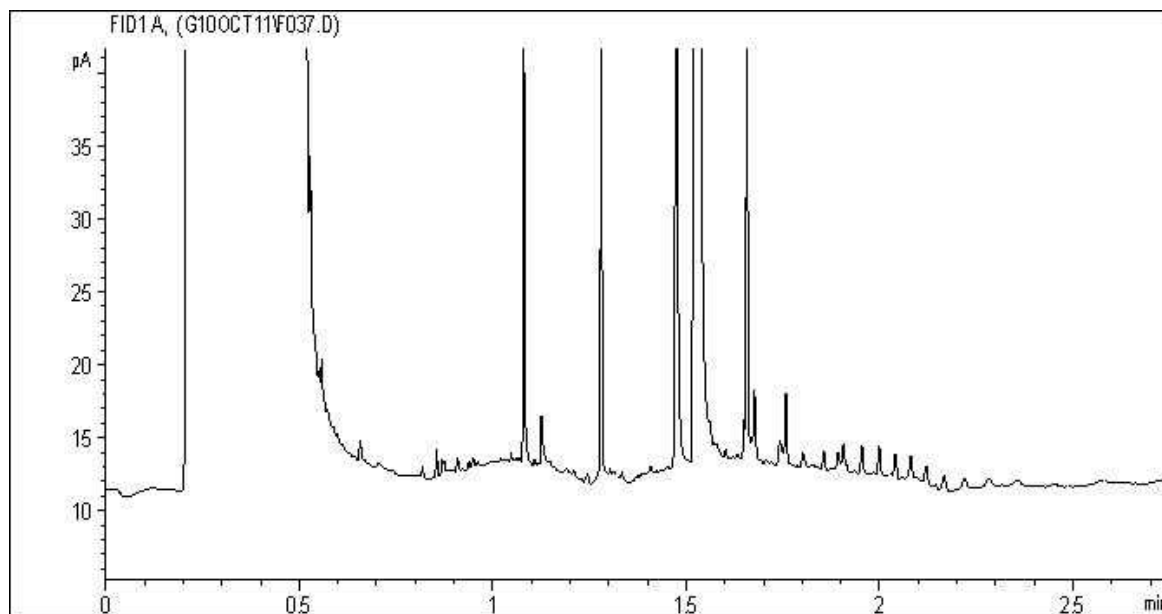
Page 30 of 34

[illegible]

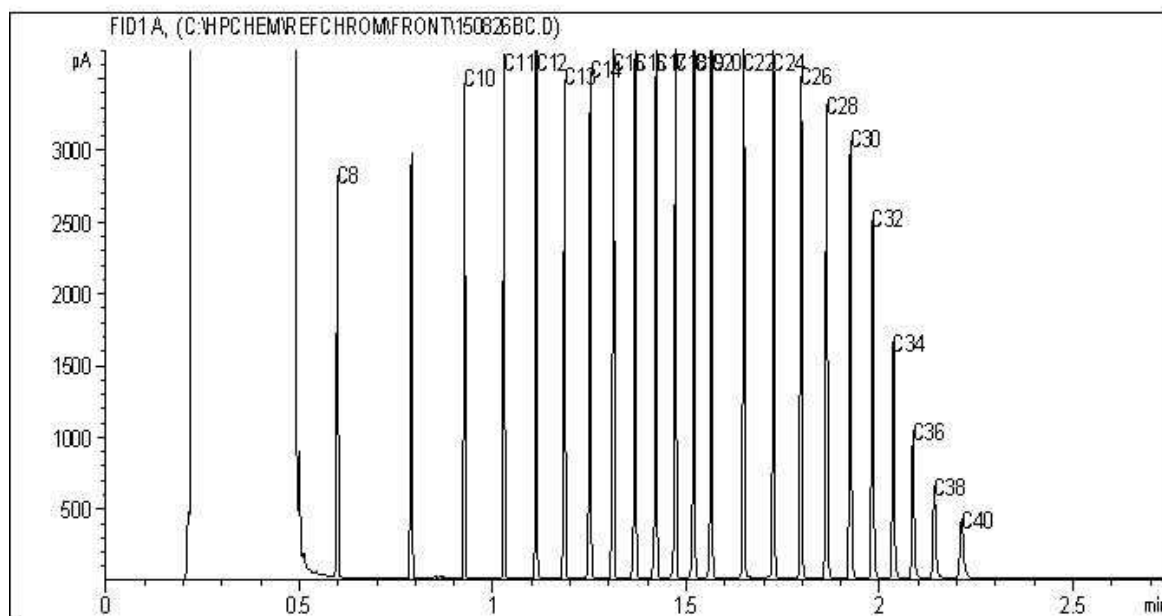
[illegible]

SAMANTHA FREGIEN, BSc
Project Manager

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram

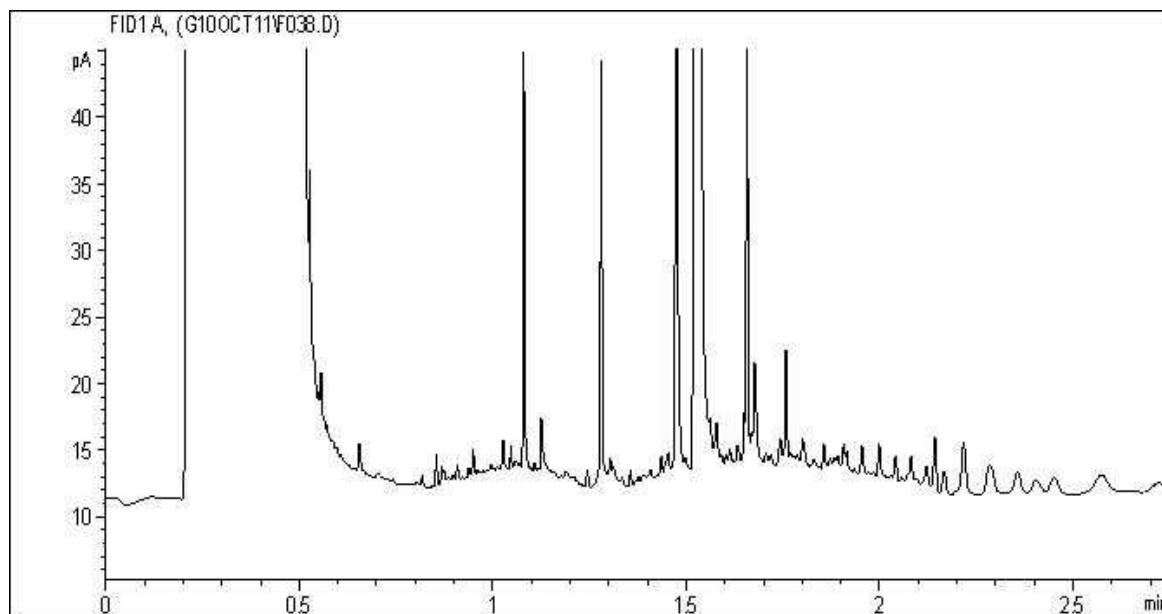


TYPICAL PRODUCT CARBON NUMBER RANGES

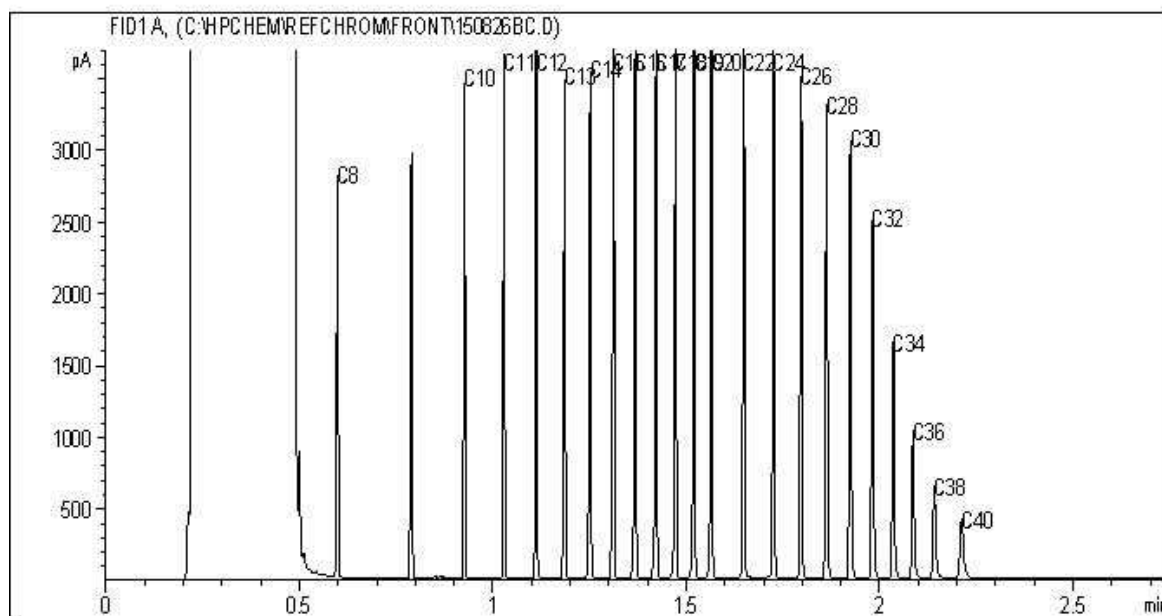
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.



SSOW Reference Code : C#486392-01-01

Footnotes

- Key**
- | | |
|--|---------------------------|
| | Required Field |
| | Populate When Appropriate |
| | Field Data |



SSOW Reference Code :

pH	Temperature	Conductivity	Turbidity	TDS			Eh / ORP
----	-------------	--------------	-----------	-----	--	--	----------

Footnotes

-
-
-
-
-

Your P.O. #: 73500976-1
Your Project #: 088877
Site Location: UPLAND LANDFILL
Your C.O.C. #: 486392-01-01

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Report Date: 2016/02/09

Report #: R2127940

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B607136

Received: 2016/01/30, 14:56

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	2016/02/01	2016/02/01	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	1	2016/02/01	2016/02/01	BBY6SOP-00045	SM 22 5210 B m
Chloride by Automated Colourimetry	1	N/A	2016/02/01	BBY6SOP-00011	SM 22 4500-Cl- G m
COD by Colorimeter	1	2016/02/02	2016/02/03	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	1	N/A	2016/02/01	BBY6SOP-00026	SM 22 2510 B m
Sulphide (as H ₂ S) (1)	1	N/A	2016/02/08	AB WI-00065	Auto Calc
Hardness (calculated as CaCO ₃)	1	N/A	2016/02/02	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAf	1	N/A	2016/02/03	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Ion Balance	1	N/A	2016/02/02	BBY WI-00033	SM 22 1030E
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2016/02/02	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved)	1	N/A	2016/02/01	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	1	2016/02/02	2016/02/03	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2016/02/02	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (highlevel)	1	N/A	2016/01/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	1	N/A	2016/01/30	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	1	N/A	2016/02/02	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals	1	N/A	2016/02/03	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	1	N/A	2016/02/01	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (highlevel)	1	N/A	2016/01/30	BBY6SOP-00013	SM 22 4500-P E m
Sulphide (1)	1	N/A	2016/02/08	EENV SOP-00096	SM 22 4500-S ₂ D m
Sulphate by Automated Colourimetry	1	N/A	2016/02/01	BBY6SOP-00017	SM 22 4500-SO ₄ ²⁻ E m
Total Dissolved Solids (Filt. Residue)	1	2016/02/02	2016/02/03	BBY6SOP-00033	SM 22 2540 C m
TKN (Calc. TN, N/N) total	1	N/A	2016/02/03	BBY WI-00033	Calculation
Total Phosphorus	1	N/A	2016/02/02	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	1	N/A	2016/02/03	BBY6SOP-00034	SM 22 2540 D

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Maxxam Edmonton Environmental

(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Attention:Airesse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Your P.O. #: 73500976-1
Your Project #: 088877
Site Location: UPLAND LANDFILL
Your C.O.C. #: 486392-01-01

Report Date: 2016/02/09
Report #: R2127940
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B607136

Received: 2016/01/30, 14:56

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Tabitha Rudkin, ASCT, Burnaby Project Manager
Email: TRudkin@maxxam.ca
Phone# (604)638-2639

=====

This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OA7684		
Sampling Date		2016/01/29 09:30		
COC Number		486392-01-01		
	UNITS	SW-88877-290116-JS-01	RDL	QC Batch
Calculated Parameters				
Ion Balance	N/A	1.0	0.010	8179563
Sulphide (as H ₂ S)	mg/L	0.0080	0.0020	8186073
Demand Parameters				
Biochemical Oxygen Demand	mg/L	<6.0	6.0	8180164
Chemical Oxygen Demand	mg/L	<10	10	8181224
Misc. Inorganics				
Alkalinity (Total as CaCO ₃)	mg/L	23.6	0.50	8180424
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	0.50	8180424
Bicarbonate (HCO ₃)	mg/L	28.8	0.50	8180424
Carbonate (CO ₃)	mg/L	<0.50	0.50	8180424
Hydroxide (OH)	mg/L	<0.50	0.50	8180424
Anions				
Sulphide	mg/L	0.0078 (1)	0.0019	8186189
Nutrients				
Total Ammonia (N)	mg/L	0.016	0.0050	8181543
Total Phosphorus (P)	mg/L	0.0738	0.0050	8182316
Physical Properties				
Conductivity	uS/cm	65.5	1.0	8180426
pH	pH	7.63	N/A	8180425
Physical Properties				
Total Suspended Solids	mg/L	20.0	4.0	8180947
Total Dissolved Solids	mg/L	32	10	8180757
RDL = Reportable Detection Limit N/A = Not Applicable (1) Sample was analyzed after holding time expired.				

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		OA7684	OA7684		
Sampling Date		2016/01/29 09:30	2016/01/29 09:30		
COC Number		486392-01-01	486392-01-01		
	UNITS	SW-88877-290116-JS-01	SW-88877-290116-JS-01 Lab-Dup	RDL	QC Batch
ANIONS					
Nitrite (N)	mg/L	<0.10	<0.10	0.10	8180972
Calculated Parameters					
Nitrate (N)	mg/L	<0.10	N/A	0.10	8179513
Anions					
Dissolved Sulphate (SO4)	mg/L	4.94	N/A	0.50	8180386
Dissolved Chloride (Cl)	mg/L	3.6	N/A	0.50	8180385
Nutrients					
Orthophosphate (P)	mg/L	<0.10	<0.10	0.10	8180161
Nitrate plus Nitrite (N)	mg/L	<0.10	<0.10	0.10	8180971
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable					

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		OA7684		
Sampling Date		2016/01/29 09:30		
COC Number		486392-01-01		
	UNITS	SW-88877-290116-JS-01	RDL	QC Batch
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	N/A	ONSITE
Misc. Inorganics				
Dissolved Hardness (CaCO3)	mg/L	26.8	0.50	8179312
Elements				
Dissolved Mercury (Hg)	ug/L	<0.010	0.010	8182207
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	53.2	3.0	8180047
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	8180047
Dissolved Arsenic (As)	ug/L	0.18	0.10	8180047
Dissolved Barium (Ba)	ug/L	2.0	1.0	8180047
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8180047
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8180047
Dissolved Boron (B)	ug/L	<50	50	8180047
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	8180047
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8180047
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	8180047
Dissolved Copper (Cu)	ug/L	0.38	0.20	8180047
Dissolved Iron (Fe)	ug/L	11.8	5.0	8180047
Dissolved Lead (Pb)	ug/L	<0.20	0.20	8180047
Dissolved Lithium (Li)	ug/L	<5.0	5.0	8180047
Dissolved Manganese (Mn)	ug/L	20.9	1.0	8180047
Dissolved Molybdenum (Mo)	ug/L	<1.0	1.0	8180047
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	8180047
Dissolved Selenium (Se)	ug/L	0.12	0.10	8180047
Dissolved Silicon (Si)	ug/L	1110	100	8180047
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8180047
Dissolved Strontium (Sr)	ug/L	18.7	1.0	8180047
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	8180047
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8180047
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8180047
Dissolved Uranium (U)	ug/L	<0.10	0.10	8180047
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8180047
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8180047
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		OA7684		
Sampling Date		2016/01/29 09:30		
COC Number		486392-01-01		
	UNITS	SW-88877-290116-JS-01	RDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	<0.50	0.50	8180047
Dissolved Calcium (Ca)	mg/L	8.13	0.050	8179313
Dissolved Magnesium (Mg)	mg/L	1.58	0.050	8179313
Dissolved Potassium (K)	mg/L	0.231	0.050	8179313
Dissolved Sodium (Na)	mg/L	3.10	0.050	8179313
Dissolved Sulphur (S)	mg/L	<3.0	3.0	8179313
RDL = Reportable Detection Limit				

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

TOTAL TKN IN WATER (WATER)

Maxxam ID		OA7684		
Sampling Date		2016/01/29 09:30		
COC Number		486392-01-01		
	UNITS	SW-88877-290116-JS-01	RDL	QC Batch

Nutrients				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.19	0.10	8179587
Total Nitrogen (N)	mg/L	0.190	0.020	8181606
RDL = Reportable Detection Limit				

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B607136
Report Date: 2016/02/09

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8180047	Dissolved Aluminum (Al)	2016/02/01	106	80 - 120	109	80 - 120	<3.0	ug/L	10 (1)	20
8180047	Dissolved Antimony (Sb)	2016/02/01	106	80 - 120	110	80 - 120	<0.50	ug/L	NC (1)	20
8180047	Dissolved Arsenic (As)	2016/02/01	NC	80 - 120	105	80 - 120	<0.10	ug/L	1.3 (1)	20
8180047	Dissolved Barium (Ba)	2016/02/01	NC	80 - 120	103	80 - 120	<1.0	ug/L	0.92 (1)	20
8180047	Dissolved Beryllium (Be)	2016/02/01	99	80 - 120	98	80 - 120	<0.10	ug/L	NC (1)	20
8180047	Dissolved Bismuth (Bi)	2016/02/01	99	80 - 120	105	80 - 120	<1.0	ug/L	NC (1)	20
8180047	Dissolved Boron (B)	2016/02/01	NC	80 - 120	93	80 - 120	<50	ug/L	NC (1)	20
8180047	Dissolved Cadmium (Cd)	2016/02/01	106	80 - 120	109	80 - 120	<0.010	ug/L	NC (1)	20
8180047	Dissolved Chromium (Cr)	2016/02/01	104	80 - 120	108	80 - 120	<1.0	ug/L	NC (1)	20
8180047	Dissolved Cobalt (Co)	2016/02/01	100	80 - 120	106	80 - 120	<0.50	ug/L	NC (1)	20
8180047	Dissolved Copper (Cu)	2016/02/01	97	80 - 120	103	80 - 120	<0.20	ug/L	NC (1)	20
8180047	Dissolved Iron (Fe)	2016/02/01	NC	80 - 120	120	80 - 120	<5.0	ug/L	0.91 (1)	20
8180047	Dissolved Lead (Pb)	2016/02/01	113	80 - 120	113	80 - 120	<0.20	ug/L	NC (1)	20
8180047	Dissolved Lithium (Li)	2016/02/01	NC	80 - 120	105	80 - 120	<5.0	ug/L	1.9 (1)	20
8180047	Dissolved Manganese (Mn)	2016/02/01	NC	80 - 120	106	80 - 120	<1.0	ug/L	1.1 (1)	20
8180047	Dissolved Molybdenum (Mo)	2016/02/01	NC	80 - 120	111	80 - 120	<1.0	ug/L	1.6 (1)	20
8180047	Dissolved Nickel (Ni)	2016/02/01	99	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
8180047	Dissolved Selenium (Se)	2016/02/01	103	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
8180047	Dissolved Silicon (Si)	2016/02/01					<100	ug/L	0.040 (1)	20
8180047	Dissolved Silver (Ag)	2016/02/01	106	80 - 120	103	80 - 120	<0.020	ug/L	NC (1)	20
8180047	Dissolved Strontium (Sr)	2016/02/01	NC	80 - 120	115	80 - 120	<1.0	ug/L	1.2 (1)	20
8180047	Dissolved Thallium (Tl)	2016/02/01	103	80 - 120	110	80 - 120	<0.050	ug/L	NC (1)	20
8180047	Dissolved Tin (Sn)	2016/02/01	113	80 - 120	109	80 - 120	<5.0	ug/L	NC (1)	20
8180047	Dissolved Titanium (Ti)	2016/02/01	108	80 - 120	104	80 - 120	<5.0	ug/L	NC (1)	20
8180047	Dissolved Uranium (U)	2016/02/01	110	80 - 120	111	80 - 120	<0.10	ug/L	NC (1)	20
8180047	Dissolved Vanadium (V)	2016/02/01	103	80 - 120	106	80 - 120	<5.0	ug/L	NC (1)	20
8180047	Dissolved Zinc (Zn)	2016/02/01	108	80 - 120	119	80 - 120	<5.0	ug/L	NC (1)	20
8180047	Dissolved Zirconium (Zr)	2016/02/01					<0.50	ug/L	NC (1)	20
8180161	Orthophosphate (P)	2016/01/30	94 (2)	80 - 120	91	80 - 120	<0.10	mg/L	NC (3)	20
8180164	Biochemical Oxygen Demand	2016/02/01			102	85 - 115	<6.0	mg/L	NC (1)	20

Maxxam Job #: B607136
Report Date: 2016/02/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8180385	Dissolved Chloride (Cl)	2016/02/01	101	80 - 120	100	80 - 120	0.51, RDL=0.50	mg/L	0.57 (1)	20
8180386	Dissolved Sulphate (SO4)	2016/02/01	NC	80 - 120	94	80 - 120	0.59, RDL=0.50	mg/L	0.035 (1)	20
8180424	Alkalinity (PP as CaCO3)	2016/02/01					<0.50	mg/L	NC (1)	20
8180424	Alkalinity (Total as CaCO3)	2016/02/01	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.11 (1)	20
8180424	Bicarbonate (HCO3)	2016/02/01					<0.50	mg/L	0.11 (1)	20
8180424	Carbonate (CO3)	2016/02/01					<0.50	mg/L	NC (1)	20
8180424	Hydroxide (OH)	2016/02/01					<0.50	mg/L	NC (1)	20
8180425	pH	2016/02/01			101	97 - 103			0 (1)	N/A
8180426	Conductivity	2016/02/01			100	80 - 120	<1.0	uS/cm	0.17 (1)	20
8180757	Total Dissolved Solids	2016/02/03	102	80 - 120	98	80 - 120	<10	mg/L	5.7 (1)	20
8180947	Total Suspended Solids	2016/02/03	117	80 - 120	104	80 - 120	<4.0	mg/L	NC (1)	20
8180971	Nitrate plus Nitrite (N)	2016/01/30	117 (2)	80 - 120	106	80 - 120	<0.10	mg/L	NC (3)	25
8180972	Nitrite (N)	2016/01/30	107 (2)	80 - 120	100	80 - 120	<0.10	mg/L	NC (3)	20
8181224	Chemical Oxygen Demand	2016/02/03	103	80 - 120	107	80 - 120	<10	mg/L	NC (1)	20
8181543	Total Ammonia (N)	2016/02/02	NC	80 - 120	114	80 - 120	<0.0050	mg/L		
8181606	Total Nitrogen (N)	2016/02/03	NC	80 - 120	87	80 - 120	<0.020	mg/L	6.1 (1)	20
8182207	Dissolved Mercury (Hg)	2016/02/03	96	80 - 120	95	80 - 120	<0.010	ug/L	NC (1)	20
8182316	Total Phosphorus (P)	2016/02/02			97	80 - 120	<0.0050	mg/L		

Maxxam Job #: B607136
Report Date: 2016/02/09

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8186189	Sulphide	2016/02/08			90	80 - 120	<0.0019	mg/L	NC (1)	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [OA7684-02]

(3) Duplicate Parent ID [OA7684-02]

Maxxam Job #: B607136
Report Date: 2016/02/09

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

VALIDATION SIGNATURE PAGE

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



Andy Lu, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics
4608 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-Free: 800-563-6286 Fax: (604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#163 GHD Limited	Company Name	#27087 GHD Limited	Quotation #	B31426	Maxxam Job #	Bottle Order #:
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73500976-1		
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address	179 Colonnade Road, Suite 400 Ottawa ON K2E 7J4	Project #	088877		
Phone	(519) 884-0510	Phone	(613) 727-0510	Project Name		Chain Of Custody Record	Project Manager
Email	airesse.macphee@ghd.com; NationalEDDSupport@ma	Email	amacphee@CRAworld.com	Site #			
				Sampled By			

Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)												Turnaround Time (TAT) Required:	
☐ CSR																Please provide advance notice for rush projects	
☐ CCME																Regular (Standard) TAT:	
☐ BC Water Quality																(will be applied if Rush TAT is not specified):	
☐ Other																Standard TAT = 5-7 Working days for most tests.	
																Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
																Job Specific Rush TAT (if applies to entire submission)	
																1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: ☐	
																Rush Confirmation Number:	
																(call lab for #)	
																# of Bottles	
																Comments	

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered? (Y/N)	Alkalinity, pH, EC, Cl, SO4, NO2, NO3, PO4, Ion bal, TDS	BOD, TSS	COD, NH4, TKN, T-Phos	Cyanide, Sulphide-LL	CSR Dissolved Metals in Water with CV Hg	Phenols (4-AAP)	LEPH/HEPH/PAH, TOG	CSR VOC + VPH in Water	pH, conductivity, ion balance	# of Bottles
0A 7684	SW-88877-290116-15-01	29/01/16	9:30	W	Y	X	X	X	X	X				X	6

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only		
Jamie Stewart		16/01/30	9:30	KEVIN CHOW		2016/01/30	14:56	N/A	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
									☒	1, 1, 1	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

Maxxam Analytics International Corporation o/a Maxxam Analytics

White: Maxxam Yellow: Client

GHD Field Sample Key (FSK)

Site	Uplands Excavating
Sample Reason	hydro/geo investigation
Sampler Name	Thomas Elliot/James Stewart
Sampling Company	GHD
Laboratory(s)	Maxxam

SSOW Reference Code : C#487576-02-01

[illegible]

Footnotes

- | Rank | Methodology |
|------|-------------------------------------|
| 1. | Sampled using high flow methodology |
| 2. | Sampled using low flow methodology |
| 3. | |
| 4. | |
| 5. | |
| 6. | |

Key

	Required Field
	Populate When Appropriate
	Field Data



SSOW Reference Code :

C#487576-02-01

[illegible]

Footnotes

-
-
-
-
-

Key

GHD 088877 (02)

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Your P.O. #: 73500976-1
Your Project #: 088877
Site#: UPLANDS
Site Location: UPLAND LANDFILL
Your C.O.C. #: 487576-02-01

Report Date: 2016/04/19

Report #: R2159059

Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B612278

Received: 2016/02/17, 09:00

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	2016/02/19	2016/02/19	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	1	2016/02/19	2016/02/20	BBY6SOP-00026	SM 22 2320 B m
Biochemical Oxygen Demand	2	2016/02/19	2016/02/19	BBY6SOP-00045	SM 22 5210 B m
Chloride by Automated Colourimetry	2	N/A	2016/02/19	BBY6SOP-00011	SM 22 4500-Cl- G m
Cyanide SAD (strong acid dissociable)	2	N/A	2016/02/22	BBY6SOP-00004	SM 22 4500-CN O m
COD by Colorimeter	2	2016/02/19	2016/02/19	BBY6SOP-00024	SM 22 5220 D m
Conductance - water	1	N/A	2016/02/19	BBY6SOP-00026	SM 22 2510 B m
Conductance - water	1	N/A	2016/02/20	BBY6SOP-00026	SM 22 2510 B m
Hardness (calculated as CaCO ₃)	2	N/A	2016/02/22	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAf	2	N/A	2016/02/22	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Ion Balance	2	N/A	2016/02/22	BBY WI-00033	SM 22 1030E
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2016/02/22	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved)	2	N/A	2016/02/19	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	2	2016/02/23	2016/02/24	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Unpreserved)	2	N/A	2016/02/19	BBY6SOP-00009	SM 22 4500-NH ₃ - G m
Nitrate + Nitrite (N) (highlevel)	2	N/A	2016/02/19	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrite (N) by CFA (highlevel)	2	N/A	2016/02/19	BBY6SOP-00010	SM 22 4500-NO ₃ - I m
Nitrogen - Nitrate (as N)	2	N/A	2016/02/20	BBY6SOP-00010	SM 22 4500-NO ₃ I m
Filter and HNO ₃ Preserve for Metals	2	N/A	2016/02/22	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	1	N/A	2016/02/19	BBY6SOP-00026	SM 22 4500-H+ B m
pH Water (2)	1	N/A	2016/02/20	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (highlevel)	2	N/A	2016/02/23	BBY6SOP-00013	SM 22 4500-P E m
Sulphide (1)	2	N/A	2016/02/22	CAL SOP-00062	SM 22 4500 S2-D m
Sulphate by Automated Colourimetry	2	N/A	2016/02/19	BBY6SOP-00017	SM 22 4500-SO ₄ 2- E m
Total Dissolved Solids (Filt. Residue)	2	2016/02/23	2016/02/24	BBY6SOP-00033	SM 22 2540 C m
TKN (Calc. TN, N/N) total	2	N/A	2016/02/24	BBY WI-00033	Calculation
Total Phosphorus	2	N/A	2016/02/20	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	2	2016/02/22	2016/02/23	BBY6SOP-00034	SM 22 2540 D

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

Attention: Aïresse MacPhee

GHD Limited
651 COLBY DRIVE
WATERLOO, ON
CANADA N2V 1C2

Your P.O. #: 73500976-1
Your Project #: 088877
Site#: UPLANDS
Site Location: UPLAND LANDFILL
Your C.O.C. #: 487576-02-01

Report Date: 2016/04/19
Report #: R2159059
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B612278

Received: 2016/02/17, 09:00

(1) This test was performed by Maxxam Calgary Environmental

(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

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

Tabitha Rudkin, ASCT, Burnaby Project Manager

Email: TRudkin@maxxam.ca

Phone# (604)638-2639

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OD3412	OD3412		
Sampling Date		2016/02/15 13:30	2016/02/15 13:30		
COC Number		487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-01	WG-88877-150216-JS-01 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Ion Balance	N/A	0.98	N/A	0.010	8195244
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<6.0 (1)	N/A	6.0	8196084
Chemical Oxygen Demand	mg/L	<10	N/A	10	8194905
Misc. Inorganics					
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00057	N/A	0.00050	8197879
Alkalinity (Total as CaCO3)	mg/L	58.6	N/A	0.50	8196009
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	0.50	8196009
Bicarbonate (HCO3)	mg/L	71.4	N/A	0.50	8196009
Carbonate (CO3)	mg/L	<0.50	N/A	0.50	8196009
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	8196009
Anions					
Sulphide	mg/L	<0.0019	N/A	0.0019	8197671
Nutrients					
Total Ammonia (N)	mg/L	<0.0050	<0.0050	0.0050	8197824
Total Phosphorus (P)	mg/L	0.0130	N/A	0.0050	8197866
Physical Properties					
Conductivity	uS/cm	124	N/A	1.0	8196008
pH	pH	7.14	N/A	N/A	8196005
Physical Properties					
Total Suspended Solids	mg/L	13.8	15.3	4.0	8197579
Total Dissolved Solids	mg/L	58 (1)	N/A	10	8198475
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Sample analysed past recommended hold time.					

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		OD3413	OD3413		
Sampling Date		2016/02/15 12:45	2016/02/15 12:45		
COC Number		487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-02	WG-88877-150216-JS-02 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	N/A	N/A	ONSITE
Ion Balance	N/A	0.96	N/A	0.010	8195244
Demand Parameters					
Biochemical Oxygen Demand	mg/L	<6.0 (1)	N/A	6.0	8196084
Chemical Oxygen Demand	mg/L	25	N/A	10	8194905
Misc. Inorganics					
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00054	N/A	0.00050	8197879
Alkalinity (Total as CaCO3)	mg/L	38.0	N/A	0.50	8196024
Alkalinity (PP as CaCO3)	mg/L	<0.50	N/A	0.50	8196024
Bicarbonate (HCO3)	mg/L	46.3	N/A	0.50	8196024
Carbonate (CO3)	mg/L	<0.50	N/A	0.50	8196024
Hydroxide (OH)	mg/L	<0.50	N/A	0.50	8196024
Anions					
Sulphide	mg/L	<0.0019	N/A	0.0019	8197671
Nutrients					
Total Ammonia (N)	mg/L	<0.0050	N/A	0.0050	8197824
Total Phosphorus (P)	mg/L	0.121	0.119	0.0050	8197866
Physical Properties					
Conductivity	uS/cm	85.7	N/A	1.0	8196028
pH	pH	7.85	N/A	N/A	8196029
Physical Properties					
Total Suspended Solids	mg/L	139 (2)	N/A	16	8197579
Total Dissolved Solids	mg/L	60 (1)	N/A	10	8198475
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Sample analysed past recommended hold time. (2) RDL raised due to high concentration of solids in the sample.					

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

HIGH LEVEL ANIONS PACKAGE (WATER)

Maxxam ID		OD3412	OD3412	OD3413		
Sampling Date		2016/02/15 13:30	2016/02/15 13:30	2016/02/15 12:45		
COC Number		487576-02-01	487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-01	WG-88877-150216-JS-01 Lab-Dup	WG-88877-150216-JS-02	RDL	QC Batch
ANIONS						
Nitrite (N)	mg/L	<0.10 (1)	N/A	<0.10 (1)	0.10	8196784
Calculated Parameters						
Nitrate (N)	mg/L	0.15	N/A	<0.10	0.10	8194532
Anions						
Dissolved Sulphate (SO4)	mg/L	3.72	N/A	4.52	0.50	8197488
Dissolved Chloride (Cl)	mg/L	2.4	N/A	0.83	0.50	8197478
Nutrients						
Orthophosphate (P)	mg/L	<0.10 (1)	<0.10	<0.10 (1)	0.10	8197859
Nitrate plus Nitrite (N)	mg/L	0.15 (1)	N/A	<0.10 (1)	0.10	8196778
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable (1) Sample analysed past recommended hold time.						

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		OD3412	OD3413		
Sampling Date		2016/02/15 13:30	2016/02/15 12:45		
COC Number		487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-01	WG-88877-150216-JS-02	RDL	QC Batch
Misc. Inorganics					
Dissolved Hardness (CaCO ₃)	mg/L	53.3	34.9	0.50	8194515
Elements					
Dissolved Mercury (Hg)	ug/L	<0.010	<0.010	0.010	8197841
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	10.6	24.2	3.0	8195915
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8195915
Dissolved Arsenic (As)	ug/L	1.10	0.83	0.10	8195915
Dissolved Barium (Ba)	ug/L	4.4	2.8	1.0	8195915
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8195915
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8195915
Dissolved Boron (B)	ug/L	<50	<50	50	8195915
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	8195915
Dissolved Chromium (Cr)	ug/L	1.4	<1.0	1.0	8195915
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	0.50	8195915
Dissolved Copper (Cu)	ug/L	1.71	<0.20	0.20	8195915
Dissolved Iron (Fe)	ug/L	20.1	<5.0	5.0	8195915
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8195915
Dissolved Lithium (Li)	ug/L	<5.0	<5.0	5.0	8195915
Dissolved Manganese (Mn)	ug/L	8.5	16.2	1.0	8195915
Dissolved Molybdenum (Mo)	ug/L	<1.0	8.7	1.0	8195915
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	8195915
Dissolved Phosphorus (P)	ug/L	<10	17	10	8195915
Dissolved Selenium (Se)	ug/L	0.68	0.20	0.10	8195915
Dissolved Silicon (Si)	ug/L	6480	4540	100	8195915
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8195915
Dissolved Strontium (Sr)	ug/L	73.0	23.7	1.0	8195915
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	0.050	8195915
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8195915
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8195915
Dissolved Uranium (U)	ug/L	<0.10	<0.10	0.10	8195915
RDL = Reportable Detection Limit					

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		OD3412	OD3413		
Sampling Date		2016/02/15 13:30	2016/02/15 12:45		
COC Number		487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-01	WG-88877-150216-JS-02	RDL	QC Batch
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	8195915
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	8195915
Dissolved Zirconium (Zr)	ug/L	<0.50	<0.50	0.50	8195915
Dissolved Calcium (Ca)	mg/L	16.0	11.1	0.050	8194530
Dissolved Magnesium (Mg)	mg/L	3.23	1.73	0.050	8194530
Dissolved Potassium (K)	mg/L	0.132	0.541	0.050	8194530
Dissolved Sodium (Na)	mg/L	5.13	2.83	0.050	8194530
Dissolved Sulphur (S)	mg/L	5.5	5.5	3.0	8194530
RDL = Reportable Detection Limit					

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

TOTAL TKN IN WATER (WATER)

Maxxam ID		OD3412	OD3413		
Sampling Date		2016/02/15 13:30	2016/02/15 12:45		
COC Number		487576-02-01	487576-02-01		
	UNITS	WG-88877-150216-JS-01	WG-88877-150216-JS-02	RDL	QC Batch
Nutrients					
Total Total Kjeldahl Nitrogen (Calc)	mg/L	<0.10	<0.10	0.10	8194519
Total Nitrogen (N)	mg/L	0.155	0.095	0.020	8199117
RDL = Reportable Detection Limit					

Maxxam Job #: B612278
Report Date: 2016/04/19

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

GENERAL COMMENTS

Revised Report (Version:2): Report comments have been amended (TWI).

Results relate only to the items tested.

Maxxam Job #: B612278
Report Date: 2016/04/19

QUALITY ASSURANCE REPORT

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8194905	Chemical Oxygen Demand	2016/02/19	NC	80 - 120	100	80 - 120	<10	mg/L	6.3 (1)	20
8195915	Dissolved Aluminum (Al)	2016/02/20	70 (2)	80 - 120	100	80 - 120	<3.0	ug/L		
8195915	Dissolved Antimony (Sb)	2016/02/20	102	80 - 120	106	80 - 120	<0.50	ug/L		
8195915	Dissolved Arsenic (As)	2016/02/22	115	80 - 120	102	80 - 120	<0.10	ug/L	NC (1)	20
8195915	Dissolved Barium (Ba)	2016/02/22	NC	80 - 120	101	80 - 120	<1.0	ug/L	3.1 (1)	20
8195915	Dissolved Beryllium (Be)	2016/02/20	110	80 - 120	91	80 - 120	<0.10	ug/L		
8195915	Dissolved Bismuth (Bi)	2016/02/20	88	80 - 120	104	80 - 120	<1.0	ug/L		
8195915	Dissolved Boron (B)	2016/02/20	NC	80 - 120	96	80 - 120	<50	ug/L		
8195915	Dissolved Cadmium (Cd)	2016/02/22	103	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
8195915	Dissolved Chromium (Cr)	2016/02/22	100	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
8195915	Dissolved Cobalt (Co)	2016/02/20	102	80 - 120	104	80 - 120	<0.50	ug/L		
8195915	Dissolved Copper (Cu)	2016/02/20	74 (2)	80 - 120	108	80 - 120	<0.20	ug/L		
8195915	Dissolved Iron (Fe)	2016/02/22	NC	80 - 120	107	80 - 120	<5.0	ug/L	1.3 (1)	20
8195915	Dissolved Lead (Pb)	2016/02/22	105	80 - 120	94	80 - 120	<0.20	ug/L	NC (1)	20
8195915	Dissolved Lithium (Li)	2016/02/20	NC	80 - 120	88	80 - 120	<5.0	ug/L		
8195915	Dissolved Manganese (Mn)	2016/02/22	NC	80 - 120	102	80 - 120	<1.0	ug/L	1.1 (1)	20
8195915	Dissolved Molybdenum (Mo)	2016/02/20	91	80 - 120	103	80 - 120	<1.0	ug/L		
8195915	Dissolved Nickel (Ni)	2016/02/20	95	80 - 120	107	80 - 120	<1.0	ug/L		
8195915	Dissolved Phosphorus (P)	2016/02/20					<10	ug/L		
8195915	Dissolved Selenium (Se)	2016/02/22	81	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	20
8195915	Dissolved Silicon (Si)	2016/02/20					<100	ug/L		
8195915	Dissolved Silver (Ag)	2016/02/22	77 (2)	80 - 120	102	80 - 120	<0.020	ug/L	NC (1)	20
8195915	Dissolved Strontium (Sr)	2016/02/20	NC	80 - 120	92	80 - 120	<1.0	ug/L		
8195915	Dissolved Thallium (Tl)	2016/02/20	98	80 - 120	100	80 - 120	<0.050	ug/L		
8195915	Dissolved Tin (Sn)	2016/02/20	117	80 - 120	100	80 - 120	<5.0	ug/L		
8195915	Dissolved Titanium (Ti)	2016/02/20	85	80 - 120	92	80 - 120	<5.0	ug/L		
8195915	Dissolved Uranium (U)	2016/02/20	104	80 - 120	88	80 - 120	<0.10	ug/L		
8195915	Dissolved Vanadium (V)	2016/02/20	101	80 - 120	106	80 - 120	<5.0	ug/L		
8195915	Dissolved Zinc (Zn)	2016/02/22	NC	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
8195915	Dissolved Zirconium (Zr)	2016/02/20					<0.50	ug/L		

Maxxam Job #: B612278
Report Date: 2016/04/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8196005	pH	2016/02/19			102	97 - 103			1.9 (1)	N/A
8196008	Conductivity	2016/02/19			100	80 - 120	<1.0	uS/cm	0.45 (1)	20
8196009	Alkalinity (PP as CaCO ₃)	2016/02/19					<0.50	mg/L	NC (1)	20
8196009	Alkalinity (Total as CaCO ₃)	2016/02/19	95	80 - 120	95	80 - 120	<0.50	mg/L	0.10 (1)	20
8196009	Bicarbonate (HCO ₃)	2016/02/19					<0.50	mg/L	0.10 (1)	20
8196009	Carbonate (CO ₃)	2016/02/19					<0.50	mg/L	NC (1)	20
8196009	Hydroxide (OH)	2016/02/19					<0.50	mg/L	NC (1)	20
8196024	Alkalinity (PP as CaCO ₃)	2016/02/19					<0.50	mg/L	NC (1)	20
8196024	Alkalinity (Total as CaCO ₃)	2016/02/19	NC (3)	80 - 120	101	80 - 120	<0.50	mg/L	2.2 (1)	20
8196024	Bicarbonate (HCO ₃)	2016/02/19					<0.50	mg/L	2.2 (1)	20
8196024	Carbonate (CO ₃)	2016/02/19					<0.50	mg/L	NC (1)	20
8196024	Hydroxide (OH)	2016/02/19					<0.50	mg/L	NC (1)	20
8196028	Conductivity	2016/02/19			102	80 - 120	<1.0	uS/cm		
8196029	pH	2016/02/19			102	97 - 103			0.14 (1)	N/A
8196084	Biochemical Oxygen Demand	2016/02/19			100	85 - 115	<6.0	mg/L	0.65 (1)	20
8196778	Nitrate plus Nitrite (N)	2016/02/19	105	80 - 120	103	80 - 120	<0.10	mg/L	NC (1)	25
8196784	Nitrite (N)	2016/02/19	98	80 - 120	96	80 - 120	<0.10	mg/L	NC (1)	20
8197478	Dissolved Chloride (Cl)	2016/02/19			98	80 - 120	<0.50	mg/L		
8197488	Dissolved Sulphate (SO ₄)	2016/02/19			93	80 - 120	<0.50	mg/L		
8197579	Total Suspended Solids	2016/02/23	107	80 - 120	99	80 - 120	<4.0	mg/L	NC (4)	20
8197671	Sulphide	2016/02/22			97	80 - 120	<0.0019	mg/L	NC (1)	20
8197824	Total Ammonia (N)	2016/02/19	105 (5)	80 - 120	96	80 - 120	0.0082, RDL=0.0050	mg/L	NC (6)	20
8197841	Dissolved Mercury (Hg)	2016/02/22	97	80 - 120	99	80 - 120	<0.010	ug/L	NC (1)	20
8197859	Orthophosphate (P)	2016/02/23	98 (7)	80 - 120	104	80 - 120	<0.10	mg/L	NC (8)	20
8197866	Total Phosphorus (P)	2016/02/20			105	80 - 120	<0.0050	mg/L	2.0 (9)	20
8197879	Strong Acid Dissoc. Cyanide (CN)	2016/02/22	102	80 - 120	100	80 - 120	0.00066, RDL=0.00050	mg/L	NC (1)	20
8198475	Total Dissolved Solids	2016/02/24	105	80 - 120	94	80 - 120	<10	mg/L	2.3 (1)	20

Maxxam Job #: B612278
Report Date: 2016/04/19

QUALITY ASSURANCE REPORT(CONT'D)

GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8199117	Total Nitrogen (N)	2016/02/24	NC	80 - 120	97	80 - 120	<0.020	mg/L	0.61 (1)	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Duplicate Parent ID

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(3) Matrix Spike Parent ID [OD3413-03]

(4) Duplicate Parent ID [OD3412-02]

(5) Matrix Spike Parent ID [OD3412-03]

(6) Duplicate Parent ID [OD3412-03]

(7) Matrix Spike Parent ID [OD3412-04]

(8) Duplicate Parent ID [OD3412-04]

(9) Duplicate Parent ID [OD3413-07]

Maxxam Job #: B612278
Report Date: 2016/04/19

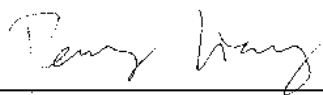
GHD Limited
Client Project #: 088877
Site Location: UPLAND LANDFILL
Your P.O. #: 73500976-1
Sampler Initials: JS

VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist



Harry (Peng) Liang, Senior Analyst

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

INVOICE TO:		Report information		Project information		Laboratory Use Only										
Company Name	#163 GHD Limited	Company Name	Airesse MacPhee	Quotation #	B31426	Maxxam Job #	B612278									
Contact Name	Airesse MacPhee	Contact Name	Airesse MacPhee	P.O. #	73500976-1	Chain Of Custody Record	Project Manager									
Address	651 COLBY DRIVE WATERLOO ON N2V 1C2	Address		Project #	088877	Tabitha Rudkin										
Phone	(519) 884-0510	Phone		Project Name	Water Quality											
Fax	(519) 725-1394	Fax		Site #	16/02/17											
Email	amacphee@CRWorld.com; NationalEDDSupport@ma	Email	amacphee@CRWorld.com; NationalEDDSupport@ma	Sampled By	J. Stewart, T. Elliot											
Regulatory Criteria:		Special Instructions		ANALYSIS REQUESTED (PLEASE BE SPECIFIC)		Turnaround Time (TAT) Required:										
☐ CSR ☐ CCME ☐ BC Water Quality ☐ Other				(will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: _____ Rush Confirmation Number: _____ (call lab for #)		Please provide advance notice for rush projects ☒ Regular (Standard) TAT: Please note: Standard TAT for certain tests such as BOD and Dissolved Metals are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) 1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: _____ Rush Confirmation Number: _____ (call lab for #)										
SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM																
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Alk, pH, Conductivity, ion bal.	High-Level Anions (Cl, F, NO ₂ , NO ₃ , SO ₄)	Ammonia-N (Unpreserved), tot. N, CO ₂ , Nitrogen, TNK	CSR Dissolved Metals in Water with CV Hg + P	CSR Total Metals in Water with CV Hg + P	CSR DOC, UV ₂₅₄ , Water	TSS, TDS	BOD	LL-Sulphide	Cyanide	# of Bottles	Comments
1	150216-JS-01	15/02/16	13:30	W	X	X	X	X	X	X	X	X	X	X	9	
2	-02		12:45		X	X	X	X			X	X	X	X	9	
3	-03		13:30		X	X	X	X			X	X	X	X	9	HOLD*
4	-56484-															
5	-56484-															
6	-56484-															
7	-56484-															
8	-56484-															
9	-56484-															
10	-56484-															
* * RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted		Lab Use Only						
Jamie Stewart		16/02/16	10:00	C. Lamer		16/02/17	09:00			Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Act on Cooler?			
										☐	11/1	Yes ☐ No ☐	Yes ☐ No ☐			
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.																

Appendix F

Quality Assurance/Quality Control Memorandum



Memorandum

To: Rose Marie Rocca Ref. No.: 088877

From: Airesse MacPhee/al/1 *AM* Date: October 29, 2015
Revised: October 30, 2015

Re: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Corporation Date(s) Sampled: September 17-18, October 5-6, 2015

Lab Job No.: B582021, B588841

Sampled By: Thomas Elliott, Danny Fitzgerald

Media Sampled: Groundwater, Surface Water

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☐	☐	☒
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: AM			

The following results are qualified based on holding time exceedance:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091715-TDF-01	pH	8.12	J	pH units
B582021	W-88877-091715-TDF-02	pH	7.80	J	pH units
B582021	W-88877-091715-TDF-03	pH	8.15	J	pH units
B582021	W-88877-091715-TDF-04	pH	7.83	J	pH units
B582021	W-88877-091715-TDF-05	pH	8.01	J	pH units
B582021	W-88877-091715-TDF-06	pH	7.96	J	pH units
B582021	W-88877-091715-TDF-07	pH	7.65	J	pH units
B582021	W-88877-091815-TDF-08	pH	7.52	J	pH units
B582021	W-88877-091815-TDF-09	pH	7.45	J	pH units
B582021	W-88877-091815-TDF-10	pH	7.33	J	pH units
B588841	WG-88877-05102015-TE-01	pH	7.85	J	pH units
B588841	WG-88877-05102015-TE-02	pH	7.98	J	pH units



Memorandum

To: Rose Marie Rocca, Thomas Elliott

Ref. No.: 088877

From: Airesse MacPhee/al/2

Date: April 19, 2016

Re: Data Quality Assessment and Validation

Laboratory: Maxxam Analytics International Corporation

Date(s) Sampled: January 29,
February 15, 2016

Lab Job No.: B607136, B612278

Sampled By: James Stewart

Media Sampled: Groundwater, Surface Water

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☐	☐	☒
Field Blank (blind)	Non-detect	☐	☐	☐	☒
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: AM			

The following results are qualified based on holding time exceedance:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B607136	SW-88877-290116-JS-01	Hydrogen sulfide	0.0080	J	mg/L
B607136	SW-88877-290116-JS-01	pH	7.63	J	pH units
B607136	SW-88877-290116-JS-01	Sulfide	0.0078	J	mg/L
B612278	WG-88877-150216-JS-01	Nitrate (as N)	0.15	J	mg/L
B612278	WG-88877-150216-JS-02	Nitrate (as N)	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-01	Nitrite (as N)	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-02	Nitrite (as N)	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-01	Nitrite/Nitrate	0.15	J	mg/L
B612278	WG-88877-150216-JS-02	Nitrite/Nitrate	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-01	Orthophosphate	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-02	Orthophosphate	0.10	UJ	mg/L
B612278	WG-88877-150216-JS-01	pH	7.14	J	pH units
B612278	WG-88877-150216-JS-02	pH	7.85	J	pH units

The following results are qualified based on method blank detections:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B612278	WG-88877-150216-JS-01	Cyanide (total)	0.00057	U	mg/L
B612278	WG-88877-150216-JS-02	Cyanide (total)	0.00054	U	mg/L

Notes:

- J - Estimated concentration
- UJ - Non-detect with an Estimated Report Limit
- U - Not Detected
- N - Nitrogen

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B588841	WG-88877-05102015-TE-03	pH	7.73	J	pH units
B588841	WG-88877-05102015-TE-04	pH	8.03	J	pH units
B588841	WG-88877-05102015-TE-05	pH	8.13	J	pH units
B588841	WG-88877-06102015-TE-07	pH	7.48	J	pH units
B588841	WG-88877-06102015-TE-08	pH	8.00	J	pH units
B588841	WG-88877-06102015-TE-09	pH	8.16	J	pH units
B588841	WS-88877-05102015-TE-06	pH	8.18	J	pH units
B588841	WS-88877-06102015-TE-10	pH	7.54	J	pH units
B588841	WS-88877-06102015-TE-11	pH	7.46	J	pH units
B582021	W-88877-091715-TDF-01	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-02	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-03	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-04	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-05	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-06	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-07	Orthophosphate	0.10	UJ	mg/L
B582021	W-88877-091715-TDF-01	Total dissolved solids (TDS)	146	J	mg/L
B582021	W-88877-091715-TDF-03	Total dissolved solids (TDS)	292	J	mg/L
B582021	W-88877-091715-TDF-04	Total dissolved solids (TDS)	78	J	mg/L
B582021	W-88877-091715-TDF-05	Total dissolved solids (TDS)	108	J	mg/L
B582021	W-88877-091715-TDF-06	Total dissolved solids (TDS)	100	J	mg/L
B582021	W-88877-091715-TDF-07	Total dissolved solids (TDS)	52	J	mg/L
B588841	WS-88877-06102015-TE-10	Total suspended solids (TSS)	4.0	UJ	mg/L
B588841	WS-88877-06102015-TE-11	Total suspended solids (TSS)	4.0	UJ	mg/L

The following results are qualified based on method blank detections:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091715-TDF-02	Cyanide (total)	0.00080	U	mg/L
B582021	W-88877-091715-TDF-03	Cyanide (total)	0.00119	U	mg/L
B582021	W-88877-091715-TDF-04	Cyanide (total)	0.00091	U	mg/L
B582021	W-88877-091715-TDF-05	Cyanide (total)	0.00057	U	mg/L
B582021	W-88877-091715-TDF-06	Cyanide (total)	0.00056	U	mg/L

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091715-TDF-07	Cyanide (total)	0.00054	U	mg/L
B582021	W-88877-091815-TDF-08	Cyanide (total)	0.00062	U	mg/L
B582021	W-88877-091715-TDF-01	Sulfide	0.0078	U	mg/L
B582021	W-88877-091715-TDF-02	Sulfide	0.0058	U	mg/L
B582021	W-88877-091715-TDF-06	Sulfide	0.0075	U	mg/L
B588841	WS-88877-05102015-TE-06	Aluminum	9.5	U	µg/L
B588841	WS-88877-06102015-TE-10	Iron	29	U	µg/L
B588841	WG-88877-05102015-TE-01	Total dissolved solids (TDS)	72	U	mg/L
B588841	WG-88877-05102015-TE-03	Total dissolved solids (TDS)	82	U	mg/L
B588841	WG-88877-06102015-TE-07	Total dissolved solids (TDS)	58	U	mg/L
B588841	WS-88877-06102015-TE-10	Total dissolved solids (TDS)	51	U	mg/L
B588841	WS-88877-06102015-TE-11	Total dissolved solids (TDS)	51	U	mg/L

The following results are qualified based on field duplicate variability:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091715-TDF-05	Ammonia-N	0.058	J	mg/L
B582021	W-88877-091715-TDF-06	Ammonia-N	0.034	J	mg/L
B582021	W-88877-091715-TDF-05	Phosphorus	0.275	J	mg/L
B582021	W-88877-091715-TDF-06	Phosphorus	0.387	J	mg/L
B582021	W-88877-091815-TDF-09	Total dissolved solids (TDS)	32	J	mg/L
B582021	W-88877-091815-TDF-10	Total dissolved solids (TDS)	44	J	mg/L
B588841	WG-88877-06102015-TE-08	Aluminum (dissolved)	16.6	J	µg/L
B588841	WG-88877-06102015-TE-09	Aluminum (dissolved)	8.5	J	µg/L
B588841	WG-88877-06102015-TE-08	Arsenic (dissolved)	0.26	J	µg/L
B588841	WG-88877-06102015-TE-09	Arsenic (dissolved)	0.42	J	µg/L
B588841	WG-88877-06102015-TE-08	Barium (dissolved)	2.1	J	µg/L
B588841	WG-88877-06102015-TE-09	Barium (dissolved)	15.5	J	µg/L
B588841	WG-88877-06102015-TE-08	Calcium (dissolved)	7.28	J	mg/L
B588841	WG-88877-06102015-TE-09	Calcium (dissolved)	17.9	J	mg/L
B588841	WG-88877-06102015-TE-08	Iron (dissolved)	17.5	J	µg/L
B588841	WG-88877-06102015-TE-09	Iron (dissolved)	6.1	J	µg/L

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B588841	WG-88877-06102015-TE-08	Magnesium (dissolved)	1.30	J	mg/L
B588841	WG-88877-06102015-TE-09	Magnesium (dissolved)	1.82	J	mg/L
B588841	WG-88877-06102015-TE-08	Manganese (dissolved)	1.8	J	µg/L
B588841	WG-88877-06102015-TE-09	Manganese (dissolved)	19.8	J	µg/L
B588841	WG-88877-06102015-TE-08	Potassium (dissolved)	0.288	J	mg/L
B588841	WG-88877-06102015-TE-09	Potassium (dissolved)	0.476	J	mg/L
B588841	WG-88877-06102015-TE-08	Alkalinity, total (as CaCO ₃)	72.0	J	mg/L
B588841	WG-88877-06102015-TE-09	Alkalinity, total (as CaCO ₃)	102	J	mg/L
B588841	WG-88877-06102015-TE-08	Bicarbonate (as CaCO ₃)	87.9	J	mg/L
B588841	WG-88877-06102015-TE-09	Bicarbonate (as CaCO ₃)	124	J	mg/L
B588841	WG-88877-06102015-TE-08	Conductivity	251	J	µS/cm
B588841	WG-88877-06102015-TE-09	Conductivity	309	J	µS/cm
B588841	WG-88877-06102015-TE-08	Hardness (dissolved)	23.5	J	mg/L
B588841	WG-88877-06102015-TE-09	Hardness (dissolved)	52.2	J	mg/L
B588841	WG-88877-06102015-TE-08	Nitrate (as N)	0.77	J	mg/L
B588841	WG-88877-06102015-TE-09	Nitrate (as N)	1.11	J	mg/L
B588841	WG-88877-06102015-TE-08	Nitrite/Nitrate	0.77	J	mg/L
B588841	WG-88877-06102015-TE-09	Nitrite/Nitrate	1.11	J	mg/L
B588841	WG-88877-06102015-TE-08	Nitrogen	0.990	J	mg/L
B588841	WG-88877-06102015-TE-09	Nitrogen	1.31	J	mg/L
B588841	WG-88877-06102015-TE-08	Phosphorus	0.0184	J	mg/L
B588841	WG-88877-06102015-TE-09	Phosphorus	0.0108	J	mg/L
B588841	WG-88877-06102015-TE-08	Total dissolved solids (TDS)	158	J	mg/L
B588841	WG-88877-06102015-TE-09	Total dissolved solids (TDS)	204	J	mg/L

The following results are qualified based on laboratory duplicate variability:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091715-TDF-01	Aluminum (dissolved)	10.6	J	µg/L
B582021	W-88877-091715-TDF-02	Aluminum (dissolved)	9.9	J	µg/L
B582021	W-88877-091715-TDF-03	Aluminum (dissolved)	17.2	J	µg/L
B582021	W-88877-091715-TDF-04	Aluminum (dissolved)	127	J	µg/L
B582021	W-88877-091715-TDF-05	Aluminum (dissolved)	9.6	J	µg/L
B582021	W-88877-091715-TDF-06	Aluminum (dissolved)	9.8	J	µg/L
B582021	W-88877-091715-TDF-07	Aluminum (dissolved)	9.0	J	µg/L
B588841	WS-88877-05102015-TE-06	Copper	0.53	J	µg/L
B588841	WS-88877-06102015-TE-10	Copper	0.67	J	µg/L
B588841	WG-88877-05102015-TE-01	Zirconium (dissolved)	0.50	UJ	µg/L

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B588841	WG-88877-05102015-TE-02	Zirconium (dissolved)	0.50	UJ	µg/L
B588841	WG-88877-05102015-TE-03	Zirconium (dissolved)	0.50	UJ	µg/L
B588841	WG-88877-05102015-TE-04	Zirconium (dissolved)	3.67	J	µg/L
B588841	WG-88877-05102015-TE-05	Zirconium (dissolved)	0.50	UJ	µg/L
B588841	WG-88877-06102015-TE-07	Zirconium (dissolved)	0.50	UJ	µg/L
B588841	WG-88877-06102015-TE-08	Zirconium (dissolved)	0.50	UJ	µg/L
B588841	WG-88877-06102015-TE-09	Zirconium (dissolved)	0.50	UJ	µg/L

The following results are qualified based on laboratory control sample recovery:

Lab Report #	Sample ID	Analyte	Result	Qualifier	Units
B582021	W-88877-091815-TDF-09	trans-1,3-Dichloropropene	1.0	UJ	µg/L

Notes:

- J - Estimated concentration
- UJ - Non-detect with an Estimated Report Limit
- U - Not Detected
- N - Nitrogen

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