2019 Groundwater Monitoring Report

Warsaw Road Landfill Site
(PC of A A340902)
Township of Douro-Dummer
County of Peterborough

GHD | 347 Pido Road Unit 29 Peterborough Ontario K9J 6X7 Canada

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Enclosures

1. Introduction

The following report presents the results of the 2019 groundwater monitoring program completed for the Warsaw Road Landfill Site in the Township of Douro-Dummer (formerly Township of Douro), County of Peterborough. The monitoring program was conducted in accordance with the scope of work as presented by our proposal dated January 15, 2009 as well as additional requirements outlined in the Ministry of the Environment, Conservation and Parks (MECP) review of AECOM Canada Ltd. Warsaw Road Landfill Site "2008 Annual Monitoring Report" and subsequent Memorandum dated January 16, 2012.

2. Background

The Warsaw Road Landfill Site is situated along the south side of County Road No. 4, 6 km southwest of the community of Warsaw. The Geologic Plan, Plate 1, illustrates the location of the landfill with respect to surrounding roads and watercourses. The property is described as a 2.0 hectare (ha) refuse footprint situated within a 2.43 ha property in Part of Lot 8, Concession 5 in the Township of Douro-Dummer.

Details regarding the operation of the landfill are outlined in the Provisional Certificate of Approval (PC of A) No. A 340902 dated September 17, 1978, an amendment to the PC of A for continued operation was issued on September 30, 1994. A second PC of A was issued on June 22, 1996 for the final closure of the site. A C of A was issued by the MOE on June 13, 2004 for a passive landfill gas venting system at the Warsaw Road Landfill Site. Copies of the PC of As are presented in Appendix A along with the aforementioned MECP Memorandum.

Background data pertaining to the site was from the AECOM Canada Ltd. (AECOM) 2008 report obtained late in 2009.

Reference is made to the following background documents associated with the Warsaw Road Landfill Site:

1. Current PC's of A issued by the MECP (Appendix A);
2. Excerpts from a report prepared by Hydroterra Limited regarding details of the monitoring well construction and borehole records (Appendix B);
3. MECP well record abandonment for monitors TW-3-1, TW-4-1 and TW-8-1 (Appendix B);
4. Monitoring program and sampling protocol established for the landfill site by the former Township of Douro (Appendix C); and
5. Reports prepared by AECOM dated 2007 and 2008 and Geo-Logic from 2009 to the present related to past monitoring programs.

3. Site Conditions

3.1 General Geology

The site is situated in an area within the physiographic region known as the Peterborough Drumlin Field (Chapman and Putnam, 1984). This region is characterized by relatively northeast-southwest trending drumlin features. Bedrock underlying the site consists of limestone, with the minor shale of the Middle Ordovician Trenton-Black River Group.

Surface drainage at the site is generally southwest towards a tributary of June's Creek which eventually outlets into the Indian River situated approximately 3.5km southeast of the site.

3.2 Monitoring Program

3.2.1 Groundwater

The groundwater monitoring network consists of eight (8) monitors locations, designated as TW 4 (located up-gradient, northwest of the landfill); TW 7 (located at the southerly refuse perimeter); TW 3, TW 2, TW 6, TW 8 and TW 9 (located within the down-gradient attenuation zone); and TW 5 (located on the east side Douro Fourth Line). Monitor TW 9 has routinely been dry or contains too little water for sampling.

Previously, monitoring locations were multi-depth well installations but over time, the bedrock monitors identified as "–1", were sealed to prevent upward migration of mineralized water. Monitors TW 2 and TW 3-2 are constructed of 32mm diameter PVC pipe while the remaining monitors are 50mm diameter PVC pipe.

Residential wells RW-1, RW-2, RW-3 and RW-4 are included in the sampling circuit every three (3) years including the 2017 monitoring circuits. Installation information and construction particulars for the monitoring wells are presented in Appendix B. Locations of the monitors are depicted on the Site Plan, Plates 2A and 2B. More specific details of the ground surface including topography and vegetation are illustrated on Plates 2C and 2D.

3.2.2 Surface Water

The surface water monitoring network comprises of four stations, DSW 9 (situated southwest of the landfill); DSW 7 and DSW 17 (within the attenuation zone); DSW 11 (an unnamed water course). The location of the surface water locations is depicted on the Site Plan, Plate 2B through to 2D.

3.2.3 Landfill Gas

The landfill gas-monitoring network involves the groundwater monitors listed in section 3.2.1 (sampled twice per year), and six gas probes (GP 1, GP 2, GP 3, GP 4, GP 5, GP 6). The location of the gas probes is depicted on the Site Plan, Plate 2A.

3.3 Pattern of Groundwater Movement

Groundwater monitoring was conducted during two sampling circuits in 2019. The water level data was acquired on May 31 and October 25, 2019. The measurements are presented on Plate 4 and summarized in Table 3.1. Historical elevation data was obtained from the AECOM 2007-2008 monitoring report and Geo-Logic 2009-2019 monitoring reports for comparison purposes. The groundwater existed at elevations that ranged from 93.46m (TW 3-2) to 104.72m (TW 4-2) in May 2019 and from 93.10m (TW 3-2) to 102.53 m (TW 4-2) in October of 2019.

The groundwater monitoring data for 2019 is presented on Plate 3.1. Based on the data, the pattern of shallow groundwater movement appears to be in a southwesterly direction with higher water levels in TW 4-2 and TW 7 than in the down-gradient attenuation lands. Water levels were relatively similar to other years. Historical data from Cambium Environmental (1997-2006) and AECOM Canada Ltd. (2007-2008) are included in Appendix D.

Table 3.1 2019 Water Level Summary

Monitor Number	Elevation Top of Casing	Water Level Elevation	
		May 31, 2019	October 25, 2019
TW 2	96.96	95.71	95.48
TW 3-2	93.73	93.46	93.10
TW 4-2	105.04	104.72	102.53
TW 5-2	95.98	95.70	95.39
TW 6-2	96.86	95.16	94.84
TW 7	100.35	96.70	96.02
TW 8-2	96.29	---	95.04
TW 9-2	96.10	dry	dry

Notes: All measurements are presented in metres. Monitor top of casing elevations provided by TSH. Elevations are referenced to an assumed benchmark of 100.00 metres.

3.4 Hydraulic Conductivity

The hydraulic conductivity of a soil is described as a measure of the soil's ability to transmit water. Slug tests were performed on four (4) wells in order to assess the permeability at the representative elevations on site in 2009. TW 2 and TW 7 are screened in the shallow overburden, TW 6-2 is screened in the mid-level overburden, while TW 5-2 is screened in the deeper overburden. Table 3.2 summarizes the results of slug tests performed at the site.

Table 3.2 Warsaw Road Hydraulic Conductivity

Location	Test Type	Hydraulic Conductivity (cm/s)	Geometric Mean K (cm/s)	Representative Aquifer
TW 2	Rising Head	2.06E-03	2.06E-03	Silty Sand
TW 5-2 TW 5-2	Falling Head Rising Head	9.15E-03 3.23E-03	5.43E-03	Silty Sand Silty Sand
TW 6-2 TW 6-2	Falling Head Rising Head	1.26E-01 4.30E-02	7.37E-02	Clean Sand Silty Sand, Clean Sand
TW 7 TW 7	Falling Head Rising Head	6.60E-03 1.57E-03	3.22E-03	Silty Sand Silty Sand

4. Sampling/Monitoring Program

GHD followed the established sampling and monitoring protocol for the Warsaw Road Landfill Site. Details of this protocol are summarized in Appendix C. An overview of the protocol is presented below.

1. Fieldwork was carried out at all groundwater monitoring stations during the spring and fall season. Monitor TW 9-2 provided insufficient water for sampling during both sampling periods.
2. The four (4) surface water stations were sampled during the spring circuit while three (3) were dry in the fall.
3. Methane gas and hydrogen sulphide was measured at each monitoring well using a 4 gas meter during both sampling periods. The six gas probes were measured five (5) times during 2019.
4. Water levels were then recorded for each groundwater monitor prior to well purging.
5. Three to five measured casing volumes were then removed from each monitor in order to ensure that representative groundwater samples were obtained.
6. In-situ chemical analyses were carried out during the purging operation in order to determine a stabilized water quality condition. The in-situ testing included temperature, conductivity, ORP, H_2S and pH.
7. After the purging operation, representative samples of groundwater were collected in proper containers with appropriate preservatives where needed.
8. The water samples were then delivered to SGS Laboratories in Lakefield for both sampling circuits.
9. Slug testing on representative wells to determine hydraulic conductivity values were completed in 2009. The testing was requested by the (MECP) review (dated December 29, 2008) of the Warsaw Road Landfill 2007 Monitoring Report prepared by AECOM Canada Ltd. Hydraulic Gradients were calculated using well locations and groundwater elevations.

5. Water Quality Data

5.1 General

Representative groundwater samples from each of the monitors were subjected to chemical testing for specified parameters. The parameters tested for included the parameters in Column 3 (Comprehensive List for Surface Water) of Schedule 5 in the Landfill Standards: A Guideline on Regulatory and Approval Requirements for New or Expanding Sites as well as for Column 1 metals. In addition, samples from TW 7 were analyzed for volatile organic compounds to evaluate any trends that may develop over time. Each surface water station was sampled for the parameters listed in Column 3 of Schedule 5 of the Landfill Standards Guideline (Comprehensive List for Surface Water).

5.2 Groundwater Monitors

The sampling monitors are divided into up-gradients background monitor (TW 4-2), landfill monitor (TW 7) and down-gradients monitors (TW 2, TW 3-2, TW 5-2, TW 6-2, TW 8-2 and TW 9-2). Monitor TW 9-2 contained insufficient water for sampling during both sampling circuits. A list of the wells that had parameters that exceeded the Ontario Drinking Water Standards (ODWS or PWQO) for the 2019 spring and fall sampling periods is listed below.

Parameter	
Spring	
TDS	All Wells
Iron	TW 2, TW-3-2, TW-7
Manganese	TW 2, TW-3-2, TW-7
Phenolics	TW-5-2
Alkalinity	TW-5-2
Phosphorus	TW 2, TW 3-2, TW 5-2, TW 7
Fall	
TDS	All Wells
Iron	TW 2, TW 3-2, TW 7
Manganese	TW 2, TW 3-2, TW 6-2, TW 7
Phenolics	TW-2 TW 4-2, TW 7
Phosphorus	TW-7

Some wells showed exceedances for TDS, Iron, Manganese, Phenolics and Phosphorus. Total dissolved solids (TDS), manganese and iron have been historically elevated in these monitors in the past. Iron has been historically elevated for the general area.

Phosphorus levels in some wells marginally exceeded the PWQO in some wells in the spring and only marginally in one well in the fall. This should be monitored in future monitoring events. Phenolics showed marginal exceedances in one (1) well in the spring and three (3) different wells in the fall. The chemical results from the monitoring wells have been summarized in Tables 5.1 and 5.2. The data is presented with the ODWS and PWQO criteria for comparison purposes. The results indicate less parameter exceedances of the ODWS or PWQO as in the previous year.

Chemical comparison graphs for iron, manganese, conductivity and chloride are presented in Appendix D. The graphs indicate similar results as in previous years with the exception of chloride that appears to be slightly trending upwards even in the background monitor. Although the levels are well within the ODWS and have shown no increases at the surface water locations chloride should still be monitored in the future to see if this trend continues. The certificates of analysis are included in Appendix E.

Table 5.1 2019 Spring Groundwater Quality Summary

PARAMETERS	Warsaw Road Landfill Site Monitors							Ontario Drinking Water Standards	PWQO
	TW 2	TW 3-2	TW 5-2	TW 6-2	TW 7	TW 8-2	TW 4-2 Background		
May 31, 2019									
BOD	4	< 4	< 4	< 4	< 4	Dry	< 4	---	---
TSS	1770	150	140	22	931		50	---	---
Alkalinity	407	366	2340	386	332		276	30-500	---
pH	7.41	7.30	8.05	7.91	7.83		8.02	6.5-8.5	6.5-8.5
Conductivity	933	962	1010	917	1040		878	---	---
TDS	611	563	571	509	571		529	500	---
COD	37	24	< 8	< 8	< 8		< 8	---	---
Phosphorus	0.74	0.23	0.19	< 0.03	0.42		< 0.03	---	0.03
TKN	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 0.5	---	---
Ammonia	< 0.1	< 0.1	< 0.1	< 0.1	0.5		< 0.1	---	3.3**
Phenolics	0.001	< 0.001	0.002	< 0.001	< 0.001		< 0.001	---	0.001
Sulphate	< 2	23	8	10	2		6	500	--
Chloride	99	87	160	76	130		130	250	---
Nitrite	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		< 0.03	1.0	---
Nitrate	< 0.06	0.08	0.31	0.10	0.21		1.35	10	---
Mercury	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	0.001	
Arsenic	0.0007	0.0006	< 0.0002	<0.0002	0.0006		< 0.0002	0.002	0.05
Barium	0.139	0.113	0.166	0.109	0.105		0.0503	200	---
Boron	0.015	0.099	0.016	0.055	0.128		0.010	1.0	0.2
Calcium	166	148	131	148	173		126	---	---
Cadmium	0.000014	0.000005	<0.000003	0.000004	0.000073		0.000005	0.005	0.0002
Chromium	0.00025	0.00027	0.00015	0.00015	0.00117		0.00099	0.05	---
Copper	0.0004	0.0005	0.0008	0.0014	0.0024		0.0006	1.0	0.005
Iron	1.50	1.21	< 0.007	< 0.007	2.03		0.021	0.3	0.3
Potassium	0.840	5.98	1.20	5.67	4.34		0.521	---	---
Magnesium	8.98	9.53	7.85	6.70	20.2		3.78	---	---
Manganese	0.550	0.277	0.00005	0.0122	0.587		0.00012	0.05	0.05
Sodium	48.9	42.9	57.6	31.3	48.0		52.2	200	---
Lead	0.00003	0.00005	<0.00001	<0.00001	0.01074		<0.00001	0.01	0.005
Zinc	0.004	0.009	< 0.002	0.002	0.032		0.003	5.0	0.03

Notes: All results in mg/L with the exception of Conuctivity (uS/cm), Mercury (ug/L), and pH
Highlighted indicates an exceedance of the ODWS and/or PWQO.

Table 5.2 2019 Fall Groundwater Quality Summary

PARAMETERS	Warsaw Road Landfill Site Monitors							Ontario Drinking Water Standards	PWQO
	TW 2	TW 3-2	TW 5-2	TW 6-2	TW 7	TW 8-2	TW 4-2 Background		
Oct. 5, 2017									
BOD	< 4	< 4	< 4	< 4	< 4	< 4	< 4	---	---
TSS	2	2	< 2	2	7	2	< 2	---	---
Alkalinity	249	382	289	360	331	309	283	30-500	---
pH	7.72	7.79	7.88	7.37	7.81	7.95	7.89	6.5-8.5	6.5-8.5
Conductivity	1160	1040	953	1160	1030	997	1060	---	---
TDS	871	654	529	663	597	566	686	500	---
COD	34	30	< 8	< 8	9	< 8	< 8	---	---
Phosphorus	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	---	0.03
TKN	0.6	0.6	< 0.5	1.2	0.9	< 0.5	< 0.5	---	---
Ammonia	< 0.1	0.1	< 0.1	1.0	0.8	< 0.1	< 0.1	---	3.3**
Phenolics	0.005	< 0.001	< 0.001	< 0.001	0.004	< 0.001	0.002	---	0.001
Sulphate	40	26	14	< 2	< 2	13	8	500	--
Chloride	210	100	130	160	140	140	160	250	---
Nitrite	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	1.0	---
Nitrate	< 0.06	< 0.06	0.24	1.14	< 0.06	< 0.06	2.50	10	---
Mercury	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.001	
Arsenic	0.0005	0.0008	< 0.0002	0.0002	0.0009	< 0.0002	0.0002	0.002	0.05
Barium	0.145	0.122	0.151	0.145	0.139	0.210	0.0582	200	---
Boron	0.016	0.140	0.022	0.065	0.099	0.027	0.014	1.0	0.2
Calcium	175	164	128	171	145	134	152	---	---
Cadmium	0.000021	0.000014	<0.000003	0.000016	<0.000003	<0.000003	0.000337	0.005	0.0002
Chromium	0.00024	0.00035	0.00010	0.00012	0.00019	0.00015	0.00027	0.05	---
Copper	0.0027	0.0014	0.0010	0.0018	0.0003	0.0005	0.0005	1.0	0.005
Iron	0.605	1.08	0.009	0.029	4.13	0.100	0.011	0.3	0.3
Potassium	0.560	6.74	1.40	8.69	4.63	1.69	0.687	---	---
Magnesium	8.03	11.5	8.02	9.89	13.4	11.1	4.92	---	---
Manganese	0.0887	0.282	0.00248	0.0796	1.27	0.0259	0.00065	0.05	0.05
Sodium	68.8	53.4	64.8	70.5	63.6	62.0	62.9	200	---
Lead	0.00005	0.00010	<0.00001	0.00006	0.00005	0.00002	0.00013	0.01	0.005
Zinc	0.003	0.004	< 0.002	0.004	0.002	< 0.002	0.004	5.0	0.03

Notes: All results in mg/L with the exception of Conuctivity (uS/cm) and pH
Highlighted indicates an exceedance of the ODWS and/ or PWQO.

In addition to the above analysis, monitor TW 7 was sampled for volatile organic compounds (VOCs) analysis during both sampling circuits. In both circuits all VOC parameters were reported with values below their respective detection limits. These certificates of analysis are also included in Appendix E.

A MECP memorandum indicated “that any groundwater locations that discharge to surface water should be identified and compared to the PWQO”. The groundwater at all monitoring wells, with the exception of TW 4-2, potentially discharges to surface water. TW 3-2 is immediately up-gradient of DSW-9 while TW-2, TW 5-2 and TW 8-2 are immediately up-gradient of DSW-17, and TW-6-2 is up-gradient of DSW 7. Since TW 4-2 is the background monitor it was also analyzed for Column 3 of Schedule 5 parameters for comparative purposes.

5.3 Surface Water Monitors

Surface water samples were collected during both the May and October sampling period. In-field measurements were taken at the surface water station as presented in Table 5.2. Only DSW11 had water in the fall as the remainder were dry. The MECP has recommended their recent review that “If ponded conditions are representative of the nature of the surface water feature, sampling should be undertaken”. The wells were dry not ponded in the fall.

Table 5.2 2019 Surface Water Field Measurements

Parameter	Field Measurement							
	DSW 7		DSW 9		DSW 11		DSW 17	
	May 31, 2019	Oct. 25, 2019	May 31, 2019	Oct. 25, 2019	May 31, 2019	Oct. 25, 2019	May 31, 2019	Oct. 25, 2019
Temperature (°C)	12.8	dry	14.5	dry	15.0	8.6	14.0	dry
pH	7.97		7.61		7.76	5.80	7.89	
Conductivity (us/cm)	561		698		460	522	731	
Dissolved Oxygen (mg/L)	9.30		7.40		5.60	5.93	6.67	
Hydrogen Sulphide	0		0		0	---	0	
ORP	139		160		153	22.4	3.6	

The surface water samples were submitted for analysis of Column 3, Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Water). All of the parameters tested are within their respective current PWQO with the exception of TDS, Phosphorus, Phenolics, Iron and Manganese. DSW 9 showed the majority of the exceedances. DSW 9 is a pond in the middle of the pasture field that is down-gradient of DSW7 and DSW 11 which did not show similar results.

There were less exceedances in 2019 as there were in 2018 especially in DSW 7. Phenols showed minor exceedances more often this year were it has not in the past. This should be monitored in the future. The results of the sampling are summarized on Table 5.3 with the certificates of analysis presented in Appendix E.

Table 5.3 Leachate Indicator Parameters 2019 Surface Water Quality Results

Parameters	Surface Water Locations								Ontario Drinking Water Standards	PWQO
	DSW 7		DSW 9		DSW 11		DSW 17			
	May 31 2019	Oct. 25 2019	May 31 2019	Oct. 25 2019	May 31 2019	Oct. 25 2019	May 31 2019	Oct. 25 2019		
BOD	< 4	dry	13	dry	< 4	< 4	< 4	dry	---	---
TSS	< 2		23		27	<2	5		---	---
Alkalinity	282		239		237	250	324		30-500	---
pH	8.24		8.48		8.35	7.94	8.35		6.5-8.5	6.5-8.5
Conductivity	702		770		529	678	881		---	---
TDS	423		511		346	440	534		500	---
COD	< 8		53		29	52	34		---	---
Phosphorus	<0.003		0.398		0.013	0.017	0.035		---	0.02
TKN	< 0.5		1.5		< 0.5	0.8	< 0.5		---	---
Ammonia	< 0.1		0.6		< 0.1	< 0.1	< 0.1		---	3.3**
Phenolics	< 0.001		0.009		0.002	0.003	0.007		---	0.001
Sulphate	6		< 2		< 2	< 2	< 2		500	--
Chloride	64		64		36	64	100		250	---
Nitrite	< 0.03		< 0.03		< 0.03	< 0.03	< 0.03		1.0	---
Nitrate	< 0.06		0.08		< 0.06	< 0.06	< 0.06		10	---
Mercury	< 0.01		< 0.01		< 0.01	< 0.01	< 0.01		200	---
Arsenic	<0.0002		0.0005		0.0003	0.0005	0.0004		1.0	0.2
Barium	0.0764		0.0798		0.0304	0.0421	0.0891		200	---
Boron	0.051		0.073		0.017	0.017	0.066		1.0	0.2
Calcium	109		115		89.4	112	131			---
Cadmium	<0.000003		0.000021		<0.000003	<0.000003	0.000010		0.005	0.0002
Chromium	< 0.00008		0.00019		< 0.00008	0.00015	0.00013		0.05	---
Copper	0.0003		0.0025		0.0002	0.0005	0.0006		1.0	0.005
Iron	0.03		0.988		0.03	0.047	0.086		0.3	0.3
Potassium	3.75		10.2		0.937	2.29	5.18		---	---
Magnesium	6.29		9.38		3.55	4.40	8.20		---	---
Manganese	0.0266		1.29		0.00565	0.0129	0.0784		0.05	0.05
Sodium	28.4		31.0		19.2	27.2	58.7		200	---
Lead	< 0.00001		0.00020		< 0.00001	<0.00001	0.00006		0.01	0.005
Zinc	< 0.002		0.009		< 0.002	0.003	0.003		5.0	0.03

Notes: All results in mg/L with the exception of Conductivity (uS/cm) and pH.

Highlighted indicates an exceedance of the ODWS and/or PWQO.

5.3.1 Surface Water Trigger Mechanism

Trigger mechanism established for this site is based on 8 consecutive samples that the analysis shows that one of the trigger parameters exceed the 75th percentile of DSW 16 (background sample). DSW 16 values are derived from historical results as it was dry in 2019. Once this has happened, then the contingency plan is triggered. Only sample sites DSW 7 and DSW 17 are used as trigger sites. Trigger parameters are set as chloride, conductivity, iron, and manganese. Tables 5.4 and 5.5, compares parameters to values for the trigger sites for the last 8 sampling periods. No parameter has exceeded the trigger value for the 8 consecutive periods. Therefore, the contingency plan is not triggered.

Table 5.4 Surface Water Trigger Mechanism 2016 – 2019 DSW 7

Parameters	Trigger Value	DSW 7							
		June 2016	Oct. 2016	June 2017	Sep. 2017	June 2018	Oct. 2018	May 2019	Oct. 2019
Chloride	310	89	Dry	58	Dry	60	77	64	Dry
Conductivity	1460	766	Dry	575	Dry	797	859	702	Dry
Iron	1.77	0.067	Dry	0.348	Dry	1.37	0.990	0.03	Dry
Manganese	0.696	0.0317	Dry	0.0196	Dry	1.07	1.58	0.0266	Dry

Notes: All results in mg/L with the exception of Conductivity (uS/cm). Trigger value reported as 75th percentile of average past monitoring events.

Table 5.5 Surface Water Trigger Mechanism 2016 – 2019 DSW 17

Parameters	Trigger Value	DSW 17							
		June 2016	Oct. 2016	June 2017	Sep. 2017	June 2018	Oct. 2018	May 2019	Oct. 2019
Chloride	310	110	Dry	96	Dry	90	Dry	100	Dry
Conductivity	1460	965	Dry	810	Dry	829	Dry	881	Dry
Iron	1.77	0.056	Dry	0.090	Dry	0.598	Dry	0.086	Dry
Manganese	0.696	0.0201	Dry	0.0336	Dry	0.150	Dry	0.0784	Dry

Notes: All results in mg/L with the exception of Conductivity (uS/cm). Trigger value reported as 75th percentile of average past monitoring events.

5.4 Residential Wells

The four residential wells are sampled every three (3) years. The wells were sampled in 2017 and are not due to be sampled till 2020.

5.5 Landfill Gas Monitoring

Landfill gas monitoring was conducted at six gas probe that have been installed within and adjacent to the buried refuse area. The locations of the gas probes are depicted on Plate 2A. Hydrogen sulphide gas was not detected. Methane gas was detected in GP5 for all sampling periods. The readings ranged from 18% to 55% by volume. GP6 which in the past has recorded sporadic methane levels ranging from 0% in May to 10% in October. No methane was detected in any of the other gas probes for the 5 periods. The results of the monitoring are summarized in Table 5.7. Graphs depicting the results of methane gas monitoring for the last nine years are presented in Appendix D.

Table 5.7 2019 Warsaw Landfill Gas Monitoring

Date	GP-1	GP-2	GP-3	GP-4	GP-5	GP-6
January	0	0	0	0	18	0
February	0	0	0	0	19	1
October	0	0	0	0	38	4
November	0	0	0	0	42	7
December	0	0	0	0	55	10

6. Conclusions and Recommendations

This report presents the results of the 2019 groundwater monitoring program completed at the Warsaw Road Landfill Site in the Township of Douro-Dummer. It is our professional opinion that the groundwater level and chemical data do not indicate a significant anomaly from the results of the previous years. The majority of the parameters are within their acceptable limits with a few exceedances in the shallow monitors located adjacent to the refuse area. The results are similar to past years.

Future monitoring data should be compiled on an annual basis to evaluate any trends. Surface water sample results were also similar to previous years. The results of sampling at the trigger sampling locations were compared to background concentrations of select parameters. The results indicated that the contingency plan did not need to be activated and will not be for the foreseeable future as all 2019 results were all within the trigger values.

1. The monitoring wells and surface water locations should continue to be monitored for the parameters established in this report. Surface water stations will be sampled even if ponded or stagnant.
2. Water Quality at the residential wells should be tested in 2020 as part of the required frequency, i.e. once every 3rd year testing.
3. Sampling should continue for VOC parameters for monitor TW 7.

6.1 Signatures

We trust that this report meets with your immediate requirements. Should you have any questions, please contact our office.

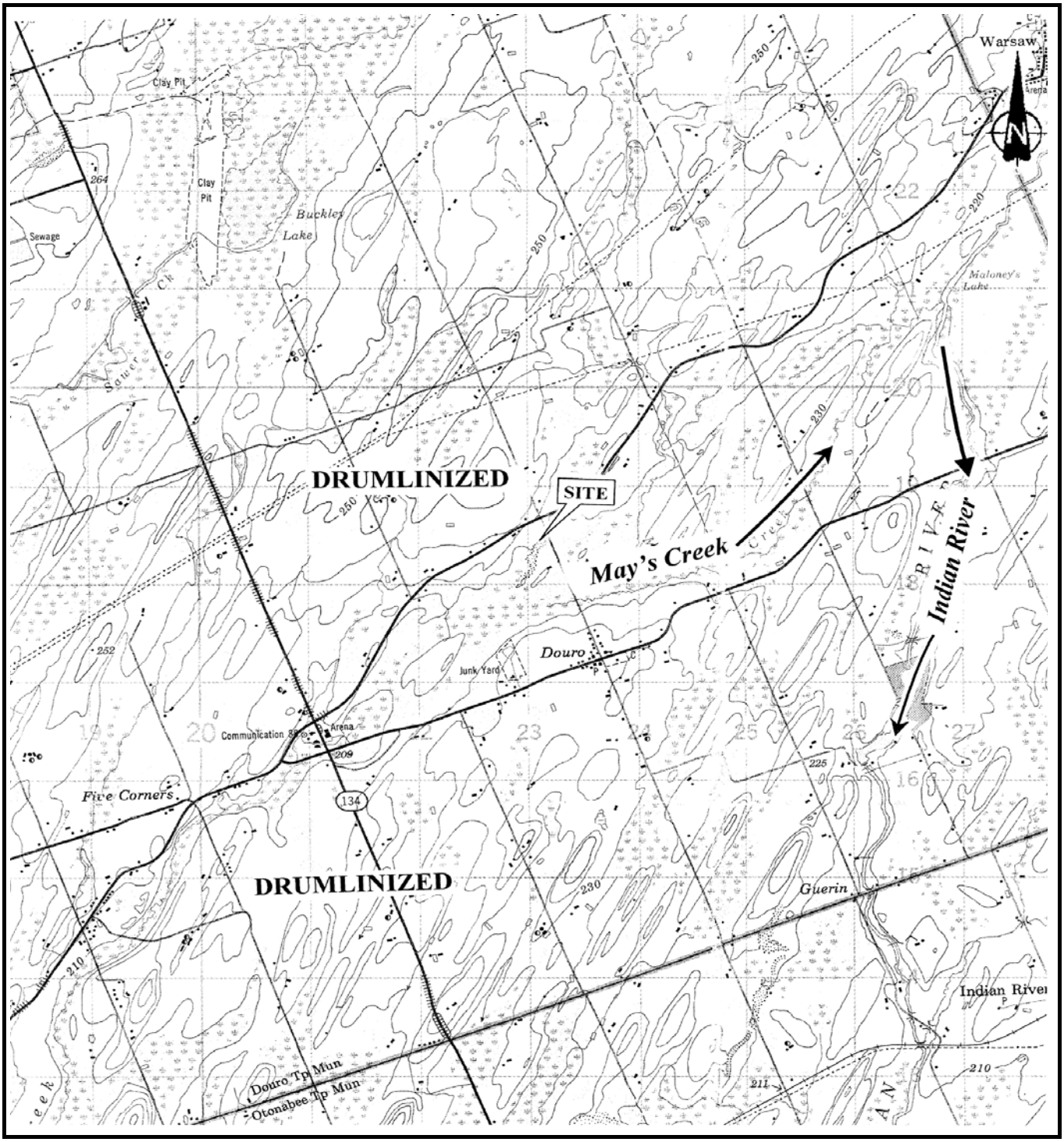
Sincerely,

GHD

Steven Gagne, H.B.Sc.

Nyle McIlveen, P.Eng.

Enclosures



Base map complied from Energy, Mines and Resources Canada Map 31 D/8 dated 1985. Air photography dated 1981.

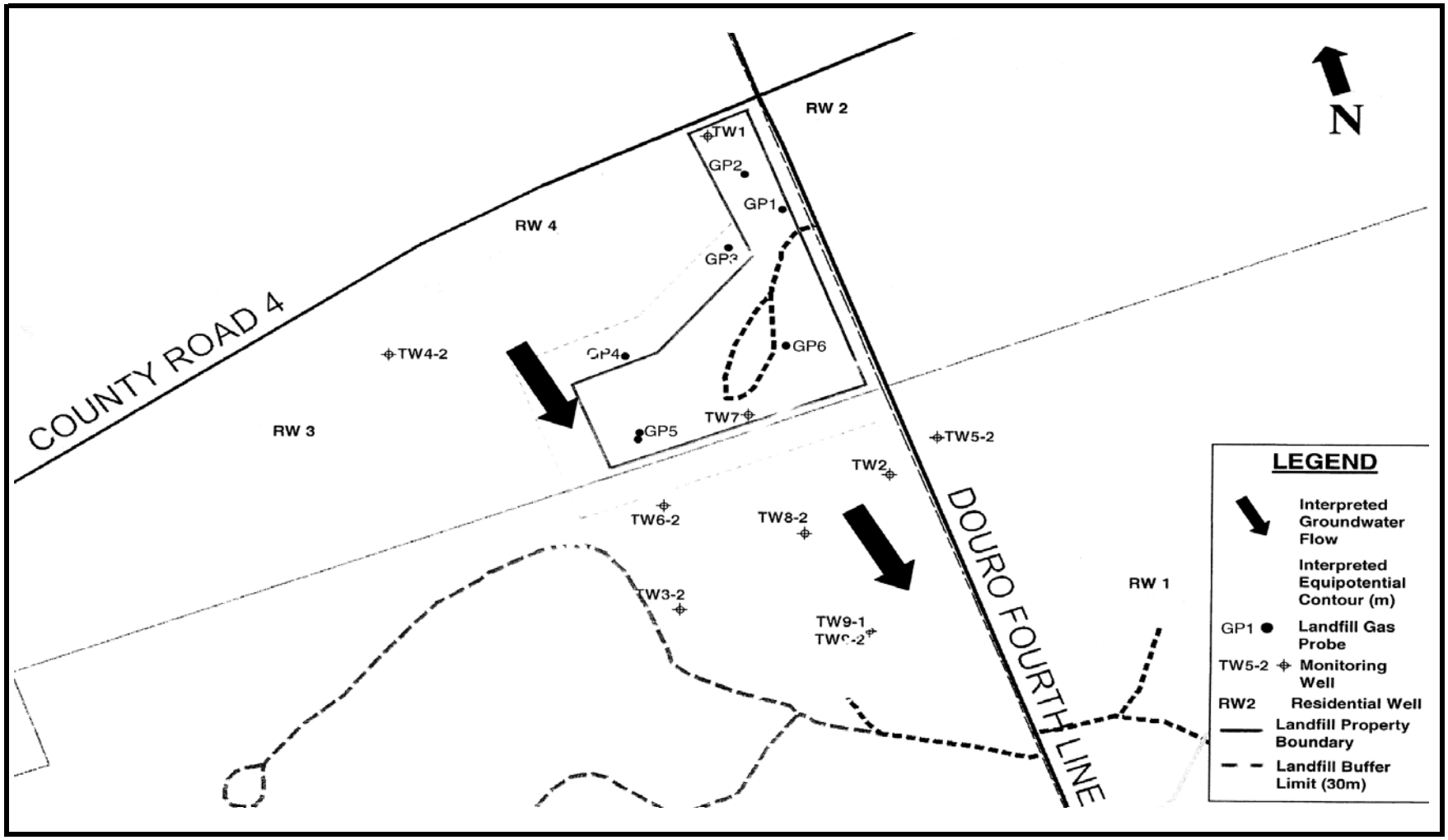
Scale:
1:50000
Coordinate System
NAD 1983 UTM

Warsaw Road Landfill
Part Lot 8, Concession 5
Township of Douro-Dummer

11193447
March 2020

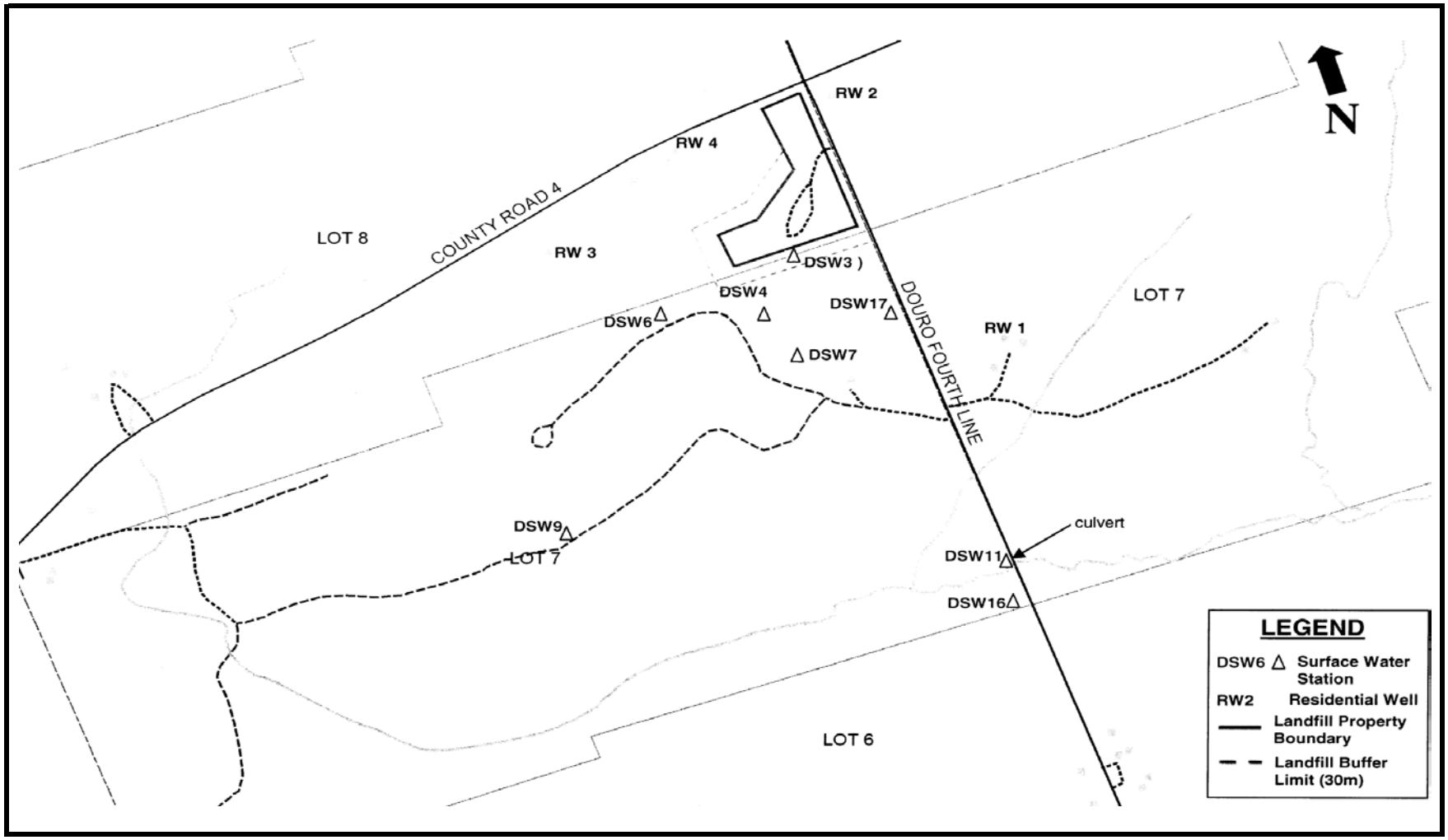
Vicinity Plan

Plate 1



Base Plan Provided By AECOM

Scale: Not To Scale Coordinate System: NAD 1983 UTM Zone 17	N	GHD	Warsaw Road Landfill Part Lot 8, Concession 5 Former Township of Douro-Dummer **Plot Plan A**	11193447 1-Mar-20 **Plate 2A**



Base Plan Provided By AECOM

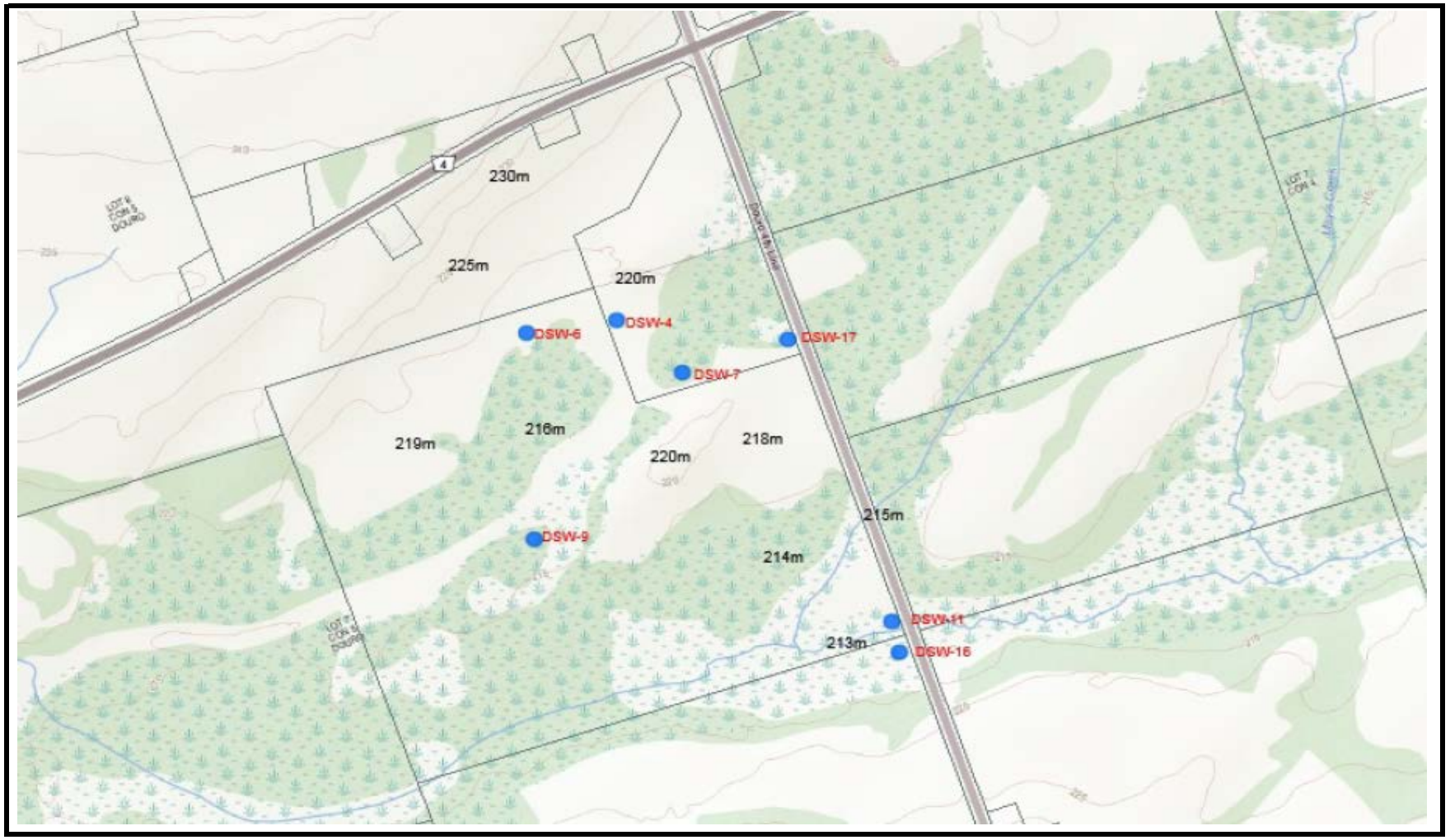
Scale:
Not To Scale
Coordinate System:
NAD 1983 UTM Zone 17

Warsaw Road Landfill
Part Lot 8, Concession 5
Former Township of Douro-Dummer

11193447
March 2020

Plot Plan B

Plate 2B



Base Plan Provided By AECOM

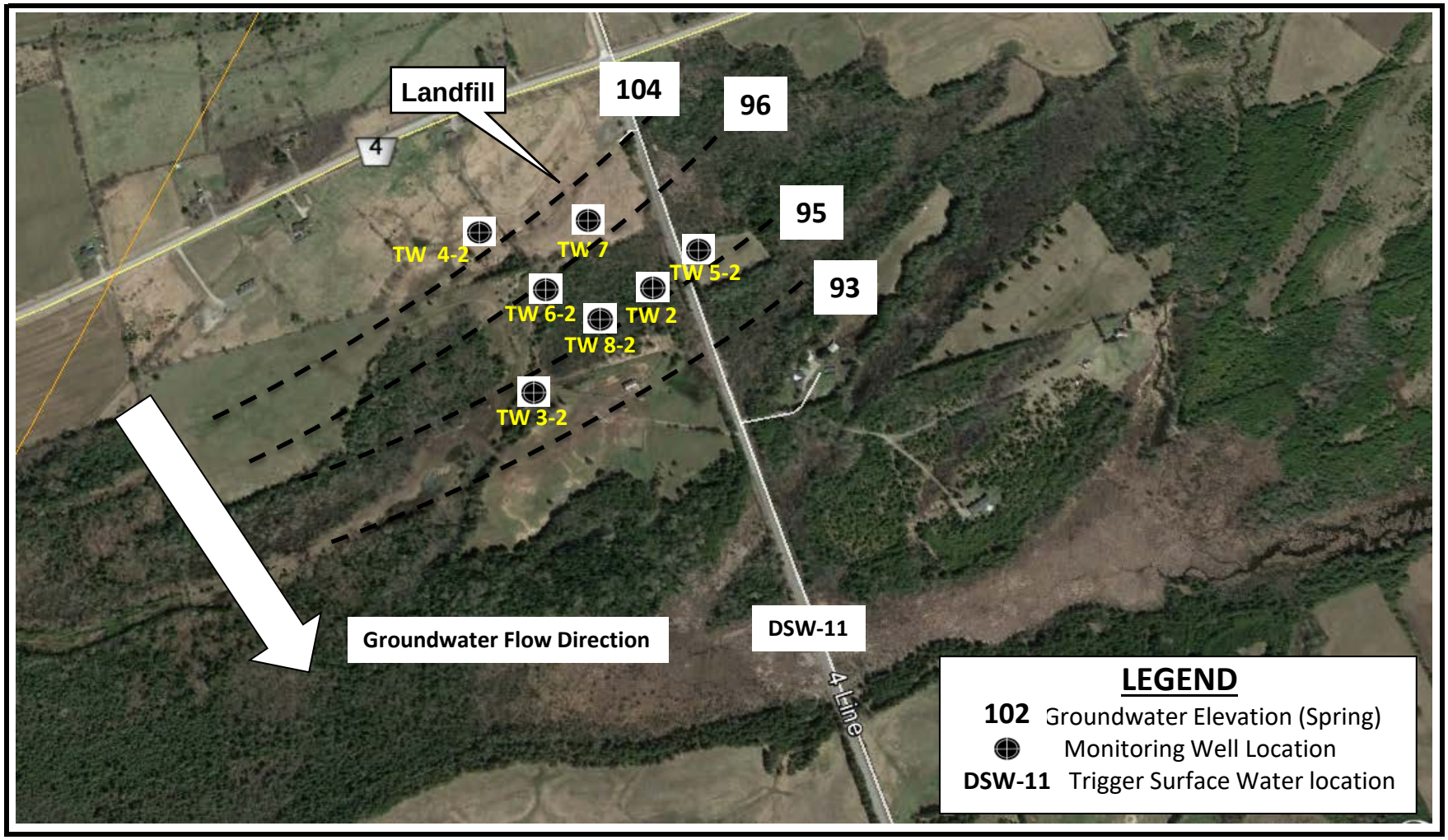
Scale:
Not To Scale
Coordinate System:
NAD 1983 UTM Zone 17

Warsaw Road Landfill
Part Lot 8, Concession 5
Former Township of Douro-Dummer

11193447
March 2020

Surface Elevation Plan

Plate 2C



Base Plan Provided By AECOM

Scale:
Not To Scale
Coordinate System:
NAD 1983 UTM Zone 17

Warsaw Road Landfill
Part Lot 8, Concession 5
Former Township of Douro-Dummer

11193447
March 2020

Groundwater Flow Plan

Plate 2D

2019 FIELD MONITORING SUMMARY

Warsaw Road Landfill Site
Township of Douro-Dummer, County of Peterborough
Project No. 11193447-01

	May 31, 2019						*October 25, 2019*					
MONITORING WELL	**Temp. (°C)**	**EC (uS/cm)**	**Methane (% CH_4)**	**pH**	**H_2S**	**ORP**	**Temp. (°C)**	**EC (uS/cm)**	**Methane (% CH_4)**	**pH**	**H_2S**	**ORP**
TW-2	9.7	738	0	7.55	0	200	11.1	915	0	6.29	0	195
TW-3-2	8.5	692	0	7.26	0	70	11.2	774	0	6.84	0	177
TW-4-2	9.5	664	0	7.71	0	34	11.1	780	0	7.14	0	172
TW-5-2	8.4	725	0	7.71	0	98	11.0	688	0	5.98	0	200
TW-6-2	9.0	686	0	7.45	0	119	22.0	839	0	6.76	0	178
TW-7	9.8	784	0	7.78	0	150	11.2	734	0	6.77	0	2
TW-8-2							10.5	727	0	6.54	0	185

Notes:
(---) indicates no data

GHD
PLATE 3

2019 WATER LEVEL MONITORING SUMMARY

Warsaw Road Landfill Site
Township of Douro-Dummer, County of Peterborough
Project No. 11193447

		May 31, 2019		October 25, 2019	
MONITORING WELL	TOP OF CASING ELEVATION (M)	WATER LEVEL FROM TOP OF CASING (M)	WATER LEVEL ELEVATION (M)	WATER LEVEL FROM TOP OF CASING (M)	WATER LEVEL ELEVATION (M)
TW-2	97.08	1.37	95.71	1.60	95.48
TW-3-2	94.83	1.37	93.46	1.73	93.10
TW-4-2	105.99	1.27	104.72	3.46	102.53
TW-5-2	96.63	0.93	95.70	1.24	95.39
TW-6-2	97.66	2.50	95.16	2.82	94.84
TW-7	100.68	3.98	96.70	4.66	96.02
TW-8-2	97.16	---	---	2.12	95.04
TW-9-2	96.38	dry	na	dry	na

Notes:
All measurments presented in metres.
MP refers to measuring point (top of protective casing) above surrounding ground surface.
(na) - indicates not available

PLATE 4

Appendix A
MOECC Provisional Certificates of Approval and Correspondence

Ministry of the Environment

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D U M

January 16, 2012

TO: Keith Jamieson
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: Beth Gilbert
Surface Water Specialist
Technical Support Section
Eastern Region

RE: 2009 & 2010 Annual Monitoring Reports
Warsaw Road Waste Disposal Site (WDS)
Douro-Dummer, Peterborough County
IDS#: 7014-85CMVP and 3120-8FVRRN

I have reviewed the above mentioned monitoring reports prepared by Geo-Logic Inc. for surface water impacts and have the following comments to offer.

Background

Comments were most recently provided on this site in a memorandum (dated July 7, 2010) authored by Mr. Mark Phillips, MOE Surface Water Scientist on the 2007 and 2008 Annual Monitoring Reports (AMR).

The WDS includes a 2 hectare fill area within a larger 2.43 hectare licensed area. The site was operated as a landfill by the Township for approximately 25 years before it was closed in 1996.

The Warsaw WDS is bounded to the south and east by a low-lying area that is wet at ground surface during most of the year. Agriculture pasture land borders the northern and western boundaries of the site. The Provincially Significant Indian River/Warsaw South Wetland surrounds the site. Drainage from the site flows to the south-southeast towards the wetland. Shallow groundwater is described as flowing in a south-easterly direction.

The surface water sampling program involves sampling at 7 locations, twice annually, for chloride, conductivity, iron, manganese, as well as field parameters: pH, temperature, and dissolved oxygen. These parameters are the basis for the trigger mechanism and are used to

determine if the landfill is impacting on surface waters. If the analysis shows that one of these parameters exceeds the 75th percentile of the background sample data (DSW16) then the contingency plan is triggered.

The AMR indicates that surface water sampling location DSW16 (downgradient from the landfill) serves as a background sampling location. DSW4 and DSW7 are located down-gradient from the landfill within the wetland. DSW17 is located downgradient from the landfill within the roadside ditch. DSW6 is located within the wetland to the west of the WDS and DSW9 is located within the wetland to the southwest of the WDS. DSW11 is located a substantial distance south of the WDS on a small creek. DSW3 was located at the foot of the landfill within the wetland, but is no longer active as it was impacted by soils which eroded during final cover placement.

The measured parameters were compared to the Provincial Water Quality Objectives (PWQOs) (MOE 1994).

2010 AMR

In 2010, three surface water stations were sampled in spring (DSW9, DSW11, DSW17) and two stations were sampled in the fall (DSW11 and DSW17). These samples were analyzed for the parameters listed in Column 4, Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Water). The remaining stations were not sampled as they were either dry or ponded. The AMR does not indicate which stations were dry and which were ponded. The contingency plan was not triggered for 2010.

Boron exceedances of the PWQO (PWQO = 0.002 mg/L) occurred in the spring and fall of 2010. Boron exceedances occurred at all stations sampled (DSW9, DSW11, DSW17). Concentrations were highest at DSW9 (0.043 mg/L). However, comparison with the draft Canadian Water Quality Guideline for boron of 1.5 mg/L (based on more up-to-date toxicolgy information) showed no exceedances and indicates that aquatic toxicity is not anticipated.

Iron concentrations were greater than the PWQO at DSW9, but only marginally greater (0.313 mg/L). With the data provided, the reviewer cannot determine whether the iron PWQO exceedance is greater than the 75th percentile at the background site. There was no explanation offered for this exceedance; however, past memos (September 23, 2004; Dec 4, 2007) indicate that the PWQO for iron has been exceeded at the background site (DSW16).

Phosphorus concentrations exceeded the PWQO of 0.03 mg/L at DSW17 and DSW 11. Concentrations ranged from 0.04-0.05 mg/L at DSW17 and from 0.01 to 0.08 mg/L at DSW11. This is not unexpected given that the site drains a nutrient rich wetland environment where phosphorus concentrations and primary productivity are expected to be high.

2009 AMR

In 2009, two surface water stations were sampled in spring and fall (DSW11 and DSW17). These samples were analyzed for the parameters listed in Column 4, Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Water). The remaining stations were not sampled as they were either dry or ponded. The AMR does not indicate which stations were dry and which were ponded. The contingency plan was not triggered for 2009.

In 2009, the only PWQO exceedance found was for phosphorus at DSW 17. Phosphorus ranged from <0.01 - 0.04 mg/L.

Comments/Recommendations

With the limited data provided, the waste disposal site does not appear to be having an impact on the water quality measured at the surface water trigger locations at this time. The measured parameters were recorded at levels below PWQO and CWQG with the exception of iron, boron, and phosphorus. Based on the iron PWQO and interim draft guideline for boron, the monitoring data suggests that concentrations of boron and iron are not at levels that are likely to be toxic to aquatic organisms. Similarly for phosphorus, these concentrations are not unexpected for a productive wetland type environment.

In both the 2009 and 2010 AMR, Geo-logic recommends that surface water monitoring locations should continue to be monitored for the parameters established in the 2008 AECOM report. I do not support this recommendation as the parameters analyzed in the 2008 AECOM report did not include a number of the parameters listed in Column 4, Schedule 5 of the Landfill Standards Guideline (Indicator List for Surface Water) including: ammonia, TKN, suspended solids, total dissolved solids, sulphate, phenol, or phosphorus. I recommend that the surface water locations should continue to be analyzed for the parameters established in the 2009 and 2010 Geo-logic AMR.

It should also be noted that the sampling station DSW3 was lost due to erosion of final cover material and has never been replaced with a suitable monitoring station located in close proximity to the waste mound – wetland interface to capture impacts associated with overland flow and/or groundwater discharge as requested in a previous memo from Mr. Mark Phillips, dated December 4, 2007.

The sampling sites are illustrated on Plate 2B. In addition Plate 2B is not sufficient for indicating the extent of hydrologic features at the site. The Plate should show the location of surface water sampling sites (indicated with a dot and a label), groundwater sampling sites, groundwater flow direction, topographic contours, ponds, creeks, roadside ditches, wetlands, direction of flow, etc.

The AMR should provide a description of the sampling sites (nature of the surface water feature, flow, location description, etc.) with an opinion on whether the sites are still appropriate for providing monitoring data to assess impacts from the landfill. Following this review of the monitoring design, the trigger mechanism should be re-visited.

Sampling was not conducted at monitoring locations where water was ponded. It is not known at which locations this occurred. If ponded conditions are representative of the nature of the surface water feature, sampling should be undertaken. Stagnant or ponded waters may represent a potential conduit for contaminants to surface water features at other times of the year.

The AMR provided annual data for the trigger parameters summarized in table form. Although the certificates of analysis are provided in the appendix and include the suite of indicator parameters listed in Schedule 5, Column 4 of the Ministry's "Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites," (OMOE 1998) this data should be presented within the same table as the trigger parameters within the main body of the AMR and compared to PWQOs for a comprehensive view of water quality conditions at the sample locations. The reviewer could not find a description of the trigger mechanism within the documents provided in the AMR. Future reports should contain a copy of the document which outlines the trigger mechanism.

The measured parameters could not be compared to background water quality, as this information was not provided. Future AMR should provide a table summarizing the 75th percentile for the measured parameters at the background site. This data should be a 'running' percentile which incorporates the monitoring data from the previous year in the calculation of percentiles. Any exceedance beyond these values or their respective PWQOs should be explained.

The WDS is surrounded by the Provincially Significant Indian River/Warsaw South Wetland. The report does not indicate whether the levels of parameters being measured at the sampling sites, in particular Iron and Boron, are anticipated to have an impact on the features and functions for which the wetland has been identified.

The consultants need to identify which (if any) groundwater monitoring locations represent groundwater which is discharging to surface water and compare groundwater quality at these locations to the PWQO (OMOE 1994).

Summary of Comments

- With the limited data provided, the WDS does not appear to be having an impact on the water quality at the monitored surface water stations.

- Boron, Iron and phosphorus concentrations exceeded PWQOs. In the case of Boron, concentrations did not exceed the more up-to-date CWQG. In the case of iron, the exceedance of PWQO was minimal and restricted to one date and location. In the case of phosphorus, concentrations in this range are not unusual given the site drains a productive stagnant wetland environment. These parameters should continue to be monitored.

- Sampling should continue for the parameters established in the 2009 & 2010 AMR.

- The design of the surface water monitoring locations should be re-evaluated to determine if the sites are still appropriate for determining surface water impacts from the landfill. After this evaluation, the trigger mechanism should be re-visited.

- Data was not provided for a station representing background water quality conditions. Future AMR should indicate the 75th percentile of measured concentrations at the background monitoring location.

- Future reports should contain a copy of the document which outlines the trigger mechanism.

- Any future AMR should show the extent of hydrologic features at the site including location of surface water sampling sites (indicated with a dot and a label), groundwater sampling sites, groundwater flow direction, topographic contours, ponds, creeks, roadside ditches, wetlands, direction of flow, etc.

- Any groundwater monitoring locations that discharge to surface water should be identified and compared to PWQOs.

Should you have any questions on the above, please do not hesitate to contact me at 613-540-6864.

Beth Gilbert

Beth Gilbert, M.Sc.
BG/gl

c: Mark Phillips, Surface Water Scientist
Beth Gilbert, Surface Water Reviewer
Shawn Kinney, Ground Water Reviewer
Peter Taylor, Water Resources Unit Supervisor
David Bradley, Peterborough District Office Supervisor
SW-PB-DD C5-03-06 (Douro-Dummer) (Warsaw Road (South) Landfill)
GW-PB-DD 01-03-C5 (Warsaw Road Waste Disposal Site)

MAR 0 3 2009

Ministry of the Environment
Eastern Region
Peterborough District Office
Peterborough Area Office
2nd Floor South Tower
300 Water St S
Peterborough ON K9J 8M5
Fax: (705)755-4321
Tel: (705) 755-5271

Ministère de l'Environnement
Direction régionale de l'Est
2e étage tour sud
300 rue Water S
Peterborough ON K9J 8M5
Télécopieur: (705)755-4321
Tél:(705) 755-5271

Ontario

February 26, 2009

David Clifford, CAO
The Corporation of the Township of Douro-Dummer
894 South St., PO Box 92
Warsaw, Ontario,
K0L 3A0

Dear Mr. Clifford

RE: Warsaw Road Landfill Site, 2007 Annual Monitoring Report
Reference Number 4647-7DSGUL

The Ministry of the Environment's, Eastern Region Technical Support Section, have completed the technical review associated with the above-stated document. A copy of the comments are attached to this letter for your review and implementation.

Further, it is recommended that the Township provide a copy of the attached comments to their consultant for their review and consideration, as applicable.

Should you have any questions or concerns pertaining to this letter or the attached comments, please do not hesitate to contact Chris Johnston, Senior Environmental Officer, at 705 755-4308.

Yours truly,

Tim Hannah
Peterborough District Office

File Storage Number: SIPBDOCO5 610 - LOT 8

Ministry of the Environment

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

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Kingston (Ontario)
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613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

29 December 2008

TO: Cathy Curlew
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: Shawn Kinney
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: 2008 Annual Monitoring Report
Warsaw Road Closed Waste Disposal Site A340902
Lot 8, Concession 5, Geographic Township of Douro
Township of Douro-Dummer

I have reviewed the hydrogeologic aspects of the following documents entitled:

- "*Warsaw Road Landfill Site, 2007 Annual Monitoring Report*" Totten Sims Hubicki Associates, March 2008.

Appendix B of the report includes the document entitled:

- "*2007 Annual Report, Warsaw Landfill, Township of Douro-Dummer, Provisional Certificate of Approval A 340902*" Hydroterra Limited, February 2008.

I submit the following comments for your consideration.

Summary

1. The site is closed. Guideline B-9 applies. Manganese levels are twice as high as the provincial objective at the existing attenuation zone boundary. Monitoring of this situation should continue.

2. The primary pathway for migration of leachate is reportedly southward through the shallow overburden and bedrock.

3. The potential does not exist for surface water impacts to occur at this time.

4. The proposed groundwater monitoring program is satisfactory.

5. Future monitoring reports should include hydraulic conductivity data for all on-site monitoring wells.

6. Future monitoring reports should include site diagrams depicting a horizontal scale.

Certificate of Approval

The Warsaw Road Waste Disposal Site operates under Certificate of Approval A340902. The site was licensed for the use and operation of a 2.0 hectare landfill site within a total site area of 2.43 hectares. The landfill underwent final closure in 1996. The landfill is a naturally attenuating site.

Geology

Appendix B, the Hydroterra document, describes site geology. Figure 1 of the appended Hydroterra report provides geologic cross sections. Appendix D includes borehole logs for 9 boreholes. Based on this information, the general site geology is as follows:

- Sandy loam, silty sand and sandy gravel: up to 4 metres
- Bedrock: Limestone with minor shale

Overburden in the eastern edge portion of the site differs from this general condition and is comprised of clay till.

Hydrogeologic Conditions

Hydraulic Conductivity

The provided documents do not present hydraulic conductivity data. I therefore cannot advise you on leachate migration rates. Future monitoring reports should include hydraulic conductivity data for all on-site monitoring wells.

Horizontal Hydraulic Gradient

The field notes provided in Appendix D tabulate water level measurements for April and October 2007. Based on the overburden materials and water level data I conclude that the general hydraulic gradient is from the fill area southward towards monitor TW3-2. The provided site diagrams and cross sections do not include a horizontal scale. I am unable to confirm the magnitude of the horizontal gradients.

Vertical Gradient

Monitoring location TW9 appears to be the only remaining multi-level groundwater monitoring location. An upward gradient was observed at TW-9.

The well abandonment log provided in Appendix D indicated that bedrock monitor TW3-1 was historically a flowing well. This suggests that an upward gradient also exists at TW-3, located west of TW-9.

Groundwater Flow Direction

As noted above, the groundwater flow direction within the sandy overburden is from the fill area southward towards monitor TW3-2.

Anomalously low water levels measured in TW9-2 appear to suggest flow towards the TW9 location. I note, however, that TW9-2 is screened in "clayey silt" which is likely less amenable to groundwater flow than the sandy gravel noted at the TW3 location.

Hydrogeologic Units

The sand and gravel overburden existing over most of the site is a shallow aquifer. The clay till material in the south-eastern portion probably functions as an aquitard and may be a confining layer in the vicinity of TW9. The underlying limestone bedrock is also an aquifer which appears to recharge upwards in the southern part of the site.

Conceptual Model

The primary pathway of leachate migration from the waste disposal site is the shallow overburden and fractured bedrock aquifer.

Background Water Quality

TW4-2 is a representative background monitor. In my previous review memorandum dated 29 November 2007 I examined the median values of the 5 recent sample analyses for this well, as provided in Table 5 of the 2007 monitoring report. The water quality at TW4-1 conformed to the Ontario Drinking Water Standards and Objectives with the following exceptions:

- The median *hardness* level was 335 mg/l. This is 3 times greater than the 100 mg/l aesthetic objective.
- The median *total dissolved solids* level was 491 mg/l. This is approximately equal to the 500 mg/l aesthetic objective.

Leachate Water Quality

Monitoring well TW-7 is completed within the fill area. I have examined the most recent water quality data for this well, as presented in Appendix E of the 2008 report. I note the following contaminants of concern:

- The *manganese* concentration ranged from 0.48 mg/l to 1.3 mg/l. These values are 9.6 to 26 times greater than the 0.05 mg/l aesthetic objective.
- The *iron* concentration ranged from 2.4 mg/l to 2.9 mg/l. These values are 8 to 10 times greater than the 0.3 mg/l aesthetic objective.

Overall, manganese concentrations were slightly lower compared to the preceding year, while iron concentrations increased slightly.

Downgradient Water Quality

I am satisfied that the extent of iron and manganese impacts have been determined. Downgradient monitor TW3-2 was impacted by manganese and iron.

Manganese levels were 2.2 to 2.4 times greater than the 0.05 mg/l provincial drinking water criterion. Iron levels slightly exceeded the 0.3 mg/l drinking water criterion during October 2007, but conformed to the criterion in April 2007.

There has been minimal change since the previous year. The situation should continue to be monitored.

GW/SW Interaction

I have previously concluded that no surface water receivers existed downgradient of the fill area in the immediate vicinity of the site. This assessment was based upon an examination of Ontario Base Map #10 17 7200 49150. Mr. Mark Phillips, a Regional Surface Water Scientist, has subsequently advised me that an evaluated wetland exists approximately 350 metres downgradient of the fill area.

The most recent groundwater monitoring data suggests that excessive leachate impacts in groundwater would not extent to the evaluated wetland. I conclude that the potential does not exist for surface water impacts via this pathway at this time.

Guideline B-7

The Warsaw Road Waste Disposal Site is closed. Guideline B-7 does not apply. I note that the manganese levels at downgradient monitor TW3-2 are more than twice the provincial drinking

water objective. Although no residential water wells appear to be under threat, monitoring of this situation should continue.

Groundwater Monitoring Program and Reporting

The existing groundwater monitoring frequency and analytical parameters are satisfactory for this site. I have examined the groundwater monitoring recommendations summarized in Section 8.0 of the appended Hydroterra report.

The consultant recommends abandonment of the last remaining bedrock monitoring well TW9-1. The consultant expressed concern that naturally salty water in the bedrock aquifer may pose a risk to the adjacent private water well. I do not object to the consultant's recommendation. I recommend that historical water level data and water quality data from TW9-1 continue to be provided in future monitoring reports.

The consultant proposes limiting landfill gas monitoring to monitors GP1 to GP6 inclusive, TW5-2 and TW6-2. This is satisfactory.

The consultant proposes continued monitoring of residential water wells designated as R1, R2, R3, and R4. This is satisfactory.

Shawn Kinney, P.Geo
SK/gl

c: Jacqueline Fuller (Peterborough Area Office)
Mark Phillips (Surface Water Scientist)
Peter Taylor (Water Resources Unit)
GW 03-03 (A340902) DODU Warsaw Road Landfill, Township of Duoro
SK #8848-7DSH4T

Ontario

Ministry of the Environment | Ministère de l'Environnement

CERTIFICATE OF APPROVAL
AIR
NUMBER 6601-5YWQBH

The Corporation of the Township of Douro-Dummer
PO Box 92
Warsaw, Ontario
K0L 3A0

Site Location: Warsaw Road Landfill,
Lot 8, Concession 5, Douro Ward
Douro-Dummer Township, County of Peterborough

You have applied in accordance with Section 9 of the Environmental Protection Act for approval of:

- a passive landfill gas venting system serving a municipal landfill, consisting of two (2) vents, each having a diameter of 0.05 metre, extending 3.0 metres above grade;

- in accordance with the application and all supporting information dated August 21, 2003, signed by D. Clifford.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary
Environmental Review Tribunal

The Director
Section 9, Environmental Protection Act

2300 Yonge St., 12th Floor
P. Box 2382
nto, Ontario
...4P 1E4

AND

Ministry of Environment and Energy
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted works are approved under Section 9 of the Environmental Protection Act.

DATED AT TORONTO this 13th day of May, 2004

THIS CERTIFICATE WAS MAILED
ON May 17, 2004
DC
(Signed)

Neil Parrish, P.Eng.
Director
Section 9, *Environmental Protection Act*

QN/

District Manager, MOE Peterborough
Linda Elliott, SGS Lakefield Research Limited ✓

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

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Toronto ON M4S 1H2

2e étage
Toronto ON M4S 1H2

APPROVAL II BRANCH
3rd Floor
Tel: (416) 440-3544
Fax: (416) 440-6973

May 22, 1996

Clerk Administrator
The Township of Douro
General Delivery
Douro, Ontario
K0L 1S0

RECEIVED MAY 30 1996

Dear Sir/Madam:

Re: Notice of Amendment - Site Closure
Provisional Certificate of Approval No. A 340902
Township of Douro Waste Disposal Site

Enclosed is a copy of the Notice of Amendment for the above mentioned Provisional Certificate of Approval. The Notice provides for closure of this waste disposal site. In addition, it should be noted that Conditions 19 and 20 of this Notice require additional information with respect to the Surface Water Monitoring program and contingency plans. As such, for your assistance a copy of the Ministry's document entitled "MOEE Eastern Region - Surface Water Unit, Interim Guidance Document for the Development of Waste Disposal Site Contingency Plan Trigger for Surface Water" dated May 01, 1995 is attached.

Please note that all other terms and conditions as outlined in the original Certificate of Approval and all subsequent Notices remain unchanged.

I trust this document is adequate. If you have any questions, please feel free to contact Mr. J. Kaasalainen at (416) 440-7032.

Sincerely,

A. Dominski, P.Eng., Supervisor
Waste Unit

Encl.
JAK/es

cc: Brian Ward, Director, MOEE Southeastern Region
Richard Raeburn-Gibson, MOEE Peterborough District Office

TO: The Township of Douro
Douro, Ontario
K0L 1S0

You are hereby notified that the terms and conditions of Provisional Certificate of Approval No. A 3409u dated September 17, 1980, and all subsequent Notices are hereby amended as follows:

The waste disposal site shall be closed in accordance with the followi documents:

i. The document entitled "Leachate Attenuation Zone Assessment, Warsaw Ro (South) Waste Disposal Site, Part of Lot 8, Concession V, Township Douro, County of Peterborough, Certificate of Approval No. A 3409 dated September 29, 1995 by Lakefield Research Limited.

ii. The document entitled "Final Site Closure Plan, Township of Douro Wars Road (South) Landfill Site" dated October 1995 by Lakefield Resear Limited.

In addition, the following conditions are added as part of this approval:

Surface Water

19. The Surface Water Monitoring program shall be revised to include th following information:

a. identification of significant surface watercourses which are to be monitored for compliance;
b. the establishment of monitoring locations at natural marsh/wetla surface waters; and
c. the establishment and rationale for locating compliance locati stations.

This work shall be done in consultation with the Ministry's Region Office.

20. A detailed surface water contingency plan complete with appropria trigger levels shall be submitted to the Regional Director for approv within 120 days of the issuance of this Notice. This contingency plan shall be done in consultation with the Ministry's Regional Office.

Contaminant Attenuation Zone/Buffer Lands

1. a. The Township shall undertake all necessary efforts to acquire o gain access agreements for the contaminant attenuation zone a described in document (i) above. Written documentation of th progress the Township is making in this regard shall be provided t the Regional Director on a monthly basis.

b. Within 120 days of acquiring or gaining access agreements for the contaminant attenuation zone the Township shall have a legal survey conducted of these lands, including all buffer lands, and have this Certificate registered as an Instrument in the appropriate Land Registry Office against the title of those lands. A duplicate registered copy of the Instrument shall be submitted to the Director.

Groundwater

2. a. Within three (3) months of obtaining control and/or access agreements for the contaminant attenuation zone, a multi-level monitoring well shall be constructed close to the new down-gradient property/attenuation zone boundary.

b. Within three (3) months of the issuance of this Notice, an early warning multi-level monitoring well shall be installed between the waste disposal site and the residential well No. 2 as described in the document entitled "Environmental Impact Assessment, Warsaw Road "South" Landfill Site, Township of Douro" dated April 1995 by Lakefield Research Limited.

These new proposed groundwater monitors shall be incorporated into the monitoring program and the groundwater contingency plans.

3. The Groundwater Monitoring program shall be revised as follows:

a. total organic carbon shall be added to the list of parameters to be tested for;
b. a volatile organic compound scan shall be performed on samples from Monitor TW7; and
c. the sampling frequency shall be revised to mid-April and late August/early September and shall include all multi-level monitoring wells.

4. The Township shall notify, in writing, the Regional Director of the abandonment of monitor TW 8 and the upgrade or abandonment of monitor TW3-1.

Landfill Gas

25. The landfill gas monitoring/contingency plan shall be revised follows:

a. If an exceedance of the landfill gas trigger level occurs dur any one of the sampling events, then two additional confirmato sampling events shall be conducted within 60 days of the init exceedance sampling event.

b. One additional gas probe shall be installed along the east property/buffer zone boundary. This gas probe shall incorporated into the monitoring program and the landfill g. contingency plans.

The reason for this amendment is to ensure that the site is closed in an environmentally safe manner

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990 c. E-19, a may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

1. *The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;*
2. *The grounds on which you intend to rely at the hearing in relation to each portion appealed.*

In addition to these legal requirements the Notice should also include:

3. *The name of the appellant;*
4. *The address of the appellant;*
5. *The Certificate of Approval number;*
6. *The date of the Certificate of Approval;*
7. *The name of the Director;*
8. *The municipality within which the waste disposal site is located;*

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
112 St. Clair Avenue West,
Suite 502,
Toronto, Ontario,
M4V 1N3

AND

The Director,
Section 39, Environmental Protection Act,
Ministry of Environment and Energy,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

DATED AT TORONTO this 22nd *day of* May, 1996.

A. Dominski, P. Eng.
Director
Section 39
Environmental Protection Act

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

2nd Floor
Tel. (416) 440-3544
Fax. (416) 440-6972

September 30, 1994

Clerk Administrator
The Township of Douro
General Delivery
Douro, Ontario
K0L 1S0

Dear Sir/Madam:

Re: Notice of Amendment - Emergency Approval
Provisional Certificate of Approval No. A 340902
Township of Douro Waste Disposal Site

Enclosed is a copy of the Notice of Amendment for the above mentioned Provisional Certificate of Approval. The Notice provides for the continued use and operation of the waste disposal site until March 30, 1996, under Section 31, Emergency Approval, of the Environmental Protection Act.

Please note that all other terms and conditions as outlined in the original Certificate of Approval and all subsequent Notices remain unchanged.

I trust this document is adequate. If you have any questions, please feel free to contact Mr. J. Kaasalainen at (416) 440-7032.

Yours truly,

A. Dominski, P.Eng., Acting Supervisor
Waste Sites & Systems Approvals Unit
Industrial Approvals Section

Encl.
JAK/es
c.c.: Bryan Ward, Director, MOEE Eastern Region
Jacques Bourque, MOEE Peterborough District Office

Ontario Ministry of Environment and Energy / Ministère de l'Environnement et de l'Énergie

NOTICE
1 of 4

TO: The Township of Douro
Douro, Ontario
K0L 1S0

You are hereby notified that the terms and conditions of Provisional Certificate of Approval No. A 340902, dated September 17, 1980, and all subsequent Notices are hereby amended as follows:

The Notice dated August 23, 1994 allowing for the continued use and operation of this waste disposal site under Section 31, Emergency Approval, of the Environmental Protection Act is amended by revoking condition 7 and replacing it with the following condition:

7. Waste can be disposed of at the site until March 30, 1996, in accordance with the following plans and specifications:

   i. The Application for a Certificate of Approval for a Waste Disposal Site (Landfill) and supporting documentation dated August 18, 1994.

   ii. The document entitled "The Corperation of the Township of Douro, Warsaw Road Waste Disposal Site, Provisional Certificate of Approval No. A 340902, Interim Site Development Plan and Operations Report", dated August 1994, by the Greer Galloway Group Incorporated.

   iii. Addendum No. 1, dated September 29, 1994, to the "Interim Site Development Plan and Operations Report" by the Greer Galloway Group Inc., dated August 1994.

In addition, the following conditions are included as part of this approval:

11. The Township shall undertake all necessary efforts to acquire or gain permanent control of a minimum 30 metre attenuation/buffer zone along the south, east, and west edges of the site, as mentioned in document (ii) above.

12. By June 30, 1995, the Township shall submit for the Director review an assessment of potential and existing impacts to surf water and groundwater resulting from the operation of the wa disposal site and the assessment shall be comprised of:

a. a surface water drainage and monitoring plan for the s including upstream or off-stream surface water monitori station(s) for evaluating the background surface wa quality;

b. expansion of the surface water monitoring program by includi a sampling station at a permanently flowing location on Creek downstream from the waste disposal site to determine impact of the waste disposal site on the water course and t include ambient water temperature as a sampling parameter

c. a groundwater impact assessment based on the Ministry's Polic 15-08, "The Incorporation of the Reasonable Use Concept i the Groundwater Management Activities of the Ministry of Environment and Energy", which shall include the following.

i. the installation of a minimum of one up gradient nest groundwater monitor with one piezometer in each of t upper and lower aquifers for evaluating the backgrou groundwater quality; and,

ii. the installation of additional nested groundwate monitors in order to determine the vertical horizontal extent of the contaminant plume and determine whether or not the site is in compliance wit the Ministry's Reasonable Use Policy (Policy 15-08) the property boundary or the proposed attenuation z boundary.

These new proposed groundwater monitors shall be incorporat into the monitoring program.

13. A work plan shall be submitted to the Director, Eastern Regi Ontario Ministry of the Environment and Energy, by November 1 1994 with regards to the scheduling of the installation of the new groundwater monitoring wells as discussed in Condition 12(c).

14. By November 14, 1994, The Township shall submit to the Director for approval contingency plans to address contaminant migration leachate related parameters at the site/attenuation zone bounda for both surface water and groundwater which do not comply with the Ministry of the Environment and Energy's Reasonable Use objectiv for groundwater and/or with the Provincial Water Quality Objectiv for surface water.

Ministry of Environment and Energy
Ontario

Ministère de l'Environnement et de l'Énergie

15. If for any reason(s) the Township fails to establish the attenuation zone as per condition 11 by June 30, 1995, then a detailed plan of mitigation measures to address off-site contaminant migration for both surface and groundwater which do not comply with the Ministry of the Environment and Energy's Reasonable Use objectives for groundwater and/or with the Provincial Water Quality objectives for surface water shall be submitted to the Director for approval by September 30, 1995.

16. If the continued interim use of the site is required at the end of this emergency period then an application for an interim expansion pursuant to Section 30 of the Environmental Protection Act shall be submitted to the Director for approval by June 30, 1995.

17. If closure of the site is required at the end of this emergency period then a Closure Plan as per Appendix VII, "Approvals Requirements and Process, Section 2, Closure of a Landfill Site" of the Ministry of the Environment and Energy Approvals Branch document entitled "Guide for Applying for Certificates of Approval, Waste Disposal Sites (Landfills, Transfer or Processing)", dated September 1992 shall be submitted to the Director for approval by June 30, 1995.

18. If closure of the site is required at the end of this emergency period then final cover shall be constructed to a final grade of between 5 and 25 percent as per Ministry of the Environment and Energy guidelines.

The reason for this amendment is that an emergency situation with respect to waste disposal exists for the Township of Douro. The continued use of the site is to allow sufficient time for the Township to determine, evaluate, and implement alternative solutions for alleviating the emergency situation.

The conditions added to this certificate are to ensure that the waste disposal site is operated in an environmentally safe manner.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990 c. E-19, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

1. *The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;*
2. *The grounds on which you intend to rely at the hearing in relation to each portion appealed.*

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

NOTICE
4 of 4

In addition to their legal requirements the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Secretary,
Environmental Appeal Board,
112 St. Clair Avenue West,
Suite 502,
Toronto, Ontario.
M4V 1N3

AND

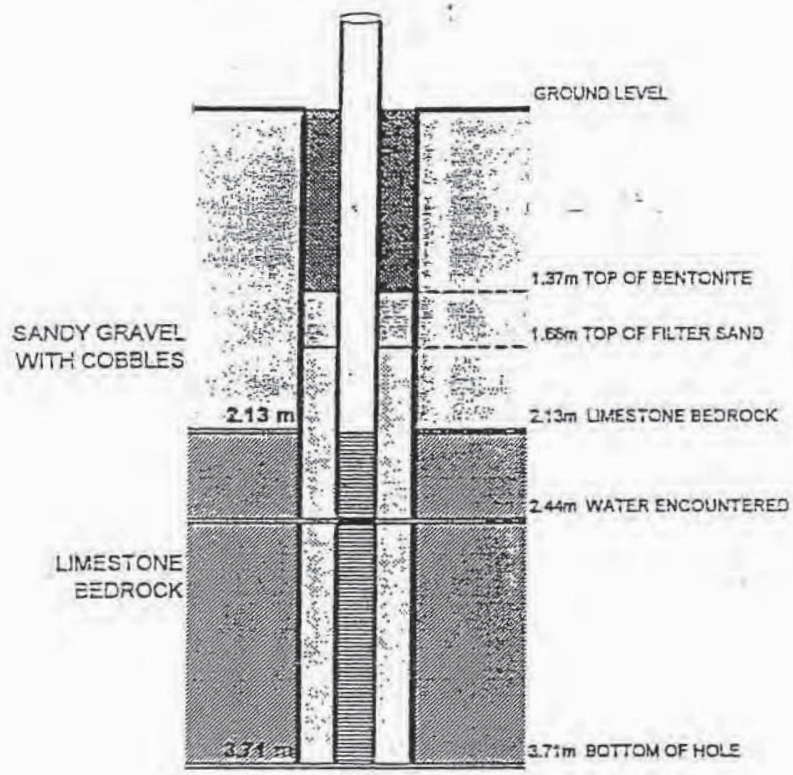
The Director,
Section 39, Environmental Protection Act,
Ministry of Environment and Energy,
250 Davisville Avenue,
Toronto, Ontario.
M4S 1H2

DATED AT TORONTO this 10th day of September, 1994.

W. Ng, P.Eng.
Director
Section 39
Environmental Protection Act

Appendix B
Monitoring Well Details and Borehole Data

TW - 1 DOURO LANDFILL SOUTH SITE



LIMESTONE BEDROCK

SANDY GRAVEL WITH COBBLES

BENTONITE HOLE PLUG

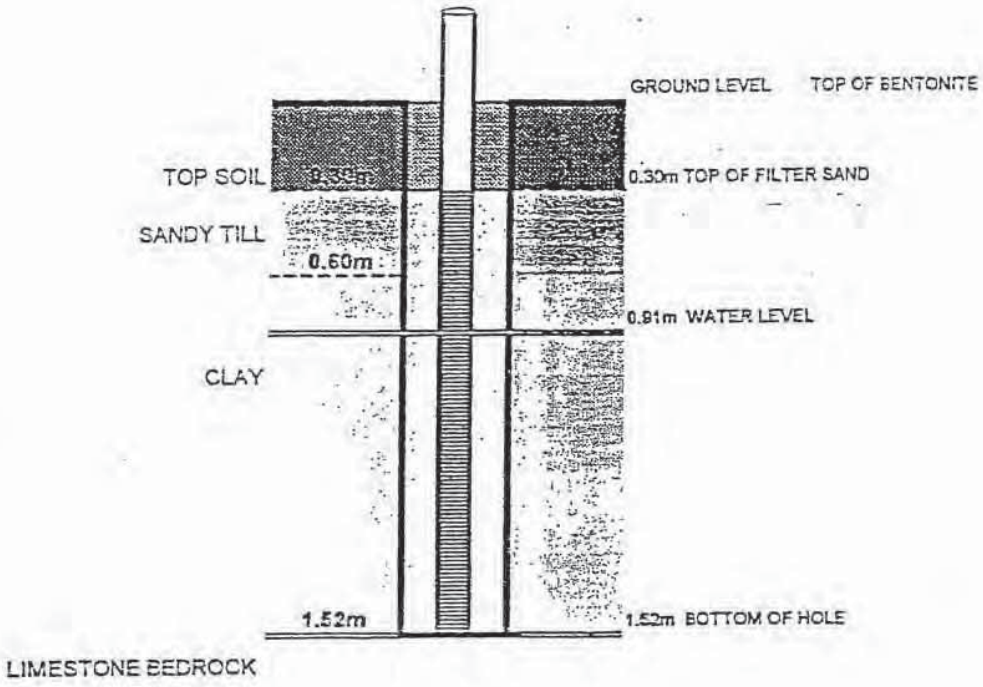
FILTER SAND

NATURAL BACKFILL

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

TW - 2 DOURO LANDFILL SOUTH SITE



STRATIGRAPHY LEGEND

- TOP SOIL
- SANDY TILL
- CLAY

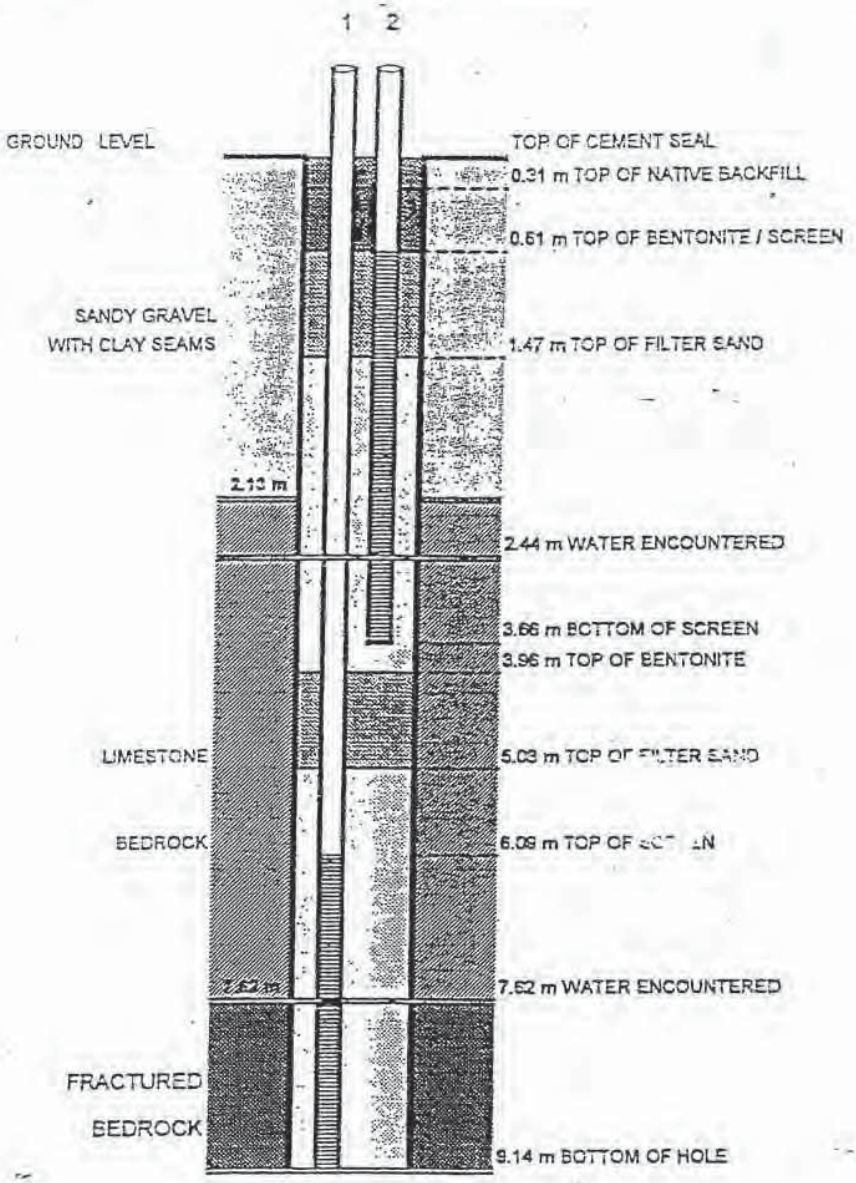
BORE HOLE LEGEND

- SCREEN
- BENTONITE HOLE PLUG
- FILTER SAND

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

TW - 3 DOURO LANDFILL SOUTH SITE



STRATIGRAPHY LEGEND

- SANDY GRAVEL WITH CLAY SEAMS
- LIMESTONE BEDROCK
- FRACTURED LIMESTONE BEDROCK

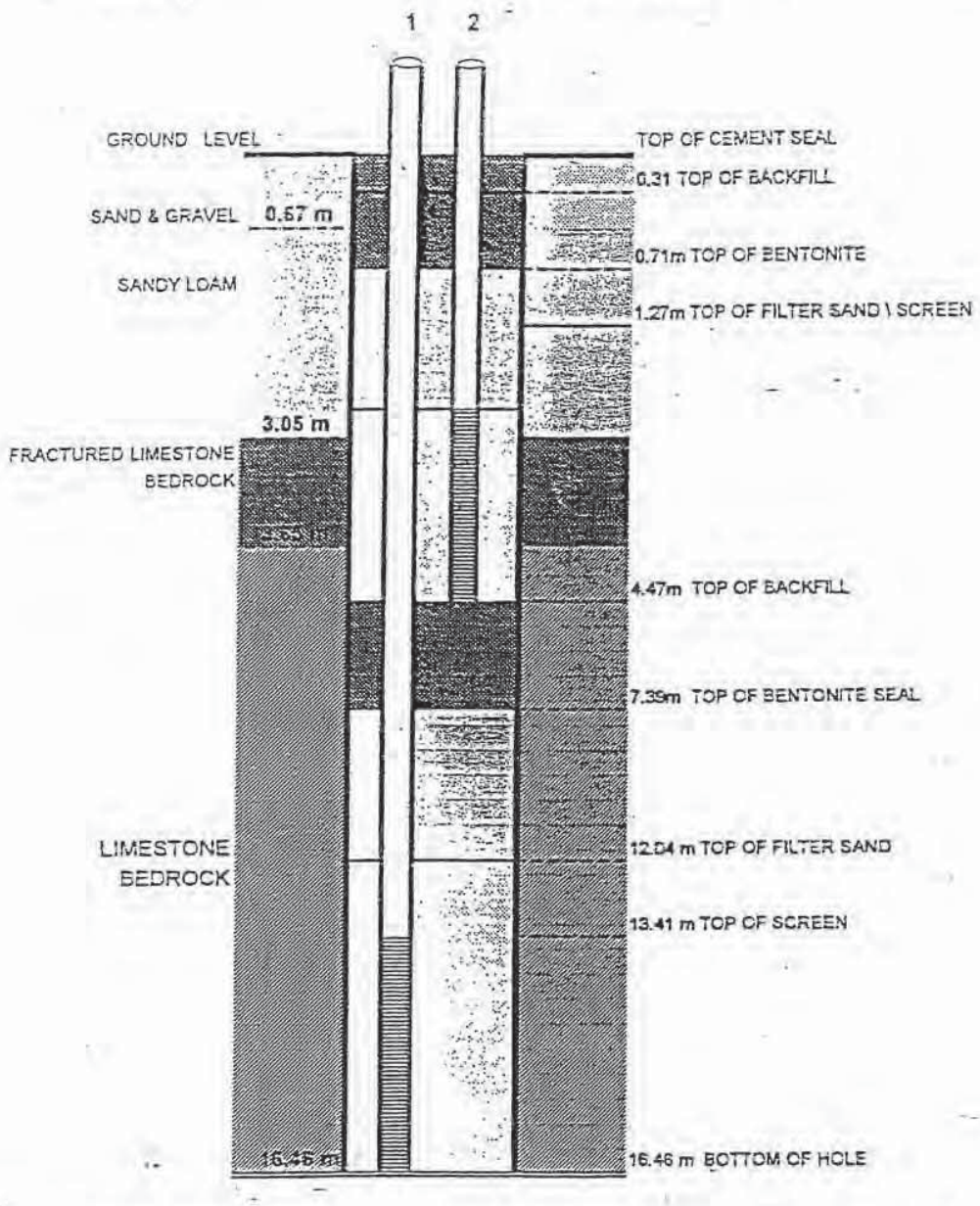
BORE HOLE LEGEND

- CEMENT SEAL
- NATURAL BACKFILL
- BENTONITE HOLE PLUG
- FILTER SAND

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

94TW - 4 DOURO LANDFILL SOUTH SITE



STRATIGRAPHY LEGEND

- SAND AND GRAVEL
- SANDY LOAM
- FRACTUERED LIMESTONE BEDROCK
- LIMESTONE BEDROCK

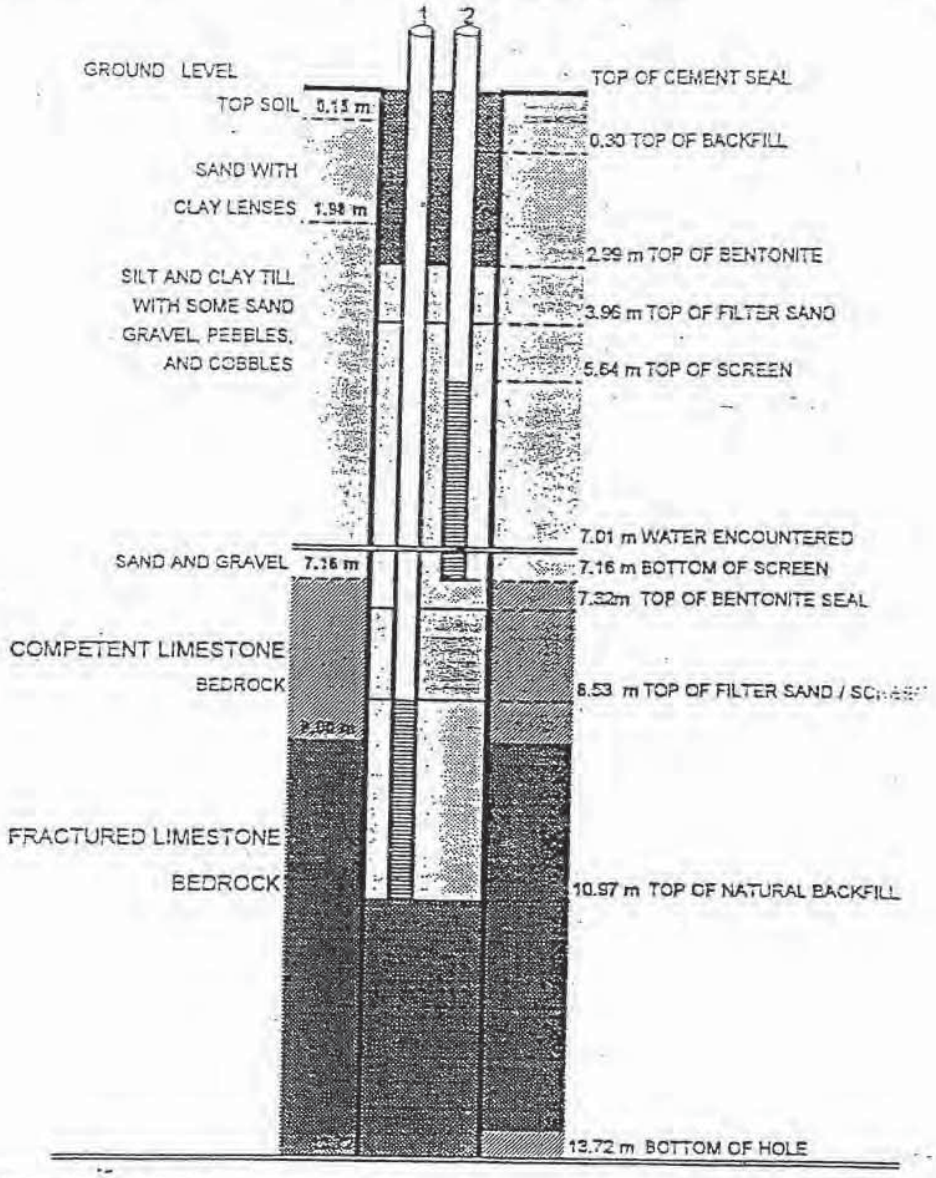
BOREHOLE LEGEND

- CEMENT SEAL
- NATURAL BACKFILL
- BENTONITE HOLE PLUG
- FILTER SAND

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

94TW - 5 DOURO LANDFILL SOUTH SITE



STRATIGRAPHY LEGEND

- TOP SOIL
- SILT .....COBBLES
- SAND AND GRAVEL
- COMPETENT LIMESTONE BEDROCK
- FRACTURED LIMESTONE BEDROCK

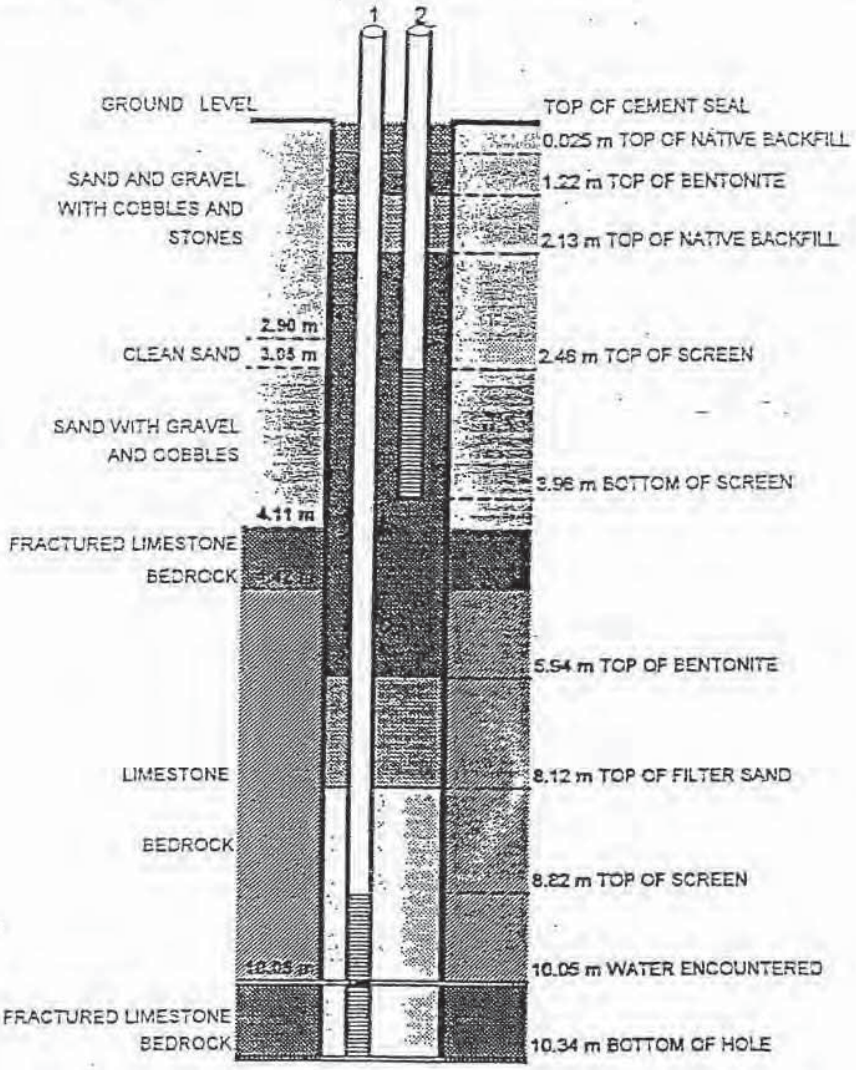
BORE HOLE LEGEND

- CEMENT SEAL
- NATURAL BACKFILL
- BENTONITE HOLE PLUG
- FILTER SAND

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

94TW - 6 DOURO LANDFILL SOUTH SITE



STRATIGRAPHY LEGEND

- SAND AND GRAVEL ..... STONES
- CLEAN SAND
- SAND WITH GRAVEL AND COBBLES
- LIMESTONE BEDROCK
- FRACTURED LIMESTONE BEDROCK

BORE HOLE LEGEND

- CEMENT SEAL
- NATURAL BACKFILL
- BENTONITE HOLE PLUG
- FILTER SAND

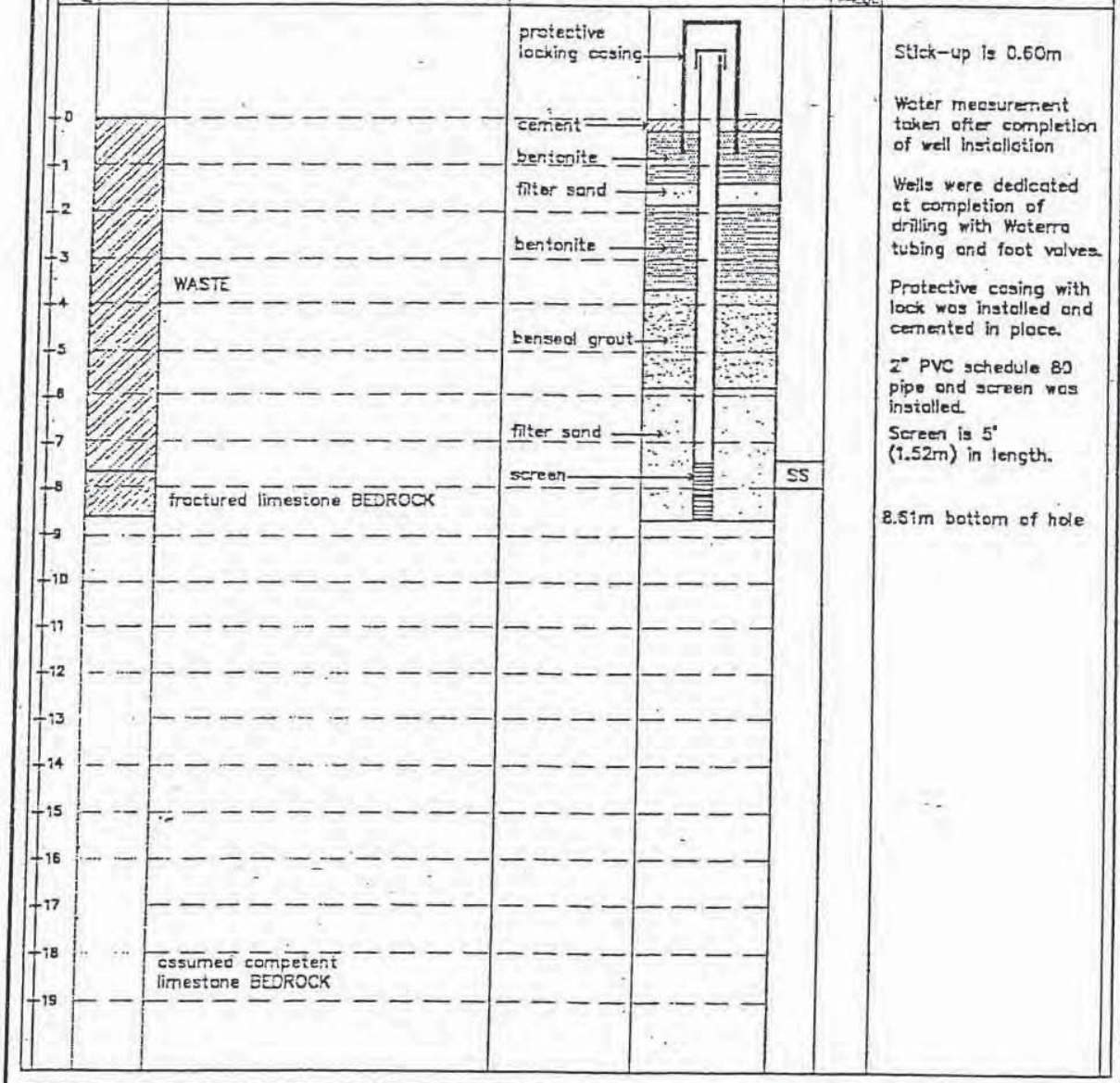
ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

BOREHOLE LOG # TW 7

PROJECT NAME	LOGGED BY
DOURO SOUTH LANDFILL SITE	D. BUCHOLTZ

DRILLING METHOD	PROJECT No	DATE DRILLED	GROUND ELEV.	SCALE
HOLLOW STEM AUGERS	7777-079	AUG 16, 1995	100.35	1:125



LAKEFIELD RESEARCH

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

BOREHOLE LOG # TW 8-1	PROJECT NAME: DOURO SOUTH LANDFILL SITE		LOGGED BY: D. BUCHOLTZ	
DRILLING METHOD: HOLLOW STEM AUGERS	PROJECT No: 7777-079	DATE DRILLED: AUG 16, 1995	GROUND ELEV.: 96.30	SCALE: 1:125

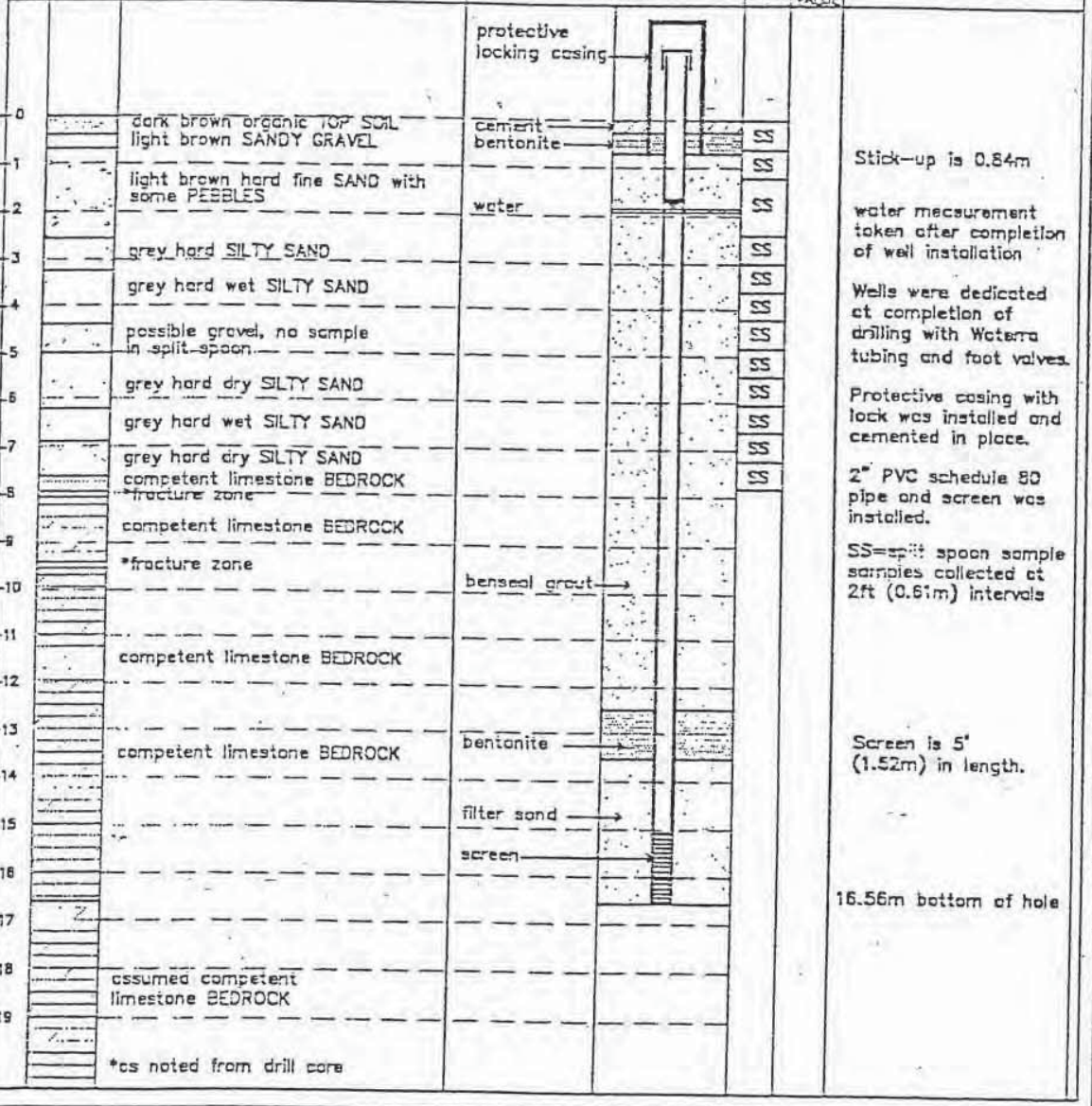
DEPTH METERS	STRAT-IGRAPHY	STRATIGRAPHIC DESCRIPTION	CONSTRUCTION DETAILS	SAMPLE TYPE	SAMPLE N VALUE	COMMENTS
0		dark brown organic TOP SOIL light brown SANDY GRAVEL	protective locking casing cement bentonite	SS		Stick-up is 0.84m
1		light brown hard fine SAND with some PEBBLES		SS		
2			water	SS		water measurement taken after completion of well installation
3		grey hard SILTY SAND		SS		
4		grey hard wet SILTY SAND		SS		Wells were dedicated at completion of drilling with Waterra tubing and foot valves.
5		possible gravel, no sample in split-spoon		SS		
6		grey hard dry SILTY SAND		SS		Protective casing with lock was installed and cemented in place.
7		grey hard wet SILTY SAND grey hard dry SILTY SAND		SS		
8		competent limestone BEDROCK *fracture zone		SS		2" PVC schedule 80 pipe and screen was installed.
9		competent limestone BEDROCK				
10		*fracture zone	benseal grout			SS=split spoon sample samples collected at 2ft (0.61m) intervals
11		competent limestone BEDROCK				
12						
13		competent limestone BEDROCK	bentonite			Screen is 5' (1.52m) in length.
14						
15			filter sand			
16			screen			16.56m bottom of hole
17						
18		assumed competent limestone BEDROCK				
19						
		*as noted from drill core				

LAKEFIELD RESEARCH

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

BOREHOLE LOG	# TW 8-1	PROJECT NAME		LOGGED BY	
		DOURO SOUTH LANDFILL SITE		D. BUCHOLTZ	
DRILLING METHOD		PROJECT No	DATE DRILLED	GROUND ELEV.	SCALE
HOLLOW STEM AUGERS		7777-079	AUG 16, 1995	96.30	1:125



LAKEFIELD RESEARCH

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

BOREHOLE LOG # TW 8-2

PROJECT NAME	LOGGED BY
DOURO SOUTH LANDFILL SITE	D. BUCHOLTZ

DRILLING METHOD	PROJECT No	DATE DRILLED	GROUND ELEV.	SCALE
HOLLOW STEM AUGERS	7777-079	AUG 16, 1995	96.29	1:125

DEPTH METERS	STRAT-IGRAPHY	STRATIGRAPHIC DESCRIPTION	CONSTRUCTION DETAILS	SAMPLE TYPE	SAMPLE N VALUE	COMMENTS
0		dark brown organic TOP SOIL light brown SANDY GRAVEL	protective locking casing cement bentonite			Stick-up is 0.85m Water measurement taken after completion of well installation Wells were dedicated at completion of drilling with Waterra tubing and foot valves. Protective casing with lock was installed and cemented in place. 2" PVC schedule 80 pipe and screen was installed. Screen is 5' (1.52m) in length. 7.61m bottom of hole
1		light brown hard fine SAND with some PEBBLES				
2						
3		grey hard SILTY SAND				
4		grey hard wet SILTY SAND	benseal grout			
5		possible gravel, no sample in split spoon	bentonite			
6		grey hard dry SILTY SAND				
7		grey hard wet SILTY SAND grey hard dry SILTY SAND	screen filter sand			
8		competent limestone BEDROCK *fracture zone				
9		competent limestone BEDROCK				
10		*fracture zone				
11						
12						
13						
14		competent limestone BEDROCK (from TW 8-1 well log data)				
15						
16						
17						
18		assumed competent limestone BEDROCK				
19						

* as note from drill core

LAKEFIELD RESEARCH

ENVIRONMENTAL SERVICES
LAKEFIELD, ONTARIO
K0L 2H0, (705) 652-2020

LAKEFIELD RESEARCH LIMITED

BOREHOLE LOG

BH9-1

PROJECT NAME: TOWNSHIP OF DOURO, WARSAW ROAD LANDFILL			LOGGED BY: D. BUCHOLTZ, LAKEFIELD RESEARCH LIMITED
DRILLING METHOD: HOLLOW STEM AUGER	PROJECT No: 7777-369	DATE DRILLED: AUGUST 20, 1997	GROUND ELEV.: N/A
			SCALE: NTS

DEPTH METERS	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	CONSTRUCTION DETAILS	SAMPLE TYPE	SAMPLE N VALUE	COMMENTS
0		ORGANIC, overburden	PROTECTIVE CASING; CEMENT			Drilling commenced 08:00hrs, Aug 20/97
1		SILT, sandy, rocks, brown, wet				Well instrumented with dedicated inertia pump upon completion.
2						
3		SILT, clayey, rocks, grey, moist				TW9-1 has 50MM PVC Schedule 40 riser pipe and 1.52m No.10 slotted screen
4						
5						
6		SILT, clayey, rocks, grey, dry, dense	BENTONITE			
7						
8		BEDROCK, limestone heavily fractured				
9						Water was encountered @ 10.85m (35.6ft) below grade.
10						
11		BEDROCK, limestone	SILCA SAND			Bottom of hole at 11.34m (37.2ft) below grade.
12			BENTONITE			
13						
14						
15						
16						
17						
18						
19						

LAKEFIELD RESEARCH LIMITED
ENVIRONMENTAL SERVICES

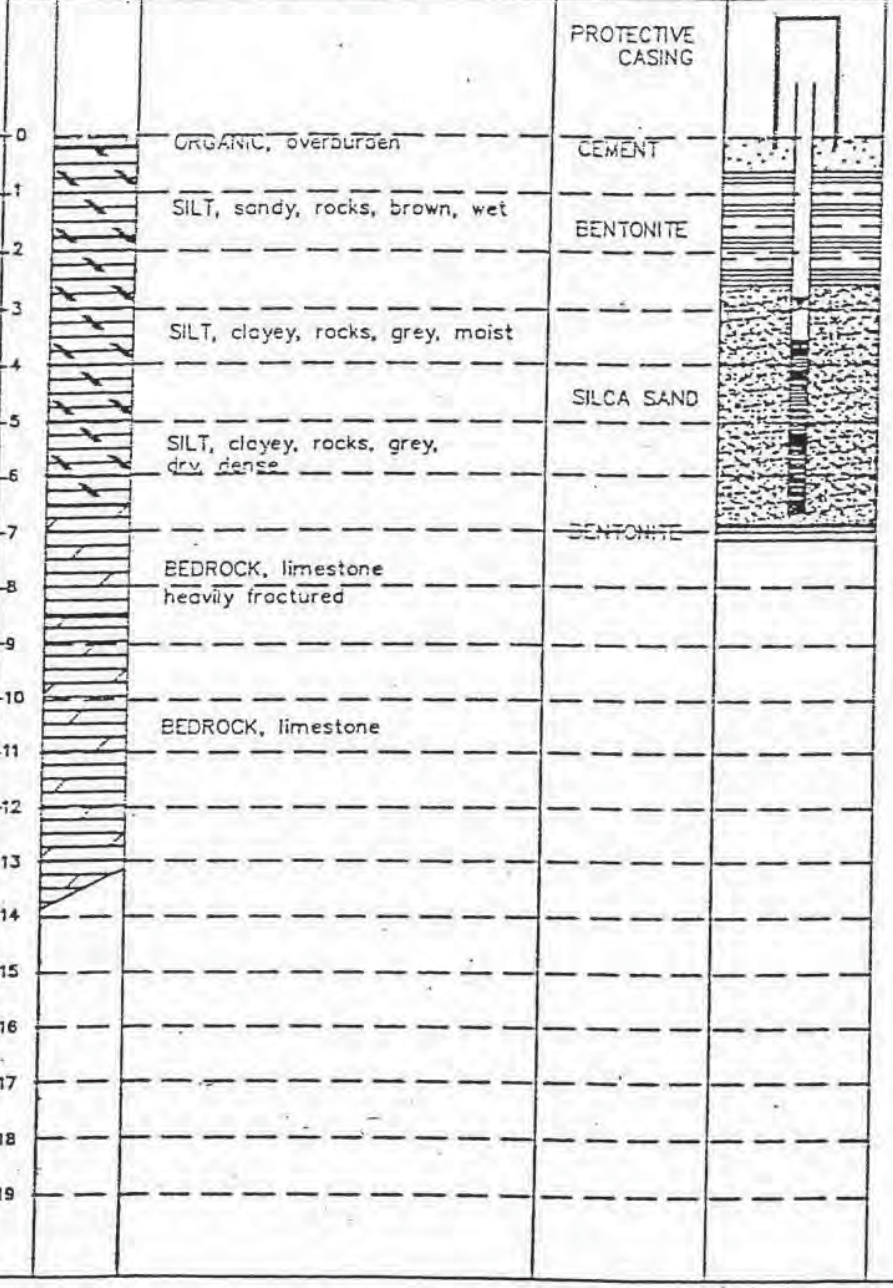
185 CONCESSION STREET
LAKEFIELD, ONTARIO, CANADA

21, 1st AVENUE
SCHUMACHER, ONTARIO, CANADA

BOREHOLE LOG — BH9-2

PROJECT NAME: TOWNSHIP OF DOURO, WARSAW ROAD LANDFILL			LOGGED BY: D. BUCHOLTZ, LAKEFIELD RESEARCH LIMITED
DRILLING METHOD: HOLLOW STEM AUGER	PROJECT No: 7777-369	DATE DRILLED: AUGUST 20, 1997	GROUND ELEV.: N/A	SCALE: NTS

DEPTH METERS	STRAT-IGRAPHY	STRATIGRAPHIC DESCRIPTION	CONSTRUCTION DETAILS	SAMPLE TYPE	SAMPLE N VALUE	COMMENTS
0		ORGANIC, overburden	PROTECTIVE CASING; CEMENT			Drilling commenced 08:00hrs, Aug 20/97
1		SILT, sandy, rocks, brown, wet	BENTONITE			Well instrumented with dedicated inertia pump upon completion.
2						
3		SILT, clayey, rocks, grey, moist				TW9-2 has 50MM PVC Schedule 40 riser pipe and 1.52m No.10 slotted screen
4			SILCA SAND			
5						Water was encountered @ 3.00m (9.8ft) below grade.
6		SILT, clayey, rocks, grey, dry dense				
7			BENTONITE			Bottom of hole at 6.91m (22.67ft) below grade.
8		BEDROCK, limestone heavily fractured				
9						
10		BEDROCK, limestone				
11						
12						
13						
14						
15						
16						
17						
18						
19						



LAKEFIELD RESEARCH LIMITED
ENVIRONMENTAL SERVICES

185 CONCESSION STREET
LAKEFIELD, ONTARIO, CANADA

21, 1st AVENUE
SCHUMACHER, ONTARIO, CANADA

Ministry of Environment and Energy Ontario

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

Watson Road

County or District	Township/Borough/City/Town/Village	Con. block tract survey, etc.	Lot
PETERBOROUGH	DOURO	5	8
Owner's surname / First name	Address	Date	
TOWNSHIP OF DOURO	DOURO ONT.	24 09 97	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

NOTE: WELL ABANDONMENT
T.W 3-1. NORMALLY A FLOWING WELL
WAS NOT FLOWING AT TIME OF
ABANDONMENT.

SOUTH LAND FILL.

CASING & OPEN HOLE RECORD

Inside diam. inches	Material	Wall thickness inches
2"		S.H. 40

SCREEN

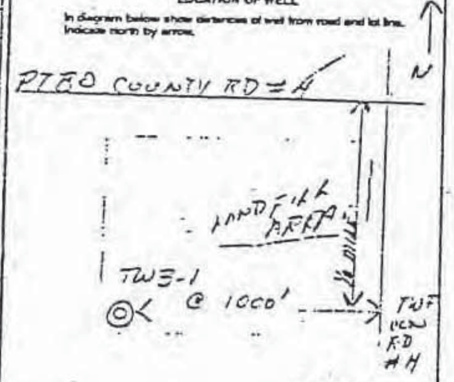
Diameter: 2"
Material and type: P.V.C

PLUGGING & SEALING RECORD

Depth set at - feet		Material and type
+3	130'	BENTONITE

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



FINAL STATUS OF WELL

WATER USE

METHOD OF CONSTRUCTION

Name of Well Contractor	Well Contractor's Licence No.
TRIAQUA DRILLING	6778
Address: RR#2 LAKEFIELD ONT	
Name of Well Technician: PATRICK O'BRIEN	Well Technician's Licence No.: T2155
Signature of Technician/Contractor	Submission date: 24 09 97

MINISTRY USE ONLY

171309

Ministry of Environment and Energy

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

'Watson Road

County or District	Township, Borough, City, Town, Village	Concession	Lot
PETERBOROUGH	DOURO	5	8
Owner's surname First name	**Address**		**Date**
TOWNSHIP OF DOURO	DOURO ONT.		21 08 97

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - metres From	Depth - metres To
NOTE:	WELL	ABANDONMENT.			
	TW 4-1				
	SOUTH ROAD	FILL.			

WATER RECORD

Water found at - feet	Kind of water		
	☐ Fresh ☐ Salty	☐ Gas ☐ Oil	
	☐ Fresh ☐ Salty	☐ Gas ☐ Oil	
	☐ Fresh ☐ Salty	☐ Gas ☐ Oil	
	☐ Fresh ☐ Salty	☐ Gas ☐ Oil	
	☐ Fresh ☐ Salty	☐ Gas ☐ Oil	

CASING & OPEN HOLE RECORD

Inside diameter	Material	Wall thickness	Depth - metres From	Depth - metres To
2"	PVC	SCH 40		

SCREEN

Slot no.	Diameter	Length
	2"	
Material and type	Depth - metres From	Depth - metres To
PVC.		

PLUGGING & SEALING RECORD

Depth - metres From	Depth - metres To	Material and type (Cement grout, bentonite, etc.)
+2	15M	BENTONITE.

PUMPING TEST

Pumping test method	Pumping rate	Duration of pumping
☐ Pump ☐ Bailer	GPM	Hours Minutes

Static level	Water level end of pumping	Water levels during ☐ Pumping ☐ Recovery			
		10 minutes	20 minutes	30 minutes	40 minutes
feet	feet	feet	feet	feet	feet

If flowing give rate	Pump intake set at	Water at end of test
GPM	feet	☐ Clear ☐ Cloudy

Recommended pump type	Recommended pump setting	Recommended pump rate
☐ Shallow ☐ Deep	feet	GPM

FINAL STATUS OF WELL

☐ Water supply ☐ Observation, monitoring or recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Abandoned (Other) ☐ Dewatering ☐ Unfinished ☐ Replacement well

WATER USE

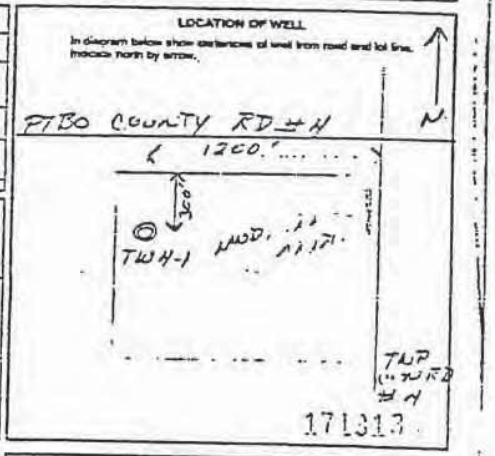
☐ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public supply ☐ Cooling & air conditioning ☐ Not used ☐ Other

METHOD OF CONSTRUCTION

☐ Cable tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☐ Rotary (air) ☐ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

LOCATION OF WELL

In diagram below show distances of well from road and lot lines. Indicate north by arrow.



171313

Name of Well Contractor	Well Contractor's Licence No.
TRIAQUA DRILLING	6779
Address	
RR#2 LAKEFIELD ONT.	
Name of Well Technician	**Well Technician's Licence No.**
PATRICK O'BRIEN	T2155
Signature of Well Contractor or Well Technician	**Submission date**
	21 08 97

MINISTRY USE ONLY

OWNER'S COPY

Ministry of Environment and Energy — Ontario

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

Warsaw Road

County or District	Township/Borough/City/Town/Village	Con.	Lot
PETERBOROUGH	DOURO	C	9
Owner's surname / First name	Address	Date completed
TOWNSHIP OF DOURO	DOURO ONT	24 03 97

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
NONE.	WELL	ABANDONMENT.			
	TW 8-1				
	SOUTH LAND FILL				

WATER RECORD

Water found at — Feet	Kind of water		
	☐ Fresh ☐ Salty	☐ Untested ☐ Untested Gas	☐ Plugged ☐ Plugged Gas
	☐ Fresh ☐ Salty	☐ Untested ☐ Untested Gas	☐ Plugged ☐ Plugged Gas
	☐ Fresh ☐ Salty	☐ Untested ☐ Untested Gas	☐ Plugged ☐ Plugged Gas
	☐ Fresh ☐ Salty	☐ Untested ☐ Untested Gas	☐ Plugged ☐ Plugged Gas
	☐ Fresh ☐ Salty	☐ Untested ☐ Untested Gas	☐ Plugged ☐ Plugged Gas

CASING & OPEN HOLE RECORD

Inside diameter inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			

SCREEN

Slot no. (Dia. No.)	Diameter inches	Length feet
Setting and type	Depth at top of screen feet

PLUGGING & SEALING RECORD

☐ Annular space ☐ Lower portion

Depth set at — feet From	To	Material and type (Cement grout, bentonite, etc.)
		±3 KG BENTONITE

PUMPING TEST

Pumping rate GPM	Duration of pumping Hours Mins
Static level feet	Water level end of pumping feet
Water levels during ☐ Pumping ☐ Recovered	
15 minutes feet	30 minutes feet
45 minutes feet	60 minutes feet
If flowing give rate GPM	Pump intake set at feet
Water at end of test ☐ Clear ☐ Cloudy	
Recommended pump type ☐ Shallow ☐ Deep	Recommended pump setting feet
Recommended pump rate GPM	

FINAL STATUS OF WELL

☐ Water supply ☐ Observation well ☐ Test hole ☐ Recharge well
☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Abandoned (Other)
☐ Dewatering
☐ Unfinished ☐ Replacement well

WATER USE

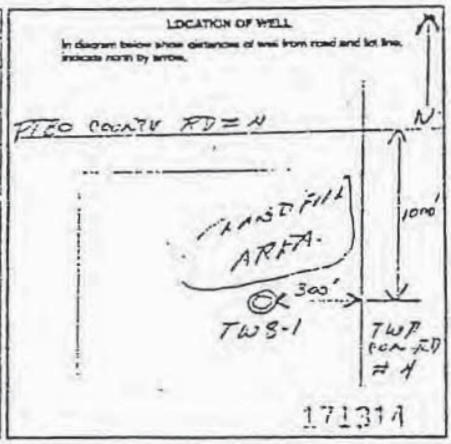
☐ Domestic ☐ Stock ☐ Irrigation ☐ Industrial
☐ Commercial ☐ Municipal ☐ Public supply ☐ Cooling & air conditioning
☐ Not used ☐ Other

METHOD OF CONSTRUCTION

☐ Cable tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☐ Rotary (air)
☐ Air percussion ☐ Boring ☐ Diamond ☐ Jetting
☐ Driving ☐ Digging ☐ Other

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



171314

Name of Well Contractor	Well Contractor's Licence No.
TRIAQUA DRILLING	6778
Address of Well Contractor: RR 2 LAKEFIELD ONT	
Name of Well Technician	Well Technician's Licence No.
PATRICK O'BRIEN	T 2655
Signature of Technician and/or Contractor	Date Submitted: 24 03 97

MINISTRY USE ONLY

1 - OWNER'S COPY

Appendix C
Established Monitoring Program and Sampling Protocol

SECTION I: GROUNDWATER MONITORING AND SAMPLING PROTOCOL

1.0 WATER LEVEL MEASUREMENTS

1. Prior to purging/sampling, water levels shall be measured by the wetted-taped method or with an electric depth gauge to the nearest 0.01 metres (or 0.01 feet).
2. MEASUREMENTS SHALL BE TAKEN WITHOUT THE REMOVAL OF THE DEDICATED SAMPLING DEVICE (tubing and foot-valve arrangements).
3. MEASUREMENTS SHALL BE TAKEN FROM TOP OF THE MONITORED WELL. IN MOST CASES, THE MEASUREMENT WILL BE TAKEN FROM TOP OF THE PVC CASING AND NOT THE TOP OF THE PROTECTIVE CASING.
4. Measurements shall be recorded on FORM 1 for each specific monitor in the log book, indicating MEASURING POINT.
5. Rinse tip of measuring device with distilled water after taking measurement in each monitor.

2.0 PURGING PROCEDURE

1. Prior to sampling, each well shall be purged to remove the stagnant water within the casing.
2. THREE CASING VOLUMES SHALL BE REMOVED BY THE DEDICATED SAMPLERS OR BY BAILER FROM THE WELLS WITH MODERATE INFLOW. THE PURGED WATER SHALL BE MEASURED INTO A CALIBRATED CONTAINER AND THE VOLUME REMOVED SHALL BE RECORDED ON FORM 2 FOR THE SPECIFIC MONITOR IN THE LOG BOOK.
3. SLOW INFLOW MONITORS SHALL BE PURGED ENTIRELY DRY. THE VOLUME OF PURGED WATER SHALL BE RECORDED IN FORM 2 FOR THE SPECIFIC MONITOR ON THE LOG BOOK.

SECTION I: GROUNDWATER MONITORING AND SAMPLING PROTOCOL

2.0 PURGING PROCEDURE (cont'd)

4. The volume of standing water in each monitor shall be calculated from the highest recorded static level and the total well depth and recorded on FORM 2. This volume will not appreciably change with seasonal fluctuations and may be used as the uniform standard in determining the purged volume during each sampling survey.

5. Conductivity, temperature and pH values shall be recorded after the removal of each casing volume to confirm stabilized quality conditions. When this field-measurement program is initiated, these quality results may be utilized to determine if the purged volume may be reduced to two casing volumes. Field monitoring equipment shall be calibrated each day prior to use, and results noted on FORM 6.

3.0 SAMPLING/SUBMISSION PROCEDURE

1. Suitable sample bottles (containing premeasured preservatives, as required) and QA/QC blanks shall be obtained from the analyzing laboratory in advance of the sampling program. The number and type of field and spiked blanks shall be determined by prior consultation with the laboratory representative.

2. Samples shall be collected the day following the purging exercise (to permit water-level recovery in the slower responding monitors) by means of the dedicated samplers in all monitor wells.

3. Sample collection shall be undertaken in the following sequence, as necessary:

- Volatile organics
- Pesticides/herbicides
- Phenolics
- Heavy metals
- General chemistry

SECTION I: GROUNDWATER MONITORING AND SAMPLING PROTOCOL

3.0 SAMPLING/SUBMISSION PROCEDURE (cont'd)

4. Samples collected for heavy-metal determinations (which include iron and manganese) shall be field filtered before placement into sample bottle containing the acid preservative. If appreciable sediment occurs in the sample and filtering cannot be undertaken, a sample shall be collected in a bottle without preservative, and the sediment shall be allowed to settle before a sample is decanted into a bottle without preservative for subsequent filtration and analysis by the laboratory.

5. Sample collected for volatile organics shall completely fill the sample bottle, with no air space permitted.

6. PLACE SAMPLES INTO A COOLER WITH PRE-FROZEN ICE PACKS AND DELIVER TO LABORATORY WITHIN 24 HOURS AFTER COMPLETION OF PROGRAM.

7. Sampling information shall be recorded on FORM 3 of the log book.

8. Each sample bottle shall be labelled to indicate the project name, well designation, time of sample collection, preservatives added and analyses to be performed.

9. If submitted to other than the MOE, a chain of custody form shall be completed and submitted together with the samples to the laboratory.

SECTION II: SURFACE WATER MONITORING AND SAMPLING PROTOCOL

1. Water samples shall be collected upstream, opposite and downstream from the landfill side of the watercourse.
2. Sampling shall be preferably undertaken under baseflow conditions (to observe maximum quality impact). Thus, there shall be several days without precipitation antecedent to the sampling survey.
3. Sampling shall be preferably undertaken when the stream has a discernable flow. Sampling of pondings shall be discouraged unless representative of the local conditions.
4. Samples shall be collected at mid-depth in the stream (to prevent the uptake of bottom sediments) and preferably from the middle of the stream. Remove bottle cap when sampling point reached and point bottle opening opposite direction of flow.
5. Samples shall be directly collected into the sample bottles (with or without preservatives, as required) WITHOUT filtering.
6. Field measurements shall be taken of the temperature, conductivity, and pH at each sampling station when samples are collected for chemical analysis. Additionally, the stream and weather conditions shall be noted and the prevailing flow shall be determined by estimation of the stream depth, width and the current velocity.
7. Pertinent information on the stream conditions shall be recorded for each station during each site visit on FORM 4 of the log book.
8. Any digitally-metered instrument used to obtain field measurements (other than temperature) shall be calibrated before and after the sampling survey to ensure reliable results.

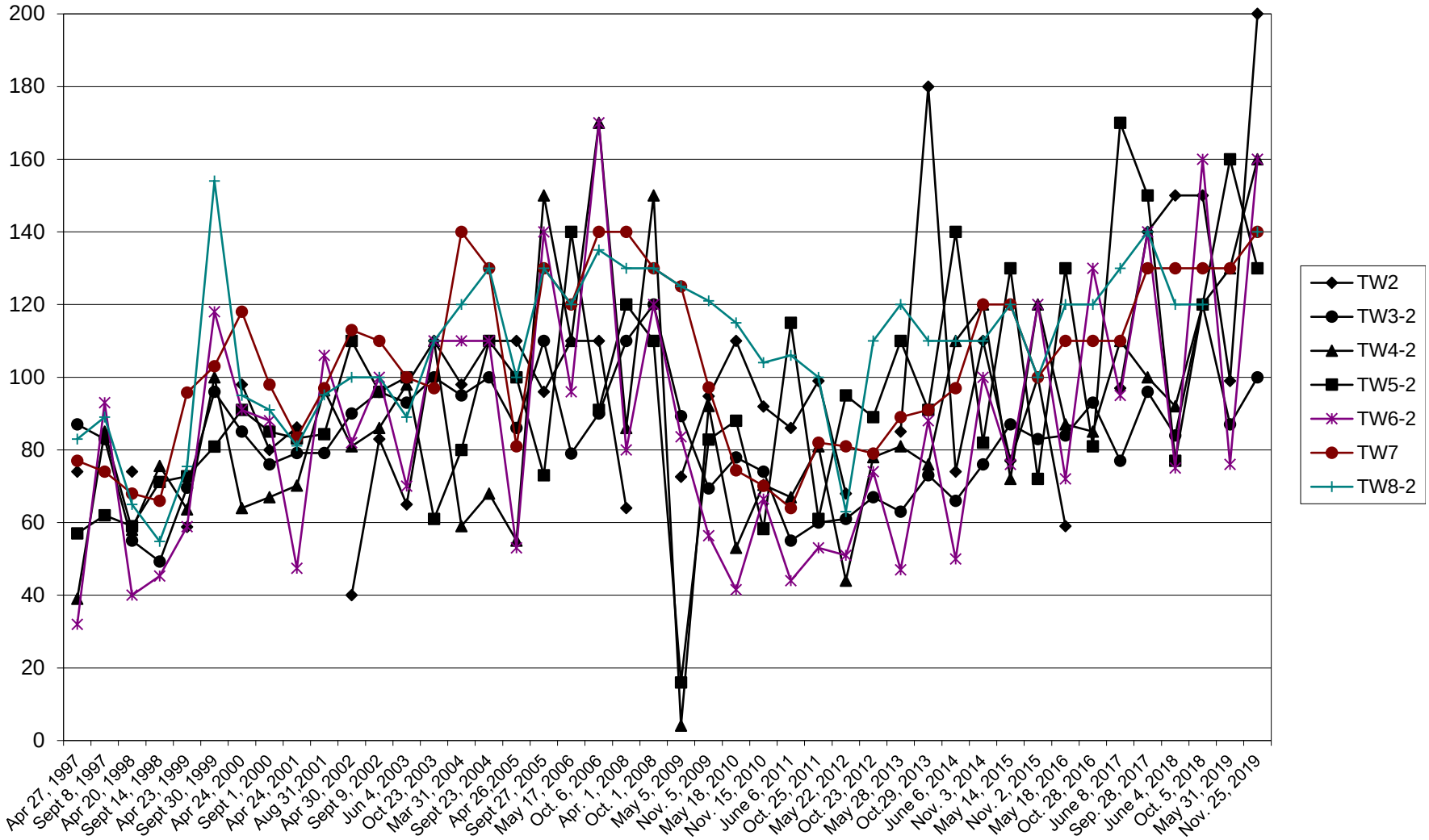
SECTION III: COMBUSTIBLE GAS MONITORING PROTOCOL

1. Prior to the field survey, the combustible gas detector shall be calibrated to ensure acceptable gas measurements.
2. When measuring the gas concentration in any probe, a specific sequence shall be followed:
   i) Thoroughly purge by aspirating atmospheric air through instrument.
   ii) Zero high-level (0-100 percent) and low-level (0-5 percent) detection scales.
   iii) Aspirate gas from probe initially USING THE HIGH SCALE (0-100 percent) until a steady reading is observed on the scale.
   iv) If a gas concentration below 5 percent is indicated, set to low-level scale (0-5 percent) and aspirate until a steady reading is observed on the scale.
   v) Conclude test by purging instrument with atmospheric air.
3. Combustible gas presence/absence and concentrations shall be recorded on FORM 5 of the log book.

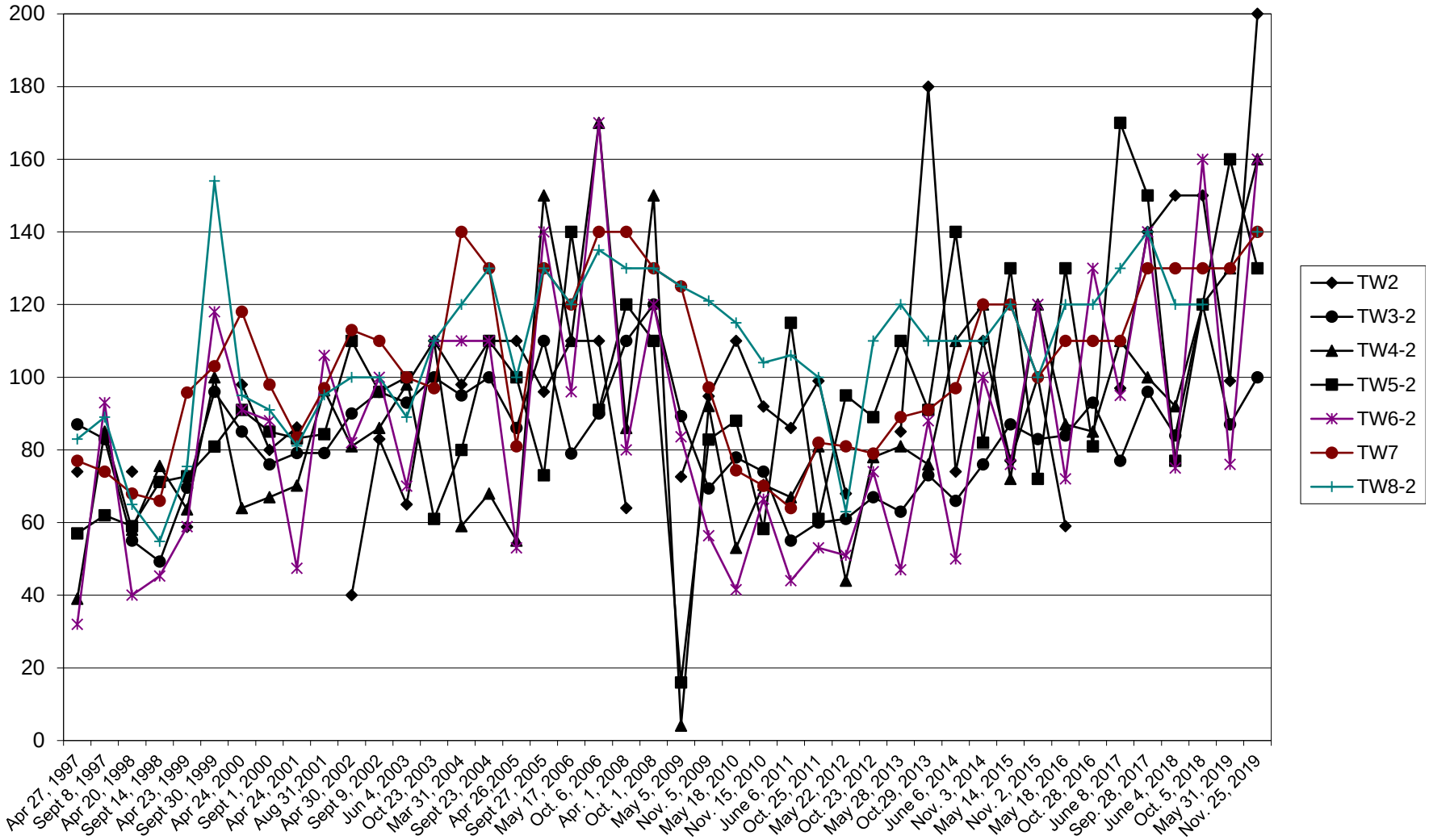
Appendix D

Water Hydrographs, Chemical Comparison Graphs, Hydraulic Conductivity Graphs

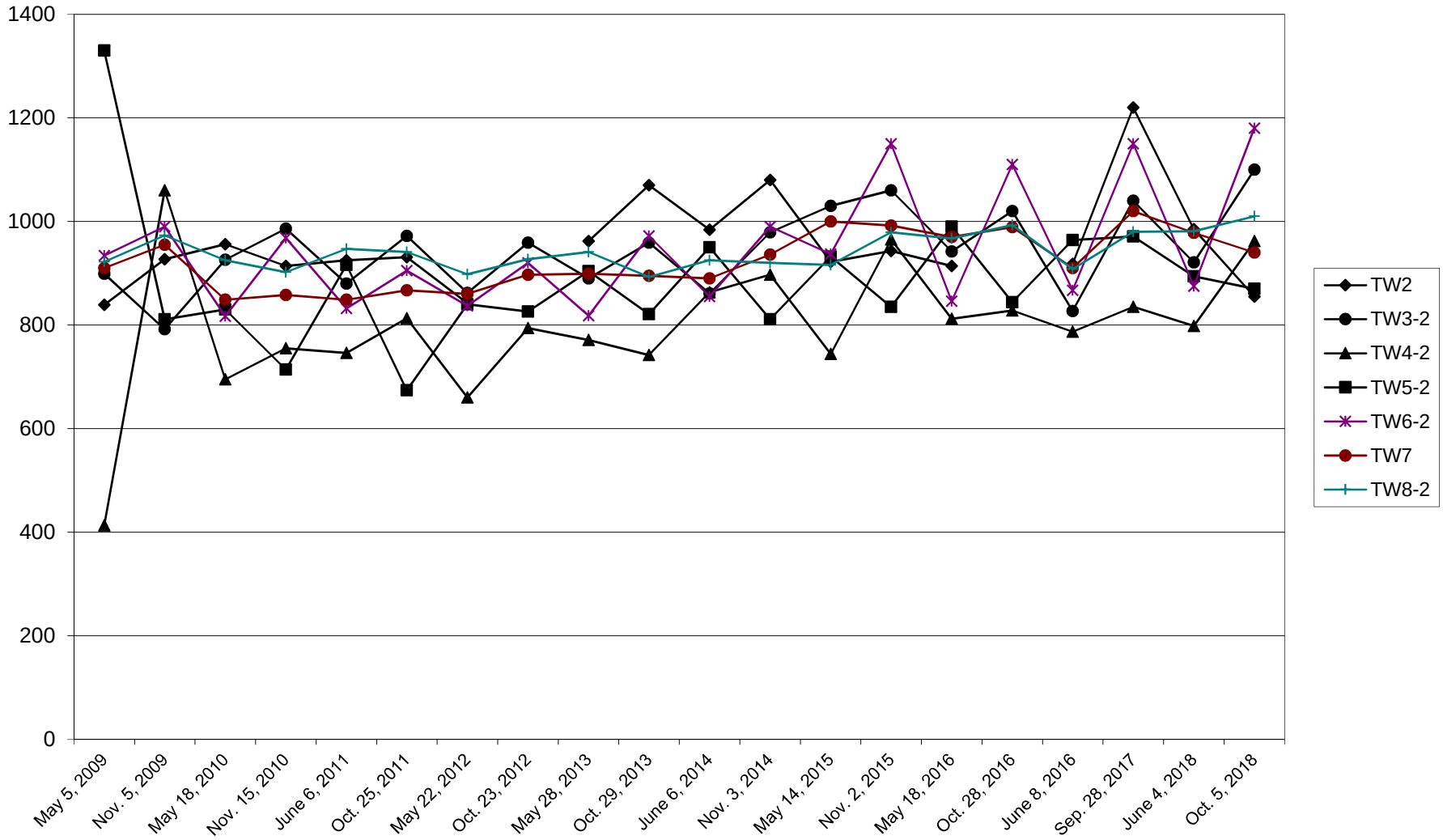
CHLORIDE - WARSAW ROAD LAND FILL SITE



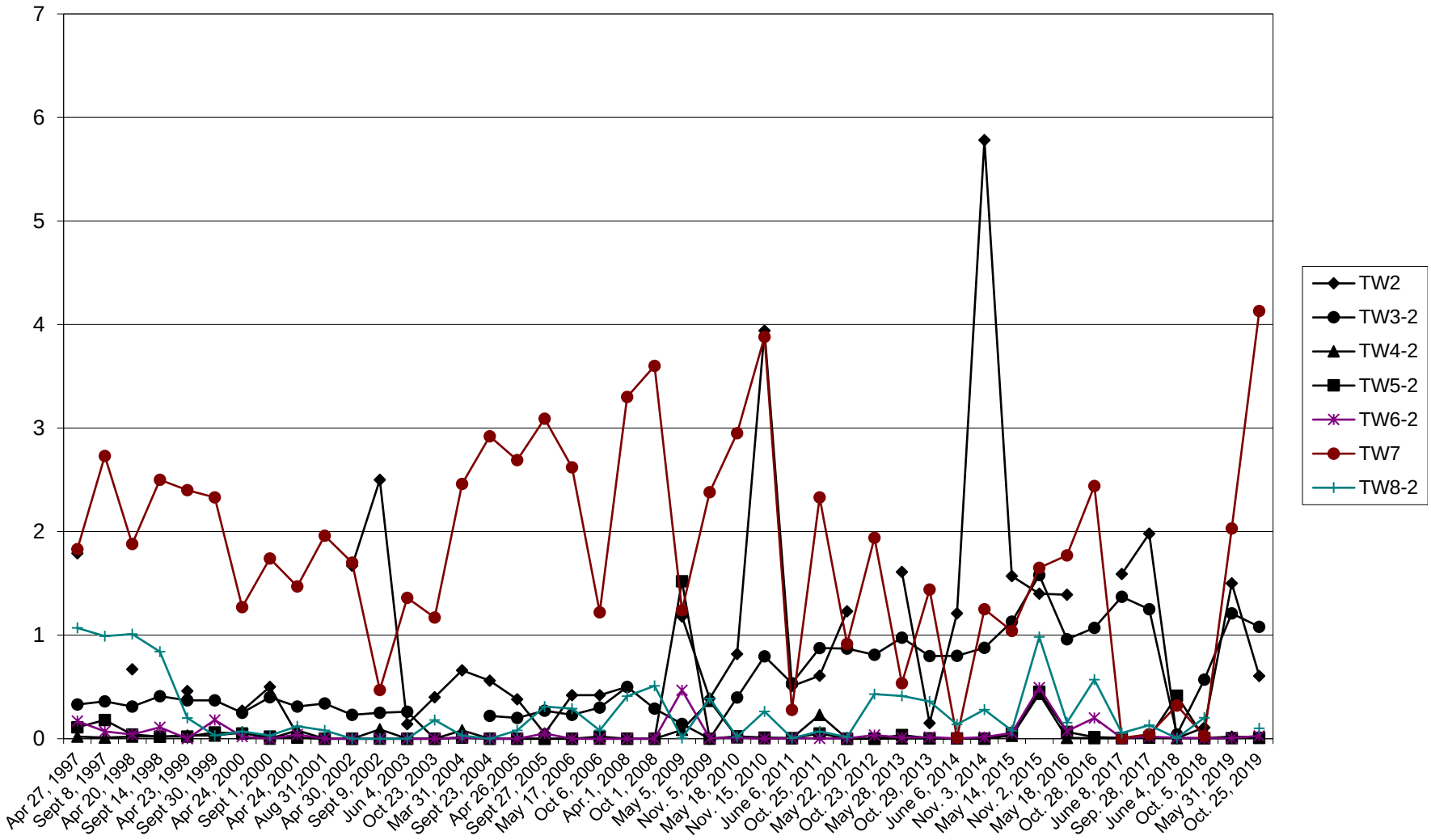
CHLORIDE - WARSAW ROAD LAND FILL SITE



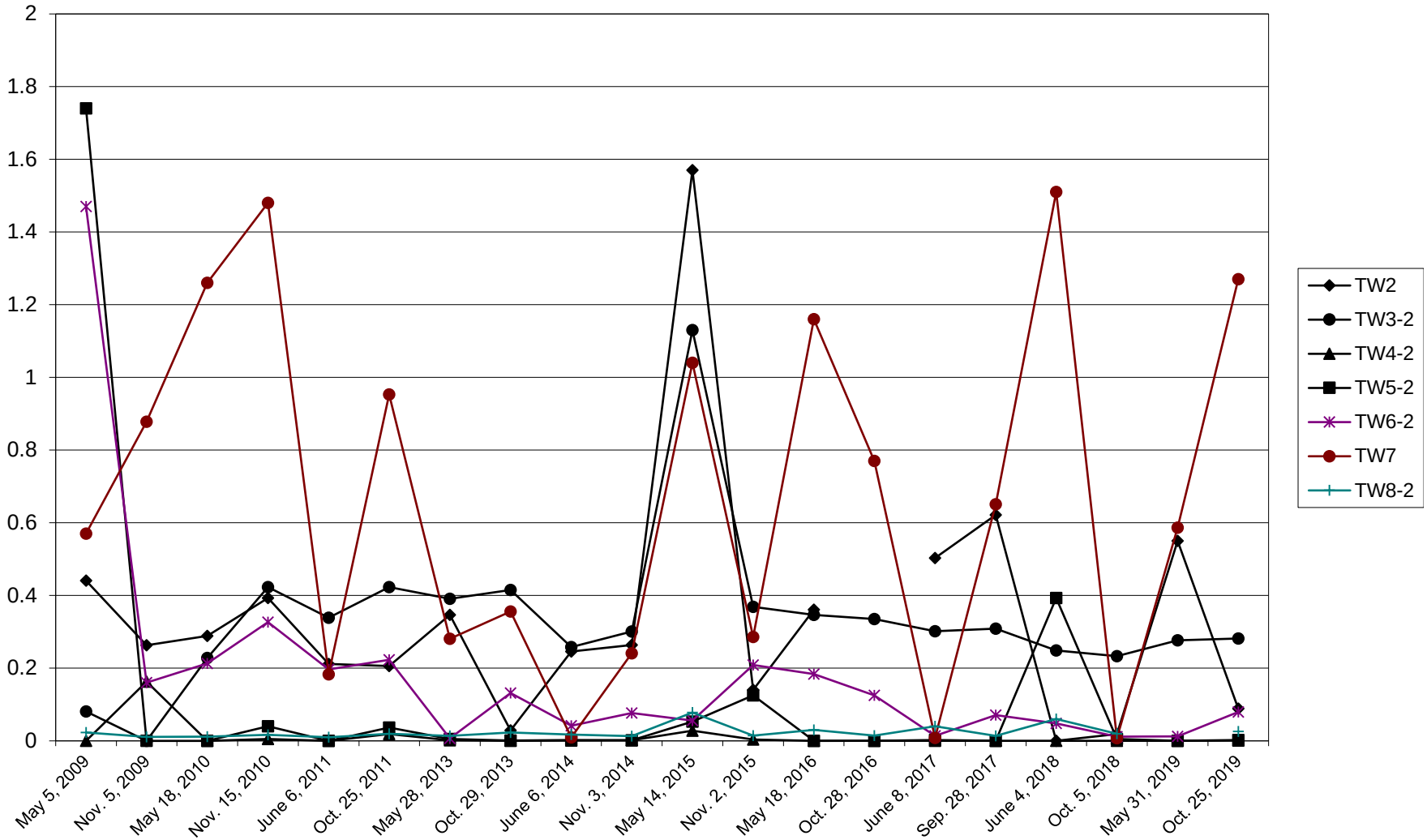
CONDUCTIVITY - WARSAW ROAD LAND FILL SITE



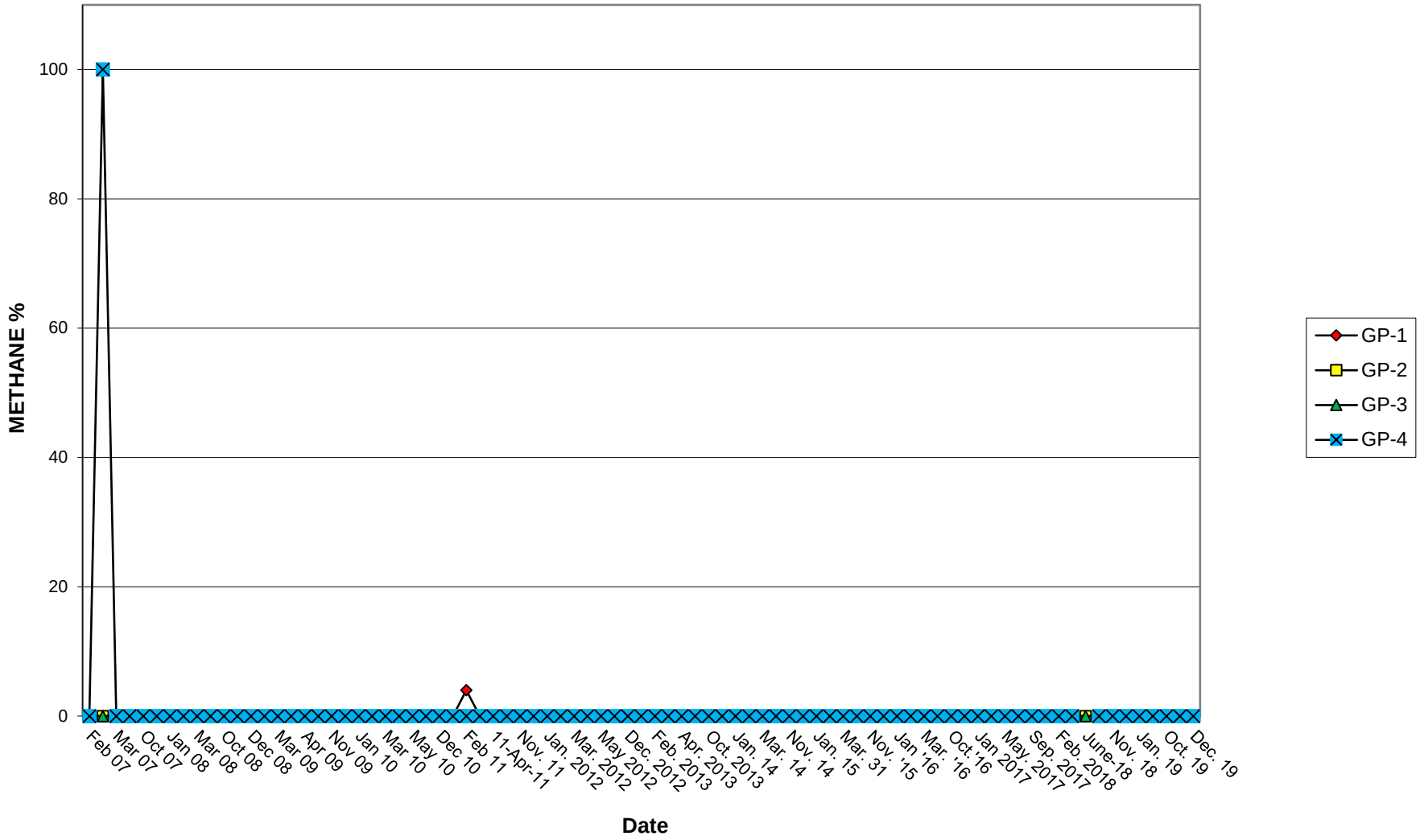
IRON - WARSAW ROAD LAND FILL SITE



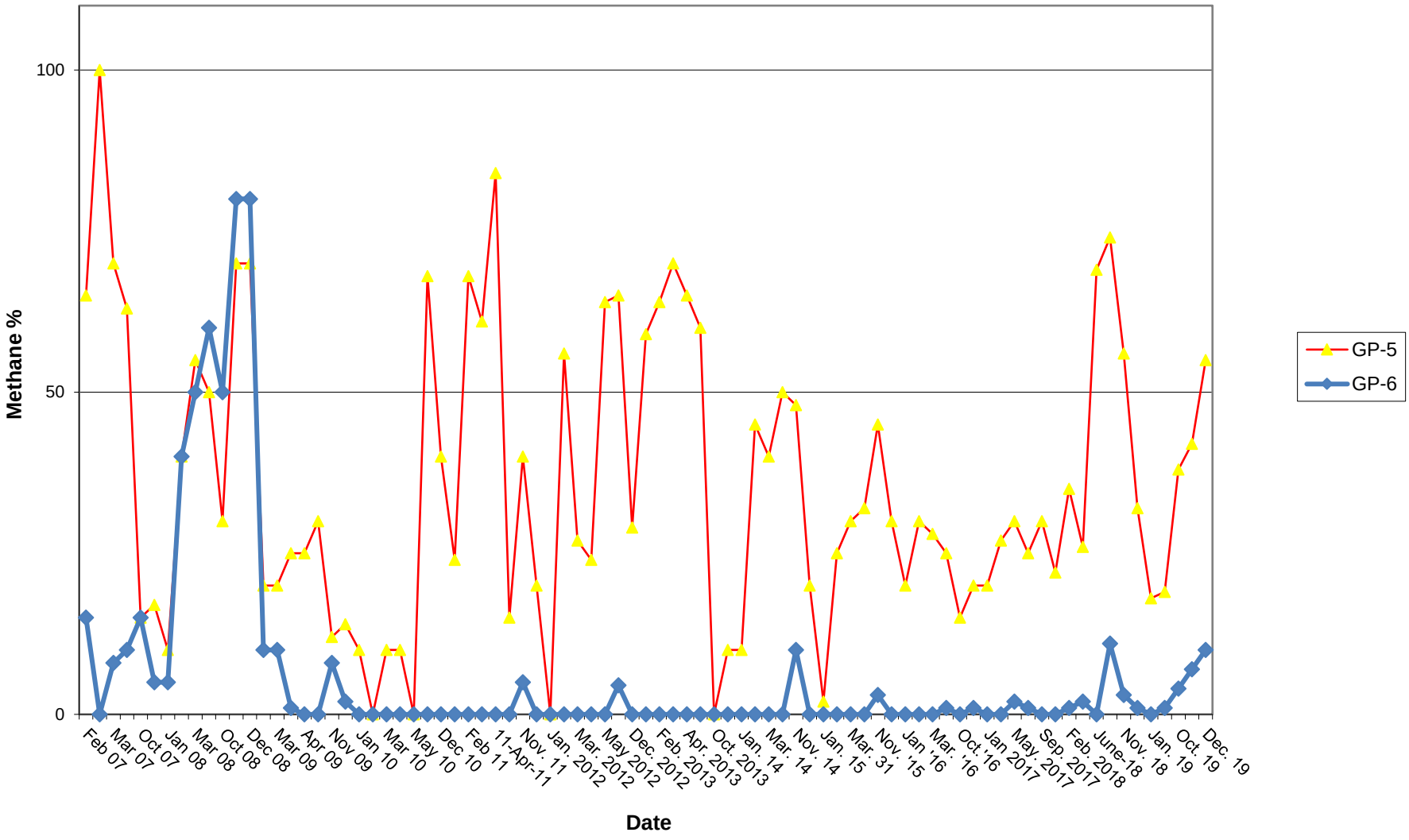
MANGANESE - WARSAW ROAD LAND FILL SITE



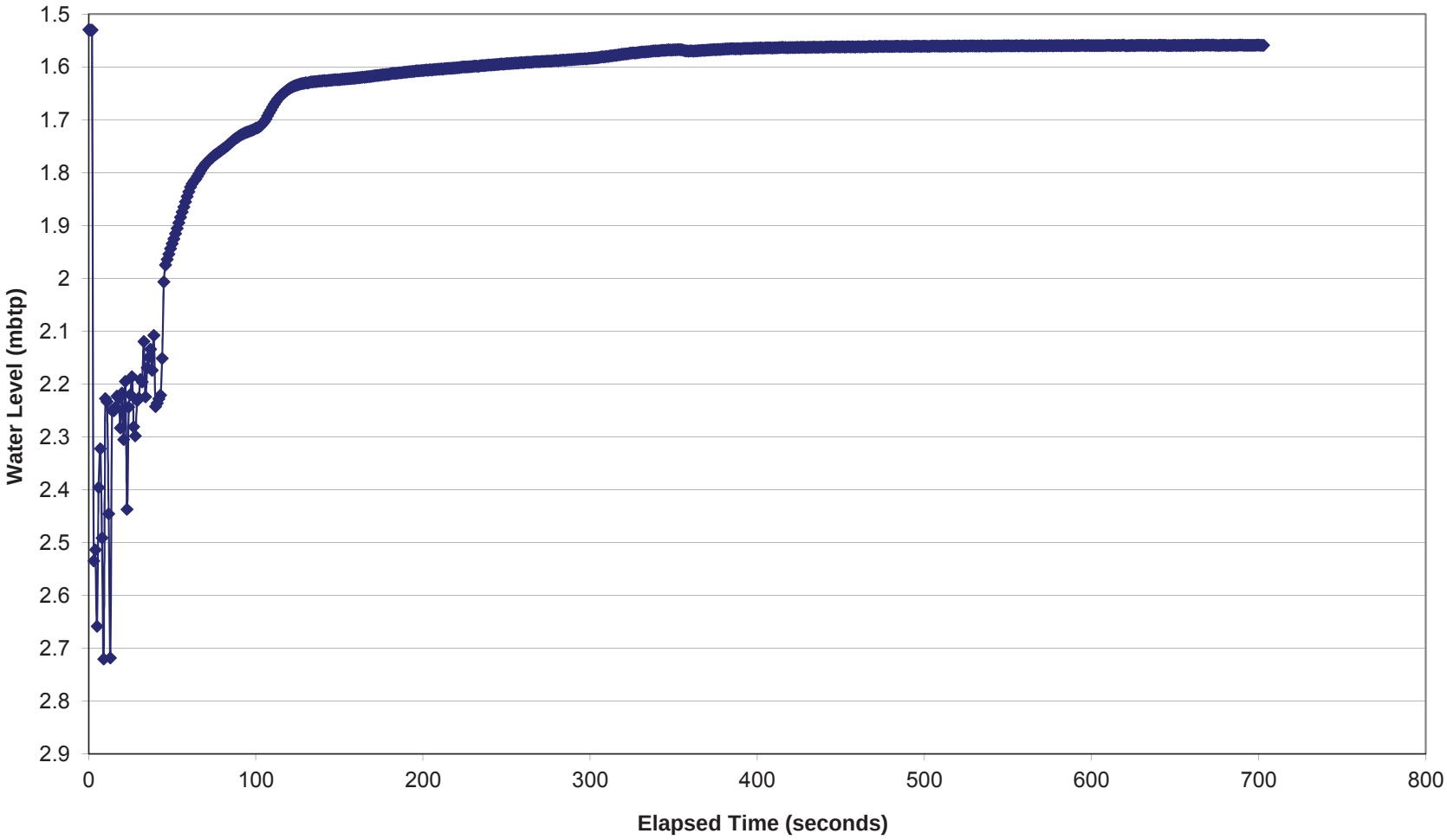
METHANE LEVELS



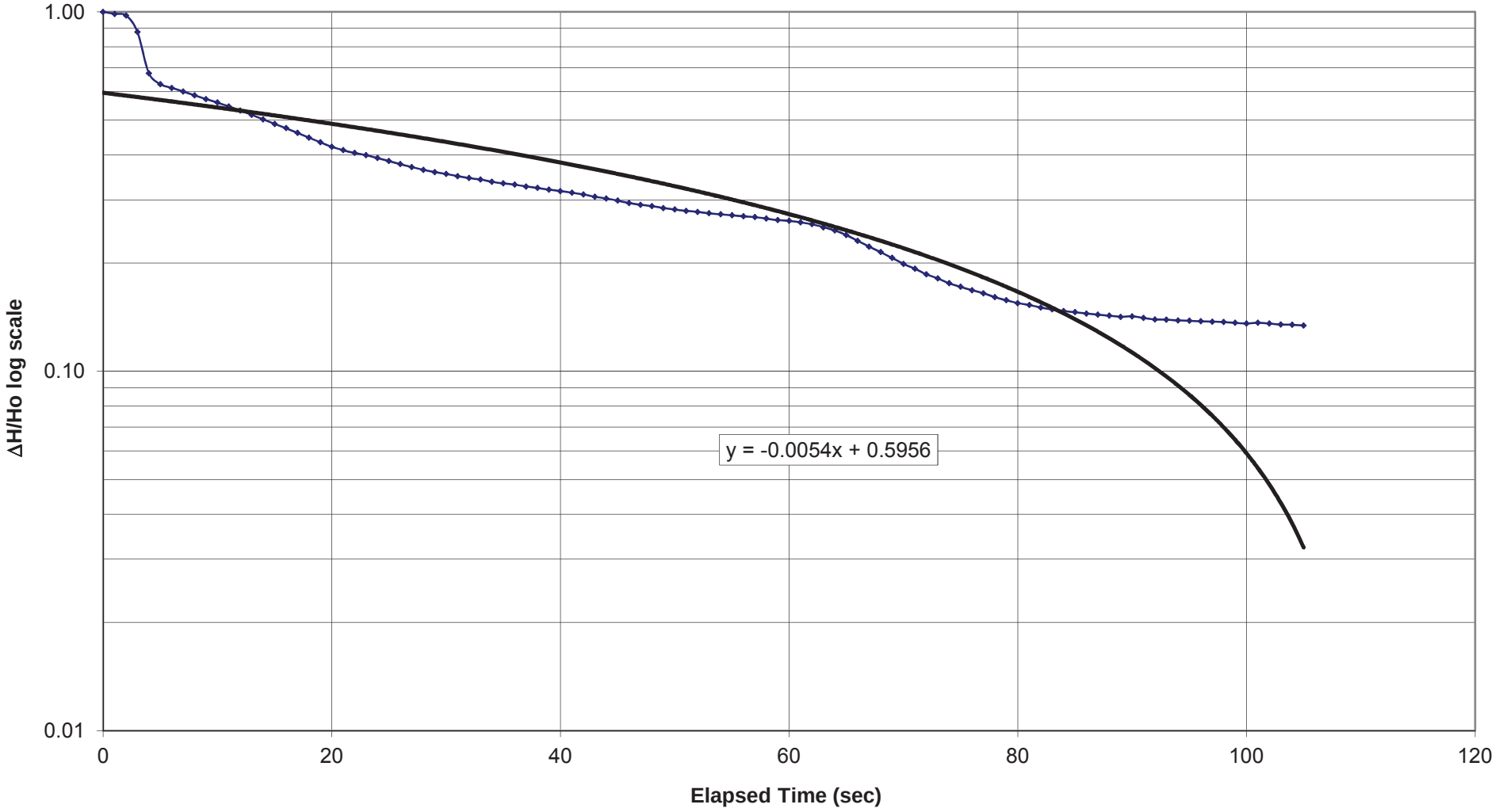
METHANE LEVELS



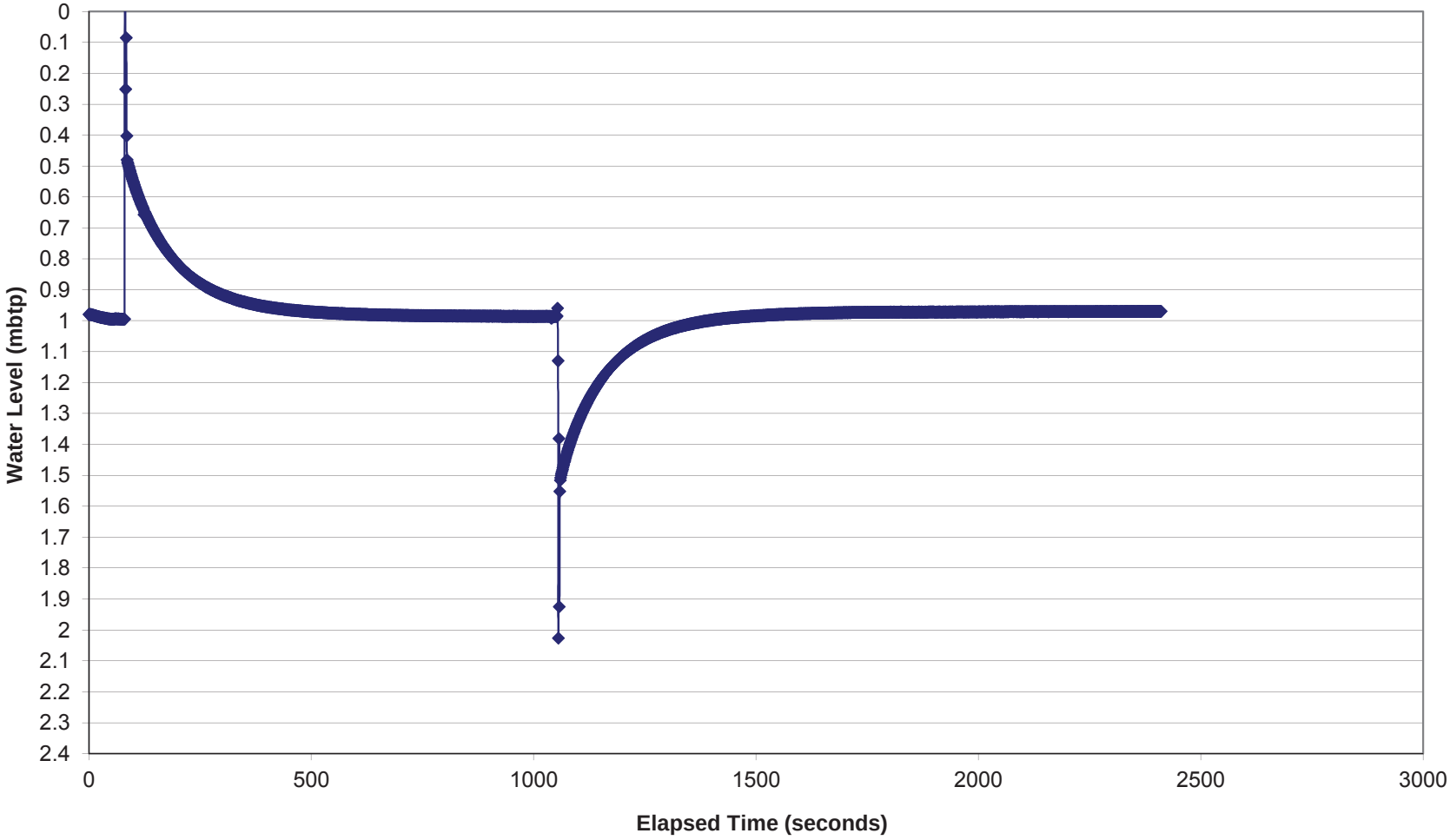
Hydraulic Conductivity Testing at TW-2
Warsaw Landfill



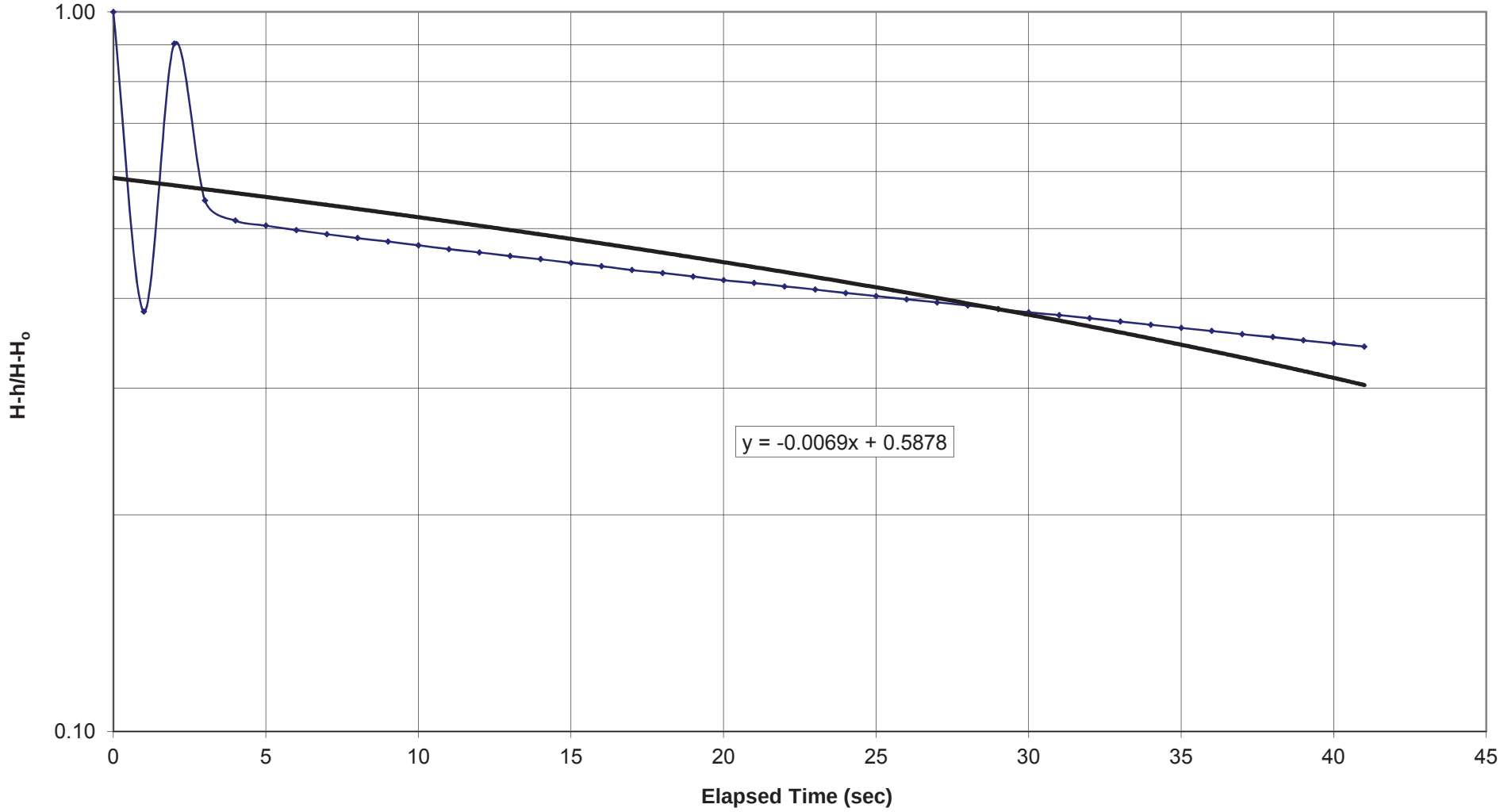
Rising Head Hydraulic Conductivity Analysis at TW-2



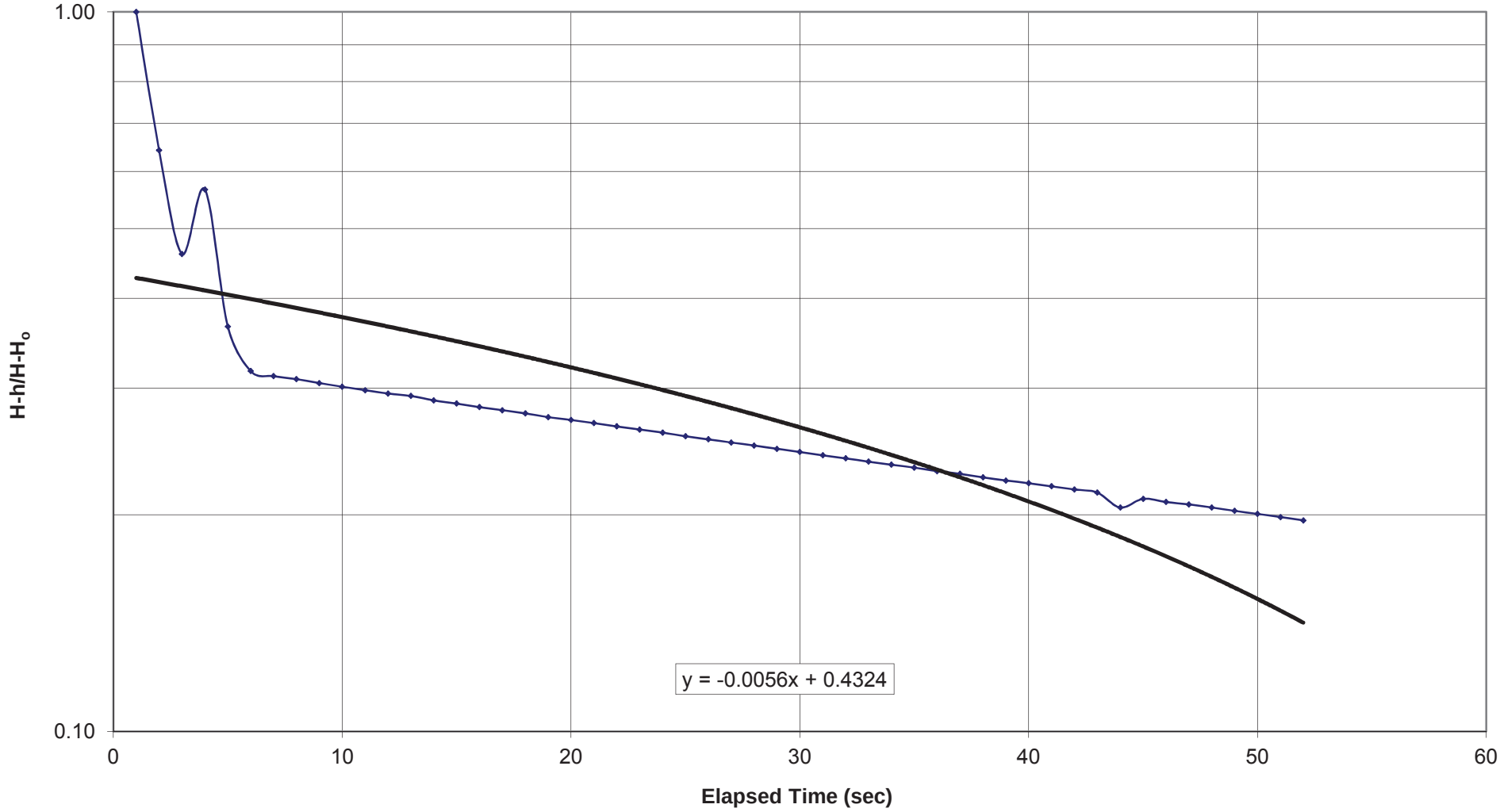
Hydraulic Conductivity Testing at TW-5-2
Warsaw Landfill

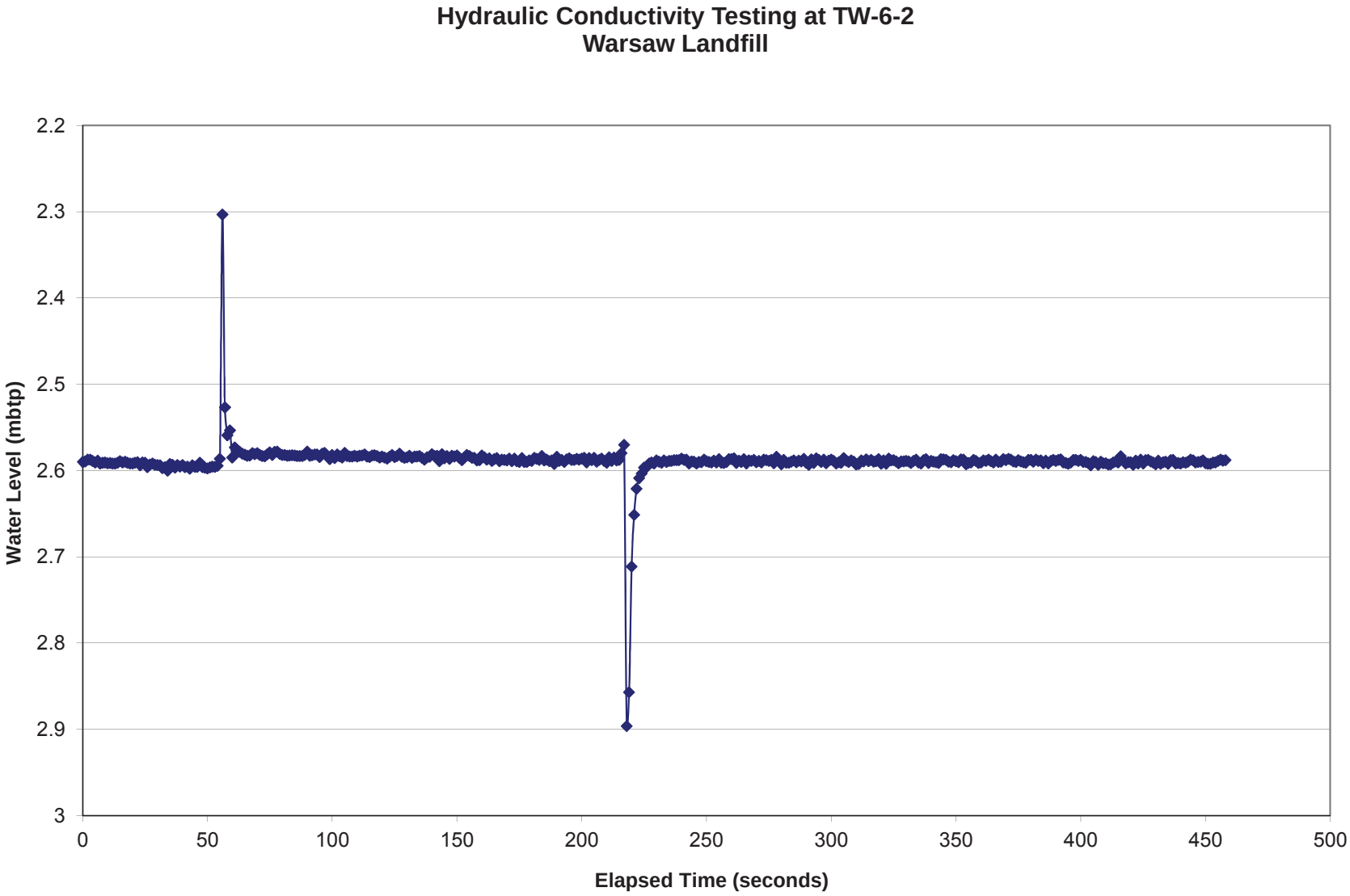


Rising Head Hydraulic Conductivity Analysis at TW-5-2

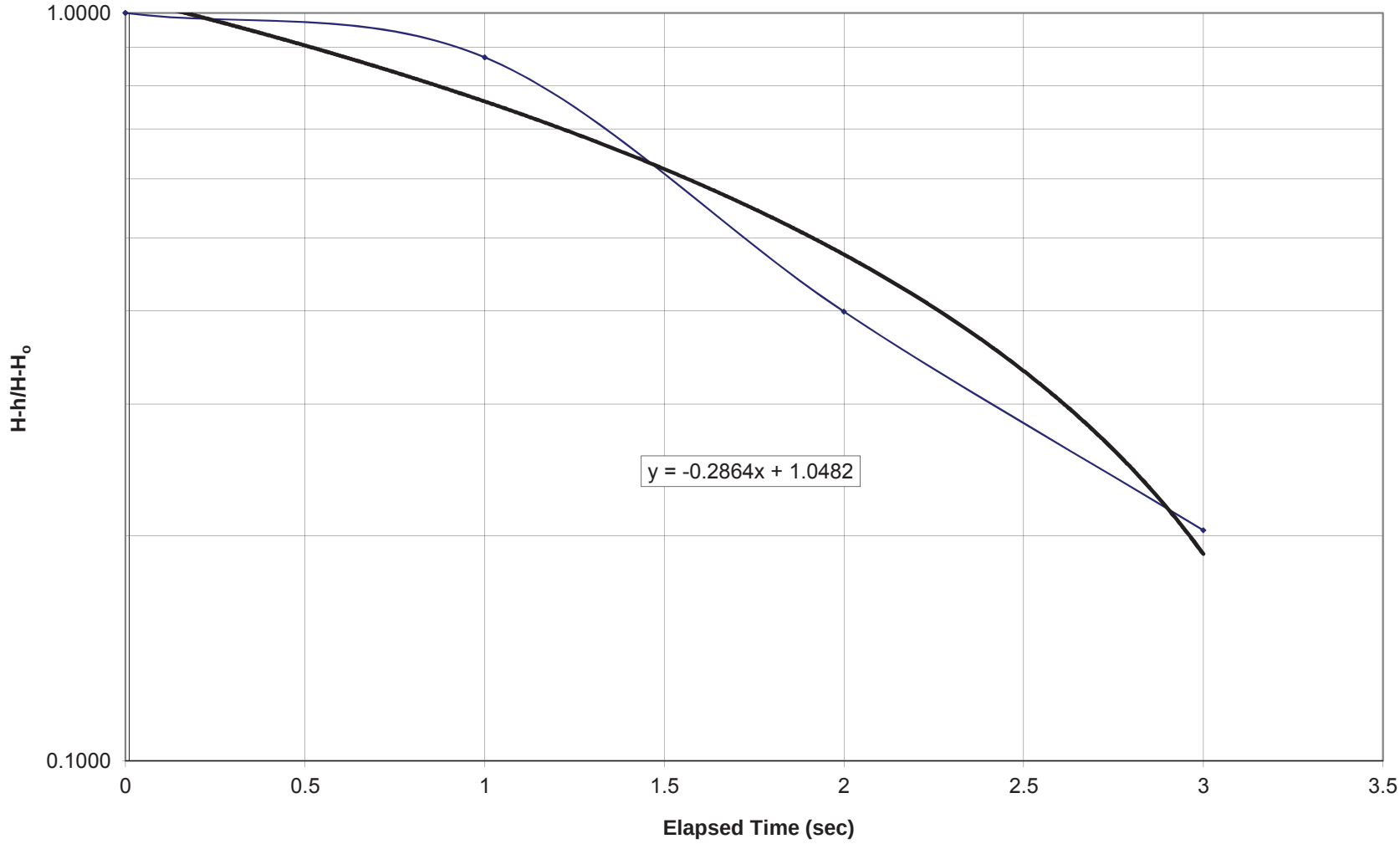


Falling Head Hydraulic Conductivity Analysis at TW-5-2

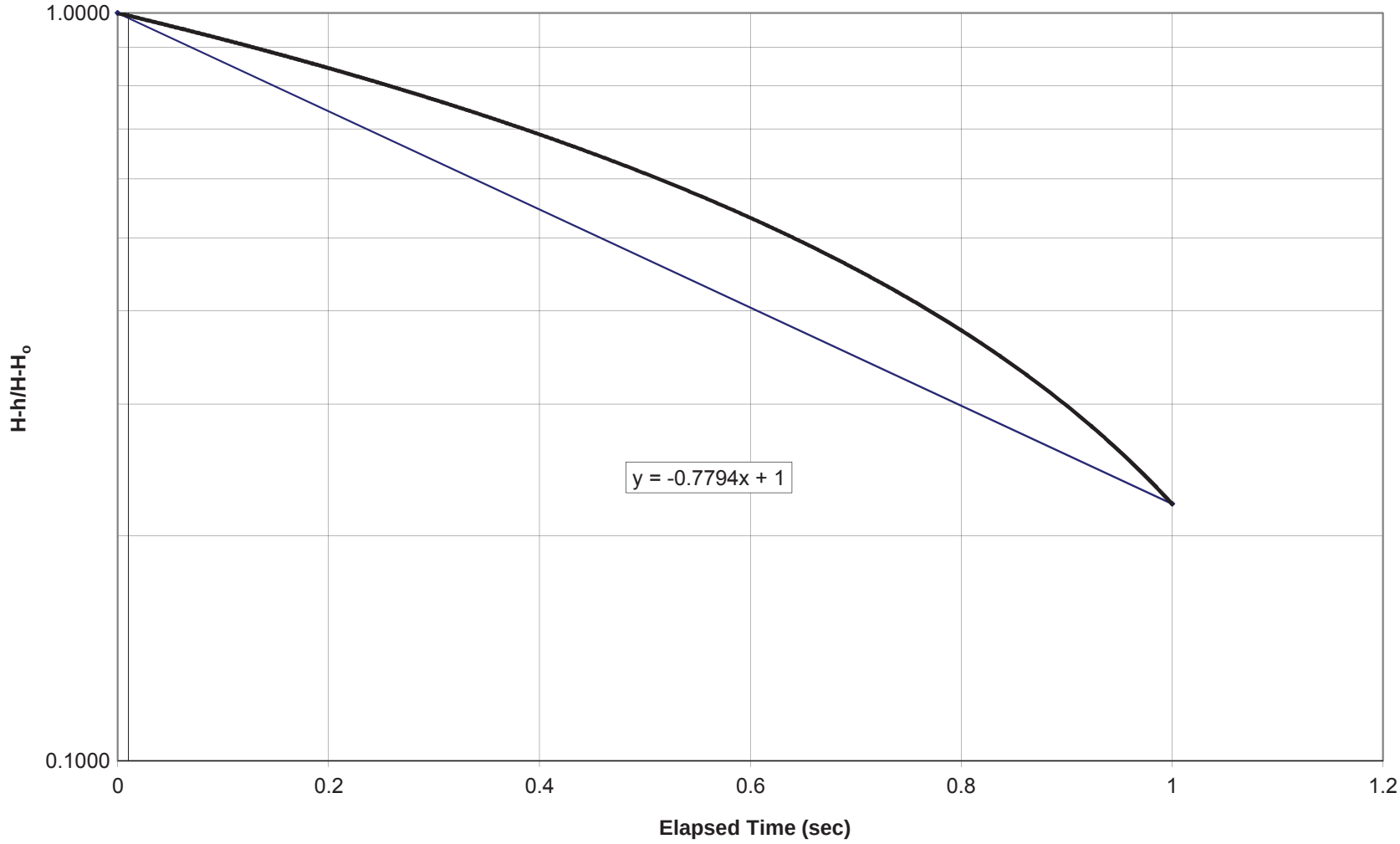


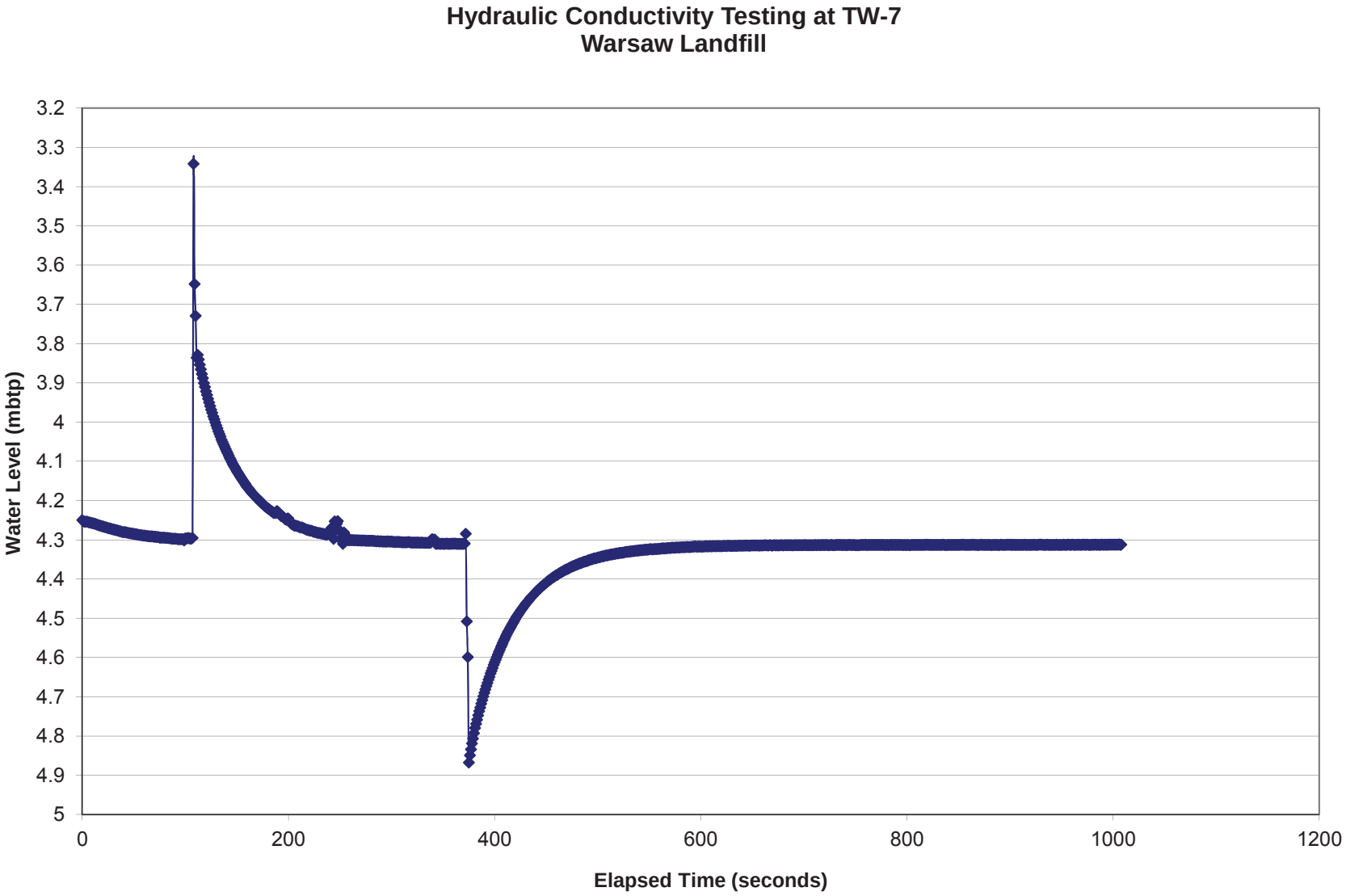

Hydraulic Conductivity Testing at TW-6-2
Warsaw Landfill
Water Level (mbtp)
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
0
50
100
150
200
250
300
350
400
450
500
Elapsed Time (seconds)

Rising Head Hydraulic Conductivity Analysis at TW-6-2

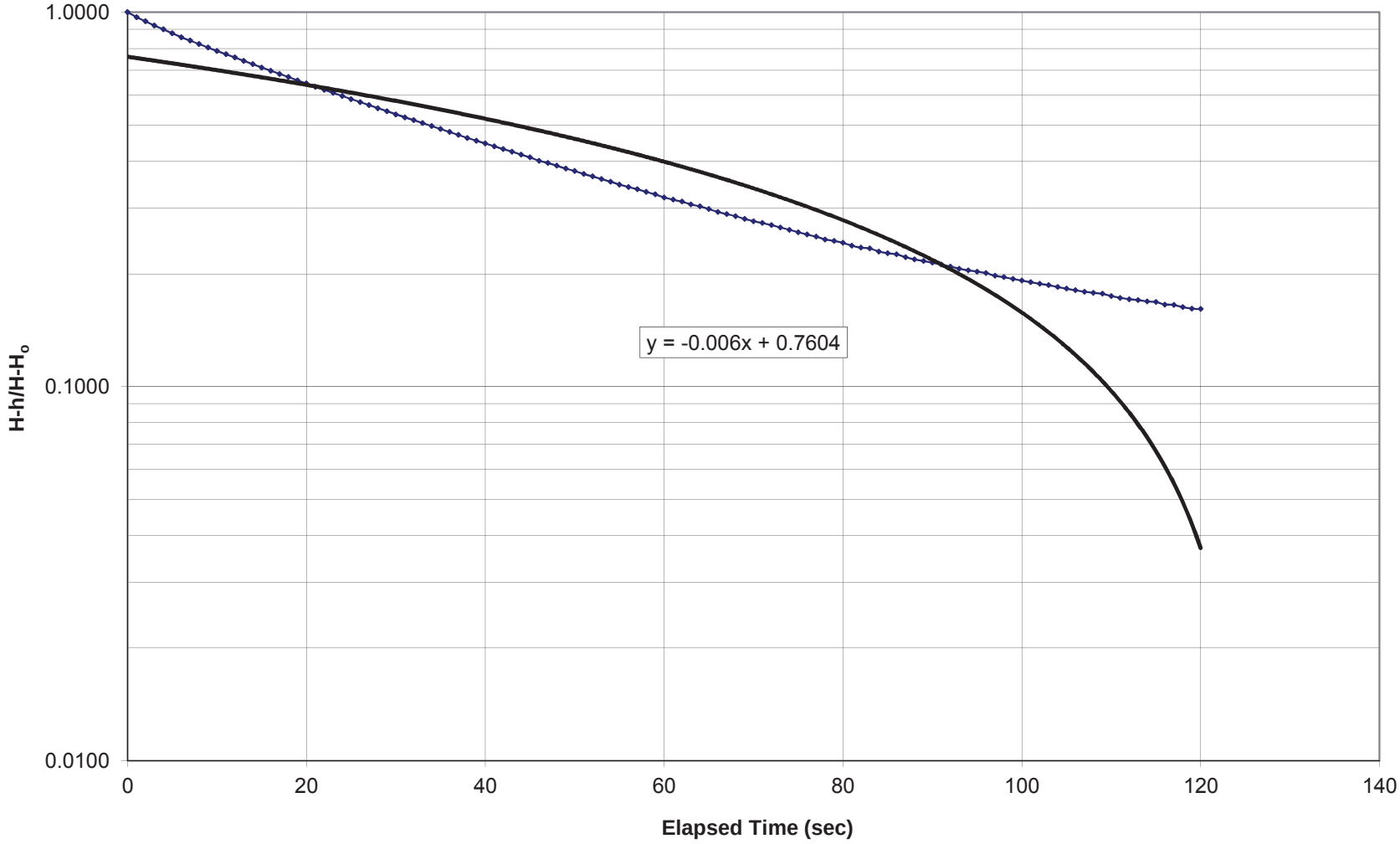


Falling Head Hydraulic Conductivity Analysis at TW-6-2

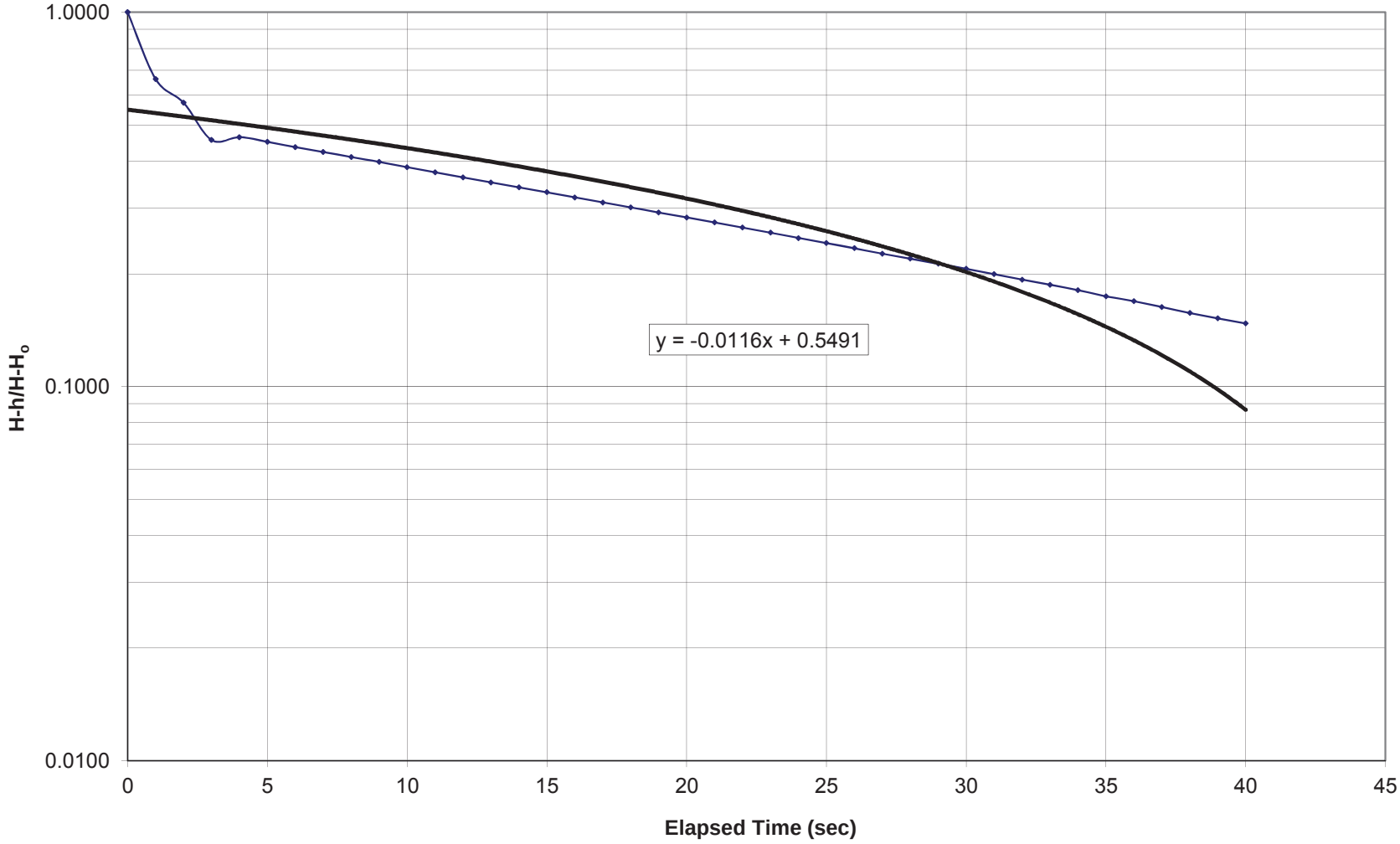



Hydraulic Conductivity Testing at TW-7
Warsaw Landfill
Water Level (mbtp)
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4
4.1
4.2
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
0
200
400
600
800
1000
1200
Elapsed Time (seconds)

Rising Head Hydraulic Conductivity Analysis at TW-7



Falling Head Hydraulic Conductivity Analysis at TW-7



Appendix E
2019 Water Quality Data

FINAL REPORT

CA18152-MAY19 R

73515228, 11193447-01

Prepared for

GHD

FINAL REPORT

CA18152-MAY19 R

First Page

CLIENT DETAILS

Client	GHD
Address	347 Pido Rd., Unit #29, Peterborough Canada, K9J 6Z8 Phone: 705-749-3317. Fax:
Contact	Gus Bolin
Telephone	705-749-3317
Facsimile	
Email	gus.bolin@ghd.com
Project	73515228, 11193447-01
Order Number	
Samples	Surface Water (1)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
Facsimile	705-652-6365
Email	brad.moore@sgs.com
SGS Reference	CA18152-MAY19
Received	05/28/2019
Approved	06/04/2019
Report Number	CA18152-MAY19 R
Date Reported	06/04/2019

COMMENTS

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: GHD
Project: 73515228, 11193447-01
Project Manager: Gus Bolin
Samplers: K Geraldi

PACKAGE: **- General Chemistry** (WATER)

Sample Number	5
Sample Name	SW-7
Sample Matrix	Surface Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
General Chemistry				
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4↑
Total Suspended Solids	mg/L	2		< 2
Alkalinity	mg/L as CaCO3	2		282
Conductivity	uS/cm	2		702
Total Dissolved Solids	mg/L	30		423
Chemical Oxygen Demand	mg/L	8		< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1

PACKAGE: **- Metals and Inorganics** (WATER)

Sample Number	5
Sample Name	SW-7
Sample Matrix	Surface Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
Metals and Inorganics				
Sulphate	mg/L	2		6
Nitrite (as N)	as N mg/L	0.03		< 0.03
Nitrate (as N)	as N mg/L	0.06		< 0.06
Arsenic (total)	mg/L	0.0002		< 0.0002
Barium (total)	mg/L	0.00002		0.0764
Boron (total)	mg/L	0.002		0.051
Calcium (total)	mg/L	0.01		109

Client: GHD
Project: 73515228, 11193447-01
Project Manager: Gus Bolin
Samplers: K Geraldi

PACKAGE: **- Metals and Inorganics** (WATER)

Sample Number	5
Sample Name	SW-7
Sample Matrix	Surface Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
Metals and Inorganics (continued)				
Cadmium (total)	mg/L	0.000003		< 0.000003
Chromium (total)	mg/L	0.00008		< 0.00008
Copper (total)	mg/L	0.0002		0.0003
Iron (total)	mg/L	0.007		0.038
Potassium (total)	mg/L	0.009		3.75
Magnesium (total)	mg/L	0.001		6.29
Manganese (total)	mg/L	0.00001		0.0266
Sodium (total)	mg/L	0.01		28.4
Phosphorus (total)	mg/L	0.003		< 0.003
Lead (total)	mg/L	0.00001		< 0.00001
Zinc (total)	mg/L	0.002		< 0.002

Client: GHD
Project: 73515228, 11193447-01
Project Manager: Gus Bolin
Samplers: K Geraldi

PACKAGE: **- Other (ORP)** (WATER)

Sample Number	5
Sample Name	SW-7
Sample Matrix	Surface Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
Other (ORP)				
pH	no unit	0.05		8.24
Chloride	mg/L	1		64
Mercury (total)	µg/L	0.01		< 0.01

PACKAGE: **- Phenols** (WATER)

Sample Number	5
Sample Name	SW-7
Sample Matrix	Surface Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
Phenols				
4AAP-Phenolics	mg/L	0.001		< 0.001

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0547-MAY19	mg/L as CaCO3	2	< 2	0	10	99	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0230-MAY19	as N mg/L	0.1	<0.1	0	10	101	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0587-MAY19	mg/L	1	<1	0	20	101	80	120	102	75	125
Sulphate	DIO0587-MAY19	mg/L	2	<2	0	20	102	80	120	100	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0636-MAY19	mg/L	0.03	<0.03	ND	20	92	80	120	99	75	125
Nitrate (as N)	DIO0636-MAY19	mg/L	0.06	<0.06	0	20	97	80	120	105	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0053-MAY19	mg/L	2	< 2	2	30	93	70	130	NV	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0523-MAY19	mg/L	8	<8	ND	20	82	80	120	87	75	125

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0547-MAY19	uS/cm	2	< 2	0	10	100	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0029-MAY19	ug/L	0.01	<0.01	ND	20	99	80	120	112	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (total)	EMS0201-MAY19	mg/L	0.0002	<0.0002	2	20	100	90	110	96	70	130
Barium (total)	EMS0201-MAY19	mg/L	0.00002	<0.00002	2	20	99	90	110	NV	70	130
Boron (total)	EMS0201-MAY19	mg/L	0.002	<0.002	0	20	93	90	110	NV	70	130
Calcium (total)	EMS0201-MAY19	mg/L	0.01	<0.01	1	20	97	90	110	NV	70	130
Cadmium (total)	EMS0201-MAY19	mg/L	0.000003	4e-006	ND	20	96	90	110	94	70	130
Chromium (total)	EMS0201-MAY19	mg/L	0.00008	<0.00008	2	20	98	90	110	95	70	130
Copper (total)	EMS0201-MAY19	mg/L	0.0002	<0.0002	6	20	99	90	110	NV	70	130
Iron (total)	EMS0201-MAY19	mg/L	0.007	<0.007	0	20	98	90	110	NV	70	130
Potassium (total)	EMS0201-MAY19	mg/L	0.009	<0.009	2	20	99	90	110	NV	70	130
Magnesium (total)	EMS0201-MAY19	mg/L	0.001	<0.001	1	20	98	90	110	NV	70	130
Manganese (total)	EMS0201-MAY19	mg/L	0.00001	<0.00001	0	20	100	90	110	NV	70	130
Sodium (total)	EMS0201-MAY19	mg/L	0.01	<0.01	1	20	101	90	110	NV	70	130
Lead (total)	EMS0201-MAY19	mg/L	0.00001	<0.00001	7	20	99	90	110	NV	70	130
Zinc (total)	EMS0201-MAY19	mg/L	0.002	<0.002	ND	20	101	90	110	95	70	130

QC SUMMARY

Metals in aqueous samples - ICP-OES

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	EMS0201-MAY19	mg/L	0.003	<0.003	ND	20	97	90	110	NV	70	130

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0547-MAY19	no unit	0.05	NA	0		101			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-IENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0220-MAY19	mg/L	0.001	<0.001	4	10	96	90	110	90	75	125

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0006-JUN19	mg/L	30	<30	ND	20	97	90	110	NA		

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0535-MAY19	mg/L	2	< 2	ND	10	NV	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0221-MAY19	as N mg/L	0.5	<0.5	3	10	99	90	110	96	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA18153-MAY19 R

PO#: 73515228, 11193447-01

Prepared for

GHD

FINAL REPORT

CA18153-MAY19 R

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	GHD	Project Specialist	Brad Moore Hon. B.Sc
		Laboratory	SGS Canada Inc.
Address	347 Pido Rd., Unit #29, Peterborough Canada, K9J 6Z8 Phone: 705-749-3317. Fax:	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Gus Bolin	Telephone	705-652-2143
Telephone	705-749-3317	Facsimile	705-652-6365
Facsimile		Email	brad.moore@sgs.com
Email	gus.bolin@ghd.com	SGS Reference	CA18153-MAY19
Project	PO#: 73515228, 11193447-01	Received	05/28/2019
Order Number		Approved	06/04/2019
Samples	Ground Water (6)	Report Number	CA18153-MAY19 R
		Date Reported	06/04/2019

COMMENTS

Bromomethane LCS; Recovery is outside control limits; the overall quality control for this analysis has been assessed and meets method acceptability criteria.

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: GHD

Project: PO#: 73515228, 11193447-01

Project Manager: Gus Bolin

Samplers: K Geraldi

PACKAGE: **- BTEX** (WATER)

Sample Number	5
Sample Name	TW-2
Sample Matrix	Ground Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
BTEX				
Benzene	ug/L	0.5		< 0.5
Ethylbenzene	ug/L	0.5		< 0.5
Toluene	ug/L	0.5		< 0.5
Xylene (total)	ug/L	0.5		< 0.5
o-xylene	ug/L	0.5		< 0.5
m/p-xylene	ug/L	0.5		< 0.5

PACKAGE: **- General Chemistry** (WATER)

Sample Number				5	6	7	8	9	10
Sample Name				TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7
Sample Matrix				Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sample Date				28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
General Chemistry									
Biochemical Oxygen Demand (BOD5)	mg/L	2		4	< 4↑	< 4↑	< 4↑	< 4↑	< 4↑
Total Suspended Solids	mg/L	2		1770	150	50	140	22	931
Alkalinity	mg/L as CaCO3	2		407	366	276	2340	386	332
Conductivity	uS/cm	2		933	962	878	1010	917	1040
Total Dissolved Solids	mg/L	30		611	563	529	571	509	571
Chemical Oxygen Demand	mg/L	8		37	24	< 8	< 8	< 8	< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.5

Client: GHD

Project: PO#: 73515228, 11193447-01

Project Manager: Gus Bolin

Samplers: K Geraldi

PACKAGE: **- Metals and Inorganics** (WATER)

Sample Number			5	6	7	8	9	10
Sample Name			TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7
Sample Matrix			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sample Date			28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019
Parameter	**Units**	**RL**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics								
Phosphorus (total)	mg/L	0.03	0.74	0.23	< 0.03	0.19	< 0.03	0.42
Sulphate	mg/L	2	< 2	23	6	8	10	2
Nitrite (as N)	as N mg/L	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06	< 0.06	0.08	1.35	0.31	0.10	0.21
Arsenic (dissolved)	mg/L	0.0002	0.0007	0.0006	< 0.0002	< 0.0002	< 0.0002	0.0006
Barium (dissolved)	mg/L	0.00002	0.139	0.113	0.0503	0.166	0.109	0.105
Boron (dissolved)	mg/L	0.002	0.015	0.099	0.010	0.016	0.055	0.128
Calcium (dissolved)	mg/L	0.01	166	148	126	131	148	173
Cadmium (dissolved)	mg/L	0.000003	0.000014	0.000005	0.000005	< 0.000003	0.000004	0.000073
Chromium (dissolved)	mg/L	0.00008	0.00025	0.00027	0.00099	0.00015	0.00015	0.00117
Copper (dissolved)	mg/L	0.0002	0.0004	0.0005	0.0006	0.0008	0.0014	0.0024
Iron (dissolved)	mg/L	0.007	1.50	1.21	0.021	< 0.007	< 0.007	2.03
Potassium (dissolved)	mg/L	0.009	0.840	5.98	0.521	1.20	5.67	4.34
Magnesium (dissolved)	mg/L	0.001	8.98	9.53	3.78	7.85	6.70	20.2
Manganese (dissolved)	mg/L	0.00001	0.550	0.277	0.00012	0.00005	0.0122	0.587
Sodium (dissolved)	mg/L	0.01	48.9	42.9	52.2	57.6	31.3	48.0
Lead (dissolved)	mg/L	0.00001	0.00003	0.00005	< 0.00001	< 0.00001	< 0.00001	0.01074
Zinc (dissolved)	mg/L	0.002	0.004	0.009	0.003	< 0.002	0.002	0.032

Client: GHD

Project: PO#: 73515228, 11193447-01

Project Manager: Gus Bolin

Samplers: K Geraldi

PACKAGE: **- Other (ORP)** (WATER)

Sample Number			5	6	7	8	9	10	
Sample Name			TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	
Sample Matrix			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	
Sample Date			28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)									
pH	no unit	0.05		7.41	7.30	8.02	8.05	7.91	7.83
Chloride	mg/L	1		99	87	130	160	76	130
Mercury (total)	µg/L	0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PACKAGE: **- Phenols** (WATER)

Sample Number			5	6	7	8	9	10	
Sample Name			TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	
Sample Matrix			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	
Sample Date			28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	28/05/2019	
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Phenols									
4AAP-Phenolics	mg/L	0.001		0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001

PACKAGE: **- THMs (VOC)** (WATER)

Sample Number			5	
Sample Name			TW-2	
Sample Matrix			Ground Water	
Sample Date			28/05/2019	
Parameter	**Units**	**RL**		**Result**
THMs (VOC)				
Bromodichloromethane	µg/L	0.5		< 0.5
Bromoform	µg/L	0.5		< 0.5
Dibromochloromethane	µg/L	0.5		< 0.5

Client: GHD

Project: PO#: 73515228, 11193447-01

Project Manager: Gus Bolin

Samplers: K Geraldi

PACKAGE: **- VOCs** (WATER)

Sample Number	5
Sample Name	TW-2
Sample Matrix	Ground Water
Sample Date	28/05/2019

VOCs

Parameter	Units	RL		Result
Bromomethane	µg/L	0.5		< 0.5
Carbon tetrachloride	µg/L	0.2		< 0.2
Chloroethane	µg/L	5.0		< 5
Chloroform	µg/L	0.5		< 0.5
Chloromethane	µg/L	5.0		< 5
1,2-Dichlorobenzene	µg/L	0.5		< 0.5
1,3-Dichlorobenzene	µg/L	0.5		< 0.5
1,4-Dichlorobenzene	µg/L	0.5		< 0.5
1,1-Dichloroethane	µg/L	0.5		< 0.5
1,2-Dichloroethane	µg/L	0.5		< 0.5
1,1-Dichloroethylene	µg/L	0.5		< 0.5
1,2-Dichloropropane	µg/L	0.5		< 0.5
trans-1,2-Dichloroethene	µg/L	0.5		< 0.5
cis-1,2-Dichloroethene	µg/L	0.5		< 0.5
cis-1,3-Dichloropropene	µg/L	0.5		< 0.5
trans-1,3-Dichloropropene	µg/L	0.5		< 0.5
Ethylenedibromide	µg/L	0.2		< 0.2
Dichloromethane	µg/L	0.5		< 0.5
Monochlorobenzene	µg/L	0.5		< 0.5
Styrene	µg/L	0.5		< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5		< 0.5
Tetrachloroethene	µg/L	0.5		< 0.5
Trichloroethylene	µg/L	0.5		< 0.5

Client: GHD

Project: PO#: 73515228, 11193447-01

Project Manager: Gus Bolin

Samplers: K Geraldi

PACKAGE: **- VOCs** (WATER)

Sample Number	5
Sample Name	TW-2
Sample Matrix	Ground Water
Sample Date	28/05/2019

Parameter	Units	RL		Result
VOCs (continued)				
Vinyl Chloride	µg/L	0.2		< 0.2
Trichlorofluoromethane	µg/L	5.0		< 5
1,1,1-Trichloroethane	µg/L	0.5		< 0.5
1,1,2-Trichloroethane	µg/L	0.5		< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5		< 0.5

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0001-JUN19	mg/L as CaCO3	2	< 2	7	10	102	80	120	NA		
Alkalinity	EWL0547-MAY19	mg/L as CaCO3	2	< 2	0	10	99	80	120	NA		
Alkalinity	EWL0576-MAY19	mg/L as CaCO3	2	< 2	1	10	101	80	120	NA		
Alkalinity	EWL0583-MAY19	mg/L as CaCO3	2	< 2	0	10	97	80	120	NA		
Alkalinity	EWL0601-MAY19	mg/L as CaCO3	2	< 2	1	10	102	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0230-MAY19	as N mg/L	0.1	<0.1	0	10	101	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0587-MAY19	mg/L	1	<1	0	20	101	80	120	102	75	125
Sulphate	DIO0587-MAY19	mg/L	2	<2	0	20	102	80	120	100	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0636-MAY19	mg/L	0.03	<0.03	ND	20	92	80	120	99	75	125
Nitrate (as N)	DIO0636-MAY19	mg/L	0.06	<0.06	0	20	97	80	120	105	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0053-MAY19	mg/L	2	< 2	2	30	93	70	130	NV	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0523-MAY19	mg/L	8	<8	ND	20	82	80	120	87	75	125
Chemical Oxygen Demand	EWL0524-MAY19	mg/L	8	<8	0	20	94	80	120	101	75	125

QC SUMMARY

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0001-JUN19	uS/cm	2	< 2	2	10	99	90	110	NA		
Conductivity	EWL0547-MAY19	uS/cm	2	< 2	0	10	100	90	110	NA		
Conductivity	EWL0576-MAY19	uS/cm	2	2	1	10	101	90	110	NA		
Conductivity	EWL0583-MAY19	uS/cm	2	2	1	10	97	90	110	NA		
Conductivity	EWL0601-MAY19	uS/cm	2	< 2	0	10	100	90	110	NA		

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0029-MAY19	ug/L	0.01	<0.01	ND	20	99	80	120	112	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0190-MAY19	mg/L	0.0002	< 0.0002	ND	20	96	90	110	95	70	130
Barium (dissolved)	EMS0190-MAY19	mg/L	0.00002	< 0.00002	ND	20	102	90	110	NV	70	130
Boron (dissolved)	EMS0190-MAY19	mg/L	0.002	< 0.002	ND	20	91	90	110	NV	70	130
Calcium (dissolved)	EMS0190-MAY19	mg/L	0.01	< 0.01	14	20	95	90	110	74	70	130
Cadmium (dissolved)	EMS0190-MAY19	mg/L	0.000003	< 0.000003	ND	20	98	90	110	102	70	130
Chromium (dissolved)	EMS0190-MAY19	mg/L	0.00008	< 0.00008	ND	20	97	90	110	NV	70	130
Copper (dissolved)	EMS0190-MAY19	mg/L	0.0002	< 0.0002	ND	20	100	90	110	NV	70	130
Iron (dissolved)	EMS0190-MAY19	mg/L	0.007	< 0.007	ND	20	92	90	110	NV	70	130
Potassium (dissolved)	EMS0190-MAY19	mg/L	0.009	< 0.009	1	20	94	90	110	78	70	130
Magnesium (dissolved)	EMS0190-MAY19	mg/L	0.001	< 0.001	14	20	98	90	110	81	70	130
Manganese (dissolved)	EMS0190-MAY19	mg/L	0.00001	< 0.00001	ND	20	99	90	110	NV	70	130
Sodium (dissolved)	EMS0190-MAY19	mg/L	0.01	< 0.01	ND	20	96	90	110	86	70	130
Lead (dissolved)	EMS0190-MAY19	mg/L	0.00001	< 0.00001	13	20	102	90	110	96	70	130
Zinc (dissolved)	EMS0190-MAY19	mg/L	0.002	< 0.002	2	20	96	90	110	80	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0001-JUN19	no unit	0.05	NA	0		100			NA		
pH	EWL0547-MAY19	no unit	0.05	NA	0		101			NA		
pH	EWL0576-MAY19	no unit	0.05	NA	0		100			NA		
pH	EWL0583-MAY19	no unit	0.05	NA	0		101			NA		
pH	EWL0601-MAY19	no unit	0.05	NA	0		101			NA		

Phenols by SFA

Method: SM 5530B-D I Internal ref.: ME-CA-IENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
4AAP-Phenolics	SKA0220-MAY19	mg/L	0.001	<0.001	4	10	96	90	110	90	75	125

QC SUMMARY

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0226-MAY19	mg/L	0.03	<0.03	2	10	105	90	110	90	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0006-JUN19	mg/L	30	<30	ND	20	97	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0525-MAY19	mg/L	2	< 2	1	10	NV	90	110	NA		
Total Suspended Solids	EWL0535-MAY19	mg/L	2	< 2	ND	10	NV	90	110	NA		
Total Suspended Solids	EWL0546-MAY19	mg/L	2	< 2	10	10	NV	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0221-MAY19	as N mg/L	0.5	<0.5	3	10	99	90	110	96	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	91	50	140
1,1,1-Trichloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	97	60	130	74	50	140
1,1,2,2-Tetrachloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	104	60	130	104	50	140
1,1,2-Trichloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	98	60	130	119	50	140
1,1-Dichloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	93	60	130	73	50	140
1,1-Dichloroethylene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	82	60	130	58	50	140
1,2-Dichlorobenzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	101	60	130	72	50	140
1,2-Dichloroethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	95	60	130	87	50	140
1,2-Dichloropropane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	91	60	130	84	50	140
1,3-Dichlorobenzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	85	50	140
1,4-Dichlorobenzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	86	50	140
Benzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	98	60	130	90	50	140
Bromodichloromethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	98	60	130	91	50	140
Bromoform	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	101	60	130	90	50	140
Bromomethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	159	50	140	109	50	140
Carbon tetrachloride	GCM0613-MAY19	ug/L	0.2	<0.2	ND	30	99	60	130	82	50	140
Chloroethane	GCM0613-MAY19	ug/L	5.0	<5	ND	30	93	60	130	82	50	140
Chloroform	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	103	60	130	75	50	140
Chloromethane	GCM0613-MAY19	ug/L	5.0	<5	ND	30	99	60	130	76	50	140
cis-1,2-Dichloroethene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	80	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	98	60	130	73	50	140
Dibromochloromethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	98	60	130	124	50	140
Dichloromethane	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	96	60	130	77	50	140
Ethylbenzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	105	60	130	95	50	140
Ethylenedibromide	GCM0613-MAY19	ug/L	0.2	<0.2	ND	30	97	60	130	125	50	140
m/p-xylene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	105	60	130	94	50	140
Monochlorobenzene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	93	50	140
o-xylene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	108	60	130	98	50	140
Styrene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	108	60	130	70	50	140
Tetrachloroethene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	100	60	130	110	50	140
Toluene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	102	60	130	92	50	140
trans-1,2-Dichloroethene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	93	60	130	71	50	140
trans-1,3-Dichloropropene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	104	60	130	76	50	140
Trichloroethylene	GCM0613-MAY19	ug/L	0.5	<0.5	ND	30	95	60	130	88	50	140
Trichlorofluoromethane	GCM0613-MAY19	ug/L	5.0	<5	ND	30	100	50	140	85	50	140
Vinyl Chloride	GCM0613-MAY19	ug/L	0.2	<0.2	ND	30	102	60	130	79	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14816-OCT19 R

11192447-01, Warsaw Road Landfill

Prepared for

GHD

FINAL REPORT

CA14816-OCT19 R

First Page

CLIENT DETAILS

Client	GHD
Address	347 Pido Rd., Unit #29, Peterborough Canada, K9J 6Z8 Phone: 705-749-3317. Fax:
Contact	Gus Bolin
Telephone	705-749-3317
Facsimile	
Email	gus.bolin@ghd.com
Project	11192447-01, Warsaw Road Landfill
Order Number	
Samples	Surface Water (1)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
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SGS Reference	CA14816-OCT19
Received	10/25/2019
Approved	11/04/2019
Report Number	CA14816-OCT19 R
Date Reported	11/04/2019

COMMENTS

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - General Chemistry** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	5
Sample Name	SW-11
Sample Matrix	Surface Water
Sample Date	25/10/2019

Parameter	Units	RL	L1	Result
General Chemistry				
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4 ↑
Alkalinity	mg/L as CaCO3	2		250
Conductivity	uS/cm	2		678
Total Suspended Solids	mg/L	2		< 2
Total Dissolved Solids	mg/L	30		440
Chemical Oxygen Demand	mg/L	8		52
Total Kjeldahl Nitrogen	as N mg/L	0.5		0.8
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1

PACKAGE: **PWQO - Metals and Inorganics** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	5
Sample Name	SW-11
Sample Matrix	Surface Water
Sample Date	25/10/2019

Parameter	Units	RL	L1	Result
Metals and Inorganics				
Sulphate	mg/L	2		< 2
Nitrite (as N)	as N mg/L	0.03		< 0.03
Nitrate (as N)	as N mg/L	0.06		< 0.06
Arsenic (total)	mg/L	0.0002	0.005	0.0005
Barium (total)	mg/L	0.00002		0.0421
Boron (total)	mg/L	0.002	0.2	0.017
Calcium (total)	mg/L	0.01		112

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **PWQO - Metals and Inorganics** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	5
Sample Name	SW-11
Sample Matrix	Surface Water
Sample Date	25/10/2019

Parameter	Units	RL	L1	Result
Metals and Inorganics (continued)				
Cadmium (total)	mg/L	0.000003	0.0001	< 0.000003
Chromium (total)	mg/L	0.00008		0.00015
Copper (total)	mg/L	0.0002	0.001	0.0005
Iron (total)	mg/L	0.007	0.3	0.047
Potassium (total)	mg/L	0.009		2.29
Magnesium (total)	mg/L	0.001		4.40
Manganese (total)	mg/L	0.00001		0.0129
Sodium (total)	mg/L	0.01		27.2
Phosphorus (total)	mg/L	0.003	0.01	0.017
Lead (total)	mg/L	0.00001	0.001	< 0.00001
Zinc (total)	mg/L	0.002	0.02	0.003

Client: GHD
Project: 11192447-01, Warsaw Road Landfill
Project Manager: Gus Bolin
Samplers: Gus Bolin

PACKAGE: **PWQO - Other (ORP)** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	5
Sample Name	SW-11
Sample Matrix	Surface Water
Sample Date	25/10/2019

Parameter	Units	RL	L1	Result
Other (ORP)				
pH	no unit	0.05	8.5	7.94
Chloride	mg/L	1		64
Mercury (total)	µg/L	0.01	0.2	< 0.01

PACKAGE: **PWQO - Phenols** (WATER)

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	5
Sample Name	SW-11
Sample Matrix	Surface Water
Sample Date	25/10/2019

Parameter	Units	RL	L1	Result
Phenols				
4AAP-Phenolics	mg/L	0.001	0.001	0.003

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
SW-11				
Phosphorous	SM 3030/EPA 200.8	µg/L	0.017	0.01
4AAP-Phenolics	SM 5530B-D	mg/L	0.003	0.001

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0496-OCT19	mg/L as CaCO3	2	< 2	2	10	105	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0252-OCT19	as N mg/L	0.1	<0.1	0	10	100	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0587-OCT19	mg/L	1	<1	6	20	98	80	120	102	75	125
Sulphate	DIO0587-OCT19	mg/L	2	<2	ND	20	98	80	120	105	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0549-OCT19	mg/L	0.03	<0.03	ND	20	102	80	120	111	75	125
Nitrate (as N)	DIO0549-OCT19	mg/L	0.06	<0.06	0	20	102	80	120	105	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0049-OCT19	mg/L	2	< 2	4	30	89	70	130	128	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0509-OCT19	mg/L	8	<8	ND	20	112	80	120	104	75	125

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0496-OCT19	uS/cm	2	< 2	1	10	99	90	110	NA		

QC SUMMARY

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0031-OCT19	ug/L	0.01	<0.01	ND	20	111	80	120	110	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (total)	EMS0204-OCT19	mg/L	0.0002	<0.0002	5	20	108	90	110	107	70	130
Barium (total)	EMS0204-OCT19	mg/L	0.00002	<0.00002	2	20	99	90	110	73	70	130
Boron (total)	EMS0204-OCT19	mg/L	0.002	<0.002	0	20	94	90	110	NV	70	130
Calcium (total)	EMS0204-OCT19	mg/L	0.01	<0.01	3	20	92	90	110	NV	70	130
Cadmium (total)	EMS0204-OCT19	mg/L	0.000003	<0.000003	ND	20	100	90	110	110	70	130
Chromium (total)	EMS0204-OCT19	mg/L	0.00008	<0.00008	16	20	100	90	110	100	70	130
Copper (total)	EMS0204-OCT19	mg/L	0.0002	<0.0002	ND	20	100	90	110	NV	70	130
Iron (total)	EMS0204-OCT19	mg/L	0.007	<0.007	1	20	94	90	110	NV	70	130
Potassium (total)	EMS0204-OCT19	mg/L	0.009	<0.009	2	20	93	90	110	NV	70	130
Magnesium (total)	EMS0204-OCT19	mg/L	0.001	<0.001	1	20	91	90	110	NV	70	130
Manganese (total)	EMS0204-OCT19	mg/L	0.00001	<0.00001	2	20	108	90	110	NV	70	130
Sodium (total)	EMS0204-OCT19	mg/L	0.01	<0.01	0	20	99	90	110	NV	70	130
Lead (total)	EMS0204-OCT19	mg/L	0.00001	<0.00001	12	20	100	90	110	94	70	130
Phosphorus (total)	EMS0204-OCT19	mg/L	0.003	0.003	2	20	90	90	110	NV	70	130
Zinc (total)	EMS0204-OCT19	mg/L	0.002	<0.002	ND	20	110	90	110	126	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0496-OCT19	no unit	0.05	NA	1		100			NA		

Phenols by SFA

Method: SM 5530B-D I Internal ref.: ME-CA-IENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
4AAP-Phenolics	SKA0004-NOV19	mg/L	0.001	<0.001	7	10	109	90	110	107	75	125
4AAP-Phenolics	SKA0282-OCT19	mg/L	0.001	<0.001	8	10	108	90	110	115	75	125

Solids Analysis

Method: SM 2540C I Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Total Dissolved Solids	EWL0485-OCT19	mg/L	30	<30	1	20	93	90	110	NA		

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0489-OCT19	mg/L	2	< 2	8	10	NV	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0255-OCT19	as N mg/L	0.5	<0.5	ND	10	99	90	110	100	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

FINAL REPORT

CA14815-OCT19 R1

11192447-01, Warsaw Road Landfill

Prepared for

GHD

FINAL REPORT

First Page

CLIENT DETAILS

Client	GHD
Address	347 Pido Rd., Unit #29, Peterborough Canada, K9J 6Z8 Phone: 705-749-3317. Fax:
Contact	Gus Bolin
Telephone	705-749-3317
Facsimile	
Email	gus.bolin@ghd.com
Project	11192447-01, Warsaw Road Landfill
Order Number	
Samples	Ground Water (7)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2143
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Email	brad.moore@sgs.com
SGS Reference	CA14815-OCT19
Received	10/25/2019
Approved	11/05/2019
Report Number	CA14815-OCT19 R1
Date Reported	11/05/2019

COMMENTS

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **- BTEX** (WATER)

Sample Number	10
Sample Name	TW-7
Sample Matrix	Ground Water
Sample Date	25/10/2019

Parameter	Units	RL		Result
BTEX				
Benzene	ug/L	0.5		< 0.5
Ethylbenzene	ug/L	0.5		< 0.5
Toluene	ug/L	0.5		< 0.5
Xylene (total)	ug/L	0.5		< 0.5
o-xylene	ug/L	0.5		< 0.5
m/p-xylene	ug/L	0.5		< 0.5

PACKAGE: **- General Chemistry** (WATER)

Sample Number	5	6	7	8	9	10	11		
Sample Name	TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	TW-8-2		
Sample Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water		
Sample Date	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019		

Parameter	Units	RL		Result	Result	Result	Result	Result	Result	Result
General Chemistry										
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑	< 4 ↑
Total Suspended Solids	mg/L	2		2	2	< 2	< 2	2	7	2
Alkalinity	mg/L as CaCO3	2		249	382	283	289	360	331	309
Conductivity	uS/cm	2		1160	1040	1060	953	1160	1030	997
Total Dissolved Solids	mg/L	30		871	654	686	529	663	597	566
Chemical Oxygen Demand	mg/L	8		34	30	< 8	< 8	< 8	9	< 8
Total Kjeldahl Nitrogen	as N mg/L	0.5		0.6	0.6	< 0.5	< 0.5	1.2	0.9	< 0.5
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1	0.1	< 0.1	< 0.1	1.0	0.8	< 0.1

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **- Metals and Inorganics** (WATER)

Sample Number				5	6	7	8	9	10	11
Sample Name				TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	TW-8-2
Sample Matrix				Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sample Date				25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Metals and Inorganics										
Phosphorus (total)	mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03
Sulphate	mg/L	2		40	26	8	14	< 2	< 2	13
Nitrite (as N)	as N mg/L	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L	0.06		< 0.06	< 0.06	2.50	0.24	1.14	< 0.06	< 0.06
Arsenic (dissolved)	mg/L	0.0002		0.0005	0.0008	0.0002	< 0.0002	0.0002	0.0009	< 0.0002
Barium (dissolved)	mg/L	0.00002		0.145	0.122	0.0582	0.151	0.145	0.139	0.210
Boron (dissolved)	mg/L	0.002		0.016	0.140	0.014	0.022	0.065	0.099	0.027
Calcium (dissolved)	mg/L	0.01		175	164	152	128	171	145	134
Cadmium (dissolved)	mg/L	0.000003		0.000021	0.000014	0.000337	< 0.000003	0.000016	< 0.000003	< 0.000003
Chromium (dissolved)	mg/L	0.00008		0.00024	0.00035	0.00027	0.00010	0.00012	0.00019	0.00015
Copper (dissolved)	mg/L	0.0002		0.0027	0.0014	0.0005	0.0010	0.0018	0.0003	0.0005
Iron (dissolved)	mg/L	0.007		0.605	1.08	0.011	0.009	0.029	4.13	0.100
Potassium (dissolved)	mg/L	0.009		0.560	6.74	0.687	1.40	8.69	4.63	1.69
Magnesium (dissolved)	mg/L	0.001		8.03	11.5	4.92	8.02	9.89	13.4	11.1
Manganese (dissolved)	mg/L	0.00001		0.0887	0.282	0.00065	0.00248	0.0796	1.27	0.0259
Sodium (dissolved)	mg/L	0.01		68.8	53.4	62.9	64.8	70.5	63.6	62.0
Lead (dissolved)	mg/L	0.00001		0.00005	0.00010	0.00013	< 0.00001	0.00006	0.00005	0.00002
Zinc (dissolved)	mg/L	0.002		0.003	0.004	0.004	< 0.002	0.004	0.002	< 0.002

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **- Other (ORP)** (WATER)

Sample Number				5	6	7	8	9	10	11
Sample Name				TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	TW-8-2
Sample Matrix				Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sample Date				25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Other (ORP)										
pH	no unit	0.05		7.72	7.79	7.89	7.88	7.37	7.81	7.95
Chloride	mg/L	1		210	100	160	130	160	140	140
Mercury (total)	µg/L	0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

PACKAGE: **- Phenols** (WATER)

Sample Number			5	6	7	8	9	10	11
Sample Name			TW-2	TW-3-2	TW-4-2	TW-5-2	TW-6-2	TW-7	TW-8-2
Sample Matrix			Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Sample Date			25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019	25/10/2019
Parameter	**Units**	**RL**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Phenols									
4AAP-Phenolics	mg/L	0.001	0.005	< 0.001	0.002	< 0.001	< 0.001	0.004	< 0.001

PACKAGE: **- THMs (VOC)** (WATER)

Sample Number			10	
Sample Name			TW-7	
Sample Matrix			Ground Water	
Sample Date			25/10/2019	
Parameter	**Units**	**RL**	**Result**	
THMs (VOC)				
Bromodichloromethane	µg/L	0.5	< 0.5	
Bromoform	µg/L	0.5	< 0.5	
Dibromochloromethane	µg/L	0.5	< 0.5	

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **- VOCs** (WATER)

Sample Number	10
Sample Name	TW-7
Sample Matrix	Ground Water
Sample Date	25/10/2019

Parameter	Units	RL		Result
VOCs				
Bromomethane	µg/L	0.5		< 0.5
Carbon tetrachloride	µg/L	0.2		< 0.2
Chloroethane	µg/L	5.0		< 5
Chloroform	µg/L	0.5		< 0.5
Chloromethane	µg/L	5.0		< 5
1,2-Dichlorobenzene	µg/L	0.5		< 0.5
1,3-Dichlorobenzene	µg/L	0.5		< 0.5
1,4-Dichlorobenzene	µg/L	0.5		< 0.5
1,1-Dichloroethane	µg/L	0.5		< 0.5
1,2-Dichloroethane	µg/L	0.5		< 0.5
1,1-Dichloroethylene	µg/L	0.5		< 0.5
1,2-Dichloropropane	µg/L	0.5		< 0.5
trans-1,2-Dichloroethene	µg/L	0.5		< 0.5
cis-1,2-Dichloroethene	µg/L	0.5		< 0.5
cis-1,3-Dichloropropene	µg/L	0.5		< 0.5
trans-1,3-Dichloropropene	µg/L	0.5		< 0.5
Ethylenedibromide	µg/L	0.2		< 0.2
Dichloromethane	µg/L	0.5		< 0.5
Monochlorobenzene	µg/L	0.5		< 0.5
Styrene	µg/L	0.5		< 0.5
1,1,2,2-Tetrachloroethane	µg/L	0.5		< 0.5
Tetrachloroethene	µg/L	0.5		< 0.5
Trichloroethylene	µg/L	0.5		< 0.5

Client: GHD

Project: 11192447-01, Warsaw Road Landfill

Project Manager: Gus Bolin

Samplers: Gus Bolin

PACKAGE: **- VOCs** (WATER)

Sample Number	10
Sample Name	TW-7
Sample Matrix	Ground Water
Sample Date	25/10/2019

VOCs (continued)

Parameter	Units	RL		Result
Vinyl Chloride	µg/L	0.2		< 0.2
Trichlorofluoromethane	µg/L	5.0		< 5
1,1,1-Trichloroethane	µg/L	0.5		< 0.5
1,1,2-Trichloroethane	µg/L	0.5		< 0.5
1,1,1,2-Tetrachloroethane	µg/L	0.5		< 0.5

QC SUMMARY

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0483-OCT19	mg/L as CaCO3	2	< 2	1	10	100	80	120	NA		
Alkalinity	EWL0486-OCT19	mg/L as CaCO3	2	< 2	2	10	102	80	120	NA		
Alkalinity	EWL0496-OCT19	mg/L as CaCO3	2	< 2	2	10	105	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0252-OCT19	as N mg/L	0.1	<0.1	0	10	100	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0587-OCT19	mg/L	1	<1	6	20	98	80	120	102	75	125
Sulphate	DIO0587-OCT19	mg/L	2	<2	ND	20	98	80	120	105	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrite (as N)	DIO0555-OCT19	mg/L	0.03	<0.03	ND	20	95	80	120	91	75	125
Nitrate (as N)	DIO0555-OCT19	mg/L	0.06	<0.06	1	20	99	80	120	107	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0049-OCT19	mg/L	2	< 2	4	30	89	70	130	128	70	130

Chemical Oxygen Demand

Method: HACH 8000 I Internal ref.: ME-CA-[ENVIEWL-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chemical Oxygen Demand	EWL0508-OCT19	mg/L	8	<8	ND	20	98	80	120	98	75	125
Chemical Oxygen Demand	EWL0509-OCT19	mg/L	8	<8	ND	20	112	80	120	104	75	125
Chemical Oxygen Demand	EWL0528-OCT19	mg/L	8	<8	5	20	110	80	120	108	75	125

QC SUMMARY

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0483-OCT19	uS/cm	2	4	2	10	100	90	110	NA		
Conductivity	EWL0486-OCT19	uS/cm	2	3	1	10	99	90	110	NA		
Conductivity	EWL0496-OCT19	uS/cm	2	< 2	1	10	99	90	110	NA		

Mercury by CVAAS

Method: SM 3112/SM 3112B | Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0031-OCT19	ug/L	0.01	<0.01	ND	20	111	80	120	110	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Arsenic (dissolved)	EMS0194-OCT19	mg/L	0.0002	<0.0002	ND	20	100	90	110	95	70	130
Barium (dissolved)	EMS0194-OCT19	mg/L	0.00002	<0.00002	5	20	99	90	110	72	70	130
Boron (dissolved)	EMS0194-OCT19	mg/L	0.002	<0.002	ND	20	96	90	110	NV	70	130
Calcium (dissolved)	EMS0194-OCT19	mg/L	0.01	<0.01	2	20	96	90	110	113	70	130
Cadmium (dissolved)	EMS0194-OCT19	mg/L	0.000003	<0.000003	ND	20	100	90	110	91	70	130
Chromium (dissolved)	EMS0194-OCT19	mg/L	0.00008	<0.00008	9	20	103	90	110	NV	70	130
Copper (dissolved)	EMS0194-OCT19	mg/L	0.0002	<0.0002	2	20	99	90	110	98	70	130
Iron (dissolved)	EMS0194-OCT19	mg/L	0.007	<0.007	2	20	97	90	110	NV	70	130
Potassium (dissolved)	EMS0194-OCT19	mg/L	0.009	<0.009	0	20	97	90	110	106	70	130
Magnesium (dissolved)	EMS0194-OCT19	mg/L	0.001	<0.001	2	20	102	90	110	78	70	130
Manganese (dissolved)	EMS0194-OCT19	mg/L	0.00001	<0.00001	4	20	98	90	110	94	70	130
Sodium (dissolved)	EMS0194-OCT19	mg/L	0.01	<0.01	0	20	107	90	110	NV	70	130
Lead (dissolved)	EMS0194-OCT19	mg/L	0.00001	<0.00001	ND	20	98	90	110	106	70	130
Zinc (dissolved)	EMS0194-OCT19	mg/L	0.002	<0.002	ND	20	105	90	110	118	70	130
Manganese (dissolved)	EMS0217-OCT19	mg/L	0.00001	<0.00001	ND	20	101	90	110	NV	70	130

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0483-OCT19	no unit	0.05	NA	1		100			NA		
pH	EWL0486-OCT19	no unit	0.05	NA	1		100			NA		
pH	EWL0496-OCT19	no unit	0.05	NA	1		100			NA		

Phenols by SFA

Method: SM 5530B-D I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
4AAP-Phenolics	SKA0014-NOV19	mg/L	0.001	<0.001	NV	10	102	90	110	87	75	125
4AAP-Phenolics	SKA0029-NOV19	mg/L	0.001	<0.001	ND	10	107	90	110	107	75	125
4AAP-Phenolics	SKA0282-OCT19	mg/L	0.001	<0.001	8	10	108	90	110	115	75	125

QC SUMMARY

Phosphorus by SFA

Method: SM 4500-P J | Internal ref.: ME-CA-IENVISFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0250-OCT19	mg/L	0.03	<0.03	3	10	97	90	110	100	75	125

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0485-OCT19	mg/L	30	<30	1	20	93	90	110	NA		

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-IENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0489-OCT19	mg/L	2	< 2	8	10	NV	90	110	NA		
Total Suspended Solids	EWL0491-OCT19	mg/L	2	< 2	0	10	NV	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0255-OCT19	as N mg/L	0.5	<0.5	ND	10	99	90	110	100	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,1,2-Tetrachloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	101	50	140
1,1,1-Trichloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	98	60	130	98	50	140
1,1,2,2-Tetrachloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	95	60	130	103	50	140
1,1,2-Trichloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	101	60	130	99	50	140
1,1-Dichloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	95	60	130	97	50	140
1,1-Dichloroethylene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	98	60	130	101	50	140
1,2-Dichlorobenzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	100	50	140
1,2-Dichloroethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	100	60	130	99	50	140
1,2-Dichloropropane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	104	50	140
1,3-Dichlorobenzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	100	50	140
1,4-Dichlorobenzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
Benzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	101	60	130	102	50	140
Bromodichloromethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	102	50	140
Bromoform	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	104	60	130	98	50	140
Bromomethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	101	50	140	102	50	140
Carbon tetrachloride	GCM0461-OCT19	ug/L	0.2	<0.2	ND	30	102	60	130	102	50	140
Chloroethane	GCM0461-OCT19	ug/L	5.0	<5	ND	30	67	60	130	99	50	140
Chloroform	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	102	50	140
Chloromethane	GCM0461-OCT19	ug/L	5.0	<5	ND	30	104	60	130	109	50	140
cis-1,2-Dichloroethene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	103	50	140

QC SUMMARY

Volatile Organics (continued)

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
cis-1,3-Dichloropropene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
Dibromochloromethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	100	50	140
Dichloromethane	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	99	60	130	103	50	140
Ethylbenzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	104	50	140
Ethylenedibromide	GCM0461-OCT19	ug/L	0.2	<0.2	ND	30	103	60	130	100	50	140
m/p-xylene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	104	60	130	102	50	140
Monochlorobenzene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	102	50	140
o-xylene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	101	50	140
Styrene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	104	60	130	103	50	140
Tetrachloroethene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	100	50	140
Toluene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	102	60	130	103	50	140
trans-1,2-Dichloroethene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	96	60	130	99	50	140
trans-1,3-Dichloropropene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	103	60	130	96	50	140
Trichloroethylene	GCM0461-OCT19	ug/L	0.5	<0.5	ND	30	108	60	130	98	50	140
Trichlorofluoromethane	GCM0461-OCT19	ug/L	5.0	<5	ND	30	116	50	140	117	50	140
Vinyl Chloride	GCM0461-OCT19	ug/L	0.2	<0.2	ND	30	100	60	130	105	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --

Appendix F
MOECC Monitoring and Screening Checklist

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Warsaw Road Landfill Site
Location (e.g. street address, lot, concession)	Part Lot 8, Concession 5, Township of Douro-Dummer (Douro), County of Peterborough
GPS Location (taken within the property boundary at front gate/ front entry)	17 781275E 445174N
Municipality	Township of Douro-Dummer
Client and/or Site Owner	Corporation of the Township of Douro-Dummer
Monitoring Period (Year)	2019
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	Provisional Certificate of Approval A341004
Director's Order No.:	N/A
Provincial Officer's Order No.:	N/A
Other:	N/A

Report Submission Frequency	◉ **Annual** ○ **Other**	Specify (Type Here):	
The site is: **(Operation Status)**	○ **Open** ○ **Inactive** ◉ **Closed**		
Does your Site have a Total Approved Capacity?	○ **Yes** ◉ **No**		
If yes, please specify Total Approved Capacity		*Units*	
Does your Site have a Maximum Approved Fill Rate?	○ **Yes** ◉ **No**		
If yes, please specify Maximum Approved Fill Rate		*Units*	
Total Waste Received within Monitoring Period (Year)		*Units*	
Total Waste Received within Monitoring Period (Year) *Methodology*			
Estimated Remaining Capacity		*Units*	
Estimated Remaining Capacity *Methodology*			
Estimated Remaining Capacity *Date Last Determined*	Select Date		
Non-Hazardous Approved Waste Types	☐ Domestic ☐ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☐ Tires	☐ Contaminated Soil ☐ Wood Waste ☐ Blue Box Material ☐ Processed Organics ☐ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other: Provide any other approved waste types not listed here
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*			
Year Site Opened *(enter the Calendar Year only)*		**Current ECA Issue Date**	17/09/1980
Is your Site required to submit Financial Assurance?	○ **Yes** ◉ **No**		
Describe how your Landfill is designed.	◉ Natural Attenuation only ○ Fully engineered Facility ○ Partially engineered Facility		
Does your Site have an approved Contaminant Attenuation Zone?	○ **Yes** ◉ **No**		

If closed, specify C of A, control or authorizing document closure date:	22-May-96
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**
If yes, provide details:	Type Here
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)	○ Yes ◉ No

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document (s):	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Is landfill gas being monitored or controlled at the site?	◉ **Yes** ○ **No**	
If yes to 3(a), please answer the next two questions below.		
b) Have any measurements been taken since the last reporting period that indicate landfill gas is present in the subsurface at levels exceeding criteria established for the site?	○ **Yes** ◉ **No**	
c) Has the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(•) Yes ( ) No	If no, the potential design and operational concerns/exceptions are as follows (Type Here):	
6) The site meets compliance and assessment criteria.	(•) Yes ( ) No	If no, list and explain exceptions (Type Here):	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(•) Yes ( ) No	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	(•) Yes ( ) No	**Note which practice(s):**	☐ (a) ☐ (b) ☒ (c)
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) Yes (•) No ( ) Not Applicable	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

1-Mar-19

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended** ○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Nyle McIlveen, P.Eng.		
Seal:	Add Image 		
Signature:		**Date:**	22-Mar-20
CEP Contact Information:	Nyle McIlveen, P./Eng.		
Company:	GHD		
Address:	347 Pido Road, Unit 29, Peterborough, Ontario K9J 6X7		
Telephone No.:	(705) 749-3317	Fax No. :	(705) 749-9248
E-mail Address:	nyle.mcilveen@ghd.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Dummer Lake
Distance(s)	2.5 Km

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	◉ Yes ○ No	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	◉ Yes ○ No ○ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	○ **Yes** ○ **No** ○ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	(•) **Yes** ( ) **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	( ) **Yes** ( ) **No**	If yes, specify (Type Here)

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	(•) **Yes** ( ) **No**	If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here)
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g., PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	( ) Yes (•) No ( ) Not Known ( ) Not Applicable	
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (•) **No** ( ) **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories*, or as amended from time to time by the ministry.

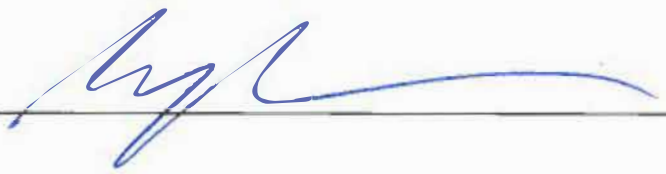
If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No Changes to the monitoring program are recommended**	Type Here
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended**	Type Here
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	
Relevant Discipline	Civil engineering, hydrogeology
Date:	22-Mar-20
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