The City of Winnipeg RFP No. 838-2013

# **APPENDIX 1**



## **CITY OF WINNIPEG**

FORMER ELMWOOD / NAIRN LANDFILL SITE FINAL PRELIMINARY SITE CONDITION ASSESSMENT REPORT



December 2008



KONTZAMANIS • GRAUMANN • SMITH • MACMILLAN INC. CONSULTING ENGINEERS & PROJECT MANAGERS



## KONTZAMANIS • GRAUMANN • SMITH • MACMILLAN INC. CONSULTING ENGINEERS & PROJECT MANAGERS

December 23, 2008

File No. 08-0107-15

City of Winnipeg Planning Property and Development Department Civic Accommodation Division 3<sup>rd</sup> Floor, 65 Garry Street Winnipeg, Manitoba R3C 4K4

ATTENTION: Ms. Bonnie Konzelman, P. Eng. Contract Coordinator

RE: Former Elmwood / Nairn Avenue Landfill Site Preliminary Site Conditions Assessment Report City Of Winnipeg

Dear Ms. Konzelman:

Please find a copy of the Former Elmwood / Nairn Avenue Landfill Site Final Preliminary Site Conditions Assessment Report.

We trust the above final report is adequate for the City of Winnipeg to complete their review of the site condition and proposed recommendations, however, please do not hesitate to contact the undersigned should you have any questions.

Yours truly, Robert D. Sinclair, P. End

Manager, Environmental Services

RDS/jr Enclosed

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## 1.0 INTRODUCTION

KGS Group has been contracted by the City of Winnipeg to conduct a preliminary site condition assessment on the former Elmwood/Nairn Avenue Landfill Site (See Figure 1). The City of Winnipeg is evaluating the cost-effectiveness and practicality of developing a Works and Operation Yard and possibly a Fleet Maintenance Building on the landfill site.

The facilities components are currently defined to require in the order of 12 hectares (30 acres) with the Works and Operation Building having an area of approximately 9,000 m<sup>2</sup> (100,000 ft<sup>2</sup>) composed mainly of garage area, a Fleet Maintenance Facility of approximate 4,500 m<sup>2</sup> (50,000 ft<sup>2</sup>), a salt storage facility with road access for heavy equipment, both granular and paved parking areas and yard storage areas as well as a small, 0.6 hectare (1.5 acre) stormwater management pond within approximately 12 hectares (30 acres). A possible refueling station may also be situated on site. The following study components are presented in the report.

- Review of Background Data
- Geophysical Screening Survey
- Test Pit and Groundwater Quality Survey (77 test pit logs in Appendix A)
- Foundation Options and Cost Evaluation (Appendix B)
- Stormwater Management Pond Evaluation (Appendix C)
- Leadership in Energy and Environmental Design (LEED) Components

The study components are presented in this final report with appendices.



## 2.0 BACKGROUND DATA

The site was formally part of an east-west trending depression that was made up of east-west elongated swampy areas. Remnants of these wet depressions are visible to the east of Highway 59/Lagimodiere. These low, wet pond areas were systematically in filled using mainly waste asphalt, concrete and soil from City of Winnipeg road renewal projects from back into the 1950's to about the 1990's. Current employees of local asphalt/concrete recycling companies worked on this site in the past.

KGS Group conducted a Landfill Site Disposition Study for the City of Winnipeg in 1992 to 1993, however, there was limited information on the Elmwood/Nairn Avenue Site likely because it was known to be essentially construction wastes (asphalt, concrete and soil) mainly from City of Winnipeg street road renewals and this previous 1993 study was focused on landfill leachate and gas concerns.

Four existing piezometers were located on site, two near Thomas Avenue, one at the back near the CN Rail line, and one located in the snow dump area. These were sampled for groundwater quality and landfill gas (methane) levels, water quality data is presented in Table 2.

A general geologic profile for the site is 1 m of soil cover, 2 to 3 m of asphalt, concrete and soil underlain by reeds and bulrushes with about 0.3 m of bog/peat deposit overlying brown, undisturbed silty clay.



## 3.0 GEOPHYSICAL SCREENING SURVEY

The Elmwood Landfill geophysical survey was completed on November 4<sup>th</sup> and November 13<sup>th</sup>, 2008 by KGS Staff Personnel. The geophysical survey consisted of using an electromagnetic conductivity (EM) device on an approximate 10-metre grid within the landfill site. A local EM benchmark site was established to insure quality control of the EM Survey.

#### 3.1 EQUIPMENT AND METHODS

#### EM 31 Mk 2

The geophysical electromagnetic conductivity survey utilized the Geonics EM 31 Mk 2 electromagnetic induction instrument to measure in-situ conductivity. The EM 31 has a fixed coil spacing of 3.66 meters and operates on a 9.8 kHz frequency. The EM 31 instrument was completed in the Vertical Dipole Position. This allows for the Quadrature Phase (conductivity) and in-phase readings to a depth of 6 m. The units of measure used for conductivity is millimho/metre (also known as millisiemens/metre) and the In-phase unit of measure is parts per thousand (PPT).

The instrument was properly calibrated to the manufacturer specifications. This included the procedure of instrument zeroing every day and checking onto the same location at the start and end of every day to ensure that instrument drift did not occur. During the course of the survey no drift above +/- 0.2 millimhos/m was detected and the zero check value was 0.0 on each day. The benchmark site was located on the northern location of the site.

#### Global Positioning System (GPS)

EM 31 surveys were conducted by coupling the EM 31 Mk2 to a Trimble GeoXT real time submeter differential grade GPS (DGPS) unit with Post Processing capabilities. This method allowed for the in the field coupling of all EM31 readings to have an accurate GPS position. The GPS/EM final positions were corrected to a KGS Survey Grade Base located on site for the survey. This procedure insured that all positions for the survey were corrected and has an absolute accuracy of no more than 0.5 metres.



#### 3.2 GEOPHYSICAL RESULTS AND DATA ANALYSIS

The geophysical electromagnetic Vertical Dipole conductivity survey completed on the Elmwood property utilized the Geonics EM 31 Mk 2 electromagnetic induction instrument to measure insitu conductivity. The EM 31 has a fixed coil spacing of 3.66 meters and operates on a 9.8 kHz frequency. This allows for the Quadrature Phase (conductivity) and in-phase readings to a depth of 6 m. The units of measure used for conductivity is millimho/metre (also known as millisiemens/metre). The conductivity is a measure of the resisteivty of the soil and is an indicator of the soil mass below the ground. The In-phase unit of measure is parts per thousand (PPT) and is very sensitive to large metallic objects that may be located below the ground surface.

The instrument was properly calibrated to the manufacturer specifications. This included the procedure of instrument zeroing every day and checking onto the same location at the start and end of every day to ensure that instrument drift did not occur. During the course of the survey no drift above +/- 0.2 millimhos/m was detected and the zero check value was 0.0 on each day. The benchmark site was located on the northern location of the site.

The EM conductivity survey readings were mapped and analyzed in a Geographical Information System (GIS) and overlaid with other known features. The EM 31 conductivity values were then interpolated by an Inverse Distance Weighting (IDW) GRID method to facilitate a conductivity surface. The GRID surface allows for better analysis when comparing the conductivity and in-phase readings and identifying trends across the project site. Figure 2 shows the vertical Dipole conductivity for the Elmwood Landfill. The conductivity results are classified into EM ranges to assist in the interpretation and display of the conductivity results. The in-phase results are shown on Figure 3 and the blue indicates the locations of areas where the presence of higher levels of metallic material is located on the landfill site.

The EM conductivity results are consistent with the soil material found during the test pitting and demonstrate normal conductivity for these soil types and type of fill found during the investigation. The expected typical conductivity for the site was 50-125 mS/m. The In-phase component of the EM survey indicates that no large metal objects are buried in the landfill site up to a depth of 6 metres, but significant amounts of small metal and rebar are scattered



throughout the site, specifically in the areas south of the main access gate. The EM31 results indicate that the north end of site shows elevated conductivity (conductivity values 125-200 mS/m) that may be a result of road salting and the proximity of the water main and valves, but does not appear to be a result of leachate impacted soils. The area to the west show very high values of conductivity (150 to 600 mS/m and red in colour) that are higher than normal for the soils on site and is an indication of the presence of leachate to some extent. The test pitting in this area found garbage materiel and backfill in the western holes. The green areas show the lowest conductivity and define soil and rubble with lowly impacted groundwater.



## 4.0 TEST PIT AND GROUNDWATER QUALITY SURVEY

Following the above EM geophysical survey, KGS Group conducted a program of 77 test pits over the site between November 3 and 13, 2008 and this subsurface information is presented in Appendix A and the test pit locations are shown on Figure 4. A backhoe and operator was supplied by J. D. Penner Ltd of Winnipeg. The EM geophysical survey provided information as to areas of concern but it was still important to provide a broad coverage of the site. As noted in the EM survey figures, the main area of concern in terms of actual municipal waste with leachate is on the north side of the snow dump area between Foster and Chester Avenue adjacent to the car parts recycling facility. Concrete with rebar is exposed in many areas throughout the area west of Chester Avenue. Other than this area there are no significant environmental limitation to development over the remaining area to the east.

The partial groundwater quality data base as presented in Table 1, is quite variable but presents no significant concerns. Conductivity is a general parameter that reflects overall groundwater quality. The results from the site demonstrate measurable, but relatively low leachate impact levels based on a measure of dissolved minerals or leachate in the groundwater. Levels in the 2000 mS/m range demonstrated no real leachate impacts, below 10,000 mS/m low leachate impacts and over 25,000 mS/m medium to higher leachate impacts and values near 100,000 very high leachate impacts. This quality data, coupled with the fact that not all holes encountered groundwater, also suggests that groundwater quality or quantity will not present significant concerns during construction. Groundwater quality shows pH values in the 8 to 10 range and this is expected for long-term leaching of the basic pH levels from concrete cements. Groundwater may flow into the excavation but will slow within several days and could be readily pumped back to the ponds along the south side of the property or to the storm ponds with good construction schedule planning. Dilution with on-site ponds or storm pond would be expected to lower pH values into the 8 to 9 range with no real concerns. These small ponds may fill and overflow, but overland discharge through the current thick, natural grasses would mitigate most quality concerns.



## 5.0 FOUNDATION OPTIONS AND COST EVALUATION

As noted previously, this work component is presented in Appendix B. Also, in overall terms, the City of Winnipeg can locate the facility anywhere east of Chester Avenue with no real preference relative to environmental or geotechnical foundations design concepts.



## 6.0 STORMWATER MANAGEMENT POND EVALUATION

A small stormwater management pond will be required to dampen out peak flows from the proposed development as well as settle suspended solids from overall site but with a focus on granular parking and roadway areas. The stormwater management pond sizing evaluation is presented in Appendix C. An area of approximately 0.4 hectare (1 acre) will be required within a fenced area with approximate 2 m of operating depth.

The drainage district for this site is the Mission District which is about to be studied for relief. There is a 1500 mm sewer on Mission south of the railway tracks. The existing snow dump, site for pond, has a drain system with a valve and a pipe to the 450 mm storm sewer on Chester, with drainage then into the Roland District.

The conservative approach would be to limit the drainage of the entire site prior to development. Therefore a connection using the existing pit and valve system at Chester is recommended. The existing system should be inspected during the next phase of this work. Scheduling the storm pond and site drainage early in the process and possibly oversizing the required storm water pond would mitigate run-off concerns during, as well as after, construction.



## 7.0 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

The proposed construction on a former landfill site would present LEED components as would the recycling of wastes where cost-effective. Furthermore, KGS Group has completed geothermal HVAC evaluation for the casino on Regent Avenue and has ongoing groundwater work at the Freshwater Fish Marketing Corporation further east in Transcona. There would be options to consider groundwater based geothermal systems, horizontally bored, closed loop system below the rubble wastes or a combination of the two options, all of which are significant LEED components.

The City of Winnipeg Streets Maintenance group currently has a standing offer with Rocky Roads located just to the west of the study site. Rocky Roads can supply crushed recycled waste material that meets City of Winnipeg specifications for various uses. All of the waste asphalt and concrete recyclers would take the landfill rubble that must be excavated at no cost with some reimbursement from Rocky Roads possible. All recyclers require that the material not include significant dirt levels and such material would require storage to allow rainfall to clean the material if practical. It would not be practical or cost-effective to recycle any of the wastes that do not need to be removed for construction.



## 8.0 CONCLUSIONS

- The historic Elmwood / Nairn Avenue Landfill was developed within low lying wet depression areas that were infilled by mainly asphalt, concrete and soil wastes from the 1950's to about the 1990's with snow and street sweepings still disposed of at the site.
- The City of Winnipeg used the site for street renewal wastes for many years in the past.
- The geophysical and test pit survey demonstrated that the site east of Chester is essential all street renewal / similar wastes, however, some municipal waste was defined west of Chester along the north side of the open and relatively flat, snow dump area.
- The geophysical survey defined elevated conductivity in the snow dump area likely related to "old" leachate making development in this area generally less desireable.
- There are no significant environmentally related limitation in the area east of Foster but the rubble must be managed for foundation systems as presented in Appendix B.
- Groundwater does demonstrate elevated pH's and Total Dissolved Solids (TDS) related to mainly concrete and soil dissolution but groundwater can be managed with no significant cost implication.
- Storm water management will be required but the system area is quite small and in the order of 0.4 hectares (1 acre) within a fenced area.
- The snow dump area away from the leachate would be a potential storm water management location and would be constructed from the deep, native silty clay deposits to produce a water tight structure.
- There are opportunities for "green" development of the site with LEED components for the re-use of the landfill site, re-use/recycle of wastes as well as potential for both open loop (groundwater) and closed loop (horizontally drilled loops) at the site.



## 9.0 **RECOMMENDATIONS**

It is recommended that the City of Winnipeg consider the following regarding the potential development of the Elmwood / Nairn Avenue Landfill Site:

- Focus the main development into the area east of Chester Avenue.
- Limit the development in the snow dump area to the possible construction of storm water management pond or possibly material or equipment storage.
- Consider LEED development of the site where practical and cost effective.
- Utilize the foundation concepts as an initial basis to defining the cost / benefits of building design and conceptual layout.
- Discuss the general stormwater management plans for the area with Water and Waste staff as the development concept moves forward.
- Consider retaining the services of a specialized cost estimator to better define overall project costs relative to the use of the historic Elmwood/Nairn Landfill site.

## **10.0 STATEMENT OF LIMITATIONS**

KGS Group prepared this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this report, including its conclusions, is based on the information that was made available to KGS Group during the investigation and upon the services described which were performed within the time and budgetary requirements of the City of Winnipeg. As the report is based on available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information.

In evaluating the property, KGS Group has relied in good faith on information provided by individuals noted in this report. KGS Group assumes that the information provided is factual and accurate. KGS Group accepts no responsibility for any deficiency, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretations or fraudulent acts of the persons interviewed.

KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated. KGS Group has no contractual liability to third parties for the information or opinions contained in this report.



TABLES



#### TABLE 1 GENERAL WATER QUALITY ELMWOOD LANDFILL WINNIPEG, MANITOBA

Demonster 1	FOI	TP1	TP4	TP6	TP7	TP19	TP49	TP69
Parameter	EQL	3-Nov-08	3-Nov-08	3-Nov-08	3-Nov-08	4-Nov-08	7-Nov-08	12-Nov-08
pH (units)	0.01	7.81	9.61	10.42	10.81	9.60	8.04	7.98
E.C. (µS/cm)	0.4	3880	1210	2850	2110	2740	3080	14900
Alkalinity as CaCO <sub>3</sub>	1	1500	124	190	278	49	1020	427
Bicarbonate as CaCO <sub>3</sub>	2	1830	58	20	35	5	1240	521
Carbonate as CaCO <sub>3</sub>	0.6	<0.6	46.1	104	149	26.8	<0.6	<0.6
Hydroxide as CaCO <sub>3</sub>	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Hardness as CaCO <sub>3</sub>	0.2	1440	172	377	300	770	1470	2500
Chloride	9	611	196	833	510	478	121	5110
Sulphate	9	<9	159	17	24	685	853	409
Nitrate & Nitrite (as N)	0.005	0.01	1.54	0.01	0.04	0.035	0.125	0.011
Calcium	0.05	167	43	151	120	307	216	114
Magnesium	0.01	249	15.6	0.36	0.32	1.01	226	539
Potassium	0.05	41	25.6	40	34.5	31	21.8	311
Sodium	0.02	330	178	398	300	254	279	1630
Iron	0.01	1.08	5.79	0.17	0.26	0.25	0.91	<0.01
Manganese	0.0002	1.21	0.14	0.0068	0.0093	0.0199	0.815	0.305
T.D.S.	5	2300	698	1550	1160	1780	2330	8370

#### Notes:

"-" = No Data

EQL = Estimated Quantitation Limit = The lowest level of the parameter that can be quantified with confidence

E.C. = Electrical Conductivity

T.D.S. = Total Dissolved Solids

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.

#### TABLE 2 PIEZOMETER DATA ELMWOOD LANDFILL WINNIPEG, MANITOBA

										Ра	rameter <sup>(1)</sup>					
Sample No.	Date	pH (units)	E.C. (µS/cm)	Turbidity (ntu)	Alkalinity as CaCO <sub>3</sub>	Hardness as CaCO <sub>3</sub>	Ammonia	Nitrate	Calcium	Chloride	Sulphate	Magnesium	Potassium	Total Phosphorous	Sodium	Iron
EQL		0.01	0.4	-	1	0.2	-	0.005	0.05	9	9	0.01	0.05	0.3	0.02	0.01
GWQ 26 P36L	14-Nov-08	7.81	5640	183	1320	1380	5.013	0.18	84	570	1150	240	222	2.8	702	27.50
GWQ 26 P37L	14-Nov-08	7.52	5340	320	1180	1710	7.618	0.13	134	815	190	284	32.4	0.4	537	4.52
GWQ 27 P19E	14-Nov-08	7.21	7310	752	1610	4670	0.019	0.04	540	400	3430	698	22	1.2	475	4.33
GWQ 27 P27L	14-Nov-08	7.17	3690	458	1270	1370	0.933	0.02	218	610	18	210	8.7	<0.3	359	13.60

Sample No.         Date           EQL         Image: Constraint of the system of the syst		Parameter <sup>(1)</sup>													
No.	Date	Manganese	T.D.S.	T.S.S.	T.K.N.	T.O.C.	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Total Coliform (Col./100 mL)	E.Coli (CFU/100 mL)
EQL		0.0002	5	-	-	-	-	0.001	-	-	-	-	-	3	3
GWQ 26 P36L	14-Nov-08	0.28	4030	168	8	39	0.016	<0.001	0.016	0.013	0.009	0.093	0.159	23	<3
GWQ 26 P37L	14-Nov-08	0.09	2830	164	11	36	0.009	<0.001	0.027	0.021	0.022	0.022	0.049	430	<3
GWQ 27 P19E	14-Nov-08	0.43	7540	121	4	39	0.010	<0.001	0.020	0.045	0.034	0.163	1.250	93	<3
GWQ 27 P27L	14-Nov-08	0.97	2150	1360	2	28	0.018	<0.001	0.018	0.010	0.022	0.029	0.041	150	7

#### Notes:

"-" = No Data

EQL = Estimated Quantitation Limit = The lowest level of the parameter that can be quantified with confidence

E.C. = Electrical Conductivity

T.D.S. = Total Dissolved Solids

T.S.S. = Total Suspended Solids

T.O.C. = Total Organic Carbon

T.K.N. = Total Kjeldahl Nitrogen

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.

FIGURES





- 9:41am : UserName: EChubey 2008 19, Dec I KGS FILE NO.:P:\Projects\2008\08-0107-15\Dwg\Env\Revision 0\08-0107-15-01rev0.dwg - Tab: Layout1 8 1/2"x11"/PLOT SCALE: 1















APPENDICES



APPENDIX A

**TEST PIT LOGS** 



K	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-	-01	l		SHE	ET 1	of 1
CLIE	NT (		F WINNIPEG - WATER AND WASTE DEPARTMENT	J(	DB N	Ю.	08-1	07-15		
PROJ SITE	JECT	Elmwoo	od Landfill	D	ATE	DRI	ILLED 11/3	/2008		
LOCA	ATION 4	45.7 m :	southwest of Thomas Avenue	U	TMs	(NA	ND83) N 5,52 E 637.	9,165 203		
DRIL METI	LING HOD	Rubber	Tire Excavator Daewoo 180WV							
LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION		APLE TYPE	IUMBER	FIELD HEADS Photoionizab 250 50	SPACE le Vapo )0 7	TEST ours (pp 50 10	m) •
ш		σ			SAN	z	Diesel Fuel (p	EST (P pm)		
			ORGANIC MATERIAL					<u> </u>		
-	0.5 -		FILL - Asphalt, concrete, clay, brown, slightly moist, firm, low plasticity.							
	1.0-									
	1.5 -						·····			
2	2.0-									
2000).01										
	2.5 -									
	3.0-		Note:							
			1. Water bubbles visible, water flowed in at high volumes at 2.13 m.							
	3.5 -									
	4.0-									
A IL COO									• • • • • • • • • • •	
	4.5 -									
- 19/1- 10	5.0-									
	5.5 -									
P. 11 5001	6.0-									
	6.5 -									
CONT	TE TYPE	د ۲	INSPECTOR				AP1 -		11/00/	
ζ J	& D PH	ENNER	K. SINCLAIR	APPRO	VE	0	<u>" []</u> D	ATE	11/20/	

<b>K</b> GI	<b>GS</b> ROUP	,	SUMMARY LOG	HOLE NO. <b>TP-(</b>	)2			SHE	ET 1	of 1
CLI		CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15	_	
SIT	E	Elmwoo	od Landfill	DAT	'E DRI	LLED	11/3	/2008		
LOG	CATION	30.5 m s	southwest of TP-01	UTN	ls (NA	D83)	N 5,52	9,123 190		
DRI ME	ILLING THOD	Rubber	Tire Excavator Daewoo 180WV							
EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		IPLE TYPE UMBER	FIELD Photo 25	HEADS bionizab	SPACE le Vapo 0 7	TEST purs (p) 50 1	om) ● 000
	i B	GF			N N	FIELD Diese	SOIL 7 I Fuel (p	EST (P opm)		
		-5702	COVER - Loose coarse grained gravel and cobbles.						00 4	
	- 0.5		FILL - Concrete (reinforced with rebar), asphalt, silty sand clay, brown,	slightly						
1	1.0-		moist, low plasticity.				• • • • • • •			
	1.0						• • • • • •			
	1.5						•			
2	2.0-						<u> </u>			
008).GI										
V 13, 2	2.5		CLAY - Grey, slightly moist, high plasticity.							
ON OL			- Small silt seam, grey. - Railway tie visible at 2.59 m.					·		
200 3	3.0-	-////								
D LAN	3.5									
		-	END OF TEST PIT AT 3.66 m.							
	4.0-	-	1. Small trickles of water visible at 2.44 m.							
	4.5	-					•			
		-								
19/062	5.0-	-								
- /010-5		-								
2008/02	5.5	-								
ECIS		-								
LON4	6.0-	-								
		-								
GWE	6.5	_								
		-								
SAN	⊥⊥ ⁄IPLE TYI	PE				1				••••
CON	VTRACTO	OR	INSPECTOR		/60	P	D		11/20	10.8
AN I	u & D I	PENNER	K. SINCLAIR		<u> </u>	ſΨ	<u> </u>		11/20/	00

K	<b>SS</b> DUP		SUMMARY LOG	HOLE NO.	-03					SI	IEEI	1	of 1
	IT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	j	OB NO				08-1	07-15	5		
SITE	ECT	Flmwor	od Landfill	D	ATE DI	RILLI	ED		11/3	/2008			
LOCA	τιον	Approx	imately 30.5 m southwest of TP-02	U	TMs (N		3)	N	5.52	9.093			
DRILL METH	.ING OD	Rubber	Tire Excavator Daewoo 180WV				-,	Ē	637,	175			
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE		FIELI Photo 2 FIELI Diese	D HE oion 50 D SC	EADS izab 5( DIL T	SPAC le Va )0 EST	Pour 750 (PET	ST s (pp 1( ROF	m) ● 000 ∟ LAG)
							1(	000	20	00	30,00	40	00
		0000	COVER - Loose coarse grained gravel and cobbles										
	0.5		FILL - Concrete (rebar visible), asphalt, sand and coarse grained grav	el.									
	1.0-		- Concrete, coarse grained gravel, silty clay.										
	1.5											· · · · ·	
	2.0-												
	2.5												
	3.0-												
_	3.5		CLAY - Grey, slightly moist, high plasticity.										
	4.0-		CONCRETE AND GRAVEL FILL - Coarse grained gravel.										
_	4.5		SANDY CLAY - Brown, slightly moist, intermediate plasticity.										
	5.0-	-	END OF TEST PIT AT 4.57 m. Note: 1. Small trickles of water visible at 4.57 m.								· · · · ·	· · · · · ·	
	5.5												
	6.0-					.,							
	6.5	-										(• (• )• (• (• )•	
		-											
SAMPI	_ .e typ	Έ					<u>Α</u> Λ						
CONTF J	RACTO	R ENNER	INSPECTOR K. SINCLAIR	APPR	OVED	ľ	Ð	Λ	D	ATE	1	1/20/	08

	<b>K</b> GR	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. <b>TP-</b>	•04			SHE	ET 1	of 1
-				WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.		08-10	07-15	_	
	SITE	201	Elmwoo	d Landfill	DA	TE DRI	LLED	11/3/	2008		
	LOCA	TION	30.5 m s	south of TP-03	UT	Ms (NA	D83) <u>N</u>	5,529	9,053		
	DRILL METH	LING IOD	Rubber	Tire Excavator Daewoo 180WV			E	637,1	173		
	ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE NUMBER	FIELD Photoi 25 FIELD Diesel	HEADS onizabl 0 50 SOIL T Fuel (p	SPACE le Vapo 00 7: EST (Popm)	TEST purs (pp 50 10 ETROFI	m) ● 00 
$\left  \right $			1 1				100	0 200	00 30	00 40	00
	-	-		COVER - Light brown							
		0.5 -									
	-	1.0-		FILL - Concrete with rebar, coarse grained gravel, sandy clay, grey, mo	oist.						
		1.5 -							•••••		
		20-									
B).GPJ		2.0						: : : : : : : : :			
3 2008											
0013		2.5 -									
2 TO N											
NON	_	3.0-		END OF TEST PIT AT 3.05 m.							
FILL (				Note:							
LAND		3.5 -		<ol> <li>Water seeped into hole at high volumes at 2.44 m, no bubbles visible</li> <li>High volumes of concrete with rebar where uncovered.</li> </ol>				· · · · ·			
0000			-								
/ELMV		4.0-	-								
rogs			-					*****			
		4.5 -	-								
SIGN			-								
-15/DE		5.0-	-								
-0107-											
08/08		5.5 -	-								
:TS/20	ĺ		-								
SOJEC		60-	-								
P:/PF		0.0	-								
			-					: ::::::::::::::::::::::::::::::::::::		•••••••	
OGW		6.5	-								
TP) N			-								
FOR	SAMPI	∟ LE TYP	E							· · · ·	
DURS	CONTI	RACTO	R	INSPECTOR			<i>M</i>				
VAP(	J	& D P	ENNER	K. SINCLAIR	APPRC	VED	<u>IP</u>	D.	ATE	11/20/0	

	K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-	05				SH	EET :	L of 1
	CLIEN		CITY ΟΙ	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	BN	Э.		08-1	07-15		
	SITE	ECI	Elmwoo	od Landfill	DA		DRII	LED	11/3	/2008		
	LOCA	τιοΝ	Approx	imately 30.5 m east of TP-01	UT	Ms (	NA	D83) M	5,52	9,139		
	DRILL METH	LING IOD	Rubber	Tire Excavator Daewoo 180WV				E	637,	,236		
	LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION		MPLE TYPE	NUMBER	FIELD Photo 25	HEAD onizat 0 5	SPACE	E TESI pours ( 750	ppm) ● 1000
	ш		Ū			SAI	2	Diesel	Fuel (	ppm)	000	40.00
ſ				ORGANIC MATERIAL								
	_		1998	COVER								
		0.5	Page									
	_	1		FILL - Coarse grained gravel, concrete rebar, clay, grey, slightly mois	t.							
		1.0-										
				- Railway tie uncovered at 1.22 m.								
		1.5 ·	-*****									
GPJ		2.0-										
(8008)												
13, 2		2.5										
20N												
310		20										
Nov	-	3.0-	<i>777</i>	SANDY CLAY - Grey, moist, low plasticity.		11						
FILL				- Black organic matter, roots visible.								
ANDI		3.5	}///									
	-	1		CLAY - Grey, moderately moist, high plasticity.		1						
0 M W		40-	¥/////									
S/EL		-0.4	¥/////									
VLOG			\$/////									
VIEN/		4.5	-\/////									: ::::::::::::::::::::::::::::::::::::
SIG			\$/////					·····				÷
15\DE	-	5.0-	-	END OF TEST PIT AT 4.88 m.		]		<u> </u>				
107-			-	Note:								
8/08-(			-	1. Water began to trickle into test pit at 4.88 m.								
\$\200(		5.5	-									
ECT			-						÷ • • • •			
PROJ		6.0-	-									
V P:/			-									
		6.5	-									
N9 0		0.5	-									
TP) N			-									
FOR	S A D M		Г					• • • •	. : : :			
JRS (	SAMP		E 					-A( \.				
APOL	J	& D F	ENNER	K. SINCLAIR	APPRC	VEI	)	ľŊ	Ľ	DATE	11/2	0/08
3	<b>`</b>							1	_			

	K	<b>GS</b> DUP		SUMMARY LOG	ILE NO. <b>TP-</b>	06		SHE	ET 1 of	: 1
	CLIEN	IT FOT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.	(	8-107-15		
	PROJI SITE	ECT	Elmwoo	od Landfill	DA	TE DR	RILLED 1	1/3/2008		
	LOCA	τιον	30.5 m s	southwest of TP-05	UT	Ms (N/	AD83) N 5	529,113		
	DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV						
	EV. (m)	(m) HTc	APHICS	DESCRIPTION AND CLASSIFICATION		OLE TYPE IMBER	FIELD HE Photoioni 250	ADSPACE zable Vapc 500 7:	<b>TEST</b> burs (ppm) 50 1000	•
	ELf	DEF	GRI			SAMF	FIELD SC Diesel Fu 1000	IL TEST (P el (ppm) 2000 30	ETROFLA	G) O
ſ				COVER						
		0.5 -		FILL - Clay, grey, dry, low plasticity, mixed with coarse grained gravel, conc rebar, railway tie, piece of hydro pole, and asphalt visible.	rete with					
		1.0-								
		1.5 -								
).GPJ		2.0-								
3, 2008	_	25-		END OF TEST DIT AT 2 44 m						
TO NOV 1		2,5	-	Notes:				· · · · · · · · · · · · · · · · · · ·	·····	
(NOV 3		3.0-	-	<ol> <li>2. Obtained water sample.</li> </ol>						
D LANDFILL		3.5 -								
SVELMWOO		4.0-	-							
SNIENVILOG		4.5 -	-							
07-15\DESIC		5.0-	-							
LS/2008/08-0		5.5 -	-							
P:/PROJECT		6.0-	-							
TP) NO GW ELEV		6.5 -	-							
(FOR	SAMPI	LE TYP	E				<u> </u>			
VAPOUR	CONTI J	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR	APPRO	VED	MA	DATE	11/20/08	

<b>K</b>	<b>GS</b> ROUP		SUMMARY LOG	<sup>10.</sup> TP-(	07		SH	EET 1 of	1
CLI	IENT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	3 NO.	-	08-107-15		
PR SIT	OJECT E	Elmwoo	od Landfill	DAT	re dr	ILLED	11/3/2008		
LO	CATION	30.5 m (	east of TP-03	UTN	As (NA	N (D83)	5,529,082 637,212		
DR) ME	ILLING THOD	Rubber	Tire Excavator Daewoo 180WV						
(m) /:-	TH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		'LE TYPE MBER	FIELD H Photoio 250	EADSPACE nizable Vap 500	E TEST ours (ppm) 750 1000	•
		GR/			SAMP	FIELD S Diesel F 1000	OIL TEST (I uel (ppm) 20,00 3	<b>PETROFLAG</b>	3) O
	0.5		COVER <u>FILL</u> - Concrete, cobbles mixed with clay, grey, slightly moist, low plasticity. Pla roots visible.	ant					
	1.5								
, 2008).GPJ	2.0-								
8 TO NOV 13	2.5		<u>SILTY CLAY</u> - Grey and brown, slightly moist, high plasticity, mixed with cobbles concrete.	and			• • • • • • • •	· · · · · · · · · · · · · · · · · · ·	
NON)	3.0-		END OF TEST PIT AT 3.05 m.						
000 LANDFILL	3.5		Notes: 1. Water entering into test pit at high volumes at 3.05 m, no bubbles visible . 2. Obtained water sample.						
VLOGS/ELMW	4.0-							· · · · · · · · · · · · · · · · · · ·	
DESIGNIEN	4.5							· · · · · · · · · · · · · · · · · · ·	
008\08-0107-15	5.0-								
PROJECTS/20	6.0-	-							
) NO GW ELEV P:N	6.5								
FORT									
COJ COJ	NTRACTO	R PENNER	INSPECTOR K. SINCLAIR	APPROV	/ED	APA	DATE	11/20/08	

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	DLE NO. TP-	-08	3			SHI	SET 1	of 1	
CLIEI		ΟΙΤΥ ΟΙ	F WINNIPEG - WATER AND WASTE DEPARTMENT	JC	DB N	Ю.		08-	107-15			
SITE	201	Elmwoo	od Landfill	D	ATE	DRII	LED	11/3	8/2008			
LOCA	TION	30.5 m (	east of TP-04	U	TMs	(NAI	D83)	N 5,52	29,049			
DRILL		Rubber	Tire Excavator Daewoo 180WV					C 03/	,200			
					Ш		FIELD		SPACE	TEST		
EV. (m)	PTH (m	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYI	JMBER	Photo 2	50 5	ole Vap 00 7	ours (p 750	<b>pm)</b> ● 1000	
Ē	DE	GR			SAM	N	FIELD Diese	SOIL	TEST (F ppm)	PETRO	FLAG)	
		2070	COVER		+	_		00 20				
	0.5 -		FILL - Concrete with rebar, mixed with brown clay and coarse grained sand low plasticity.	d, moist,								
	1.0											
	1.0-											
	1.5 -											
5	2.0-											
	2.5 -		- Clay, grey, moderately moist, intermediate plasticity, mixed with coarse g at 2.44 m.	rained sand			· · · · · · · · · · · · · · · · · · ·					
-	3.0-											
			END OF TEST PIT AT 3.05.								-	
	3.5 -	- - -	Note: 1. Sloughing in of sides at 3.05.									
	4.0-											
	4.5 -	-						•••••				
	5.0-											
	5.5 -	-										
	6.0-	-										
	6.5	-						•••••				
	0.0 -	-										
SAMPI	⊥ LE TYPI	E					Δ					
CONT	RACTO	R Enner	INSPECTOR K. SINCLAIR	APPRO	OVEI	)	M	)	ATE	11/20	/08	
	~ • •					-						
	K	<b>SS</b> DUP		SUMMARY LOG	E NO. TP	-09	)			SH	EET 1	l of 1
--------------	---------------	------------------	------------	---	-------------	-----------	-------	---------------------	---------------	-------------------	---------------------------	----------------
	CLIEN	<i>IT</i> (		WINNIPEG - WATER AND WASTE DEPARTMENT	J(	OB N	10.		08-	107-15		
	PROJ SITE	ECT	Elmwoo	od Landfill	D	ATE	DRI	LED	11/	3/2008		
	LOCA	TION	30.5 m e	east of TP-08	U	TMs	(NAI	D83)	N 5,5 E 63	29,042 7,249		
	DRILL METH	ING IOD	Rubber	Tire Excavator Daewoo 180WV								
	-EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		IPLE TYPE	UMBER	FIELI Photo 2	D HEAI	DSPACE	E TEST pours (j 750	ppm) ● 1000
	Ш	Ö	5			SAN	z	Diese	I Fuel	(ppm)		FLAG)
ſ		-	000	COVER						000 3		4000
	_	0.5 -		FILL - Concrete and rebar mixed with clay, grey, moist, low plasticity, with coa grained sand and gravel.	arse							
		1.0-										
		1.5 -										
3, 2008).GPJ		2.5										
V 3 TO NOV		3.0-										
ANDFILL (NO		3.5 -		<ul> <li>Very moist, high plasticity, loose coarse grained gravel. Very strong garbage no garbage visible at 3.05 m.</li> </ul>	e odour,							
ELMWOOD L		4.0-										
VENV/LOGS/	_	4.5 -		OLAN. One was which the statistic with second second second						· · · · · · · · ·		
107-15\DESIG		5.0-		- Silt seam, beige/brown, slightly moist, intermediate plasticity at 5.49 m.								
8/08-01												
PROJECTS/200		5.5 - 6.0-		END OF TEST PIT AT 5.49 m. Note: 1. Water visible entering test pit at 1.5 m.								
GW ELEV P:\F		6.5 -										
TP) NO (			-									
S (FOR	SAMP	LE TYPE	E					<u> </u>	<u>, 1</u>			
VAPOUR	CONTI J	RACTOI	r enner	INSPECTOR K. SINCLAIR	APPR	OVE	D	A	X	DATE	11/2	0/08

K GR	<b>SS</b> DUP		SUMMARY LOG	р. ГР-10				SHE	ET 1	of
CLIEN	IT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	).	(	)8-107	-15		·
PROJ	ECT	Elmuro	ad Landfill	DATE D	RILLED	1	1/3/20	08		
SILE	τιον	30.5 m	east of TP-09							
		50.5 m		UTMS (N	NAD83)	N S E	5,529,0 537,29	33 l		
METH	ING IOD	Rubber	Tire Excavator Daewoo 180WV							
LEV. (m)	EPTH (m)	SAPHICS	DESCRIPTION AND CLASSIFICATION	IPLE TYPE	HIEL Phot	D HE	ADSP	ACE Vapo 75	TEST urs (p	<b>pm)</b>
Ш	õ	5		SAN	Z FIEL Dies	D SO el Fu 000	el (ppr	5T (Pl n) 30		FLAG)
	0.5		FILL - Coarse grained gravel and cobbles.				2000			
_	0.5		SILTY CLAY - Grey, dry, low plasticity.							
	1.0-	-0/0/0 -0/0/0 -0/0/0/0	- Black, low plasticity mixed with coarse grained sand between 0.91 m and 1.22 m							
_	1.5 ·		FILL - Concrete.							
-	2.0-		<b>CLAY</b> - Black, slightly moist, low plasticity, with coarse grained gravel.							
_	2.5		SILT SEAM - Beige/brown, slightly moist, low plasticity.							
_	3.0-		CLAY - Grey, moist, high plasticity.							
	3.5 -									
	4.0-		- Encountered grasses and black organic soil, fibers visible at 3.96 m.							
_	4.5 -		<u>CLAY</u> - Dark grey, slightly moist, low plasticity, crumbling. Silt seam present, beige moderately moist, intermediate plasticity.	€,						
		-	END OF TEST PIT AT 4.57 m.							
	5.0-	-								
	5.5 -									
	6.0-	-								
	6.5 -	-								
		-								
SAMPL	E TYP	E R	INSPECTOR		A					
J	& D P	ENNER	K. SINCLAIR A	PPROVED	<u> </u>	N.	DAI	E	11/20	/08

	K	<b>SS</b> DUP		SUMMARY LOG	DLE NO. TP-	-11	[			SI	IEET	1 c	of 1
		IT ECT	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JO	)B N	Ю.		08-	107-15	5		
	SITE	207	Elmwoo	od Landfill	DA	٩ΤΕ	DRII	LED	11/	3/2008			
	LOCA	τιον	30.5 m e	east of TP-10	UT	ГMs	(NAI	083)	N 5,5	29,016			
	DRILL	ING	D						E 63'	7,344			
	METH	OD	Rubber			-					_		
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	JMBER	FIELE Photo 2	D HEAL	DSPAC ble Va 500	E TES	5T (ppn 10(	n) ● 00
	EL	DEI	GR			SAME	ľ	FIELD	SOIL	TEST (ppm)	(PETF	OFL	AG) O
								10	00 2	000	30,00	400	00
			0000	COVER									
	_	0.5 -		SILT SEAM - Beige, dry, low plasticity. Concrete slabs were visible at 0.61	m								
			¥/////	CLAY - Slightly moist, intermediate plasticity, with coarse grained sand.									
		1.0-										:: ::	
				- Dark grey, moist, intermediate plasticity.						•			
		1.5 -	-	- Concrete slabs visible at 1.22 m.									
			<i>\$/////</i>										
		20-											
3).GPJ		2.0-	<i>\\\\\</i>										
2008			¥/////										
OV 13		2.5 -	¥/////										
3 TO N(	-			ORGANIC MATTER - Black, with fibers, deposits of decomposing wood.									
VOV)	-	3.0-		SILT SEAM - Beige, moist, intermediate plasticity.									
PILL													
LANC	_	3.5 -											
000	_			CLAY - Grey, slightly moist, high plasticity.									
ELMV		4.0-	<u> </u>										
OGS										• • • • • • •			
INVI		4.5 -	<i>\$/////</i>						·	· · · · · · · ·			
SIGN			<i>\\\\\\</i>										
5\DE		5.0-											
107-1		5.0											
8\08-C		_											
S/200	-	5.5 -	-	END OF TEST PIT AT 5.49 m.									
JECT			]	Note:									
PRO		6.0-	-	1. Small amount of water visible at 3.66 m.									
EVP			-					-9-9-9-9-				•	
SW EL		6.5	-										
NO			-										
R TP)												:::	
S (FO	SAMPI	LE TYP	E					A					
APOUR	CONTI J	RACTO	R ENNER	INSPECTOR K. SINCLAIR	APPRO	OVE	D	M	1	DATE	11	/20/0	8

	K	<b>SS</b> DUP		SUMMARY LOG	NO. <b>TP-</b>	12				SH	EET 1	of 1
		T (		F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.			08-	107-15		
	SITE	-07 H	Elmwoo	od Landfill	DA	TE DI	RILL	.ED	11/.	3/2008		
1	LOCAT	TION 3	30.5 m o	east of TP-11	UT	Ms (N	IAD	33)	N 5,52	29,004		
	DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV					L 057	,571		
	ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		AMPLE TYPE		FIELD Photo 2: FIELD Diese	) HEAD bionizal 50 5 0 SOIL	DSPACE ble Vap 500 TEST (I	E TEST pours (p 750 1 PETROI	pm) ● 000 
						0)		10	00 2	000 3	000 4	000
				ORGANIC MATTER - With fibers.								
		0.5 -		SILTY CLAY - Brown, slightly moist, intermediately plasticity, trace of coarse gra sand.	ained							
		1.5							· · · · · · · · · · · · · · · · · · ·			
5		2.0		SILT SEAM - Grey, dry, crumbles.								
O NOV 13, 2008).GF		2.5 -		<u>CLAY</u> - Dark grey, slightly moist, high plasticity, trace of coarse grained sand. Concrete and rebar visible at 2.13 m.								· · · · · · · · · · · · · · · · · · ·
IDFILL (NOV 3 1		3.0-		- Silty clay seam, brown with grey pockets, crumbles. Tree branches and fibers at 3.05 m.	visible	S:	S1•	2				
D LAN	_	3.5 -		CLAX Drawn slichtly maint intermediate sloutisity								
OGS/ELMWOOL		4.0-		CLAY - Brown, slightly moist, intermediate plasticity.								
DESIGNIENVI		4.5 -							• • • • • • • • •			
8\08-0107-15\	-	5.0-		END OF TEST PIT AT 15.19 m.								
KOJECTS/200		5.5 -		Notes: 1. Water trickling in at 3.66 m. 2. Soil sampled obtained at 3.1 m.								
TP) NO GW ELEV P:\PF		6.5 -	-									
(FOR	SAMPL	– .E TYPI		Grab from Bucket				1.1	)			
VAPOURS	CONTR J &	ACTOI	R ENNER	INSPECTOR K. SINCLAIR	APPRO	VED		M		DATE	_11/20	/08

	K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-13	SHEET 1 of 1
	CLIEN	VT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO.	08-107-15
	PROJI SITE	ECT	Elmwoo	od Landfill	DATE DRI	LLED 11/3/2008
	LOCA	TION	30.5 m e	east of TP-12	UTMs (NAI	D83) N 5,528,985
	DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV		2 037,400
	ELEV. (m)	)ЕРТН (m)	BRAPHICS	DESCRIPTION AND CLASSIFICATION	MPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000 FIELD SOIL TEST (PETROFLAG)
			0		SA	Diesel Fuel (ppm) O 1000 2000 3000 4000
			luurintuuri a galaa ar	ORGANIC MATERIAL		
	_	0.5 -		SILTY CLAY - Beige, slightly moist, crumbles, with coarse grained gra	vel.	
		1.0-		CLAY - Grey, very moist, wood visible.		
		1.5 -		- Water visible at 1.52 m.		
08).GPJ		2.0				
TO NOV 13, 20	_	2.5 -		SILTY CLAY - Dark grey, dry, low plasticity.	\$\$20	4.2
L (NOV 3	-	3.0-		CLAY - Brown, slightly moist, high plasticity.		
OOD LANDFIL		3.5 -				
VLOGS/ELMW	ļ	4.0-				
GN/EN/	-	4.5 -	-/////	END OF TEST PIT AT 4.57 m.		
3-0107-15\DESI		5.0-		Notes: 1. Encountered water at 1.52 m. 2. Soil sampled obtained at 2.44 m.		
JECTS/2008/06		5.5 -				
ELEV P:\PRO.		6.0-	-			
TP) NO GW		6.5 -	-			
RS (FOF	SAMPI	LE TYP	E	Grab from Bucket		A A
VAPOUF	CONTH J	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR	APPROVED	DATE <u>11/20/08</u>

K	<b>SS</b> DUP		SUMMARY LOG	HOLE NO. TP-14		SHE	ET 1 of 1
	IT (	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO.		08-107-15	
SITE		Elmwoo	od Landfill	DATE DI	RILLED	11/3/2008	
LOCA	τιοΝ :	30.5 m e	east of TP-13	UTMs (N	AD83) I	N 5,528,960	
DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV			E 637,509	
.EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	IPLE TYPE	FIELD Photo	HEADSPACE ionizable Vap	TEST purs (ppm) ● 50 1000
Ш	DE	ъ		SAN	FIELD Diese	9 SOIL TEST (F I Fuel (ppm) 00 2000 30	(ETROFLAG)
			ORGANIC MATTER - Fibers visible.				
	0.5		<u>SILTY CLAY</u> - Beige, slightly moist, low plasticity.				
	1.0—		CLAY - Grey, moist, high plasticity.			· · · · · · · · · · · · · · · · · · ·	·····
	1.5 -						
_	2.0-	and the second secon	ORGANIC MATTER - Black, branches visible.				
	2.5 -		<u>CLAY</u> - Brown, slightly moist, high plasticity.			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
	3.0						
	3.5 -						
	4.0-						
_	4.5 -		END OF TEST PIT AT 4.57 m.				
	5.0-	-					
	5.5 -	-					
	6.0-	-					
	6.5 -						
SAMPI	E TYP	с Е			$\wedge$	••••	
CONT	RACTO	R ENNER	INSPECTOR K. SINCLAIR	APPROVED	AÐ	DATE	11/20/08

K(GRC	<b>SS</b> DUP		SUMMARY LOG	HOLE NO. TP-15	SHEET 1 of 1
	IT FCT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NC	0. 08-107-15
SITE LOCA		Elmwoo 30.5 m e	od Landfill east of TP-14	DATE D UTMs (I	DRILLED 11/3/2008 (NAD83) N 5.528.951
DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV		E 637,557
LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION	APLE TYPE	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)
ш	ā	ច		SAM	Z FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) 1000 2000 3000 4000
			ORGANIC MATTER - Roots visible.		
-	0.5 -		FILL - Coarse grained gravel and large slabs of concrete.		
	1.0 <i>—</i> 1.5 <i>-</i>		SILTY CLAY - Grey, slightly moist, low plasticity. Encountered wood at (	0.91 m.	
_	2.0-		CLAY - Dark grey, slightly moist, firm, low plasticity.		
	2.5 -		<b><u>CLAY</u></b> - Grey, slightly moist, firm, intermediate plasticity.		
	3.5 -				
-	4.0 4.5 -		SILTY CLAY - Brown, moist, soft, low plasticity.		
	5.0-		END OF TEST PIT AT 4.57 m.		
	5.5 -				
	6.0— 6.5 —				
SAMPL	_ .E TYPI				
CONTR J &	ACTOR D PI	ک ENNER	INSPECTOR K. SINCLAIR	APPROVED	DATE <u>11/20/08</u>

GRO	<b>GS</b> DUP		SUMMARY LOG	NO. <b>TP-</b>	16	5			S	HEET	1	of 1
CLIEN	NT ECT		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	ΒN	0.		08-	107-1	5		
SITE	201	Elmwoo	od Landfill	DA	ΤE	DRII	LED	11/	4/200	8		
LOCA	τιοΝ	30.5 m	east of TP-07	UTI	Ms	(NAI	283)	N 5,5	29,069	)		
DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV				,	E 637	7,269			
.EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	JMBER	FIELD Photo 2:	D HEAI	DSPA ble Va 500	CE TE apour 750	ST s (pp 10	<b>m)</b> ● 00
E	DE	GR			SAM	ž	FIELD Diese	SOIL Fuel	TEST (ppm)	(PET	ROFI	- <b>AG)</b> 00
		53	ORGANIC MATERIAL - Fibers visible.								40	
	0.5 -	, , , , , , , , , , , , , , , , , , ,										
-			CRUSHED CONCRETE FILL					• • • • • • •				
	10-	首任										
_											· · · · ·	
	15		<b><u>SILIY GLAY</u></b> - Grey, signtly moist, firm, low plasticity, with fine grained gravel.					•				
	1.5	-UIII										
	2.0											
5	2.0~											
-		<u>IIII</u>			X	SS3	0.4	• • • • • •			 	
	2.5 -	1///	CLAY - Grey, moist, firm, low plasticity. Encountered wooden debris.						•			
							-3-3-5-5-		·   · · · · ·		••••••	
	3.0-											
2		\$///										
	3.5 -		SILTY CLAY, Moist firm intermediate plasticity sparse grained group. fill aug	has								
			asphalt and crushed concrete visible.	11 d5					•			
	4.0-											
								• • • • •			 	
	4.5 -							• • • • •				
									•			
5	5.0-											
	5.5 ·	<i>\\\\\\\</i>	CLAY - Grey, moist, slightly firm, high plasticity.									
		\$ <i>\\\\\</i>						••••••				
	6.0-		END OF TEST PIT AT 6.10 m.									
		-	Notes:									
	6.5 -	-	1. Soil sample obtained at 2.44 m.									
		-							·   · · · · ·			
SAMPI	LE TYP	E	Grab from Bucket		(		$\Lambda$			.		
CONTI	RACTO	R	INSPECTOR		VE	D	()	1			1/20/	10
J	& D P	ENNER	K. SINCLAIR	APPRO	۷E.	ם ח	P	]	DATE	1	1/20/(	

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. <b>TP-</b>	17				5	HEE	T 1	of 1
CLIEI			WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NC	).		08-	107-1	5		
SITE	207	Elmwoo	d Landfill	DA	TE D	RI	LED	11/	4/200	8		
LOCA	TION	30.5 m e	east of TP-16	UT	Ms (N	NAI	083)	N 5,5	29,05	4		
DRILI METH	LING 10D	Rubber	Tire Excavator Daewoo 180WV				ľ	= 03	7,309			
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	JMBER	FIELD Photo 25	HEAI	DSPA Ible V 500	CE T apou 75(	EST Irs (pp ) 1	<b>om)</b> ● 000
Ш	DE	GR			SAM	ž	FIELD Diese	SOIL	TES (ppm	Г (РЕ ) 200		LAG)
			ORGANIC MATERIAL							300		
	0.5 -		COVER									
-			CRUSHED CONCRETE FILL									
	1.0-											
	1.5 -											
-		ZZ	CLAY - Dark grey, very moist, with coarse grained gravel.									
2008).GPJ	2.0-		SILTY CLAY - Grey, moist, soft, low plasticity.									
TO NOV 13, 2	2.5 -		<b>CLAY</b> - Dark grey, moist, low plasticity, with fine grained gravel and coars sand.	se grained							(	
T (NOV 3	3.0-		- Mixed with coarse grained gravel and cobbles at 3.05 m.									
OD LANDFII	3.5 -		- Brown below 3.35 m.									
SSELMWOO	4.0-											
SIGNENVILUC	4.5 -		<b>CLAY</b> - Dark grey, moist, firm, intermediate plasticity, with coarse grained	d sand.								
1010-2012	5.0											
-	5.5 -	-	END OF TEST PIT AT 5.49 m.									
NPROJECT	6.0-	-	Note: 1. Water entering into test pit at 1.83 m.									
P) NO GW ELEV P:	6.5 -	- - - - - -										
		1					::::  ∧	:::	:   : :	::	::::	::::
SAMP SAMP CONT	RACTO	R ENNER	INSPECTOR K. SINCLAIR	APPRO	OVED	)	MU		DAT	E	11/20	/08

	<b>S</b>		SUMMARY LOG	<sup>NO.</sup> ТР-	18					SHE	ET 3	l of
CLIEN	IT (		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOI	B NO	).		0	8-107	7-15		
PROJI SITE	ECT	Elmwoo	od Landfill	DA	TE D	RILI	_ED	1	1/4/2	008		
LOCA	TION	30.5 m (	east of TP-17	UT	Ms (N	NAD	83)	N 5	.529.	057		
DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV		(		/	Ë õ	37,34	4		
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE	NUMBER	FIEL Phote 2 FIEL	D HE/ oioni: 50 J D SOI	ADSF zable 500 L TE	PACE Vapo 7 ST (F	TEST ours (j 50 PETRO	opm) 1000 J
							1(	00	2000	) 3(	000	4000
			ORGANIC COVER									
-	05-		SANDY CLAY - Brown, slightly moist, firm, low plasticity. Wooden debris uncov	ered.								
-			CRUSHED CONCRETE AND ASPHALT FILL									
	1.0—											
-		的	CLAY - Dark grey, moist, firm, low plasticity, with coarse grained gravel									
_	1.5 -		CILTY CLAY, Page de firm another									
	-		SILIT CLAY - Beige, ary, firm, crumbles.									
_	2.0		CLAY - Grev. moist. firm. intermediate plasticity.			-				<u> </u>		
Í	-											
	2.5 -											
	-											
_	3.0					+						
	-		moist, firm, high plasticity.	y								
	3.5 -											
	-											
	4.0-					╞						
	-											
	4.5 -											
	-											
	5.0								-			
	-		END OF TEST PIT AT 5.18 m.									
	5.5 -		Note: 1. Encountered water at 3.66 m.									
	-											
	6.0											
	-											
	6.5 -											
	-											
SAMPL	E TYPE	I					N).					
CONTR	ACTOR	2	INSPECTOR	ADDDO		1	$\lambda/A$		DAT	rr.	11/2	

KGS GROUP	,	SUMMARY LOG	о. Г <b>Р-1</b>	9			SH	EET	1 of
	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-	107-15		
SITE	Flmwor	od Landfill	DAT	E DRI	LLED	11/4	4/2008		
LOCATION	30.5 m	east of TP-18		le /ΝΔ	D83)	N 55	29 052		
			0110	15 (11/1	000)	E 637	,377		
METHOD	Rubber	Tire Excavator Daewoo 180WV							
ELEV. (m) DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE ITPE NUMBER	FIELI Photo 2 FIELI Diese	D HEAD oionizal 50 5 J D SOIL 21 Fuel (	DSPACI ble Var 500 TEST ( ppm)	E TES ours ( 750 PETRO	r (ppm) 1000  OFLAG)
			_		10	00 20	000 3	000	4000
	au <sup>den</sup> anger <sup>e</sup> M <sup>den</sup> angere	ORGANIC COVER							
0.5		SILTY CLAY - Dark grey, slightly moist, firm, low plasticity, with coarse grained gravel.							
- 1.0-		FILL - Concrete slabs and cobbles, mixed with clay, grey, slightly moist, firm, low plasticity.							
- 1.5		SILTY CLAY - Dark grey, moist, firm, low plasticity, mixed with coarse grained gravel.							
2.5		SILTY CLAY - Brown, firm, moist, high plasticity.							
3.0-									
3.5		LARGE SLABS OF CONCRETE AND REBAR FILL - Mixed with silty clay, grey, very moist, firm, high plasticity.							
4.0-									
4.5									····
		SILTY CLAY - Light grey, moist, soft.							••••
- 5.0-		SILTY CLAY - Grey, slightly moist, firm, high plasticity.							
- 5.5									
	-	Note: 1 Encountered water at 1.52 m							
6.0-	-								· · · · · · · · · · · · · · · · · · ·
6.5									
SAMPLE TYP	PE	J			<u>, 1</u> 1		::::		:[:::
CONTRACTO J&DI	)R PENNER	INSPECTOR K. SINCLAIR AI	PPROV	ED		Г	DATE	11/2	20/08

	K	<b>GS</b> OUP		SUMMARY LOG	DLE NO. <b>TP-</b>	-20	)			SI	HEET	1 of	1
			CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B N	0.		08-	107-15	5		
	SITE	207	Elmwoo	od Landfill	DA	ΑTE	DRIL	LED	11/4	4/2008			
	LOCA	TION	30.5 m e	east of TP-19	UT	Ms	(NA[	283)	N 5.5	29.028			
	DRILL	LING			01	1010	(10) (1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	E 637	,416			
	METH	IOD	Rubber	Tire Excavator Daewoo 180WV									
	-EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	UMBER	FIELI Photo 2	D HEAD	SPAC	E TES	<b>(ppm)</b> 1000	•
	Ш	ä	5			SAM	z	FIELI	) SOIL I Fuel (	TEST (ppm)	(PETR	OFLAC	G) O
						L.		10	00 2	000	3000	4000	
	-	-		ORGANIC COVER - Roots visible.									
		0.5 -		<b><u>FILL</u></b> - Concrete pieces mixed with coarse grained gravel mixed with siny classrown, slighty dry, firm, intermediate plasticity with coarse grained sand.	ay,								
		1.0-											
		1.5 -											
GPJ		2.0-											
/ 13, 2008).		2.5 -											
V 3 TO NOV	_	3.0-		SILTY SAND - Grey, very moist, coarse grained sand, fine grained gravel m with concrete slabs/pieces.	nixed								
NDFILL (NO		35 -											
AWOOD LA	_			SILTY CLAY - Grey, moist, firm, high plasticity.									
VLOGS/ELI		4.0-						•••••			· · · · · · ·		
DESIGN/EN		4.5 -										· · · · · · · · ·	
/-15/[		5.0-	-	END OF TEST PIT AT 4.88 m.									
3-010			-	Note:									
CT SV2008/06		5.5 -	-	r. vvater entered into note at 2.74 m.									
P:\PROJE		6.0-	-										
NO GW ELEV		6.5 -											
(dI 2													
E LO	SAMPI	LE TYP	E										
VAPOURS	CONTI J	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR	APPRO	VEI		M		DATE	11/	20/08	

	<b>GS</b> OUP		SUMMARY LOG	). [ <b>P-2</b>	1			SH	EET 3	. of 1
CLIEI	NT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08	-107-15		
SITE LOCA	TION	Elmwoo 30.5 m	od Landfill east of TP-20	DATE UTM:	E DRI	LLED D83)	11. N 5.5	/4/2008 (29.009		
DRILI METH	LING 10D	Rubber	Tire Excavator Daewoo 180WV	0			Ë 63	7,482		
ELEV. (m)	DEPTH (m)	BRAPHICS	DESCRIPTION AND CLASSIFICATION	MPLE TYPE	NUMBER	FIELD Photo 2: FIELD	) HEAI bioniza 50 ) SOIL	DSPAC Ible Var 500 I TEST (	E TEST pours (j 750 PETRC	opm) ● 1000 □ □
				SA	;	Diese	I Fuel 00 2	( <b>ppm)</b>	30,00	C 40 00
			ORGANIC COVER							
-	0.5		<u>SILTY CLAY</u> - Brown, slightly moist, firm, low plasticity, silt pockets and roots visible.							
	1.0-		- Mixed with concrete slabs/pieces. No silt pockets and no visible roots below 0.91	m.						
_	1.5		SILTY CLAY - Brown, moist, firm, intermediate plasticity, some medium grained							
· · · · · · · · · · · · · · · · · · ·	2.0-		sand.							
	3.0-		- Dark grey, soft below 2.74 m.							
-	3.5		SU TY CLAY - Light brown moist soft high plasticity							
	4.0-									
_	4.5	-						·		
	5.0-	-	Note: 1. Water entered into test pit at 4.27 m.							
	5.5	- - - -			-					
	6.0-	-  -						• • • • • • • •		
	6.5	-								
SAMP	LE TYP	Έ						· · · · ·		
CONTI J	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR AI	PROVE	ED		I	DATE	11/2	)/08

	K	<b>GS</b> DUP		SUMMARY LOG	TP-	22					S	HEI	ET :	1 0:	f 1
	CLIEN	IT FOT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO				08-	107-1	5			
	PROJ SITE	ECT	Elmwoo	od Landfill	DA	TE D	RILL	.ED		11/-	4/200	8			
	LOCA	τιοΝ	30.5 m	east of TP-21	UT	Ms (N	AD	83)	N	5,5	28,99	1			
	DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV					E	637	,518				
	ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE	NOWBER	FIEL Phot FIEL Dies	-D F toio 250 	HEAD Iniza	DSPA ble V 500 TES1	CE 1 apoi 75	TEST urs ( 0 ETRC	<b>ppm</b> ) 1000	) ● )
								1	000	) 2	000	, 30¦0	00	4000	)
			<sup>1</sup> IIIIIIIIIIIIIIIIIIIIIIIIIIII 1IIIIIIII	ORGANIC COVER - Roots visible.											
		0.5 -		SILTY CLAY - Dark grey, dry, firm, low plasticity, with coarse grained sand.											
		1.0		SANDY SILTY CLAY - Beige, dry, firm, low plasticity, with coarse grained graned grane concrete slabs/pieces.	ravel,										
		1.5 -													
08).GPJ	_	2.0—		SILTY CLAY - Grey, slightly moist, medium soft, high plasticity.											
0 NOV 13, 20		2.5 -									·			· · · · · · · · · · · · · · · · · · ·	
ILL (NOV 3 T		3.0-		- Brown, firm below 3.05 m.			-								
VOOD LANDF		3.5 -					•								
/LOGS/ELMV		4.0-													
N/EN/	-	4.5 -		END OF TEST PIT AT 4 57 m											
107-15/DESIG		5.0-	- - - -	Note: 1. Water seeping in at 2.13 m.			•								
TS\2008\08-0		5.5 -													
P:\PROJEC		6.0-													
NO GW ELEV		6.5 -													
OR TP)			-												
OURS (FI	SAMPI CONTF	LE TYP	E R	INSPECTOR			h		1						
AP	J	& D P	ENNER	K. SINCLAIR	APPRO	VED	$\mathcal{V}_{-}$	K	4	_ [	DATE	· -	11/2	:0/08	

KC GRC	<b>SS</b>		SUMMARY LOG	HOLE NO. TP-23	3			SHI	SET 1	of 1
	т =ст	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB N	10.		08-	107-15		
SITE	207	Flmwor	od Landfill	DATE	DRI	LED	11/4	4/2008		
LOCAT	ΓΙΟΝ	30.5 m	east of TP-22		/NIA1	1021	N = = = "	00 070		
	MG			U T WIS		565)	E 637	,573		
METH	OD	Rubber	Tire Excavator Daewoo 180WV							
-EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	РLЕ ТҮРЕ	UMBER	FIELI Photo 2	D HEAD	SPACE ble Vap	TEST ours (p 750	<b>pm)</b>
Ξ	Đ	GF		SAN	z	FIELI Diese	2 SOIL 1 Fuel ( 100 - 21	TEST (I ppm) 000 3	PETRO 000 ⊿	F <b>LAG)</b> C
			ORGANIC COVER - Fibers/roots visible.							
1		- TIIII	SILTY CLAY - Grey, slightly moist, firm, high plasticity.							
	0.5									
	1.0-		- Light brown, soft below 0.91 m.							-
	15		- Dark brown, with light brown silt pockets below 1.22 m.							
	1.0									
	2.0-									
	2.5									
	30-		ORGANIC MATTER - Black, moist, low plasticity, crumbly. Fibrous roots	visible.		·····				
-			SILTY CLAY - Light brown, slightly moist, soft, high plasticity.							
	3.5									
	4.0-									
		-//////					• • • • • •			
	4.5						• • • • • •			
1			SILTY CLAY - Light brown, slightly moist, soft, low plasticity, crumbly.							
	5.0									
	5.0-									
-	5.5		SILTY CLAY - Brown, slightly moist, soft, high plasticity.							
	6.0-	-/////								
-		-	END OF TEST PIT AT 6.10 m.				• • • • • •		•	
	65	-				••••••	•			
	0.5					•		-		
		-								
SAMPL	– E TYP	Έ		I.		$\Lambda \Lambda$				<u> </u>
CONTR	ACTO	R	INSPECTOR	ΔΡΡΡΟΙΛΕΙ	D	hV	/ -	ATE	11/20	/08
J		LUNER	K. SINCLAIR	AFFRUVE		Y Y		AIE	11/20	/00

	K	<b>SS</b> DUP		SUMMARY LOG TP	-24	ŀ				SHE	ET 1	of 1
	CLIEN	IT ECT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	OB N	О.		0	8-107	-15		
	SITE		Elmwoo	D <b>d Landfil</b> l D	ATE	DRIL	LED	1	1/4/20	008		
	LOCA	τιοΝ	30.5 m (	east of TP-15 U	TMs	(NAE	083)	N 5	,528,9	37		
	DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV	_			EO	37,01	2		
	ELEV. (m)	(m) EPTH	IRAPHICS	DESCRIPTION AND CLASSIFICATION	MPLE TYPE	NUMBER	FIEL Phot	D HE	ADSP zable 500	ACE Vapo 7:	TEST burs (p	pm) ● 1000 
	ш		0		SA		Dies	el Fue	el (pp) 2000	<b>m)</b> 30	00 4	000
	_			ORGANIC MATTER - Roots visible.								
		0.5		FILL - Concrete pieces/slabs mixed with silty clay, light brown, moist, moderately firm, intermediate plasticity, with black organic matter pockets with visible fibrous roots.								
	-	1.0-		SILTY CLAY - Brown, slightly moist, firm, high plasticity.	1		<u></u>					
	_	1.5		<b><u>SILTY CLAY</u></b> - Dark grey, sightly moist, firm, low plasticity, with coarse grained sand and fine grained gravel.			••••••					· · · · · · · · · ·
3).GPJ		2.0-				-						
NOV 13, 200	-	2.5		ORGANIC MATTER - Black, slightly moist, moderately firm, intermediate plasticity, crumbly. Fibrous roots visible.								•   •• •• •• ••
LL (NOV 3 TO		3.0-		SILTY CLAY - Grey, moist, soft, nigh plasticity.		-						
00D LANDFI		3.5										
LOGS/ELMW		4.0-		- Light brown, slightly moist, firm below 3.96 m.		-						
DESIGN/ENV	_	4.5										
0107-15/L		5.0-	-	END OF TEST PIT AT 4.88 m.		-						
JECTS/2008/		5.5	-									
LEV P:\PRO,		6.0-	-			-						
TP) NO GW E		6.5	-									
(FOR	SAMPI	_ LE TYP	Έ				$\Lambda \Lambda$		•			
VAPOURS	CONTE J	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR APPRO	OVEI		Ŋ		DA1	ſΈ	11/20	/08

GRO	<b>SS</b> DUP		SUMMARY LOG	™. <b>TP-2</b> 5	5			SH	EET 1	. of 1
	IT ECT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB N	10.		08-	107-15		
SITE	201	Elmwoo	od Landfill	DATE	DRII	LLED	11/4	4/2008		
LOCA	τιον	30.5 m e	east of TP-24	UTMs	(NAI	D83)	N 5.52	28.914		
DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV		<b>(</b> , , , , , , , , , , , , , , , , , , ,		E 637	,664		
LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION	IPLE TYPE	UMBER	FIELD Photo 23	HEAD	SPACE	E TEST ours (j 750	opm) •
Ξ	D	19		SAN	z	Diese	0 SOIL I Fuel ( 00 21	TEST (I ppm) 000 3		FLAG) C 4000
		$\mathbf{P}$	ORGANIC MATTER - Roots visible.							
_	0.5		FILL - Coarse grained gravel, concrete slabs/pieces with silty clay, brown, slightl moist, moderately firm, high plasticity.	у						
	1.0-									
	1.5 -		- Wooden debris visible at 1.52 m.							
	2.0-		ORGANIC MATTER - Black, slightly moist, soft, low plasticity. Roots visible.							
	2.5		SILTY CLAY - Grey, slightly moist, firm, high plasticity.							
	3.0-									
	3.5 ·		- Brown below 3.66 m.							
	4.0-									
-	4.5 -									
	5.0-									
	5.5									
	6.0-	-								
	6.5 ·									
SAMPI	LE TYP	E				ΛΛ.	::::	]::::	:::	: : : : :
CONTI	RACTO & D P	R ENNER	INSPECTOR K. SINCLAIR	APPROVE	D	MPA	I	DATE	11/2	)/08

K	<b>SS</b> DUP		SUMMARY LOG	). [ <b>P-2</b>	6			SH	EET :	L of 1
CLIEN	IT For	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
SITE	ECI	Elmwoo	od Landfill	DATE	DRI	LED	11/4	/2008		
LOCA	τιον	30.5 ea	st of TP-25	UTMs	s (NAI	D83)	N 5,52	8,900		
DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV				E 637,	721		
LEV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	TYPE	UMBER	FIELE Photo 2:	HEAD	SPACE	E TEST ours ( 750	<b>ppm)</b> ● 1000
Ш	ä	5		SAM	z	FIELD Diese	SOIL	rest (1 ppm)		OFLAG) O
			ORGANIC COVER - Fibers visible.				00 20			4000
=			SILTY CLAY - Beige/tan, slightly moist, soft, intermediate plasticity	Г						
	0.5		FILL - Concrete with rebar, mixed with silty clay, grey, moist, firm, high plasticity.							
	1.0-									<u> </u>
						·••••	• • • • • •			
	15									
	1.5									
_	2.0-	-2000								
		in the second	ORGANIC MATTER - Black, slightly moist, soft, low plasticity. Roots visible.							
-	2.5		SILTY CLAY - Grey, firm, moist high plasticity.							
		<i>\     </i>								
	3.0-	-/////								
		<u> </u>					•••••••	- <u>-</u>		
	3.5									
		-9////	- Brown below 3.66 m.							
		-0////			ĺ					
	4.0-	-9////								
		-/////								
-	4.5		END OF TEST PIT AT 4 57 m				• • • • • •			
		-	Note:							
	5.0-	-	1. Water seeping into test pit at 2.13 m.							-
		-								
	5.5	-								
	6.0-	-								
		-								
	6.5	-								
	0.5	-								
		-								
SAMPI	∟ LE TYP	Έ	I		1	$\Lambda \Lambda$				•   • • • •
CONT	RACTO	R	INSPECTOR			(A)	1			A 10 C
J	& D F	ENNER	K. SINCLAIR AI	PPROVE	Ð	ľP	↓ D	ATE	11/2	0/08

K	<b>SS</b> DUP		SUMMARY LOG	HOLE NO. TP-2	27				5	SHEE	T 1	of 1
CLIEN PROJI	IT ECT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	B NC	<b>)</b> .		08	<b>-107-</b> 1	15		
SITE		Elmwoo	od Landfill	DAT	E D	DRII	LED	11	/4/200	8		
LOCA	τιον	30.5 ea	st of TP-26	UTN	/Is (I	NAI	D83)	N 5,	528,87	7		
DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV					E 03	07,783			
.LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION			UMBER	FIEL Phot 2	D HEA	DSPA able V 500	CE TI 750	EST rs (pp 10	<b>om)</b>
ш	D	U			SAR	2	Dies	E SON Fue	2000	) 300(	) 4(	LAG) (
			ORGANIC COVER - Fibers visible.									
-	0.5		FILL - Coarse grained gravel, pebbles and concrete.									
	0.5											
	1.0-											
	1.5											
	2.0-										<u> </u>	
-	2.5		ORGANIC MATTER - Black, slightly moist, soft, spongy, mosses and fil	bers visible.								
-			SILTY CLAY - Grey, wet, firm, high plasticity.				•				•	
	3.0-											
	2.5											
	3.5		- Rail ties uncovered at 3.66 m.		s	54 <b>0</b>	2.8					
	4.0-	-/////	- Brown below 3.96 m									
			- Brown Below 3.30 m.								•	
	4.5	-(////					•••••					
-	5.0-	_	END OF TEST PIT AT 4.88 m.			ſ						
		-	Note: 1. Soil sampled obtained at 3.66 m.									
	5.5	-										
	6.0-											
		-										
	6.5 -						•					
	_	-										
SAMPL	LE TYP	E	Grab from Bucket				A					
CONTR	ACTO	R ENNER	INSPECTOR K. SINCLAIR	APPROV	'ED		NV		DATE	8 1	1/20/	08

<b>K</b> GI	<b>GS</b> ROUP		HOLE	е NO. <b>ТР-</b>	28			SHEI	ET 1	of 1
CLI		CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO		08-107	-15		
SIT	DJECT E	Elmwoo	od Landfill	DA	TE D	RILLED	11/4/20	08		
LOC	CATION	30.5 no	rth of TP-26	UT	Ms (N	IAD83)	N 5,528,9 E 637,73	28 3		
DRI ME	LLING THOD	Rubber	Tire Excavator Daewoo 180WV							
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE	FIEL Phot FIEL Dies	D HEADSP oionizable 50 500 	ACE 1 Vapor 75 5T (PE n)	TEST urs (pp 0 10 ETROFI	m) ● 000 ∟ LAG) ○
			OPCANIC MATTER Eikora visible			10	00 2000	300	0 40	00
			<u>ORGANIC MATTER</u> - Fibers Visible.	r						
	0.5		FILL - Coarse grained gravel mixed with silty clay, light grey, firm, dry, low plas	/ sticity.						
										· · · · · · ·
	1.0-		SILTY CLAY - Grey, slightly moist, firm, intermediate plasticity.							
	1.5									
_	2.0-									
08).GP										
/ 13, 20	2.5 ·	-	END OF TEST PIT AT 2.44 m.							
TO NO		-	Note: 1. Encountered water at 2.13 m							
. E VON	3.0-	-								
DFILL (		-								
D LAN	3.5									
MWOC	4.0-	-								
DGS/EI							·····			
ENVIL	4.5	-								
DESIGN		-								
07-15\C	5.0-	-							<u> </u>	
8\08-01		-								
TSV200	5.5	-								
ROJEC	6.0-	-								
EV P:\P		-								
GW EL	6.5	-								
TP) NO		-								
SAN	↓ ∕IPLE TYP	E				 /	$\int$	:	:	
COJ COJ	NTRACTO	R	INSPECTOR K STNCLATP	APPRO	VED	(h)		E	11/20/	18
AN	JANF	THINGK	K. DINCHAIR		• 00	<u> </u>		<u>ь</u>	11/20/1	

GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-2	29		S	HEET	1 of 1
CLIE			WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	B NO.		08-107-1	5	
SITE	JECT	Elmwoo	od Landfill	DAT	e drii	LED	11/5/200	8	
LOC	ATION	North of	f TP-16	UTN	/Is (NA[	D83) N	5,529,11	3	
DRII MET	LLING THOD	Rubber	Tire Excavator Daewoo 180WV			C	037,270		
.EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE UMBER	FIELD I Photoio 250	HEADSPA onizable V 500	CE TES apours 750	<b>Г</b> (ppm) ● 1000
Ш	DE	GR			NAS	FIELD S	SOIL TEST Fuel (ppm)	(PETR)	OFLAG) 4000
	0.5 - 1.0- 1.5 -		SAND AND GRAVEL FILL - Grey to brown, damp, compact, well grade grained sand to coarse grained gravel, trace organics.	ed, fine					
13, 2008).GPJ	2.0-		- Trace concrete below 1.83 m.						
T (NOV 3 TO NOV	3.0		- Hard below 2.90 m.						
WOOD LANDFII	3.5 -		CLAY - Grey, damp, firm, high plasticity.						
ENVILOGS/ELM	4.0		END OF TEST PIT AT 3.96 m.				· · · · · · · · · · · · · · · · · · ·		
07-15/DESIGNIE	5.0-	- - - -							
JECTS/2008/08-01	5.5 -	-							
. TP) NO GW ELEV P:\PRO	6.0- 6.5 ·								
SAM	IPLE TYP	E	· · · · · · · · · · · · · · · · · · ·						
CON	ITRACTO	R ENNER	INSPECTOR A. OLEKSYN	APPRO	VED	LД	DATE	E <u>11</u> /	20/08

	<b>SS</b>		SUMMARY LOG	<b>P-</b> 3	30	)				S	HEE	r 1	of 1
	IT FCT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	3 N	О.			08-1	107-1	5		
SITE	EC /	Elmwoo	od Landfill	DAT	ſΕ	DRII	LED		11/5	5/200	8		
LOCA	τιον	North o	f TP-17	UTN	/Ic i	(ΝΔΓ	1831	N	5 52	0 00	2		
DRILL	ING OD	Rubber	Tire Excavator Daewoo 180WV	011	/15	(14/1	505)	Ē	637,	,328	,		
.(m)	TH (m)	VPHICS	DESCRIPTION AND CLASSIFICATION		LE TYPE	MBER	FIEL Phot	D Hi toior 250	EAD hizat	SPA ble V 00	CE TI apou 750	EST rs (pj 1	om) (
ELE	DEP	GRA			SAMP	NN	FIEL Dies	DSC el Fi	CIL Jel (	TEST ppm)	(PE		LAG)
			SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained sand to coarse grained gravel.								3000	<u>, 4</u>	
	0.5		- Trace wood, PVC pipe at 0.61 m.										
	1.0-	-	SILTY CLAY FILL - Grey to black, damp, soft, intermediate plasticity, trace organic matter.									•••••	
	1.5												
	2.0-												
	2.5									•••••			
	3.0-		- Asphalt chunks, trace wood, trace concrete below 3.05 m.										
	3.5 ·												
_	4.0-		END OF TEST PIT AT 4.27 m.										
	4.5	-	Note: 1. Water seeping into test pit at 0.61 m.						• • • • •				
	5.0-	-											
	5.5 -	-											
	6.0-	-				ĺ			•				
	6.5	-								•••••			
SAMPL	– E TYP	E					1	: : A	::	:::	: : :	:::	:::
CONTR	ACTO	R	INSPECTOR	PROV	/FT		AD)	1	n		1	1/20/	08

	K	<b>SS</b> DUP		SUMMARY LOG	<sup>NO.</sup> ТР-З	<b>8</b> 1	SHEET 1 of 1
	CLIEN	IT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.	08-107-15
	PROJI SITE	ECT	Elmwoo	od Landfill	DAT	E DRI	LLED 11/5/2008
	LOCA	τιον	North o	f TP-19	UTN	/Is (NA	D83) N 5,529,089
	DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV			E 63/,3//
	ΞV. (m)	(ш) НТ°	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE JMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 250 500 750 1000
	ELE	DEF	GR/			SAMF	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) O 1000 2000 3000 4000
ſ				SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained so to coarse grained gravel, organics.	and		
	-	0.5 -		SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete rebar, bricks belo	w		
		1.0-		0.01111.			
		1.5 -					
GPJ		2.0-					
13, 2008).(		2.5 -					
V 3 TO NOV		3.0-					
IDFILL (NO		25					
WOOD LAN		3.5 -					
SVELM	-	4.0-		SILTY CLAY - Brown, damp, stiff, high plasticity.			
ENVILOG	_	4.5 -	-	SILTY CLAY - Light brown, damp, soft, intermediate plasticity.			
SIGNE	_			SILTY CLAY - Brown, damp, stiff, high plasticity.			
7-15/DE	-	5.0-		END OF TEST PIT AT 4.88 m.			
108-010			-	Note: 1. Water seeping into test pit at 1.83 m.			
ECTS/2008		5.5	-				
V P:\PROJ		6.0-	-				
NO GW ELE		6.5	-				
R TP) N			-				
RS (FO	SAMPI	LE TYP	E				A-A.
APOUF	CONTI J	RACTO & D P	R PENNER	INSPECTOR A. OLEKSYN	APPROV	VED	DATE <u>11/20/08</u>

GI	<b>GS</b> ROUP		SUMMARY LOG	о. <b>ТР-3</b>	2			SHE	ET 1	of 1
CLI	IENT		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
PR( SIT	OJECT E	Elmwoo	od Landfill	DAT	e dri	LLED	11/5/	2008		
LO	CATION	North o	f TP-20	UTM	s (NA	D83)	N 5,529 E 637,4	),077 419		
DRI ME	ILLING THOD	Rubber	Tire Excavator Daewoo 180WV				_			
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		JMBER	FIELI Phote 2	D HEADS	SPACE le Vapo 0 7	<b>TEST</b> ours (pp 50 10	<b>0m)</b> ● 000
	5   B	GR		CAM		FIELI Diese	<b>SOIL T</b> I Fuel (p	EST (P pm) 0 30	ETROF	LAG) 000
	0.5		SILTY CLAY FILL - Brown to grey, damp, firm, high plasticity, trace brick, concret	te.						
	1.0-									
).GPJ	2.0-									
3 TO NOV 13, 2006	2.5		- Some wood and other organics below 2.44 m.							
d LANDFILL (NOV	3.5		SILTY CLAY - Brown, damp, stiff, friable, intermediate plasticity.							
VLOGS/ELMWOO	4.0-		SILTY CLAY - Brown, damp, firm, high plasticity, silt inclusions, trace oxidation.							
-15/DESIGN/ENV	4.5		- Dark brown, stiff, massive below 4.88 m.						· · · · · · · · · · · · · · · · · · ·	
001ECTS/2008/08-0107	5.5		END OF TEST PIT AT 5.03 m.							
P) NO GW ELEV P:/PF	6.5									
SAN	⊥_ MPLE TYP	1 E						::::		
VAPOURS COJ	NTRACTO J&DI	R ENNER	INSPECTOR A. OLEKSYN A	APPROV.	ED V	M	D/	<b>A</b> TE	11/20/	08

GRO	<b>GS</b> DUP		HOLE N	™. TP-3	3			SHI	SET 1	. of 1
CLIEN	NT	ΟΙΤΥ ΟΙ	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
PROJI SITE	ECT	Elmwoo	od Landfill	DAT	E DRI	LLED	11/5/	/2008		
DRILL	LING	Rubber	Tire Excavator Daewoo 180WV	UTM	ls (NA	D83) 1	N 5,529 E 637,4	9,075 485		
METH (E)	ED (E)	S		HVBE		FIELD Photo	HEADS	SPACE le Vap	TEST	opm) ●
ELEV.	DEPTH	GRAPH	DESCRIPTION AND CLASSIFICATION		NUMB	25 FIELD Diesel	50 50 SOIL T Fuel (p	)0 7 EST (F opm)	250 PETRO	1000 
	0.5 -		SILTY CLAY FILL - Brown to grey, damp, soft to firm, intermediate plasticity, trac brick, concrete, organics.	ce						
	1.0 <i>-</i> -		- Large chunk of concrete and rebar below 1.52 m.							
	2.0									
	3.0		- Wood below 2.74 m. SILTY CLAY - Grey, damp, firm, high plasticity.							
_	3.5 -		<u>SILT</u> - Grey, moist, soft, intermediate plasticity, oxidation.							
	4.0						·····			
	5.0-		SILTY CLAY - Brown, damp, stiff, high plasticity, trace silt inclusions, trace oxidation.			·····	· · · · ·	·····		· · · · · · · · · · · · · ·
	5.5 -	-	END OF TEST PIT AT 5.18 m.							
	6.0-	- - - - - - - - - - - -								
SAMPI CONTF J a	LE TYPI RACTO & D P	E R ENNER	INSPECTOR A. OLEKSYN	APPROV	ED J	A		ATE		)/08

<b>K</b> GR	<b>SS</b> DUP		SUMMARY LOG	е NO. <b>ТР-3</b>	<b>34</b>				_			SHE	CET	1	of 1
CLIEN	π	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO	).				08-	107-	15			
PROJI SITE	ECT	Elmwoo	od Landfill	DAT	ΈD	RIL	LE	5		11/	5/20	08			
LOCA	TION	North o	of TP-22	UTM	1s (N	NAE	983)		N	5,52 637	29,0 ',54(	72 )			
DRILL METH	ING OD	Rubber	Tire Excavator Daewoo 180WV											_	
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION			IMBER	Fi Pł	ELE noto 2:	D HE	EAD nizal 5	DSP/ ble \ 500	ACE Vapo 7	TES ours	T (ppr 10	<b>m)</b>
Ц	DE	GR				ž	FI Di	ELE ese	0 SC 1 Ft 00	DIL Jel (	TES (ppn 000	6T (F n) 3(	PETR		. <b>AG</b> ) C
	0.5 -		TOPSOIL SILTY CLAY FILL - Brown, damp, firm, intermediate plasticity, wood bricks.												
	1.0 1.5 -														
	2.0-					ſ									
	2.5 -		Concrete at 2.74 m						•••••						
	3.0-														
	3.5 -														
-	4.0		SILTY CLAY - Brown, damp, firm, high plasticity, trace silt inclusions, slight oxidation.												
-	4.5 -		- Stiff below 4.27 m.												
	5.0	-	Note: 1. Water entering into test pit at 2.74 m.			-									
	5.5 -	-													
	6.0—	-				-									
	6.5 -														
SAMPL	- E TYPI	-[] E					:: /		::	::		::		:	
CONTR	ACTO	R	INSPECTOR	APPROV	ED		ħ.	ĥ	ŋ	n	)дТ	E	11/2	20/0	8

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-3:	5	SHEET 1 of 1
CLIE	NT	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.	08-107-15
PRO. SITE	JECT	Elmwoo	d Landfill	DATE	DRI	LLED 11/5/2008
LOCA	ATION	Norh of	TP-23	UTMs	(NAI	D83) N 5,529,035 E 637,585
DRIL Meti	LING HOD	Rubber	Tire Excavator Daewoo 180WV			
:V. (m)	TH (m)	VPHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	MBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000
	DEP	GR⊅		SAMP	Ν	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm)
NPROJECTS/2008/08-0107-15/DESIGN/ENV/LOGS/ELMW00D LANDFILL (NOV 3 TO NOV 13, 2008) GPJ	0.5 - 1.0- 1.5 - 2.0- 2.5 - 3.0- - 3.5 - - 4.0- - 4.5 - 5.0- 5.5 - 6.0-		SILT: OLERT FILE       Driver to grey, damp, don, methodiate plasticity, organics, concrete and rebar.         SILT: - Brown, moist, soft, intermediate plasticity.         SILTY CLAY         - Brown, damp, firm, high plasticity, trace silt inclusions.         END OF TEST PIT AT 4.57 m.         Note:         1. Water entering test pit at 0.61 m.			
TP) NO GW ELEV	6.5					
SAM	L PLE TYP	E				
APOUR SUOD	TRACTO	R ENNER	INSPECTOR A. OLEKSYN	APPROVI	ED /	DATE 11/20/08

	K	<b>GS</b> DUP		SUMMARY LOG	IOLE NO. TP-	36					SH	EET	1 0	of 1
		IT FOT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOI	B N(	Э.		0	8-10	7-15			
	SITE	ECI	Elmwoo	od Landfill	DA	те (	DRIL	LED	1	1/5/2	2008			
1	LOCA	TION	North o	f TP-24	UTI	Ms (	NAE	083)	N 5	529	,014			
L	DRILL METH	.ING IOD	Rubber	Tire Excavator Daewoo 180WV					E 0.	57,0	39			
	ΞV. (m)	отн (m)	APHICS	DESCRIPTION AND CLASSIFICATION		LE TYPE	MBER	FIEL Phot 2	D HEA oioniz	ADS able 500	PACE e Vap	E TES ours 750	T (ppr 100	<b>n) ●</b> 00
	ELE	DEF	GR/			SAMF	Z	FIEL Dies	D SOI el Fue	L TE	EST (l pm)	PETR	OFL	AG) O
-				SILTY CLAY FILL - Brown to grey, damp, firm, intermediate plasticity, tra	ce			10	000	200	0 3	000	400	)0 ::::::
		0.5		organics, concrete and rebar, brick.										
		1.0-												
		1.5												
().GPJ		2.0-					ĺ							
13, 2006		2.5												
NOV 3 10 P		3.0-					ĺ							
	-			- Wood at 3.20 m.										
		3.5		<u>one ri olem</u> - brown, damp, sun, blocky, intermediate plasticity.										
-OG9/ELINIV		4.0-												
O IGNIEIN VI	_	4.5		SILTY CLAY - Brown, damp, firm, high plasticity, trace silt inclusions.						• • •				
	-	5.0-	-	END OF TEST PIT AT 4.88 m.						:			::	<u></u>
000000-0101		5.5	-	Note: 1. Water entering test pit at 0.61 m.										
KUJELISK		6.0-	-											
		0.0	-											
IF) NU GW		6.5	-											
LUK S	SAMPI	∟ LE TYP	'E						1 · · <u>·</u>	•			•••	<u></u>
	CONTI	RACTC & D I	R ENNER	INSPECTOR A. OLEKSYN	APPRO	VEE		M	r	DA	TE	11/	20/0	8

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	OLE NO. TP-	37				SHE	ET 1	of 1
CLIE	NT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOI	BNC	).		08-1	07-15		
PRO. SITE	JECT	Elmwoo	od Landfill	DA	TED	RIL	LED	11/5	/2008		
LOCA	ATION	North o	f TP-25	UTI	Ms (	NAE	083) <b>h</b>	5,52	8,991 696		
DRIL	LING HOD	Rubber	Tire Excavator Daewoo 180WV				ſ	- 037,	090		
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE	NUMBER	FIELD Photo 25 FIELD Diese	HEAD ionizat 0 5 SOIL <sup>-</sup> Fuel (	SPACE ble Vapo 00 7 FEST (P ppm)	TEST purs (pj 50 1 ETROF	om) 0000 ⊥ ELAG) 0000
			SILTY CLAY FILL - Black, damp, firm, intermediate plasticity, high organic	c content.							
			- Brown below 0.30 m.		Í						
	0.5		- Grey below 0.61 m.								
	1.0-							<u></u>			
	1.5										
CH9.	2.0-										
ROOZ 'S	25										
	2.0		Wood at 2.74 m								
21 8 20	3.0-		- wood at 2.74 m.								
	_										
	3.5		SILTY CLAY - Dark brown, damp, sun, nigh plasticity.								
	4.0-										
	4.5	-/////									
ESIGN											
UICT-70	5.0-	-	END OF TEST PIT AT 4.88 m.								
8/08-01		-									
	5.5	-									
KOJEC	6.0-	-									
	5.0	-									
	6.5	-							·····		
ON (1		-									
SAM	∟∟ PLE TYP	Έ					$\Lambda$				
CONT	FRACTO	R	INSPECTOR	ልፆፆ₽₢∩	VFL	)			ATF	11/20	/08

	K( GR(	<b>SS</b> DUP		SUMMARY LOG	LE NO. <b>TP-3</b>	8		SHI	ET 1 c	of 1
	CLIEN	π	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-107-15		
	PROJI SITE	ЕСТ	Elmwoo	od Landfill	DAT	e dri	LLED	11/5/2008		
	LOCA	TION			UTM	ls (NA	D83) N E	5,528,973 637,745		
	DRILL METH	ING IOD	Excavat	tor - Komatsu WB146			_	,		
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		JMBER	FIELD H Photoio 250	EADSPACE nizable Vap	<b>TEST</b> ours (ppn 750 100	<b>n)</b> ●
	ELE	DEF	GRI				FIELD S Diesel F	OIL TEST (F uel (ppm) 2000 3	<b>PETROFL</b>	AG) 0
		0.5 -		SILTY CLAY FILL - Brown to grey, damp, firm, intermediate plasticity, trace organics, concrete bricks.						
	-	1.0-		SILT - Light brown, wet, soft, intermediate plasticity.						
	_			SILTY CLAY - Brown, damp, firm, intermediate plasticity, organics.						
		1.5 -								
008).GPJ		2.0—								
TO NOV 13, 2		2.5 -								
NOV 3	_	3.0-		SILTY CLAY - Grey to black, damp, soft, high plasticity, high organic conten	nt.					
OD LANDFILL		3.5 -								
GS/ELMWC		4.0		- Dark brown, firm below 3.96 m.						
GN/EN//TC	_	4.5 -		END OF TEST PIT AT 4.57 m.						****
0107-15\DESI		5.0-	-							
CTS\2008\08-		5.5 -	-							
P:\PROJE(		6.0	-							
TP) NO GW ELEV		6.5 -	- - - - -							
S (FOR	SAMPI	LE TYP	E				ANA			
APOUR	CONTI J	RACTO	R ENNER	INSPECTOR A. OLEKSYN	APPROV	'ED	MA	DATE	11/20/0	8

GRO	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. <b>TP-39</b>				SHE	ET 1	of 1
	IT FCT		WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	D.		08-	107-15		
SITE	EUI	Elmwoo	od Landfill	DATE D	RIL	LED	11/	6/2008		
LOCA	TION	North o	f TP-27	UTMs (	NAD	83)	N 5,5 E 637	28,956 7,793		
DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146							
LEV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION	ИРЦЕ ТҮРЕ	IUMBER	FIELI Photo 2	D HEAE	SPACE ble Vapo 500 7	TEST	om) ● 000
ш	ā	ס		SAN	2		Fuel (	(ppm) 000 30	00 4	
	0.5 -		SILTY CLAY FILL - Brown, dry, firm, intermediate plasticity, trace or	ganics.						
	1.0-		- Grey below 1.22 m.					· · · · · · · · · · · · · · · · · · ·		
2 IS	2.0-		SILTY CLAY - Grey, damp, soft, low plasticity.		- - -			· · · · · · · · · · · · · · · · · · ·		
	3.0		<u>SILT</u> - Brown, damp, soft, low plasticity.		- -			· · · · · · · · · · · · · · · · · · ·		
	4.0-		SILTY CLAY - Grey, damp, firm, high plasticity.							
	4.5 -	-	END OF TEST PH AT 4.27 M.							
	5.5 -	- - - - -			.					
) ) ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	6.0-				-					
	6.5									
SAMPI	LE TYP RACTO & D P	E R ENNER	INSPECTOR A. OLEKSYN	APPROVED	, [	Ð	I	DATE	11/20/	08

GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. <b>TP-4</b>	10			SHE	ET 1	of 1
CLIE PRO	NT JECT	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	NO.		08-1	07-15		
SITE		Elmwoo	od Landfill	DAT	E DR	LLED	11/6	/2008		
LOCA	ATION	North o	f TP-27	UTN	As (NA	.D83) 🏌	N 5,52	8,912		
DRIL METI	LING HOD	Excavat	tor - Komatsu WB146			E	= 037,	/00		
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		SAMPLE TYPE NUMBER	FIELD Photo 25 FIELD Diesel	HEADS ionizab 0 5( SOIL T Fuel (p	SPACE le Vapo 007: EST (Pl	TEST purs (pp 50 10 ETROF	m) ● )00 ⊥ LAG)
					· •	100	0 20	0030	00 <u>4</u> 0	00
	0.5 -		<u>SILTY CLAY FILL</u> - Grey, damp, soft, high plasticity.							
8).GPJ	1.5 - 2.0-		- Brown, dry, firm, intermediate plasticity, concrete chunks below 1.22 m	1.						
LL (NOV 3 TO NOV 13, 200	2.5 -		SILTY CLAY - Grey to black, moist, soft, high plasticity, very high organi (old roots and bull rushes).	ic content						
DGS/ELMWOOD LANDFI	3.5 -		- Grey, damp, firm below 3.66 m.							
07-15\DESIGNENVIL	4.5 -		END OF TEST PIT AT 4.27 m.							
J.ECTS/2008/08-010	5.5 -									
TP) NO GW ELEV P:IPRC	6.0-									
SAMP	 PLE TYP	E				11	)			
J CONT	FRACTO & D P	R <b>enner</b>	INSPECTOR A. OLEKSYN	APPROV	/ED	M	1 D	ATE	11/20/0	08

K	<b>SS</b>		SUMMARY LOG	тр-4	1			SHE	ET 1	of
CLIEN	IT		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		_
PROJ	ECT			DATE	יוסס		11/6	2000		
SITE		Elmwoo	od Landfill	DATE	: DRII	LLED	11/6/	2008		
LOCA	TION	North o	f TP-25	UTMs	(NAI	D83) N E	5,52 637,0	8,953 684		
DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146			I				
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	PLE TYPE	JMBER	FIELD Photoi 25	HEADS onizab	SPACE le Vapo 0 7	<b>TEST</b> ours (p) 50 1	<b>pm)</b> 000
Ц	DE	GR		SAM	ĩ	FIELD Diesel	SOIL T Fuel (p	EST (F ppm)	ETROF	
			SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organics.			100	0 20	00 30	00 4	000
	0.5		- Grey below 0.61 m.							
	1.0-									
-	1.5		SILTY CLAY - Grey to black, damp, soft, high plasticity, very high organic cor	ntent.						
_	2.0-		SILTY CLAV Light brown, damp, soft intermediate plasticity							
	3.0-		<u>Site i olent</u> - Light brown, damp, solt, intermediate plasticity.							
_	3.5 -		SILTY CLAY - Dark brown, moist, soft, high plasticity, very high organic conte	ent.						
	4.0-		- Laminated silt layers below 3.96 m.							
_	4.5 ·									
	5.0-		END OF TEST PIT AT 4.57 m.							
	5.5 -	-								
	6.0-									
	6.5 -	-								
	_	-								
AMPI	LE TYP	E				M	ŀ			
CONTR		R	INSPECTOR	APPROVE	D	In h V	D	ATE	11/20	/08

GRO	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-42	2			SHE	ET 1	of 1
CLIEN	NT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	10.		08-1	107-15		
PROJ SITE LOCA	ECT	Elmwoo North o	od Landfill f TP-24	DATE		LED 083)	11/6 N 5,52	5/2008 28,961		
DRILL	LING IOD	Excavat	tor - Komatsu WB146			E	E 637,	,622		
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD Photo 25 FIELD Diese	HEAD ionizat 50 5 SOIL	SPACE ble Vapo 00 7 I TEST (P ppm)	TEST purs (pp 50 10 ETROF	om) ● 000 ⊥ LAG) 000
	0.5 -		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete chur	iks, brick.			00 20	00 30	000 40	000
2000, 91-9	1.5 - 2.0-		- Grey below 1.22 m.							
	2.5 - 3.0-		SILTY CLAY - Grey to black, damp, soft, high plasticity, very high org	ganic content.						
	3.5 - 4.0-		- Brown, stiff, massive, trace silt inclusions below 3.66 m.							
	4.5 - 5.0-		END OF TEST PIT AT 4.27 m. Note: 1. Water entering into test pit at 3.35 m.							
	5.5 -	- - - - - - - -								
	6.0				-					
SAMPI CONTH	LE TYP RACTO	E R ENNER	INSPECTOR A. OLEKSYN	APPROVE	D	N)	D	ATE	11/20/0	08

	K GR	<b>SS</b> DUP		SUMMARY LOG	OLE NO. <b>TP-</b>	43			SHE	ET 1	of 1
	CLIEN	ΙΤ	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.		08-10	07-15		
	PROJI SITE	ECT	Elmwoo	od Landfill	DA	TE DRI	LLED	11/6/	2008		
	LOCA	τιον	Northea	ast of TP-29	UT	Ms (NA	D83) N	5,529 637,2	0,152 294		
	DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146			_				
	ELEV. (m)	DEPTH (m)	BRAPHICS	DESCRIPTION AND CLASSIFICATION		MPLE TYPE NUMBER	FIELD Photoi 250 FIELD	HEADS onizabl 0 50 SOIL T	PACE le Vapo 0 7: EST (Pl	TEST urs (pp 50 10 ETROFI	m) ● 1000 ∟
		5				SA	Diesel	Fuel (p	<b>pm)</b> 00 30	00 40	00
		0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete chunks, b	prick.						
		1.0-		- Light brown below 0.61 m.						• • • • • • • •	
		1.5		- Grey, soft, trace organic matter below 1.52 m.			· · · · · · · · · · · · · · · · · · ·				
2008).GPJ		2.0-		- Grey to black, firm, very high organic content below 2.13 m.							
3 TO NOV 13, 3	_	2.5		SILTY CLAY - Grey, damp, soft, high plasticity.							
FILL (NOV 3		3.0-									
WOOD LAND		3.5									
ENVLOGS/ELM		4.0- 4.5		- Brown below 4.27 m.							
0107-15/DESIGN		5.0-		Firm bolow 5.18 m							
TS\2008\08-0	_	5.5		END OF TEST PIT AT 5.49 m.							
V P:\PROJEC		6.0-									
TP) NO GW ELEV		6.5						· · · · · · · · · · · · · · · · · · ·			
RS (FOR	SAMP	LE TYI	PE				Ali				
APOUF	CONT J	RACTO	)R p <b>enner</b>	INSPECTOR A. OLEKSYN	APPRO	VED		K D	ATE	11/20/	08

GF	<b>GS</b> <b>ROUP</b>		BUMMARY LOG	DLE NO. <b>TP-44</b>			\$	SHEE!	C 1 -	of 1
CLI	ΕΝΤ	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	D.		08-107-	15		
PRC SIT	DJECT E	Elmwoo	od Landfill	DATE I	ORILLE	Đ	11/6/200	8		
LOC	ATION	North o	f TP-30	UTMs (	NAD83	3) N E	5,529,14 637,345	40		
DRI ME'	LLING THOD	Excava	tor - Komatsu WB146					_		
EV. (m)	отн (m)	APHICS	DESCRIPTION AND CLASSIFICATION	PLE TYPE	MBER H	FIELD H Photoio 250	EADSPA nizable \ 500	ACE TE /apour 750	<b>ST</b> rs (pp) 10	<b>m)</b> ● 00
ELE	DEF	GR/		SAMF		FIELD S Diesel F 10,00	OIL TES uel (ppn 2000	T (PET I) 30,00	<b>ROFL</b>	<b>AG)</b> 00
			SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matter, t brick.	trace						
	0.5		- Brown below 0.61 m.							
	-		SILTY CLAY - Grey, damp, firm, high plasticity.							
	1.5									
008).GPJ	2.0-									
TO NOV 13, 2	2.5		- Black, soft, very high organic content below 2.44 m.							
FILL (NOV 3	3.0-		- Grey, moist below 3.05 m.							
NOOD LAND	3.5									
VLOGSVELM	4.0		- Brown, damp, firm, trace silt inclusions, trace oxidation below 3.96 m.							
SIDESIGNIEN	4.5	<u>())/////</u> - - -	END OF TEST PIT AT 4.57 m.							
38/08-0107-15	5.0	-								
(0)ECTS/200	5.5									
V ELEV P:\PR	6.0	-								
R TP) NO GV	6.5	-								
SAN	MPLE TY	PE	· · · · · · · · · · · · · · · · · · ·			$\sqrt{h}$				
IND COL	NTRACT( J&D	)R penner	INSPECTOR A. OLEKSYN	APPROVEI	<u> </u>	VF.	DAT	E _	1/20/0	)8
K	<b>GS</b> DUP		SUMMARY LOG	10. <b>TP-</b> 4	45			SH	EET	1 of 1
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CLIEN	IT ECT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	3 NO.		08-1	107-15		
SITE		Elmwoo	od Landfill	DA	re dr	ILLED	11/6	5/2008		
LOCA	TION	North o	f TP-31	UTI	/Is (NA	D83)	N 5,52	29,120		
DRILL METH	.ING IOD	Excava	tor - Komatsu WB146					,071		
EV. (m)	РТН (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE JMBER	FIELD Photo 2:	D HEAD Dionizal	SPAC ble Vap 00	E TEST pours ( 750	<b>ppm)</b> ●
E	DE	GR			SAMF	FIELD	SOIL	TEST ( ppm)	PETRO	OFLAG)
		-///	CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, brick, concr	rete.	-		00 20	00 3	3000	4000
	0.5									
	1.0-									
_	1.5		SILTY CLAY - Dark grey to black, damp, soft, high plasticity, organic matter prese	ent.						
	2.0-									
1	2.5									
	3.0-									
	3.5									
	4.0-		- Brown, damp, stiff, trace silt inclusions below 3.96 m.							
-	4.5		END OF TEST PIT AT 4 57 m			·····	•••••			· · · · · · · · · · ·
	5.0-	-								
	5.5	-								
	6.0-	-								
	6.5									
SAMPI	 LE TYP	Ē					::::	::::	:::	:   : : : :
CONTR	RACTO	R ENNER	INSPECTOR A. OLEKSYN A	APPROV	/ED	M	1_ D	ATE	11/2	0/08

	K	<b>GS</b> DUP		SUMMARY LOG	<sup>NO.</sup> <b>TP-46</b>					SHI	SET (	L of 1
		NT FCT		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	D.		0	8-10	7-15		
	SITE	EUI	Elmwoo	od Landfill	DATE D	DRILI	LED	1	1/6/2	2008		
	LOCA	τιον	Northea	ast of TP-32	UTMs (	NAD	83)	N 5	,529	,108		
	DRILL METH	.ING IOD	Excava	tor - Komatsu WB146				E 6	37,4	46		
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	РLЕ ТҮРЕ	JMBER	FIELI Phote 2	D HE	ADS zable 50	PACE e Vap	<b>TEST</b> ours ( 750	ppm) ● 1000
	EL	DE	GR		SAMI	Ñ	FIELI Diese	D SO el Fue	IL TE el (pj 200	EST (F pm) 0 3	PETRC	0 <b>FLAG)</b> 0 4000
F			- 7. 7. 7. 7. 0. 0. 0. 0. 0.	TOPSOIL -					200			
			- 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5									
	-	0.5 -		SILTY CLAY - Brown damn firm high plasticity trace oxidation trace organics								
			- Willi	rebar.	',							
		1.0-	-/////			F						
				- Concrete and bricks at 1.22 m.								
		1.5 -	-0////	- Dark brown below 1.52 m.								
			<u>UNN</u>	Some coarse gravel at 1.83 m. Water trickling through gravel								
L d S		2.0-		- Some coalse graver at 1.05 m. vvater theking through graver.		F	<u></u>	::		<u></u> 		
008).(			<i>UIII</i>			ŀ						
/ 13, 2		2.5 -										
ÓN O			-9777									
N 3 T		3.0-				-						
IL (NC			-9////	- Grey to black, soft, very high organic content below 3.05 m.								
		3.5 -		SILT - Brown, moist, soft, low plasticity.								
ODL			-									
MMO	-	4.0-		SILTY CLAY - Brown damp stiff high plasticity			<u> </u>			<u> </u>		
CGS/E				Serry Storn, damp, our, ngh photoky.								
NVLC		45-	<u> IIIII</u>									
IGN/E	-	1.5	-	END OF TEST PIT AT 4.57 m.					•••			
PIDES		5.0	-						•••••			
1-7010		5.0-	-									
8/08-0			-									
S/200		5.5 -										
OJECI			-									
P:/PR(		6.0-	-									
ELEV			-									
GW		6.5	-									
DN (d			-									
FOR	SAMP	L. Le tvp	F					]::	::	::::	:::	:   : : : :
DURS (	CONTI	RACTO	R	INSPECTOR	_	1	Kil	1				
VAPC	J	& D P	ENNER	A. OLEKSYN	APPROVED		Ψ	r 	DA	ΛTE	11/2	0/08

	K	<b>GS</b> DUP		SUMMARY LOG	<sup>10.</sup> TP-4	17			SH	EET	1 of 1
		NT FOT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
	SITE	EGI	Elmwoo	od Landfill	DAT	E DRI	LLED	11/6	/2008		
	LOCA	τιον	North o	f TP-33	UTN	ls (NA	D83)	N 5,52	9,101		
	DRILL METH	.ING IOD	Excava	tor - Komatsu WB146				E 637,	507		
	EV. (m)	(m) HTc	APHICS	DESCRIPTION AND CLASSIFICATION		LE LYPE IMBER	FIELD Photo 2:	D HEAD	SPAC le Var	E TES	T (ppm) ● 1000
	ELI	DEI	GR/			NU	FIELD Diese	) SOIL 1 I Fuel ()	EST ( ppm)	PETR	OFLAG)
-			- <u> </u>				10	00 20	00 3	3000	4000
		0.5 -	<ul> <li>- 25 25 25 25</li> <li>- 55 25 25 25 25</li> <li>- 55 25 25 25</li> <li>- 75 27 25 25</li> <li>- 75 27 25 25</li> <li>- 75 27 56 25</li> </ul>								
	-			SILTY CLAY - Light brown, damp, firm, high plasticity, trace organics.				· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·		
		1.0-									
		1.5 -						• • • • • • • • •			
				- Grey, trace wood, wire, concrete, brick, trace coarse grained gravel below 1.83	m.						
008).GPJ		2.0-									
NOV 13, 2		2.5 -						••••••••			
NOV 3 TO		3.0-						· · · · · · · · · · · · · · · · · · ·			
) LANDFILL (	_	3.5 -		SILTY CLAY - Light brown, damp, firm, intermediate plasticity, trace oxidation.							
SVELMWOOI		4.0-									
ENVLOGS	-	4.5 •		SILTY CLAY - Dark brown, damp, stiff, high plasticity, trace silt inclusions.					•••••		
DESIGN	_		-/////								
-0107-15\L		5.0-	-	END OF TEST PIT AT 4.88 m.							
SV2008/08		5.5 -									
PROJECT		6.0-	-								
W ELEV P:		6.5	-				· · · · · · · · · · · · · · · · · · ·				
TP) NO G			-								
S (FOR	SAMPI	LE TYP	E	·			of h			•   • •	[
APOUR	CONTI S	RACTO & D P	R ENNER	INSPECTOR A. OLEKSYN	APPROV	ED	N/A	D	ATE	11/	20/08

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	о. <b>ГР-4</b>	8			SHE	ET 1	of 1
CLIE	NT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-10	7-15		
PRO. SITE	JECT	Elmwoo	od Landfill	DATE	DRII	LED	11/7/2	008		
LOCA	ATION			UTMs	s (NAI	083) N	5,529, 637,5	092 60		
DRIL	LING HOD	Excavat	tor - Komatsu WB146				_			
EV. (m)	TH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	MBER	FIELD Photoi 25(	HEADS onizable ) 50(	PACE	TEST urs (pr 50 10	om) ● 000
ELE	DEF	GRI		SAMF	NN	FIELD Diesel	SOIL TE Fuel (pp 0 200	EST (Pl om) 0 30	ETROF	LAG) 000
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace brick, concrete and wire.							
	1.5		- Trace fine to coarse grained gravel below 1.22 m.							
008).GPJ	2.0-		- Grey below 1.83 m.							
TO NOV 13, 2	2.5								· · · · · · · · · · · · · · · · · · ·	
DFILL (NOV 3	3.0-		SILTY CLAY - Black, moist, soft, high plasticity, very high organic content.							
MWOOD LAN	3.5		- Light brown, damp, firm, oxidized below 3.66 m.							
ENVLOGS/EL	4.5		- Brown below 4.27 m.						• • • • • • • • •	
SIGN	]	-	END OF TEST PIT AT 4.57 m.			······································				
8-0107-15\DE	5.0-	- - -								
JECTS/2008/0	5.5	-								
LEV P. PRO.	6.0-	-								
TP) NO GW E	6.5	-								
SAMP	⊥⊥ PLE TYP	'E				$\Lambda$		::		
CONI CONI	TRACTC	R PENNER	INSPECTOR A. OLEKSYN A	APPROVE	ED	NPA	DA	TE	11/20/	08

	K	<b>GS</b> DUP		HOLE SUMMARY LOG	NO. <b>TP-</b>	49				SI	IEET	1	of 1
	CLIEN	VT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	BN	D.		08-	107-15	;		
	PROJI SITE	ECT	Elmwoo	od Landfill	DA	TEI	DRII	LED	11/	7/2008			
	LOCA	TION	Northea	ast of TP-35	UT	Ms (	NAI	083)	N 5,5	29,062			
	DRILL METH	LING IOD	Excava	tor - Komatsu WB146					E 637	,614			
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	JMBER	FIELD Photo 2:	D HEAD	DSPAC	E TES pours 750	ST 5 (ppi 10	<b>n)</b> ● 00
	EL	DEI	GR			SAM	ľ	FIELD Diese	SOIL Fuel	TEST (ppm)		ROFL	AG) 0
$\left  \right $				SILTY CLAY FILL - Brown, moist, firm, intermediate plasticity, concrete, rebar,	some				00 2		3000	40	
				sand and gravel. Water trickled through sand and gravel.									
		0.5		- Light brown, damo, soft, high plasticity, trace organic matter below 0.61 m.									
										·		• • • •	
	_	1.0-											
		1.5		SILTY CLAY - Grey, damp, firm, high plasticity, trace organic matter.						•			
		1.0	-9////										
2		2.0-											
19).61													
13, 21		2.5	-9////										
									• • • • •				
2 2 2		3.0-											
		3.5								-			
			-/////										
		4.0-	-9////							,			
NAIFOL		4.5		- Black, moist, soft, very high organic content/peat below 4.27 m.									
ופואפו		5		- Brown, damp, firm, oxidation below 4.57 m.					• • • • • •				
-Torner	_	5.0-	_ <u>_///////</u>	END OF TEST PIT AT 4.88 m.									
-/010-0			-										
		5.5	_										
ECIS			-										
UNHU.		6.0-	-										
			-							·   · } · › · › · › · · · · · · · · · · · · · ·			
C GW		6.5	-										
N (AL )			-										
S (FUF	SAMPI	LE TYI	PE			_		Ali	)				
NOO A	CONTI	RACTO	)R PENNEP	INSPECTOR A. OLEKSYN	APPRO	VEI	)	#		DATE	11	/20/0	8
A	0	נעצ	- GININER					v jA	<u> </u>			20/0	

	K	<b>GS</b> DUP		SUMMARY LOG	о. ГР-5	50		SHE	ET 1	of 1
	CLIEN	IT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.	08	-107-15		
	PROJ SITE	ECT	Elmwoo	od Landfill	DAT	e dri	LLED 11	/7/2008		
	LOCA	τιον	Northea	ast of TP-36	UTN	ls (NA	D83) N 5,5 E 63	529,043 7,673		
	DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146						
	-EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		IPLE TYPE UMBER	FIELD HEA Photoioniza 250	DSPACE able Vapo 500 7	<b>TEST</b> <b>burs (pp</b> 50 10	<b>om)</b> •
	Ш	DE	В			N N	FIELD SOIL Diesel Fuel 1000	. TEST (P (ppm) 2000 30	<u>)00 40</u>	LAG) 0
ſ				SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete.						
	-	0.5	-988	SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained sar to coarse grained gravel.	nd /					
				SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete, plastic.						
		1.0-								
		1.5								
_		2.0-								
008).GF										
V 13, 2		2.5								
3 TO NC				- Grey to black, soft, very high organic content, reeds, peats below 2.74 m.					•••••••••••••••••••••••••••••••••••••••	
NON)		3.0-								
ANDFILI	-	3.5		SILTY CLAY - Brown, damp, firm, high plasticity, oxidation.						
1000 L/										
S/ELMV		4.0-								
INLOG										
SIGNEN	-	4.5	- <u>                                    </u>	END OF TEST PIT AT 4.57 m.	-					
-15\DES		5.0-	-							
70107			-							
S\2008\L		5.5	-							
OJECT										
V P:\PR		6.0-	-							
SW ELE		6.5	-							
P) NO (			-							
(FOR T	SAMP	∟ le tyi	PE				<u> </u>	:   : : : :	<u>::::</u>	::::
POURS	CONT	RACTO	)R Denned	INSPECTOR A. OLEKSYN	APPROV	/ED	MA	DATE	11/20/	08
۶I	J	αD.	EDMINER					2.110		

	K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-51		SHI	SET 1 of 1
	CLIEN	NT ECT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB N	0.	08-107-15	
	SITE	207	Elmwoo	od Landfill	DATE	DRILLED	11/7/2008	
	LOCA	τιοΝ	Northea	ast of TP-37	UTMs	(NAD83)	N 5,529,017 E 637,722	
	DRILL METH	LING IOD	Excavat	tor - Komatsu WB146			,	
	ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	AMPLE TYPE	HE Pho BWON FIE	LD HEADSPACE toioinizable Vap 250 500 LD SOIL TEST (I sel Fuel (ppm)	ETEST ours (ppm) 750 1000 PETROFLAG)
					0	Die	1000 2000 3	000 4000
		0.5		SILTY CLAY - Brown, damp, firm, high plasticity, concrete, organic m - Light brown, trace organic matter, brick below 0.61 m.	natter.			
		1.5 -		- Grey, organic matter below 1.22 m.				
2008).GPJ		2.0-						
NOV 3 TO NOV 13,		2.5						
<b>LANDFILL</b>		3.5 -		- Black, moist, soft, very high organic content, reeds, peat, wood belo	ow 3.35 m.			
GS/ELMWOOD		4.0-		- Light brown, damp, moist, oxidation below 3.66 m.				
ESIGN/EN//LO		4.5 -		- Dark brown, stiff below 4.27 m.				
9-0107-15/DI	_	5.0-	-	END OF TEST PIT AT 4.88 m.				
OJECTS/2008/01		5.5 -	-					
R TP) NO GW ELEV P:/PR		6.0-	- - - - - - - - - - - -					
SS (FOF	SAMPI	LE TYP	Έ			K		
APOUR	CONTI J	RACTO & D P	R PENNER	INSPECTOR A. OLEKSYN	APPROVEI	o M	DATE	11/20/08

	K	<b>SS</b> DUP		SUMMARY LOG	o. <b>TP-5</b> 2	2			SHI	EET 1	of 1
ľ	CLIEN	VT (		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
	PROJ. SITE	ECT	Elmwoo	od Landfill	DATE	DRI	LLED	11/1	0/2008		
	LOCA	TION	North o	f TP-01	UTMs	s (NA	D83)	N 5,52 E 637,	9,210 219		
	DRILL METH	ING IOD	Excavat	tor - Komatsu WB146							
	EV. (m)	(m) HTG	APHICS	DESCRIPTION AND CLASSIFICATION	PLE TYPE	JMBER	FIELD Photo	HEAD ionizat	SPACE	<b>TEST</b> ours (p	<b>pm) ●</b> 000
	ELI	DEI	GR		SAMI	N	FIELD Diese	<b>SOIL</b> I Fuel ( 00 20	FEST (I ppm) 100 3	<b>PETRO</b>	ELAG)
		0.5 -		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete/rebar, brick, wood organic matter.	d,						· · · · · · · · · · · · · · · · · · ·
	-	1.0		SILTY CLAY - Grey, damp, firm, high plasticity, organic matter.							
		1.5 -									
13, 2008).GPJ		2.0-									
(NOV 3 TO NOV		3.0-		- Grey to black, soft, very high organic content, reeds, roots, wood below 2.74 m.							
OOD LANDFILL		3.5 -		- Brown, firm, oxidation below 3.66 m.			·····				
VLOGS/ELMW		4.0-						·····			
ESIGN/EN		4.5		- Dark brown, stiff below 4.57 m.			· · · · · · · · · · · · · · · · · · ·				
-0107-15\DI	_	5.0-		END OF TEST PIT AT 4.88 m.							
ECTS/2008/08		5.5 -	-								
EV P:\PROJE		6.0	-								
TP) NO GW EL		6.5 -	- - - -				· · · · · · · · · · · · · · · · · · ·				
S (FOR	SAMP	LE TYPE	3				1				<u> </u>
VAPOURS	CONTI J	RACTOR	R ENNER	INSPECTOR A. OLEKSYN	APPROVI	ED 🛔	MJ F	` E	ATE	11/20	/08

K	<b>SS</b> DUP		SUMMARY LOG	P-:	53					5	SHE	ET	1 0	f 1
CLIEN	17	CITY O	WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	3 NC	).			08-	107-1	15			
PROJI SITE LOCA	ECT TION	Elmwoo North o	od Landfill f TP-05		TE D Ms (N		LED	N	11/1 5.52	10/20 29.20	)08 )5			
DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146				,	Ē	637	,258				
:V. (m)	TH (m)	PHICS	DESCRIPTION AND CLASSIFICATION		LE TYPE	MBER	FIEL Phot	<b>D H</b> toior 250	EAD hizal 5	DSPA	CE apo 7	TES <sup>-</sup> ours (	<b>ppn</b> 100	ı) ◀ 0
Э́ТЭ	DEP	GRA			SAMP	NN	FIEL Dies	D S el F 000	OIL uel ( 2(	TES (ppm	T (P)	ETRO	DFL/	•G) (
			SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace concrete/rebar, trace brick, trace organic matter.	_										
	0.5		- Light brown, trace concrete below 0.61 m.											
_	1.5		SILTY CLAY TO SILTY CLAY FILL - Grey to black, damp, firm, high plasticity, trace brick, concrete, tires.	e							· · · · · · · · · · · · · · · · · · ·			
	2.0-					ſ								
-	2.5		SILTY CLAY - Grey to black, moist, soft, high plasticity, very high organic content.								· · · · · · · · · · · · · · · · · · ·		••••	
	3.0-		- Brown, damp, firm, trace oxidation below 3.05 m.								· · · ·			
	3.5												· · · · ·	
_	4.0-		END OF TEST PIT AT 4.27 m.										• • •	
	4.5										· · · · · · · · · · · · · · · · · · ·		••••	
	5.0-	-				ſ								
	5.5 · 6.0-	-												
	6.5	-												
	_	-												
SAMPL CONTR	LE TYP RACTO & D P	E R ENNER	INSPECTOR K. THIESSEN AP	PROV	VED		A	H	r r	DATI		11/2	:0/08	;

	K	<b>SS</b> DUP		HOLE N	ю. <b>ТР-5</b> 4	4			SHEI	ST 1	of 1
		NT ECT	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-10	7-15	_	
	SITE	201	Elmwoo	od Landfill	DATE	DRII	LED.	11/10/	2008		
	LOCA	TION	North o	f TP-43, east of TP-53	UTMs	(NAI	083) N	5,529,	192		
	DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146			E	637,30	)4		
	EV. (m)	TH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	MBER	FIELD Photoi 25(	HEADSI onizable	PACE Vapo	<b>TEST</b> urs (pp 0 10	<b>m) ●</b> 100
	ELE	DEF	GR/		SAMP	NN	FIELD Diesel	SOIL TE Fuel (pp 0 2000	<b>ST (PE om)</b> ) 30(	<b>ETROFI</b>	<b>_AG)</b>
ſ				SILTY CLAY FILL - Brown, damp, soft, high plasticity, plastics, metal, trace organ matter, trace granular material, trace sand and gravel.	nic						
		0.5		- Light brown, firm, trace concrete below 0.61 m.							
		1.0-									
	_	2.0-		SILTY CLAY - Grey to black, damp, firm, high plasticity.							
/ 13, 2008).GF		2.5									
VOV 3 TO NOV	-	3.0-		SILTY CLAY - Grey to black, damp, soft, intermediate plasticity, high organic content (grass and reeds).							
D LANDFILL (N	_	3.5 ·		SILTY CLAY - Light brown, damp, stiff, high plasticity.							
GSVELMWOO	-	4.0-		END OF TEST PIT AT 3.96 m.							
SIGNIENVILO		4.5	-								
8-0107-15\DE		5.0-	-								
ECTS/2008/0		5.5	-								
LEV P:/PROJ		6.0-	-								
TP) NO GW E		6.5									
FOR	SAMPI	∟ Le typ	'E				<u></u>	. : : :   :		::::	
VAPOURS	CONTI	RACTO	PR PENNER	INSPECTOR K. THIESSEN	APPROVE	ED ,	MA	DA	TE	11/20/	08

GRUUP		IP-55	SHEET 1 of 1
CLIENT CI	TY OF WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO.	08-107-15
SITE E	mwood Landfill	DATE DRILLED	11/10/2008
LOCATION NO	orth of TP-44	UTMs (NAD83) N E	5,529,178 637,353
DRILLING METHOD EX	cavator - Komatsu WB146		
EV. (m) PTH (m)	DESCRIPTION AND CLASSIFICATION	Hereit He	HEADSPACE TEST prizable Vapours (ppm) ● 500 750 1000
DE EL	9. 19.	S Z FIELDS S Diesel I 1000	SOIL TEST (PETROFLAG) Fuel (ppm) 0 2000 3000 4000
	SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic ma granular material (sand)	atter, trace	
0.5	- Light brown below 0.61 m.		
	SILTY CLAY - Grey to black, damp, firm, high plasticity.		
1.5 -	SILTY CLAY, Grow to black, damp, soft, intermediate placticity, high o	rnanic	
2.0-	content.		
	SILTY CLAY - Grey, damp, stiff, high plasticity.		
3.0	END OF TEST PIT AT 3.05 m.		
3.5 -			
4.0			
4.5 -			
5.0-			
5.5			
6.0			
6.5			
SAMPLE TYPE CONTRACTOR	INSPECTOR	APPROVED AA	DATE 11/20/08

K	<b>GS</b> OUP		SUMMARY LOG	о. ГР-56	)			SHI	3ET 1	of :
CLIEN PROJ	NT ECT	CITY OF	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB N	0.		08-1	07-15		
SITE	207	Elmwoo	od Landfill	DATE	DRIL	LED	11/1	0/2008		
LOCA	TION	North o	f TP-45	UTMs (	(NA[	083) N	5,52	9,164		
DRILL METH	LING IOD	Excavat	tor - Komatsu WB146			E	637,	402		
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	MBER	FIELD Photoi 25	HEAD onizat	SPACE ble Vap	<b>TEST</b> ours (p) 750 1	pm) •
ELI	DEF	GR/		SAMF	NN	FIELD Diesel	SOIL 1 Fuel (j	FEST (F ppm)		LAG)
			SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matter, trace concrete.							
	0.5		- Brown, saturated below 0.61 m.							
-	1.0-		SILTY CLAY - Grey to black, saturated, high plasticity, high organic content.							
	1.5									
	2.5		- Grey, damp, stiff, high plasticity below 2.13 m.							
_	3.0-		END OF TEST PIT AT 2.74 m.							
	2.5	-	Note: 1. Water began to fill test pit during excavation at 0.61 m.							
	4.0-	-								
	4.5									
	4.0 ·	-					· · · · · · · · · · · · · · · · · · ·			
	5.0-	-			1					
	0.0	-								
	0.U-	-						•••••		
	0.0	-								
SAMPI	LE TYP	E				A	M			
CONT	RACTO	R	INSPECTOR		、 	H		ATE	11/20	10.0

<b>K</b> GR	<b>GS</b> DUP		SUMMARY LOG	TP-5	57			SHE	ET 1	of 1
CLIEN	NT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	B NO.		08-1	07-15		
PROJ SITE	ECT	Elmwoo	od Landfill	DAT	E DRI	LLED	11/1	0/2008		
LOCA	TION	North o	f TP-46	UTN	/Is (NA	D83)	N 5,52	9,147		
DRILL METH	LING IOD	Excavat	tor - Komatsu WB146				E 637,	430		
.EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE UMBER	FIELD Photo 2:	D HEAD Dionizat	SPACE le Vapo 00 7	<b>TEST</b> <b>Durs (pr</b> 50 10	<b>om)</b> ● 000
Ш	DE	GR			NAS	FIELD Diese	) SOIL 1 I Fuel (	TEST (P opm) 00 3(		LAG) 0
	0.5		<u>SILTY CLAY FILL</u> - Brown, damp, firm, high plasticity, trace organic matter, tra granular material (sand)	ace						
	1.0 1.5 -		- Light brown, trace metal, concrete and rubber below 1.22 m.							
	2.0-		<u>SILTY CLAY</u> - Grey to black, damp, firm, high plasticity, trace organic.							
	2.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.							
	3.0-		SILTY CLAY - Brown, damp, stiff, high plasticity.							
_	4.0-		END OF TEST PIT AT 3.66 m.							
	4.5	-								
	5.0-	-								
	5.5 · 6.0-	-								
	6.5 ·	-								
SAMPI	∟ LE TYP	E				<u>,</u> ΔΔ	<u>::::</u>	::::	::::	::::
CONTI J	RACTO	R ENNER	INSPECTOR K. THIESSEN	APPROV	/ED	ſ₽	D	ATE	11/20/	08

K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-	-58		s	HEET	l of 1
CLIEN	VT	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JC	B NO.		08-107-1	5	
PROJ SITE	ECT	Elmwoo	od Landfill	DA	ATE DRI	LLED	11/10/200	)8	
LOCA	TION	North o	f TP-47, east of TP-57	UT	Ms (NA	D83) N E	5,529,140 637,506	)	
METH	IOD	Excava	tor - Komatsu WB146		T	1			
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE JMBER	FIELD H Photoic 250	HEADSPAC Dizable Va 500	<b>DE TES</b> apours ( 750	- <b>ppm)</b> ● 1000
EL	DE	GR			SAME	FIELD S Diesel I	SOIL TEST Fuel (ppm)	(PETRO	0FLAG) C
			SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter concrete and metal.	er, trace			, 2000	3000	+000
	0.5 -		- Light brown below 0.61 m.						
	1.0-					••••••			••••
	1.5 -								
_	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.						
	2.5 -								· · · · · · · · · · · · · · · · · · ·
	3.0-		<ul> <li>Soft, high organic matters (wood and reeds) below 2.74 m.</li> <li>Brown, stiff, trace oxidation below 3.05 m.</li> </ul>						
	3.5 -								
-	4.0		END OF TEST PIT AT 3.96 m.						
	4.5 -	-							
	5.0-	-							
	5.5 -	-							
	6.0-								
	6.5 -	-							
SAMPI	 _E TYP	-[] E				 ↓ /)			
CONTR	RACTO	R ENNER	INSPECTOR K. THIESSEN	APPRO	VED	AL-	DATE	_11/2	0/08

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-	59			SHE	ET 1	of 1
CLIEF	NT	CITY OF	WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.		08-10′	7-15		
SITE	ECT	Elmwoo	od Landfill	DA	TE DRI	LLED	11/10/	2008		
LOCA	TION	North of	f TP-48, east of TP-58	UT	Ms (NA	D83) N	5,529,	123		
DRILI METH	LING 10D	Excavat	tor - Komatsu WB146				. 037,37	0		
-EV. (m)	EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION		IPLE TYPE UMBER	FIELD Photoi 25	HEADSI onizable	PACE Vapo 75	TEST urs (pr 50 10	om) ● 000
	D	10			SAN	FIELD Diesel	Fuel (pp 0 2000	ST (Pi m) ) 30	1 <b>ROF</b>	LAG) 0
			SILTY CLAY FILL - Dark brown, damp, firm, high plasticity, trace orga	anic matter.				, 50		
	0.5 -									
			- Light brown, trace concrete below 0.61 m.						• • • • • • •	
	1.5 -					·····				
	2.0-		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concret	te.						
0.000	2.5 -									
	3.0-									
			- High organic matters (wood and reeds) below 3.05 m.							
-	3.5 -		END OF TEST PIT AT 3.66 m.							
	4.0-	-								
	4.5 -	-							• • • • • • • •	
	5.0	-								
	5.5 -	-								
	6.0-	-								
	6.5 -									
SAMP	LE TYPI	E				li	$\lambda$			
CONT	RACTO	R enner	INSPECTOR K. THIESSEN	APPRO	VED	MA	DA	TE	11/20/	08

	K	<b>SS</b> DUP		SUMMARY LOG	HOLE NO. <b>TP-</b>	·60				s	HEET	10	of 1
-	CLIEN	<b>I</b> Т (		WINNIPEG - WATER AND WASTE DEPARTMENT	JC	B NC	D.		08-	107-1	5	_	<b></b> _
	PROJ SITE	ECT E	Elmwoo	d Landfill	DA	ATE D	ORIL	LED	11/	10/20	08		
	LOCA	TION 1	North of	f TP-49, east of TP-59	UT	ſMs (	NAC	)83) N E	5,52 637	29,11 7,629	l		
	DRILL METH	ING IOD E	Excavat	or - Komatsu WB146			_						
	-EV. (m)	EPTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	UMBER	FIELD Photo 25	HEAD ioniza	DSPA ble V 500	CE TE	ST s (ppr 100	<b>n)</b> •
	Ш	DE	5			SAN	z	FIELD Diesel	SOIL Fuel (	TEST (ppm)	(PET	ROFL	. <b>AG)</b>
		-		SILTY CLAY FILL - Dark brown, damp, firm, high plasticity, trace organic	c matter.				<u>10</u> 2		3000	400	
		0.5		- Light brown, trace concrete below 0.91 m.									
		- - 1.5 - -								· · · · · · · · · · · · · · · · · · ·			
08).GPJ	_	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.									
OV 13, 20		2.5 -		- Soft, high organic content below 2.44 m.						·   · · · · ·			
L (NOV 3 TO N	_	3.0-		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						· · · · · ·			
OOD LANDFIL	-	3.5 -		SILTY CLAY - Grey, damp, stiff, high plasticity.									
VLOGS/ELMW	_	4.0-		END OF TEST PIT AT 3.96 m.									
VDESIGN/EN/		4.5 -							······································			 	
008/08-0107-15		5.0								-			
PROJECTS/20		6.0	-										
TP) NO GW ELEV P:\		6.5 -											
S (FOR	SAMP	L. LE TYPE	3					$\Delta l$		1::			
APOUR	CONT	RACTOR	ENNER	INSPECTOR K. THIESSEN	APPRO	OVEI	)	13H		DATE	2 1	1/20/0	)8

	KG. ROU	SP		SUMMARY LOG	HOLE NO. TP-(	61			SHI	ET 1	of 1
CL		( r		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOL	B NO.		08-3	107-15		
SI	TE	Ē	Elmwoo	od Landfill	DA	TE DR	ILLED	11/1	10/2008		
LC	OCATIO	N I	North o	f TP-50, east of TP-60	UTI	Ms (NA	D83)	N 5,52	29,085		
DF MI	RILLING ETHOD	Э E	Excavat	tor - Komatsu WB146				L 037	,004		
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE IMBER	FIELD Photo 2:	HEAD bionizal	SPACE ole Vap	TEST ours (p) 50 1	<b>pm) ●</b> 000
		DEI	GR			SAMF NU	FIELD Diese	SOIL	TEST (F ppm)	PETROF	<sup>-</sup> LAG) 000
	-	-		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic r	natter.		10			100 4	
		-									
	0	).5 —		- Light brown, trace concrete below 0.61 m.							-
		-									
	'										
	_ 1	.5 —									
		-		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concret	te.						
2	2	0-									
008).G		-									
V 13, 2	2	2.5 —									
TO NO		-						• • • • • •			
NOV 3	_ 3	3.0 —		SILTY CLAY - Grey to black, damp, soft, intermediate plasticity, high	organic						
	-	-		content.							
D LANE	3	s.5									
NWOO		-									
GS/ELI		- 0.0						• • • • • •			
INVILO		- - 5 —		END OF TEST PIT AT 4.27 m.				• • • • • •			
SIGNE		-									
-15/DE	5	.0—									
8-0107		-									
12008/0	5	i.5 —									
JECTS		-									
:\PRO	6	.0 -									
ELEV		-									
IO GW	6	.5 -									
		-									
SA	MPLE T	YPE	2				A	1			
DO CC	ONTRAC	TOR PE	ENNER	INSPECTOR K. THIESSEN	APPRO	VED	AV	L L	DATE	11/20/	/08

	K	<b>GS</b> DUP		SUMMARY LOG	LE NO. <b>TP-</b>	62		SI	IEET 1 d	of 1
	CLIEN	<i>IT</i> (		F WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO.		08-107-15	;	
	PROJI SITE	ECT E	Elmwoo	od Landfill	DA	TE DF	RILLED	11/12/200	8	
	LOCA	TION 1	Northea	ast of TP-51	UT	Ms (N	AD83) N E	5,529,045 637,758		
	DRILL METH	ING IOD	Excavat	tor - Komatsu WB146			_	,		
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	FIELD Photoio 250	HEADSPAC onizable Va ) 500	E TEST pours (ppr 750 100	<b>n)</b> •
	ELI	DE	GR			SAMI	FIELD	SOIL TEST Fuel (ppm)	(PETROFL	AG) 00
		0.5 -		<u>SILTY CLAY FILL</u> - Brown, damp, firm, high plasticity, trace organic matter, t concrete.	trace					
3).GPJ	_	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete, timb	er.					
3 10 NOV 13, 200		2.5 -								
		-		- Black, soft, trace timber, odour below 3.05 m.						
	_	3.5 - - - 4.0-		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						
NVILUGS	-	4.5 -		SILTY CLAY - Brown, damp, stiff, high plasticity, trace oxidation.						
	_	5.0		END OF TEST PIT AT 4.57 m.						
		5.5 -								
		6.0								
121) 021	SAMPI	LE TYPE	2				A	,,,		
VAPOUL	CONTI J	RACTOF & D PI	C ENNER	INSPECTOR K. THIESSEN	APPRO	VED		DATE	11/20/0	8

	K GR	<b>GS</b> DUP		SUMMARY LOG	DLE NO. <b>TP</b>	-63	<b>,</b>	SHEET 1 of	1
	CLIEI	NT (		WINNIPEG - WATER AND WASTE DEPARTMENT	J(	OB N	Ю.	08-107-15	-
	PROJ SITE	ECT	Elmwoo	od Landfill	D	ATE	DRII	ILLED 11/12/2008	
	LOCA	TION I	North o	f TP-39	U	TMs	(NAI	D83) N 5,529,017 E 637,802	
	DRILI METH	LING IOD	Excavat	tor - Komatsu WB146					
	EV. (m)	тн (m)	APHICS	DESCRIPTION AND CLASSIFICATION		LE TYPE	MBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000	•
	ELE	DEF	GR/			SAMP	NN	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) 1000 2000 3000 4000	0
		0.5 -		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter concrete.	r, trace				
	-	1.5		<u>SILTY CLAY</u> - Grey to black, damp, firm, high plasticity, trace concrete, tra organic.	ace	_			
3, 2008).GPJ		2.0							
OV 3 TO NOV 1		3.0		- Black high organic content below 3.05 m					
D LANDFILL (N		- - 3.5 -		- Light brown below 3.35 m.					
OGS/ELMWOO		4.0		- Stiff below 4 27 m					
DESIGN/EN/VI	_	4.5 -							
107-15/		5.0-		END OF TEST PIT AT 4.88 m.					
CTS/2008/08-0		- - 5.5 — -							
EV P:\PROJE(		6.0-							
TP) NO GW EL		6.5							
RS (FOR	SAMP	LE TYPE	8					<i>A</i>	
/APOUF	CONT J	RACTOF & D PI	( Enner	INSPECTOR K. THIESSEN	APPRO	OVE	d /	DATE <u>11/20/08</u>	_

	K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-	64					SHE	ET 1	of 1
	CLIEN	IT.		WINNIPEG - WATER AND WASTE DEPARTMENT	JO	B NO			08-	107-	15		_
	PROJ SITE	ECT	Elmwoo	od Landfill	DA	TE DI	RIL	LED	11/	12/20	)08		
	LOCA	TION	West la	ndfill area, west of TP-03	UT	Ms (N	AC	83)	N 5,5 E 63	29,11 7,131	9		
	DRILL	.ING IOD	Excavat	tor - Komatsu WB146								_	
	.EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	UMBER	FIELD Photo 25	HEA	DSPA ble \ 500	ACE /apo 75	TEST urs (p	<b>pm)</b> ● .000
	Ц	DE	GR			SAM	Ž	FIELD Diese	SOIL Fuel	TES (ppn 000	T (PI 1) 30		FLAG) 0
Ī				SILTY CLAY FILL - Wet, firm, intermediate plasticity, trace granular.						.000	30		
		0.5 -											
		1.0-		- Concrete blocks and rebar, hole filling with water at 0.91 m.			-						
	_		-/_/%% - -	END OF TEST PIT AT 1.22 m.			ĺ	•••••••				•	
		1.5 -											
GPJ		2.0-					Ī						
3, 2008).		25.	-										
O NOV 1	ſ	2.5	-										
(NOV 3 T		3.0-					Ī						
NDFILL		3.5 -	-										
VOOD LA			-										
<b>GS/ELM</b>		4.0-	-										
VENVILO		4.5 -											
NDESIGN			-					••••••		,			
-0107-15		5.0-	-				ĺ						
12008/08		5.5 -	-										
ROJECTS		60-	-										
EV P:\PF		0.0	-				ľ						
O GW EL		6.5 -											
N (41 AC			-					·····	<u>۱</u>				
JURS (FC	SAMPI	LE TYP	E R	INSPECTOR				A.	X				
VAPC	J	& D P	ENNER	K. THIESSEN	APPRO	VED		μP	<u>}</u>	DAT	E	_11/20	0/08

	K	<b>GS</b> DUP		SUMMARY LOG	HOLE NO. TP-6	65			SHE	ET 1	of 1
	CLIEN			WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	NO.		08-1	07-15		
	SITE	ECI	Elmwoo	od Landfill	DAT	E DRII	LED	11/1	2/2008		
	LOCA	TION	West of	TP-64	UTN	/Is (NAI	D83) N	5,52 637.	9,125 088		1
	DRILL METH	.ING IOD	Excavat	tor - Komatsu WB146			_	,			
	ELEV. (m)	)EPTH (m)	RAPHICS	DESCRIPTION AND CLASSIFICATION		MPLE TYPE NUMBER	FIELD Photo 25 FIELD	HEAD: ionizab 0 50	SPACE le Vapo 007	TEST burs (pp 50 10 PETROF	om) ● 000 LAG)
	ш		0			SA	Diese	Fuel (	opm)	00 40	0
		0.5 -		SILTY SAND FILL - Brown, damp, compact, medium grained sand with s trace gravel.	silt and			0 20			
		1.0—		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matte	er.						
	-	1.5 -		- Light brown below 1.52 m.							
GPJ		2.0-									
0 NOV 13, 2008		2.5 -					·····				
ILL (NOV 3 TO		3.0-									
NOOD LANDF		3.5 -		- Grey, some concrete below 3.35 m.							
ILOGS/ELM	-	4.0-		END OF TEST PIT AT 4.27 m.							
ESIGNENV		4.5 -	-	Note: 1. Could not dig deeper than 4.27 m due to concrete.							
\08-0107-15\D		5.0-	-								
DJECTS/2008		5.5 -	-								
ELEV P://PRC		6.0	-								
TP) NO GW		6.5 -	-								
S (FOR	SAMP	LE TYP	E					4			
VAPOUR	CONTI J	RACTO & D P	R ENNER	INSPECTOR K. THIESSEN	APPRO	VED	YAP		ATE	11/20/	/08

	K	<b>GS</b> DUP		SUMMARY LOG	OLE NO. <b>TP-</b>	-66		SHE	ET 1	of 1
	CLIEN	VT (		WINNIPEG - WATER AND WASTE DEPARTMENT	JC	DB NO.		08-107-15		
	PROJ SITE	ECT	Elmwoo	od Landfill	DA	ATE DRIL	LED	11/12/2008		
	LOCA	TION	West of	TP-65	UT	ſMs (NA[	083) N E	5,529,136 637,037		
	DRILL METH	ING IOD	Excavat	tor - Komatsu WB146		r				
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE JMBER	FIELD F Photoic 250	HEADSPACE onizable Vapo 500 7	<b>TEST</b> burs (pp 50 10	<b>m)</b> ● 00
	ELI	DEI	GR			SAMI	FIELD S Diesel F 1000	SOIL TEST (P Fuel (ppm) ) 2000 30	ETROFL	-AG) 00
		0.5 -		SILTY SAND F FILL - Brown, damp, compact, medium grained sand and s gravel, trace organic.	silt, trace					
	-	1.0— 		<u>SILTY CLAY FILL</u> - Light grey, damp, firm, high plasticity, trace organic m concrete.	hatter, trace					
13, 2008).GPJ	_	2.0		SILTY CLAY - Grey, damp, firm, high plasticity, trace concrete, trace coars gravel.	se grained					
L (NOV 3 TO NOV		3.0-								
ILMWOOD LANDFI		3.5 - - - 4.0-		- Grey to black, wet, soft below 3.35 m.						
SIGN/EN/VIOGS/E		4.5 -		- Damp, firm below 4.27 m.					· · · · · · · · · · · · · · · · · · ·	
SV2008\08-0107-15\D	_	5.0— 5.5 —		END OF TEST PIT AT 5.18 m.						
ELEV P://PROJECT		6.0-								
R TP) NO GM		6.5 -								
URS (FO	SAMP	LE TYPE	E	INSPECTOR			ALA			
VAPO	J	& D P	ENNER	K. THIESSEN	APPRO	OVED		DATE	11/20/0	)8

	<b>SS</b> DUP		SUMMARY LOG	DLE NO. TP-	-67	7				SI	HEET	1	of 1
	IT (	CITY OI	F WINNIPEG - WATER AND WASTE DEPARTMENT	JC	)B N	0.			08-1	107-15	5		
SITE		Elmwoo	od Landfill	DA	٩TE	DRII	LED		11/1	2/200	8		
LOCA	TION	West of	TP-66	UT	TMs	(NAI	083)	Ы	5,52	9,155	;		
DRILL METH	ING OD	Excavat	tor - Komatsu WB146						030,	,702			
EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE	JMBER	FIEL Phot	DH 0001 250	EAD hizak	SPAC ble Va 00	E TE	ST s(pp 1(	<b>000</b>
Ш	DE	GR			SAM	ñ	FIEL Dies	D S el F	OIL 1 uel (j	TEST ppm)	(PET	ROF	LAG) C
			SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, gravel, trace organic matter.	, trace							5000	40	
	0.5 -		SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace granular	(sand).							•••••••••••••••••••••••••••••••••••••••		
	1.0— - - 1.5 —											· · · · · · · · · · · · · · · · · · ·	
	2.0—		SILTY CLAY - Brown, damp, firm, high plasticity, trace concrete.										
	2.5 -												
	3.0-												
	3.5 -		- Black, soit, high organic content, odour below 3.35 m.										
	4.0		- Grey, stiff below 4.27 m.										
_	5.0-												
	- - 5.5 – - -		END OF TEST FILAT 5.18 M.										
	6.0-												
	6.5 - - -												
SAMPL	E TYPE						M	1					
CONTR	ACTOR	< ENNER	INSPECTOR K. THIESSEN	APPRO	OVEI		A/A	K	D	ATE	1	1/20/	08

	K	<b>SS</b> DUP		SUMMARY LOG	DLE NO. TP-6	68	SHEET 1 of 1
		IT ECT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.	08-107-15
	SITE	EGI	Elmwoo	od Landfill	DAT	E DRII	LLED 11/12/2008
	LOCA	TION	West of	f TP-67	UTM	ls (NAI	D83) N 5,529,173 E 636,927
	DRILL METH	.ING IOD	Excava	tor - Komatsu WB146			
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		JMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000
	EL	DEI	GR				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) O 1000 2000 3000 4000
		0.5 -		SILTY SAND - Brown, damp, compact, medium grained sand and silt, trace trace organic matter.	e gravel,		
	_	1.0 1.5 -		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace concrete, trace matter.	organic		
2008).GPJ	-	2.0-		SILTY CLAY - Grey to black, firm, high plasticity.			
DV 3 TO NOV 13,		2.5 · 3.0-		Dieck ooft high angelie content (wood) below 2.05 m			
DOD LANDFILL (N	_	3.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity, some silt.			
ENV/LOGS/ELMW	_	4.0-		SILTY CLAY - Grey, damp, stiff, high plasticity.			
07-15/DESIGN/E	_	5.0-		END OF TEST PIT AT 4.57 m. Note: 1. Water seeped into test pit at 2.44 m.			
ECTS/2008/08-01		5.5					
V ELEV P:\PROJE		6.0-					
R TP) NO GV		0.0	-				
RS (FOI	SAMPI	LE TYP	PE				AW
VAPOU	CONTI J	RACTO	R PENNER	INSPECTOR K. THIESSEN	APPROV	'ED	DATE 11/20/08

	K	<b>GS</b> DUP		SUMMARY LOG	по. <b>ТР-6</b>	i9			SHE	ET 1	of 1
	CLIEN	NT (		F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB	NO.		08-1	07-15		
	PROJ SITE	ROJECT ITE Elmwood Landfill DA				DATE DRILLED 11/12/2008					
	LOCA	<b>OCATION</b> Northwest corner of fenced area, North of TP-68 UTMs (N					D83)	N 5,52	9,302 942		
	DRILL METH	LING IOD	Excavat	tor - Komatsu WB146			-	,			
	EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		JMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 250 500 750 1000				
	EL	DE	GR		M V O	NIN	FIELD Diese	SOIL 1 Fuel (µ 00 20	<b>EST (P</b> opm) 00 30	etrof	LAG) 0
		0.5 -		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, tra- organic matter.	ce						
	-	1.0-		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter.							
		1.5 -									
2008).GPJ		2.0-									
3 TO NOV 13, 2	_	2.5 -		SILTY CLAY - Light brown, damp, firm, high plasticity.							
LANDFILL (NOV	-	3.5 -		SILTY CLAY - Grey to black, wet, firm, intermediate plasticity, high organic cor	ntent.						
GS/ELMW00D		4.0-		- Black, soft, trace metal waste below 3.66 m.							
DESIGN/ENVILO		4.5 -		SILTY CLAY - Grey, damp, stiff, high plasticity.							
08-0107-15/	_	5.0		END OF TEST PIT AT 5.18 m.							
JECTS/2008/		5.5 -	-	Note: 1. Water entering test pit at 3.05 m. Water sample taken.							
IO GW ELEV P:\PRO		6.0-									
R TP) N											
VAPOURS (FC	SAMP CONT	LE TYPE RACTOR	E R ENNER	INSPECTOR K. THIESSEN	APPROV	'ED	M	, D	ATE	11/20/	/08

<b>K</b> GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-70	SHEET 1 of 1
CLIE	NT		WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	08-107-15
PRO. SITE	ROJECT SITE Elmwood Landfill				DRILLED 11/12/2008
LOCA	ATION	West of	TP-69	UTMs (N	NAD83) N 5,529,290 F 636,986
DRIL METI	LING HOD	Excavat	tor - Komatsu WB146		2 000,000
EV. (m)	oTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 250 500 750 1000 Photoionizable Vapours (ppm) ●
	DEF	GR/		SAMP	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) 0 1000 2000 3000 4000
	0.5 -		SILTY SAND - Brown, damp, compact, trace organic matter.		
			SILTY CLAY - Brown, damp, stiff, high plasticity, trace organic matter, tr concrete, trace metal.	race	
ſd	2.0		- Grey to black, firm below 1.83 m.		
NOV 13, 2008).4	2.5 -				
D LANDFILL (NOV 3 TC	3.0		- Grey, stiff below 3.35.		
	4.0-				
IGNENVILOGS/EL	4.5 -	-	Note: 1. Water seeped into test pit at 3.05 m.		
1010-1010-50 0	5.0-	-			
KUNECISKUUR	5.5 -				
	6.5 -				
SAMP	⊥ PLE TYPI	E			ΔΛ
TVOOD	RACTOR	RENNER	INSPECTOR K. THIESSEN	APPROVED	DATE 11/20/08

K	<b>SS</b> DUP		SUMMARY LOG	OLE NO. TP-	-7]	l			SHI	SET 1	of 1
CLIEN	CLIENT		CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT		JOB NO.			08-1	07-15		
PROJI SITE LOCA	ECT TION	Elmwood Landfill / East of TP-70		DA UT	ATE TMs	DRI (NAI	LLED D83) N	11/1 5,52 637,	3/2008 9,275 027		
DRILL METH	.ING IOD	Excava	tor - Komatsu WB146				_				
EV. (m)	TH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		LE TYPE	MBER	FIELD I Photoio 250	HEADS onizab	SPACE le Vap	<b>TEST</b> ours (p	<b>pm)</b>
ELE	DEF	GR/			SAMP	NN	FIELD S Diesel 1	SOIL T Fuel (p	EST (F opm)	<b>ETROP</b>	<b>=LAG)</b> C
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt organic matter, trace concrete/rebar.	lt, trace							
_	1.0-		SILTY CLAY - Light brown, damp, firm, high plasticity, trace bricks, trace c trace metal.	concrete,							
	1.5		- Grey to black below 1.52 m.								
	2.0-										
	3.0-										
	3.5										
	4.0-		- Black, soft, high organic content below 3.96 m.								
	4.5 ·		- Grey, sun below 4.27 m.					• • • • • • • •		· · · · · · · · · · ·	
	5.0-		END OF TEST PIT AT 4.88 m.								
	5.5	-									
	6.5	-									
	_	-									
SAMPL CONTE	LE TYP RACTO & D P	E R ENNER	INSPECTOR K. THIESSEN	APPRC	OVE	D	·M	D.	ATE	11/20/	/08

GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. TP-72		SHE	ET 1 of 1	
CLIEI	CLIENT CITY OF PROJECT SITE Elmwood		WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	O.	08-107-15		
SITE			od Landfill		DRILLED	11/13/2008		
LOCA	TION	East of	71		(NAD83)	N 5,529,250 E 637.081		
DRILI METH	LING HOD	Excava	tor - Komatsu WB146			,		
ELEV. (m)	EPTH (m)	BRAPHICS	DESCRIPTION AND CLASSIFICATION	MPLE TYPE	FIELD Photo B W N Z FIELD	FIELD HEADSPACE TEST Photoionizable Vapours (pp 250 500 750 10		
				SA	Diese	<b>I Fuel (ppm)</b> 00 2000 30	0 4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand and s organic matter, trace concrete/rebar.	ilt, trace				
	1.0-		SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace organic trace concrete.	; matter,				
2008).GPJ	2.0-		SILTY CLAY - Grey to black, damp, firm, high plasticity.					
40V 3 TO NOV 13,	3.0-							
000 LANDFILL (1	3.5							
IENVILOGSIELMW	4.0-		- Black, moist, soft, high organic content, with garbage below 3.96 m.					
010/-15\DESIGN	5.0-		- Brown, damp, stiff below 4.88 m.					
OJEC I SKUUBIUD	5.5							
10 GW ELEV MINN	6.0-							
		-						
SAMP CONT	RACTO	PE DR	INSPECTOR	APPROVE		DATE	11/20/08	

<b>K</b>	<b>CS</b> ROUP		SUMMARY LOG	OLE NO. <b>TP-73</b>		SHE	ET 1 of 1				
CL	IENT	CITY O	F WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO		08-107-15					
PR SIT	PROJECT SITE Elmwood Landfill				RILLED	LLED 11/13/2008					
LO	CATION	East of	TP-72	UTMs (N	AD83) N	5,529,234					
DR ME	ILLING THOD	Excava	tor - Komatsu WB146								
	ELEV. (m) DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	FIELD Photo 25 FIELD Diesel	HEADSPACE ionizable Vapo 0 500 75 SOIL TEST (PE Fuel (ppm)	TEST urs (ppm) 10 1000 ETROFLAG) O				
					10(	0 2000 300	00 4000				
	- 0.5 -		SILTY SAND FILL - Brown, damp, compact, medium grained sand with sin organic matter, trace concrete. SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace organic i trace concrete.	matter,							
	1.5		SILTY CLAY - Grey, moist, firm, high plasticity.								
TO NOV 13, 2008).GPJ	2.5										
LANDFILL (NOV 3	3.0-		<u>SILTY CLAY</u> - Black, damp, soft, intermediate plasticity, high organic matt <u>SILTY CLAY</u> - Brown, damp, stiff, high plasticity.	ter.							
VLOGS/ELMWOOL	4.0		END OF TEST PITAT 3.66 m. Note: 1. Water seeped through at 3.35 m.								
07-15/DESIGN/EN	4.5 · 5.0-										
0.1ECTS/2008/08-01	5.5										
TP) NO GW ELEV P. PRC	6.0-										
SAN	MPLE TYP	E			_A/I	 /					
IOO KAPOU	NTRACTO	R ENNER	INSPECTOR K. THIESSEN	APPROVED	ľ k	DATE	11/20/08				

GR	<b>GS</b> OUP		SUMMARY LOG	HOLE NO. $TP-74$		SHI	EET 1 of 1
CLIE	NT (		WINNIPEG - WATER AND WASTE DEPARTMENT	JOB NO	D.	08-107-15	
SITE	1	Elmwoo	od Landfill	DATE D	DRILLED	11/13/2008	
LOCA	ATION S	South o	If TP-73	UTMs (	NAD83)	N 5,529,175 E 637,141	
DRILL	LING HOD	Excavat	tor - Komatsu WB146				
EV. (m)	(m) HTc	APHICS	DESCRIPTION AND CLASSIFICATION	ILE TYPE	FIELD Photo B 2	D HEADSPACE Dionizable Vap	ETEST ours (ppm) ● 750 1000
ELE	DEF	GR/		SAMP	FIELD Diese	<b>O SOIL TEST (F el Fuel (ppm)</b> 000 2000 30	PETROFLAG) 000 4000
	-		SAND AND GRAVEL FILL - Damp, compact, medium grained sand a	nd silt.			
	0.5 -						
					-3-3-3-3-		
-	1.0		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace granular gravel), trace concrete.	(sand and			
	1.5 -						
-	2.0		SILTY CLAY - Grey, saturated, soft, high plasticity, trace garbage, trac	ce concrete.			
008).61							
73, 2	2.5 -						
							·····
	3.0-						······································
	3.5 -		CONCRETE				
	-						
	4.0		END OF TEST PIT AT 3.96 m.				
ALC O					-2-2-2-2-		
	4.5 -						
	5.0-						
2010-00							
SKUUGN	5.5 -						
	6.0-						
	6.5 -						
	-						
SAMP	∟ LE TYPE	,			:::: /	1.	
CONT	RACTOR		INSPECTOR	APPROVED	, In	DATE	11/20/08
U U			K. INTESSEN		/	<u> </u>	11/20/00

K( GR(	<b>SS</b> DUP		SUMMARY LOG	TP-75					SHE	ET	1 c	of 1
		CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT				JOB NO. 08-107-15						
SITE		Elmwoo	od Landfill	DATE	ORIL	LED	11	/13/2	2008			
LOCA	τιον	West of	f TP-74	UTMs (	NAC	083)	N 5,	529,1	192			
DRILL METH	ING OD	Excava	tor - Komatsu WB146				E 63	37,06	6			
:V. (m)	TH (m)	PHICS	DESCRIPTION AND CLASSIFICATION	LE TYPE	MBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000					n) ● 20	
ELE	DEP	GRA		SAMP	N	FIELD	) SOII I Fue	L TE	ST (P m)	ETR	OFL	AG)
		-83800	SILTY SAND FILL - Brown, damp, compact, trace timber.		_	10	00 :::	2000	30	000	400	Ю :::::
	0.5	-										
_												
	1.0-		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter.		ļ							
	1.5											
_	2.0-		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace garbage (clothing, metal, bricks, etc.).		1							
	2.5											
											· · · ·	
	3.0-				ĺ							
	3.5											
_	4.0-											
	4.0-		SILIY CLAY - Black, damp, soft, intermediate plasticity, high organic content (wo and reeds). - Light brown below 4.27 m.	bod								
_	4.5		SILTY CLAY - Brown, damp, stiff, high plasticity, trace oxidation				• • • •					
-	50-		END OF TEST PIT AT 4.88 m.									
	0.0	-										
	5.5	-										
	6.0-	-										
	6.5											
		-										
SAMPI	_ .E TYP	Έ		,		1/1	1					
CONTE	ACTO D P	R	INSPECTOR K. THIESSEN	APPROVED	> /	M	ł	DA	ΓE	11/2	20/0	8

	<b>KGS</b> GROUP		SUMMARY LOG TP-76		76			SHE	ET 1	of 1	
					B NO.		08-1	07-15			
	SITE	207	Elmwood Landfill DA		DA	DATE DRILLED 11/13/2008					
	LOCA	τιον	West of	f TP-75	UTI	Ms (N/	AD83)	N 5,52 E 637	9,199 010		
	DRILL METH	ING OD	Excava	tor - Komatsu WB146							
	.EV. (m)	PTH (m)	APHICS	DESCRIPTION AND CLASSIFICATION		PLE TYPE UMBER	FIELI Phote 2	D HEAD bionizal 50 5	SPACE ble Vapo 00 7	T <b>EST</b> Durs (pp 50 10	<b>om)</b> ● 000
	Ш	DE	GR			SAM	FIELI Diese	D SOIL el Fuel ( )00 20	<b>FES</b> T ( <b>F</b> <b>ppm)</b> 100 30	<b>ETROF</b>	LAG) 000
		0.5 -		SILTY SAND FILL - Brown, damp, compact, trace organic matter.							
	-	1.0 1.5 -		SILTY CLAY - Light brown, damp, firm, high plasticity, trace garbage (clothing, etc.).	metal						
18).GPJ		2.0-		- Grey to black, trace organic matter below 1.83 m.							
TO NOV 13, 200		2.5 -		- Black seam below 2.44 m.							
ILL (NOV 3		3.0-									
DOD LANDF	_	3.5 -		CONCRETE SILTY CLAY - Black, damp, soft, intermediate plasticity, high organic content.							
<b>JGS/ELMW</b>	-	4.0-		SILTY CLAY - Grey, damp, stiff, high plasticity.							
ESIGNIENVILO		4.5 -	-	END OF TEST PIT AT 4.27 m. Note: 1. Water seeped into test pit at 3.66 m.							
3/08-0107-15/D		5.0-									
OJECTS/2006		5.5 -									
P) NO GW ELEV P:/PR		6.0-									
(FOR T	SAMPI	_ .E TYP	1 E					<u> ::::</u> 7	::::		::::
VAPOURS	CONTR	ACTO D P	R ENNER	INSPECTOR K. THIESSEN	APPRO	VED	Ŵ	<u>г</u>	ATE	11/20/	08

	KGS GROUP		SUMMARY LOG				SHEET 1 of 1
	CLIEN	IT	CITY O	WINNIPEG - WATER AND WASTE DEPARTMENT	JOE	B NO.	08-107-15
	PROJI SITE LOCA	ECT TION	Elmwoo West of	od Landfill TP-76	DAT UTM	TE DRI Mis (NA	ILLED 11/13/2008 D83) N 5,529,219
	DRILL METH	.ING IOD	Excava	tor - Komatsu WB146			E 636,957
	ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION		AMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) 250 500 750 1000 FIELD SOIL TEST (PETROFLAG)
						ŝ	Diesel Fuel (ppm)         O           1000         2000         3000         4000
		0.5 -		SILTY SAND FILL - Brown, damp, compact, trace organic matter.			
		1.0-		SILTY CLAY - Brown, damp, firm, high plasticity, trace organic matter.			
		1.5 -		- Grey, trace garbage (cloth), trace concrete below 1.52 m.			
(008).GPJ		2.0-					
3 TO NOV 13, 2		2.5					
NON)	_	3.0-					
ANDFILL	_	3.5 -		SILTY CLAY - Black, damp, soit, intermediate plasticity, high organic co SILTY CLAY - Grey, damp, stiff, high plasticity.			
SVELMWOOD L	_	4.0-	-	END OF TEST PIT AT 3.66 m. Note: 1. Water seeped into test pit at 3.35 m.			
IGN/EN/VLOG		4.5 -					
3-0107-15\DES		5.0-					
JECTS/2008/00		5.5 -	-				
ELEV P:\PRO.		6.0-					
R TP) NO GW		6.5 -	- - - - -				
RS (FO	SAMPI	LE TYP	E	DIANDOMAD			Ala
VAPOU	CONTI J	KACTO & D P	K ENNER	INSPECTOR K. THIESSEN	APPROV	VED	DATE <u>11/20/08</u>

# APPENDIX B

# FOUNDATION OPTIONS AND COST EVALUATION



## FORMER ELMWOOD / NAIRN LANDFILL SITE

### FOUNDATION OPTIONS AND COST EVALUATION

### 1.0 INTRODUCTION

Site specific structural systems will be required to address landfill related issues at the Elmwood site. The following commentary outlines structural design options; the advantages and disadvantages of these options; the relative costs of each option; and the cost premium relative to more typical Winnipeg site conditions.

#### 2.0 SITE DEVELOPMENT

Functional requirements for the proposed drainage building will include: offices, cold and heated storage, heated storage and a repair/maintenance shop. The total building area will be approximately 100,000 sq. ft (9,300 m<sup>2</sup>) with up to 50,000 sq. ft. (4,650 m<sup>2</sup>) of additional building area for fleet storage. Site development will also include: salt/gravel storage domes, yard storage, and parking areas for vehicles and heavy equipment.

## 3.0 SITE CONDITIONS

Test pits varying in depth from 3 to 5 meters have been excavated over the entire site. The depth of fill varies from 2.5 to 3.5 meters. Fill consists of concrete rubble, reinforcing steel and wood debris mixed with clay. At this time no deep test holes have been drilled. Based on prior experience in this area, it is anticipated that below the landfill there will be approximately 15 m to 16 m of clay and silty clay deposits overlaying glacial till and limestone bedrock.

The landfill material presents structural concerns with respect to potential settlement of floors which are constructed on grade and problems with pile installation i.e. augering through the fill and keeping holes open prior to casting piles and/or driving precast piles. In areas where concrete/reinforcing steel conflict with pile locations, installation options will be to core through the debri or excavate and backfill. Cost estimates for piling assume an average cost premium of 30% to account for pile installation complications.

# 4.0 BUILDING CONSTRUCTION

### 4.1 BUILDING OPTIONS

Structural options for the building foundations and main floor framing; the associated site preparation requirements; and the relative advantages and costs of each option are as follows:

SITE PREPARATION	STRUCTURAL OPTION	COMMENTS
1) Remove 900 mm to 1200 mm of fill; regraded with compacted crushed limestone and granular fill.	Concrete slab on grade with under slab membrane and ventilation piping; cast-in-place concrete or precast driven concrete piles	<ul> <li>Floor susceptible to settlement. Settlement could be minimized by preloading</li> <li>Potential problems with augering and / or driving piles through the fill</li> <li>A portion of the contaminate fill remains in place</li> <li>Lowest relative cost. The estimate cost for building site preparation, piling and floor slab is \$320/m<sup>2</sup>. The estimated cost for a typical site which would require only 300 mm of excavation and fill is \$210/m<sup>2</sup>.</li> </ul>
2) Regrade leaving fill in place	Concrete structural slab on void form; under slab membrane and ventilation system; cast-in-place concrete or precast driven piles	<ul> <li>Stable floor</li> <li>Potential problems with pile installation</li> <li>Contaminated fill remains in place</li> <li>Higher cost relative to option 1). The estimated cost is \$490/m<sup>2</sup>. The estimated cost for this options on a typical site is \$430/m<sup>2</sup>.</li> </ul>
3) Remove approx. 900 mm of fill	Steel framed with precast concrete structural floor or steel joists, metal decking and C-I-P concrete slab; vented crawlspace with membrane; cast-in-place concrete or precast driven piles.	<ul> <li>Stable floor</li> <li>Potential problems with pile installation</li> <li>Portion of contaminated fill left in place but a better ventilation system than option 1) or 2)</li> <li>Higher cost than options 1) or 2). The estimated cost is \$500/m<sup>2</sup>. The estimated cost for a typical site is \$465.00</li> </ul>
SITE PREPARATION	STRUCTURAL OPTION	COMMENTS
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4) Remove all the fill and backfill with compacted limestone and granular fill.	Concrete slab on grade; cast-in- place concrete piles	<ul> <li>Minimal slab settlement if fill adequately compacted</li> <li>All contaminates removed, no membrane or ventilation system required</li> <li>Piles must be installed prior to placing limestone fill which will make it difficult to achieve adequate compaction.</li> <li>Similar cost to option 1, with membrance and vent pipes excluded. Estimated cost is \$350/m<sup>2</sup>.</li> </ul>
5) Remove all fill and replace with clay fill	Concrete structural slab on void form; cast-in-place concrete piles	<ul> <li>Stable floor</li> <li>All contaminates removed, no membrane or ventilation required</li> <li>Piles easiest to install; negative skin friction must be accounted for.</li> <li>Similar cost to option 2 and 3 without membrance &amp; ventilation cost. Estimated cost is \$510/m<sup>2</sup>.</li> </ul>

### 4.2 ADDITIONAL COMMENTS

The above options provide a range of possible structural systems. The choice of which system is most appropriate should be made with consideration given to functional requirements and the above grade framing system. A consideration will be to provide an option 1) substructure for the storage and shop area and either option 2 or 3 substructure for the office area. The office area could be 2 or 3 stories in height to minimize the building footprint. The storage/shop area will potentially have longer spans with "preengineered" steel framing components. Precast driven piles will be most appropriate for this superstructure which has fewer columns with higher column loads. Precast piles will also be most appropriate for a 2 or 3 story office building which has higher column loads.

### 5.0 PARKING AREAS

Base preparation for a typical site would include 600 mm excavation, geotextile, geogrid, limestone and granular fill. The unit cost for a typical site is \$55 to \$60/m<sup>2</sup>. Assuming 1200 mm average excavation and backfill for the landfill site, the unit cost will be \$95 to \$105/m<sup>2</sup>.

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## APPENDIX C

## STORMWATER MANAGEMENT POND EVALUATION



# STORMWATER POND SIZING ASSESSMENT

Runoff from the proposed development will require management at the site. Runoff from the landfill site will be collected in a wet pond located at the west end of the site. The surface area for the development has been assumed as 200 m x 400 m or 8.0 ha. It has been assumed that the majority of the site, when fully developed will be mostly impervious, with only about 5 percent pervious.

The surface runoff from the site has been determined for rainstorms having return periods from 2 years to 100 years. The computed runoff volumes have been plotted in the figure below as a frequency curve. The 1:25 year runoff volume of 4,700 m<sup>3</sup> has been selected for the sizing of the pond.

At this time there is no information on drainage features (surface drains or buried sewers) to convey the runoff from the site to the pond or downstream sewers or drains to drain water from the pond to the downstream sewer. As a result the pond has been sized to contain the design runoff volume with a pond depth of approximately 2 metres. Assuming equal width and length with 4:1 side slopes for sizing the pond, the approximate dimensions are 40 m x 40 m at the base and approximately 56 m x 56 m at the ground surface.

