

APPENDIX 1



CITY OF WINNIPEG

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



December 2008

KGS
GROUP

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
3rd Floor, 65 Garry Street
Winnipeg, Manitoba
R3C 4K4

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

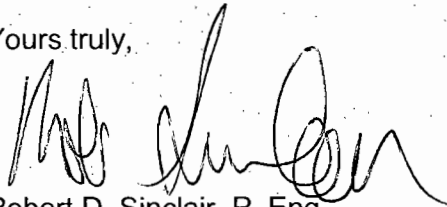
RE: Former Elmwood / Nairn Avenue Landfill Site
Preliminary Site Conditions Assessment Report
City Of Winnipeg

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. Eng.
Manager, Environmental Services

RDS/jr
Enclosed

TABLE OF CONTENTS

	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 BACKGROUND DATA.....	2
3.0 GEOPHYSICAL SCREENING SURVEY	3
3.1 EQUIPMENT AND METHODS	3
3.2 GEOPHYSICAL RESULTS AND DATA ANALYSIS.....	4
4.0 TEST PIT AND GROUNDWATER QUALITY SURVEY.....	6
5.0 FOUNDATION OPTIONS AND COST EVALUATION.....	7
6.0 STORMWATER MANAGEMENT POND EVALUATION	8
7.0 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED).....	9
8.0 CONCLUSIONS.....	10
9.0 RECOMMENDATIONS.....	11
10.0 STATEMENT OF LIMITATIONS.....	12
TABLES	
FIGURES	
APPENDICES	

LIST OF TABLES

1. General Water Quality
2. Piezometer Data

LIST OF FIGURES

1. Site Location Map
2. EM Survey (Vertical Di-pole)
3. EM Survey (In-Phase)
4. Topographical Plan

LIST OF APPENDICES

- A. Test Pit Logs
- B. Foundation Options and Cost Evaluation
- C. Stormwater Management Pond Evaluation

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 m² (100,000 ft²) composed mainly of garage area, a Fleet Maintenance Facility of approximate 4,500 m² (50,000 ft²), 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 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 4th and November 13th, 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 sub-meter 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 in-situ 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 resistivity 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 desirable.
- 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**

Parameter ¹	EQL	TP1	TP4	TP6	TP7	TP19	TP49	TP69
		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 ₃	1	1500	124	190	278	49	1020	427
Bicarbonate as CaCO ₃	2	1830	58	20	35	5	1240	521
Carbonate as CaCO ₃	0.6	<0.6	46.1	104	149	26.8	<0.6	<0.6
Hydroxide as CaCO ₃	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Hardness as CaCO ₃	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**

Sample No.	Date	Parameter ⁽¹⁾														
		pH (units)	E.C. (µS/cm)	Turbidity (ntu)	Alkalinity as CaCO ₃	Hardness as CaCO ₃	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	Parameter ⁽¹⁾													
		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

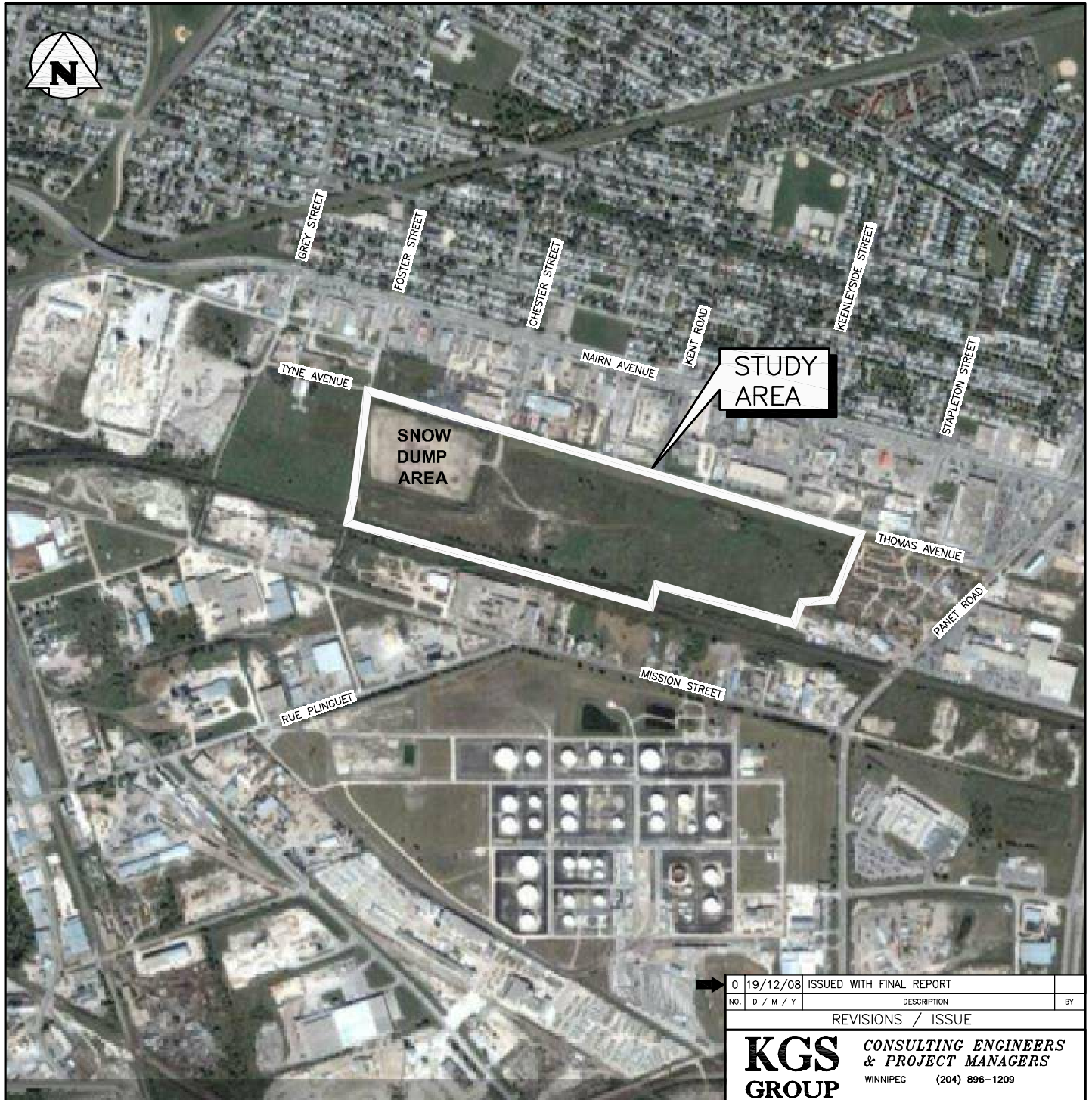
T.S.S. = Total Suspended Solids

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



0	19/12/08	ISSUED WITH FINAL REPORT	
NO.	D / M / Y	DESCRIPTION	BY

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS & PROJECT MANAGERS
 WINNIPEG (204) 896-1209

CLIENT:  THE CITY OF WINNIPEG

PROJECT: FORMER ELMWOOD LANDFILL SITE ASSESSMENT REPORT
 WINNIPEG, MB

DWG. DESCRIPTION: SITE LOCATION MAP

ENG. STAMP	DESIGNED: BY: RS CHECKED: RS	DRAWN: BY: EC CHECKED:
APPROVED:		
SCALE: AS NOTED	DATE: NOVEMBER 2008	
KGS DWG. NO. 08-0107-15		01

CLIENT DWG. NO.	REV: 0
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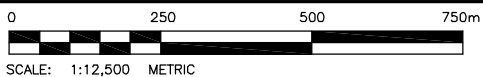
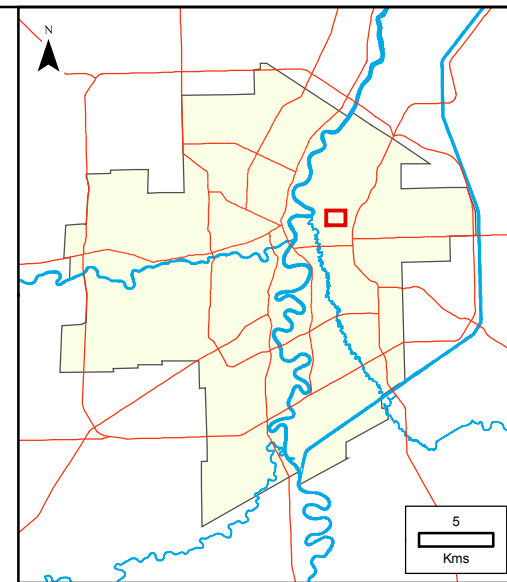
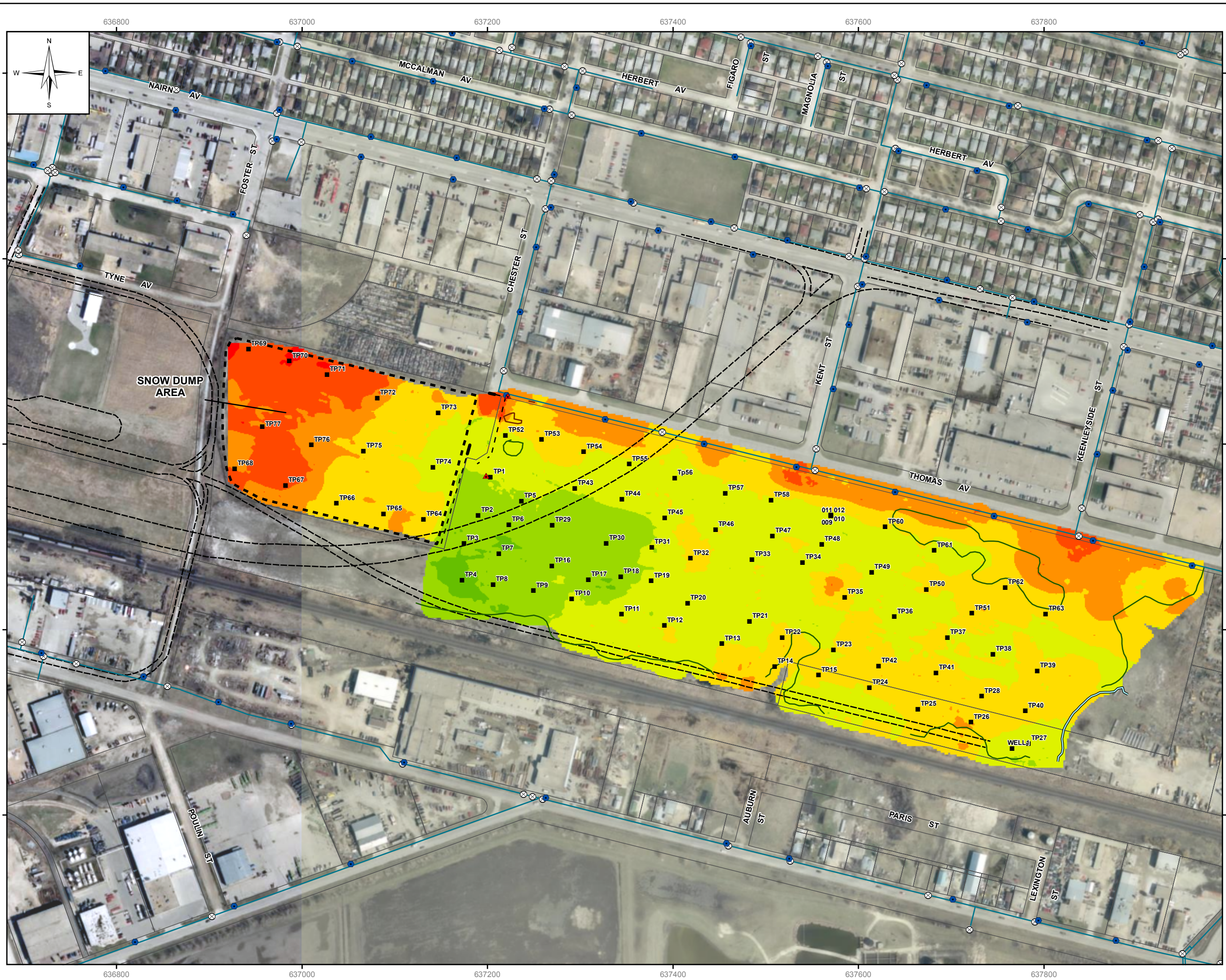


FIGURE 1



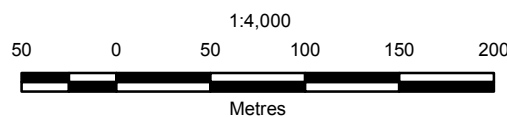
Legend

- ▲ Control Point
- Test Pit
- Hydrants
- ⊗ Water Valves
- Watermains
- - - Fence
- Gate
- Metal
- Pipe
- Tree
- - - Proposed Corridor
- Cadastral Lot
- ⊞ Snow Dump

Vertical Conductivity EM-31 Results

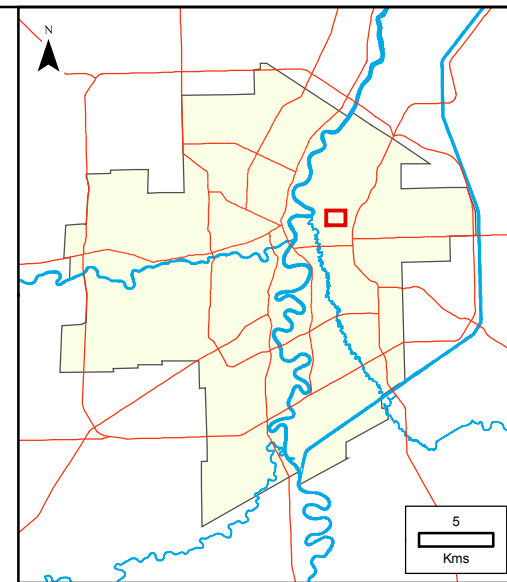
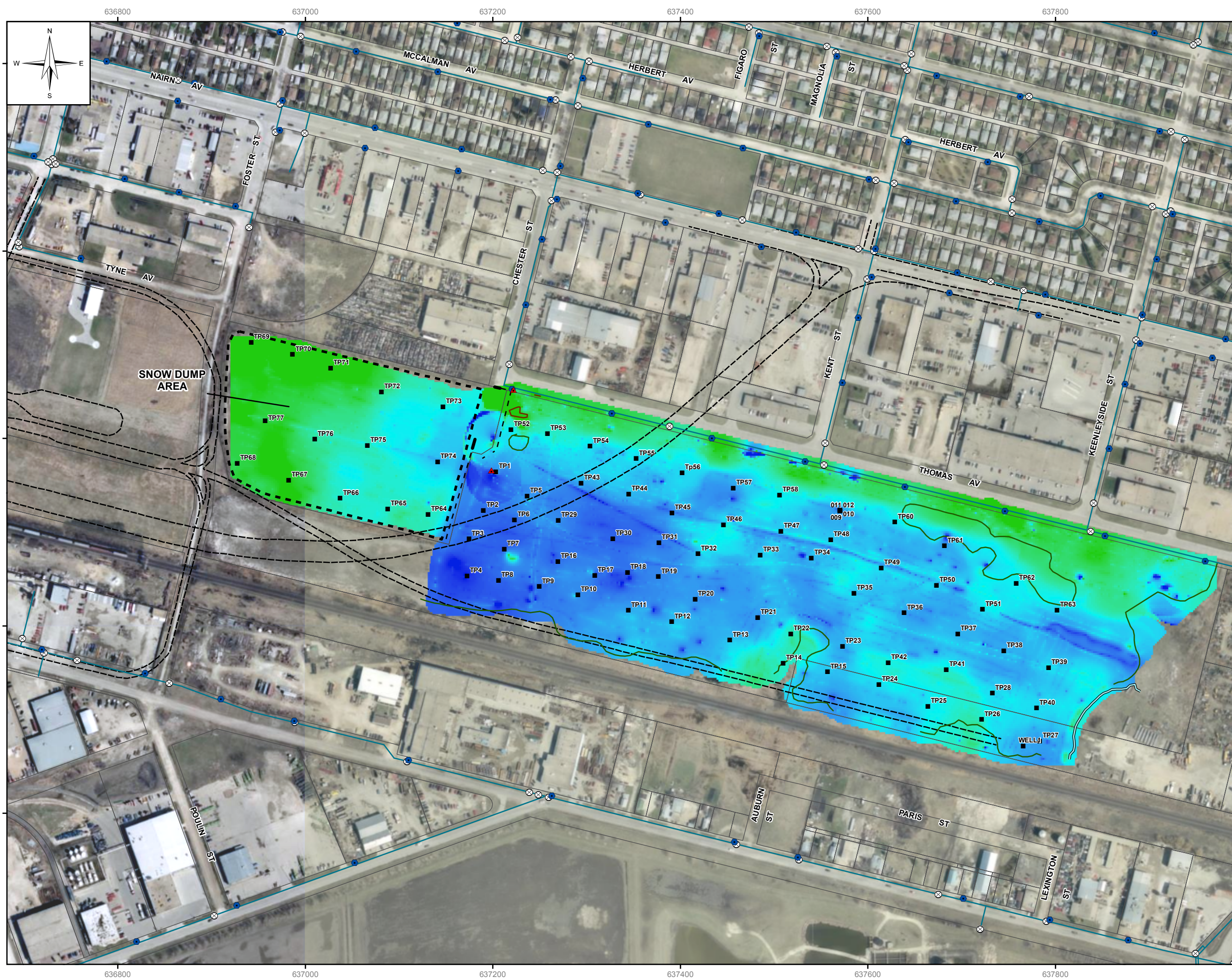
Millisiemens Per Metre (mS/m)

- 0 - 25 (mS/m)
- 25 - 50 (mS/m)
- 50 - 75 (mS/m)
- 75 - 100 (mS/m)
- 100 - 125 (mS/m)
- 125 - 150 (mS/m)
- 150 - 200 (mS/m)
- 200 - 600 (mS/m)



Note:
 1. EM31 and topographic survey was completed by KGS Group Nov-8-13, 2008
 2. Airphoto/vector data provided by City of Winnipeg GIS database
 3. All units are metric and in metres unless otherwise specified
 Transverse Mercator Projection, NAD 1983, Zone 14
 Elevations are in metres above sea level (MSL)

KGS GROUP	
ELMWOOD LANDFILL	
EM SURVEY (VERTICAL DI-POLE)	
DECEMBER 2008	FIGURE 2
	REV: A

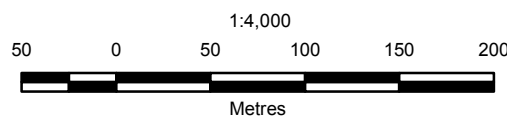


Legend

- ▲ Control Point
- Test Pit
- Hydrants
- ⊗ Water Valves
- Watermains
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- Cadastral Lot
- Snow Dump

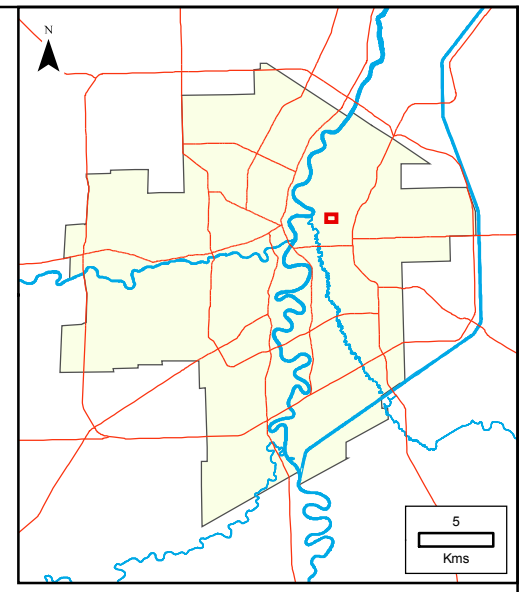
Vertical Inphase EM-31 Results
Parts Per Thousand (PPT)

High : 19.6 (PPT)
Low : -20.5 (PPT)

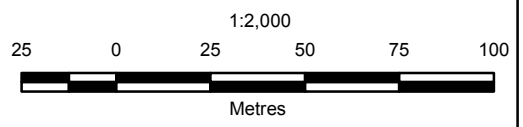


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 Elevations are in metres above sea level (MSL)

KGS GROUP	
ELMWOOD LANDFILL	
EM SURVEY (IN-PHASE)	
DECEMBER 2008	FIGURE 3
	REV: A

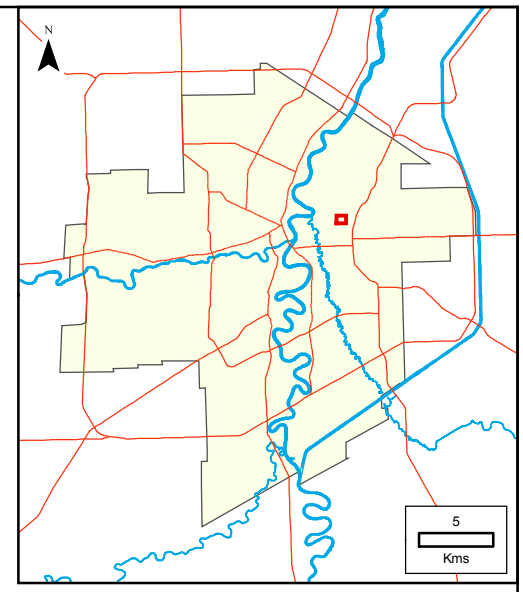


- Legend**
- ▲ Control Point
 - Test Pit
 - Hydrants
 - ⊗ Water Valves
 - Watermains
 - - - Fence
 - Gate
 - Metal
 - Pipe
 - Tree
 - - - Proposed Corridor
 - 1 m Index Contour
 - 0.25 m Contour
 - Cadastral Lot
 - ⊞ Snow Dump

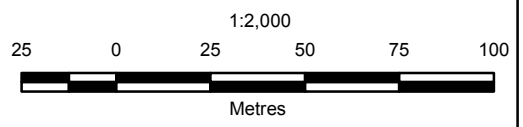


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 Elevations are in metres above sea level (MSL)

KGS GROUP			
ELMWOOD LANDFILL			
TOPOGRAPHICAL PLAN			
Sheet 1 of 2			
DECEMBER 2008	FIGURE 4	REV: A	



- Legend**
- ▲ Control Point
 - Test Pit
 - Hydrants
 - ⊗ Water Valves
 - Watermains
 - - - Fence
 - Gate
 - Metal
 - Pipe
 - Tree
 - - - Proposed Corridor
 - 1 m Index Contour
 - 0.25 m Contour
 - Cadastral Lot



Note:
 1. EM31 and topographic survey was completed by KGS Group Nov-8-13, 2008
 2. Airphoto/vector data provided by City of Winnipeg GIS database
 3. All units are metric and in metres unless otherwise specified
 Transverse Mercator Projection, NAD 1983, Zone 14
 Elevations are in metres above sea level (MSL)

KGS GROUP			
ELMWOOD LANDFILL			
TOPOGRAPHICAL PLAN			
Sheet 2 of 2			
DECEMBER 2008	FIGURE 4	REV: A	

APPENDICES

APPENDIX A
TEST PIT LOGS

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


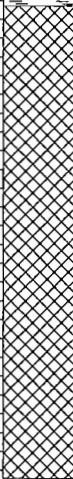
SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 45.7 m southwest of Thomas Avenue

UTMs (NAD83) N 5,529,165
E 637,203

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
			<u>ORGANIC MATERIAL</u>								
	0.5		<u>FILL</u> - Asphalt, concrete, clay, brown, slightly moist, firm, low plasticity.								
	1.0										
	1.5										
	2.0										
	2.5										
	3.0		END OF TEST PIT AT 2.74 m.								
	3.5		Note: 1. Water bubbles visible, water flowed in at high volumes at 2.13 m.								
	4.0										
	4.5										
	5.0										
	5.5										
	6.0										
	6.5										

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE **11/20/08**

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m southwest of TP-01

UTMs (NAD83) N 5,529,123
E 637,190

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		COVER - Loose coarse grained gravel and cobbles.						
	1.0		FILL - Concrete (reinforced with rebar), asphalt, silty sand clay, brown, slightly moist, low plasticity.						
	2.5		CLAY - Grey, slightly moist, high plasticity. - Small silt seam, grey. - Railway tie visible at 2.59 m.						
	3.66		END OF TEST PIT AT 3.66 m.						
	4.0		Note: 1. Small trickles of water visible at 2.44 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION Approximately 30.5 m southwest of TP-02

UTMs (NAD83) N 5,529,093
E 637,175

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			COVER - Loose coarse grained gravel and cobbles						
	0.5		FILL - Concrete (rebar visible), asphalt, sand and coarse grained gravel.						
	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.						
			END OF TEST PIT AT 4.57 m.						
	5.0		Note: 1. Small trickles of water visible at 4.57 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m south of TP-03

UTMs (NAD83) N 5,529,053
E 637,173

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0 - 0.5		<u>ORGANIC MATERIAL</u> <u>COVER</u> - Light brown						
	0.5 - 3.05		<u>FILL</u> - Concrete with rebar, coarse grained gravel, sandy clay, grey, moist.						
	3.05 - 3.5		END OF TEST PIT AT 3.05 m.						
	3.5 - 6.5		Note: 1. Water seeped into hole at high volumes at 2.44 m, no bubbles visible. 2. High volumes of concrete with rebar where uncovered.						

VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION Approximately 30.5 m east of TP-01

UTMs (NAD83) N 5,529,139
E 637,236

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		ORGANIC MATERIAL COVER						
	1.0		FILL - Coarse grained gravel, concrete rebar, clay, grey, slightly moist. - Railway tie uncovered at 1.22 m.						
	3.0		SANDY CLAY - Grey, moist, low plasticity. - Black organic matter, roots visible.						
	4.0		CLAY - Grey, moderately moist, high plasticity.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5		Note: 1. Water began to trickle into test pit at 4.88 m.						
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\200808-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m southwest of TP-05

UTMs (NAD83) N 5,529,113
E 637,223

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.0 - 0.5		COVER FILL - Clay, grey, dry, low plasticity, mixed with coarse grained gravel, concrete with rebar, railway tie, piece of hydro pole, and asphalt visible.								
	0.5 - 2.44										
	2.44 - 2.5		END OF TEST PIT AT 2.44 m.								
	2.5 - 6.5		Notes: 1. Water entering into test pit at high volumes at 2.44 m, no bubbles visible. 2. Obtained water sample.								

VAPOURS (FOR TP), NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GFJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-03

UTMs (NAD83) N 5,529,082
E 637,212

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0		COVER FILL - Concrete, cobbles mixed with clay, grey, slightly moist, low plasticity. Plant roots visible.						
	0.5								
	1.0								
	1.5								
	2.0								
	2.5		SILTY CLAY - Grey and brown, slightly moist, high plasticity, mixed with cobbles and concrete.						
	3.0		END OF TEST PIT AT 3.05 m.						
	3.5		Notes: 1. Water entering into test pit at high volumes at 3.05 m, no bubbles visible . 2. Obtained water sample.						
	4.0								
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-04

UTMs (NAD83) N 5,529,049
E 637,206

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST			
						Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG)			
						Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
	0.5		COVER FILL - Concrete with rebar, mixed with brown clay and coarse grained sand, moist, low plasticity.						
	1.0								
	1.5								
	2.0								
	2.5		- Clay, grey, moderately moist, intermediate plasticity, mixed with coarse grained sand at 2.44 m.						
	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								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-08

UTMs (NAD83) N 5,529,042
E 637,249

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.0		COVER FILL - Concrete and rebar mixed with clay, grey, moist, low plasticity, with coarse grained sand and gravel.								
	0.5										
	1.0										
	1.5										
	2.0										
	2.5										
	3.0										
	3.5		- Very moist, high plasticity, loose coarse grained gravel. Very strong garbage odour, no garbage visible at 3.05 m.								
	4.0										
	4.5										
	5.0		CLAY - Grey, very moist, high plasticity, with coarse grained gravel. - Silt seam, beige/brown, slightly moist, intermediate plasticity at 5.49 m.								
	5.5		END OF TEST PIT AT 5.49 m.								
	6.0		Note: 1. Water visible entering test pit at 1.5 m.								
	6.5										

VAPOURS (FOR TP) NO. GW ELEV. P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GP.J

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-09

UTMs (NAD83) N 5,529,033
E 637,291

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		FILL - Coarse grained gravel and cobbles.								
	1.0		SILTY CLAY - Grey, dry, low plasticity. - Black, low plasticity mixed with coarse grained sand between 0.91 m and 1.22 m								
	1.5		FILL - Concrete.								
	2.0		CLAY - 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.								
	4.0		- Encountered grasses and black organic soil, fibers visible at 3.96 m.								
	4.5		CLAY - 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										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-10

UTMs (NAD83) N 5,529,016
E 637,344

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			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								
	1.5		- Dark grey, moist, intermediate plasticity. - Concrete slabs visible at 1.22 m.						
	2.0								
	2.5								
	3.0		ORGANIC MATTER - Black, with fibers, deposits of decomposing wood.						
	3.5		SILT SEAM - Beige, moist, intermediate plasticity.						
	4.0		CLAY - Grey, slightly moist, high plasticity.						
	4.5								
	5.0								
	5.5		END OF TEST PIT AT 5.49 m.						
	6.0		Note: 1. Small amount of water visible at 3.66 m.						
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-11

UTMs (NAD83) N 5,529,004
E 637,391

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
			ORGANIC MATTER - With fibers.						
	0.5		SILTY CLAY - Brown, slightly moist, intermediately plasticity, trace of coarse grained sand.						
	1.0								
	1.5								
	2.0		SILT SEAM - Grey, dry, crumbles.						
	2.5		CLAY - Dark grey, slightly moist, high plasticity, trace of coarse grained sand. Concrete and rebar visible at 2.13 m.						
	3.0		- Silty clay seam, brown with grey pockets, crumbles. Tree branches and fibers visible at 3.05 m.	SS1	2.2				
	3.5								
	4.0		CLAY - Brown, slightly moist, intermediate plasticity.						
	4.5								
	5.0								
	5.5		END OF TEST PIT AT 15.19 m.						
	6.0		Notes: 1. Water trickling in at 3.66 m. 2. Soil sampled obtained at 3.1 m.						
	6.5								

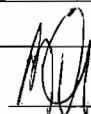
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SAMPLE TYPE  Grab from Bucket

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-12

UTMs (NAD83) N 5,528,985
E 637,453

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
			<u>ORGANIC MATERIAL</u>						
	0.5		<u>SILTY CLAY</u> - Beige, slightly moist, crumbles, with coarse grained gravel.						
	1.0		<u>CLAY</u> - Grey, very moist, wood visible.						
	1.5		- Water visible at 1.52 m.						
	2.0								
	2.5		<u>SILTY CLAY</u> - Dark grey, dry, low plasticity.	SS2	4:2				
	3.0		<u>CLAY</u> - Brown, slightly moist, high plasticity.						
	3.5								
	4.0								
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0		Notes: 1. Encountered water at 1.52 m. 2. Soil sampled obtained at 2.44 m.						
	5.5								
	6.0								
	6.5								

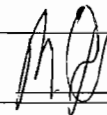
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SAMPLE TYPE  Grab from Bucket

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-13

UTMs (NAD83) N 5,528,960
E 637,509

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0		ORGANIC MATTER - Fibers visible.						
	0.5		SILTY CLAY - Beige, slightly moist, low plasticity.						
	1.0		CLAY - Grey, moist, high plasticity.						
	1.5								
	2.0								
	2.5		ORGANIC MATTER - Black, branches visible.						
	3.0		CLAY - Brown, slightly moist, high plasticity.						
	3.5								
	4.0								
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-01-07-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

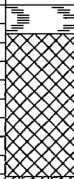
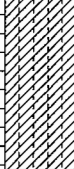


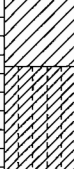
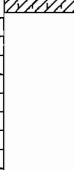
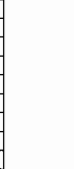
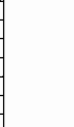
SITE Elmwood Landfill

DATE DRILLED 11/3/2008

LOCATION 30.5 m east of TP-14

UTMs (NAD83) N 5,528,951
E 637,557

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			<u>ORGANIC MATTER</u> - Roots visible.						
	0.5		<u>FILL</u> - Coarse grained gravel and large slabs of concrete.						
	1.0		<u>SILTY CLAY</u> - Grey, slightly moist, low plasticity. Encountered wood at 0.91 m.						
	1.5								
	2.0		<u>CLAY</u> - Dark grey, slightly moist, firm, low plasticity.						
	2.5		<u>CLAY</u> - Grey, slightly moist, firm, intermediate plasticity.						
	3.0								
	3.5								
	4.0		<u>SILTY CLAY</u> - Brown, moist, soft, low plasticity.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-07

UTMs (NAD83) N 5,529,069
E 637,269

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
					250	500	750	1000
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
					1000	2000	3000	4000
	0.5		<u>ORGANIC MATERIAL</u> - Fibers visible.					
	1.0		<u>CRUSHED CONCRETE FILL</u>					
	1.5		<u>SILTY CLAY</u> - Grey, slightly moist, firm, low plasticity, with fine grained gravel.					
	2.5		<u>CLAY</u> - Grey, moist, firm, low plasticity. Encountered wooden debris.	SS3	0.4			
	3.0							
	3.5							
	4.0		<u>SILTY CLAY</u> - Moist, firm, intermediate plasticity, coarse grained gravel, fill such as asphalt and crushed concrete visible.					
	4.5							
	5.0							
	5.5		<u>CLAY</u> - Grey, moist, slightly firm, high plasticity.					
	6.0							
	6.5		END OF TEST PIT AT 6.10 m.					
	6.5		Notes: 1. Soil sample obtained at 2.44 m.					

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE Grab from Bucket

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-16

UTMs (NAD83) N 5,529,054
E 637,309

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0		ORGANIC MATERIAL COVER						
	0.5		CRUSHED CONCRETE FILL						
	1.0								
	1.5								
	2.0		CLAY - Dark grey, very moist, with coarse grained gravel. SILTY CLAY - Grey, moist, soft, low plasticity.						
	2.5		CLAY - Dark grey, moist, low plasticity, with fine grained gravel and coarse grained sand.						
	3.0		- Mixed with coarse grained gravel and cobbles at 3.05 m.						
	3.5		- Brown below 3.35 m.						
	4.0								
	4.5		CLAY - Dark grey, moist, firm, intermediate plasticity, with coarse grained sand.						
	5.0								
	5.5		END OF TEST PIT AT 5.49 m.						
	6.0		Note: 1. Water entering into test pit at 1.83 m.						
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION 30.5 m east of TP-17
DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

JOB NO. 08-107-15
DATE DRILLED 11/4/2008
UTMs (NAD83) N 5,529,057
 E 637,344

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			ORGANIC COVER						
	0.5		SANDY CLAY - Brown, slightly moist, firm, low plasticity. Wooden debris uncovered.						
	1.0		CRUSHED CONCRETE AND ASPHALT FILL						
	1.5		CLAY - Dark grey, moist, firm, low plasticity, with coarse grained gravel.						
	2.0		SILTY CLAY - Beige, dry, firm, crumbles.						
	2.5		CLAY - Grey, moist, firm, intermediate plasticity.						
	3.0		LARGE SLABS OF CONCRETE AND REBAR FILL - Mixed with clay, grey, very moist, firm, high plasticity.						
	3.5								
	4.0								
	4.5								
	5.0								
	5.5		END OF TEST PIT AT 5.18 m.						
	6.0		Note: 1. Encountered water at 3.66 m.						
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPI

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-18

UTMs (NAD83) N 5,529,052
E 637,377

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
			<u>ORGANIC COVER</u>								
	0.5		<u>SILTY CLAY</u> - Dark grey, slightly moist, firm, low plasticity, with coarse grained gravel.								
	1.0		<u>FILL</u> - Concrete slabs and cobbles, mixed with clay, grey, slightly moist, firm, low plasticity.								
	1.5		<u>SILTY CLAY</u> - Dark grey, moist, firm, low plasticity, mixed with coarse grained gravel.								
	2.0										
	2.5		<u>SILTY CLAY</u> - Brown, firm, moist, high plasticity.								
	3.0										
	3.5		<u>LARGE SLABS OF CONCRETE AND REBAR FILL</u> - Mixed with silty clay, grey, very moist, firm, high plasticity.								
	4.0										
	4.5		<u>SILTY CLAY</u> - Light grey, moist, soft.								
	5.0		<u>SILTY CLAY</u> - Grey, slightly moist, firm, high plasticity.								
	5.5		END OF TEST PIT AT 5.49 m.								
	6.0		Note: 1. Encountered water at 1.52 m.								
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT










SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-19

UTMs (NAD83) N 5,529,028
E 637,416

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			ORGANIC COVER - Roots visible.						
	0.5		FILL - Concrete pieces mixed with coarse grained gravel mixed with silty clay, brown, slightly dry, firm, intermediate plasticity with coarse grained sand.						
	1.0								
	1.5								
	2.0								
	2.5								
	3.0		SILTY SAND - Grey, very moist, coarse grained sand, fine grained gravel mixed with concrete slabs/pieces.						
	3.5								
	4.0		SILTY CLAY - Grey, moist, firm, high plasticity.						
	4.5								
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5		Note: 1. Water entered into hole at 2.74 m.						
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-20

UTMs (NAD83) N 5,529,009
E 637,482

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			<u>ORGANIC COVER</u>						
	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								
	2.0		<u>SILTY CLAY</u> - Brown, moist, firm, intermediate plasticity, some medium grained sand.						
	2.5								
	3.0		- Dark grey, soft below 2.74 m.						
	3.5								
	4.0		<u>SILTY CLAY</u> - Light brown, moist, soft, high plasticity.						
	4.5								
			END OF TEST PIT AT 4.57 m.						
	5.0		Note: 1. Water entered into test pit at 4.27 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGNVIEW\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED _____ **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT










SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-21

UTMs (NAD83) N 5,528,991
E 637,518

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

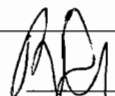
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST			
						Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG)			
						Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
			<u>ORGANIC COVER</u> - Roots visible.						
	0.5		<u>SILTY CLAY</u> - Dark grey, dry, firm, low plasticity, with coarse grained sand.						
	1.0		<u>SANDY SILTY CLAY</u> - Beige, dry, firm, low plasticity, with coarse grained gravel, trace concrete slabs/pieces.						
	1.5								
	2.0								
	2.5		<u>SILTY CLAY</u> - Grey, slightly moist, medium soft, high plasticity.						
	3.0								
	3.5								
	4.0								
	4.5								
			END OF TEST PIT AT 4.57 m.						
	5.0		Note: 1. Water seeping in at 2.13 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-22

UTMs (NAD83) N 5,528,978
E 637,573

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			ORGANIC COVER - Fibers/roots visible.						
	0.5		SILTY CLAY - Grey, slightly moist, firm, high plasticity.						
	1.0		- Light brown, soft below 0.91 m.						
	1.5		- Dark brown, with light brown silt pockets below 1.22 m.						
	2.0								
	2.5								
	3.0		ORGANIC MATTER - Black, moist, low plasticity, crumbly. Fibrous roots visible.						
	3.5		SILTY CLAY - Light brown, slightly moist, soft, high plasticity.						
	4.0								
	4.5		SILTY CLAY - Light brown, slightly moist, soft, low plasticity, crumbly.						
	5.0								
	5.5		SILTY CLAY - Brown, slightly moist, soft, high plasticity.						
	6.0		END OF TEST PIT AT 6.10 m.						
	6.5								


VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\OGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-15

UTMs (NAD83) N 5,528,937
E 637,612

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		ORGANIC MATTER - Roots visible.						
	1.0		FILL - Concrete pieces/slabs mixed with silty clay, light brown, moist, moderately firm, intermediate plasticity, with black organic matter pockets with visible fibrous roots.						
	1.5		SILTY CLAY - Brown, slightly moist, firm, high plasticity.						
	2.0		SILTY CLAY - Dark grey, slightly moist, firm, low plasticity, with coarse grained sand and fine grained gravel.						
	2.5		ORGANIC MATTER - Black, slightly moist, moderately firm, intermediate plasticity, crumbly. Fibrous roots visible.						
	3.0		SILTY CLAY - Grey, moist, soft, high plasticity.						
	4.0		- Light brown, slightly moist, firm below 3.96 m.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 m east of TP-24

UTMs (NAD83) N 5,528,914
E 637,664

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV


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					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			<u>ORGANIC MATTER</u> - Roots visible.						
	0.5		<u>FILL</u> - Coarse grained gravel, concrete slabs/pieces with silty clay, brown, slightly moist, moderately firm, high plasticity.						
	1.0								
	1.5		- Wooden debris visible at 1.52 m.						
	2.0		<u>ORGANIC MATTER</u> - Black, slightly moist, soft, low plasticity. Roots visible.						
	2.5		<u>SILTY CLAY</u> - Grey, slightly moist, firm, high plasticity.						
	3.0								
	3.5								
	4.0		- Brown below 3.66 m.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\EN\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPI

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 east of TP-25

UTMs (NAD83) N 5,528,900

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

E 637,721

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
			ORGANIC COVER - Fibers visible.								
	0.5		SILTY CLAY - Beige/tan, slightly moist, soft, intermediate plasticity.								
			FILL - Concrete with rebar, mixed with silty clay, grey, moist, firm, high plasticity.								
	1.0										
	1.5										
	2.0										
	2.5		ORGANIC MATTER - Black, slightly moist, soft, low plasticity. Roots visible.								
	3.0		SILTY CLAY - Grey, firm, moist high plasticity.								
	3.5										
	4.0		- Brown below 3.66 m.								
	4.5										
			END OF TEST PIT AT 4.57 m.								
	5.0		Note: 1. Water seeping into test pit at 2.13 m.								
	5.5										
	6.0										
	6.5										

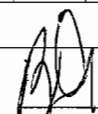
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 east of TP-26

UTMs (NAD83) N 5,528,877
E 637,783

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
					250	500	750	1000
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
					1000	2000	3000	4000
			<u>ORGANIC COVER</u> - Fibers visible.					
	0.5		<u>FILL</u> - Coarse grained gravel, pebbles and concrete.					
	1.0							
	1.5							
	2.0							
	2.5		<u>ORGANIC MATTER</u> - Black, slightly moist, soft, spongy, mosses and fibers visible.					
	3.0		<u>SILTY CLAY</u> - Grey, wet, firm, high plasticity.					
	3.5		- Rail ties uncovered at 3.66 m.					
	4.0		- Brown below 3.96 m.					
	4.5							
	5.0		END OF TEST PIT AT 4.88 m.					
	5.5		Note: 1. Soil sampled obtained at 3.66 m.					
	6.0							
	6.5							

SS4 ● 2.8

SAMPLE TYPE Grab from Bucket

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/4/2008

LOCATION 30.5 north of TP-26

UTMs (NAD83) N 5,528,928
E 637,733

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		ORGANIC MATTER - Fibers visible. - Black, moist, soft, high plasticity below 0.28 m.								
	0.5		FILL - Coarse grained gravel mixed with silty clay, light grey, firm, dry, low plasticity.								
	1.0		SILTY CLAY - Grey, slightly moist, firm, intermediate plasticity.								
	2.5		END OF TEST PIT AT 2.44 m.								
	3.0		Note: 1. Encountered water at 2.13 m.								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. SINCLAIR

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT






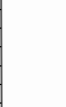
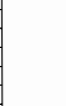
SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-16

UTMs (NAD83) N 5,529,113
E 637,270

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SAND AND GRAVEL FILL - Grey to brown, damp, compact, well graded, fine grained sand to coarse grained gravel, trace organics.						
	1.0								
	1.5								
	2.0		- Trace concrete below 1.83 m.						
	2.5		SILTY CLAY FILL - Grey to brown, damp, firm, high plasticity.						
	3.0		- Hard below 2.90 m.						
	3.5		CLAY - Grey, damp, firm, high plasticity.						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

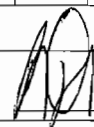
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\EN\WLOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

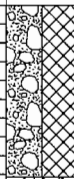
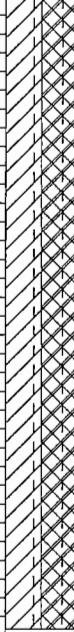
SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-17

UTMs (NAD83) N 5,529,093
E 637,328

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

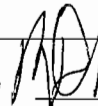
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained sand to coarse grained gravel. - Trace wood, PVC pipe at 0.61 m.						
	1.0		SILTY CLAY FILL - Grey to black, damp, soft, intermediate plasticity, trace organic matter. - Asphalt chunks, trace wood, trace concrete below 3.05 m.						
	4.27		END OF TEST PIT AT 4.27 m.						
	4.5		Note: 1. Water seeping into test pit at 0.61 m.						

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-19

UTMs (NAD83) N 5,529,089
E 637,377

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained sand to coarse grained gravel, organics.						
	1.0		SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete rebar, bricks below 0.61 m.						
	1.5								
	2.0								
	2.5								
	3.0								
	3.5								
	4.0		SILTY CLAY - Brown, damp, stiff, high plasticity.						
	4.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						
	4.88		SILTY CLAY - Brown, damp, stiff, high plasticity.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5		Note: 1. Water seeping into test pit at 1.83 m.						
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-20

UTMs (NAD83) N 5,529,077
E 637,419

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown to grey, damp, firm, high plasticity, trace brick, concrete.						
	1.0								
	1.5								
	2.0								
	2.5		- Some wood and other organics below 2.44 m.						
	3.0								
	3.5		SILTY CLAY - Brown, damp, stiff, friable, intermediate plasticity.						
	4.0								
	4.5		SILTY CLAY - Brown, damp, firm, high plasticity, silt inclusions, trace oxidation.						
	5.0			- Dark brown, stiff, massive below 4.88 m.					
	5.03		END OF TEST PIT AT 5.03 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT




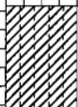
SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION

UTMs (NAD83) N 5,529,075
E 637,485

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST			
						Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG)			
						Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
	0.5		SILTY CLAY FILL - Brown to grey, damp, soft to firm, intermediate plasticity, trace brick, concrete, organics.						
	1.0								
	1.5		- Large chunk of concrete and rebar below 1.52 m.						
	2.0								
	2.5								
	3.0		- Wood below 2.74 m.						
	3.5		SILTY CLAY - Grey, damp, firm, high plasticity.						
	4.0		SILT - Grey, moist, soft, intermediate plasticity, oxidation.						
	4.5								
	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								
	6.5								

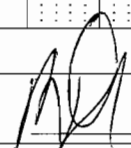
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SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-22

UTMs (NAD83) N 5,529,072
E 637,540

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			TOPSOIL						
	0.5		SILTY CLAY FILL - Brown, damp, firm, intermediate plasticity, wood bricks.						
	1.0								
	1.5								
	2.0								
	2.5								
	3.0		- Concrete at 2.74 m.						
	3.5								
	4.0		SILTY CLAY - Brown, damp, firm, high plasticity, trace silt inclusions, slight oxidation. - Stiff below 4.27 m.						
	4.5								
			END OF TEST PIT AT 4.57 m.						
	5.0		Note: 1. Water entering into test pit at 2.74 m.						
	5.5								
	6.0								
	6.5								

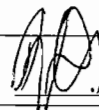
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SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT




SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-23

UTMs (NAD83) N 5,529,035
E 637,585

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
					250	500	750	1000		
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
					1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown to grey, damp, soft, intermediate plasticity, trace organics, concrete and rebar.							
	1.0									
	1.5									
	2.0									
	2.5									
	3.0									
	3.5		SILT - Brown, moist, soft, intermediate plasticity.							
	4.0									
	4.5		SILTY CLAY - Brown, damp, firm, high plasticity, trace silt inclusions.							
	5.0									
	5.5		END OF TEST PIT AT 4.57 m.							
	6.0		Note: 1. Water entering test pit at 0.61 m.							
	6.5									

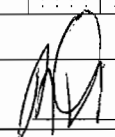
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SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

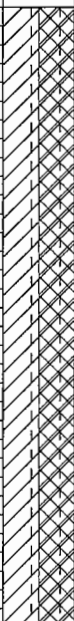
SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-24

UTMs (NAD83) N 5,529,014
E 637,639

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

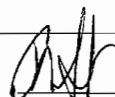
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
					250	500	750	1000		
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
					1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown to grey, damp, firm, intermediate plasticity, trace organics, concrete and rebar, brick.							
	1.0									
	1.5									
	2.0									
	2.5									
	3.0									
	3.5		- Wood at 3.20 m. SILTY CLAY - Brown, damp, stiff, blocky, intermediate plasticity.							
	4.0									
	4.5		SILTY CLAY - Brown, damp, firm, high plasticity, trace silt inclusions.							
	5.0		END OF TEST PIT AT 4.88 m.							
	5.5		Note: 1. Water entering test pit at 0.61 m.							
	6.0									
	6.5									

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

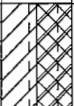

SITE Elmwood Landfill

DATE DRILLED 11/5/2008

LOCATION North of TP-25

UTMs (NAD83) N 5,528,991
E 637,696

DRILLING METHOD Rubber Tire Excavator Daewoo 180WV

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Black, damp, firm, intermediate plasticity, high organic content. - Brown below 0.30 m. - Grey below 0.61 m.						
	1.0								
	1.5								
	2.0								
	2.5								
	3.0		- Wood at 2.74 m.						
	3.5		SILTY CLAY - Dark brown, damp, stiff, high plasticity.						
	4.0								
	4.5								
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

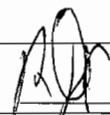
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SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN



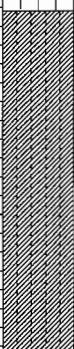
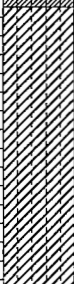
APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/5/2008
UTMs (NAD83) N 5,528,973
 E 637,745

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	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.						
	1.5		SILTY CLAY - Brown, damp, firm, intermediate plasticity, organics.						
	2.0								
	2.5								
	3.0								
	3.5		SILTY CLAY - Grey to black, damp, soft, high plasticity, high organic content.						
	4.0		- Dark brown, firm below 3.96 m.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

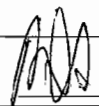
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-27

UTMs (NAD83) N 5,528,956
E 637,793

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, dry, firm, intermediate plasticity, trace organics.								
	1.0		- Grey below 1.22 m.								
	1.5										
	2.0										
	2.5		SILTY CLAY - Grey, damp, soft, low plasticity.								
	3.0										
	3.5		SILT - Brown, damp, soft, low plasticity.								
	4.0		SILTY CLAY - Grey, damp, firm, high plasticity.								
	4.27		END OF TEST PIT AT 4.27 m.								
	4.5										
	5.0										
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

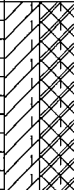

SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-27

UTMs (NAD83) N 5,528,912
E 637,780

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Grey, damp, soft, high plasticity.								
	1.0										
	1.5		- Brown, dry, firm, intermediate plasticity, concrete chunks below 1.22 m.								
	2.0										
	2.5		SILTY CLAY - Grey to black, moist, soft, high plasticity, very high organic content (old roots and bull rushes).								
	3.0										
	3.5										
	4.0		- Grey, damp, firm below 3.66 m.								
	4.5		END OF TEST PIT AT 4.27 m.								
	5.0										
	5.5										
	6.0										
	6.5										

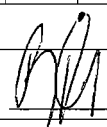
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\200808-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN





APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION North of TP-25
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/6/2008
UTMs (NAD83) N 5,528,953
 E 637,684

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organics. - Grey below 0.61 m.						
	1.0								
	1.5								
	2.0		SILTY CLAY - Grey to black, damp, soft, high plasticity, very high organic content.						
	2.5								
	3.0		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						
	3.5								
	4.0		SILTY CLAY - Dark brown, moist, soft, high plasticity, very high organic content. - Laminated silt layers below 3.96 m.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

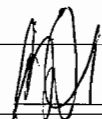
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-01\07-15\DESIGN\NEWLOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
S & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


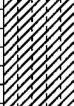
SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-24

UTMs (NAD83) N 5,528,961
E 637,622

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete chunks, brick.								
	1.0		- Grey below 1.22 m.								
	1.5										
	2.0										
	2.5		SILTY CLAY - Grey to black, damp, soft, high plasticity, very high organic content.								
	3.0		- Dark brown, firm below 3.05 m.								
	3.5										
	4.0		- Brown, stiff, massive, trace silt inclusions below 3.66 m.								
	4.5		END OF TEST PIT AT 4.27 m.								
	5.0		Note: 1. Water entering into test pit at 3.35 m.								
	5.5										
	6.0										
	6.5										

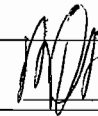
VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GP-J

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION Northeast of TP-29

UTMs (NAD83) N 5,529,152
E 637,294

DRILLING METHOD Excavator - Komatsu WB146

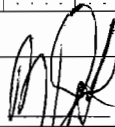
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete chunks, brick.						
	1.0		- Light brown below 0.61 m.						
	1.5		- Grey, soft, trace organic matter below 1.52 m.						
	2.0		- Grey to black, firm, very high organic content below 2.13 m.						
	2.5		SILTY CLAY - Grey, damp, soft, high plasticity.						
	3.0								
	3.5								
	4.0								
	4.5		- Brown below 4.27 m.						
	5.0		- Firm below 5.18 m.						
	5.5		END OF TEST PIT AT 5.49 m.						
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE _____

CONTRACTOR J & D PENNER

INSPECTOR A. OLEKSYN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

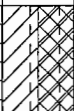
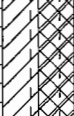



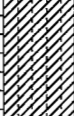
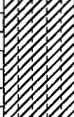


SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-30

UTMs (NAD83) N 5,529,140
E 637,345

DRILLING METHOD Excavator - Komatsu WB146

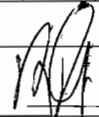
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
					250	500	750	1000		
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
					1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matter, trace brick. - Brown below 0.61 m.							
	1.0									
	1.5		SILTY CLAY - Grey, damp, firm, high plasticity.							
	2.0									
	2.5		- Black, soft, very high organic content below 2.44 m.							
	3.0		- Grey, moist below 3.05 m.							
	3.5									
	4.0		- Brown, damp, firm, trace silt inclusions, trace oxidation below 3.96 m.							
	4.5									
			END OF TEST PIT AT 4.57 m.							
	5.0									
	5.5									
	6.0									
	6.5									

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVLOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-31

UTMs (NAD83) N 5,529,120
E 637,391

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, brick, concrete.						
	1.0								
	1.5		SILTY CLAY - Dark grey to black, damp, soft, high plasticity, organic matter present.						
	2.0								
	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								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION Northeast of TP-32

UTMs (NAD83) N 5,529,108
E 637,446

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
	0.5		TOPSOIL -						
	1.0		SILTY CLAY - Brown, damp, firm, high plasticity, trace oxidation, trace organics, rebar.						
	1.5		- Concrete and bricks at 1.22 m.						
	2.0		- Dark brown below 1.52 m.						
	2.5		- Some coarse gravel at 1.83 m. Water trickling through gravel.						
	3.0		- Grey to black, soft, very high organic content below 3.05 m.						
	3.5		SILT - Brown, moist, soft, low plasticity.						
	4.0		SILTY CLAY - Brown, damp, stiff, high plasticity.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/6/2008

LOCATION North of TP-33

UTMs (NAD83) N 5,529,101
E 637,507

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0		TOPSOIL						
	0.5		SILTY CLAY - Light brown, damp, firm, high plasticity, trace organics.						
	1.0								
	1.5								
	2.0		- Grey, trace wood, wire, concrete, brick, trace coarse grained gravel below 1.83 m.						
	2.5								
	3.0								
	3.5		SILTY CLAY - Light brown, damp, firm, intermediate plasticity, trace oxidation.						
	4.0								
	4.5		SILTY CLAY - Dark brown, damp, stiff, high plasticity, trace silt inclusions.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPI

SAMPLE TYPE

CONTRACTOR
S & D PENNER



INSPECTOR
A. OLEKSYN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/7/2008
UTMs (NAD83) N 5,529,092
 E 637,560

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST			
					Photoionizable Vapours (ppm) ●			
					250	500	750	1000
					FIELD SOIL TEST (PETROFLAG)			
					Diesel Fuel (ppm) ○			
					1000	2000	3000	4000
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace brick, concrete and wire.					
	1.0							
	1.5		- Trace fine to coarse grained gravel below 1.22 m.					
	2.0		- Grey below 1.83 m.					
	2.5							
	3.0							
	3.5		SILTY CLAY - Black, moist, soft, high plasticity, very high organic content.					
	4.0		- Light brown, damp, firm, oxidized below 3.66 m.					
	4.5		- Brown below 4.27 m.					
	4.57		END OF TEST PIT AT 4.57 m.					
	5.0							
	5.5							
	6.0							
	6.5							

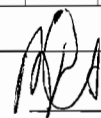
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SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/7/2008

LOCATION Northeast of TP-35

UTMs (NAD83) N 5,529,062
E 637,614

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, moist, firm, intermediate plasticity, concrete, rebar, some sand and gravel. Water trickled through sand and gravel.								
	1.0		- Light brown, damp, soft, high plasticity, trace organic matter below 0.61 m.								
	1.5		SILTY CLAY - Grey, damp, firm, high plasticity, trace organic matter.								
	2.0										
	2.5										
	3.0										
	3.5										
	4.0										
	4.5		- Black, moist, soft, very high organic content/peat below 4.27 m.								
	4.5		- Brown, damp, firm, oxidation below 4.57 m.								
	5.0		END OF TEST PIT AT 4.88 m.								
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER












INSPECTOR
A. OLEKSYN

APPROVED 

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION Northeast of TP-36
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/7/2008
UTMs (NAD83) N 5,529,043
 E 637,673

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
			SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete.						
	0.5		SAND AND GRAVEL FILL - Brown, damp, compact, well graded, fine grained sand to coarse grained gravel.						
			SILTY CLAY FILL - Grey, damp, firm, high plasticity, concrete, plastic.						
	1.0								
	1.5								
	2.0								
	2.5								
	3.0		- Grey to black, soft, very high organic content, reeds, peats below 2.74 m.						
	3.5		SILTY CLAY - Brown, damp, firm, high plasticity, oxidation.						
	4.0								
	4.5								
			END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

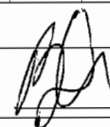
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

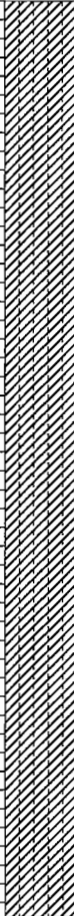
SITE Elmwood Landfill

DATE DRILLED 11/7/2008

LOCATION Northeast of TP-37

UTMs (NAD83) N 5,529,017
E 637,722

DRILLING METHOD Excavator - Komatsu WB146


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
			SILTY CLAY - Brown, damp, firm, high plasticity, concrete, organic matter.								
	0.5		- Light brown, trace organic matter, brick below 0.61 m.								
	1.0		- Grey, organic matter below 1.22 m.								
	1.5										
	2.0										
	2.5										
	3.0										
	3.5		- Black, moist, soft, very high organic content, reeds, peat, wood below 3.35 m.								
	4.0		- Light brown, damp, moist, oxidation below 3.66 m.								
	4.5		- Dark brown, stiff below 4.27 m.								
	5.0		END OF TEST PIT AT 4.88 m.								
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008). GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


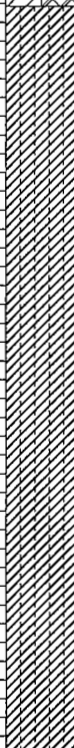
SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-01

UTMs (NAD83) N 5,529,210
E 637,219

DRILLING METHOD Excavator - Komatsu WB146

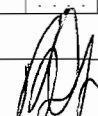
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						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, concrete/rebar, brick, wood, organic matter.								
	1.0		SILTY CLAY - Grey, damp, firm, high plasticity, organic matter.								
	1.5										
	2.0										
	2.5										
	3.0		- Grey to black, soft, very high organic content, reeds, roots, wood below 2.74 m.								
	3.5										
	4.0		- Brown, firm, oxidation below 3.66 m.								
	4.5										
	4.57		- Dark brown, stiff below 4.57 m.								
	5.0		END OF TEST PIT AT 4.88 m.								
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
A. OLEKSYN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


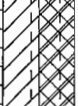
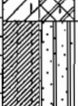
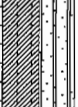
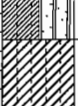
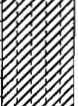
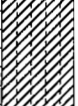
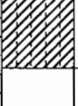
SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-05

UTMs (NAD83) N 5,529,205
E 637,258

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
					250	500	750	1000		
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
					1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace concrete/rebar, trace brick, trace organic matter. - Light brown, trace concrete below 0.61 m.							
	1.0									
	1.5		SILTY CLAY TO SILTY CLAY FILL - Grey to black, damp, firm, high plasticity, trace brick, concrete, tires.							
	2.0									
	2.5		SILTY CLAY - Grey to black, moist, soft, high plasticity, very high organic content.							
	3.0									
	3.5									
	4.0									
	4.27		END OF TEST PIT AT 4.27 m.							
	4.5									
	5.0									
	5.5									
	6.0									
	6.5									

VAPOURS (FOR TP) NO GWELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


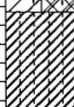
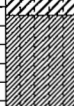
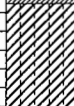
SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-43, east of TP-53

UTMs (NAD83) N 5,529,192
E 637,304

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST			
						Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG)			
						Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
	0.5		SILTY CLAY FILL - Brown, damp, soft, high plasticity, plastics, metal, trace organic matter, trace granular material, trace sand and gravel.						
	1.0		- Light brown, firm, trace concrete below 0.61 m.						
	1.5								
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity.						
	2.5								
	3.0		SILTY CLAY - Grey to black, damp, soft, intermediate plasticity, high organic content (grass and reeds).						
	3.5		SILTY CLAY - Light brown, damp, stiff, high plasticity.						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

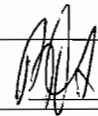
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-01\07-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


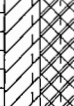
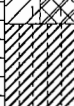
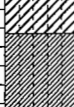
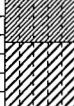

SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-44

UTMs (NAD83) N 5,529,178
E 637,353

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
					250	500	750	1000
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
					1000	2000	3000	4000
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, trace granular material (sand) - Light brown below 0.61 m.					
	1.0		SILTY CLAY - Grey to black, damp, firm, high plasticity.					
	1.5		SILTY CLAY - Grey to black, damp, soft, intermediate plasticity, high organic content.					
	2.0		SILTY CLAY - Grey, damp, stiff, high plasticity.					
	2.5		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
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-45

UTMs (NAD83) N 5,529,164
E 637,402

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matter, trace concrete. - Brown, saturated below 0.61 m.						
	1.0								
	1.5		SILTY CLAY - Grey to black, saturated, high plasticity, high organic content.						
	2.0								
	2.5		- Grey, damp, stiff, high plasticity below 2.13 m.						
	3.0		END OF TEST PIT AT 2.74 m.						
	3.5		Note: 1. Water began to fill test pit during excavation at 0.61 m.						
	4.0								
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

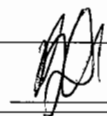
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-01\07-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-46

UTMs (NAD83) N 5,529,147
E 637,456

DRILLING METHOD Excavator - Komatsu WB146

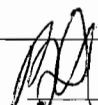
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, trace granular material (sand)								
	1.0		- Light brown, trace metal, concrete and rubber below 1.22 m.								
	1.5										
	2.0		SILTY CLAY - 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.								
	3.5										
	4.0		END OF TEST PIT AT 3.66 m.								
	4.5										
	5.0										
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  **DATE** 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT



SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-47, east of TP-57

UTMs (NAD83) N 5,529,140
E 637,506

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, trace concrete and metal.						
	1.0		- Light brown below 0.61 m.						
	1.5								
	2.0								
	2.5		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.						
	3.0		- Soft, high organic matters (wood and reeds) below 2.74 m.						
	3.5		- Brown, stiff, trace oxidation below 3.05 m.						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

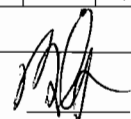
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT


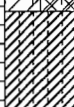
SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-48, east of TP-58

UTMs (NAD83) N 5,529,123
E 637,570

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Dark brown, damp, firm, high plasticity, trace organic matter.								
	1.0		- Light brown, trace concrete below 0.61 m.								
	1.5										
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.								
	2.5										
	3.0		- High organic matters (wood and reeds) below 3.05 m.								
	3.5		- Stiff, trace oxidation below 3.35 m.								
	4.0		END OF TEST PIT AT 3.66 m.								
	4.5										
	5.0										
	5.5										
	6.0										
	6.5										

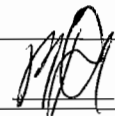
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-01\07-15\DESIGN\EN\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT




SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-49, east of TP-59

UTMs (NAD83) N 5,529,111
E 637,629

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Dark brown, damp, firm, high plasticity, trace organic matter.						
	1.0		- Light brown, trace concrete below 0.91 m.						
	1.5								
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.						
	2.5		- Soft, high organic content below 2.44 m.						
	3.0								
	3.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						
	4.0		SILTY CLAY - Grey, damp, stiff, high plasticity.						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

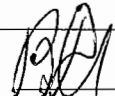
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

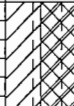
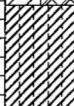
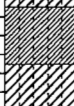
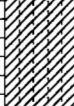
SITE Elmwood Landfill

DATE DRILLED 11/10/2008

LOCATION North of TP-50, east of TP-60

UTMs (NAD83) N 5,529,085
E 637,682

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter.								
	1.0		- Light brown, trace concrete below 0.61 m.								
	1.5		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete.								
	2.0										
	2.5										
	3.0		SILTY CLAY - Grey to black, damp, soft, intermediate plasticity, high organic content.								
	3.5		SILTY CLAY - Grey, damp, stiff, high plasticity.								
	4.0										
	4.5		END OF TEST PIT AT 4.27 m.								
	5.0										
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENVI\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION Northeast of TP-51

UTMs (NAD83) N 5,529,045
E 637,758

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, trace concrete.						
	1.0								
	1.5		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete, timber.						
	2.0								
	2.5								
	3.0		- Black, soft, trace timber, odour below 3.05 m.						
	3.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity.						
	4.0								
	4.5		SILTY CLAY - Brown, damp, stiff, high plasticity, trace oxidation.						
	4.57		END OF TEST PIT AT 4.57 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER


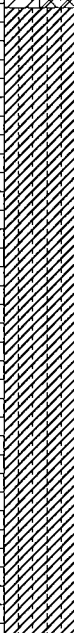
INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION North of TP-39
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/12/2008
UTMs (NAD83) N 5,529,017
 E 637,802

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter, trace concrete.						
	1.0								
	1.5		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace concrete, trace organic.						
	2.0								
	2.5								
	3.0								
	3.5		- Black, high organic content below 3.05 m. - Light brown below 3.35 m.						
	4.0								
	4.5		- Stiff below 4.27 m.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

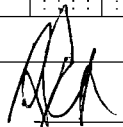
VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

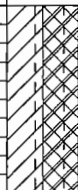

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West landfill area, west of TP-03

UTMs (NAD83) N 5,529,119
E 637,131

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY CLAY FILL - Wet, firm, intermediate plasticity, trace granular.								
	1.0		- Concrete blocks and rebar, hole filling with water at 0.91 m.								
	1.22		END OF TEST PIT AT 1.22 m.								
	1.5										
	2.0										
	2.5										
	3.0										
	3.5										
	4.0										
	4.5										
	5.0										
	5.5										
	6.0										
	6.5										

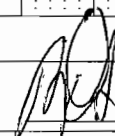
VAPOURS (FOR TP) NO. GW ELEV. P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West of TP-64

UTMs (NAD83) N 5,529,125
E 637,088

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand with silt and trace gravel.						
	1.0		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace organic matter.						
	1.5		- Light brown below 1.52 m.						
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity.						
	2.5								
	3.0								
	3.5		- Grey, some concrete below 3.35 m.						
	4.0								
	4.27		END OF TEST PIT AT 4.27 m.						
	4.5		Note: 1. Could not dig deeper than 4.27 m due to concrete.						
	5.0								
	5.5								
	6.0								
	6.5								

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West of TP-65

UTMs (NAD83) N 5,529,136
E 637,037

DRILLING METHOD Excavator - Komatsu WB146

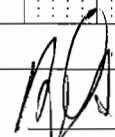
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY SAND F FILL - Brown, damp, compact, medium grained sand and silt, trace gravel, trace organic.								
	1.0		SILTY CLAY FILL - Light grey, damp, firm, high plasticity, trace organic matter, trace concrete.								
	1.5										
	2.0		SILTY CLAY - Grey, damp, firm, high plasticity, trace concrete, trace coarse grained gravel.								
	2.5										
	3.0										
	3.5		- Grey to black, wet, soft below 3.35 m.								
	4.0										
	4.5		- Damp, firm below 4.27 m.								
	5.0										
	5.18		END OF TEST PIT AT 5.18 m.								
	5.5										
	6.0										
	6.5										

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West of TP-66

UTMs (NAD83) N 5,529,155
E 636,982

DRILLING METHOD Excavator - Komatsu WB146


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.0		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, trace gravel, trace organic matter.						
	0.5		SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace granular (sand).						
	1.0								
	1.5		SILTY CLAY - Brown, damp, firm, high plasticity, trace concrete.						
	2.0								
	2.5								
	3.0								
	3.5		- Black, soft, high organic content, odour below 3.35 m.						
	4.0								
	4.5		- Grey, stiff below 4.27 m.						
	5.0								
	5.18		END OF TEST PIT AT 5.18 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO. GW/ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West of TP-67

UTMs (NAD83) N 5,529,173
E 636,927

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND - Brown, damp, compact, medium grained sand and silt, trace gravel, trace organic matter.						
	1.0		SILTY CLAY FILL - Grey, damp, firm, high plasticity, trace concrete, trace organic matter.						
	1.5								
	2.0		SILTY CLAY - Grey to black, firm, high plasticity.						
	2.5								
	3.0		- Black, soft, high organic content (wood) below 3.05 m.						
	3.5		SILTY CLAY - Light brown, damp, soft, intermediate plasticity, some silt.						
	4.0		SILTY CLAY - Grey, damp, stiff, high plasticity.						
	4.5		END OF TEST PIT AT 4.57 m.						
	5.0		Note: 1. Water seeped into test pit at 2.44 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION Northwest corner of fenced area, North of TP-68

UTMs (NAD83) N 5,529,302
E 636,942

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●					
						250	500	750	1000		
						FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○					
						1000	2000	3000	4000		
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, trace organic matter.								
	1.0		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter.								
	1.5										
	2.0										
	2.5		SILTY CLAY - Light brown, damp, firm, high plasticity.								
	3.0		SILTY CLAY - Grey to black, wet, firm, intermediate plasticity, high organic content.								
	3.5		- Black, soft, trace metal waste below 3.66 m.								
	4.0										
	4.5		SILTY CLAY - Grey, damp, stiff, high plasticity.								
	5.0										
	5.5		END OF TEST PIT AT 5.18 m.								
	6.0		Note: 1. Water entering test pit at 3.05 m. Water sample taken.								
	6.5										

VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/12/2008

LOCATION West of TP-69

UTMs (NAD83) N 5,529,290
E 636,986

DRILLING METHOD Excavator - Komatsu WB146


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND - Brown, damp, compact, trace organic matter.						
	1.0		SILTY CLAY - Brown, damp, stiff, high plasticity, trace organic matter, trace concrete, trace metal.						
	1.5								
	2.0		- Grey to black, firm below 1.83 m.						
	2.5								
	3.0								
	3.5		- Grey, stiff below 3.35.						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5		Note: 1. Water seeped into test pit at 3.05 m.						
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

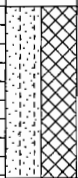
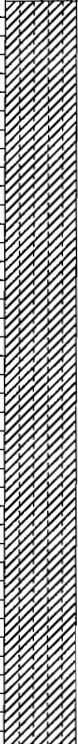
SITE Elmwood Landfill

DATE DRILLED 11/13/2008

LOCATION East of TP-70

UTMs (NAD83) N 5,529,275
E 637,027

DRILLING METHOD Excavator - Komatsu WB146

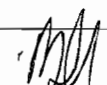
ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, trace organic matter, trace concrete/rebar.						
	1.0		SILTY CLAY - Light brown, damp, firm, high plasticity, trace bricks, trace concrete, trace metal. - Grey to black below 1.52 m.						
	4.0		- Black, soft, high organic content below 3.96 m. - Grey, stiff below 4.27 m.						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED



DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/13/2008

LOCATION East of TP-71

UTMs (NAD83) N 5,529,250
E 637,081

DRILLING METHOD Excavator - Komatsu WB146


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST			
						Photoionizable Vapours (ppm) ●			
						250	500	750	1000
						FIELD SOIL TEST (PETROFLAG)			
						Diesel Fuel (ppm) ○			
						1000	2000	3000	4000
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand and silt, trace organic matter, trace concrete/rebar.						
	1.0		SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace organic matter, trace concrete.						
	1.5								
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity.						
	2.5								
	3.0								
	3.5								
	4.0		- Black, moist, soft, high organic content, with garbage below 3.96 m.						
	4.5								
	5.0		- Brown, damp, stiff below 4.88 m.						
	5.5		END OF TEST PIT AT 5.18 m.						
	6.0								
	6.5								

VAPOURS (FOR TP) NO GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE **11/20/08**

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION East of TP-72
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/13/2008
UTMs (NAD83) N 5,529,234
 E 637,147

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, medium grained sand with silt, trace organic matter, trace concrete.						
	1.0		SILTY CLAY FILL - Light brown, damp, firm, high plasticity, trace organic matter, trace concrete.						
	1.5								
	2.0		SILTY CLAY - Grey, moist, firm, high plasticity.						
	2.5								
	3.0								
	3.5		SILTY CLAY - Black, damp, soft, intermediate plasticity, high organic matter. SILTY CLAY - Brown, damp, stiff, high plasticity.						
	3.66		END OF TEST PIT AT 3.66 m.						
	4.0		Note: 1. Water seeped through at 3.35 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO. GW ELEV. P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/13/2008

LOCATION South of TP-73

UTMs (NAD83) N 5,529,175
E 637,141

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SAND AND GRAVEL FILL - Damp, compact, medium grained sand and silt.						
	1.0		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace granular (sand and gravel), trace concrete.						
	1.5		SILTY CLAY - Grey, saturated, soft, high plasticity, trace garbage, trace concrete.						
	2.0		SILTY CLAY - Grey, saturated, soft, high plasticity, trace garbage, trace concrete.						
	2.5		SILTY CLAY - Grey, saturated, soft, high plasticity, trace garbage, trace concrete.						
	3.0		SILTY CLAY - Grey, saturated, soft, high plasticity, trace garbage, trace concrete.						
	3.5		CONCRETE						
	4.0		END OF TEST PIT AT 3.96 m.						
	4.5								
	5.0								
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION West of TP-74
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/13/2008
UTMs (NAD83) N 5,529,192
 E 637,066


ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, trace timber.						
	1.0		SILTY CLAY FILL - Brown, damp, firm, high plasticity, trace organic matter.						
	1.5								
	2.0		SILTY CLAY - Grey to black, damp, firm, high plasticity, trace garbage (clothing, metal, bricks, etc.).						
	2.5								
	3.0								
	3.5								
	4.0		SILTY CLAY - Black, damp, soft, intermediate plasticity, high organic content (wood and reeds). - Light brown below 4.27 m.						
	4.5		SILTY CLAY - Brown, damp, stiff, high plasticity, trace oxidation						
	5.0		END OF TEST PIT AT 4.88 m.						
	5.5								
	6.0								
	6.5								

VAPOURS (FOR TP) NO. GW ELEV P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED  DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT

JOB NO. 08-107-15

PROJECT

SITE Elmwood Landfill

DATE DRILLED 11/13/2008

LOCATION West of TP-75

UTMs (NAD83) N 5,529,199
E 637,010

DRILLING METHOD Excavator - Komatsu WB146

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				
					250	500	750	1000	
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○				
					1000	2000	3000	4000	
	0.5		SILTY SAND FILL - Brown, damp, compact, trace organic matter.						
	1.0		SILTY CLAY - Light brown, damp, firm, high plasticity, trace garbage (clothing, metal etc.).						
	1.5		- Grey to black, trace organic matter below 1.83 m.						
	2.0		- Black seam below 2.44 m.						
	2.5								
	3.0								
	3.5		CONCRETE						
	4.0		SILTY CLAY - Black, damp, soft, intermediate plasticity, high organic content.						
	4.5		SILTY CLAY - Grey, damp, stiff, high plasticity.						
	4.5		END OF TEST PIT AT 4.27 m.						
	5.0		Note: 1. Water seeped into test pit at 3.66 m.						
	5.5								
	6.0								
	6.5								

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE 11/20/08

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT
SITE Elmwood Landfill
LOCATION West of TP-76
DRILLING METHOD Excavator - Komatsu WB146

JOB NO. 08-107-15
DATE DRILLED 11/13/2008
UTMs (NAD83) N 5,529,219
 E 636,957

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●			
					250	500	750	1000
					FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
					1000	2000	3000	4000
	0.0 - 0.5		SILTY SAND FILL - Brown, damp, compact, trace organic matter.					
	0.5 - 3.35		SILTY CLAY - Brown, damp, firm, high plasticity, trace organic matter. - Grey, trace garbage (cloth), trace concrete below 1.52 m.					
	3.35 - 3.5		SILTY CLAY - Black, damp, soft, intermediate plasticity, high organic content. SILTY CLAY - Grey, damp, stiff, high plasticity.					
	3.5 - 3.66		END OF TEST PIT AT 3.66 m.					
	3.66 - 6.5		Note: 1. Water seeped into test pit at 3.35 m.					

VAPOURS (FOR TP) NO. GW ELEV. P:\PROJECTS\2008\08-0107-15\DESIGN\ENV\LOGS\ELMWOOD LANDFILL (NOV 3 TO NOV 13, 2008).GPJ

SAMPLE TYPE

CONTRACTOR
J & D PENNER

INSPECTOR
K. THIESSEN

APPROVED

DATE **11/20/08**

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 m²) with up to 50,000 sq. ft. (4,650 m²) 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 debris 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 style="list-style-type: none"> • Floor susceptible to settlement. Settlement could be minimized by preloading • Potential problems with augering and / or driving piles through the fill • A portion of the contaminate fill remains in place • Lowest relative cost. The estimate cost for building site preparation, piling and floor slab is \$320/m². The estimated cost for a typical site which would require only 300 mm of excavation and fill is \$210/m².
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 style="list-style-type: none"> • Stable floor • Potential problems with pile installation • Contaminated fill remains in place • Higher cost relative to option 1). The estimated cost is \$490/m². The estimated cost for this options on a typical site is \$430/m².
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 style="list-style-type: none"> • Stable floor • Potential problems with pile installation • Portion of contaminated fill left in place but a better ventilation system than option 1) or 2) • Higher cost than options 1) or 2). The estimated cost is \$500/m². The estimated cost for a typical site is \$465.00

SITE PREPARATION	STRUCTURAL OPTION	COMMENTS
4) Remove all the fill and backfill with compacted limestone and granular fill.	Concrete slab on grade; cast-in-place concrete piles	<ul style="list-style-type: none"> Minimal slab settlement if fill adequately compacted All contaminants removed, no membrane or ventilation system required Piles must be installed prior to placing limestone fill which will make it difficult to achieve adequate compaction. Similar cost to option 1, with membrane and vent pipes excluded. Estimated cost is \$350/m².
5) Remove all fill and replace with clay fill	Concrete structural slab on void form; cast-in-place concrete piles	<ul style="list-style-type: none"> Stable floor All contaminants removed, no membrane or ventilation required Piles easiest to install; negative skin friction must be accounted for. Similar cost to option 2 and 3 without membrane & ventilation cost. Estimated cost is \$510/m².

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/m². Assuming 1200 mm average excavation and backfill for the landfill site, the unit cost will be \$95 to \$105/m².

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 m³ 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.

